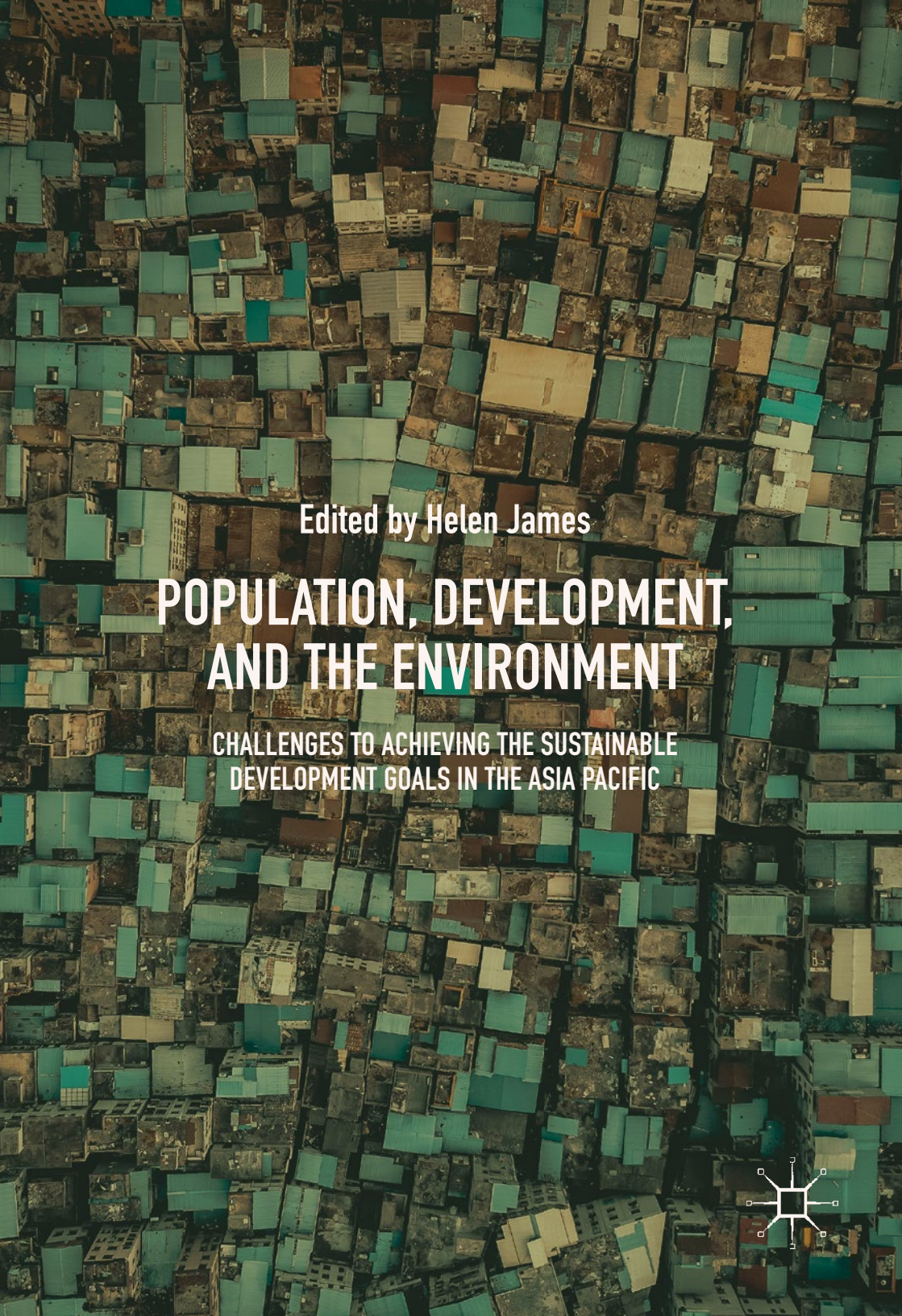

Edited by Helen James

POPULATION, DEVELOPMENT, AND THE ENVIRONMENT

CHALLENGES TO ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS IN THE ASIA PACIFIC

Population, Development, and the Environment

Helen James
Editor

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Challenges to Achieving the Sustainable Development Goals in the Asia Pacific

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Preface

This book *Population, Development and the Environment: Challenges to Implementing the Sustainable Development Goals in the Asia Pacific* had its origins in a joint conference between the Australian National University (ANU) and the University of Yangon, 2–3 February 2017. It was held in the Arts Assembly Hall at the University of Yangon and represents a significant collaborative research engagement between the authors of all the chapters in the book. Many of the authors are researchers from the University of Yangon who participated in the research training program funded by the Department of Foreign Affairs and Trade, Canberra, Australia, 2014–2016, for academics from the University of Yangon to assist in enhancing their research outputs. They came to the ANU in four cohorts, 56 researchers, to study an intensive program of Social and Demographic Research Methods training which they then applied to significant socio-economic development issues in transitional Myanmar.

Other authors came from around the world—from Japan, New Zealand, Indonesia, Thailand, Vietnam, The Netherlands, and, of course, Australia—to join with University of Yangon researchers in presenting firstly the conference, then producing the book. A notable characteristic of this endeavor has been the goodwill and collegiality which has underpinned this venture.

Based on empirical research across various countries in the Asia Pacific, the book highlights the interlinkages between disasters, the sustainable development goals (SDGs), poverty alleviation, and climate change impacts, in both urban and rural contexts. Most of all, it brings to the fore the enduring commonalities in human societies in seeking to overcome

environmental and resource challenges impinging on human well-being. From floods, landslides, and earthquakes to poverty alleviation, migration, mining, water, food security, and agricultural dilemmas in coping with salinity as a result of rising sea levels, the quality of life on earth, as Professor Maung Maung Aye has so clearly articulated, is very much conditioned by how we interact with, preserve, and respect the environment for the future.

I wish to express my deep appreciation to all the authors, who gave their time to making this project a reality, and to the sponsors, the Crawford Fund, the Australian National University, and the University of Yangon. Many of the international speakers whose chapters are included here funded their participation themselves as funds were tight; to them I owe a debt of gratitude for their generosity in being prepared to invest their time and resources in this collaborative endeavor.

Canberra, ACT, Australia — Helen James
16 April 2018

Prologue 1

Opening Address Delivered by Dr. Nay Win Oo, Deputy Director General of the Department of Higher Education at the International Conference on *Regional Perspectives on Population, Development and the Environment*, Arts Hall, University of Yangon, 2 February 2017

H.E. Dr. Myo Myint, Chairman of the National Education Policy Commission

Mr. Nicholas Cumpston, Minister Counselor and Economic Development Advisor at the Australian Embassy

Professor Helen James, Lead Project Coordinator, Social and Demographic Research Methods, Government partnerships for Development, Australian National University

Keynote Speaker, Professor Maung Maung Aye, Vice-President of Environmental and Economic Research Institute

Keynote Speaker, Professor Robert Cribb, Professor of Asian History and Politics, College of Asia and Pacific, Australian National University

Rectors, Pro-Rectors, Professors

Distinguished Guests

Esteemed participants

Ladies and Gentlemen

and all those who are present at this occasion, I would like to wish you a very Good Morning.

It is a pleasure for me to deliver the opening remarks at this International Conference on *Regional Perspectives on Population, Development and the Environment* organized by the Australian National University, The

Crawford Fund for a Food Secure World, the University of Yangon and all the personnel concerned.

Ladies and Gentlemen,

This conference has been held for the faculty of the University of Yangon who studied social and demographic research methods at the Australian National University at Canberra, Australia. They did research in different research areas in Myanmar and are going to present their research results.

I have great expectations that this conference will lead us to a systematic implementation of social and demographic research projects in the fields of social sciences and humanities.

Ladies and Gentlemen,

I am sure that this conference will not only help us polish our mastery of social and demographic research methods but also, most importantly, contribute to developing specific original and feasible research ideas and projects that we will pursue in our professional future as well as in planning for social, economic, educational, healthcare and environmental development for our country.

I would like to extend a hearty welcome to those attending this conference as it coincides with the strenuous efforts being made by Myanmar to raise the standard of education to international level.

I am certain that this conference will make significant contributions to our efforts to make the education sector more responsive to the needs of our citizens, further strengthen the education sector and help raise the standard of higher education.

I would also like to request Myanmar faculty members to participate actively in the conference to make effective use of what they have learnt and to share the knowledge gained from this conference with colleagues.

Ladies and gentlemen

I would like to conclude my opening remarks by expressing my sincere thanks to H.E. Dr. Myo Myint, Mr. Nicholas Cumpston, Professor Helen James, ANU personnel, and all the international as well as local speakers for the special efforts that they have made to present at this conference, without which this event will not be a success, and to all the attendees for sharing their specialist knowledge and extensive experience.

I would also like to express my sincere appreciation to the Keynote speakers who will be leading this conference. I am confident that we will be able to learn a great deal from the discussions, enhance our capacity as well as promote the standard of our Higher Education institutions.

Thank you.

Prologue 2

Mr. Nicholas Cumpston

Counselor and Economic Development Advisor,
Australian Embassy, Yangon

Yangon University

2 February 2017

Your Excellencies,

Professor Dr. Myo Myint, Director General Department of Higher Education, Ministry of Education, Myanmar

Professor Dr. Nay Win Oo, Deputy Director General and Joint Secretary National Education Policy Commission

Professor Dr. Maung Maung Aye, President Geographical Association of Myanmar

International and Domestic Speakers, Colleagues and Guests.

It is a great pleasure to speak today on behalf of the Australian Embassy Yangon and the Australian Government at this conference. This is a very heavy schedule where people seem to cover a range of important topics. Thinking about all the different issues and parts of what is going to be discussed in the next two days reminds me very much that these are the same issues that come up over and over again in the work that the Australian Embassy is involved with throughout the country to support

the people of Myanmar. More broadly, the issues relate closely to those that we often hear the State Counselor, Daw Aung San Suu Kyi, speak to the international community and her colleagues within the government about: what are the challenges facing Myanmar at the moment? Those challenges are substantial. I don't need to tell people here about the history that has led to this point in terms of, for instance, the areas of water dam projects for hydropower that has often been extremely controversial, often been unpopular with local communities, but at the same time the demand for electricity in Myanmar is doubling every six years. Only 30% of the population has access to the national electricity grids and other forms of electricity generation such as coal. It is also controversial. They are no easy answers to these questions. And part of the value of conferences like this is to learn from experiences of others, and we can see this from within these countries that have faced many of the same challenges, made choices regarding possible solutions. Choices often come with benefits, but we are speaking as representatives of the Australian government and we can't make these choices for the government and the people of Myanmar. However, we can help share experiences and help in the collection of information so that informed choices can be made. But ultimately they are the choices that the people and government in Myanmar make for themselves. What we can do through events such as this is to help make those choices better informed, to learn from both mistakes but also successes that hopefully can be shared. The challenges go well beyond the water sectors as well. We are all just coming here today to see the challenges of Yangon, a rapidly expanding city very much at the heart of growing the economy of the nation. This economic growth is put in peril potentially, if solutions are not found to transport infrastructure, and in helping to manage the challenges of urban migration. There has been an increasing urban population. What happens to the rural areas where people come from? There are villages where there are almost no men as a result of outward migration to other countries overseas, or cities, leaving behind families and farms. What happens to those communities? These are not easy questions for which to find answers.

Challenges and opportunities are presented by Myanmar's unique mining resources. Again the areas where the mining projects exist in the country have been controversial, to say the very least. Those resources are also potentially great opportunities which may transform the lives of millions of people. So again communities need help and hopefully this is a useful

way for us to help. This is the question that Myanmar needs to consider for itself.

I also had the privilege of attending an event last week on the government nutrition initiative, very ambitious, a new initiative to reduce the level of childhood stunting across Myanmar which remains high, around 30% of all children. But the question here is increasing agricultural productivity, different processes for the use of land, and who owns the land. To achieve this inspiring vision, we need to know more. The State Counselor said: "We need the data; we cannot take action without accurate data." Sitting in the comfort of Yangon, these questions can sometimes seem far away. We go through the next few days thinking about how these lessons are learned, how the successes and failures of others can provide information for the future, can provide the information that helps realize this vision of a peaceful, prosperous, stable and democratic Myanmar which I think we all share. Thank you.

Contents

Notes on Contributors

Mucahid Mustafa Bayrak is a faculty member of the Department of Geography, College of Liberal Arts, National Taiwan Normal University, Taiwan. He teaches various courses on sustainability policy and development cooperation to both undergraduate and graduate students. Bayrak's research concentrates on changing forms of resource management and policy, including the impact of REDD+ on local communities, and urban climate resilience of secondary cities in East and Southeast Asia. His articles have appeared in *Geoforum*, *Sustainability*, *Journal of Political Ecology*, and *Land* and book chapters in *Shifting Cultivation and Environmental Change: Indigenous People, Agriculture and Forest Conservation* (2015) and *Shifting Cultivation Policies: Balancing Environmental and Social Sustainability* (2017). Before starting his position, he was at Utrecht University. Bayrak has also been affiliated with the Chinese University of Hong Kong (where he received his PhD in 2015), Harbin Institute of Technology, University of Economics Prague, VU University Amsterdam, Hue University, University of Sydney, and National Taiwan Normal University.

Robert Cribb is Professor of Asian History and Politics in the Coral Bell School, College of Asia Pacific, Australian National University (ANU). He holds a PhD from the School of Oriental and African Studies, University of London, and has taught at Griffith University, Leiden University, and the University of Queensland. From 1997 to 1999, he was Director of the Nordic Institute of Asian Studies in Copenhagen. He is a fellow of the Australian Academy of the Humanities. He has served twice as a president of the Asian Studies Association of Australia, twice as a head of ANU's

Department of Pacific and Asian History and once as a deputy president of the ANU Academic Board. He has been the recipient of seven Australian Research Council Discovery grants. He has been a visiting fellow at the Koninklijk Instituut voor Taal-, Land- en Volkenkunde (Leiden) and at the University of Heidelberg and is a member of the International Advisory Board of the Ateneo de Manila Centre for Asian Studies. His research deals mainly with Indonesia and focuses on national identity, mass violence, historical geography, and environmental politics. He also has research interests in Myanmar, Malaysia, and Northeast Asia. Among his many publications, he is the author of *Historical Atlas of Northeast Asia* (with Li Narangoa, 2014), *Wild Man from Borneo: A Cultural History of the Orangutan* (with Helen Gilbert and Helen Tiffin, 2014), and *Japanese War Criminals: The Politics of Justice After the Second World War* (with co-authors Sandra Wilson, Beatrice Trefalt, and Dean Aszkielowicz, 2017). He has also edited the 1990 volume on *The Indonesian Killings: Studies from Java and Bali*. He teaches Southeast Asian history and historical methodology.

Nicholas Cumpston is a diplomat with the Department of Foreign Affairs and Trade in Canberra and at the time of the conference was Counselor at the Australian Embassy in Yangon.

Lindsay Falvey was Chair of Agriculture and Dean of what is now the Faculty of Veterinary and Agricultural Sciences at the University of Melbourne where he continues in an honorary professorial capacity. A life member and past fellow of Clare Hall at the University of Cambridge, he has acted as the head of the Melbourne Institute of Asian Languages and Societies at the University of Melbourne; he is a member of the National Thai Studies Centre of the ANU and has conducted tens of assignments for government and development agencies across Asia. He has been conferred with five degrees relating to agriculture including a PhD from the University of Queensland, a higher doctorate DAgrSc from the University of Melbourne and an honorary doctorate from Thaksin University in Thailand in recognition of his agricultural research in Asia. A Fellow of the Australian Academy of Technological Science, and of the Institute of Agricultural Science and Technology, he is also a recipient of the Centenary Medal of Australia. His publications include 150 papers and 20 books, including *Thai Agriculture* (การเกษตรไทย), *Understanding Southeast Asia: Syncretism in Commonalities*, *Beliefs That Bias Food & Agriculture*, *Small Farmers Secure Food*, *Religion and Agriculture*, and *Introduction to*

Working Animals (Sú Dung Dông Vât Làm Viêc). He is Chair of the Board of the International Livestock Research Institute among other roles.

Helen James is Director of the IRDR ICoE for Integrated Research on Disaster Risk Science at ANU. She is a specialist on Southeast Asia with the Department of Anthropology, School of Culture, History and Language, College of Asia Pacific, ANU. She holds a PhD and an MA from the University of Pittsburgh, and a BA (Oriental Studies) from the ANU. She was the lead Chief Investigator for the ARC funded project, "Demographic Consequences of Asian Disasters: Family Dynamics, Social Capital and Migration Patterns" (DP120100606). She researches and lectures in the Environment Management program, Crawford School, ANU, on Disaster Risk Reduction and Management and Population, Climate Change and Sustainable Development for the Master of Social Research (2010–2013). Her multidisciplinary work draws on the disciplines of anthropology, sociology, politics, history, and international studies in relation to Southeast/East Asia, Thailand, and Myanmar. She has visited Myanmar 28 times for research and outreach since 1995 and formerly lived in Thailand for 14 years (1967–1980). She has published 10 books, 123 articles, chapters in books, conference and policy papers, and occasional papers. She has been a visiting fellow at the Centre of International Studies, Cambridge University, the Swedish International Peace Research Institute, and the East-West Centre, Hawaii. In 2004 she was elected a life member of Clare Hall, Cambridge University. Her research interests lie in the fields of the anthropology, sociology, and demography of natural disasters; disaster risk reduction, resilience, risk and recovery, governance, civil society, social capital, and sustainable development; citizenship, human security, and international development.

Christine Kenney (Ngāi Tahu, Te Ātiawa ki Whakarongotai, Ngāti Toarangatira) is an associate professor and leads the Indigenous Disaster Management Programme at the Joint Centre for Disaster Research, GNS Science/Massey University, New Zealand. She has a dual academic background in sociology and public health, as well as international expertise in implementing community-based research and policy projects with the governments, local authorities, and Indigenous peoples of New Zealand, Canada, and Australia. Her research focuses on identifying factors that build Māori and Indigenous community resilience in response to adversity and documenting ways such Indigenous knowledges and practices can

inform and enhance New Zealand's formal disaster risk management infrastructure. Her work also involves developing methods for enhancing disaster risk reduction capacities and capabilities in diverse Indigenous communities. Kenney's work in Indigenous disaster risk reduction is well recognized in New Zealand. She was appointed to New Zealand's diplomatic delegation to the September 2014 intergovernmental preparatory meeting for the 2015 United Nations' Global Conference on Disaster Risk Reduction and subsequently participated in New Zealand's delegation to the Third World Conference in Sendai, Japan. Additional roles include participation in national and ministerial funding review panels and acting as an external advisor to the Department of Prime Minister and Cabinet on the development of the national disaster resilience and recovery strategies. Kenney is also a regularly invited contributor to key UN publications and conferences, most recently the United Nations World Humanitarian Summit which was held in 2016. She is a member of the UN women's major group and has been a formal nominee for the Pacific seat on the United Nations' Permanent Forum on Indigenous Issues for the period 2017–2019.

Ladawan Khaikham is Lecturer in Politics at the Department of Political Science and Public Administration, Faculty of Social Sciences, Kasetsart University, Bangkok, Thailand. She holds a BA (Hons) in Political Science from Thammasat University in 2010 and an MSc in Political Theory from the London School of Economics and Political Science in 2011. She holds a PhD from the ANU on the topic "A Life in Waiting: Thai Citizenship and Stateless Youth Along the Thailand–Myanmar Border" under the Thai Government Scholarship program for the Humanities and the Social Sciences of Thailand (2010–2017). During her PhD, she was fully funded by Brown University and Santander Universities to participate in the intensive workshops on Ethnicity, Conflict, and Inequality in Global Perspective in June 2015 at Brown University, Providence, Rhode Island, US.

Khin Mar Wai and her colleagues are senior academics in various departments at the University of Yangon. Khin Mar Wai is a Professor (retired) who served in the English Department at the University of Yangon. She has participated in the Social and Demographic Research Methods training at ANU funded by the DFAT under the GPfD Program 2014–2016.

Khine Myint Cho is a professor in the Department of Geography at Dawei University, Myanmar. She was formerly an associate professor in the Department of Geography, University of Yangon. She holds a PhD from the University of Yangon in 2007 and wrote her dissertation on socio-economic development in rural areas in Maubin Township. Her research is mainly about the economy and social factors of rural communities. She has researched with the SEAMEO CHAT organization in Myanmar. The project was titled "Historical Development of Rural Societies and Villager's Livelihood in Myanmar—from Tradition to Modernity" (2003). She has authored *Public Transport in Downtown Areas of Yangon City* (2004). She has also written about the "Geographical Assessment on Areas Suitable for Groundnut Cultivation in the Central Part of Rakhine State" that was included in the journal of The Asia Research Centre Yangon University in 2013. She is doing research on the "Impact on Poverty Reduction by Irrigation Water in Nyaung Oo Township" and "Cause and Effect of Rural-Urban Migration on Rural Areas." She has participated in the Social and Demographic Research Methods training at ANU funded by the DFAT under the GPfD Program 2014–2016.

Kyaw Htun is a doctoral candidate in the Department of Geology, University of Yangon. He is a visiting professor in the Department of Engineering Geology, Yangon Technological University, and a member of the Myanmar Earthquake Committee. He holds a BSc (Geology) in 1977, an MPhil in 1996, and an MSc (Geology) in 1998 from Yangon University. He received an ME (Engineering Geology) from Yangon Technological University in 2000. He has presented many research papers concerning dam foundation, tunneling, landslides, and earthquakes in local and international conferences. He also lectures for the geotechnical training courses sponsored by the Myanmar Geosciences Society in collaboration with the Ministry of Irrigation. He is preparing to submit his doctoral dissertation, concerning geotechnical characterization of dams, tunnel and slope stability in different formations along the western ranges of Myanmar, at Yangon University. He has participated in the Social and Demographic Research Methods training at ANU funded by the DFAT under the GPfD Program 2014–2016. The co-authors of the chapter written by Kyaw Htun are Cho Thae Oo, Tun Naing Zaw, and Professor Day Wa Aung, Department of Geology, University of Yangon.

Kyaw Kyaw is a professor with the Department of Geography at the University of Yangon. He holds a BA (Hons) in 1992, MA in 1998, Dip.

in GIS in 2005, and PhD (Geography) in 2007 from the University of Yangon. He has presented papers on Geographical Analysis of the Solid Waste Situation in the Downtown Area of Yangon City, Water Resource Management of Villages near West Yangon University, Geographical analyses on the socio-economy of Coastal Areas: the case of Daminseik Village, Mon State, Emergency Preparedness within Yangon City: preliminary study of Petroleum Filling Stations and Neighbouring Residential Areas, and Causes and Effects of Migration on Migrated People: the case of Hse-Gyi Village, Pantanaw. He and his co-authors participated in the Social and Demographic Research Methods training at ANU funded by the DFAT under the GPfD Program 2014–2016. The co-authors are Dr. Khaing Myint Cho, Associate Professor, Department of Geography, University of Yangon; Dr. Wai Yang Linn, Lecturer, Department of Philosophy, University of Yangon; Dr. Chaw Su Lwin, Lecturer, Computer Science, University of Yangon; Dr. Mya Thandar Aung, Lecturer, Department of Chemistry, University of Yangon; Phyu Phyu Khaing, Assistant Lecturer, Department of English, University of Yangon; Daw Phyu Phyu, Assistant Lecturer, Department of English, University of Yangon; and Daw Mi Nwe Than, Assistant Lecturer, Department of Myanmar, University of Yangon.

Adam Jon Lebowitz is a professor at the Jichi Medical University in Tochigi, Japan. He holds a PhD from the Graduate School of Comprehensive Human Sciences, University of Tsukuba, Japan, where he wrote his dissertation on social support and mental health in communities affected by the 11 March 2011 triple disaster. Originally from the US, he holds an MA in Asian Studies from the University of Illinois and has lived in Japan for over 20 years. His articles have appeared in *Community Mental Health Journal*, *Disaster Medicine and Public Health Preparedness*, and *Australian Journal of Emergency Management*. As an English as a Second Language teacher he edits a column in *The Language Teacher* published by the Japan Association for Language Teaching. He contributed a chapter about the cultural/linguistic aspects of atomic bomb memory to *The Power of Memory in Modern Japan* (Global Oriental) and has published Japanese-language essays and poetry in the literary monthly *Shi to Shisô* (Poetry and Thought). His main research is on post-disaster community mental health with a focus on how social support received by and contributed by disaster survivors can positively affect symptoms of depression and trauma. He is also

examining if social network density—the extent members of an individual's web of acquaintances know each other—are associated with mental health outcomes. His other research concerns disasters and the elderly in Japan's aging population, disaster-related educational competencies, and disaster and culture in Japanese society. Collaborating with the University of Tasmania, he has led a "disaster tour" for students who visited areas in Fukushima, Japan, affected by the nuclear meltdown and in Miyagi that were seriously impacted by the tsunami. This tour included visiting museums and other memorials in Tokyo to place disasters in the historical context of that country and the newly established International Research Institute of Disaster Science in Sendai.

Maung Maung Aye is a very distinguished environmentalist in Myanmar. He is Rector-in-Charge of the Yangon University of Distance Education. Previously he was a professor and Head of Department of Geography, Dagon University, and Dean of the Faculty of Earth Sciences, Dagon University, Yangon, Myanmar. He has also been a visiting professor and a foreign research fellow in the Department of Natural Environmental Studies, Institute of Environmental Studies, Graduate School of Frontier Science, University of Tokyo, Japan. He holds a BA (Hons) from the University of Yangon and an MA in Geomorphology from James Cook University, Australia. His research interests are fluvial geomorphology, drainage basin morphometry and oceanography; hydrology, climatology, watershed management and conservation; and environmental studies, integrated human geography, and regional analysis. He has published 33 books, 149 research papers, 170 articles, and given 29 radio and TV lectures. Among his many distinguished positions, he is Member of the Myanmar Academy of Arts and Sciences; Patron and Chief Advisor, Myanmar Environment Institute; Vice-President, Environmental and Economic Research Institute; President, National Committee, International Geographical Union (IGU); Vice-President, Myanmar Archaeology Association (MAA); Vice-President, Myanmar Sustainable Development Engineering Services (MSDES); Patron, Treasure Land Development Association (TLDA); Patron, National Commission of Enquiry on Letpadaungtaung Copper; Member, Mining Project, Monywa District (2012–2013); Associated Expert, e-Guard Environmental Services, Yangon, Myanmar; External Expert, Review Team for the Letpadaung ESIA Report; External Expert, National Commission of

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Myint Thida is Professor of Geography at Hinthada University. She was formerly an associate professor in the Department of Geography, University of Yangon. She has worked as a researcher at Dawei University and University of Yangon. Her research interests are agriculture, migration, poverty alleviation, land use, and climate change. She has also participated in research on Bioresources Management of Myanmar supported by Kyoto University Program "Promotion of International Collaboration on Bioresources Management in Myanmar (PICBiRMa)." She has led many research projects on agriculture, migration, poverty alleviation, land use, and climate change and has published 13 papers in journals of the Myanmar Academy of Arts and Science. She has participated in the Social and Demographic Research Methods training at ANU funded by the DFAT under the GPfD Program 2014–2016. Co-authors associated with the paper are Dr. Khin Myat Myat Mon, Assistant Lecturer, Department of Geography, University of Yangon; Dr. Nyi Nyi Aung, Assistant Lecturer, Nationalities and Youth Resource Development Degree College, Yangon; and Dr. Nwe Yin Min, Lecturer, Department of Geography, University of Yangon.

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Nilar Aung is a Pro Rector East Dagon University. She has been a professor in the Department of Geography, University of Yangon. She holds a BA, MA, and PhD from the University of Yangon in 1986, 1995, and 2008, respectively. Her dissertation title was "Vegetable Supply for Yangon City." She has presented many research papers concerning paddy cultivation, urban agriculture, urban food supply, sustainable floating garden cultivation, and so forth. She has also conducted research on rural-urban interaction in the urban fringe area of Yangon city supported by the Graduate School of International Development, Nagoya University, in 2016. Her main research fields in recent years are rural-urban interaction, migration, poverty alleviation, deep-water rice cultivation, and rural development. She also lectures in human geography for PhD preliminary classes in geography and archeology specialization. She has participated in the Social and Demographic Research Methods training at the ANU funded by the Australian Department of Foreign Affairs and Trade (DFAT) under the Government Partnerships for Development (GPfD) Program 2014–2016.

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Jamie Pittock is an associate professor at the Fenner School of Environment and Society at the ANU and also Director of International Programs for the UNESCO Chair in Water Economics and Transboundary Water Governance at the ANU. From 2010 to 2013 he was Program Leader, Australia and United States' Climate, Energy and Water for the US Studies Centre and the ANU Water Initiative. His research considers how our societies can conserve biodiversity, respond to climate change, supply energy and food, and better manage increasingly scarce water resources to benefit both people and nature. Pittock manages large research programs with multiple partner organizations in Africa and the Mekong region. Pittock teaches two courses: ENVS1001 Environment and Society, and ENVS8003 Climate Change Vulnerability and Adaptation. He currently supervises 13 doctoral researchers and a number of other research students. He serves as an editor of three academic journals and holds other positions, including Deputy Chair of Water Stewardship Australia and a member of Technical Advisory Committee of The Gold

Standard, Eminent Scientists Group of WWF Australia, the Wentworth Group of Concerned Scientists and IUCN World Commission on Protected Areas. From 2001 to 2007 Pittock was Director of WWF's Global Freshwater Program, promoting sustainable river basin management and sustainable use of water by agriculture, energy, and other industries globally. Jamie represented WWF in a range of international processes, such as the Ramsar Convention on Wetlands, World Water Forum, and task forces of the China Council on International Cooperation and Development.

Julian Prior is Senior Lecturer in Natural Resource Policy and Rural Extension at the University of New England, Armidale, NSW, Australia. Prior is leader of the ACIAR-funded project Strengthening Institutional Capacity, Extension Services and Rural Livelihoods in the Central Dry Zone and Ayeyarwaddy Delta Regions of Myanmar that funded this research.

Henri Sitorus is a lecturer/researcher at the Department of Sociology, University of North Sumatra (Universitas Sumatera Utara) in Medan, Indonesia. His expertise is in the sociology of development, environmental sociology, disaster rehabilitation, and sustainable livelihoods. He holds a PhD in Sociology of Development from the ANU in 2015 and completed his MSc in Development Studies at the University of Birmingham in 2000. He was involved in the disaster emergency response and rehabilitation program for the 2004 Tsunami in Aceh while he served as Country Director of Heifer International Indonesia. He has also led various research and program evaluations related to food security, disaster rehabilitation, and livelihoods resilience such as (1) Team Leader for the Final Evaluation of the Disaster Risk Reduction project of USAID and Primary Chief Investigator of "Cross Sectoral Strategies for Climate Change and Disaster Risk Reduction (CADRE) in Indonesia"; (2) Team Leader of the Mid-Term Evaluation for the Project "Restoring Coastal Livelihoods (RCL): Building Social and Ecological Resilience in Mangrove Ecosystems in South Sulawesi, Indonesia"; (3) Team Leader of the Project Final Evaluation of Livelihood Resilience in Disaster Prone Areas in Jambi and Bengkulu, Caritas Indonesia and Caritas Italy; (4) Team Leader for Research on "Exploring the Linkage Between Social Protection and Small Farmers in Indonesia" for OXFAM GB. He is an expert researcher on sustainable development at

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Tin Tin Mar is a lecturer in the Department of Geography, University of Yangon. She holds a BA (Hons) in 2002 from the University of Yangon, an MA in 2004, and Literature Outstanding Award for Arts subject from the University of Yangon. She also holds an MRes degree in 2005 and a PhD degree in 2013 from the University of Yangon. Her dissertation title was "A Geographical Analysis on Rural Development in Hlegu Township, Yangon Region, Myanmar." She is conducting research on Poverty Alleviation in Bagan-Nyaung Oo and Rural-Urban Interaction in Hlegu Township. Her main research fields in recent years are rural-urban interaction, migration, poverty alleviation, deep-water rice cultivation, and rural development. She has participated in the Social and Demographic Research Methods training at the ANU funded by the DFAT under the GPfD Program 2014–2016.

Thong Tran is a post-doctoral fellow at the Asia Research Institute, National University of Singapore working on Transboundary Water Governance. He holds a PhD from the Fenner School of Environment and Society, the ANU, Australia, in 2017. He earned a Master's degree in Conflict Transformation at Eastern Mennonite University, US, in 2007. Since 2009, he has also worked as a researcher and lecturer at the Research Centre for Rural Development, An Giang University, Vietnam. His special research interests are the policy domains related to water governance and adaptation. He has led several local research projects with regards to gender roles in climate change responses and impacts of saline intrusion on local inhabitants' livelihoods in coastal areas in the Mekong Delta of Vietnam. He also participated in a research project on water governance, climate change adaptation, and engagement of the local community in the decision-making processes in the region in collaboration with the Institute of Policy and Strategy for Agriculture and Rural Development, Ministry of Agriculture and Rural Development of Vietnam.

Wint Wint Htun holds a BSc (Hons) in Geology in 2001. She holds a PhD in Environmental Science from the University of Yangon in 2010.

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CHAPTER 1

Introduction: The Dynamics of Sustainability and Environmental Governance in the Asia Pacific

Helen James

Introduction

Challenges to achieving sustainable communities and societies in the Asia Pacific are daunting. As Cribb (Chap. 3, this volume) shows, human actions and interests guide environmental policies rather than scientific understanding. When politicians continue to support and subsidize the coal and oil industries in defiance of scientific data showing that use of fossil fuels for energy generation is the most significant factor contributing to increasing greenhouse gas emissions and global warming, their decisions arise from self-interest, not cerebral comprehension of the risk to future quality of life in human societies posed by such policies. The politics of the environment are strongly associated with conflicting interests. The chapters in this volume put these conflicting interests under the spotlight; they examine the multitude of ways how quality of life in human societies is subject to exploitation, degradation and impoverishment of the spiritual and material well-being and the ways how human beings seek to challenge,

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adapt and overcome the societal limitations arising from continued exploitation of the environmental envelope.

Challenges are multi-scalar—local, national and global. When local authorities turn a blind eye to loggers desecrating old-growth forests, they undermine national level legislation which may have taken years of negotiations with vested political, economic, business and societal interests to put in place. Without the forests, land degradation, soil erosion, floods and landslides imperil the quality of life on earth. Several chapters in this volume (Chaps. 6, 10, 12, 14 and 16) tease out the interlocking societal consequences of short-sighted policies and failure to give priority to the preservation of the environment. While legal frameworks abound (Myint Thu Myaing, Chap. 17), their implementation is often hoisted on the petard of political self-interest.

On the other hand, global level frameworks seek to achieve a balance between the economic exploitation of the world's resources and environmental conservation. They attempt to develop a policy arena where conflicting interests can be reconciled. The 17 Sustainable Development Goals (SDGs) 2015–2030 adopted by UN member countries on 25 September 2015[1] (successors to the Millennium Development Goals 2000–2015) are the latest in a series of multilateral platforms which prioritize protection of the earth's life-support systems, poverty alleviation and human resource development, all nested within an integrated environmental and social framework which aims to improve the quality of life on earth. The SDGs are perceived to be mutually reinforcing. Political governance is at the heart of their aspirations; it conditions how and whether the goals will be achieved and implemented.

The SDGs, centered on thriving lives and livelihoods; sustainable food and water security; universally accessible clean energy which does not contribute to greenhouse gas emissions; healthy and productive ecosystems; and democratic governance for sustainable societies, highlight the principle that advances in human well-being must be achieved in tandem with protection of the earth's life-support systems. That is, the security of the people and the security of the planet are interchangeable; one cannot be at the expense of the other. They set the bar high; they entail equitable distribution of societal resources; achievement of gender equity in access to political, economic and societal opportunities; and legal frameworks which support and uphold human rights as the fundamental platform on which sustainable societies need to be based.

Interrogating the Population, Development, Environment Nexus

The conflicting dynamics underlying these principles are playing out among the regional economies and societies of Asia and the Pacific. Conceptualized as policies which seek to achieve a balance between economic development and protection of the earth's environmental envelopes on land, in the oceans and in the atmosphere, the 17 SDGs are the latest emanation of the global vision embodied in the 1987 Brundtland Report, *Our Common Future*. Arising from the work of the World Commission on Environment and Development, it sets the scene for the 1992 Earth Summit, the Agenda 21 and Rio Declaration and co-relative Commission on Sustainable Development. Its frequently cited definition of "sustainable development," as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs," has become the benchmark by which intergenerational equity is to be measured in public policies which allegedly try to balance the need for economic policies which address poverty alleviation, the number one SDG, with the need for environmental protection, the heart of almost all the other SDGs. The great insight of the 2015–2030 SDG agenda is that it portrays the necessary integration of the two key aspects rather than their dichotomous identities.

Environmental protection is essential to poverty alleviation, and poverty alleviation cannot be achieved without sound legal and policy frameworks for, and implementation of, environmental protection in all its aspects. When mangrove forests which deflect the ferocity of a storm surge or even tsunami are cut down by poor farmers for fuel for their wood stoves or for heating, this series of actions is a measure of dire poverty, lack of human resource development, lack of infrastructure and frequently poor health governance as the smoke from the wood fires contributes to the high incidence of lung disease and pneumonia.

As Henri Sitorus (Chap. 11, this volume) has shown, environmental protection itself is a dynamic concept which requires pro-active engagement with the power centers of policy-making through citizen and community activism, or what he has identified as "environmental citizenship"; those impacted by governmental policies which adversely affect their livelihoods take action to confront the damaging long-term consequences of such policies. In the case of North Sumatra and Lampung provinces, the sites of Dr. Sitorus's research, both agricultural and marine livelihoods, are

damaged and often destroyed entirely by poorly conceived environmental policies which disempower the rural poor. Developing this theme, Jamie Pittock (Chap. 5, this volume) examines the adverse impact on the food security of agricultural communities along Asia's major river systems arising from similarly ill-conceived water policies where hydro-power generation is prioritized for state benefit.

The nexus between empowerment of the rural and urban poor and environmental governance is also the focus of chapters by Prior and his colleagues (Chap. 7), Khin Mar Wai and her co-authors: Myint Thida, Nilar Aung and Tin Tin Mar. Taking a comparative perspective which embraces Ethiopia, Zimbabwe and Myanmar, Prior has elected to examine the intersections of social capital, adaptation and resilience in these predominantly agricultural societies and how livelihood adaptation is key to their resilience. This theme is also explored from the perspective of floods and riverbank erosion and their impact on livelihoods in villages along the Ayeyarwady River basin. Adaptation efforts in the peri-urban areas close to Yangon, Myanmar, are the subject of Chap. 8 by Nilar Aung and Tin Tin Mar; their chapter asks us to focus on the innovations arising from such efforts as people seek to overcome the limitations of their impoverished environment. As Maung Maung Aye has written (Chap. 2), people in these peri-urban areas are critically conscious that the intersections between population, development and the environment determine the quality of life available to them.

Environmental Governance: Fact or Fiction?

Around the Asia Pacific, the discourse of democracy is linking it overtly to improved quality of life, more varied future options and opportunities, and greater participation in the decision-making which affect people's lives. In some cases, these aspirations are partly in the process of being achieved; in other cases, hardly at all. SDGs 11, 13, 16, 17 (sustainable cities and communities; climate action; peace, justice and strong institutions; partnerships for the goals) are directly linked to the quality of governance being implemented across the region. In some countries such as Thailand, there has been a resiling from democratic governance. In other countries, democratic governance is still only partially observed. And here, protection of the environment is an unremitting challenge, as environmental exploitation goes hand in hand with dire poverty as the prevailing life experience of millions in the Asia-Pacific region.

Exploitation of the resources sectors is a notable characteristic of this situation, and is linked to lack of efforts to mitigate climate change impacts which in turn contribute to higher temperatures, droughts, food insecurity and climate-induced health problems including widespread mortalities from heat waves. Achieving food security is a key aspect of the chapters by Lindsay Falvey (Chap. 4) and Jamie Pittock (Chap. 5). This nexus highlights the important relationship between environmental protection and the capacity of all life on earth to survive and thrive.

In Myanmar, since the democratic reform process was set in train after the national elections of 2010, the country has been experiencing accelerated investment in its resources sectors. Economic development policies in Myanmar and among its regional neighbors underpin the necessity for policies which facilitate better standards of living for growing regional populations. With different histories, Myanmar's neighbors have confronted a similar conjunction of competing national, citizen and environmental interests for most of their post-colonial development. All around the Asian region, the nexus between population pressures and development priorities has been placing additional pressures on the provision of water resources, energy, land reform programs, urban renewal and conservation programs, forestry and environmental management and infrastructure provision.

As the sustainable development agenda has articulated, the imperative to alleviate poverty for the millions of people who live below the designated US$1 per day poverty line ensures that population and development pressures quickly run up against the need to conserve the environment and scarce resources for the future, leading in many societies to social and political conflict, if not managed well. These issues have been at the forefront of the policies of regional governments and civil society actors who frequently are on opposite sides of the environmental management policy divide.

The economic development, which is seen as essential to underpin employment opportunities (SDGs 8, 9, 10) and contribute to poverty alleviation, is frequently also associated with over-exploitation of land, water, forests and finite natural resources, thus bringing in its train environmental degradation which may inhibit the improved livelihoods the economic policies are designed to support. Mining of valuable mineral resources brings wealth into the national economies, but may also result in land degradation, forced relocation of local farmers from the land they have long worked as at Letpadaung in northern Myanmar, and natural

disasters such as land- and mudslides (see Chaps. 10 and 12, this volume) or, as in Central Java, a permanently boiling lake of liquid mud and gas which is engulfing villages with no end in sight.

Pressure on water resources and energy demands has meant that national, state and provincial governments resort to large dam building programs either for agricultural production or hydro-power, thus bringing into focus the significant issue of transboundary water governance, as the rivers of the Asian region frequently cross several countries, the Mekong, Ayeyarwady, Salween, Brahmaputra and Ganges being some examples of this phenomenon. Where dams are main sources of irrigation for agriculture, associated rising salinity is also becoming a major economic, social and political problem. Thong Tran's (Chap. 9) analysis of changing livelihood options along the Mekong River of the Vietnamese Delta in response to the institutionalized flood control schemes shows the inventive adaptation measures that Vietnamese agriculturalists are adopting in order to confront governmental requirements for enhanced productivity.

The climate change paradigm is another means of projecting the long-term societal and political impact of the dynamic between economic development and sustainable development. Over-exploitation of natural resources in conjunction with the move to industrialized economies over the past 200 years is drawing attention to the air, soil and water pollution, and frequently health consequences of this exploitation of the environment. Emissions from the industrialized sectors of many countries, both developed and developing, are contributing to the long-term impact of climate change, and significant weather variability is becoming more pronounced. The Asian monsoon starts later and finishes earlier than had been the norm, and total days of precipitation are reduced. Widespread drought in key rice-producing areas of Asia—the Mekong Delta of Vietnam, NE Thailand, Papua New Guinea, Upper Myanmar—has been accompanied, in coastal areas, by extensive saline intrusion which also puts the food-producing capacities at risk. Myint Thida's examination (Chap. 24) explores the impact on impoverished farmers in the Burmese delta of rising salination of their rice fields as intrusion from the sea increases, and the productivity of their lands decreases. Alternate livelihoods (e.g. from mat weaving) generate insufficient income to support their families.

Widespread rural-urban and international migration by younger population groups seeking alternate sources of income generation in neighboring countries is explored by Khine Myint Cho (Chap. 18) and Kyaw Kyaw (Chap. 19) and their colleagues. The consequences of this migration out

of the traditional agricultural societal livelihoods mean that resulting lack of labor to work the land is having an impact on rising rates of pay for remaining casual farm labor; often these costs mean that those farmers remaining cannot afford to work the land.

Community empowerment, through seeking to enhance educational and income generation opportunities in the tourist area of Bagan, is explored by Nilar Aung who shows that innovative local solutions can ameliorate the effects of poverty and produce workable adaptive measures. These are also the focus of Chap. 13 as an NGO-fostered integrated development program in Northern Pakkoku has resulted in considerable benefits for the villages in this formerly poverty-stricken region.

In the context of climate change, flooding rain often follows drought, thus also destroying food crops, as well as homes, and taking away the few benefits won from development. The poor, the elderly, women and other vulnerable groups suffer the impacts of these events most. With climate change has come more severe and more frequent natural disasters particularly cyclones/typhoons, floods, landslides, mudslides, often accompanied by the geologically based disasters, tsunamis, earthquakes. Chapters 20, 21 and 22 (Lebowitz, Yang, Kenney) highlight some of the key administrative, governance, familial and community adaptive measures following disasters in Japan, China and New Zealand. Kenney draws attention to the value of Indigenous Māori cultural practices in enhancing the resilience and adaptive capacities of communities recovering from major crisis events. Critical population issues in the recovery stage are the focus of Yang's chapter (Chap. 21) on the psychological and practical issues confronting recombined families as survivors seek new lives and new family structures. These three chapters may be seen as a microcosm of key elements embodied in the SDGs—the need for multi-scalar governance collaborations, recognition of the value of Indigenous knowledge and cultural contexts, and the primary importance of the family in governing human societies.

While adaptation to new geo-physically determined environmental conditions is part of the human story, it is the story of societal transformation which must confront the political, social, cultural and economic capacities of regional citizens and their governments, if populations are to thrive into the future and not just struggle to survive. This is the narrative of all the chapters in this volume. Increasing population, the desire for access to markets, educational opportunities, and employment are driving the well-documented regional rural-urban migration which is leading to larger cities with more energy demands, more infrastructure needs, and

pressing requirements for better urban planning, housing and transport systems. In this context, improved environmental governance aligned with the SDGs may at times seem more an aspiration than a reality.

Conclusion and Focus

In many regional countries, awareness of the need to regulate environmental exploitation is widespread, and in some cases, concerted measures have been taken to address environmental degradation and biodiversity loss. Sound environmental law and regulatory institutions are being developed; their implementation is often ineffective and deficient, a situation sometimes accompanied by serious criminal activity, in collusion with those whose responsibility it is to enforce the law. Illegal logging in northern Myanmar, for instance, has been documented for decades and a flight over the Shan States gives a clear view of how much forest has been lost in the last 20 years despite official re-planting programs. Officially protected areas are often anything but protected. Vietnam is similarly experiencing loss of forest cover as agricultural land expands to feed its large population. Ethnic minority groups, whose homes and food baskets often depend on the forest or the fish of the oceans and rivers, frequently are at risk of loss of their future habitat, and biodiversity loss is accelerating. The nexus between population, development and the environment presents a myriad of complex issues which challenge policy makers, governments, NGOs, and local communities in their efforts to develop and implement social, economic and political platforms to enable their populations to enjoy a greater quality of life.

Many intersecting themes arise from interrogating four research communities in relation to this exploration of the challenges of implementing the SDGs: climate change, poverty alleviation, development and disasters. Thus, the authors in this book explore the impact of governmental policies on water and transboundary water governance; food and water security; dams, rivers, health and livelihoods for today and future generations; agriculture and land reform; rural-urban migration; resources management, mining and national development; disasters, development and democracy; climate change, societal adaptation and transformation; environmental management, forestry and conservation; civil society, poverty alleviation and community empowerment. It is a rich feast, yet one which opens up further questions for future research into these important cross-sectoral societal landscapes.

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CHAPTER 2

The Nexus Between Population, Development and the Environment: Critical to Determining Quality of Life on Earth

Maung Maung Aye

Greetings
H. E. Dr. Myo Myint, Chairman, National Education Policy Committee (NEPC)
H. E. Mr. Nicholas Cumpston, Minister Counselor and Economic Development Advisor at the
Australian Embassy in Yangon
Dr. Nay Win Oo, Deputy Director-General, Department of Higher Education (Yangon Branch)
Professor Pho Kaung, Rector of the University of Yangon
Distinguished Guests, Scholars, Participants, All Faculty Members,
Ladies and Gentlemen,
Mingalabar! Great Auspiciousness to All of You![1]

* * *

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Introduction

Population, development and the environment are inextricably linked and are critical to determining the quality of life on earth, now and for generations to come. The 2016 International Conference on Regional Perspectives on Population, Development and the Environment jointly held by the University of Yangon (UoY) and the Australian National University (ANU) must address the paramount issues mentioned below with foresight well into this twenty-first century.

1. Increasing poverty,
2. Overconsumption of resources in the North,
3. Low status of women,
4. Inappropriate economic policies,
5. Rapid population growth and
6. Unsustainable use of natural resources are all interconnected.

One-quarter of the world's population—predominantly in the industrialized nations—consumes over 70% of the earth's resources and is responsible for most of the global environmental degradation. In addition, the implications of adding 95 to 100 million people annually to the world's current population of 7.4 billion people are staggering and will place tremendous stress on the earth's ability to provide for basic human needs.

Environmental Science and the Human Condition

Because we live in both the natural and social world, and because we and our technology have become such dominant forces on the planet, Environmental Studies must take human institutions and the human condition into account. We live in a world of haves and have-nots; a few of us live in increasing luxury, while many others lack the basic necessities for a decent, healthy, productive life. The World Bank estimates that more than 1.3 billion people—about one-fifth of the world's population—live in acute poverty with an income of less than $1 (USD) per day. These poorest of the poor generally lack access to an adequate diet, decent housing, basic sanitation, clean water, education, medical care and other essentials for a human existence. Some 70% of those people are women and children. In fact, four out of five people in the world live in what would be considered poverty in the US or Canada. Policymakers are becoming

aware that eliminating poverty and protecting our common environment are inextricably interlinked because the world's poorest people are both the victims and the agents of environmental degradation.

The poorest people are often forced to meet short-term survival needs at the cost of long-term sustainability. Desperate for croplands to feed themselves and their families many move into virgin forests or cultivate steep, erosion-prone hillsides, where soil nutrients are exhausted after only a few years. Others migrate to the grimy, crowded slums and ramshackle shantytowns that now surround most major cities in the developing world. With no way to dispose of wastes, the residents often foul their environment further and contaminate the air they breathe and the water on which they depend for washing and drinking. The cycle of poverty, illness and limited opportunities can become a self-sustaining process that passes from one generation to another. People who are malnourished and ill cannot work productively to obtain food, shelter, or medicine for themselves or their children, who also are malnourished and ill. About 250 million children—mostly in Asia and Africa and some as young as four years old—are forced to work under appalling conditions such as weaving carpets, making ceramics and jewelry or in the sex trade. Growing up in these conditions leads to educational, psychological and developmental deficits that condemn these children to perpetuate this cycle. Faced with immediate survival needs and few options, these unfortunate people often have no choice but to overharvest resources. However, in doing so, they diminish not only their own options but also those of future generations. And in an increasingly interconnected world, the environments and resource bases damaged by poverty and ignorance are directly linked to those on which we depend.

Rich and Poor Countries

Where do the rich and poor live? About one-fifth of the world's population lives in the 20 richest countries, where the average per capita income is above US$25,000 per year. Most of these countries are in North America or Western Europe, but Japan, Singapore, Australia, New Zealand, the United Arab Emirates, and Israel also fall into this group. However, almost every country even the richest, such as the US and Canada, has poor people. No doubt everyone reading this chapter knows about homeless people or other individuals who lack resources for a safe, productive life.

The *Journal of Public Health* reported in 1999 that ten million Americans—including four million children—do not have enough to eat. The other four-fifths of the world's population live in middle- or low-income countries, where nearly everyone is poor by North American standards. More than three billion people live in the poorest nations, where the average per capita income is below US$620 per year. China and India are the largest of these countries, with a combined population of almost three billion people. Among the 41 other nations in this category, 33 are in sub-Saharan Africa. All the other lowest income nations, except Haiti, are in Asia. Although poverty levels in countries such as China and Indonesia have fallen in recent years, most countries in sub-Saharan Africa and much of Latin America have made little progress. The destabilizing and impoverishing effects of earlier colonialism continue to play important roles in the ongoing problems of these countries. Meanwhile, the relative gap between rich and poor has increased dramatically. In other words, although the percentage of the world's population living in poverty has declined slightly over the past 30 years, the relative gap between the rich and poor nations has increased sharply. The ten poorest countries in the world in 1999 were (in ascending order from very poorest): Mozambique, Ethiopia, Tanzania, Congo, Malawi, Rwanda, Chad, Sierra Leone, Nepal and Niger. Each of these countries has an annual per capita gross national product (GNP) of less than US$200 per year. They also have low levels of food security, social welfare and quality of life as Table 2.1 indicates.

By contrast, each of the ten richest countries in the world—Switzerland, Japan, Norway, Denmark, Germany, the US, Austria, Singapore, France and Iceland (in descending order from richest)—has an annual per capita

Table 2.1 Average indicators of quality of life for the ten richest and poorest countries (averaged as a group)

Indicator	*Poor countries*	*Rich countries*
Per capita GNP	USD 170	USD 29,946
Life expectancy	47.4 years	77.9 years
Infant mortality (per 1000 live births)	114	5.7
Child deaths (per 1000 children under age 5)	194	7.5
Safe drinking water	42%	NA (close to 100%)
Female literacy	38%	97%
Birth rate (per 1000 people)	45.2	11.4

Source: World Resources Institute, 1998–1999

GNP more than a hundred times that of the poorest countries. As can be seen in Table 2.1, other conditions in the rich countries reflect this wide disparity in wealth.

The gulf between rich and poor is even greater at the individual level. The richest 200 people in the world have a combined wealth of over US$1 trillion. This is more than the total owned by the three billion people who make up the poorest half of the world's population.

A Fair Share of Resources?

The affluent lifestyle that many people in the richer countries enjoy consumes an inordinate share of the world's natural resources and produces a shockingly high proportion of pollutants and wastes. For example, the US with less than 5% of the total population consumes about one-quarter of most commercially traded commodities, and produces a quarter to half of most industrial wastes (Table 2.2).

To get an average American through the day takes about 450 kg (nearly 1000 lbs) of raw materials, including 18 kg (40 lbs) of fossil fuels, 13 kg (29 lbs) of other minerals, 12 kg (26 lbs) of farm products, 10 kg (22 lbs) of wool and paper and 450 liters (119 gal) of water. Every year, Americans throw away some 160 million tons of garbage, including 50 million tons of paper, 67 billion cans and bottles, 25 billion Styrofoam cups, 18 billion disposable diapers and 2 billion disposable razors. This profligate resource consumption and waste disposal strains the planet's life-support systems. If everyone in the world tried to live at consumption levels approaching North American standards, the results would be disastrous. Unless we find ways to curb our desires and produce the things we truly need in less destructive ways, the sustainability of human life on our planet is questionable.

Table 2.2 The US, with 4.5% of the world's population

Consumes	*Produces*
26% of all oil	50% of all toxic wastes
24% of aluminum	26% of nitrogen oxides
20% of copper	25% of sulfur oxides
19% of nickel	22% of chlorofluorocarbon
13% of steel	26% of carbon dioxide

Source: World Resources Institute, 1998–1999

Sustainability

In his final speech to the United Nations, Adlai Stevenson said, "We cannot maintain it [Spaceship Earth] half fortunate, half miserable, half confident, half despairing, half slave to the ancient enemies of mankind and half free in a liberation of resources undreamed of until this day. No craft, no crew, can travel with such vast contradictions. On their resolution depends the security of us all." As Ambassador Stevenson pointed out, everyone dreams of an improved standard of living. However, to produce the goods and services needed to improve life for everyone without overtaxing the environmental systems and natural resources on which we all depend is difficult. Creating processes that are just, enduring and environmentally safe remains perhaps our biggest challenge.

An overarching theme of this conference is sustainability: a search for ecological systems and human progress that can last over the long term. Of course, neither ecological systems nor human institutions can continue forever. However, we can work to protect the best aspects of both realms, and to encourage resiliency and adaptability in both of them. WHO Director Gro Harlem Brundtland defined sustainable development as "meeting the needs of the present without compromising the ability of future generations to meet their own needs." In these terms development means bettering people's lives. Sustainable development, then, means progress in human well-being that we can extend or prolong over many generations, rather than just a few years. To be truly enduring, the benefits of Sustainable Development must be available to all humans and not just to the members of a privileged group.

Indigenous Peoples

In both rich and poor countries, Indigenous or native peoples are generally the least powerful, most neglected groups in the world. Typically, descendants of the original inhabitants of an area taken over by more powerful outsiders, they are distinct from their country's dominant language, culture, religion and racial communities. Of the world's nearly 6000 recognized cultures, 5000 are Indigenous ones that account for only about 10% of the total world population. In many countries, traditional caste systems, discriminatory laws, economics or prejudice repress Indigenous peoples. Their unique cultures are disappearing, along with biological diversity, as natural habitats are destroyed to satisfy industrialized world

appetites for resources. Traditional ways of life are disrupted further by dominant Western cultures sweeping around the globe.

At least half of the world's 6000 distinct languages are dying because they are no longer taught to children. When the last few elders who still speak the language die, so will the culture that was its origin. Lost with those cultures will be a rich repertoire of knowledge about nature and a keen understanding of a particular environment and way of life.

Nonetheless, in many places, the 500 million Indigenous people who remain in traditional homelands still possess valuable ecological wisdom and remain the guardians of little-disturbed habitats that are refugees for rare and endangered species and undamaged ecosystems. Author Alan Durning estimates that Indigenous homelands harbor more biodiversity than all the world's nature reserves and that greater understanding of nature is encoded in the languages, customs and practices of native people than it is stored in all the libraries of modern science. Interestingly, just 12 countries account for 60% of all human languages. Some seven of these are also among the "megadiversity" countries that contain more than half of all unique plant and animal species.

Conditions that support the evolution of many unique species seem to favor the development of equally diverse human cultures as well. Recognizing native land rights and promoting political pluralism are often two of the best ways to safeguard ecological processes and endangered species. As the Kuna Indians of Panama say, "Where there are forests, there are native people, and where there are native people, there are forests." A few countries, such as Papua New Guinea, Fiji, Ecuador, Canada, and Australia, acknowledge Indigenous title to extensive land areas. Other countries, unfortunately, ignore the rights of native people. For example, Indonesia claims ownership of nearly three-quarters of its forest lands and all waters and offshore fishing rights, ignoring the interests of Indigenous inhabitants. Similarly the Philippine government claims possession of all uncultivated land in its territory, while Cameroon and Tanzania recognize no rights at all for forest-dwelling pygmies who represent one of the world's oldest cultures.

Conclusion

The 20% of us in the world's richest countries consume an inordinate amount of resources and produce a shocking amount of waste and pollution. Meanwhile, at least 1.3 billion people live in acute poverty and lack

access to an adequate diet, decent housing, basic sanitation, clean water, education, medical care and other essentials for a humane existence. Faced with immediate survival needs, the poorest often have little choice but to overharvest resources and reduce long-term sustainability for themselves and their children. Development means a real increase in standard of living for the average person. Sustainable Development attempts to meet the needs of present generations without reducing the ability of future generations to meet their own needs. Indigenous or native peoples are generally among the poorest and most oppressed of any group. Nevertheless, they possess a valuable ecological knowledge and remain the guardians of nature in many places. Recognizing the rights of Indigenous people and minority communities is an important way to protect natural resources and environmental quality.

Clearly, current patterns of consumption and distribution of people, wealth and natural resources are as much to blame for widespread environmental degradation as is the sheer number of people. Efforts to address population should focus on the root causes of poverty, migration and high fertility rates such as:

(a) low status of women and girls,
(b) early ages of marriage,
(c) lack of education and health care,
(d) high child mortality rates,
(e) lack of access to family planning information and services for women, men, teenagers, and so on.

Addressing the consumption lifestyles of peoples and societies is equally important. This will be done by:

- Alleviating poverty,
- Empowering women,
- Increasing access to family planning and health care,
- Ensuring human rights,
- Developing more sustainable lifestyles in the North and
- Improving international development policies.

These are all critical to providing a decent quality of life for future generations, without causing irreversible damage to the environment.

With this I would like to conclude my Keynote Speech. I wholeheartedly wish all of you great success in holding this auspicious event today and tomorrow.

Likewise, my special wish to all our guest scholars from various countries as well as national scholars from various higher education institutions in Myanmar is . . . . .

"May you all have a nice stay in Yangon and a safe and pleasant journey home!"

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Note

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CHAPTER 3

Nature Conservation and Its Bedfellows: The Politics of Preserving Nature

Robert Cribb

Introduction

The rise of what has broadly been called environmental concern was a defining feature of the twentieth century. In earlier centuries, there had been an understanding that human intervention could shape the natural environment for the worse, but examples of undesirable outcomes—the disappearance of the Wood of Ephraim in present-day Jordan, where the density of the forest obstructed a battle, the destructive introduction of rabbits into Australia and the extinction of the quagga in nineteenth-century South Africa—were largely treated as unfortunate cases in the generalized story of human enhancement of the environment. During the twentieth century, humankind came to contemplate a complex of potential environmental disasters. These projected disasters overlapped and intertwined. They included the loss of animal and plant species through habitat destruction and introduction of 'weed' species, the over-harvesting of scarce natural resources, especially fish, desertification, the degradation of soil, the industrial production of food in ways that facilitated the emergence of pandemics and the contamination of every part of the environment

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with chemicals having damaging consequences for the health and fertility of humans and other organisms. Especially in the twenty-first century, attention has focused on the potential of anthropogenic climate change to reduce the habitability of large areas of the Earth by rising sea levels and changing rainfall and temperature patterns. In this chapter I explore this dimension of environmental politics by considering the history of conservation politics. By conservation, I mean nature conservation, that is, the preservation of individual species of animals and plants from extinction and the protection of ecosystems from destruction or degradation.

In many cultures, we find practices that treat particular parts of the natural world as sacred, and therefore as deserving protection,[1] just as we find patterns of ownership that preserve specific renewable natural resources for the use of particular people—animals for hunting, forest products for commercial collection. Modern nature conservation has some antecedents in these practices, but it rests primarily on two modern scientific doctrines: the uniqueness of individual species and their inter-connectedness in ecosystems. Both doctrines became part of scientific consciousness in the eighteenth century, first in the scientific salons of the West and later in wider circles of intellectual and public life, both East and West.

The dynamics of all these processes are immensely complex. Very significant efforts by the global scientific community are devoted to investigating matters related to these problems: mapping the natural environment, determining the nature of the processes at work, and devising new techniques and technologies that may supersede or at least ameliorate destructive practices, or may allow the damage to be reversed. Such investigations identify what is at risk, what may be resilient. In explaining processes, these investigations can help determine where intervention may be most effective and where it could have undesired side-effects. They can help forecast the cost of action and of inaction. We may disagree profoundly on the details, but we all understand the scale of the challenges to human existence that may be presented by climate change, by pollution and by the loss of biodiversity. The efforts of this global research team will eventually give us a better chance of working out how to increase our chances of collective survival.

Science and the Promise of Technological Change

Two features of the contemporary global environmental crisis, however, give it a novel character in the history of technological change. First, while science once offered promises for the future, it is now increasingly inclined

to offer warnings. The formula for delivering on promises was simple: employ brilliant scientists and give them the resources to explore their dreams. A promise which failed to deliver costs little except money: the world is not endangered by the absence of flying cars or teleportation. By contrast, the failure to warn of impending danger has potentially serious, even catastrophic, consequences. This is the reason why governments fund weather bureaux, why geologists monitor volcanoes for signs of future eruptions and faults for signs of future earthquakes. It is why epidemiologists monitor the emergence of zoonoses (diseases that can spread from animals to humans). Predictions of catastrophe, however, are notoriously unreliable: predicted disasters fail to eventuate, while other disasters appear without warning. The predictions of climate science concerning the specific changes that will be brought about by past and continuing human activity represent the most ambitious of all scientific attempts to forecast the future. They rely on complicated calculations which rest in turn on fragmentary data. Even if there is a general scientific consensus that unchecked climate change will have disastrous consequences for humankind, the detail of just what consequences will be manifest and what mechanisms will produce them is a swirling maelstrom of rival hypotheses.[2] The most important consequence of this situation is that for the vast majority of people accepting the reality of climate change is a matter of faith in scientists rather than of direct scientific knowledge. In contrast with a great many scientific understandings that have become embedded in popular understanding, such as knowledge of hygiene and nutrition, the mechanisms that are believed to lead to climate change are poorly understood amongst the general public.

The second novel feature of the current situation is that the solutions to the problem that have been proposed are significantly political, social and cultural rather than scientific. This feature distinguishes our current condition from previous eras in which technological advance was identified as playing the most significant role in solving practical problems. The industrial and scientific revolutions of the nineteenth and twentieth centuries delivered huge advances in human health and welfare. Even if these advances were unevenly distributed, and even if none of them was without social cost, the benefits they delivered created a sense of momentum which swept their opponents away. Technology cast aside a huge range of livelihoods from cochineal farmers to bowling pinsetters, often leading to individual hardship and distress. Those who questioned the general benevolence of technology, however, were dismissed as Luddites, as both

losing and wrong. The way forward throughout the scientific revolution was to abandon old occupations and identify new ones generated by new technology. For most of recent history, the promotors of technological advance could rely on a utilitarian assumption that progress would deliver greater good for greater numbers and would therefore prevail.

By contrast, although technological fixes continue to be an important part of the response to the environmental crisis, a significant part of the apparently necessary response to that crisis lies in stopping or slowing down current activities and trends. Effectively, the injunction is to repudiate the promise of technology. Across a vast array of human activity, the clearest prescription is to do less and to make do with less. This prescription confounds the one-time promise of technology to be a rising tide that will in time lift all boats. When technology appeared to be able to improve all lives, it was less important that some lives were far more improved than that of others. If the trend must stop, and even to be reversed, for the sake of the common good, then the issue of sharing specific costs for the general good becomes acute.

Scientists themselves often see the policy imperatives arising from their research as self-evident. The two novel characteristics of the current crisis, however—the opacity of scientific prediction and political/social/cultural dimension of any solution—confound this perception. Scientists who recognize the problem sometimes believe that education is the main requirement for achieving science-based policy. They see the problem primarily as one of communicating basic scientific literacy to the larger non-scientific community so that the community can understand the significance of scientific findings. Or, if scientific literacy is too much to ask, then they want at least to persuade publics of the hegemonic authority of scientists. Yet, we have to doubt whether either of these goals can ever be achieved. Basic scientific literacy does not of itself allow us to comprehend advanced scientific insights any more than knowing the rudiments of a foreign language gives us a subtle understanding of its poetry. Australia is a highly educated society, but most people could not state the Second Law of Thermodynamics, despite its centrality to the science that analyses climate change. Few people understand what is meant by epigenetics, despite its profound implications for all manner of social policy. In areas of relatively settled science, ignorance is unimportant. Most people can operate sophisticated electronic equipment without any understanding at all of the nature of electricity. Where science is significantly not settled, such as psychology, nutrition, quantum theory, fluid dynamics, epigenetics and cli-

mate change, ignorance is potentially dangerous. And yet in these areas, above all others, the unsettled character of the science makes public education difficult.

The deeper problem, however, is that science itself does not offer moral or cultural answers. Science is uniquely capable of delivering understanding of the way the natural world works—even if that understanding is always in some senses provisional—but the most important questions which science helps us to answer are at their heart political questions. That is to say, they have to do with the allocation of power and resources. They involve ideas of justice and our deepest emotional engagement with the cosmos. If we are to understand how scientific knowledge can have an impact on the world of real-life decisions concerning the environment—high-level policy decisions as well as private, individual decisions—then we need to understand the politics of environmental issues.

The Politics of Environmental Issues

To talk of the politics of environmental issues is not to propose a distinction between pure, noble science and messy, compromising politics. The vast bulk of scientific research that is undertaken today is made possible by political decisions, decisions that require weighing the values against each other—the likely value of the research outcomes, the likely beneficiaries of that value in the short and long term, and the opportunity costs involved in devoting resources to one scientific project over another, or to science over other public goods such as communications, health, education and culture. Scientists may sometimes not be politically savvy, but scientific detachment from politics is a myth.

Policy prescriptions from science are even more firmly embedded in political choices. Even if we set aside the huge areas of uncertainty in climate science and imagine a straightforward and scientifically settled analysis of the situation, we face the issues of just what scale of action is necessary, just where the costs of climate action should fall and the practical task of devising policies that implement scientific insights and that ensure those costs do fall where they are intended. Finding answers to these questions is a political task. Those answers do not flow in any way from scientific dogma.

The perception that politics is messy and corrupt has a great deal to do with the dominant perception that politics is principally about resource allocation. Put more crudely, in the words of Harold Lasswell, politics is

said to be about 'who gets what, when, how'. Yet politics is also about ideologies, which are, at their core, contending theories of justice and entitlement. Arguing in favour of, for instance, a social safety net for the poor may be utilitarian—an argument about supporting labourers and consumers and avoiding revolution—but it is often also more a statement about the underlying rights of humans. The argument against a social safety net may equally be utilitarian—conjuring up moral hazards—or ideological—appealing to specific ideas of human responsibility. And politics is also about deeper meaning and emotion, about admiration and disgust, fear and pride, resolve and despair, anger, contentment and love. We do not understand politics unless we take account of beliefs and emotions that cannot be encapsulated in any form of utilitarian theory.

The principles of nature conservation rest on two fundamental scientific doctrines. The first doctrine is that the global biome comprises millions of distinct species, some of them abundant, some of them scarce, but all of them the product of evolutionary processes that can never be repeated. Each species is a unique assemblage of genetic material that can never be recovered if it is lost. For the loss of a species, we use the term 'extinction', a word that once referred commonly to the snuffing out of a candle. The French scientist Georges Cuvier identified extinction as a natural phenomenon in 1796, but the near-extermination of the American bison in the mid-nineteenth century made anthropogenic extinction a household concept.[3] It became a clear part of the scientific paradigm with the triumph of the Darwinian understanding of evolution in the second half of the nineteenth century and with the emergence of genetics that we trace back to Gregor Mendel. The doctrine of species uniqueness underpinned the regulatory protection of endangered species from the late nineteenth century.

The second doctrine is that the survival of species depends not just on the absence of destructive forces such as hunting or felling but also on the existence of a congenial surrounding ecosystem. Some species are resilient and adaptive, others are fragile and vulnerable, but all of them rely on a network of relationships with organisms of other species that provide nutrients and shelter, opportunity for reproduction and protection from weather and disease. In consequence, extinction can occur indirectly. The term, 'ecosystem', became a significant part of scientific understanding only after it was coined by Arthur Tansley in 1935, and it became a household term in the West only in the 1970s.[4]

Nature Conservation and Politics

Identifying the risk of extinction and the means to avert it, however, does not of itself establish a need for policy to reduce the risk. Action requires political argument. How, in other words, did the idea of nature conservation become embedded in politics? We can identify three paths that can be called utilitarian, aesthetic and implicationist.[5]

The utilitarian arguments for nature conservation derive from the discovery of ways in which preserving species, that is forestalling extinction and habitat loss, can be directly useful to humans. In the early twentieth century, for instance, a strong argument was made for providing legal protection to certain species of birds, because of the role that they were known to play in controlling the insect pests of crops. National parks have been advocated as a means of preserving the integrity of water catchment areas. Today, we hear arguments for nature conservation based on the unknown but potential utility of the genetic makeup of threatened species for the development of new drugs or other useful chemicals, a utility that might be realized only far in the future.

Utilitarian arguments can sometimes be expressed simply, but they often become complex in practice. Utilitarianism characteristically refers to achieving the greatest good for the greatest number, but the 'number' referred to is itself negotiable. It often refers to no more than the present population of a state or a community. Environmental issues, however, characteristically encompass not only the entire human population but also future generations. The most powerful variation on the standard utilitarian argument therefore is that of sustainability: in other words, we need to limit extraction to a level which will not prevent future generations from getting value out of the resource. The terms 'sustainability' and 'sustainable development' emerged in the 1980s, but they had their roots in the not-uncontested scientific understanding that there is, in a sense, excess capacity in each ecosystem which allows harvesting to take place without long-term change. The two terms also have a strong ethical component, expressing the idea that Lasswell's definition of politics—who gets what, when, how—encompasses not just people alive today but also future generations. Taking a perspective that goes beyond the present to the future also demands a precautionary ethic: that is, things that might be valuable in future should not be destroyed or squandered simply because they have no immediate value.

The utilitarian argument for nature conservation rests primarily on the perceived benefits of genetic richness. Scientific evidence suggests that ecosystems with greater genetic diversity function better and are better placed to handle relatively moderate changes in circumstance.[6] Conservation areas not only ensure the survival of genetic material that humans may one day find useful, but they also entwine with unconserved areas to enhance biological stability.

Utilitarianism, however, always works in the context of the second path, that is aesthetic appreciation.[7] Movements to protect spectacular landscapes developed in the West in the first half of the nineteenth century and formed the basis of the phenomenon of national parks.[8] The first global conservation effort emerged in the late nineteenth century to protect bird species whose feathers were being hunted for hats. The advocates of allowing hunting to continue stressed its economic benefits, portraying hunters as the pioneers of economic development, who opened up new terrain where eventually agriculture and industry would be established. The advocates of protecting plumage birds were not thinking of commercial conservation. Rather, they asserted that humankind would be spiritually impoverished if it did not have such creatures to contemplate in the future. The importance of aesthetics can be hard to grasp because the appreciation of beauty is malleable, possibly even fluid, and certainly culturally conditioned. We can find countless examples of changing norms of aesthetic appreciation of nature. Europeans visiting the tropics in the nineteenth century were sometimes revolted by tropical jungle, seeing it as corrupt and sensuous, whereas today's Western observers use terms evoking richness and fertility.[9] Nature conservation policies reflect this aesthetic by giving primary attention to what are sometimes called flagship species (or, more cynically, 'charismatic megafauna'[10]). In many cases, the strategy for creating and sustaining conservation areas has been based on the idea that the publicly acceptable task of protecting handsome species will make possible the preservation of other, less appealing species.

This focused aesthetic of a small number of valued species exists alongside a broader category of moral and emotional thinking about the cosmos and about human character. This thinking posits that nature warrants protection in its own right. As Pearson puts it, 'Nature conservation is seen as a moral imperative, akin to not committing murder or selling human organs'.[11] In the modern world, moreover, there is a pervasive spiritual doctrine that human psychological and emotional health depends on engagement with nature. This doctrine takes many forms, but it is

most evident in the marketing of nature as a means to relieve stress.[12] We would not have the social force that we now recognize as the global conservation movement, or its powerful national and local manifestations were it not for the moral and emotional judgements that have been aroused by the prospect of species extinction and the loss of habitat.

The third path along which the idea of nature conservation that has become embedded in politics is what I call the path of implication. By this path, I mean the process by which nature conservation has drawn political support not because of arguments about its value, nor because of any direct appeal to human aesthetics or emotion, but rather because the practice of nature conservation can be recruited to other purposes. These other purposes are the bedfellows that I refer to in the title of this chapter. To put it bluntly, people who care nothing for the science or the aesthetics of nature conservation may become its allies for their own reasons. This recruitment may be opportunistic and even unsavoury, but it can be a significant element in the politics of nature conservation.

I suggest that there are two main forms of implicationist support for nature conservation which I will call innovationist and ideological. Innovationist support arises because nature conservation is a relatively new phenomenon in world history. The first national park in the world was declared only in 1872. In most of the world, serious nature conservation is far more recent, dating from after the Second World War. The history of nature conservation in many countries is marked not by incremental change but by what evolution scientists would call punctuated equilibrium. These bursts of activity do not happen because the conservationist argument has suddenly been won, but rather because nature conservation provides a unique opportunity for policy initiative. A new field of policy offers potentially great rewards for the quick and the quick-witted. There is no establishment to displace and there is all the prestige that comes from shaping a new policy terrain. Indonesia's dramatic expansion of national parks in the 1970s and 1980s was driven to a significant extent by this political-bureaucratic dynamic.[13]

In an under-conserved country, the opportunity to declare national parks or to install protection is unique: once done, it cannot be repeated (though Indonesia did at one time do some creative double counting by expanding a national park, renaming it and claiming the whole expanded park as a new addition to the protected register). We are passing through a historical moment when nationally based conservation measures offer a unique opportunity for prestige. Advocates of conservation understand

this opportunity and play to the conceit of ministers and bureaucrats, though with careful management this sense of initiative can be reinvented again and again. In several parts of the world, the declaration of national parks in contested border regions has been a calculated measure to enhance the state's claim to that territory. Mongolia's protected areas, for instance, hug its long and vulnerable borders with China and Russia.[14]

The second form of implicationist support for nature conservation is ideological. In other words, nature conservation can become a pretext or metaphor for various kinds of social engineering. Here, too, one of the strongest examples is Indonesia. There, under the Suharto regime, nature conservation carried two political messages that resonated well beyond environmental policy. First was the message that Indonesian people were the enemy of the Indonesian national environment and that in nature conservation, as in so many other areas, only wise government policy, insulated from popular pressure, could deliver Indonesia an optimal nature conservation policy.[15] Having its roots in modern science, nature conservation was an ideal vehicle for the message that the mass of the people were not to be trusted with their own fate. Of course, it was not the only vehicle, but it was a significant one. In contemporary Indonesia, as in many other parts of the world, by contrast, there is a sustained discourse that portrays large corporations as the main enemy of nature conservation. Conservation in this context becomes a vehicle for radical progressive movements. Again, it is not the only such vehicle, but it is a significant one.

Suharto's Indonesia also used nature conservation in the form that focuses on habitat protection, rather than on the protection of individual species, to convey a fundamentally corporatist view of the world. The term corporatism here refers to the ideology that sees society as an organism in which many different and unequal parts function together for the sake of the whole. This view contrasts with the classical liberal view that society is composed of individuals whose separate striving for personal benefit produces public good, and with the Marxist view that society is structured according to classes, only one of which can ever be in control. As the term corporatist implies, this political position uses the analogy of the body, in which different cells and organs make different contributions and have different fates but are complementary in every fundamental sense. This is a powerful image, and it remains one of the strongest rhetorical tools of corporatism, but it has been supplemented strongly by the metaphor of the ecosystem, the web of life in which many different organisms are

essential, even if some of them are doomed to become prey for others. If anything, recent advances in biology have enhanced this message, by recognizing the body as an unusually disciplined collection of cells and Lovelock's Gaia concept which portrays the planet as a form of organism.[16]

Suharto's use of conservation was conservative, but progressives have also recruited conservationist ideas using the same sense of confluence of an idiom. The international campaign to support Indigenous peoples[17] has made much of what is said to be a pattern of gentle coexistence with ecosystems on the part of Indigenous peoples. This discourse has been used in particular to argue that Indigenous peoples can be trusted to live in conservation areas without damaging conservation values and that Indigenous knowledge of their environment can contribute usefully to park management strategies.

Implicationist alliances can be enormously effective in forging a coalition of forces to support nature conservation, but they can be risky in a variety of ways. Suharto's authoritarian conservationism proved weak when his institutional interests changed. From the 1990s, the expansion of the park system largely stalled and financial and institutional support for existing national parks withered. Without state protection, and in the absence of a strong organic conservationist sentiment in the country, the national parks become vulnerable to logging and other forms of encroachment. The marriage of convenience between conservation and Indigenous rights has its own vulnerabilities. The light touch of Indigenous peoples on the environment in the past may have been overstated[18]; the willingness of today's Indigenous peoples to maintain a light touch is also in doubt, now that they have new technology for making use of the environment and pressing social needs to be met.[19]

Conclusion

Programmes for the conservation of nature are grounded in sophisticated scientific understandings of the conditions which are needed to keep species viable. These understandings point to practical measures which, if implemented, are likely to enhance the survival prospects of specific species, both individually and as part of broader ecosystems. The adoption of conservation policies, however, and the choice among policy options where choice exists, is a matter of politics rather than science. Political processes allocate resources amongst competing social groups and adjudi-

cate among competing social and cultural values. The impulse to nature conservation has customarily been associated with political views that stress collective and broader social interests (including those of future generations) rather than the rights of the individual to pursue individual advantage or convenience. This broad association, however, is sometimes disrupted by unexpected alliances that reach across what are customarily seen as deep political divisions. The point of looking at the bedfellows of nature conservation is not to cast doubt on the necessity or urgency of the programme. It does not have anything to say about the efficacy of particular conservation measures. It alerts, us, however, to the need to be farsighted. We are rather good at solving problems, but we are not so good at anticipating the problems that will arise out of our solutions. Bedfellows of the kind I describe have their own interests, and sometimes we can see through their eyes to futures that we may not want. Understanding that nature conservation has no permanent allies helps us to be careful.

Notes

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16. J. E. Lovelock, *Gaia: a new look at life on earth* (Oxford: Oxford University Press, 1979).
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CHAPTER 4

Food, Agriculture and Small Farmers in Asia

Lindsay Falvey

Introduction

Within the theme of population, development and the environment from the perspective of the Sustainable Development Goals (SDGs), this chapter considers the nexus with food demand, including that of an increasingly urban consumer base in Asia, where risks are increasing of disease transference from domestic livestock. Beginning with the context of food security and small farmers, the discussion introduces some examples of breakthroughs of recent decades as an indication of what is necessary to meet future food demand. The discussion then considers research and development within the SDGs and seeks to align regional and international agenda to the essential role of producing secure, safe and nutritious food as a priority in development. In considering food production, it is acknowledged that agriculture changes the natural environment to suit human needs, and that sustainable intensification of food production will proceed for the foreseeable future.

Environmental consequences of food production have been misrepresented as something that could have been avoided. While true in some cases, most such arguments rely on current knowledge to critique past actions, while also neglecting the primary objective of past research break-

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throughs, which from the 1960s were overwhelmingly to avert starvation. This chapter is not the place for a detailed discussion of the relative morality of human lives saved against environmental costs; however, the food needed for the world's and, in particular, the Asian region's population relies on constant development and application of new technologies generated from agricultural research. Such research has been part of the delicate balance that maintains the stability of food availability (e.g. Regenerative 2014) essential for governance to begin to be able to oversee useful socio-economic development. Food production particularly attracts criticism of its large monocultures; globally, the major human foodstuff—cereals—relies on both those large farms and small farms that characterize most of the world's agriculture. Within the rapid economic developments of the Asian region, small farmers continue to be the major source of food production. Their role in the region's security is critical, both for their diverse food outputs and self-supporting lifestyles that allow many to remain in rural regions and so not contribute to the complex load of urban poverty.

Although farm size tends to increase in the developed world, it is the essential contribution of the small farms of two–five hectares that characterize the Asian region and much of the developing world has been discussed more fully elsewhere (Falvey 2010) as a parallel necessity to that of large farms. Numbering approximately two billion, small farmers are the majority of Asia's and the world's farmers, and technologies suited to their specific agricultural environments, and thus their production technologies, often differ from those of large corporate enterprises. With both farming types represented in Asia, and with Asia containing half of the world's population and only one of the world's seven or so major net food exporting nations, the rising food demand of populations is one of the clear outcomes of population increases. As Short (2009) observes "international organizations, governments and religious leaders will be the last to appreciate the gravity of the current situation, and the last to implement effective measures to halt further population growth." The apparent slowing of the rate of population increase correlated with affluence ironically does little to mollify the situation, since food demand actually increases with wealth as a result of a further 30 per cent of food being required to cover the inefficiencies of urban food supply systems, including wastage and the wealth-induced dietary changes (Falvey 2010).

This situation has emerged very quickly in Asia with its rapid economic development and increasingly open markets. While food security is seldom

a feature of international news about the region, it has been a preoccupation of the most populace countries of China and India, both of which are historically aware of the underpinning role of wide access to food as an indispensable pillar of governance. This holistic view of development recognizes that ensuring food security is the hallmark of good governance—a lesson from agri-history that is evident from older tribal to modern national levels. In Asia, and indeed outside the rich nations in general, the food producers are mainly small farmers who operate increasingly in commercial value chains, although some continue to sell only the food that is surplus to their subsistence requirements. Rather than view such reliance of small farmers as an exploitative economic arrangement, or as a disappearing cohort of a past era, it is more accurate to see a large segment of small farmers continuing to adapt to new conditions as they always have, which today include value chains that channel their products into urban supermarkets.

Globally more than half of the world's more than seven billion people now live in cities where interrupted food supply quickly results in riots that can disrupt social and economic development. Meeting food supply gave confidence for the current economic developments that resulted from the Green Revolution of the 1960s and 1970s, which was an overwhelming success, albeit with contingent costs. It allowed technologies that had been developed in rich nations to be adapted to suit the production conditions of poorer nations across much of Asia. After major successes, the Nobel Peace Laureate Norman Borlaug (1970) of the Green Revolution pointed out "the tide of the battle against hunger has changed for the better … but ebb tide may soon set in if we become complacent and relax our efforts."

It is easy to forget that the predictions of the time were that a major famine would result in the absence of coordinated application of agricultural science. China repeated the phenomenon by making research for increased food production its primary development policy and turned predictions of major starvation into national self-sufficiency in basic foodstuffs with some capacity for export, again at some environmental cost. China and India today support major agricultural science centres, which are increasingly the underpinning source of regional stability built on food security. Yet globally, the majority of research that stimulates continuous improvement in agricultural yields focuses on broadacre farming, while the needs of the small farms that feed about half of the world are underfunded (Alston et al. 1995). Even for those who adhere to the challenge-

able assumption that farm size will quickly increase following rich nation mores, this could be hazardous since the small farmers are a major source of current food security, especially in Asia. Just to be clear: if small farmers are displaced in large numbers and migrate to cities, the increased food demand for Asia could rise to the most pessimistic predictions of food demand models. Most commonly, the assumptions of rapid increases in average farm size accompany free trade ideologies.

Sole reliance on free trade in food is a risk for any poor net food-importing country (Falvey 2010). This is readily illustrated by the reminder of our inherent nature expressed through national governance in recent experience. We saw India in 2007 and Russia in 2010, each stands accused of subverting international free food trade when they banned most exports of grain in the face of drought-induced domestic shortages. Such actions by grain exporting nations are said by ideologues to induce unnecessarily large global price rises. Yet these governments followed their historical role of first catering for their citizens, not just out of some moral imperative but in order to ensure national stability. As Asia grows ever wealthier, it is easy to assume that free markets will apply to food like all other goods, since this seems to work for the rich industrialized nations. The critical difference remains the huge populations in Asia compared to industrialized nations, which generally have high levels of food self-sufficiency, additional production assets and in some cases are the major food exporters. As I argued elsewhere, food is always different to non-essential commodities—free trade may be applicable to luxury foods but is an unwise policy for net-importers of basic foods with large populations (Falvey 2013). In the case of Southeast Asia, the regional nature of the global rice market provides a ready example of the dangers of relying on free markets, as illustrated in Fig. 4.1 for cereal prices, especially rice—and the incidence of urban riots. Nobel Peace Laureate Amartya Sen's (1982) work has shown that reliance on free markets for a life essential such as food can fail when those with financial resources cause food cropping land to be switched to produce cash crops or non-agricultural products in place of food crops in response to market forces. Examples abound in Sen's and others' work, from the 1840s Irish famine to that in Bengal in 1943. The danger appears to be greater in populous nations.

In discussions that focus on Asia, the world's two most populous nations, China and India, have often provided nightmare scenarios of food and health risks. While risks remain in terms of population pressure, disease transfer and environmental changes, both nations have successfully

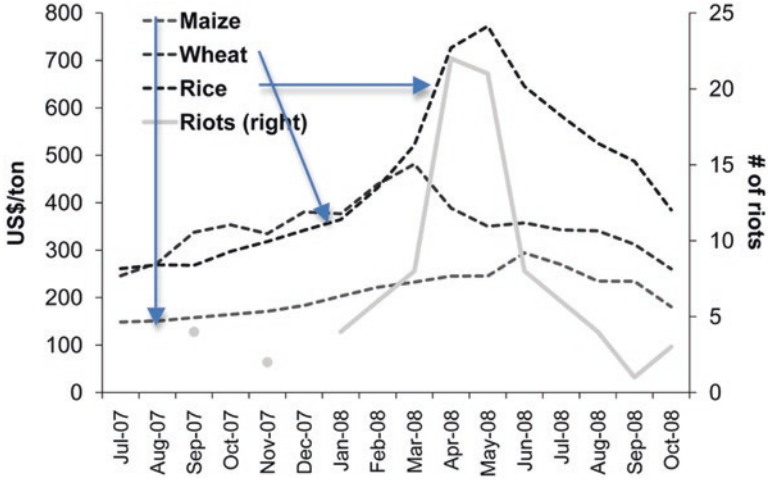

Fig. 4.1 Cereal price spikes and riots 2007–2008. (Source: von Braun 2009)

focused on food production. Their methods include variations on the approaches that Western nations imagine; in all probability, it is China and India that will lead the way for the rest of Asia in terms of innovation and research applications in food production. Both nations continue to rely on small farmers in parallel with large-scale production and to orient technological and market development to both sectors according to their requirements. To emphasize the point, using China as an example of its reducing food insecurity—in feeding around 20 per cent of the global population, China is integrating many of its hundreds of millions of small farmers into the food supply and value chains to serve national consumers that demand diverse sophisticated food products. Importing luxury foods and obtaining the use of foreign farmlands to service additional demand also form part of the wider approach, but for its domestic production new technologies including advanced irrigation, sensors, robotics, information management and genetic manipulation underpin the quest for sustainable intensification of food production. With a more rapidly rising population, India similarly reduced chronic hunger from more than 260 million in 1979–1981 to 230 million in 2003–2005.

These are snapshots of Asia in recent history. The future promises to be even more advanced as China and India become the leaders in the com-

plex biological sciences that make up agriculture. Meanwhile, agricultural research funding in wealthy nations is declining (Alston et al. 1995). The world reached the point of apparent food security by a relatively small yet sustained form of research assistance from wealthy nations to the developing world, and now appears to have at least partially passed the baton to new leaders. To understand the historical context, it is useful to review some examples of the breakthroughs that have resulted from the continuing international research community. International agricultural research involves many national research systems, and international development assistance including loans, but can be represented by a short consideration of the CGIAR, an acronym that once stood for the Consultative Group for International Agricultural Research—a system of 15 international research institutes funded mainly by wealthy nations to service food security and poverty in poorer nations.

Continuous Global Support

The CGIAR laboured against a context that has, until recently, viewed agricultural development as a dragon industrialization and rising standards of living, but is now understood correctly as a driver of economic and social development (de Janvry 2009). Five decades of experience in addressing the critical issue of increased food production has provided the confidence that future food needs can be met from research and development inputs—and lessons from the past can inform increased efficiencies for future research. This was the approach taken by the International Food Policy Research Institute (IFPRI) (Spielman and Pandya-Lorch 2009) in identifying past successes, which varied from improved crop varieties, cultivation practices, reduced pests and diseases losses, managed drought scenarios, efficient water management, focused policies and regulation, as well as orienting production to market needs. The resulting analysis and its examples are summarily grouped for discussion into intensification, environmental sustainability and market reform.

Intensification

From about 1950, India prioritized rural roads and electricity, irrigation, state agricultural universities and research institutes, fertilizer plants and land reform, and welcomed international agricultural research efforts. One result was an ability to control the historic negative yield impact of

fungal wheat rust. By such focused research, it is estimated that about 117 million hectares of wheat were protected that secured the food of 60 to 120 million rural households and millions of urban consumers (Evenson et al. 2006). This success involved the international collaboration that began the Green Revolution, the basis of the CGIAR, which went on to make further breakthroughs. Improved rice and wheat varieties suited to double cropping under irrigation followed and supported other crops, benefitting more than one billion people through increased access to food and income. Another way of expressing this is the survival of some 30 million children who would otherwise have died, nearly 70 per cent of whom were in Asia (Evenson et al. 2006).

Environmental Sustainability

Overuse of pesticides and fertilizers, profligate irrigation and soil loss from cultivation were by-products of food production successes, and these were then addressed by broad-based education, policy development and new technologies, such as zero tillage, in India, Nepal, Pakistan and Bangladesh where it was adopted by more than 600,000 wheat farmers leading to substantial environmental and financial benefit. Rather than view environmental effects in isolation and as failures, it is responsible to consider them in comparison with their benefits. Weighing and addressing the negative impacts of technological change is a constant responsibility of agricultural research, like all applied research.

Reforming Markets

Liberating seed and fertilizer markets and commodity prices from government controls stimulated new innovations from the commercial sector that further enhanced food production policy reform in China, and allowed a private seed industry for hybrid rice to develop that spread across more than 60 per cent of its rice lands (Li and Yuan 2009). Similarly, India allowed private investment in seeds, which in conjunction with research led to yield increases of more than 80 per cent (Pray and Nagarajan 2009). Success factors were generalized as diversification, policy reform and food quality.

Asia benefitted widely from diversification away from reliance only on staple cereal crops to the inclusion of livestock products and legumes, thereby improving nutrition and incomes of millions of farmers

(Shanmugasundaram et al. 2009). India's Operation Flood stimulated the creation of small-scale dairying and processor cooperatives that, along with policy reform led to India exporting dairy products (Cunningham 2009). A similar development occurred with Tilapia fish production in the Philippines (Yosef 2009).

Policies that favoured urban populations and inadvertently disadvantaged rural dwellers including farmers were reversed in China by liberating small farmers from decades of enforced collective farming (Lipton 1977). The policy reform of the Household Responsibility System covered more than 90 per cent of the farmland and provided an estimated 160 million farming families with incentives that led to their incomes doubling, rural poverty decreasing, grain output increasing by more than 30 per cent, and the freeing of some labour then needed for industrial development (Kirk 2009). Vietnam followed a similar path in policy reform changing it from a food-importing nation to become one of the world's largest rice exporters (Kirk 2009). Security of land tenure has been key to such reforms that encourage private initiative and the development and use of new technologies.

With technological, diversification and policy reform successes, the quality of food soon became a focus. Where once discussions about food security focused on energy intake, now micronutrients are seen as also being central and this can complicate agricultural development even further (Berti 2004). From home production of vegetables to urban livestock production, nutrition is seen as the sustainable means of countering the compromised mental and physical capacities that result from micronutrient deficiencies. Some successes have been quantified, such as in Bangladesh (Iannotti 2009). In Vietnam, simple improvements in local systems of fresh meat marketing have reduced contamination risks, while avoiding the costly developments that might otherwise have been required, if rich country approaches to food safety had been immediately mandated (Grace 2015).

Building on Success

Successful developments, such as those outlined above, have been the result of integrated understanding rather than single-focus interventions. They have occurred at their own pace, some relatively rapidly, while others have taken decades. Common elements of success can be elicited and include the following:

- Sustained investment and global collaboration in agricultural research
- Complementary integrated development investments
- Appropriate policies that stimulate whole-of-economy private investment
- Including communities in planning, innovation and implementation

To build on this knowledge for food as a globalized commodity in terms of markets, trade and preferences, strategic planning by governments is required backed by informed regulation that supports delivery of the primary governance role. This is a continuous process, adapting to ever-changing environmental and market conditions in the pursuit of outputs in a longer time frame than can often be foreseen. Outputs of individual research projects, conceived and interpreted in terms of their inter-relationships with other factors, are the major actions of this continuity and are most applicable when development planners have a broad understanding of science and philosophy in addition to economics, for, as Alfred North Whitehead observed "no fact is merely itself" (1938). It is this element of complexity that has, in the past, been overlooked by single-element developments that omit consideration of integrated systems, concentrating, for example, on yield increases without understanding environmental costs, infrastructure constraints, socio-cultural beliefs or market conditions. Single-focus approaches, such as increasing cereal production without considering other inter-relationships can counterintuitively undermine food security, if they detract from systemic understanding. Integrating diverse disciplines across the biological and social sciences has been the essence of agriculture science, and it is from that great legacy that Asia has been able to reach its current ascendancy; yet challenges remain.

Challenges

The future for food and agriculture has been summarized by FAO (2017) in the integrated terms of the SDGs. For example, FAO predicts the need for a 50 per cent increase in food supply by 2030 to meet population demand for rising population and wealth-induced growth in the consumption of meat, fruits and vegetables relative to cereals, with the most rapid changes occurring in Asia. Yet, at the same time, the rate of yield increases has slowed, probably in relation to such factors as rich country

de-prioritization of agricultural research and reduction of the natural resource base arising from urban expansion into farmlands, soil erosion and climate change (Alston et al. 1995). Such pressures appear to be greater in less food-secure regions, which in the short term will lead to threats to crop, livestock and fish production and then possibly stimulate further agricultural incursions into forested and marginal lands. Added to such factors is the rising incidence of disasters impacting food production from floods, droughts and conflict. While recognizing the major strides in both poverty reduction and general food security, dietary deficiencies that lead to stunting, incomplete mental development, blindness and other complications for some two billion people globally hamper the economic development that was once assumed to automatically flow after satisfying general dietary energy needs. The effects of micronutrient deficiencies are insipid, often delayed and perhaps less "breaking-newsworthy" than the starvation resulting from absolute deficiencies in energy intake; yet the limitations they impose on development are significant. New genetic technologies allow the inclusion of micronutrients in available foodstuffs, yet still face some ideological barriers from influential nations. Technological development integrated with other components of the wider environment has been and remains key to Asia's continued success in food production. Many new technologies tend to favour capital-intensive agricultural practices that can concentrate ownership of food supply chains in fewer hands and alienate capital-poor small farmers who then migrate seeking urban work, leading to depopulation of males in rural areas. Such outcomes are socially unsustainable and probably represent a transitional phase; in any case, the inequity is not sustainable. Consideration of food, population and the environment in Asia must acknowledge the role of its large agribusiness groups in efficient food production and the role of government in appropriate regulation. Reliance on markets alone for food safety and equity is not a reliable basis for the social stability needed for continued development.

Thus, the challenge for Asia remains. An unspoken assumption that a rising industrial economy indicates food security may have some basis in wealthy Western nations which have long developed the lands best suited to the food production systems that benefit from known technologies. However, Asia represents quite different natural and social environments for which additional technological innovations are needed. Experience has also shown that wealth alone is insufficient; it did not secure the foods of choice for Middle Eastern nations as recently as the 2007–2008 grain crisis, and their subsequent procurement actions were a force in driving

prices out of the reach of some other importing regions. In applying or developing technologies for new environments, Asia's challenges include maintaining production from intensive farming that is implicated in undesirable deforestation, changed water availabilities, soil depletion and other environmental imposts. Various concerned parties have used these observations to decry the loss of traditional Asian production systems, but it is both unfair and unrealistic to suggest that some farmers be kept as museums of past lifestyles. The practical approach is to be open to learning from the enduring values distilled from centuries of experience embedded in such traditions; this is the function of the Agri-history Foundation, an organization that looks at such practices from a largely objective perspective, and which commonly arrives at the need for a wider integrated view of all aspects of an environment. An integrated understanding, one that recognizes the inter-relationships of everything (Falvey 2016), is also emerging in agroecological approaches such as conservation agriculture, and incidentally informs development actions relevant to those who remain vulnerable to slipping back into poverty, as can occur when inequalities are reinforced by otherwise successful developments. Pro-poor approaches for agriculture within an integrated understanding therefore must consider urban and rural areas, not just farmlands. This implies crisis resilience, social welfare and equality in health and education. Part of this is wise policy making, but another part is maintaining an overall awareness of the effects of all investments and the continuing need for smallholder food production and their livelihoods. An integrated approach might be readily appreciated within an agroecological region, including those that cross national borders. It also extends further to the recognition that, as FAO (2017) acknowledges, "All countries are interdependent." This is the realization that allows us to transcend the old rhetoric of "developed" and "developing" countries. The naivety of assuming that national laws or borders keep us independent of the problems of food, population, environment or infections in other parts of the world is now being dispelled by migration and epidemics induced by conflict and climate change. Such inter-relationships underpin the SDGs.

The Sustainable Development Goals

The evolution from the Millennium Development Goals (MDGs) to the SDGs in 2015 has spurred calls for national programmes to align with the SDGs (Schwoob 2016). While this seems appropriate in terms of national

governance, overriding assumptions of the SDGs themselves require action by all nations since all development actions have effects beyond their immediate sphere. In this way the SDGs can be comprehended as a recognition of the integrated nature of all things, or "interlinkages" (ICS 2017). When the subject is food and health, such inter-relationships are now daily brought home to the world through hunger-induced strife and migration, and the fears of zoonotic pandemics.

The coordinated international agricultural research that is a hallmark of civilization in our era involves researchers in wealthy nations, such as Brazil, China and India, as well as most other responsible nations that can afford the costs. Today three factors threaten this essential driver of stability and wealth: increased concentration of ownership of commoditized technologies, decreases in rich nations' investment in agricultural research and the modest budgets of international research institutes. The first is beyond this chapter, the second has been mentioned already and the last of these is of particular importance because it is the means by which value is added to small farmers from research conducted by national governments and private bodies. The principal vehicle for this is the CGIAR system.

The CGIAR works through a strategy that is directly related to the SDGs of no poverty or hunger, good health and well-being, gender equality, clean water, sanitation and climate action, while also contributing to other goals. In particular, its actions can be grouped into three areas: reducing poverty, improving food and nutrition security, and improving natural resources and ecosystems, across which climate change, gender, policies and capacity development are integrated (CGIAR 2016). The 15 CGIAR centres, each governed independently for their specific mandates, cooperate and coordinate with global research bodies to focus on the issues of the poorer nations. Such a focus has produced the amazing breakthroughs described earlier in this chapter, and many others such that calculations of rates of return for the investment costs commonly exceed those possible in other sectors (Lindner et al. 2013). But research outcomes alone do not generate such returns. It is their application in appropriate ways and this necessarily involves government, development agencies and a range of non-government organizations, including in particular the private sector, for agricultural and market infrastructure among other necessities. It is this integrated agricultural service of CGIAR in conjunction with government and the private and other non-government sectors that can underpin the stability of food and nutritional security

across even the marginalized regions of Asia, and so provide the foundation for wider social programmes.

Of particular importance to Asia with a rapidly expanding middle class demanding more livestock products are the production opportunities and income sources that arise for some in rural areas. Livestock is even more important among the marginalized in a society whose diet is at risk of being imbalanced nutritionally. While it is sometimes argued that it is possible to obtain all requisite nutrients from a fully vegetarian diet, in practice it is extremely difficult to do so, unless one is wealthy and enjoys a privileged lifestyle, usually in a Western country. And for the poor, including those in Asian cities, daily or regular intakes of small amounts of animal products have been made possible for many through research and development that makes meat, milk and egg production sustainable and reliable. Ensuring such balanced micronutrient intake for poorer people allows them to participate more fully in their societies, which is a basic objective of development.

With rising wealth, the value of agricultural production in Asia is increasingly considered in monetary terms rather than energy from calories or tons of grain. From this perspective, it is noteworthy that five of the six most valuable agricultural commodities in the world are animal products (FAOSTAT 2015). Figure 4.2 illustrates that the net value of production of cow milk now exceeds that of all other major food commodities, having overtaken rice in recent years. After milk and rice, meat from pigs, cattle, chicken and fish follow and all exceed the values of wheat, soybean and maize. Within the essential animal food sources, wild and farmed fish are often underappreciated, even though they provide more than 20 per cent of the animal protein for Asia. Focusing on means of meeting the needs of the marginalized groups in society, the International Livestock Research Institute (ILRI) and World Fish—both parts of the CGIAR system—develop practices to improve people's lives through livestock and fish production. The ILRI provides compelling scientific evidence for decision-makers to plan for socio-economic, health and environmental dividends while increasing the capacities of farmers and governments to beneficially invest in outcomes from livestock and fish science.

Concentrating on sustainable livestock production for ILRI is much broader than simply increasing yields although it remains central for forage, genetics and health. It also includes ensuring that policies for development are logical, that the interactions between livestock and their

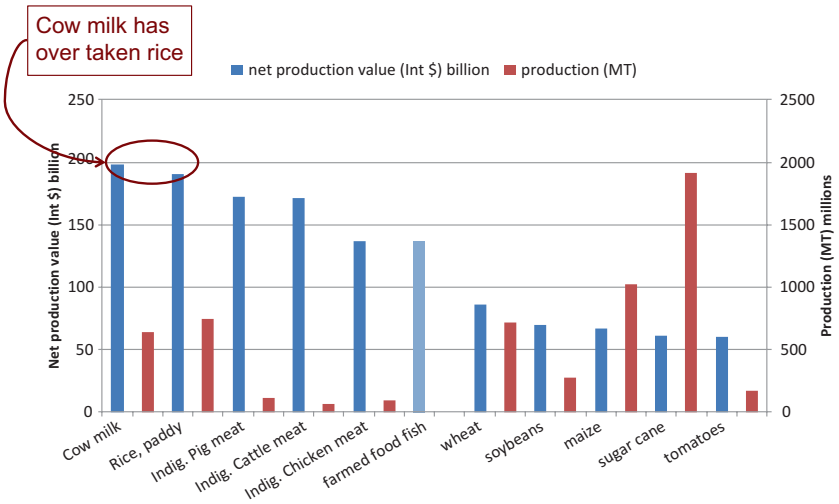

Fig. 4.2 Major agricultural production values and production, 2015. (Source: Smith 2017)

environment are managed and that foodstuffs are safe and healthy. Furthermore, it addresses containment of zoonotic diseases—those that pass from animals to humans such as Avian and Swine influenzas—through the development of new vaccines and diagnostic products. This "One-Health" approach that addresses human and animal outcomes is one of livestock research's examples of an integrated understanding of its mandate. Such research conducted on behalf of the segments of society that are often neglected by economic development aims to integrate them into both the production and consumption of livestock products, which is most logically done by transforming the small livestock systems that dominate Asia's domestic production. The alternatives to this are either importing meat products to service all of the rising demand or importing industrial livestock production systems and knowledge. Both of these can occur without government assistance, and neither obviously assists the marginalized segments of society. The ILRI focus on small producers is neither sentimental nor ideological. It is pragmatic since it is smallholders that produce most livestock outputs, and incidentally half of the crop outputs; they do so competitively without detracting from the viability of large commercial systems. With the large and increasing livestock popula-

tions of Asia in the midst of large human populations, zoonotic outbreaks are increasingly common, as emphasized by Nobel Laureate and ILRI Patron Peter Doherty's statements about specific human disease outbreaks originating from animals (Doherty 2017). The hot spots of such diseases have traditionally been the USA and Europe, which are now being joined by Asia, in particular, North, South and Southeast Asia. These examples link SDGs across health, food sufficiency and environmental considerations.

Conclusion

Progress towards the SDGs can be assessed by indicators subdivided to practical levels, if the integrated nature of the SDGs is recalled, as is currently being done (IAEG-SDGs 2017). Such indicators will assist investment planning, which inevitably will work within the implications related to food that are relevant to population, development and the environment discussed herein. Food and nutritional security remain primary responsibilities of government. Where this is forgotten, environmental degradation proceeds apace and is accelerated by population increase such that development investments become ineffective. Worthwhile ventures for conservation and environmental regulation, disaster recovery, urban reliance, gender equity and the other noble developments discussed in this book depend on the food and nutritional security that have been introduced in this chapter, and which are amplified elsewhere (Falvey 2013).

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CHAPTER 5

Trade-Offs Between Hydropower Development and Food Security in River Management

Jamie Pittock

Introduction

This chapter examines the trade-offs in managing major rivers for hydropower versus food supply by reviewing recent resource developments in the lower Mekong River to discern lessons for Myanmar. Formation of a democratically elected government in 2015, this is timely as Myanmar is considering new agricultural, energy and water policies with the as the nation emerges from political isolation and economic development accelerates. Following this introduction, the state and development options for hydropower in the lower Mekong River basin (LMB) and Myanmar are summarised. Trade-offs with supply of nutritious food are then explored. Options for managing the trade-offs are then reviewed before concluding with lessons for Myanmar from the development of the LMB region.

Many civilisations have developed along great rivers: the modern nation of Myanmar has the Irrawaddy and Salween rivers at its heart. This is not surprising since great rivers have provided transport routes that enable

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trade, alliances and wars that are the origins of many modern nation states. Great rivers also have rich soils on their floodplains and deltas that support agriculture, and the rivers are an important source of fish. The soils are sustained by sediments brought by annual flooding (Postel and Richter 2003). The agriculture practised on these floodplains and deltas was developed using extensive, traditional ecological knowledge of seasonal conditions and monsoon season flood behaviour. Rich fisheries are sustained by the breeding and migration cues of annual floods, and the opportunities they afford to access the inundated floodplains. In modern times, these ecosystem service benefits are increasingly jeopardised or substituted by the generation of hydropower (Richter et al. 2010; WCD 2000).

The nations of Southeast Asia are developing rapidly as a consequence of greater political stability and market reforms, growing populations and wealth, and in particular, demand for resources from industrialising nations such as China, Thailand and Vietnam. Among the most rapidly expanding sectors exploiting natural resources are agriculture, mining, energy and consequent water supply (Smajgl and Ward 2013). The Asian Development Bank and the Chinese government have formed the Greater Mekong Subregion (GMS) programme to support development in the Yunnan Province of China, Cambodia, Laos, Myanmar, Thailand and Vietnam. The GMS programme is accelerating development through planning and financing for infrastructure projects to enhance economic integration, including roads, railways, electricity transmission and gas pipelines (ADB 2015). To meet their growing demand for electricity, China and Thailand are among the funders of an accelerated programme of hydropower developments in less developed neighbouring countries, in particular, Laos and Myanmar (ICEM 2010; IFC and ICEM 2017).

Development accelerated in the Mekong River basin in the past decade ahead of that in Myanmar, which is at an early stage. The LMB comprises the area of the Mekong River basin in Laos, Thailand, Cambodia and Vietnam. From 2010, construction of 88 new hydropower dams in the LMB has been underway and planned up to 2030 (see Fig. 5.1; ICEM 2010). A 2017 assessment of Myanmar identifies nine power plants under construction and 50 projects in various stages of pre-construction development (see Fig. 5.2; IFC and ICEM 2017). A further reason for examining lessons from the LMB is that the institutions of the Mekong River Agreement and several decades of international aid have resulted in extensive research into the costs and benefits of hydropower that is summarised in large part by ICEM (2010). By contrast relatively little consistent data

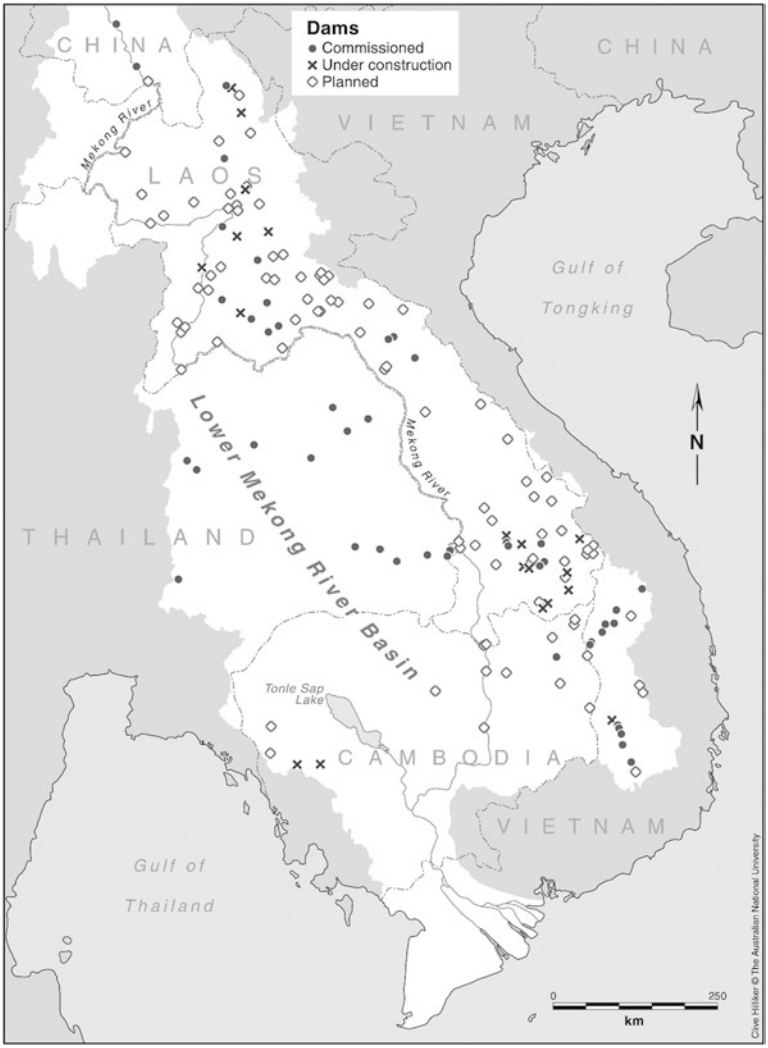

Fig. 5.1 The lower Mekong River basin showing existing and planned hydropower dams. (Source © Clive Hilliker ANU with data on dam sites from CPWF 2013)

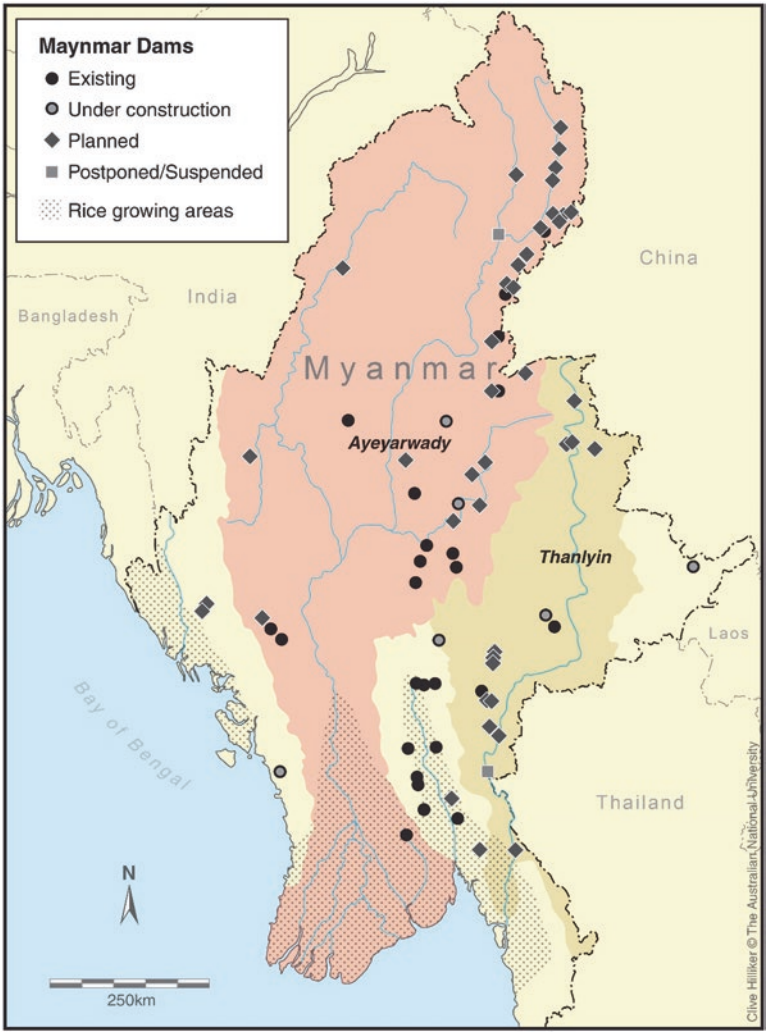

Fig. 5.2 Myanmar showing existing and planned hydropower dams above 10 MW capacity, as well and the floodplains and deltas where rice production is concentrated. (Source © Clive Hilliker ANU with data on dam projects from IFC and ICEM (2017) and lowland rice production areas from Raitzer et al. (2015))

or multi-disciplinary research is available for Myanmar, with the IFC and ICEM (2017) the first thorough attempt to collate available information. For these reasons this analysis begins with the LMB.

Hydropower Trade-Offs in the Lower Mekong Basin

Hydropower Development in the Lower Mekong Basin

The Mekong River flows from the Tibetan Plateau through China and past Myanmar and Thailand before flowing through Laos, Cambodia and Vietnam. It is one of the world's longest and most biodiverse rivers. Over a number of decades, the governments of Cambodia, Laos, Thailand and Vietnam have collaborated in river basin institutions for the development of resources, most recently through the Mekong River Agreement and Commission (MRC 2011).

The construction of hydropower dams in the LMB in Cambodia, Laos, Thailand and Vietnam provides a pivotal example of the nexus in the rapid development of a large river system (Pittock et al. 2016). Construction of 88 new hydropower dams in the LMB is planned between 2010 and 2030 (see Fig. 5.1; ICEM 2010), with work well advanced on a number of main stem dams in Laos.

Planned hydropower developments are primarily located in Cambodia and Laos (see Fig. 5.1) with most electricity to be exported to China, Thailand and Vietnam as part of the GMS economic development strategy facilitated by the Asian Development Bank. Cambodia and Laos will earn export revenue from the sale of electricity but will also generate some for their domestic use (ICEM 2010). Dam development is anticipated to have a number of impacts on the environment and people of the LMB, including inundating relatively small areas of land and displacing thousands of people, as well as changes to water, sediment and nutrient flows to highly productive floodplains and delta regions (ICEM 2010). Importantly, the dams form barriers to the migration of breeding fish, and this is projected to lead to the loss of 495,000–792,000 tons of wild-caught fish per year (ICEM 2010), which is a net loss in fish protein from –23.4 to –37.8 per cent (Orr et al. 2012). We note that official data is widely believed to under-report freshwater fish catch and thus these losses may be conservative (Hortle 2007). Further, these estimates of losses do not consider other negative impacts of hydropower dams on fish populations, for

instance, in limiting the extent of wet season floodplain inundation that provides habitat for many fish species.

Food Supply in the Lower Mekong

The loss of fish is critical for food security of people in the LMB. Food security is defined by more than just supplying energy (calorific) needs of people and includes elements of adequate nutrition and access to food supplies, which is a focus of this assessment (Pinstrup-Andersen 2009). The LMB can supply adequate calories to support people because of extensive rice production (Orr et al. 2012; Pittock et al. 2017). However, proteins and a range of micronutrients including vitamins, minerals and essential amino acids are considered to be in short supply for many poorer people in the LMB (Lee 2014; Phonvisay 2013). Fish provide essential micronutrients, especially for child health and development (Kawarazuka and Bene 2010). For example, in 2014 in Cambodia 32.4 per cent of children under five years old were stunted, whereas for Laos in 2011–12, 43.8 per cent were stunted (UNICEF et al. 2017). While nutrient supply is only one factor in reducing child stunting, it is a key prerequisite.

While the Mekong River Commission has promoted better environmental impact assessment of proposed hydropower development projects by its member states, and commissioned the 2010 *Strategic Environmental Assessment* (ICEM 2010), these have not considered how diminished food supplies from wild-caught fish could be replaced. Following an earlier study (Orr et al. 2012), Pittock et al. (2017) assessed three replacement options for the four LMB nations, namely replacement by protein-rich crops, livestock or fish, by scaling up the production of foods already consumed by people in these nations to fill this gap. They considered the replacement of both protein and lysine as an example of an essential micronutrient. Lysine is an amino acid that is found extensively in fish, legumes, ground nuts and beef (Lee 2014) and is vital for the healthy development of children's brains (Thilsted 2012; Welch and Graham 2000; Golden 1991; Young and Pellett 1990).

Comparing different food stuffs for protein and lysine content, soy, ground nuts, legumes/pulses, chicken and beef all have similar or higher levels than fish. However, pork has only around three-fifths the content of fish, and rice has only two-fifths the protein content and one-sixth that of lysine. Consequently, while planned hydropower development in the LMB will increase hydroelectricity supply by 900 per cent it would require con-

siderable resources to replace the lost lysine (as the more limiting element) in the food supply of the four LMB nations, namely (Pittock et al. 2017):

- Using fish, Thailand would need to redirect a third to half of its marine fish exports to regional consumption or Vietnam would need to redirect a quarter to a third of its aquaculture exports;
- Increasing grazing livestock production would require each country to increase pasture lands by 7–155 per cent; and
- Increasing protein-rich crop production would require each country to increase crop lands by 6–59 per cent.

The changes projected above involve loss of a common pool resource in the freshwater fisheries, conversion of forest and other lands to agricultural use and a greater commercialisation of the food supply system. While this may have economic advantages at a national scale, the rural poor are likely to be disadvantaged. In the LMB, many farmers spend part of their time in subsistence fishing, a livelihood strategy that will be diminished with the freshwater fisheries (Bene and Friend 2011). The rural poor are less able to afford to purchase alternative proteins. Many fishers have lost their livelihoods as the fisheries have declined; they have become migrant labourers (Nguyen and Connell 2015).

Changes to Agricultural Systems

Larger dams are designed to store a portion of peak wet season river flows for hydropower generation in the dry season. Necessarily this increases dry season flows, diminishes the area inundated in the wet season and changes the timing of flows. Together with projected climate change impacts on water availability, the induced changes to river flow threaten floodplain agriculture dependant on traditional ecological knowledge of when are the best times to plant and harvest crops. In the Mekong Delta in Vietnam, from the late 1990s less predictable river flows led to the construction of progressively bigger and more extensive levees to protect rice crops, replacing the traditional once per year floating rice crop with two and three crops of high-yield rice varieties (Nguyen et al. 2016). Increasing high-yield rice crops is a common prescription of international development institutions (ADB 2009). However, a number of perverse impacts are evident from this intensification of agriculture, notably (Nguyen and Connell 2015):

- Rice farming is not very profitable due to the high costs of improved seeds, fertiliser and pesticide inputs, and energy required to pump water into and out of polders (Van Nguyen and Ferrero 2006). By contrast, remaining traditional floating rice farmers have higher profits from the combination of a low yield, low chemical and high-value rice crop combined with the harvest of wild aquatic plants and animals and a dry season vegetable crop (Nguyen and Pittock 2016);
- Fisher's livelihoods are diminished or they become migrant labourers;
- Food security is diminished as rural residents have less direct access or cannot afford more nutritious foods in place of the wild fish catch; and
- The environment is degraded due to increased pollution from farm chemicals and changes to floodplain inundation.

In recent years, Vietnamese governments have recognised these problems and revised their agricultural policies in the delta to protect and restore floating rice areas for the flood management, environmental and food supply services that they provide (Nguyen and Pittock 2016).

The links between hydropower, water management and food supply described above highlight elements of a complex system where unthinking changes in one sector can have perverse impacts in other sectors. Good governance suggests that decision-makers should try as far as possible to understand such complex systems so as to intervene in ways that maximise benefits while minimising negative impacts. Pittock et al. (2016) developed an influence model for the hydropower–food supply nexus in the LMB. This model suggests that there are two reinforcing loops emanating from hydropower development. In the first, changes in river flows lead to more agricultural water infrastructure development, loss of wild food resources and an energy-intensive shift to more commercial agricultural production systems. In the second, more energy-intensive farming increases the demand for energy and industrial development (for instance, of farm chemicals and machinery), which in turn increases the demand for hydropower. This self-reinforcing industrialisation of agriculture and energy supply systems may have national economic benefits, but it challenges national governments to define policies that will reduce rural poverty and conserve natural resources. Starting 30 years after Vietnam's Doi Moi economic reforms, Myanmar has an opportunity to consider what

sort of energy and agriculture systems it wants to meet as objectives for poverty reduction and economic development.

Implications for Myanmar

Hydropower in Myanmar

This assessment focuses on the two largest rivers in Myanmar (see Fig. 5.2). The Ayeyarwady (Irrawaddy) River basin lies almost entirely within Myanmar and forms the heart of the country. The Thanlwin (Salween) River flows from the Tibetan Plateau through China and then into Myanmar. The economic and political isolation of Myanmar in the decades leading up to 2010 limited access to the resources required for hydropower development. In this time, China proposed a number of dams on these rivers in its own territory and through its investments in Myanmar. Approval for a number of the Chinese dam developments in Myanmar has been suspended due to inadequate environmental impact assessment. In face of substantial public opposition in 2011, the Government of Myanmar suspended the Chinese-funded Myitsone hydropower project, the first proposed on the main stem of the Ayeyarwady River. In Myanmar there are now 27 existing hydropower plants (installed capacity = 3192 MW), 9 power plants under construction (installed capacity = 1820 MW) and 50 projects in various stages of pre-construction development (planned installed capacity = 47,358 MW) (see Fig. 5.2; IFC and ICEM 2017). A *Strategic Environmental Assessment of the Hydropower Sector* in Myanmar is underway, but the draft does not address all the issues raised above due to limited scope and availability of data (IFC and ICEM 2017).

There is no doubt that a substantial increase in electricity supply is required in Myanmar to reduce poverty and support economic development. The IFC and ICEM report that Myanmar:

- Has the lowest grid-connected electrification rate in Southeast Asia at 35 per cent in 2015;
- Was ranked 191 in energy intensity in 2011 making it one of the least energy consuming countries in the world;
- Saw growth in annual demand for electricity of about 4.8 per cent per year from 2000–2001 to 2009–2010, increasing to 17.6 per cent per year from 2009–2010 to 2013–2014; and

- Is projected to see demand for electricity rise by 9.6 per cent annually to 2030.

Meeting this demand from energy resources with low greenhouse gas emissions will require some hydropower development (IFC and ICEM 2017).

Trade-Offs with Food Security

The food production systems in Myanmar have considerable parallels with the LMB. The IFC and ICEM (2017: 53) state that "Myanmar's freshwater capture fisheries are amongst the largest and most productive in Southeast Asia." The Ayeyarwady River supports the majority of this inland fishery resource. The potential impacts of hydropower development on these fisheries have not yet been projected. The IFC and ICEM (2017) identify the following likely impacts of hydropower on fisheries: loss of migratory fish species; loss of nutrients downstream leading to reduction in freshwater and marine fisheries; and increased potential for reservoir fisheries (although in the Mekong, this is estimated at only ten per cent of the volume of lost wild fisheries (ICEM 2010)).

There are similar food security and health challenges in Myanmar as for the LMB. For instance, in Myanmar 29.2 per cent of children under five years old were stunted in 2015–2016 indicating the need to enhance, among other factors, the supply of more nutritious foods such as fish.

The potential impact of hydropower development on flood flows and agricultural production needs to be considered. In the colonial period, Myanmar was a major rice exporting nation. The country has extensive areas of lowland paddy rice farming as illustrated in Fig. 5.2. Policies for the development of agriculture are still being considered by the new, democratic government, but already Myanmar is being advised to expand the use of water infrastructure to support multiple annual crops of high-yielding rice (Raitzer et al. 2015).

Myanmar has the largest area of traditional floating rice production remaining in Asia. Myanmar once had 1.28 million hectares of floating rice but by 2015, this had been reduced to 745,037 ha distributed across six regions (1) Kayin (36,566 ha), (2) Mon (42,048 ha), (3) Tanintharyi (20,249 ha), (4) Bago (217,379 ha), (5) Yangon (98,811 ha), and (6) Ayeyarwady (329,982 ha). The Ayeyarwady delta region has the greatest area at 329,983, accounting for 44.3 per cent of the country's total

(Nguyen and Pittock 2016). This agricultural system is important for providing flood-adapted, low input–output rice production combined with good returns from fisheries and dry season vegetables. Floating rice systems are more profitable and a source of more nutritious foods compared to intensive rice production. However, changes to river flows induced by hydropower may accelerate the conversion of open floodplain floating rice systems to infrastructure-based intensive rice production.

The IFC and ICEM (2017) identify the following likely impacts of hydropower on agriculture in Myanmar: reduced nutrient transport; reduced flooding; increased water availability for irrigation; loss of land in inundation area; reduced sediment load to the deltas; loss of riverbank gardens; higher dry season flows reducing saline intrusion in river deltas; and increased availability of more reliable, cheaper grid-based electricity. A key question for Myanmar government regulators is the extent to which the proposed hydropower dams will change the flow timing, water volumes, sediment and salinity that influence the Ayeyarwady and Thanlwin river deltas geomorphology, fisheries and agricultural production. For example, the Myitsone hydropower project on the Ayeyarwady River would increase downstream water flows by 16 per cent in the dry season and reduce them by 3.5 per cent during the flooding season (IFC and ICEM 2017). Further assessment is required to identify the cumulative impacts of basin hydropower development on the fisheries and agriculture of these river systems.

The Government of Myanmar has some key decisions to take on the direction of its energy, water and agricultural policies. If it opts to increase high volume, low value rice exports following the previous trajectory of Vietnam and the current policy of Cambodia, then considerable investments will be required in irrigation infrastructure and supplementary policies to ensure that the rural poor have more access to nutritious foods. Alternatively, if the emphasis is on poverty reduction and a more diverse range of lower yield, high-value agricultural products then the negative impacts of hydropower in changing flows to the lowlands are of great importance.

Managing the Trade-Offs

While the Government of Myanmar currently requires environmental impact assessments, currently these are not of a high technical standard and often are undertaken after the project has commenced. Further, the government currently issues hydropower concessions ad hoc in response

to developer proposals, thus significantly reducing options for maximising electricity production, while minimising negative impacts by approving projects on only the most favourable sites (IFC and ICEM 2017). The *Strategic Environmental Assessment of the Hydropower Sector* in Myanmar that is currently underway is an essential first step in providing information for more strategic decision-making.

However, a number of more sophisticated systems are available that could enable dam sites to be compared to choose sequentially the most optimal. In general, these systems involve identifying and protecting from development river tributaries and reaches of great environmental, social and economic importance. Development of the main stems of rivers is avoided so as to maintain fish migration, more natural flow variation and other important ecosystem services. Then, in this triage approach, tributary rivers with less environmental, social and economic values may be fully developed for hydropower. The International Hydropower Association has endorsed a less detailed version of this approach in its *Hydropower Sustainability Assessment Protocol* (IHA 2010). A review commissioned by the Asian Development Bank, Mekong River Commission and WWF (King et al. 2007) identified options from existing practices in Southeast Asia, leading the Mekong River Commission to propose a *Basin-wide Rapid Sustainability Assessment Tool* (MRC 2010).

Unfortunately, these more sophisticated strategic hydropower development approaches have not been applied in practice in the Mekong River basin at this time. The agreement would be required among the four nations to be most effective. Myanmar is in a better position to do so, since it controls virtually all of the Ayeyarwady River basin. For the Thanlwin River, Myanmar primarily has to negotiate with China, a nation that has demonstrated great interest in technical measures to reduce the impacts of hydropower projects on people and the environment (although a small portion of the basin also lies in Thailand).

When it comes to individual dam developments, there are some environmental mitigation measures that can reduce some of the environmental and social damage caused by hydropower projects. For instance, in China in the Lancang/Mekong basin a number of measures are applied to reduce impacts on biodiversity to different degrees and with different effectiveness (from high to low effectiveness) (Xu 2017):

- Tributary river fish reserves;
- Environmental flows;

- Thermal pollution control;
- Fishways;
- Fish lifts;
- Sediment flushing;
- More active fisheries administration;
- Fish breeding and release;
- Artificial fish egg breeding nests;
- Transporting fish.

Given the substantial presence of Chinese companies in hydropower development in Myanmar, there should be opportunities for them to transfer their knowledge and implement these mitigation measures. The Government of Myanmar should require more effective mitigation measures.

Conclusion

Following the economic and political reforms since 2010, Myanmar is in an exceptional position to determine the future development of its energy, water and agricultural resources. The nation has the opportunity to look at its neighbours in the lower Mekong Basin to evaluate development policies that have worked well and derive lessons on what to avoid.

This assessment indicates that ad hoc development of hydropower in the Mekong Basin has had many perverse impacts in changing river flows and reducing inland fisheries. While energy security has increased, food security has diminished. Changed river flows have in part led to the intensification of rice cropping in the Mekong Delta through the development of water infrastructure. Among the unexpected outcomes are reduced access of local people to nutritious foods, less profitable farming and diminution of livelihoods for those who depend on the wild freshwater fish resource. Options for replacing nutrients from the lost fish in the food supply system from aquaculture, livestock or protein-rich crops have high costs in terms of land-use change and lost opportunities.

Myanmar can draw on these lessons from the Mekong to consider different development options and choose those that best fulfil societal and government values. National governments have a sovereign right to decide how they develop their hydropower, water and agricultural resources; however, I argue that governments also have an obligation to explain to those disadvantaged by any of these policies how key elements of a good

life will be sustained, such as food security. A key question for the Government of Myanmar is whether its primary focus is to reduce rural poverty, which would favour policies that strictly control hydropower development to limit impacts on rivers, fisheries and agriculture. Alternatively, if it is more concerned with industrialisation and international trade, then this might favour less careful hydropower development, and the negative impacts on rivers, fisheries and agriculture that would ensue. Benefits across the energy, fisheries and agricultural sectors will be increased the more the government regulates hydropower development through strategic planning to better site projects, and by mandating mitigation measures on the dams that are approved.

The use of baseline data, recognition and evaluation of cross-sectoral impacts, and the weighing up of costs and benefits of hydropower development in the LMB can inform decisions elsewhere of a similar kind, in this instance in Myanmar, but potentially in places like the Amazon and Congo River basins.

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CHAPTER 6

Impacts of Flood and Riverbank Erosion on Human Livelihoods: A Case Study of Some Riverside Villages in the Lower Ayeyarwady

Khin Mar Wai and Wint Wint Htun

Introduction

The Ayeyarwady River is one of the five great rivers in the Mekong region and flows through the heartland of Myanmar. The river basin is 413, 674 square kilometers, covering a remarkable 61 percent of Myanmar's total area. As it is approximately 2170 kilometers long, the Ayeyarwady is Myanmar's most important commercial waterway. The delta supports a population of over three million people and provides nearly 60 percent of Myanmar's total rice production. Many people have lost their livelihoods along the river due to uncontrolled gold mining in the upper reaches, flood, bank erosion, sedimentation, serious pollution and cyclones and other water-related disasters in the delta. Riverbank erosion is a common issue for many countries, though the nature and impact of

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Fig. 6.1 Bank erosion in some parts of Nyaungdon Township. (Source: Photo by Wint Wint Htun 2016)

erosion vary (Fig. 6.1). It is a serious problem for the socio-economic progress of Myanmar.

Nyaungdon Township is mainly located in the central part of the Ayeyarwady delta. It lies between longitudes 95 20 E and 95 50 E, and between latitudes 16 50 and 17 10 N. Annual rainfall in the delta region is approximately 3000 mm, with a mean temperature of 31.9° C. Most of the precipitation falls during the monsoon season between mid-May and mid-November. It is cool and dry from mid-October to mid-February when temperatures begin to rise with pre-monsoon squalls in April and early May. The Pan Hlaing River flows through the eastern part of Nyaungdon Township. As the land becomes lower and gently sloping, flooding and bank erosion occur annually (Fig. 6.2).

Purpose of This Research

This research was conducted to find out the vulnerable populations, their socio-economic conditions and poverty incidence. It also highlights the physical, social and economic impacts of riverbank erosion hazards in this area and their consequences for the mental health of women, children and the villagers. Our aim is to draw attention to the needs of villagers in the disaster reconstruction phase.

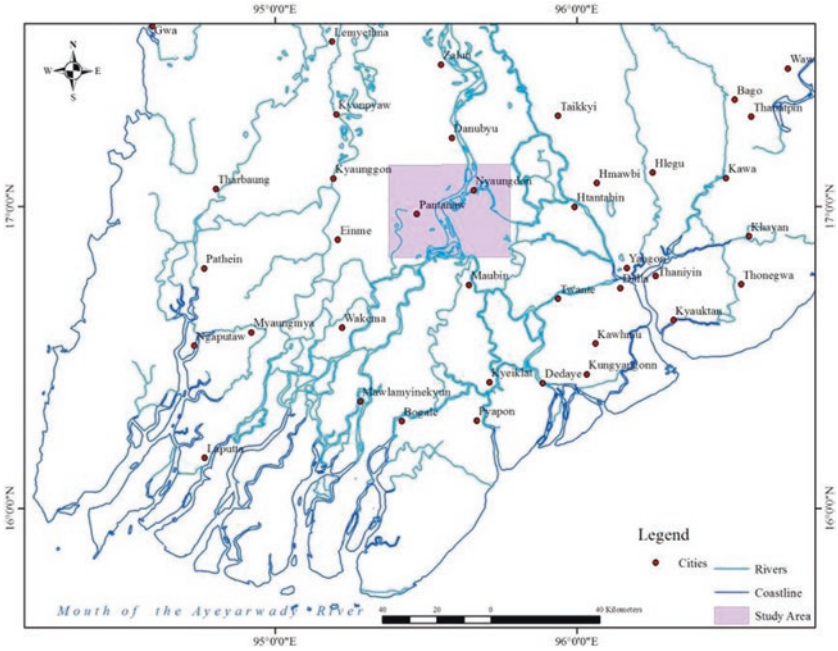

Fig. 6.2 Location map of the study area. (Source: Agriculture Atlas, 2002)

Research Outcomes

Demographic and Socio-Economic Status of the Region

Findings show that only 1.3 percent of the total population in the research area matriculated, 20.76 percent completed middle school education and 62.04 percent completed primary school education. Some 9.1 percent are literate and 5.2 percent are illiterate. Only 1.60 percent are graduates and most of them earn their living as school teachers and clerks. Therefore, it can be concluded that the people in the region have a low level of education and are weak in the use of modern technology and creative thinking skills. The mode of transportation in the daily life of the students in this area is shown in Fig. 6.3 and Table 6.1.

The parents cannot afford to enable their children to continue their education up to the point when they graduate. Consequently, their children have to work in their fields, on the farms and fishing in the river as

Fig. 6.3 The view of the students' school transportation means. (Source: Photo by Wint Wint Htun 2016)

Table 6.1 Education of the residents

Education	*Percent (%)*
Matriculated	1.3
Middle school completed	20.76
Primary school completed	62.04
Literate	9.1
Illiterate	5.2
Graduated	1.60

their ancestors did. On the other hand, there are also some parents who send their children abroad to work. In addition, there are some who get married young and have to take up any job available. This leads to intergenerational disadvantage (Table 6.2).

The highest status job for them is teaching and 1.3 percent of the working population are teachers while another 1.3 percent do clerical work. Some 7.79 percent earn their living by fishery while 20.78 percent take up any job that comes by; they represent the lowest level workers.

Some 7.79 percent of respondents grow crops on alluvial land and 6.49 percent live by selling things. The population who earn their living by rais-

Table 6.2 Occupations of the residents

Occupations	*Percent (%)*
Teachers	1.3
Clerical work	1.3
Fishery	7.79
Situational work	20.78
Alluvial farming	7.79
Selling things (small shops)	6.49
Livestock	1.3
Own farming	18.18
Dependents	14.29
Jobless	20.78

Table 6.3 Possessions of the residents

Possessions	*Percent (%)*
Motor cycles	37.77
Mobile phones	29.87
Television and video	36.00
Sewing machines	10.39
Bicycles	13.00

ing livestock is only 1.3 percent. It is, therefore, very interesting to investigate why livestock are not developed; this is worthy of examination.

Some 18.18 percent of the total population in the study area do the second highest job, earning their living by working in their own fields and on their own farms. Thus, a further study should also be conducted on the ownership of agricultural land, clearing land for cultivation and the use of cultivated land. Those who do not do any work but are just dependents (housewife and schooling) make up 14.29 percent of those surveyed and jobless are 20.78 percent, so it will be beneficial for the country if the reasons can be explained (Table 6.3).

The most valuable possession of the people in the survey is motor cycle, most of which are China-made. The majority of motor cycles are without license and 37.77 percent of the surveyed population own a motor cycle.

Some 29.87 percent of those surveyed possess mobile phones, but they use these items just for the purpose of communication; there is very little use of the internet. Some 36 percent possess televisions and video players,

most of which are operated by means of solar batteries. Those earning their living by tailoring and those who own sewing machines account for 10.39 percent of the respondents. Bicycles are used by students to go to school; some 13 percent of them own bicycles. Possessions differ according to their professions; however, the local people are found to be very poor (Table 6.4).

The majority of respondents earn less than 100,000 (c.USD 100) kyats per month; this population represents 61.04 percent of respondents. Some 20.78 percent earn 200,000 (c.USD 200) kyats per month; 2.6 percent earn 300,000 (c.USD 300) kyats per month; and 1.3 percent 400,000 (c.USD 400)–500,000 (c.USD 500) kyats per month. Those with the highest income earn their living by farming, livestock and running small shops.

There is a direct relationship between the type of jobs they take up and the income they earn. Those with the highest income are found to jointly do livestock in addition to their major income-generating jobs. It is, therefore, advisable to develop the livestock sector by educating and supporting the local people and need to help increase their income well (Table 6.5).

Some 54.55 percent of the dwellings in the area are wooden houses; 38.96 percent are bamboo houses and only 3.89 percent are brick houses. The dependents without possession of any kind of house account for 2.6 percent (Table 6.6).

Table 6.4 Average income per family

Average income	*Percent (%)*
Under USD 100	61.04
USD 200	20.78
USD 300	2.6
USD 400–500	1.3
Jobless	14.28

Table 6.5 Types of household

Household	*Percent (%)*
Wooden houses	54.55
Bamboo houses	38.96
Brick houses	3.89
No houses	2.6

Table 6.6 Ownership of land

Ownership of land	*Percent (%)*
Landowners	53.25
Tenants	18.18
Unusable land	18.18
Live on other people's land	7.79
Without own land	2.6

Table 6.7 Family patterns

Family patterns	*Percent (%)*
Nuclear family	80.5
Extended family	19.5

Table 6.8 Ethnic composition

Ethnic groups	*Percent (%)*
Bamar (Myanmar)	72.73
Kayin (Karen)	27.27

Some 53.25 percent are landowners, while tenants account for 18.18 percent of the respondents. They are victims (18.18 percent) of a flood whose land was unusable. Hence, they had to stay on land temporarily allotted by the authorities who should consider replacing the lost land with suitable plots. Some 7.79 percent live on other people's land, while 2.6 percent are without any land of their own. The authorities need to take into consideration those without any land, those temporarily allotted certain land areas and those living on other people's land when developing policies for long-term rehabilitation of livelihoods (Table 6.7).

While the traditional extended family is characteristic of Myanmar society, in this area we found some unusual family living patterns. Those living in a nuclear family account for 80.5 percent of the respondents, while those in the traditional extended family arrangements including grandparent(s), grandchildren and relatives comprised only 19.5 percent. This was an unexpected finding which needs further investigation (Table 6.8).

Table 6.9 Marital status

Marital status	*Percent (%)*
Married	85.71
Single	11.69
Divorced	1.3
Widows and widowers	1.3

In this area some 72.73 percent of the total population is Bamar (Myanmar) and 27.27 percent are Kayin (Karen) (Table 6.9).

Some 85.71 percent of the surveyed population are married and 11.69 percent are single. 1.3 percent are divorced and 1.3 percent are widows and widowers.

Age

Average age of the total population is 42.8 years; average age of the spouses is 44.55 years and average marital age of the married persons is 3.34.

Number of Children

The average number of children in a family is three.

Socio-Economic Conditions

Being located near the river in the rural area, most people earn their living as farmers, fishermen and some are casual laborers. They get low and irregular income, suffer from annual flooding and encounter severe losses caused by flooding and riverbank erosion. According to the interviews, farmers lose their crops and tradesmen cannot sell things in the flooding period. Casual laborers cannot do their work during the floods. On the other hand, bank erosion is also a major problem in some parts of the study area. Local people moved their homes to the areas allocated by the government due to the flooding. More than 80 percent of the respondents said that they had to move their homes as a result of the flood and bank erosion. Residents in Nyaungdon Township depend on river water for drinking and household uses including bathing, washing clothes and so on. In the area, schools are temporarily closed due to the annual flooding which commonly occurs twice a year. Sometimes, floods remain for more than two weeks and affect the education of the local children.

Flooding mainly occurs in the beginning and middle of the monsoon period because the southwest monsoon brings much rainfall.

Some farmers encounter crop loss during the flood. Most farmers cultivate paddy, betel leaves and chilies which are destroyed by flooding when the waters lie around for more than seven days (Fig. 6.4).

Impact on Water Sources, Health and Environment

A survey on water sources, health and environmental impact of Ayeyarwady riverbank erosion area was conducted as part of this research. This was done in Parheli, Tarwa, Innma, Chaunggyi and Kanchaung, and Nyaungdon Township, Maubin Region in order to provide information on some heavy and toxic chemical parameters, health risk microbiological parameters and environmental impacts based on various types of water sources, affected by flood and bank erosion.

Water Sources

The main objective was to identify the health significance of the river water, rain water and tubewell water of Nyaungdon as well as to provide valuable information about the levels of heavy metallic contamination in

Fig. 6.4 Flooded betel trees in Parlei village. (Source: Photo by Wint Wint Htun 2016)

existing flooded areas. Different types of water sources are mostly tube-well, lake, river and rain depending on the available means to collect water for drinking and household use in the period of the flood or riverbank erosion.

Parlei-Tarwa is on the bank of Pan Hlaing River. The villagers get water easily from the main source as tube wells under 20–35 ft in depth. In this area, water sources have no contamination or pollutants. The quality of water is clear, colorless, has no sediment or bad smell. Erosion and flooding occur annually but the worst was in 2015. The first attempt to identify the trace and toxic elements (S, Ca, Fe, Cu, Zn, Si) was detected by EDX analysis whereas Pb and Cd were analyzed by AAS in untreated river water, rainwater and tubewell water from the Nyaungdon flooded area. The concentrations of elements especially Pb and Cd detected in water samples were not in the limits of EPA, WHO guidelines and EU standard values.

Innma villagers have depended on the big lake, since 1930. In the monsoon season flooding covers the whole village. The turbid water was treated by using alum for households and schools.

Finally, the results of this study indicate that the untreated water samples including rain water, river water and tubewell water in the flooded area (15-9-2016) are contaminated with heavy toxic metals like Cd and Pb. All the results are higher than the EPA permissible level. Thus, the untreated water quality of all these sources is not suitable for drinking purposes. It depends on the collection techniques, handling and also reservoirs. pH of all samples is within the range of allowable limit 6.5–8.6. The turbidity values of all samples are higher than the maximum value 5 NTU, so water quality is low. The highest turbidity value in Chaunggyi 25.95 and Kanchaung 8.39 along Ayeyarwady riverbank indicates the high contamination in river water followed by rainwater (7.24) and untreated tubewell (6.45). Health risk microbiological parameters of collected water samples on September 17, 2016, are tested by Multiple Tube Fermentation Technique method at the Bacteriology Research Division. Most Probable Number method especially indicates the water quality and filtration effectiveness. Turbidity can shield harmful bacteria from disinfection processes. High turbidity values are often related with the high values of coliform count. The high levels of disease-causing microorganisms viruses, parasites and some bacteria can cause nausea, cramps, diarrhea and associated headaches. For public water supplies, the frequency of testing coliform count and fecal count depends on the size of the population served. High coliform count in all sources greater than the allowable level

indicated the presence of bacteria in the sample. The quality of all sources is unsatisfactory, so monitoring of water quality should be done annually. The presence of total coliform bacteria indicates that the water may be vulnerable to contamination by more harmful microorganisms. Thus, the other potential health effects may be present. Fecal count is zero in Chaungyi river water but coliform count 110 MPN/ml shows the presence of E. coli bacteria. This water should not be consumed until corrective action is taken. Microbial pathogenic parameters are typically of greatest concern because of their immediate health risk. Floodwaters commonly contain a high level of bacteria.

No data quality assessment and sustainable monitoring strategies for tubewell water quality changes are available in these villages. They give no suggestions for solving problems in water collection from various sources and water-monitoring strategies. In order to maintain the loss, reduction of nutrient, the current canals should be renovated and new canals are being dug. Along the riverside of Parlei-Tarwa, the height of the dam is five feet more and the bottom of the bank should be renovated. To achieve the high status of the villages along the riverbank, the bridge over Pan Hlaing River should be required. Effectiveness of monitoring water quality of sources should be practiced. All the results of water quality are higher than the EPA permissible level. Thus, the untreated water quality of all these sources is not suitable for drinking purposes. It depends on the collection techniques, handling and also reservoirs. Cost effective tubewell or hand pumping system and available water treatment methods training are necessary.

Cultural and Moral Development

Tarwa

Tarwa Village, in which Burmese and Karen tribes live, has so many family units. Most of the villages are Buddhists. In the rainy season, flood occurs annually, so the dam is damaged by strong current about one time per three years. At this time, the villages start to work their livelihood as fishermen because their farmyards are flooded. Even though there is no development of their business, religious activities and donations are usually performed since they are Buddhists. The villages celebrate the Kahtina festival ceremony of ordination by the recitation of Patthara and paying homage to the elders in accordance with cooperative donations. Karen race also

celebrates Karen New Year Festival. During Wazo, the Buddhists in this village keep the morality in Vijikareun monastery.

During the Thingyan period, the works open the meditation center and preach the doctrines of the Buddha in this monastery for seven days. There is an ancient stupa in the field at the central point of the three villages Palei village, Innma village and Phyarkone village. It is assumed that this "Ceti" was built 100 years ago which is named "Pyilonehanthab pagoda".

In general, although the business of villages does not develop, the religious festivals are usually celebrated with the available cash. It is known that most people have good morality and their cultural standard is ordinary.

Kanchaung Village

In this area, 68 houses are flooded and 108 families emigrate. Most of the people in this village are Burmese. Their religion is Buddhism. There is a monastery which is named "Shweohnpin" and a golden pagoda which is named "Chanda"; before flooding, there were two monasteries in this village but there is only one now because the other one was flooded. It is found that even though all villagers moved from place to place, they keep the moral conduct in every moon day, every full moon day and during the month Wazo. There is no meditation center. Moreover, they cannot celebrate the religious festivals and seasonal or traditional festivals.

Chaungkye, Bawkwin Village

There are Burmese and Karen ethnic groups in this village. The former are Buddhist and the latter are Christian. There is a Buddhist monastery which was built 30 years ago and a shrine (ceti) which was built 20 years ago. All villagers always celebrate their respective cultural and seasonal festivals. They give only cooperative donations. Significantly, the meditation center opened in this monastery three times per year. So most of the villagers may be perfect in morality.

Most of the people in all villages are Burmese. Their religion is Buddhism. Karen race is also found at least in a monastery. There is a shrine (ceti) in every village. The meditation centers can be opened at the Tarwa and Chaungkyi village. Since they are Buddhists, the religious activities (or) festivals (recitation of Patthara, a ceremony of Ordination and Kahtina festival) and the donations are performed by them but the seasonal festivals cannot be celebrated. When they perform the charity, whether one or more people donate the offering. But, most of their donations are the cooperative donations.

All of these factors happen because

(1) Only surplus money can support the development of this village
(2) There is no leadership to build the meditation center and the shrine (ceti) so often
(3) Since the lead of the village floods so often it is not suitable to make the religious places in that area. It is known that most of the people in these villages, however, follow the normal conduct of Buddhism and their cultural standard is ordinary.

Conclusion

Health
Most of the sampled households indicated that health facilities were not fully available in their communities. During the flood, different water-borne diseases like diarrhea, cholera, jaundice and skin-related health problems were not very serious in the flooded areas because of the timely precaution measures.

Water and Sanitation
All respondents from all households were not severely affected by the floodwater. It was evident that dug well and pump well were the most common water sources that communities used for drinking. Other sources are river, rain and lake. It was revealed that most of the households indicated having traditional pit latrines or dug well latrine as their main sanitary facilities. Some sample households had a flush latrine. Others may use bush or river. They use the open place at floodwater for their sanitation. In this study, it was found that water and sanitation supply were showing the medium extent of damage in the study area.

Education
The sample households indicated that graduates were few in number. Most of them were at the primary education level. Education facilities were not fully supported in the sample villages. Students could not go to the schools during floods.

According to the interview result, all types of educational institutes were closed during the flood period. The furniture in the classroom could

not be used. Therefore, a huge amount of money was needed to recover the loss. In many cases, the infrastructures of the institutes were destroyed. In the study, it was found that the infrastructure of any area is always considered important for the stability of the people.

In this area, it was found that during the flood period health facilities were most commonly affected. All types of health centers remained closed as floodwater goes inside those centers. During this period, different water-borne diseases like diarrhea, cholera, jaundice and skin-related health problems are most commonly seen. Especially, children and aged people are affected by these types of health-related problems. Primary treatment sometimes might not be possible due to lack of accessibility of basic health facilities. Medical facilities become difficult during any flood. On the other hand, flood has an effect on the pregnant mother's health. The pregnant mothers could not get to any types of health facilities during the flood time. The local people also complained that the floodwater is entirely all over the area and the water is contaminated by different bacteria and poisonous substances so that contact with this water could be harmful to human health, but they are bound to use this water in different daily activities because of the lack of safe water.

Discussion

Depending on this result, the tube well is contaminated by the floodwater and by over-flowing ponds. The main source of water was the floodwater during that time. Almost every tubewell or drinking water source was affected. Therefore, it was very difficult to manage to get safe drinking water. They collected water far from their residence or drank the affected floodwater by boiling it. Due to this unsafe floodwater, children especially suffered from different water-borne skin diseases (Fig. 6.5).

It was found that water supply and sanitation were showing medium extent damage in the study area. Sanitation facilities were one of the most affected. Due to this process of sanitation, the floodwater becomes contaminated by different types of bacteria and poison. Due to damage of the sanitation facilities or infrastructures during the flood, people are bound to complete their sanitation work under the open sky or unhygienic ways. The education sector was seriously affected during any flood. Floodwaters entered all educational institutes. All educational institutes were closed down during the flood period. All types of exams and classes were stopped and educational institutes were flood shelters (Fig. 6.6).

Fig. 6.5 Flooded areas in some parts of Nyaungdon Township. (Source: Photo Wint Wint Htun 2016)

Fig. 6.6 The research team in front of the Dhama Wi HarYaMonestry. (Source: Photo Wint Wint Htun 2016)

The list of Team Members are as follows:

1. Dr. Khin Thet Ni
2. Dr. Khin Mar Wai
3. Dr. Aye Aye Myint
4. Dr. Kay Thi Tin
5. Dr. Ohn Thwin
6. Dr. Le Le Wynn
7. Dr. Mu Mu Myint
8. Dr. Ni Win Zaw
9. Dr. Aye Aye Thant
10. Dr. Myint Thida
11. Dr. Swe Zin Win
12. Dr. Hla Hla Kyi
13. Daw Khaing War
14. Dr. See Zein
15. Dr. Khin Cho Htwe
16. Dr. Thet Thet Hlaing
17. Dr. Wint Wint Htun
18. Daw Min Min Htun
19. Dr. San San Khaing
20. Dr. Su Khaing Oo

Therefore, the floodwater flowing into the educational institutes has negative impacts on the livelihoods of those working in the educational sector. After the flood, the classrooms become unusable and it takes time to restart the educational activities. A huge amount of money is needed to recover the losses. That will have a negative impact on livelihood and socio-economic conditions of the people.

Recommendations

Erosion is a complex process brought about by the compound actions of several processes. To fight against erosion, the following measures can be effectively instituted:

i) concretization of riverbanks;
ii) plantation of erosion-resistant crops;

iii) use of nut fibers as well as synthetic erosion-control options which have been proved useful by the erosion-control team of the Granite Environmental;
iv) Use of erosion-control mats of coir straw, wood fibers and coconut fibers and synthetic erosion-resistant mats.

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CHAPTER 7

Social Capital, Adaptation and Resilience: Case Studies of Rural Communities in Ethiopia, Zimbabwe and Myanmar

Julian Prior, Thaw Ni Ni Zaw, Jemal Yousuf Hassen, and Estella Toperesi

Introduction: The Importance of Social Capital

Social capital refers to the features of social organisation such as networks, behavioural norms, trust and reciprocity that increase a society's productive potential (Fukuyama 2000). Social capital can help build human capital, and vice versa (Coleman 1988). Social capital is generally considered an attribute of communities, whereas human capital is considered an attribute of individuals (UK Office for National Statistics 2001). It is now broadly accepted that improvements to social capital contribute to poverty

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alleviation and sustainable development (World Bank 2011) and to general community well-being (Putnam et al. 1993; Productivity Commission 2003). According to the World Bank (2015):

> Social Capital refers to the norms and networks that enable collective action. It encompasses institutions, relationships, and customs that shape the quality and quantity of a society's social interactions. Increasing evidence shows that social capital is critical for societies to prosper economically and for development to be sustainable. Social capital, when enhanced in a positive manner, can improve project effectiveness and sustainability by building the community's capacity to work together to address their common needs, fostering greater inclusion and cohesion, and increasing transparency and accountability.

Social capital is productive, but it can be reduced if strategies are not implemented to enhance it. The more communities and groups work together, the more social capital is produced; and the less people work together, the greater the depletion of community stocks of social capital (Halpern 2005).

Issues examined within social capital studies often involve those related to community health, such as feelings of trust, safety and levels of crime. Social capacity indicators can be described, measured and quantified (ABS 2004; Bullen and Onyx 2005; Dudwick et al. 2006; Grootaert and Van Bastelaer 2002; Grootaert et al. 2004). The concept of social capital and local institutional development has been increasingly explored in relation to agricultural development and sustainable natural resource management over the last few decades (Bodin and Crona 2009; de Sherbinin et al. 2008; Esman and Uphoff 1988; Love et al. 2010; Ostrom and Ahn 2003; Pretty 2003).

In the context of rural development and sustainable natural resource management (SNRM), social capital refers to those aspects of social organisation that lead to better development outcomes, and that contribute to, or enhance, community participation, internal and external communication, community decision-making, consensus building and conflict resolution, community adaptability and resilience. From the point of view of government, non-government organisations (NGOs), or private sector organisations wishing to engage with communities, those communities with low social capital are less likely to effectively participate, to innovate, to resolve conflict, to build consensus and to make collaborative decisions

and reach an agreement. In many countries, traditional natural resource-dependent communities may have existing high levels of social capital based on kinship relations, cultural or religious ties, ethnicity or geographical proximity. However, the traditional foundations of social capital may be undermined by social, economic and environmental forces of change (Prior 2010).

High social capital (HSC) rural groups will be more resilient and able to adapt to social, economic and environmental shocks. HSC groups are more likely to innovate, to test and adapt new technologies, and undertake farmer-to-farmer training and extension and capacity development among their community members (Prior 2012). They will share knowledge and resources, and will often look after the poorer and more vulnerable members of their community. HSC groups that are constituted of poor and disadvantaged farmers are also more able to identify and access market opportunities for their agricultural products and improve their incomes. These characteristics will be important to improve household-level and community-level food security, and enable communities to more effectively adapt to climate change. The value of HSC groups is particularly important in developing countries where government services and resources may be sparse.

The ability to self-organise, to build consensus over shared interests and needs, and to collectively and strongly articulate these interests and needs to outside resource providers will also be important for marginal and less powerful sub-groups in society such as women or ethnic minorities.

HSC groups can mobilise local resources such as land, labour, capital and enterprise, for community good. When development interventions proceed, HSC groups are also likely to co-invest these local resources in development, and thus may cause powerful investment multipliers to come into play. Australian research has indicated that investments in rural development will be multiplied many times over when invested in HSC groups (Australian Government Department of Agriculture Fisheries and Forestry 2003).

While it is now widely accepted that social capital contributes to improving a group's or community's adaptability, resilience, economic outcomes and livelihoods, there is still much to learn about how to build social capital. A great deal of the early social capital research focused on urban communities. Much more needs are discovered about social capital development in rural communities (agricultural, agropastoralist and pastoralist).

The potential benefits of research which enables us to understand how to purposively construct social capital are considerable. If effective strategies for developing social capital can be identified, and built into the design of rural development projects, then the impacts of these projects will likely be sustained beyond project lifetime. Additional benefits will accrue where HSC groups take on roles of testing, adapting and adopting new agricultural development technologies and SNRM practices within their communities, and extend these technologies and behaviours to other groups in their networks.

Dimensions of Social Capital

Important aspects of social capital that contribute to rural development will be the building of community trust; local resource mobilisation; group learning and co-learning opportunities; the ability to extend knowledge, and influence attitudes and behaviours, both within groups and between groups; landscape approaches to SNRM; the ability to attract and utilise greater resources; and the ability to form horizontal and vertical linkages with other groups.[1] It is also necessary to identify the key components of social capital in order to understand what is meant by the term, to explain how it can contribute to community engagement in rural development and SNRM, and to identify strategies that can be used to enhance and build this social asset.

The growing literature on social capital has identified a number of important themes and indicators including core concepts (Bullen and Onyx 2005); studies of groups involved in rural development and SNRM have identified additional issues. These attributes of social capital relevant to rural development are (adapted from Prior 2012) as follows:

1. Participation in networks (*bonding* and *bridging* social capital)
2. Reciprocity (giving and receiving between individuals or groups to each other)
3. Trust between members of the group, and between the group and other institutions
4. Positive social norms (expected behaviours: including both *injunctive* social norms and *social proof* norms)[2]
5. Proactivity and innovation
6. Problem or issue identifiers
7. Local resource mobilisers

8. Co-learning from successes and mistakes, and upscaling and extending best practices (adaptive management)
9. Social protection of poor, disadvantaged or vulnerable members of the group

The expression of these social capital attributes by the case study groups is discussed later in this chapter.

If those factors that effectively contribute to building social capital can be identified, and if these factors can be constructed or enhanced, then we are in a strong position to undertake community development strategies that purposively build social capital. For example, training programmes for NGOs, private sector and government agencies working with communities, as well as awareness raising for communities themselves, to understand what are the critical social capital building factors, will enable the more rapid construction of social capital in a purposeful manner.

Research Questions

Gaps in the social capital literature dealing with agricultural development, coupled with the increasingly compelling need for poor and vulnerable communities to be able to adapt to climate change and shocks in situations where there is limited external support, highlight the following research questions in this study:

1. How is social capital expressed, and what are its attributes and indicators, in a range of agricultural communities within a variety of social, cultural, natural resource and economic contexts?
2. What is the range of *behavioural* expressions of HSC, and how can these behaviours be stimulated and developed in other communities?
3. How can rural development support a lower social capital rural group and, through carefully designed development strategies, build social capital in an effective and reasonably rapid fashion?

Research Methodology

A case study research methodology was utilised to analyse higher social capital rural groups among agricultural and pastoral communities in eastern Ethiopia, eastern Zimbabwe and central Myanmar. The case study

Table 7.1 Case study groups, collaborating NGOs and research methods

Community group	*Collaborating NGO*	*Research methods*
Harshin Community, (6 women's livestock marketing cooperatives), Somali Region, Eastern Ethiopia	OXFAM UK (Ethiopia)	35 semistructured interviews and 4 focus group interviews with community members; 2 semistructured interviews and 1 focus group interview with NGO staff
Shandaugute Women's Community Garden, group, Dembura Village Buhera District, Zimbabwe	Southern African Alliance for Indigenous Resources, Zimbabwe	15 semistructured interviews and 1 focus group interview with community members; 2 semistructured interviews and 1 focus group interview with NGO staff
Maunganidze Irrigation Group, Chipinge District, Zimbabwe	Southern African Alliance for Indigenous Resources, Zimbabwe	14 semistructured interviews and 1 focus group interview with community members; 2 semistructured interviews and 1 focus group interview with NGO staff
Won Tone Taw Village, Meiktila Township, Myanmar	CESVI Myanmar	15 semistructured interviews and 1 focus group interview with community members; 2 semistructured interviews and 1 focus group interview with NGO staff
Kan Gyi Kone Village, Meiktila Township, Myanmar	CESVI Myanmar	15 semistructured interviews and 1 focus group interview with community members
Kan Ni Village, Meiktila Township, Myanmar	CESVI Myanmar	15 semistructured interviews and 1 focus group interview with community members

groups and their collaborating NGOs are listed in Table 7.1. A comparative analysis was undertaken between these groups, to identify similarities and differences in the genesis and causal factors, expression and impacts of social capital on development outcomes. Similar research instruments and tools were applied to each of these case studies, to benchmark, describe and explain social capital, and its causal processes of development. Each of the case study groups was situated within a community or village, and while each group had a distinct identity and membership, all groups were well integrated with the communities within which they were located.

The following research methods were used with the participating rural groups, and with those organisations and individuals who support them:

- Semistructured interviews with group members
- Semistructured interviews with NGO and government representatives who support them
- Focus group interviews with group members

Results and Discussion

One of the objectives of this research was to identify social capital attributes that were similar among the different cultural contexts. Table 7.2 illustrates the dimensions and indicators of the social capital attributes as expressed by the case study groups. All case study groups exhibited aspects of the nine social capital attributes listed, although there were substantial variations between groups. While all case study groups exhibited strong bonding social capital, there was a substantial variation in the extent to which groups demonstrated bridging social capital. It would be expected that newer groups may still have to build their external linkages, and this may progress over time.

One of the longest-lived case study groups, Maunganidze Irrigation Group in Zimbabwe, had been extremely successful in maintaining its existence while most other irrigation groups in the district had collapsed. While exhibiting strong bonding social capital, it demonstrated very limited external linkages and bridging social capital. This lack of external linkages meant the group was not exposed to technological and social innovation, and had limited markets for its produce. The group had only one buyer for its crop products who had previously exited Zimbabwe during a period of economic downturn. This lack of bridging social capital rendered the group more vulnerable to shocks, including market changes. The Harshin women's livestock marketing cooperatives, located in an isolated semi-arid area of eastern Ethiopia, on the other hand, had extensive external market linkages that extended internationally. The groups used mobile phone technology as a very effective mechanism for constructing linkages and bridging social capital to national and international markets. For a poor community group, these external linkages and bridging social capital can be critical for minimising risk, reducing vulnerability and adapting to change.

Table 7.2 Social capital attributes exhibited by case study communities, their implications for improved household livelihoods and attribute indicators

Social capital attributes	*Household livelihood implications*	*Attribute indicators*
Participation in networks: Central to the concept of social capital is the existence of interlocking networks of relationships between individuals and groups. Bridging social capital networks are developed	Participation in networks allows individuals to take advantage of the opportunities provided by group membership, including social learning, attracting larger bundles of resources and services, pooling community resources in times of hardship and sharing experiences and the outcomes of on-farm adaptive trials of new technologies and practices	Number and quality of *horizontal linkages* (involving provision or sharing of resources, exchange of knowledge and training, formation of partnerships etc.) formed with other groups at the same functional level or similar geographic area (e.g. local government agencies, other farmer groups, local NGOs and local private sector/ agribusiness) Number and quality of *vertical linkages* formed with other groups at a higher institutional, political or geographical level (e.g. higher-level 'umbrella' groups of farmer groups, district and regional government agencies, research organisations and non-local private sector organisations)
Reciprocity: Reciprocity, or the expression of mutual relations (giving and receiving) between individuals or groups to each other, is also at the centre of social capital	Collective actions such as cooperative tree planting, sharing of valuable information and knowledge, loans of equipment and donations of time and resources, are all based on the principle of reciprocity: for example, farmer-to-farmer extension and training, village credit and loan schemes, and collaborative works	Number and variety of cooperative group works or activities Extent of sharing of knowledge (e.g. within training and adoption of new technologies and practices, workshops and field days, production benchmarking and cooperative learning activities; sharing of knowledge on markets, business skills and enterprise skills) Collaborative trainings conducted within a group or community, and between communities Extent of sharing of resources, farm tools and machinery, money, goods, land, animals and credit schemes

(*continued*)

Social capital attributes	*Household livelihood implications*	*Attribute indicators*
Trust: Trust is based on the expectation that others will act in mutually supportive ways, or at least will do no harm. Alternatively, trust may relate to the expectation that others will act in consistent and predictable manner. Trust engenders a willingness to take risks in a social context	Trust is a critical issue with regard to collaborative behaviours that is required for market cooperatives, and landscape-level natural resource management within participating communities. Trust and reciprocity are often closely linked as reciprocal social arrangements often require a minimum level of trust. Trust is an important attribute of both bonding and bridging social capital	Sharing of personal or potentially sensitive information within the group during co-learning, training or extension activities such as farmer field schools, sub-catchment planning, production benchmarking or during farm walks. Exhibitions of trust and the development of positive relationships between community groups and government and NGO agencies demonstrated by such actions as the use of agencies' extension and advisory services Transfer of management responsibility for programmes, projects and funding allocation from donors/ implementers to community groups and networks History of collaborative works
Positive social norms: Social norms are the standards and patterns of behaviour set and monitored by the group	The identification and encouragement or enforcement of positive social norms and discouragement of negative norms, within a group can improve community well-being and household livelihoods. Participatory and collaborative behaviours, conflict resolution and consensus building behaviours all contribute to helping communities to plan, take action and adapt. The advantage of positive social norms in relation to natural resource management (NRM) is that where groups set high standards of sustainable NRM behaviour, then there is some compulsion for the group members to at least meet these standards or improve upon them. The group may impose formal or informal sanctions upon those individuals who do not observe the community group's accepted standards of behaviour	Individual and community works and project activities are well-implemented and well-maintained. Group monitors and audits the timeliness and quality of individual's works Collaboration for access to produce markets Group rewards appropriate behaviours, and penalises inappropriate behaviours (including NRM behaviours) Positive changes in gender relations and contributions to women's economic and political empowerment. Low levels of vandalism, and damage to the individual and community property Tidy, rubbish free and well-kept village common areas External funding is well administered and accounted for Innovative project proposals developed that reflect community needs

(*continued*)

Table 7.2 *(continued)*

Social capital attributes	*Household livelihood implications*	*Attribute indicators*
Proactivity and innovation: A critical outcome of the development of social capital is that of personal and collective action	The advantage of proactive groups and communities is that they are likely to demonstrate motivation and continually ask questions, seek opportunities and take actions that will lead to better livelihood and NRM outcomes	Group strategically plans at the group level and monitors and evaluates plan implementation Group is somewhat aware of internal and external forces of change (social, economic, environmental and political); and plans to take advantage of opportunities and mitigate threats Development of new products for markets or the development of new markets, or income-generating activities Development of innovative community plans and project proposals to address future needs.
Problem or issue identifiers: HSC groups have the ability to identify issues or problems at the early stages of their emergence, or even predict future issues or problems before they occur	Where groups can identify problems or issues at the early stages of their development, then community efforts, internal and external resources, and support services can be allocated in the appropriate manner	Groups identify and work to address problems or issues in the early stages of their development, or where local awareness or recognition of issue is still low Project proposals seek to address new issues
Local resource mobilisers: Groups with HSC have the ability to mobilise local resources	The ability to collectively and rapidly mobilise local resources means that communities can seize opportunities and mitigate threats at the community and household levels The advantages of a local resource mobilisation with regard to community development or natural resource management are that investments made by governments, NGOs and other organisations may be multiplied many times once local resources are mobilised	Historical evidence of resource mobilisation and distribution in time of opportunity or hardship Level of group contributions in cash or in-kind to projects Level of investment multipliers for each unit of donor investment (through community co-investment and cost-sharing)

(continued)

Social capital attributes	*Household livelihood implications*	*Attribute indicators*
Learning from mistakes and successes, and scaling up and extending best practices: HSC groups and organisations have the ability to learn from their mistakes, identify successful strategies and technologies, and scale up and extend these strategies and technologies throughout the group and to others outside the group	Within agricultural and pastoral development and NRM, there is a continual need to improve upon old strategies and technologies and develop new ones The community-adaption challenges posed by climate change and food insecurity require that communities rapidly develop, test and adapt new technologies and practices in order to maintain livelihoods and to survive	Evidence of lessons learned, group learning, successful technologies and best practices being accumulated and documented Successful technologies, innovative practices and lessons learned being extended, both within the group and outside the group Field days, seminars and trainings conducted by group for members and non-members Active farmer-to-farmer extension strategies employed.
Social protection: HSC groups may mobilise resources to specifically target the disadvantaged, poorer or more vulnerable members of their community. Where groups undertake a social protection role, this indicates a high level of social capital	Social protection by the group provides individual households with a safety net, should their circumstances deteriorate Aiding poorer or vulnerable members also engenders an altruistic group consciousness A group that adopts a social protection role is in a stronger position to achieve community-level adaptation to climate change, and the development of community-level food security strategies	Evidence of disadvantaged community members being targeted as of recipients of group benefits

All groups claimed to have significantly improved the livelihoods of their members, and in many cases this included both improvements to household food security and incomes, and improvements to household and community infrastructure. There were significant positive changes to behavioural social norms within communities. Groups consistently described strong collaborative behaviours and a clear sense of unity, improved interpersonal behaviours, and conflict resolution and consensus building behaviours.

During the research, participants were asked to identify what they regarded as the most significant change that had occurred in the community resulting from the development of the HSC group. Participants consistently cited attitude change within their community as the most significant impact of their group. These impacts related to the building of trust, resource sharing, collaboration, gender power relations, improved interpersonal attitudes and behaviours, positive attitudes to change and innovation and strong aspirations for the future of the community.

All groups demonstrated significant impacts on improving community attitudes to gender and achieving significant improvements to women's economic and political empowerment. Attitudinal changes to gender roles were common, as illustrated by these quotations below from two women.

> *Previously I used to stand behind my husband and say nothing. Now I stand in front of him and give my opinion.* (Female, Won Tone Taw Village, Myanmar)

> *When Oxfam first came to our village we needed our husbands' permission to leave our houses. Our husbands used to yell after us: "Why are our women chasing these NGOs and leaving their children and husbands behind?" Now* ***we*** *earn the income, and are the head of our households, and no longer need our husbands' permission.* (Female, Harshin Community, Ethiopia)

Interestingly, women from communities on different continents, both described very similar attitude and behavioural changes at household and community levels in recognition of the importance of group processes.

Women from Shandaugute Women's Community Garden, Zimbabwe, and Won Tone Taw Village, Myanmar, both said words to the effect:

> *Previously we used to come to community meetings straight from working in the fields without washing, and wearing our dirty clothes. Now when we come to community meetings we first wash and put on clean clothes.*

When asked why this change in attitude to community meetings, the women responded that they now take the community development discourse and planning process, and their role in this process, much more seriously.

All groups undertook some level of social protection of the poorer or more vulnerable members of their community, and, in some cases, provided support services to members of other communities outside their own group. Social learning and exchange of knowledge and resources (reciprocity) were also common to all communities.

Factors Leading to the Construction of Social Capital

An important objective of this HSC research was to identify those causal or explanatory factors that contributed to the building of social capital in the case study groups. Such factors can potentially be utilised to purposively build social capital in poor and disadvantaged communities.

The following key factors were identified through this research and are discussed below:

1. Development interventions that progressively scaffold communities in building social capital
2. The high level of commitment to the group, sense of unity and trust among the members
3. Effective leadership and governance
4. Participatory, transparent and inclusive group-level decision-making
5. Clear benefits to group membership when compared with individual agency
6. Clearly defined positive behavioural norms and rules focused on group-well-being
7. Effective conflict resolution
8. Social protection of poorer, disadvantaged or more vulnerable members of the community
9. Development of aspirational group-level goals that also meet household livelihood needs
10. 'Look and learn' visits to other HSC communities

Each of these factors is discussed below, along with recommendations for those external organisations such as NGOs, government agencies and

industry groups who wish to purposively build social capital in their collaborating communities.

1. *Development interventions that progressively scaffold communities in building social capital*

External support provided to the case study groups by NGOs, and to a lesser extent by government agencies, was critical to their developing their social capital. Facilitation of group processes, knowledge and skills training, small loans or grants of money, animals or seed and the scaffolding of behavioural and attitude change were all critical to the building of social capital in disadvantaged communities. However, each of the NGOs that collaborated in this research worked with many other communities and groups that were unable to construct the high levels of social capital exhibited by the case study groups. This raises the important question as to what factors can be identified that explain why these particular communities achieved so much in building their community capacity when others did not.

In all groups, those organisations providing support to them had utilised development strategies that provided scaffolding and progressive learning opportunities as groups built their social capital. Transparent and participatory decision-making processes were common to all groups, usually following initial facilitation and demonstration by the NGO. Targeted trainings were held in technical areas as well as in areas such as leadership, financial management, conflict resolution and business planning processes. Where the NGO progressively devolved increasingly complex decision-making to the community, community members themselves built the skills, knowledge and attitudes that are necessary to take responsibility for decision-making. Often the social capital was also constructed from earlier interventions that had built trust and reciprocal behaviour between members of the community. Sometimes these initiatives involved credit and loan schemes in the form of loans of money, or of seeds and animals. With the Harshin community, Oxfam UK allocated the community three tranches of money as repayable loans over three years, with the second and third loan only being granted once the earlier loan had been repaid in full and on time. Thus, the NGOs supporting these communities provided scaffolding over time for the communities to aid them in the development of their internal social processes, interpersonal trust and reciprocal behaviours.

2. *The high level of commitment to the group, and a sense of unity among the members*

Strong commitments to the group, a strong sense of group identity and group unity were commonly cited as causal factors that contributed to group success. Strong identification with the group may mean that group interests will be balanced against individual interests. Strategies that foster a clear sense of shared group identity and engender pride in the group and its achievements should be enacted by supporting organisations, and by the group itself.

3. *Effective leadership and governance*

All groups cited effective leadership as being critical to their success. In all cases, this leadership is related to the leadership by both individuals and a group. The descriptive attributes ascribed by group members to their leaders included being trustworthy, motivational, reliable, concerned with achieving group outcomes, independent and unbiased, incisive decision-maker and strong. In all cases, the leadership groups had been elected by the group members. In some cases, these leaders had also been provided with additional leadership and governance training by external support organisations such as NGOs.

It was beyond the scope of this research to analyse the leadership styles within the case study groups. However, the attribute descriptors attached to group leaders by participants, coupled with the participatory decision-making and community development environment, suggest that the normative leadership style was that of transformational rather than transactional leadership. Burns (1978) postulated that there were two types of leadership, 'transactional' and 'transformational'. In Burns' view, transactional leaders approach 'followers' with the intention of exchanging one thing for another. Transactional leaders are in effect negotiators involved in bartering or trading. Transformational leadership, on the other hand, involves an 'influence relationship' between leaders and participants, with both seeking changes that reflect their mutual purposes (Rost 1993, 102).

Apart from providing leadership training, external agencies can facilitate community discussions to identify what they seek from their leaders in terms of knowledge, skills, behavioural patterns and attitudes. This information can then be used to select, train and guide leaders.

4. *Participatory, transparent and inclusive group-level decision-making*

All groups mentioned the public, participatory, transparent and inclusive decision-making processes within the group as being an important contributor to their success. These types of decision-making processes were seen as ensuring that the opinions of each group member were listened to, and that trust was built in the group-level decision-making process and the outcomes achieved.

It has become widely accepted that participatory approaches to rural community development may deliver additional benefits over non-participatory initiatives (Bechstedt 2005; Pretty 1995). Strategies such as participatory rural appraisal (Chambers 1997), farmer participatory research (Okali et al. 1994) and participatory technological development (Bechstedt 2005) have been developed. However, normative definitions of participation, which assume homogeneous communities, and that community members have equal and unfettered access to participation forums, and share common views, rarely apply. Community heterogeneity related to gender, age, power, wealth and education, amongst many other things, will determine people's ability to participate. Diverse communities with differing interests may also include existing or potential conflicts.

It was not the role of this research to analyse the extent to which group members could effectively participate in decision-making processes. Nevertheless, the fact that group members cited participatory and transparent decision-making processes as a factor contributing to their success suggests that there was a high level of satisfaction with these processes. In particular, in the mixed-gender groups, the fact that female participants stated that their opinions were acknowledged and listened to, and in the women's groups, younger women also made the same observation strongly suggests that participatory decision-making processes in the case study groups were very effective.

Training should be provided to communities in participatory, inclusive and transparent decision-making processes. It is often helpful to train specific facilitators within the community in these skills, so they can help manage community meetings and discussions in the absence of external agencies.

5. *Clear benefits to group membership when compared with individual agency*

During the interviews, all participants were asked what the group could do for them that they could not achieve as individuals. This question was

readily answered by all participants and, in most cases, related to improvements to household livelihoods or social protection.

For group-level social capital to develop requires that there are clear benefits of group membership for individual members which will encourage them to participate in an ongoing fashion. This involves group members recognising that individual household livelihood needs and interests will benefit through collaborative behaviours and addressing shared community-level needs and perspectives. Initially, these benefits may simply be because the NGO that is engaged with the community requires that it works with a group, and not at the individual, household level. Beyond this, however, group membership has to offer clear benefits over individual action.

Sometimes group membership provided benefits in terms of producing products for a market and accessing the market as a group (e.g. Maunganidze and Harshin). On other occasions, collective group action demonstrated benefits in terms of firstly meeting a community's subsistence food needs (e.g. Shandaugute and the three Myanmar communities), while sales of excess produce to markets was a later development. Nevertheless, being able to sell excess agricultural products to an accessible produce market, coupled with the benefits of collaborative agricultural production, harvesting, transport and marketing, in many cases provided strong incentives for the collaborative action, knowledge exchange and resource sharing within the group. For those agencies supporting community groups, one strategy is to conduct regular community discussions, coupled with individual household interviews, to ensure that group objectives continue to align with individual household needs.

6. *Clearly defined behavioural norms and rules focused on group well-being*

Clearly defined formal and informal behavioural norms and rules were often cited as important factors explaining the success of the HSC groups. Group members highlighted the importance of accepted formal rules in a written constitution and, as importantly, the consistent enforcement of these rules. In some communities, for example, Harshin, a sub-committee or executive committee, applied penalties to its members who broke these rules. In other communities with customary chiefly systems (e.g. Zimbabwe), or strong religious leadership (e.g. Buddhist Myanmar), the communities also relied on the formal hereditary chief or the head monk to aid them in the enforcement of the rules. According to the chief admin-

istering one community (Shandaugute), when group members came to him complaining about penalties that had been imposed on them by the group, he would respond by also imposing his traditional and more onerous additional penalty for rule-breaking, a habit which he claimed soon caused complaints to him to cease.

The development of positive *informal* social norms and rules, often 'social proof' norms, were also considered as powerful influences on group success. Often these types of norms related to gendered power relations, conflict resolution and consensus building behaviours, and trust building behaviours, all of which are discussed in more detail below. Facilitated community discussions to identify desirable positive social norms, and undesirable negative social norms, are a good starting point to enable behavioural change. If carefully managed, such discussions may speed up the process of positive attitudinal and behavioural change.

7. *Effective conflict resolution*

The ability to resolve or mitigate conflict and to build consensus within the community was often cited as a critical contributory factor to group success. Both formal and informal behavioural norms and rules contributed to the reduction in conflict and the promotion of consensus building behaviours. Groups in Ethiopia, Zimbabwe and Myanmar all described situations whereby conflict in the community diminished as the group practised participatory, open and transparent decision-making processes, and built trust among the members. Formal rules of behaviour associated with group function, such as provided through a written constitution, and sanctions for non-adherence to these rules, were seen as extremely important. Some groups elected formal conflict resolution committees, while others relied on their group executive leaders to resolve conflict. All of the Myanmar case study groups reported that they had observed the respectful behaviours of the NGO staff to one another, and the community had adopted and mirrored these respectful behaviours in the manner in which the community members treated each other. Some groups had received training in conflict resolution from their supporting NGO, while others had not, but managed to identify their own dispute resolution strategies.

Those organisations supporting a community and wishing to build social capital may facilitate open community discourses around what conflict resolution strategies might be appropriate for the community, as well as help develop conflict resolution institutions and provide conflict resolu-

tion training. Provision of model constitutions that can be modified by the community has also proven to be a useful strategy for conflict resolution. Open discussions should be held to identify appropriate sanctions for rule-breaking, and how the sanctions should be imposed and dealt with.

8. *Social protection of poorer, disadvantaged or more vulnerable members of the community*

A benefit of group membership was the confidence that the group would provide social protection and a safety net for its members if required. All case study groups undertook some level of social protection of poorer, disadvantaged or more vulnerable members of their group or community.

> *I know that if I fall ill, my sisters* (fellow group members) *will look after me, and I will still earn income from the cooperative businesses. If I have to travel away from Harshin, my sisters will look after my business while I am away.* (Female cooperative member, Harshin community)

In some cases, for example, Harshin community, groups undertook social protection of disadvantaged communities outside their own. Adopting a social protection role is a higher-level attribute of HSC communities and engenders a strong communitywide perspective, rather than solely an individual household perspective. Importantly, a group that adopts a social protection role is in a stronger position to achieve community-level adaptation to climate change, and the development of community-level food security strategies. Facilitated community discussions that explore the potential benefits of social protection, and that explore the moral and ethical motivations for this role, can help the community build consensus regarding its attitude to this undertaking.

9. *Development of aspirational group-level goals that also meet household livelihood needs*

Each of the case study groups had identified higher level, medium- to longer-term aspirational goals or 'vision' for the group. These aspirational goals were identified through consensus building processes and appeared to achieve several purposes. Firstly, they contributed to the construction of the success-narrative of each group, so that members were working col-

laboratively towards a bold outcome that met their future needs. Secondly, aspirational goals provided the groups with a timeframe and perspective that transcended their seasonal focus and struggle to survive and prosper. Thirdly, progress towards achieving these medium- to longer-term goals could be progressively revisited over time, and strategies and actions implemented to work towards goal achievement. Finally, the articulation of such aspirational goals indicated a level of self-realisation by the groups of their own empowerment, capacity and confidence to achieve higher-level outcomes. External supporting organisations should encourage their communities, as they progressively develop their capacity, to identify medium- to longer-term aspirational goals that, if realised, would improve their livelihoods and community well-being in significant ways.

10. *'Look and learn' visits to other HSC communities*

One of the most powerful influences on the development of HSC was the groups' experiences of visiting existing HSC groups elsewhere, which were already exhibiting these characteristics and achieving household and community benefits from their group activities. These 'look and learn visits', or 'cross-visits', achieved several purposes. Firstly, a visit to another HSC community engendered within the visitors a strong vision of what was possible in terms of social processes and livelihood improvements. Secondly, linking to another HSC community built bridging social capital and provided opportunities for social learning among the visitors. Thirdly, the visitors began to understand that the social changes were not minor adjustments, but rather a significant transformational change in the way in which their community viewed itself and its members. In some cases, these look and learn visits were carefully structured and purposeful. For example, Oxfam UK transported a small group of Harshin women to northern Kenya to visit an HSC community there. Following this visit, one of the leaders from the Kenyan community was relocated within Harshin community for two months, to help guide and inform the progress of development of the women's livestock marketing cooperatives there. During the interviews, the Harshin women frequently cited this initial look and learn visit and the collaboration with the Kenyan community as being a significantly powerful influence on their vision for the future for their community, and their belief in their ability to achieve that vision.

The Myanmar NGO, CESVI, facilitates cross-visits between its collaborating communities. CESVI also holds an annual two-day Agri-fair to

which representatives from each of its 125 participating communities are invited to a central event for the exchange of ideas and the development of their networks. While organisations supporting rural communities, such as NGOs, government and the private sector, sometimes facilitate knowledge exchanges between communities, often the focus of these exchanges is primarily concerned with technical knowledge and technical innovation. Less common is the look and learn visit used for the purposes of investigation of social innovation and social learning. Knowledge exchanges between communities, specifically targeting social innovation, and particularly in those areas related to social capital building, would provide enormous benefits to participating communities.

Synthesis and Conclusions

This research has highlighted several factors that explain the formation of social capital and that are common to HSC communities in three different cultural jurisdictions. The central question posed by the research is whether these factors can be used purposively to build social capital in poor or disadvantaged rural communities by those organisations supporting them.

There are a number of factors that emerge from this research that may be utilised to purposively build social capital. Many NGOs use participatory and inclusive decision-making processes in their work with communities; however, many government agencies do not. The value of such an approach to community decision-making and for building social capital has been demonstrated through this and other research, and should be adopted by agencies that work with poor communities.

Positive behavioural norms were identified by participants as a powerful influence on social capital building. Organisations supporting communities such as NGOs and government agencies can contribute to the identification of these norms through posing key behavioural questions and facilitating open community discussions and consensus building, around appropriate behaviours. Once agreed upon, these social norms, and the sanctions to be imposed for contravention of these norms, may be codified into a formal constitution. Institutional arrangements for monitoring compliance with these norms, such as elected subcommittees, can be charged by ensuring the rules are adhered to. Not all positive norms require codification but may be worthy of open discussion. Behaviours such as the respectful treatment of others in the community, and the sup-

port of the poor and disadvantaged in the community, can also be discussed in open forums.

Group members can be encouraged to reflect on whether they regard social protection as a valid role for them. At the same time, group members can consider how a social protection role contributes to their broader community ability to adapt to shocks and threats (including climate change adaptation), as well as enhancing food security status.

Effective conflict resolution was frequently cited as a factor that contributed to the success of case study groups. Careful selection of group members with personal attributes that lend themselves to conflict resolution, consensus building and mediation, and training of these people in these fields, should be promoted.

The influence of leadership and the appropriate leadership style on HSC group development was also an important factor. Leadership and governance training for democratically elected leaders, particularly including female leaders, should be encouraged. Mentoring of early career leaders by experienced people outside the group would also be valuable.

For HSC groups to develop and to be sustained require that membership of the group provides clear benefits to members when compared with individual agency. Ongoing questioning of the group's role, objectives and function, is necessary to ensure that these attributes are broadly aligned with the livelihood needs and other priority interests of its members.

Look and learn visits to other HSC communities were often mentioned as powerful formative influences on groups, enabling them to realise what was possible for them to achieve through collective action. Supporting agencies can utilise look and learn visits to purposively inspire, challenge and educate groups. Such visits also help groups to identify bolder and more challenging aspirational goals. Prior to embarking on intercommunity visits, preparations should be undertaken with the touring groups so that they understand that a key purpose of the visit is to explore social innovation and technological innovation. Such preparations should include setting clear learning objectives for the visit, and identification of key social innovation questions to be answered.

Each time an external agency interacts with a community provides an opportunity to build social capital. Utilising social capital within a community further builds social capital, and not using social capital weakens it. Progressive devolution of decision-making power, governance, leadership, activity monitoring and reporting to the community will intrinsically build

social capital. It is important, however, in the early stages of community development processes not to expect the community to have the leadership, governance and decision-making capabilities necessary to take on complex and challenging activities. This requires that external supporting agencies progressively scaffold communities as they develop their skills and knowledge, attitudes and behaviours to build their social capital over time.

This research has identified that there are some factors which contribute to the development of social capital in the case study groups; these are factors often contributed to *transformative* change within the groups.

The first of these factors was the recognition by individuals that they could achieve more by working collaboratively in the group than they could achieve by working on their own. While this might seem an obvious fact, for many poor households struggling to survive, the natural focus of endeavour is quite often at the household level. The concept that some of their very limited time, energy and resources should be allocated to group-level activities is in itself transformative.

The second transformative factor is the self-realisation by the group of its level of capacity to achieve much more than first intended. Many community groups remain modest in their achievements because their function tends to be reactive, and often primarily concerned with interactions with external agencies with whom they deal, such as government agencies and NGOs. The progressive understanding by community members of their *collective capacity*—the belief that by working together, by supporting each other and by sharing knowledge and resources, they could positively and significantly influence their livelihoods and their future—is indeed transformative. Such a realisation gives confidence to the community and empowers it to take action in many ways. HSC communities are instantly recognisable as confident and happy communities.

Another transformative factor is the positive attitudinal change that occurred within the case study groups. The significance of these attitudinal changes was highlighted by the participants themselves. These changes were exhibited in the way group members viewed themselves, viewed others and how they viewed the group as a whole. Substantial attitudinal changes were utilised by the communities to explain changes in gendered power relations, conflict resolution, social protection and improvements in feelings of community well-being.

This research sought to inform the design of rural development programmes, projects and strategies so that the development process itself

may purposively build social capital in participating communities. Ultimately, it is hoped that the research findings will contribute to designing more effective development strategies targeting the rural poor, to produce more resilient communities, that are able to better adapt to livelihood shocks and to climate change; to innovate; able to test, adapt and adopt new technologies and practices; and to resolve conflict, reach consensus and plan for the future.

Notes

1. Social capital literature distinguishes between *bonding* social capital (strong social ties) and *bridging* social capital (weak social ties). Bonding social capital generally refers to inward-looking social relationships that reinforce and bind homogeneous groups. Bridging social capital refers to outward-looking linkages to other groups (Halpern 2005). Both concepts are relevant to rural development.
2. *Injunctive* social norms (sometimes termed 'moral' norms) are those behaviours considered by a society to be appropriate or expected (e.g. treating elders with respect). *Social proof* norms (sometimes termed 'descriptive' norms) are those behaviours that are adopted because of our perception that many others in society are doing the same, for example, adopting a new farm technology or practice because many other farmers are doing so.

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CHAPTER 8

Rural-Urban Interaction in Rural Development of Peri-Urban Areas in Yangon Region, Myanmar: A Case Study of Hlegu Township

Nilar Aung and Tin Tin Mar

Introduction

The distinction between "rural" and "urban" is probably inevitable for descriptive purposes; however, it often implies a dichotomy which encompasses both spatial and sectorial dimensions. In reality, however, things tend to be far more complex: the ways in which nations define what is urban and what is rural can be very different; the boundaries of urban settlements are usually more blurred than portrayed by administrative delimitations, especially when urban use of rural resources is considered; population movement, especially temporary and seasonal migration, is not usually reflected in census figures and can make enumerations of rural and urban populations unreliable. Finally, a large number of households in urban areas tend to rely on rural resources, and rural populations are increasingly engaged in non-agricultural activities (Tacoli 1998, 2007). Potter et al. (2004) argued that urban-rural linkages were initiated in an

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attempt to gain advantage from differentials or complementarities between these two parts.

Definitions based on a sharp distinction between urban and rural settlements often assume that the livelihoods of their inhabitants can be equally reduced to two main categories: agriculture based in rural areas, and a reliance on manufacture and services in urban centers. Agriculture is being squeezed by non-agricultural pursuits, aspirations are increasingly informed by a wish to avoid farming and the "household" is being restructured as the genders and generations contest and renegotiate their respective roles. The diversification of the household economy and the interpenetration of rural and urban have created multiple hybrid ties where individuals and households shift between agricultural and industrial pursuits and cross between rural and urban areas. Farm is in thrall to non-farm, and industry is often dependent on "rural" labor (Jonathan Rigg 1998). Tacoli and Browder et al. (1995) indicate that the conversion of agricultural land to urban uses is leading to rapid transformations in agricultural production, spatial structure, social structure, land ownership and land markets in the rural-urban fringe. Thuo (2013) argued that the dynamics at work in the rural-urban fringe have not been fully captured, as they are often not visible until physical land conversion actually begins or takes place. It is at the rural-urban fringe however that we can best understand the process of today's urbanization (especially in developing countries), land conversions and development, as well as the evolving conflicts over land use. It is also in the fringe where there is an opportunity to manage urban growth patterns before they get imprinted on the landscape.

Recently, small and medium urban centers have come to be seen as playing an important role in rural-urban linkages, given the strong ties that they keep to their rural hinterland (Baker and Claeson 1990).

Located between urban and rural areas, these centers serve as the interface for urban-rural linkages. Browder considered the urban-rural interface as an array of networks connecting urban agents and rural producers. These perceptions all highlighted the transitional and dynamic features of the peri-urban area, which serves as a frontier where rural areas are in transition to becoming urban areas. The peri-urban area acts as an attractive destination for rural migrants, offering non-farming employment and access to education and medical services and so on. Further, the role of the peri-urban area has also been highlighted in situations where out-migration and industrial transfer from the downtown area to city outskirts emerge because of congestion problems in the urban areas.

The transformations in the peri-urban areas reflect regional differences and, while agricultural activities still prevail, significant shifts in land ownership and employment patterns take place, often involving the marginalization of both rural and urban poor. The high cost of food and accommodation in the cities has resulted in high levels of daily commuting from peripheral villages which show a strong involvement in the urban food market, a high proportion of non-farm employment, a substantial increase in agricultural wage labor force and a burgeoning land market.

These theoretical studies suggest to a large extent, that the pattern of resource flow and agglomeration exists at the regional level. In turn, agglomeration in the peri-urban areas (small towns) is at the medium level. The small towns can be treated as sub-centers in rural peripheries, supplying urban services (John Friedmann 2005). In this chapter, urban-rural interaction is defined as linkages (backward and forward) through labor, capital, goods and technology between urban and rural areas.

Rural-Urban Relations

According to the census, the total population of Myanmar in 2014 was about 51.4 million of which about 70 percent were rural dwellers. Therefore, the rural-urban relationship has been an important issue in recent years in Myanmar. Many of the rural-urban flows of people, goods and waste are most intensive and varied between built-up areas of towns and cities and the peri-urban area that surrounds them. The rural-urban interactions can also be traced in peri-urban areas of Yangon city. Prior to 1988, rural-urban relations were characterized by urban residents consuming agricultural products in exchange for the industrial products of the city. After the 1990s, rural-urban relations shifted from the previous balanced exchange to an increasing dependency of the rural areas on the urban economy. Yangon city could utilize resources from the larger context, which extended beyond their immediate environment, while the rural areas increasingly relied on the urban market, facilities and services. As commuters, most rural dwellers go from their villages to work daily in the city.

Hlegu Township is close to Yangon city and the livelihood of the rural population in Hlegu Township differs depending largely on their location. Some village tracts which are located along the main road rely not only on agriculture but also on small-scale home industry and services due to high accessibility, whereas the inhabitants of some villages

away from the main road earn their living in agriculture and livestock breeding. Variation in location and accessibility of the rural villages result in the variation in livelihoods and hence level of development. Sample village tracts from Hlegu Township have been selected as case study areas because the villages are close to the peri-urban areas of Yangon city such as Mingalardon, Shwepaukkan and North Okkalapa Townships. In Mingalardon Township, since 1997 Yangon Industrial Park (YIP-domestic industry) has established 98 factories by a joint venture between the Department of Urban Housing Development and Zay Kabar Company. This research is an attempt to identify the rural-urban interactions of rural development in peri-urban areas of Yangon city from the geographical point of view to provide a comprehensive understanding of the area.

According to the conceptual framework, both positive and negative interactions can be found. These can be varied in accordance with different geographic conditions of villages (Fig. 8.1). Based on this concept of rural-urban interaction, research questions are as follows:

1. What are the major factors influencing rural-urban interaction?
2. Why is there a difference in the level of development between the sample villages?

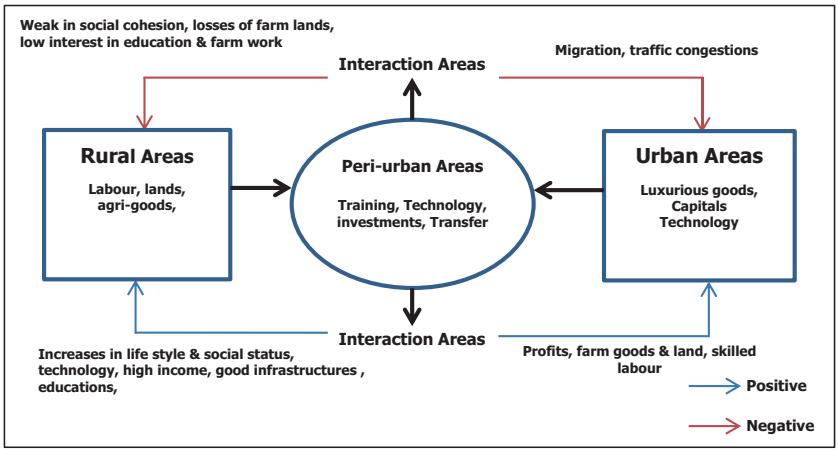

Fig. 8.1 Conceptual framework

General Background of Study Area

Hlegu Township is located in the northeastern part of Yangon Region and is bordered on the east by Bago, Kawa and Khayan Townships, on the south by Dagon Myothit (North) and North Okkalapa Townships and on the west by Hmawbi and Taikkyi Townships (Figs. 8.2 and 8.3).

The township comprises 5 wards in the urban area and 52 village tracts made up of 167 villages in the rural area. With a total length of 72 km from north to south and a total width of 26 km from east to west, the shape of the township is fairly elongated and less compact. It includes different reliefs which indirectly support uneven rural development. The boundary with Mingaladon and North Okkalapa is 13 km and 5 km in length respectively, which also follows the Barlar Creek. In 2015, the rural population of Hlegu Township was 165,028 persons, living in 52 village tracts.

Generally, rural development depends largely on transportation, agriculture and the possibility of running other economic activities. To be able to represent the variation in socio-economic development of the rural village tracts, three village tracts which occupy different physical bases and different development potential for rural development were selected as case studies (Fig. 8.4). We discuss these below:

Sinphone Village Tract has only one village and is located at the southwestern extreme of the township besides Barlar Creek, far off from Hlegu Town. It shares a boundary with Barlar Village Tract in the north, Sitpin (North) Village Tract in the east, Dagon Myothit (North) Township in the south, North Okkalapa Township in the southwest and Mingalardon Township in the northwest. In 2010, the total population was 1750 persons and in 2015 the total population was 1946 persons.

Although Sinphone Village Tract is far from Hlegu Township, it is fairly close to North Okkalapa, Dagon Myothit (North) and Mingalardon. Therefore, the inhabitants can easily seek jobs in the industrial zones of these townships and the farm laborers can work as wage earners in the off-farm period. Both monsoon and summer paddies are grown intensively. Those who have no farmland or who do not work in agriculture seek jobs at the industrial zones of Shwepaukkan, North Okkalapa and Mingalardon. It takes only about 15 minutes to cross the Balar Creek by motorcycle to get to Shwepaukkan bus terminal from where a person can proceed to other parts of Yangon city. Although Sinphone Village Tract is included in Hlegu, it interacts more with Shwepaukkan and North Okkalapa. Most

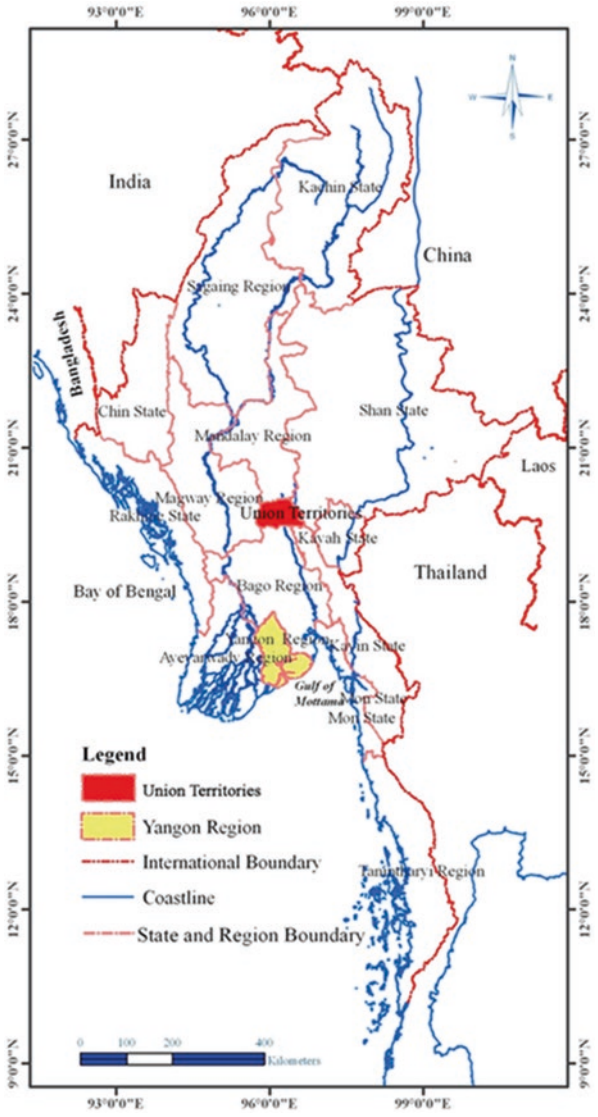

Fig. 8.2 Location of Yangon Region in Myanmar. (Source: Survey Department, Yangon, 2016)

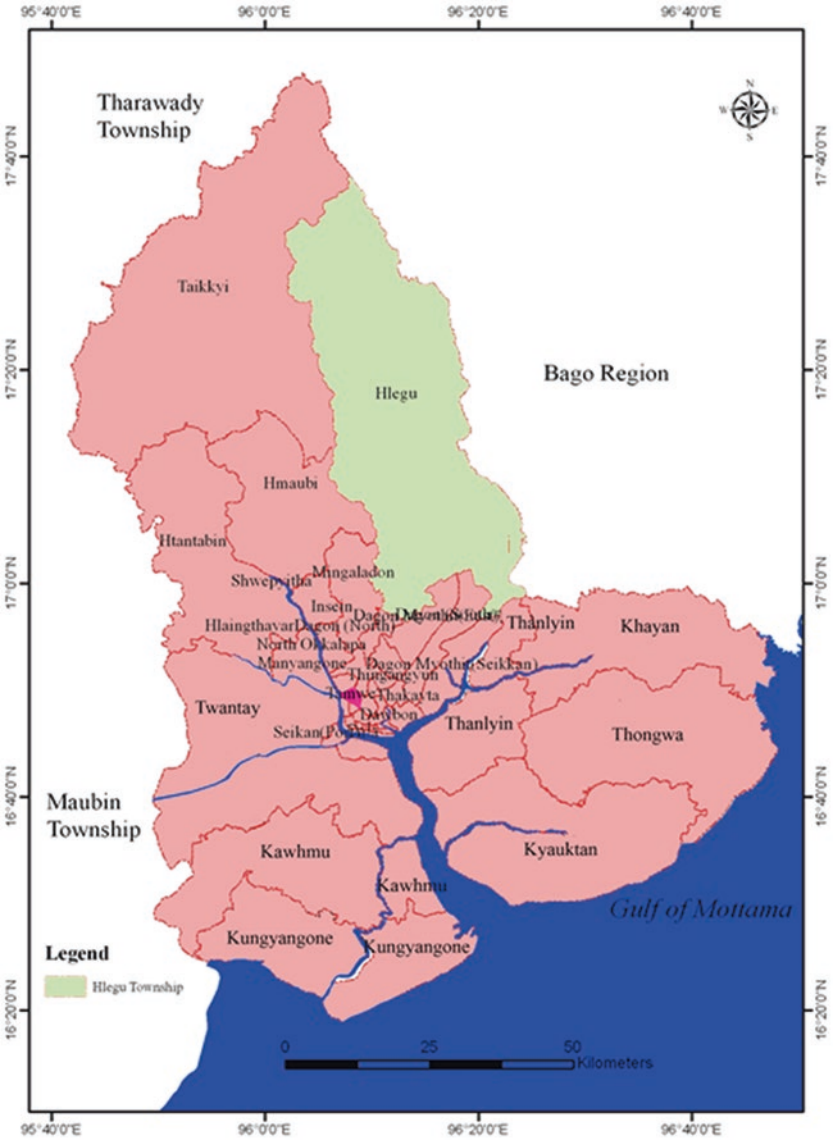

Fig. 8.3 Location of Hlegu Township, in Yangon Region. (Source: Survey Department, Yangon, 2016)

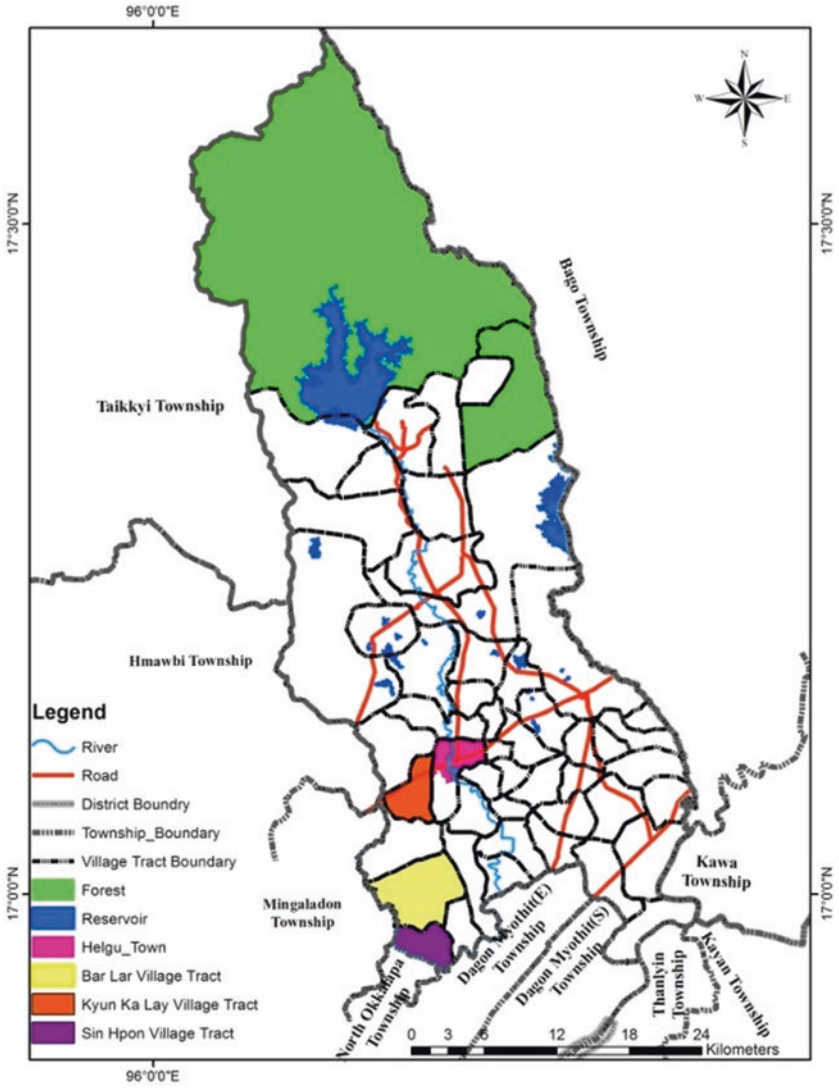

Fig. 8.4 Locations of three sample village tracts in Hlegu Township. (Source: Survey Department, Yangon, 2016)

households depend on the nearby urban areas for their livelihood (Fig. 8.5).

Barlar Village is located north of Sinphone village and is bounded by Ma Lit village in the east, Mingalardon Township on the west. In 2010, the total population was 2889 persons while in 2015, the total population was 3014 persons.

The total area of Barlar Village Tract is (2051.71) hectares. With 2018.9 hectares (4989 acres) of paddy land, Barlar Village Tract has the most paddy land area within Hlegu Township. Barlar Village Tract is located on the bank of Barlar Creek; most inhabitants earn their living by growing field crops such as paddy and pulses over a vast expanse of *le* land (paddy land). Cattle and buffalo are raised mainly to be used in the farm work and a few farmers raise milch cows. Most households raise pigs, goats, chicken and ducks at manageable scales mostly for home consumption, while a few households raise these on small commercial scales. Some raise fish in ponds for sales (Fig. 8.6).

Kyunkalay village is located along the Yangon-Bago-Mandalay No (1) Highway. This road was constructed during the colonial period but was extended and upgraded after 1988. It runs across Kyunkalay, Hlegu Town.

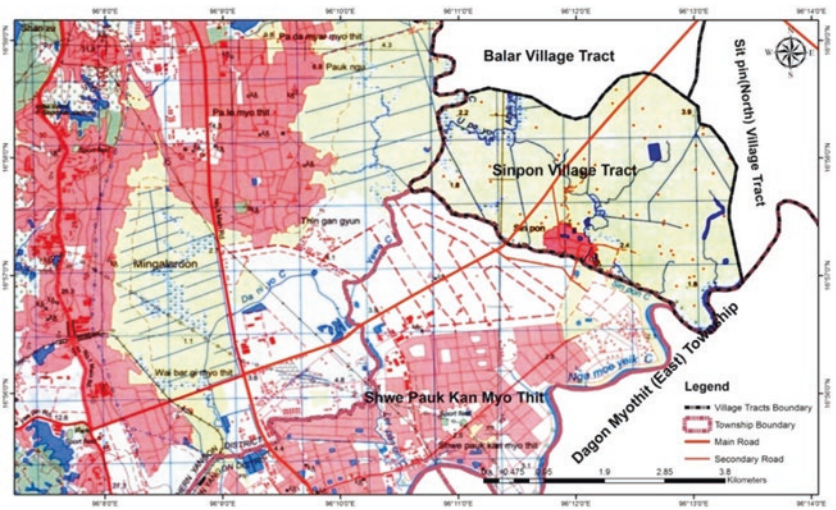

Fig. 8.5 Location of Sinphone Village Tract. (Source: Survey Department of Yangon, 2016)

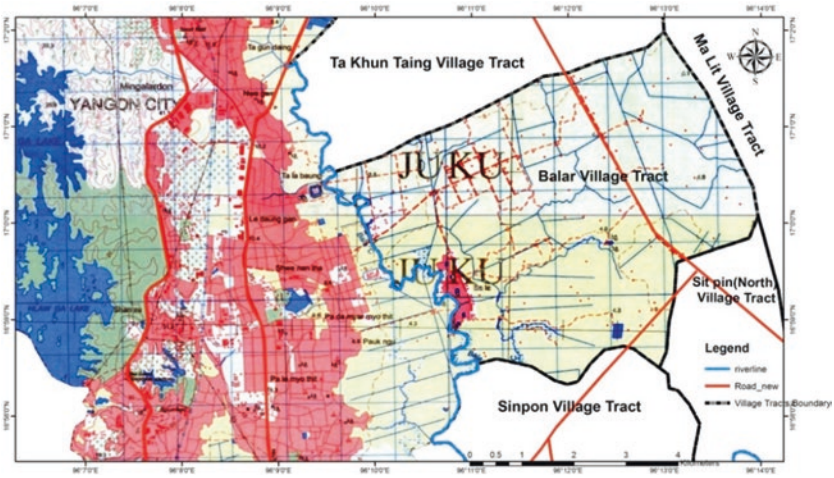

Fig. 8.6 Location of Barlar Village Tract. (Source: Survey Department of Yangon, 2016)

A number of express buses and trucks run along it day and night. The total population in 2010 was 8786 persons while in 2015, the total population was 8953 persons. It is located closer to Hlegu Town than to Yangon city (Fig. 8.7).

Generally, in the selected village tracts, 30 percent of the population basically depends on agriculture, and about 70 percent of the population is daily wage earners. There is great variation in economic activities due to their geographical location and different neighboring areas. As a result, the development level and development momentum of these village tracts vary in response to the types of jobs available.

Materials and Methods

The secondary data (numbers of inhabitants and agricultural acreages) were collected from village tract authorities for the three sample village tracts. To examine the current situations of the villages and shape the interaction between rural villages and peri-urban areas, data on active and inactive populations, major sources of income for inhabitants, education level, investment opportunities, major modes of transport and distance to the closest urban center were collected by using semi-structured inter-

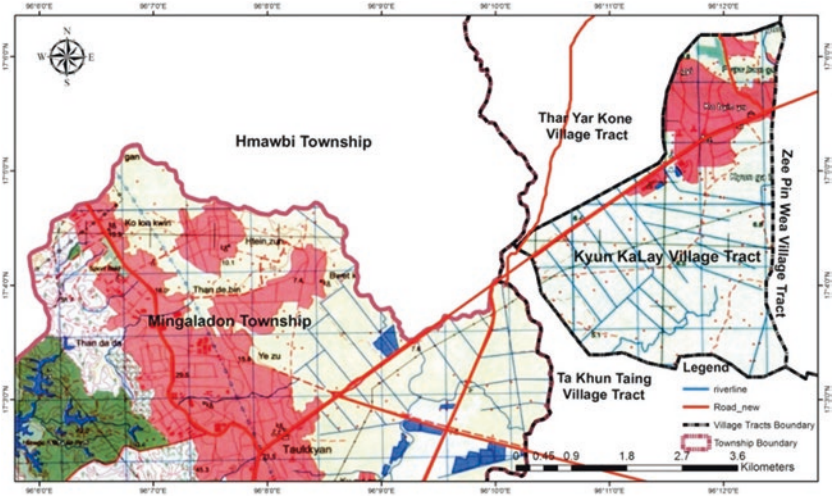

Fig. 8.7 Location of Kyunkalay Village Tract. (Source: Survey Department of Yangon, 2016)

views. In order to get a deeper understanding of the key links for rural-urban interactions, expert interviews were undertaken with the persons who have long experience in villages from each sample village tract. By using the data and information that were collected from semi-structured interviews and using key informant interviews, the major influencing factors for interactions, both positive and negative flows between rural villages and peri-urban areas can be analyzed. To find out the strengths and weaknesses of the rural-urban interactions in rural development, SWOT analysis was applied. Online sources and other books were also used to understand the theories and concepts related to rural-urban interactions.

Results and Findings

The results of the analysis are as follows:

The majority of people depend on agriculture, livestock breeding, fishing and extraction of forest products in the Hlegu Township; therefore, most of the households in the three sample village tracts depend on primary economic activities. However, some households in Sinphone and Kyunkalay villages also run secondary economic activities, particularly

small-scale industries. Tertiary economic activities are also more developed in Sinphone and Kyunkalay villages because these two villages are close to peri-urban areas of Yangon city and they have large markets where selling and buying activities are carried out not only by some inhabitants of the village tract but also by people living around it (Tin Tin Mar 2012).

Generally, the people aged between 15 and 60 years are regarded as active (working) population and the remainder as dependents. If there is a greater proportion of dependents (inactive population), it will need a proportion of the working age-group to support the former; therefore, percentages of the active and inactive population in the village are important to the development potential of the rural area.

According to the survey results, the differences in percentages of worker, student and dependent population among the village tracts were less pronounced in 2011.

However, in 2015, the percentage of the active population increased two times in all sample villages. Sinphone village has the largest proportion of the active population with 64 percent (from 37 percent), Barlar village had 56.3 percent (from 36 percent) and Kyunkalay village had 50 percent (from 28 percent) of the total population. Accordingly, a low dependency percentage was found in all three sample villages in 2015. The highest working-age percentage can be seen in Sinphone village combined with the lowest dependency percentage, because the inhabitants can easily seek jobs in the industrial zones of Mingalardon Township and the farm laborers can also work as wage earners in the off-farm period. Further, among the three sample villages, Sinphone village is the closest village to the peri-urban area of Yangon city; therefore, the spatial linkages are important factors for interaction.

According to the Myanmar "Integrated Household and Living Conditions Survey 2009–2010," published by UNDP (2011), the percentages of adult literacy rates for all the three selected village tracts as well as for the township are fairly high. Among them, Sinphone village is highest with 78.67 percent, followed by the other village tracts.

In accordance with the survey result, Sinphone village possessed the highest percentage of graduates, while Barlar village had the lowest percentage of graduates among the three sample villages. However, the student percentages in all sample villages dropped slightly in 2015. Barlar village also had the lowest percentage of students in 2015 as this group fell from 18 percent to 8.4 percent. Moreover, the number of university stu-

dents and graduates and the adult literacy rate for the over 15-year age-group are low in Barlar village, because of its location and lack of encouragement by the parents for their offspring to pursue higher education. The expert interviews revealed that the majority of children from Barlar village had to leave school after the completion of primary or middle school level. Most of the children from peasants' and random workers' families had to drop out of school after primary level. It was because of the seasonal shifting of their families to the worksites and partly to help in the parents' job or household work. Although people aged between 15 and 60 are generally included in the workforce, there are a number of people who do not work. Some children less than 15 years old engage in work in the factories in the nearby industrial zones where they can earn 60,000 kyats per month as a basic worker. Further, the older age-group (above 60 years) also engage in certain kinds of work due to their family's financial problems. The students' percentages also dropped slightly in both Sinphone and Kyunkalay villages in 2015. This is because of the high labor demand from the nearby industrial zones. It might be one of the negative aspects of relations between urban and rural areas because education is an important indicator in assessing the rural development of a particular area (Figs. 8.8, 8.9, and 8.10).

In accordance with the types of worker, unlike the two village tracts, large numbers of people in Sinphone village are highly dependent on the industrial zones of Shwepaukkan and Mingalardon Townships, especially in Yangon Industrial Park (Zaykabar zone-4). Some 66 percent of working

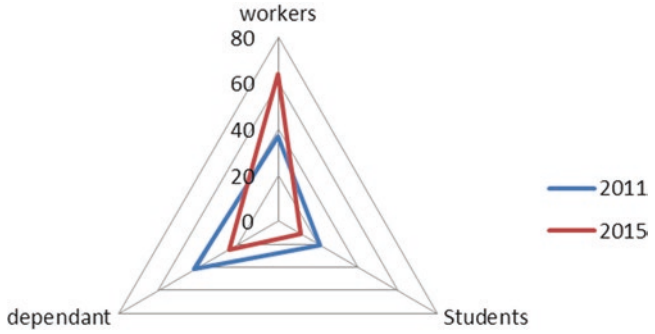

Fig. 8.8 The changes on percentage of worker, student and dependent in Sinphone Village Tract. (Source: Questionnaire Survey, 2015)

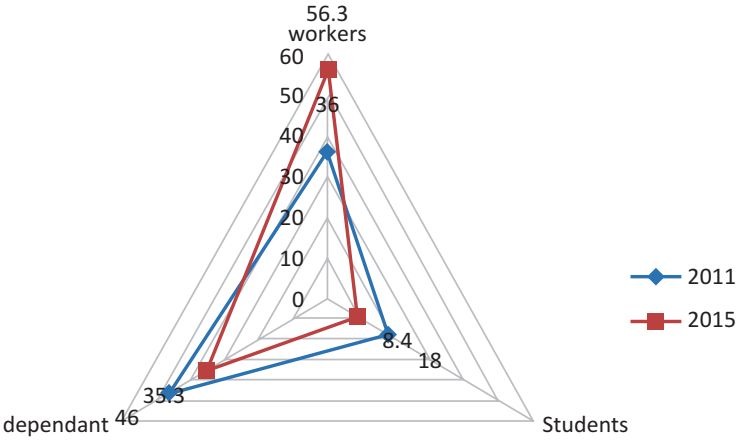

Fig. 8.9 Changes on percentage of worker, students and dependent in Balar Village Tract (2011–2015). (Source: Questionnaire Survey, 2015)

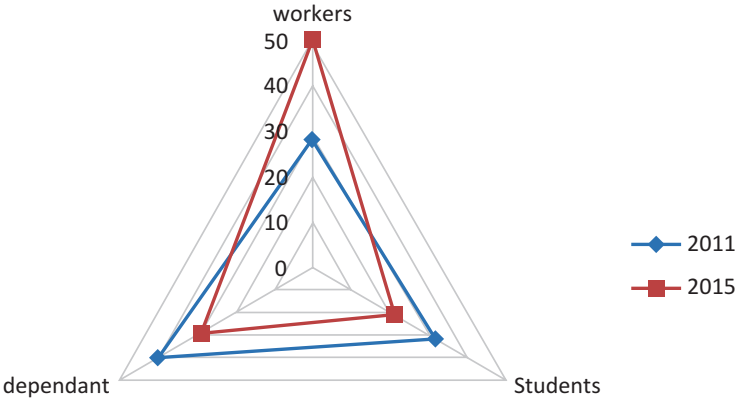

Fig. 8.10 Changes on percentage of worker, students and dependent in Kyunkalay Village Tract (2011–2015). (Source: Questionnaire Survey, 2015)

people are industrial workers. Among industrial workers, the dominant group work in the garment industry; they generally have less than five years' work experience. According to the questionnaire result, 50 percent of these workers are graduates, so they can obtain a higher salary from their jobs than others. As commuters, they go to their work by ferry, bus and

bicycle from the village. Consequently, some people from the neighboring villages, and especially from Ayeyarwady Region, have to find work in Sinphone village tract and engage in the farm work of this village. As a result, 40 percent of farmers engaged in farm work in Sinphone village came from neighboring villages and Ayeyarwady Region as salary workers because of the local labor shortage in Sinphone village. They had a very low level of education and also had low skills, so they could earn only very low wages compared to the farmer's wages in Sinphone village. Therefore, the research also found that such rural to rural migration (labor flow from low wage to high wage) can lead to increasing inequalities in the village.

The questionnaire results show that most of the industrial workers from Barlar village are basic workers with low salary because of their education level. Barlar village depends more on agriculture with 55 percent of people having relatively low income, low job opportunity and limited small-scale home industry, whereas the households in Sinphone and Kyunkalay villages have a higher living standard or quality of life than that of Barlar village. Because of their proximity to the industrial zones, peoples from nearby townships can take advantage of high employment opportunities. Although Barlar village is close to Mingalardon Township, most of its people still depend entirely on using their own bicycle for commuting, because of limited development of infrastructure, especially in transportation. Consequently, the socio-economic development of Barlar village is rather low. It is located on the bank of Barlar Creek, and most inhabitants earn their living growing field crops such as monsoon paddy, summer paddy and pulses, over a vast expanse of *le* land. Like other rural villages, farmers are poor and they do not possess sufficient cash for investment. Farmers cannot use enough input because input cost is high, and they are not able to invest much for the farm activities. As a result, the yield is low with low return. Generally, the yield of the area is directly related to types and amount of input, varieties and use of systematic farming methods. High-yield variety seeds are also one of the important determining factors affecting crop yield but the high-yield seed is expensive, and it is difficult for farmers to buy such seeds. Systematic farming methods and the use of inputs, especially fertilizer and pesticide, are also important for gaining high yield. The farmers cannot afford to buy high-yield seeds as well as inputs and they cultivate their own local varieties. It is one of the reasons for the low yield.

The area of farm size or land holding belonging to each farmer affects the socio-economic status of the peasant family as it is the chief income-

generating asset for most rural people. According to the survey results, most of the farmers from Barlar village have more than 20 years' experiences in agriculture, and Balar village has the highest paddy land areas within Hlegu Township. Based on these facts, Barlar village should be promoted as the best area for agriculture development and then it will become a major food supply area for Yangon city. This could increase the income and lifestyle of rural dwellers of Barlar village.

Because of its accessible location to both Yangon city and Hlegu Town, Kyunkalay village had the highest percentage of government staff with 12 percent, whereas Sinphone village had only 5 percent and Balar 2 percent of their total workers in 2015. However, significant diversifications in major sources of income and jobs of rural peoples were found in Kyunkalay village and the lifestyle of rural dwellers improved. Like Sinphone village, the major groups are garment workers with more than 15 years' work experience, but they can only get a low salary in accordance with their level of education. This result meant that rural peoples from Kyunkalay village had job opportunities in this kind of industry for the last ten years.

The expert interview mentioned that the main challenge for farmers of Kyunkalay village is the loss of their farmlands. As the urban population of Yangon city is increasing, land markets and land uses in all rural areas around Yangon city are increasingly influenced by estate development. As a consequence, many urban residents speculate in purchasing land. Thus, land value in Kyunkalay villages has been increasing over the last ten years. At present, the land value of Kyunkalay village is extremely high and many farmers have sold their farmlands to developers, so they have to find work as casual laborers. As a result, a high percentage of casual workers can be seen in Kyunkalay village (Figs. 8.11, 8.12, and 8.13). (**They are shown by the circle with sector methods for types of workers in three sample villages at below.**)

The average income of workers from the three villages is also different based on types of jobs and levels of education. The survey results revealed that workers from Sinphone village have the highest average income with 6800 kyats per day, whereas those from Kyunkalay village earned 5100 kyats and those from Barlar village earned 3800 kyats per day. Most parents in Sinphone village have wide knowledge and encourage their children to continue their higher education, thus the current generation is being influenced by the lifestyle of urban dwellers. They are more interested in urban areas than in their village. Accordingly, most of the current

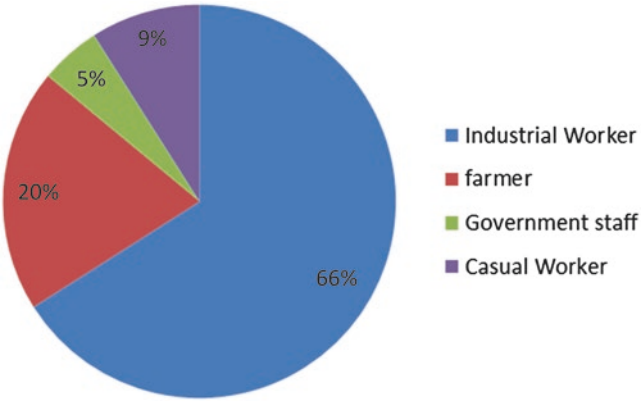

Fig. 8.11 Types of worker in Sinphone village (2015). (Source: Questionnaire Survey in 2015)

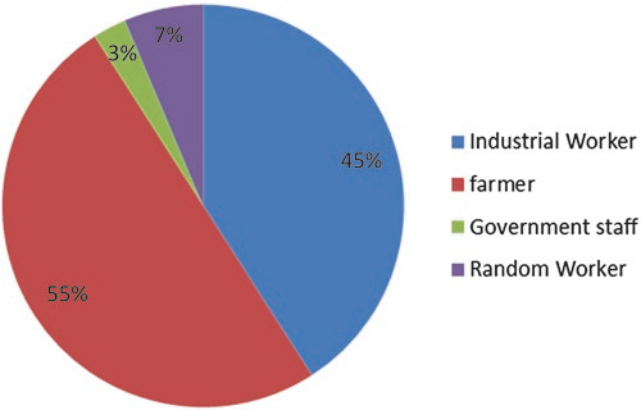

Fig. 8.12 Types of worker in Barlar village (2015). (Source: Questionnaire Survey in 2015)

generation from Sinphone village lack interest in their village's welfare. It is one of the negative factors for rural development.

As regards the flow of goods between villages and peri-urban areas, all respondents from Sinphone and Barlar villages mentioned that they rely heavily on the nearby townships such as North Okkalapa, Shwepaukkan,

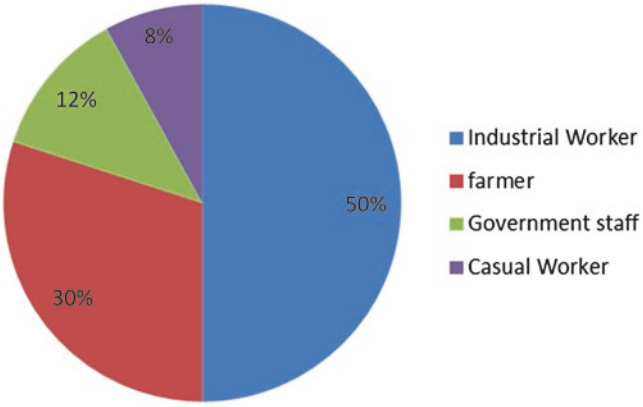

Fig. 8.13 Types of worker in Kyunkalay village (2015). (Source: Questionnaire Survey in 2015)

Mingalardon and Htaukkyant Township for buying and selling goods and also for health, education, technology, capitals, markets and job opportunities. They sell their agricultural products at markets in nearby townships and buy the household goods for their own use and for reselling in their villages. Owners of the grocery store and household commodity shop revealed that they buy their stock of goods from markets in Shwepaukkan, North Okkalapa and Mingalardon Townships once a month.

The village tracts located on the main road have a more socio-economic infrastructure and these have a relatively high living standard. Sinphone and Kyunkalay villages have more infrastructural facilities than Barlar village. As a result of its advantageous location and adjacent areas, better transportation, higher job opportunities and wider knowledge of the inhabitants, the socio-economic level of Sinphone village is higher than that of the other two villages. For example, the village head men from Sinphone village have good leadership skills, so inter-village roads and bridges were constructed on the basis of half by half in which the local people had to contribute half of the total cost and the other half was provided by the government. Likewise, school, health care center, village administrative offices, library, electricity and markets were established at the initiative of the local populace. Further, the street pattern of Sinphone

village is parallel or right-angled. Because of its infrastructure development, villagers can do business and trade more than before, and as a consequence, most of the houses in the village were updated from wood to brick and some are still under construction. Therefore, good leadership is also needed to develop the rural area. A convenient transportation system is also needed to access the peri-urban areas especially urban markets and services which contribute to the economies of rural peoples. Based on these results, the location of village tracts on different basic infrastructure is a major deciding factor for development.

The proportion of the population using an improved drinking water source is moderate for all three village tracts. Kyunkaly and Sinphone villages depend on hand-pump and surface well water, while Barlar village mainly relies on pond water. Nearly all the households of the three village tracts have fly-free toilets and thus sanitation conditions are good.

As regards the electricity supply, power lines have been installed in Sinphone and Kyunkalay villages and the inhabitants have direct access to an electricity source. Although Barlar village has access to electricity, some households cannot use electricity or electric appliances. Because they are poor farmers, they still depend on conventional lighting materials such as candles, kerosene, oil lamps and so on.

Telecommunication is necessary for making instant contact with distance places and acquiring up-to-date information. In the past, the inhabitants of the study area had to go to the auto-exchange station at the post and telegraph office. The reduction in subscription rate to 500,000 kyats in 2009 has enabled many families to use a hand phone. Since April 2012, a sim card of Global System Mobile phone has been subscribed on an installment basis. Those who want to use it need first to deposit 40,000 kyats and the remaining sum to be paid is 10,000 kyats per month. As a result, more and more households can use the telecommunication facility now. The survey results reveal that the increase in the number of hand phones has been comparatively more rapid in Sinphone and Kyunkalay villages than in Barlar. Thus, Sinphone Village Tract stands first in the number of hand phones per 1000 people with 100, compared with 97 in Kyunkalay and 40 in Barlar. Because of good communications, all villages can be developed in the future.

To find out the strength and weakness of rural-urban interaction for rural development, SWOT analysis was applied to the data and informa-

tion gained from the survey results. SWOT centers solely on the four components such as Strength, Weakness, Opportunities and Threats combined in the short form (that means that the facts for each component were written by incomplete sentences), letting the planner recognize when making decisions for plans and actions of rural development. Recognizing these negative and positive impacting aspects can assist rural areas more efficiently connect what components of a plan should be identified. Strengths and weaknesses will not normally match scheduled threats and opportunities, even if some correlation ought to exist because they are joined together (Fig. 8.14).

According to SWOT analysis, both positive and negative interactions can be found in all sample villages for rural development. However, based on different geographical settings, socio-economic conditions and human resources of villages, the strengths and weaknesses are also interwoven. The most common strengths and weaknesses for rural development factors are nearly the same in the three sample villages.

Strengths	**Weaknesses**
Good infrastructures (transportation, communication & electricity) Increases in level of Education, Increases in income & lifestyle, Experiences workers,(skilled labours), Increases in non-agricultural employment	**Low interest in welfare of village, low interest in education, low interest in farm work, highly rely on urban areas/facilities**
Opportunities	**Threats**
Favors for SMS establishing, favors for urban area extension, Favors for urban food supply areas, Favors for new investments	**Local labour shortages, decline in agricultural activities, highly land value & losses of agricultural lands, weak in social cohesion, income diversifications**

Fig. 8.14 SWOT analysis for the rural-urban interactions in rural development. (Source: Based on the results of both questionnaires and field observations in 2015)

Conclusion and Suggestions

The government adopted a rural development policy and strategy in 2001, and a nationwide rural development program was launched in all regions of the country, the coordinating authority being the Ministry for Progress of Border Areas and National Races and Development Affairs. Since then, rural-urban interaction has been increasing continuously in Myanmar. In particular, the shift of the government policy from urban-biased to rural and the establishing of Yangon Industrial Park (Zaykabar Industrial Zones) in 1997 have greatly strengthened rural-urban interactions in peri-urban areas of Yangon city. In Mingalardon Township, Yangon Industrial Park (YIP- domestic Industry) has established 108 factories by the joint venture between Department of Urban Housing, Development and Zay Kabar Company since 1997. There are many factories such as garment, food products, machineries and so on. According to the interview results with managers from garment factories at Mingalardon, each factory has about 500 laborers and all workers can get at least 3600 kyats per day. For the supervisors, skilled laborers can get a salary between 200,000 kyats and 350,000 kyats per, month. They have to teach new workers about their working procedures and mentioned that they also mainly rely on the workers from these villages. Therefore, the spatial linkages are important for the flow of people and goods from rural to urban areas and back.

The results of the research found that both positive and negative interactions can be seen between rural villages and peri-urban areas of Yangon city. Based on the different geographical conditions of the villages, the impacts are also different in the sample villages. As a consequence, the development level and development momentum of these village tracts vary with their locations and response to the types of jobs available. The proximity to urban areas is important for immediate rural development because of easy access to local markets, but the proximity to urban areas can also be a negative factor that influences rural-led development because it causes a reduction in consumption of agricultural produce, local labor shortages and low social cohesion within the village. Most of the farmers from Sinphone village came and worked from the rural areas of Bago and Ayeyarwady Regions. Because of the farming labor shortages occurring in Sinphone village, landowners hired them to work in their farmland as salary workers. The workers can get more income in Sinphone village compared to the salary that they received at their villages so the research

found that in Sinphone village the flow of labor from rural agriculture to urban industry could occur without a decline in agricultural activities.

According to Balar village's experience, access to land, capital and labor may not be important than spatial proximity and infrastructures in determining the extent to which farmers are able to benefit from urban markets. Sinphone and Barlar villages are nearly the same distance from Hlegu Town, but because of poor roads and low accessibility and the existence of vacant land between a village and the peri-urban area, Barlar village has a low living standard and less development than Sinphone village. As a result, a low intensity of rural-urban interaction can be found in Barlar village. This affects the socio-economic conditions of the village as well as the results of a poor transportation system. The diversification in income between the rural dwellers is also found in Barlar village based on their types of job and education level. It is one of the important explanatory factors for the development of the village. With regard to Barlar village, there is development potential in the agriculture sector because it has large areas of paddy land within Hlegu Township, experienced farmers and Barlar Dam. If modern technologies, finance and a convenient transportation system are supported by the government, Barlar can become the major food supply area for Yangon city. Then the socio-economic condition will improve in the village, thus countering the vicious circle of poverty. The major weakness of Barlar village for development is low infrastructure, especially in road conditions and low education achievement levels.

The village tracts located on the main roads have more socio-economic infrastructures and these enjoy a relatively high living standard. For example, Kyunkalay village is located on No (1) Yangon-Mandalay Highway. This village tract has easy access to Hlegu, Bago towns and Yangon city. On the other hand, because of its accessible location, the research found losses in agriculture lands at Kyunkalay village. It is located closer to Hlegu Town and therefore relies less on Yangon city.

Many rural dwellers from the sample villages rely on local peri-urban areas for both their wholesale and retail purchases, access to private and public sector services (secondary school and hospitals), post, and access to government services. All villages have only one sub-rural health center in which one midwife and one sanitation worker are serving. The number of midwives is too small to provide an effective service to the pregnant women of the area concerned. This situation affects the future socio-economic development of the rural areas.

Based on these findings, the following tasks should be implemented for the future rural development of the villages.

- The establishment of small-scale agro-based industries and microfinance institutions should be launched in Sinphone and Kyunkalay villages which can generate more employment opportunities.
- As development in the rural area is somehow related to the rate of literacy, the government should take responsibility for the development in rural education and health by opening more schools and health clinics and better staffed, and with better facilities including medicines.
- There are still vacant, waste lands in the rural areas and these lands should be converted into agricultural land, by the companies or entrepreneurs that have sufficient capital to invest.
- In cooperation with the Agriculture Department, high-yield quality strains should be cultivated with modern scientific farming techniques to boost the yield of crops.
- To protect the losses of agricultural land in all villages especially in Kyunkalay and Sinphone villages, land regulations should emphasize landowning conditions.
- Based on the different geographical locations and different human resources of villages, there are differences in economic potential for development; so, the specific development plans should be launched for particular areas.

Then, the socio-economic conditions will be improved in the villages, countering the vicious circle of poverty.

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CHAPTER 9

Changing Livelihood Options as Adaptation: A Comparative Analysis of Three Flood Control Schemes in the Vietnamese Mekong Delta

Thong Tran and Helen James

Introduction

The floodplains of the Vietnamese Mekong Delta (VMD) are the lifeblood of the local inhabitants. This region makes a significant contribution to agricultural and aquacultural production, which is dependent on the productive functions of seasonal floodwaters. Floods bring substantial livelihood opportunities for the majority of local households but simultaneously cause negative impacts such as the loss of crops, assets, and family

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fatalities. Over the past few decades, the VMD has undergone a large number of major floods with varying levels of impact (Tran Nhu Hoi 2009). These incidents have caused floods to be commonly viewed as a 'natural enemy'. According to the World Bank (2003), the delta currently faces increased flood complexities, which are likely to be aggravated under the combined impacts of climate change and upstream development.

The flood complexities facing these rural societies are inherently concerned with the structural development policy that has been implemented in the VMD over the past few decades. As noted by Pahl-Wostl et al. (2011), the main objectives of flood management are to reduce flood risk and increase safety of human life and infrastructure on the floodplains. In the context of the VMD, flood management aims to both mitigate negative flood impacts and capitalise on flood-based resources for local livelihood development. The flood control systems have significant implications for rural livelihood practices (Le Thi Viet Hoa et al. 2008; Dang Thanh Duc et al. 2016). While the structure-oriented flood management policies are well documented, the accompanying livelihood transformation of the farming households has not been adequately acknowledged at the local level.

This chapter presents the qualitative findings on three flood control schemes in the VMD and their corresponding impacts on the local households' livelihood systems. It first seeks to present an overview of the national water governance framework and the decentralisation process that have shaped flood governance in the delta. The next section extends the discussion to key objectives for dyke construction in the VMD. Central to this study is the idea that farming households have proactively transformed their livelihood practices to respond to emergent situations induced by the structural intervention. In light of this, a comparative analysis of the pre-dyke and post-dyke landscapes associated with the corresponding transformation of households' livelihood patterns across the schemes is provided. The chapter concludes by highlighting households' learning efforts in developing farming initiatives that make substantial contributions to local adaptation policies.

Methodology

Selection of Case Study Areas

This study employs a comparative case study approach to investigate the livelihood options of farming households in adapting to impacts caused by

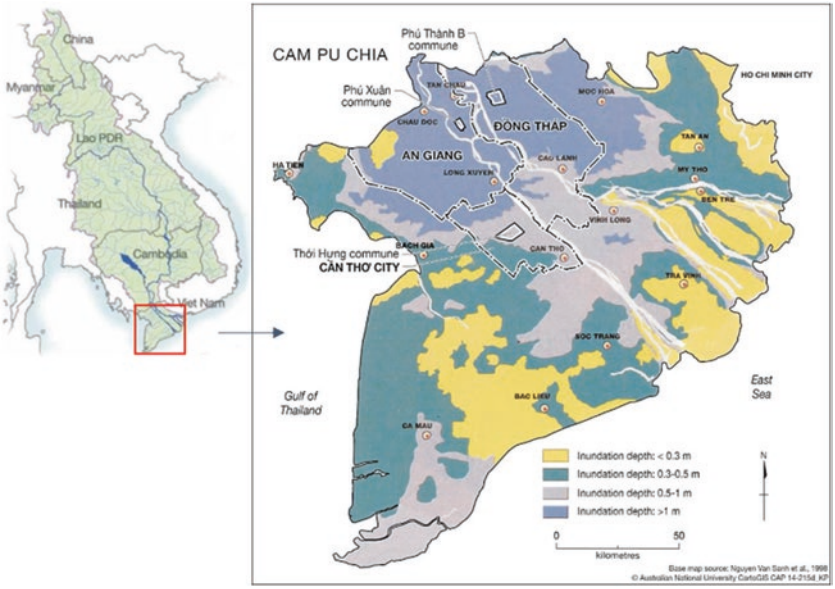

Fig. 9.1 Flood control schemes and study areas in the VMD. (Source: Adapted from the base map of Nguyen Van Sanh et al. 1998)

the scheme building. Three flood control schemes located in three distinct landform units, composed of the Plain of Reeds, the upper floodplain, and the tide-affected floodplain were selected for the study (Fig. 9.1). In particular, two study areas, Phu Thanh B and Phu Xuan communes, are located in the upper delta, which experiences a high level of flood inundation (>1 m). The third, Thoi Hung commune, belongs to Can Tho City. It has a lower flood depth level (<1 m). Investigation of these schemes provides an empirical understanding of how the flood governance arrangements in the delta have been implemented over the past few decades. The chapter also offers examples of change in the biophysical landscape of the delta as a result of control-oriented development policies and illustrates how rural societies have adapted to change.

Methods of Data Collection and Analysis

This chapter uses the mixed-methods approach, drawing on data obtained from focus group discussions (FGDs), in-depth interviews, and household

surveys in the three study areas. It includes nine FGDs with three types of household groups (poor, medium, and better-off) and 33 in-depth interviews with key informants and a survey administered to 300 participants. The data collection was undertaken from October 2013 to April 2014.

Conducting FGDs involved the employment of three participatory rural appraisal (PRA) tools which included timeline analysis, trend analysis, and seasonal calendar adapted from Narayanasamy (2009). Participants were encouraged to discuss the key issues surrounding floods and dykes that have implications for their livelihoods. The in-depth interviews recruited government officials working on agriculture at the provincial and district levels, senior scientists working at local research institutions, and experienced farmers. Respondents were asked questions about flood situations, flood management policies, impacts of dykes on rural livelihoods, and households' adaptation experiences in the post-dyke context. The data analysis strategy for the qualitative data includes the use of the NVivo software (Bazeley 2007), which assists in identifying patterns or themes that emerged from the data (Table 9.1).

Table 9.1 Summary of research methods

Methods	*Participants*	*Approaches to data collection and analysis*	*Data to be collected*
Focus group discussion	9 FGDs with 3 household groups (poor, medium, better-off)	Selection of participants based on the participatory approach (King and Horrocks 2010; Neuman 2011) Thematic analysis (Neuman 2011) assisted by NVivo	Dyke building process, alterations in flood patterns, and change in household livelihoods in the post-dyke context
In-depth interviews	33 interviews with government officials, senior scientists, and farmers	Purposive sampling and snowball sampling (Liamputtong 2013) Thematic analysis (Neuman 2011) assisted by NVivo	Dyke building process, alterations in flood patterns, and change in household livelihoods in the post-dyke context
Household surveys	300 participants (farmers)	Stratified sampling (de Vaus 2002) Univariate analysis (de Vaus 2002) assisted by Microsoft Excel	Households' perceptions of the post-dyke conditions and household adaptation responses

Source: Thong Tran 2017

Use of these exploratory techniques informed the design of the household survey. The survey included information about households' perceptions of the post-dyke flood context and their adaptive responses, using closed questions with a response checklist provided to respondents. The stratified sampling approach was employed to recruit respondents for the survey (de Vaus 2002). Households were classified based on their socio-economic characteristics (poor, medium, and better-off). Those who practised on-farm and off-farm livelihood activities were categorised into these sub-populations (strata). From each of these strata, a random sample was drawn. Some 100 households were recruited in each commune, which provided the total number of 300 participants for the survey. The results were gathered and entered into Microsoft Excel for analysis. Analysis of policy documents and scientific reports relevant to flood impacts and dyke construction in the VMD also complemented the qualitative and quantitative analysis in this study.

Results and Discussion

Flood Governance in the Vietnamese Mekong Delta

Enactment of the first Law on Water Resources (LWR) (No. 08/1998/QH10) in January 1999 provided a legislative framework for management of the water sector in Vietnam. It identified the Ministry of Agriculture and Rural Development (MARD) as the administrator of the water law accountable for water resources management (Taylor and Wright 2001). Given this responsibility, MARD plays the coordinating role in approving the planning of river basins, and hydraulic systems under the delegation of the central government (Hansen and Do Hong Phan 2005). Accordingly, the provincial governments and cities are responsible for the management of water resources in their own jurisdictions.

Flood governance in the VMD is contextualised in the decentralisation process, where administrative and fiscal responsibilities concentrate in local administrations, particularly at the provincial level (Fritzen 2006). According to Benedikter (2014), in the performance of its functions, the Department of Agriculture and Rural Development (DARD) is shaped by dual subordinations at the provincial level (Fig. 9.2). It acts both as the specialised agency vertically linked to MARD and obtains horizontal directives from the provincial people's committee. Until 2005, hydraulic engineering, water services delivery, and flood and storm control were assigned

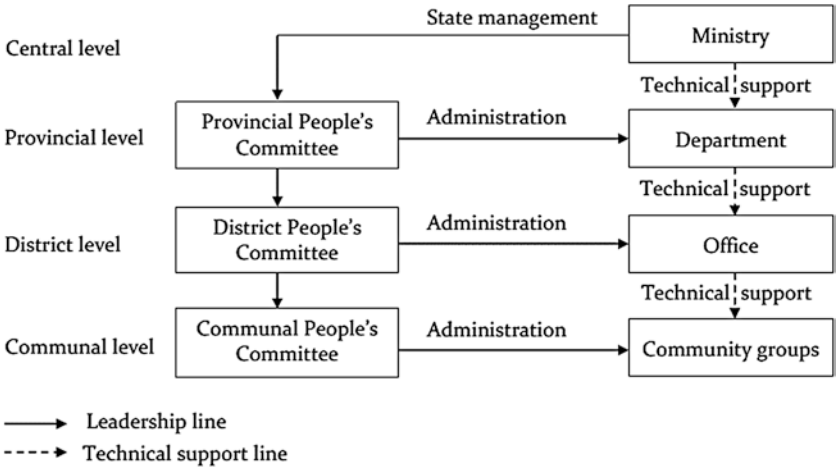

Fig. 9.2 Governance frameworks for flood management in the VMD. (Source: Modified from Hansen and Do Hong Phan (2005))

to MARD and its subordinate state management organisations, and planning institutes (Waibel et al. 2012). In the vertical decision-making procedures, these responsibilities have been moved to DARD, including planning, construction, and maintenance of all kinds of hydraulic works, particularly dykes, irrigation schemes, and sluices (Nguyen Thi Phuong Loan 2010). At the district level, the Office of Agriculture and Rural Development (OARD) coordinates its functions with DARD to implement flood control and irrigation policies. At the lowest administrative level, the communal government is assigned to perform support functions for the operation and management of the flood control schemes in association with local community institutions, mass organisations, community groups, and farming households.

The argument for decentralisation is based on the premise that local authorities have a better understanding of their local conditions, and thus are in a better position to formulate and implement their economic development (Bach Tan Sinh 2003). This process provides the provincial authorities with greater autonomy in decision-making and performing administrative functions in order to link central decrees and development programmes to their local interests. Autonomy from the central authorities provides a greater institutional flexibility that allows the local governments to pursue their own interests (Waibel 2010). Such a 'self-governance'

approach is one of the proximate causes for the fragmentation in institutional design for the construction, operation, and management of irrigation and flood control schemes in the delta.

The delegation of institutional responsibilities for the operation and management of the hydraulic systems varies a great deal, according to the size and scale of construction (Waibel et al. 2012). For instance, An Giang People's Committee has promulgated Decision No. 03/2015/QD-UBND, specifying that the provincial irrigation management company should be responsible for larger hydraulic schemes (level-one and level-two canals). In the meantime, the Sub-Bureau of Water Resources manages level-two canals within districts and level-three canals within communal and inter-communal jurisdictions. The management and maintenance of interior schemes (on-field irrigation systems) rest with the people's commune committee and the local farmers' groups.

Objectives for Scheme Construction

The state's vision of expanding the delta to achieve national security and inhabitant resettlements since the Nguyen Dynasty sheds initial light on the employment of the control approach in the colonial and post-war periods. During the colonial era, the French government accelerated land exploitation by mechanising the canal excavation process, turning it from a state of 'wildernesses' into 'civilisation'. Frequent large floods which caused significant losses of human lives, properties, and crops have led to an antagonistic view of floods that has been included in the state policy on water resources management. The negative impacts of floods therefore prompted the central government to employ flood control structures as the key solution to mitigate the flood impacts.

The ideology of 'human mastery over nature' inherited from the colonial period, together with food shortages in the post-war period, has formulated the state's strategic vision and political mandate over agricultural development in the floodplains. This policy dictates that the structural systems play a pivotal role in flood control for rice production and farming diversification in the short and long term (Imamura and Dang Van To 1997).

As previously mentioned, the structure-oriented approach has dominated the state policy on flood management in the delta. It suggested the dominant adoption of the conventional control-oriented approach based on the state's technocratic ideology. Since 1975, the hydraulic landscape

of the delta has been dramatically transformed, driven by the central government's policies for the expansion of rice cultivation areas (1976–1990), rice intensification (1991–1999), and agricultural diversification (2000 to date) (Bosma et al. 2005; Garschagen et al. 2012; Chu Thai Hoanh et al. 2014). The disastrous flood events in 1978 and subsequent widespread food shortages in the 1980s provided a stronger rationale for the state to increase investment in large-scale hydraulic schemes to mitigate flood impacts and ensure food security (Le Anh Tuan et al. 2007; Biggs et al. 2009; Waibel 2010). Miller (2007) noted that about 62 percent of the state's total capital investment in agriculture was allocated for water resource development between 1976 and 1989.

Enforcement of the decentralisation policy since 1986 has also enabled provincial governments to accelerate structural developments to serve their socio-economic development priorities. This gave them motivation and options to find new models of cooperation to sustain and improve their systems (Biggs et al. 2009). To mitigate the flood effects, the Omon-Xano irrigation project built 234 km of dykes and reinforced existing dyke systems to protect the agricultural area from annual flood inundation (World Bank 2011). Further upstream, between the Tien and Hau Rivers, the North Vam Nao flood control scheme was built. It aimed to control high floods, enable intensive rice production, and diversify agricultural production. This scheme includes 100 km of closed ring dykes and 300 km of internal dykes (Kellogg, Brown and Root 2005), covering an area of 30,836 ha of Phu Tan and Tan Chau districts of An Giang province. More high dyke systems have been built across the flood-prone areas in the delta to support the triple-cropping systems. Since 2006 the cultivated areas for the third crop (autumn-winter crop) have increased steadily. For instance, in 2012 the cultivated area devoted to the autumn-winter crop in An Giang increased by 145,000 ha, the largest area as compared to its surrounding provinces.

Flood Control Schemes in the Case Study Areas

Phu Thanh B commune belongs to Tam Nong district, Dong Thap province. Located in the low topography of the Plain of Reeds, this area frequently experiences high flood inundation in the flood season caused by flow discharge from the Mekong River, heavy rainfall, and overflows from Cambodia. Given such complex hydrological conditions, the local government constructed low dyke systems across the commune in the

mid-1990s. The aim of this strategy is three-fold. First, this structural system aims to protect the summer-autumn crops from early flood entry, until they are completely harvested. Second, floods are flushed into the rice fields to replenish soil fertility as soon as the crops are harvested. Third, floods provide great opportunities for local households to practise various flood-based livelihood activities for daily subsistence. Wild fish and aquatic resources (fresh-water crabs, golden snails, moina, sesbania sesban flowers, and waterlily) constitute a large proportion of income for the majority of local households, especially the poor. It is worth mentioning that the high flood inundation in this commune has created a favourable natural environment for the growth of the giant fresh-water prawn culture over the last decade. Initiated in 2004, this production model was soon adopted across the commune and neighbouring localities. An increasing number of better-off and medium households have employed this model as ways to make lucrative earnings during the flood season.

Phu Xuan commune belongs to Phu Tan district, located between the two main branches of the Mekong River: the Tien and Hau Rivers. The district has the highest flooding depth in the VMD (Tran Nhu Hoi 2005). The irrigation and flood control system of Phu Xuan commune is regulated by the overall management of the North Vam Nao flood control scheme. With Australian assistance, the scheme includes an external high embankment of 100 km and internal dyke systems of 300 km with 24 original compartments, embracing Phu Tan and a part of its upstream neighbouring district (Tan Chau). With this integrated flood management system, floods are proactively managed to allow the production of eight rice crops within three consecutive years. The last crop (autumn-winter crop) of the third year is suspended for flood retention, until the end of the flood season. Phu Xuan commune has four compartments surrounded by high compartment dyke systems (5+ metres). These systems provide protection for local land transport and inhabitants during the flood season.

Thoi Hung is protected by a highly controlled dyke system. For every kilometre, a secondary canal has been built to connect primary canal systems. The sluice gates were installed at each end of the secondary canals, allowing the active control of flood in-flows to support local agricultural production. Dredging of volumes of earth from these canals helps fortify the dyke systems which serve as roads for local traffic. Inside the high dyke system is a lower embankment that encircles each household's land area. This system aims to secure the production of cash crops planted in the

flood season. Each one of this household-level dyke system has a sluice gate that controls the inlet of floods into rice fields. From the outset, the Song Hau State Farm actively experimented with a wide range of integrated farming systems to support the cultivation of field crops, fruit trees, and the practice of the rice-fish culture. The 'one bund, two ditches' *(bó giữa, mương cặp)*, for instance, is one of the most successful initiatives in the commune. A bund that serves as a cadastral line is built between two adjacent household units. It also provides space for planting mangoes and short-term cash crops. An additional advantage of this integrated model is that the parallel linear ditches built on both sides of the bund provide irrigation for field crops and refuges for fingerlings. Qualitative evidence suggests that a large number of local farming households, when taking advantage of this irrigation and flood control system, have successfully diversified into cash crops to increase their income.

Pre-Dyke Versus Post-Dyke Analysis and Household Change in Livelihood Strategies

This section provides a comparative analysis of how the biophysical conditions of the case study areas characterise local households' adaptation portfolios. Land ownership plays a significant role in influencing the capacity of the household groups to deal with change. Transformation of the flood-based livelihood practices, which constitute the primary livelihoods of rural farmers during the past decades, is very pronounced in this process.

Figure 9.3 presents the adaptation strategies undertaken by farming households in Phu Thanh B commune. In the pre-dyke period, the medium and better-off household groups mainly participated in floating rice cultivation and fish culture. The medium group trapped wild fish for additional income in the flood season. Meanwhile, the poor group earned most of their income from wild fish capture and collection of aquatic plants, which are abundant in the flood season. The findings suggest dramatic differences in the way households have changed their livelihood practices in the post-dyke context. The better-off groups shifted to prawn culture in the flooding months and cultivated the winter-spring crop after the flood receded. The dyke systems allowed the medium group to practise the double rice system (winter-spring and summer-autumn). Dykes provided opportunities for the poor group to earn additional income from seasonal agricultural work such as weeding, rice transplanting, or field bund building.

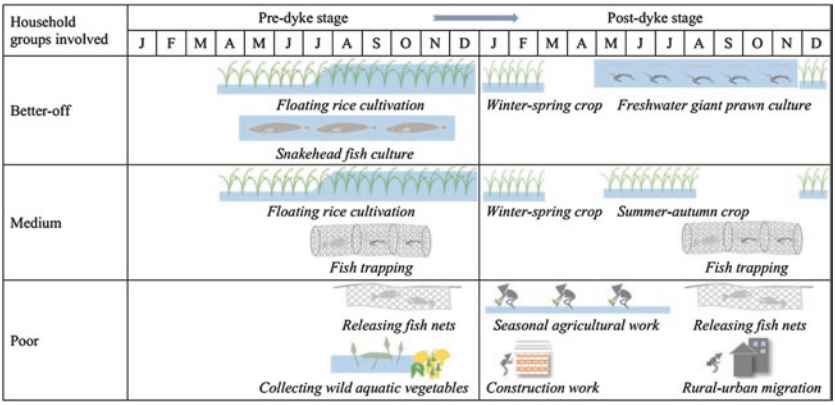

Fig. 9.3 Households' change in livelihood patterns in Phu Thanh B. (Source: Thong Tran 2017)

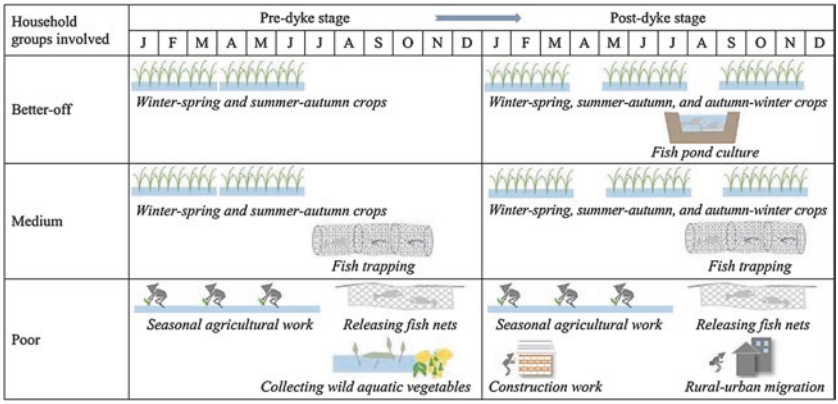

Fig. 9.4 Households' transformation of livelihood patterns in Phu Xuan. (Source: Thong Tran 2017)

There has been a significant change in local households' livelihoods since the construction of the North Vam Nao scheme in Phu Xuan commune (Fig. 9.4). Formerly, the low dykes enabled the practice of double-cropping systems for the medium and better-off households. Poor households engaged in seasonal agricultural work and collected aquatic species in the flood season. Since the scheme has been established, triple-

cropping systems are now widespread. Some better-off households take advantage of the natural resources in the flood season for fish culture. Although government officials stated that the triple-cropping systems would provide more seasonal job opportunities for local poor households, the reality is quite different. Evidence suggests that most of the poor households do not have adequate options to diversify their income, apart from trivial agricultural work and fish capture in the flood season. These conditions can be largely attributed to the depletion of natural fish stocks due to the increased use of pesticide from multiple-crop systems. Poor households are increasingly dependent on local landowners for work.

The dyke system in Thoi Hung has presented a remarkable transformation in farming systems (Fig. 9.5). The introduction of innovative farming models has produced high profits for medium and better-off groups. They also provide more employment opportunities for the poor group. It is worth noting that the integrated farming systems allow flexibility for practising gardening (planting mangoes), growing cash crops and poultry

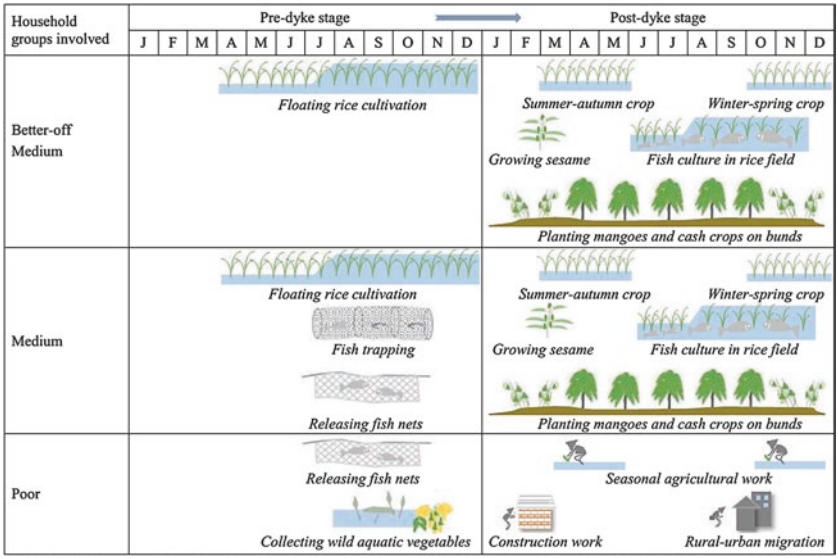

Fig. 9.5 Households' transformation of livelihood patterns in Thoi Hung. (Source: Thong Tran 2017)

husbandry during the flood season. Making use of empty spaces on rice bunds, local households put up trellises and grow a variety of climbing plants to earn extra income.

Emergence of Farming Initiatives During the Adaptation Process

Farming initiatives have evolved substantially since the dykes were built. Households played a significant role in the development and adoption of such initiatives. Evidence suggests that they shared experiential knowledge with and learned from others, by which they could enhance their adaptive capacity to deal with change. Importantly, some of these initiatives have been integrated into local adaptation strategies.

Learning interactions constitute an essential component in farming households' adaptation. The way local households developed farming initiatives was practically based on both their collective and self-learning endeavours. This highlights households' creative utilisation of experiential knowledge accumulated from their life-long interactions with local environmental conditions and collaborative engagement with others. By this means they are able to enhance their adaptive skills and capacity to successfully sustain their livelihoods and overcome hardship in new situations.

Who Adapts Better to the Post-Dyke Situations?

There are winners and losers in the post-dyke adaptation context. While the better-off and medium groups can gain better access to capital sources to diversify their farming systems, their poor counterparts face difficulties in seeking alternatives to sustain their livelihoods. While facing constraints in accessing the necessary resources, the poor households are at risk of being deprived of income-generating opportunities due to the accelerating mechanisation processes in farming production. The instability of rural employment and declining aquatic resources in the flood season add more hardship to their livelihoods. Given limited options, resources, and ability to switch to other alternative livelihoods, most of the poor households maintain traditional livelihood practices on the basis of seasonal employment and natural flood-based resources.

Evidence from Phu Thanh B suggests that poor households have hardly adapted to the post-dyke transformation. The fish population and aquatic plants are no longer abundant as before. Most of them have encountered difficulties arising from the booming agricultural mechanisation in the

commune. The increasing application of combined harvesters in rice harvesting has deprived them of possible survival options. Similarly, most poor households in Phu Xuan agreed about the negative effects of the North Vam Nao scheme. The findings suggested that they had to go far away from home to trap fish, since wild fish hardly got into the fields due to highly protected culverts. The duration of flood retention in compartments is rather short, which is not adequate for fish to grow. Similar to their counterparts in the other two communes, the majority of the poor group in Thoi Hung are disproportionately dependent on seasonal agricultural employment which gives them their primary income during the flood season.

For the poor group in the delta, migration is the main livelihood strategy. In contrast to Dun (2011) who perceived floods as a push factor for migration, this study confirms that instability in rural employment and the subsequent agricultural mechanisation driven by the control-oriented policies constitute the primary drivers for the increasing outmigration of poor households. These findings are congruent with the studies undertaken by Dang Nguyen Anh et al. (2003) and Huynh Truong Huy and Le Nguyen Doan Khoi (2011), suggesting that the transformation in agricultural production systems creates surplus labour in rural areas, and contributes largely to the increased movement of labour from rural to urban areas.

Conclusion

The process of water management in the VMD is closely linked to structural intervention. It highlights the state's 'political mission' for accelerating agricultural production in the delta, from the expansion of cultivated areas for rice intensification to the diversification of farming systems. These processes have led to the rapid development of irrigation and flood control schemes across the delta which makes the delta one of the most human-regulated water regimes in the basin.

The comparative analysis of the three flood control schemes illustrates how household groups strategically changed their livelihood practices to adapt better to the social-ecological changes caused by dyke building. In Thoi Hung, the local households proactively diversified crop production and shifted towards non-rice products in order to earn higher income. In the case of Phu Thanh B, when experiencing the high flood inundation, farming households are more likely to capitalise on the local flood environment to make a living. The flood protection from the North Vam

Nao scheme in Phu Xuan has stimulated farmers to grow sticky rice and other cash crops during the flood season. Through the adaptation process, communications and interactions with others are the key approaches that help farming households sustain their adaptive capacity to the structural impacts.

The dyke construction policies produce the significant polarity that can be observed among the household groups. Better-off and medium household groups are likely to enjoy more benefits from the dyke policy than the poor group. Trapped in the difficult situation of lack of resources and alternative livelihoods in the rural areas, most poor households have shifted to migration as a livelihood strategy. Evidence shows that it is the preferred adaptation strategy that helps poor households get out of poverty. This study advances the contemporary knowledge of rural migration, its direct link to shrinking employment opportunities, and the ensuing agricultural mechanisation caused by the dyke policies in the VMD.

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CHAPTER 10

Environmental and Social Impacts of Mining in the Mogok Area, Pyin Oo Lwin District, Mandalay Region, Myanmar

Ohn Thwin, Wint Wint Htun, and Khin Mar Wai

Introduction

Mogok is one of the most famous gem deposits in the world. For centuries, Mogok has been associated with the world's finest rubies. Although Mogok is known particularly for rubies of fine quality, sapphire, spinel and peridot are also found there. Other quality gems also found in the Mogok area are apatite, scapolite, zircon, moonstone, garnet, iolite, amethyst, topaz, danburite and so on. The mining projects can only commence on the basis of knowledge of the extent and value of the mineral deposit. Mineral development can create wealth, but it can also cause considerable disruption to the environment.

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Location, Accessibility and Physiography of Mogok Area

Mogok is located at the north latitudes 22° 55′–23° 00′ and the east longitudes 96° 25′–96° 35′ and stands 3800 feet above sea level. It is situated about 500 miles to the north of Yangon and 128 miles from Mandalay (Fig. 10.1). The general area of the tract is very mountainous, forming the western borders of the Shan Plateau. Mogok valley is an important area, consisting of a narrow alluvial plain running NE-SW, about five kilometers long and one kilometer wide. It is surrounded by mountains on all sides, namely, the Kyeni Mountains in the east, the Pinku Mountains in the west, the Htinhsu Mountains in the south and the Taung Me Mountains in the north. The Mogok valley, surrounded by these mountain ranges, lies in a low basin. In this area, the mainstream generally flows in a NNW to SSE direction. The dominant drainage pattern of the area is generally a dendritic pattern which is a medium to coarse texture.

General Geology

Geologically, the Mogok gem mining area is situated within the Mogok metamorphic belt. The area lies in the north-west of the Shan Plateau and bounded on the north by the E-W trending Momeik fault and on the west by the N-S trending Sagaing fault. The Mogok group underlies the Chaungmagyi group south-east of Mogok, and the contact between these groups is faulted. It overlies the Irrawaddian sediments along the N-S trending Sagaing fault along the western margin and is covered by alluvium at the south-west part of the present area.

The study areas are generally composed of igneous and metasedimentary rocks. The metasedimentary rocks include marble, calc-silicate rock, gneisses and quartzite, which presumably are those metamorphosed sediments of the early Paleozoic age. About one-third of the area is exposed by the intrusive igneous rocks of granitic composition. Other intrusive igneous rocks are syenite and pegmatite. The rocks of the Mogok belt were highly distributed and suffered from the severe effects of tectonism.

The names of the mining sites in the area studied are as follows:

1. Lin Yaung Chi Mine
2. Shwe Pyi Aye Mine
3. Myanmar San Taw Win Mine
4. Pan Lin Pyaung Gaung Mine

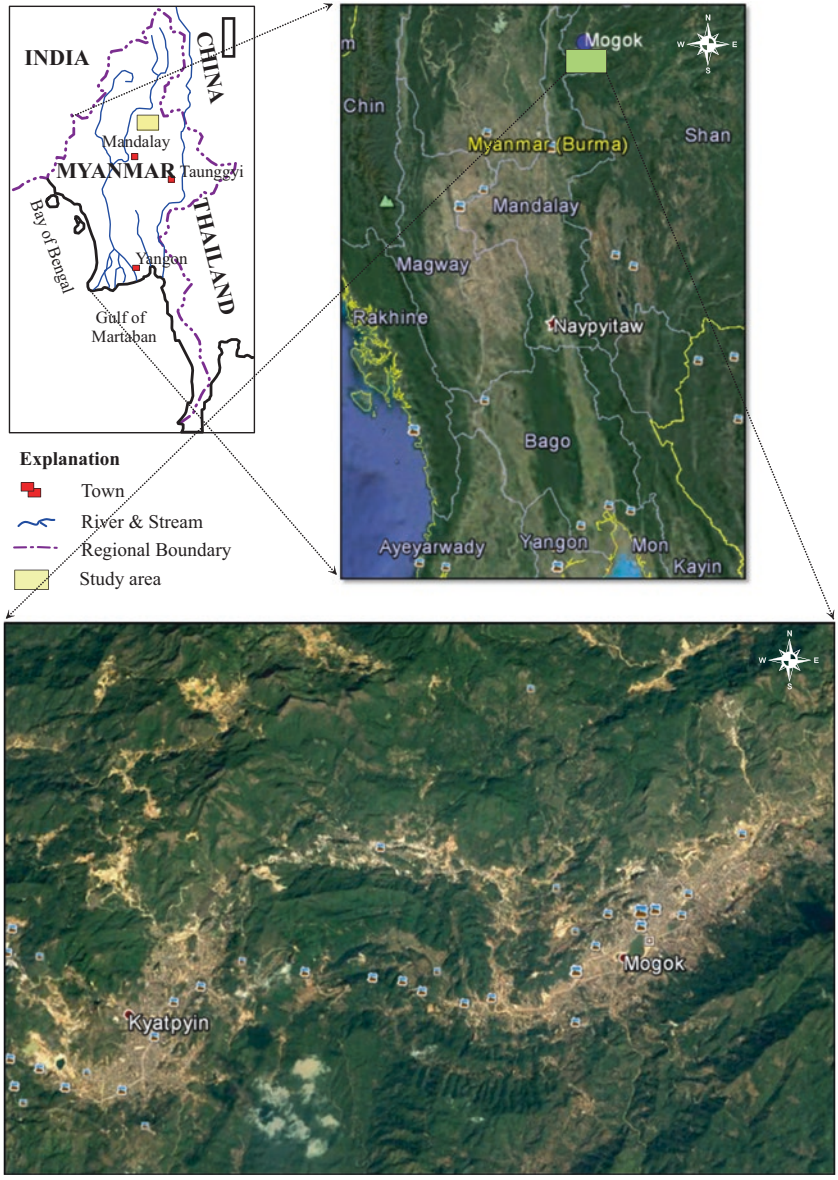

Fig. 10.1 Location map of the study sites

5. Daw Tin Yee, Ywar Thar Yar, Ah Chaut Taw (Private Company)
6. Share Family (Private Company)
7. Ruby Dragon Mine
8. Yadanar Gadaygadar Mine
9. Baw Lone Gyi and Baw Lone Lay Mine
10. Mogok Pride Mine

Mining Methods

Mining methods used in the study area are summarized as follows.

Traditional Methods
Three types of operation for traditional mining of secondary deposits in the area are:

(a) Ludwin
(b) Hmyawdwin
(c) Twinlon

Mechanized Methods

(a) Vertical Shaft and Tunneling
(b) Adit Mining

Environmental Impacts of Mining

Environmental impacts of gem mining are considerable in the study area: geomorphological changes, flooding, landslide, deforestation and water pollution occur in the mine sites and the urban areas. Many mining works have been associated with processing activities. Most processing methods use chemical reagents. In the Mogok gem mining area, gem concentrated processing methods are mostly used as gravitational vibration jigs; it is a physical method and no chemical reagents are required. But some physical environmental impacts can be seen in the Mogok area. After 1990, a large amount of investment in gem mining in the Mogok area was joint ventured with the Union of Myanmar Economic Holdings Co. Ltd. (UMEHL). Large machines have been used in these mines. According to the study, physical environmental impacts can be encountered in the Mogok gem area (Fig. 10.2).

Fig. 10.2 Geomorphological changes in the Mogok gem area

Geomorphological Changes

In the mining area, overburdened soil is removed to another region. In some mines, rocks are destroyed by blasting. Due to this fact, geomorphological features have been destroyed in Kadoke Tat and Dattaw areas of this region.

Flooding

Flooding usually forces a halt to mining during the rainy season and demolishes the urban area. Mines need to consume a large amount of water to wash the gem gravels (ge-sa). The runoff water from high-level ground or mine sites flows into the urban areas. As a result, the underground water table is raised and flooding occurs. Flooding in the urban area causes tremendous sedimentation and gradual sinking of the houses in the sediment. This phenomenon has been recently encountered in the urban areas of Mogok. It is probable that the area of precious minerals will

be lost beneath the sediment in the coming century if there is no adequate environmental conservation today.

Although the safety of the mine workers is vital for the primary deposits mine, there has not been enough security to protect the workers. Also in the superficial mining sites of the private small-scale to medium-scale organizations, there is no plan for waste and water removal systems, and this leads to damage of the existing streams near Ywar Thar Yar. As a result of the weakness in environmental management, seasonal flooding due to heavy rainfall and landslides occur in some gem mining areas. Some gem mine areas are situated close to the downtown area of Kyat Pyin and Mogok. These hazards may cause damage to the social environments of the urbanized areas (Fig. 10.3).

Landslides

Mining activities affected by landslides vary from insignificant to very significant. A landslide is caused by random tunneling. Insignificant effects currently occur in several excavation sites. Another accident that

Fig. 10.3 Flooding of Mogok during the rainy season in 2009

occurs in mine sites is collapse caused by debris flow of soil slip. It is possibly because

(1) pits are always dug in the highly fractured zone; and
(2) the gem-bearing horizons are commonly capped by incompetent layers.

In the Mogok gem mining area, Gem byones are the most profitable deposits for gem mining. They are accumulated by surface geological processes. Therefore, superficial mining has been more attractive than underground mining. After 1990, the natural surface has been damaged by superficial mining such as open-pit mining in which heavy machinery is used. On the other hand, unconsolidated dump sites occur. These have resulted in land degradation in the surrounding areas of the Mogok and Kyat Pyin settlement areas (Fig. 10.4). As a result, some drainage systems are blocked by these settlements. This causes flooding and landslides in the Mogok and Kyat Pyin low areas during the period of heavy rains.

Deforestation of the Mine Site Area

DGI Batch-11 of the University of Yangon went to Mogok Township for about nine days for a survey on mining, purchasing and to study various gems. Deforestation is one of the most important environmental impacts of mining. A large area of forest is cut for mine operations. So the overburdened soil is completely destroyed. Because of this aspect, landslides occur

Fig. 10.4 Landslides in Mogok

and plants cannot be grown. Forests have disappeared in the Shwe Pyi Aye mine, Lin Yaung Chi mine, Dattaw area and so on as a result.

The forest area was studied by comparing the satellite images shot in March 2000 and April 2015. When compared, it was found that replantation of the forest had occurred.

The result shown in the red-colored area in the images is the area of deforestation. The yellow-colored area is the original area and the green colored is the growing area. The new growth area is 167.2 sq. km, while the deforestation area is 71.73 sq. km (Fig. 10.5). Local people advised that the bamboo and wood used in the mines area have been brought from Moe Maike to Mogok.

Authorities concerned with environmental conservation do not allow the required bamboo and wood for the mines to be cut in the area. Therefore, according to local informants, the bamboo and wood to be used in the mines are brought from other regions, especially from Moe Maike. The green area in the figure is a new plantation in the northern part of Mogok. However, between Mogok and Moe Meik, the areas in the

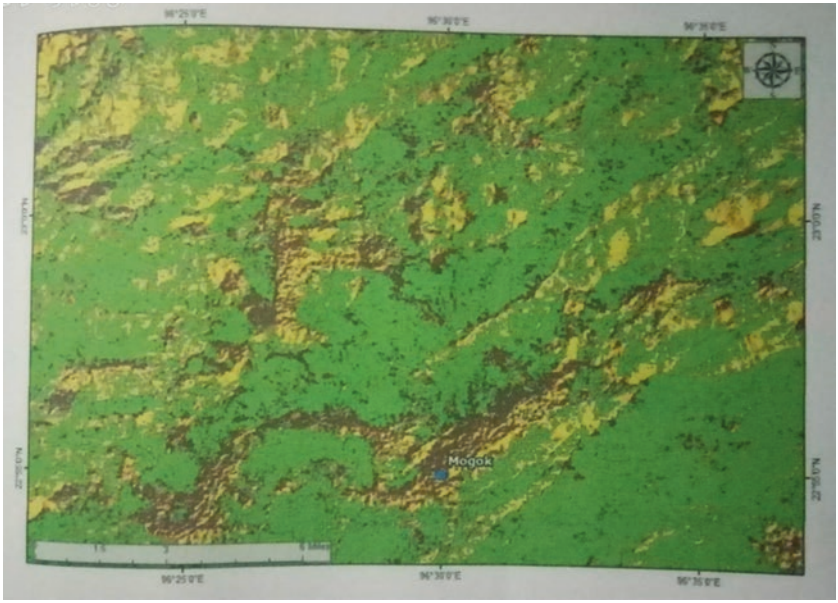

Fig. 10.5 Final stage, acquired Landsat-8ETM imagery (2015-04-05)

north-east four miles from Mogok are the deforestation area of the forest. It is advisable for the local people to plant new trees not only in Mogok Township but also in the red area which is not a mining area.

Water Pollution

Washing byons (gem-bearing gravels) are the source of water pollution in the Mogok area. In this area, water pollution is caused by washed water which flows into the main drain and stream. Water pollution occurs throughout the whole year in this study area due to the mining activities.

Social Aspects of Mining in Mogok, Pyin Oo Lwin District, Mandalay Region

Population

As per 2014 Myanmar population and housing census report, the population of Mogok is 167,149 (male 84,892, female 82,257). Mogok is a multi-ethnic city hosting Lisu, Shan, Palaung, Danu, Pa O, Kokant, Wa, Bamar, Gurkhar, Panthay and Chinese, who live together peacefully. Most of the ethnic minority people live in East Mogok. People from West Mogok (Kyat Pying) mainly come from the middle part of Myanmar; most of them earn their living as mine workers in gem mines (Fig. 10.6).

Social Setting

Most of the villagers live along the slopes of the hills. Their houses are built on village community land. The agricultural fields are outside the village along other hill slopes. Mining is the mainstay of the region. Based on discussions with the local people during the survey, it was observed that gem sorting from panning the gravel and breaking the marble up into tiny pieces with hammers from the tailings of government joint ventured gem mines (also known as kanese) is an important and lucrative source of income in Mogok. Gem trading and agriculture are other occupations of the people in the area. Major crops cultivated in the region include coffee, tea, vegetables and fruits and also animal husbandry. Major livestock in the study area consist of pigs, goats and hens. People in Mogok are good-natured, helpful, religious and strongly patriotic.

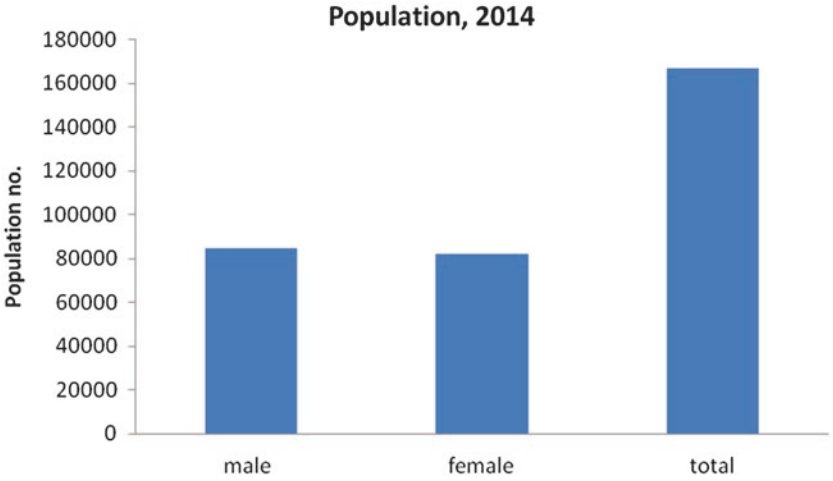

Fig. 10.6 Population of the Mogok area. (Source: Myanmar Census of Population and Housing 2014)

Survival of the Ethnic Minority Miners

Since the period of the Myanmar Kingdom, the local people of Mogok have earned their living by gem mining using the traditional manual method. Since the colonial period up to 1990, the vocational style did not significantly change. Since then, heavy industrial mining was reestablished for Mogok gemstones with permission under government policy. Thus the local people faced many difficulties in earning their earning (Fig. 10.7). Geographically, the Mogok area is not suitable for other businesses except gem mining.

Socioeconomic Conditions

Most of the ethnic minority people and migrants become mine workers in joint venture mining companies. The mine owners of the UMEHL joint venture are non-citizens. According to the observations made during the field study, the socioeconomic conditions of the mine workers do not seem to be favorable for their families. Their social welfare is neglected. They have no sufficient security in face of the mine risk. Many UMEHL joint venture mines have large areas and many heavy machines used for

Fig. 10.7 Survival of the ethnic minority miners

implementing mining activities in extended mine areas. But they have no systematic mining plan, and they have no systematic management of dump sites for removing waste materials; open dump sites can be seen around the mining area in Mogok.

Although the EIA and SIA survey data have been collected before the initial mining stage, there has been no systematic waste disposal in some of the UMEHI joint venture mines in the Mogok area. Although mine workers' safety is vital for the primary deposits mine, there has not been enough security to protect the workers. Also in the superficial mining sites of the private small-scale to medium-scale enterprises, there is no plan for waste and water removal systems, and this leads to damage of the existing streams near Ywar Thar Yar, Ah Chaunt Taw area.

Occupational Patterns

The main working-class group comprises persons engaged in mining. The cultivators and agricultural farm workers are the second largest (50%) group of people. At the age of ten years and older, they are employed, while others are unemployed or retired. Job vacancies for low-salary labor are good, but difficult for professional degree holders such as mine engineers, geologists and mechanical engineers.

Education

There are approximately 30 primary schools, 10 middle schools and 3 high schools for basic education, but no academic institution or college there. In the population of people above 25 years of age, 12,668 are literate, 31,609 are in primary school education, 21,387 are in middle school education, 12,687 are in higher education, 304 in diploma courses, 8021 in university education, 177 in postgraduate studies, 70 in vocational training and 1271 in other kinds of education. Some 25,297 people are currently attending schools or colleges, 32,976 have completed their courses and 3813 never attended any educational institution out of a total of 71,627 people aged between 5 and 29 years. As per the 2014 census report, we can conclude that the illiterate population has declined significantly for the younger generation, but there are still some in this region.

Water Availability (Types of Sources)

There are two types of water sources:

(i) tap water from Mogok City Development Council (only urban regions), which forms the source for 60% of total households, and
(ii) natural or man-made ponds, spring, rainwater near the village.

In the hot season, there is a problem with drinking and domestic water in some areas. One of the sources of wastewater in Mogok is the underground mine water during the period from mid-November until the end of April. If the storage tank of this water can be located at a higher place, it can be a source of domestic water after treating it properly.

Medical Facilities

Some 80% of the villages have medical facilities (clinics), but recently the ethnic minority people set up some non-profit civil society groups such as Myat Saytanar & Parami for better medical services. They provide blood donations and free ambulance services for accident and emergency cases. The two government hospitals are located in the eastern and western parts of Mogok, but serious cases may be transferred to Mandalay City Hospital. Most of the rural people depend on the traditional medicine specialists to cure normal illnesses.

Transportation

Most of the mine villages from east Mogok are located beside the Mandalay-Myitkyina Highway road; mine villages from west Mogok have road connection in their villages and a single-track road connected to the Mandalay-Myikyina Highway, which is constructed by donors like mine owners. Transportation in Mogok seems more convenient than in other regions perhaps as a result of the importance of mining in the economy.

Electric Power

The main source of power in Mogok urban areas is the hydropower station in Mogok (4 MW) and Sedawgyi (25 MW); rural areas depend on their village-owned hydropower, solar panel electric system and private

generation, but 20% of the population still live with candlelight. Electricity demand in Mogok is still a problem for both domestic and industrial use.

Conclusion and Suggestions

Mining activities are disrupting the environmental and social sectors in the Mogok area. Some gem mining areas are situated close to the downtown area of Kyat Pyin and Mogok. As a result of poor environmental management, seasonal flooding due to heavy rainfall and landslides occur in some gem mining areas. These hazards may cause damage to the social and environmental sectors of the urbanized areas. Subsidence or collapse and rock fall cause occupational accidents in this district.

Suggestions

Prevention can do much to minimize the impact of the hazard. Prevention measures should cautiously to reduce the loading that exists at the top of the slopes and changing conditions of the water table on the slopes. Common engineering techniques for landslide prevention include removal of unstable slope materials and provisions to form surface and subsurface drainage and grouting the hazardously fractured areas.

Warnings should be officially issued to prevent landslides. They can provide time to evacuate people and their possessions, and to reroute traffic using mine tunnels. The authorities in the mining district should warn people of the danger they would be facing if they do not relocate.

Flooding and subsequent sedimentation can be solved by excavating drainage tunnels and proper use of water pumping in the mine sites.

All the mining activities should be conducted according to the rules and regulations of international mines. Prevention can save the lives of hundreds of miners, thousands of local people, homes and millions of kyats that can be lost by unmerited use of our precious land. In particular, the following are recommended:

(1) A systematic mining plan is required especially for large gem mines and for using mining areas.
(2) Mine working should avoid having any environmental effects on settlement areas.
(3) Superficial mine working needs a plan for dump sites of waste materials.

(4) Systematic wastewater plans are necessary to protect the preexisting water flows.
(5) Government mining policy should protect the ethnic minority miners of the Mogok gem mine area.

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CHAPTER 11

Negotiating Livelihoods Access to Coastal Resources: Environmental Citizenship by NGOs in Indonesia

Henri Sitorus

Introduction

Environment and society are interdependent and affect one another. Accessibility to natural resources is key for sustaining livelihoods, particularly among the poor and marginalized communities. The communities in coastal areas are heavily dependent on access to land, mangroves and sea resources for fishing and farming.

As an archipelagic country, Indonesia has abundant coastal resources. With 5.8 million km^2 of water area, which covers 70 percent of about 7.8 million km^2 of Indonesia's national space, and a 95.180 km coastline, Indonesia has the fourth longest coastline in the world after Canada, the USA and Russia (CBS 2009).

The relationship between the community and the coastal ecosystem is interdependent. In Indonesia, 14 percent (10,666 out of 75,410) of villages directly border the sea, and 48 percent of villages are less than 50 m above sea level (CBS 2009). About 65 percent of its population live within 50 km of the coastal zone (Dahuri 2006). Coastal resources are the base

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for a number of coastal livelihoods, which make it attractive to migrants, resulting in high population growth (Post et al. 2007).

All coastal subecosystems provide strategic support for humans, which can be economic, ecologic or social, and are known as *ecosystem services*. Provision of biodiversity for human needs includes food sources, chemicals for medicines and raw materials for industry (Burke et al. 2001). In Sumatra, coastal areas are strategic resources for livelihoods, water purification, carbon sequestration, recreation and transportation.

However, coastal resources in this island have been continually degraded due to unsustainable exploitation, lack of adequate environmental policy, including lack of governance, and natural factors. In addition, increasing population in coastal areas causes further demand on space and the need for additional resources extraction. Human activities such as farming, overexploitation of fisheries, and development of coastal areas directly cause coastal changes (UNEP 2002). High population pressure in coastal areas and lack of governance have led to the conversion of mangroves to aquaculture (e.g. shrimp ponds), oil palm plantations, and rice and salt production (Brown 2010).

Fishery resources in Sumatra are also degraded. Unsustainable harvest of fishery resources is caused by high demand for fish and seafood products and by-products, and is worsened by a lack of enforcement of fisheries policy. One of the most influential policies causing overfishing is the modernization in the fishing industry, particularly known as the blue revolution. In Indonesia, starting in the 1980s, the blue revolution applied modern technology through various schemes. Application of modern technology in the form of new vessel designs, and the development of trading and transport facilities (Sahrhage and Lundbeck 1992), led to an increase in the size of catches.

Coastal Resources Grabbing and Decreased Access by Local Communities in Sumatra

In Indonesia, as argued by Peluso (2009), there is power contestation in the socio-spatial relationship where local communities claim their rights over resources access. Uncontrolled resources extraction, which is facilitated by the state to raise revenue, often involves illegal activity even after *reformasi* and decentralization. This leads to poor social and environmental outcomes, which result in contestation over natural resources access. Therefore, rights to environmental resources are contested. Mwangi et al.

(2012) indicate that rights and access to natural resources are the key institutional capital to sustain the livelihoods of rural communities. Hence, secure property rights have important implications for sustainable management of the resources. Ribot and Peluso (2003) define access as "a bundle of powers that enable actors to gain, control and benefit from, resources."

Langridge et al. (2006) expand the social and political dimension of access to include vulnerability and scarcity considerations. Access can be gained and controlled by two mechanisms: rights-based access and structural and relational mechanisms. The rights-based mechanism refers to access based on law or custom, while structural and relational access refer to access that is gained through negotiation with other social forces or authorities (Ribot and Peluso 2003). Cotula et al. (2008: 9) further argue that access to natural resources is a process by which people, individually or collectively, are *able* to use natural resources, whether on a temporary or permanent basis. These processes include participation in both formal and informal markets; resource access through kinship and social networks, including the transmission of resource rights through inheritance and within families; and resource allocation by the state and other authorities with control over natural resources.

Complexity of Access to Land and Grabbing by Agribusiness: The Case of Palm Oil

The complexity of access to land is caused by various factors, including dualism of property status, uneven distribution of land and lack of governance. Legal pluralism remains contested in Indonesia (Lukito 2013; Fitzpatrick 1997). The dualism of property status occurs between customary and statutory land rights, where state and customary laws coexist, but these laws are not equally powerful and legitimate. In Indonesia, the state-promulgated laws, including village restructures, have diminished the customary tenure system. The Indigenous and local communities have less control over agrarian resources such as land and water (Bachriadi 2011). In addition, when overlapping claims occur, the local community is less powerful in defending their rights. On the other hand, uneven distribution, which also applied before Indonesian independence (Loffler 1996), has not been successfully addressed by the government.

According to Bappenas (2014), some 14.25 million (or 55.33 percent) farmers in Indonesia own less than 0.5 ha of land for their farming. In addition to limited access to land, conflict over land tenure often takes place in rural areas in Indonesia (Kusworo 2000; Fay and Michon 2005). Conflict over land access in coastal Sumatra is characterized by massive land grabbing by the corporate sector, often for plantations, including oil palm.

Of the 7.8 million ha of palm oil plantations in Indonesia, 70 percent of the areas are located in Sumatra[1] (Coordinating Ministry for Economic Affairs 2011). As a result, agrarian conflicts are common. At least 170 conflicts took place between smallholder farmers and palm oil plantations in Indonesia in 2010, with 50 percent of these occurring in Sumatra. These conflicts involved 604 communities, of which 48 percent were in Sumatra (ELSAM 2010).

Land grabbing is defined as "the process whereby smallholders are dispossessed of their land through intervention by outside actors" (Benjaminsen and Bryceson 2012: 2). The International Land Coalition (ILC) in 2011 states that land grabbing can take place at international, national or local level, by local elites or within communities. Land grabbing is characterized by the violation of human rights and the absence of voluntary transfer, such as the absence of "free, prior or informed consent." It happens without holistic assessments of the impact of the appropriation on social, economic and environmental resources. In addition, there is no transparent communication in the process of appropriation, since it is related to undemocratic and arbitrary decisions (ILC 2011).

Similarly, Borras and Franco (2012) characterize the pattern of land grabbing in South East Asia as land-use change that involves conversion of forests for the cultivation of food crops on a large scale. The process, often in vague ways, is non-transparent and may involve corrupt practices of government officials, with an absence of downward accountability. It is obviously non-consultative and ignores local community participation. These practices lead to alienation of resources for local communities.

The palm oil growing areas were only 294,560 ha in 1980, and grew to 1.1 million ha in 1990. Then it doubled to 2 million ha in 1995 and jumped to 4.1 million ha in 2000. Again since 2000, it has expanded rapidly to reach 5.4 million in 2005 and 11.3 million ha in 2015 (Table 11.1).

The highest growth took place in 2005–2006 when the size increased more than 20 percent in one year. In 2012–2013 the size rose sharply

Table 11.1 Year by year growth in the last 10 years

Year	*Smallholder*	*State-owned plantation*	*Private*	*Total*	*Percent of growth*
2005	2,356,895	529,854	2,567,068	5,453,817	20.92
2006	2,549,572	687,428	3,357,914	6,594,914	2.61
2007	2,752,172	606,248	3,408,416	6,766,836	8.82
2008	2,881,898	602,963	3,878,986	7,363,847	6.92
2009	3,061,413	630,512	4,181,369	7,873,294	6.50
2010	3,387,257	631,520	4,366,617	8,385,394	7.24
2011	3,752,480	678,378	4,561,966	8,992,824	6.45
2012	4,137,620	683,227	4,751,868	9,572,715	9.32
2013	4,356,087	727,767	5,381,166	10,465,020	2.77
2014	4,422,365	729,022	5,603,414	10,754,801	5.07
2015	4,575,101	750,160	5,975,109	11,300,370	3.296
2016	4,763,797	755,787	6,153,277	11,672,861	

Fig. 11.1 Map of palm oil plantations in Indonesia

from 9.5 million ha to 10.4 million ha, making a growth rate of 9.32 percent (Fig. 11.1).

The total area of land under palm oil cultivation/production in Indonesia in 2016 reached 11.6 million ha, of which 53 percent is owned by private companies and 41 percent by community/smallholder plantations (Fig. 11.2).

The continuing land grabbing has excluded the rights of farmers to utilize the coastal terrestrial areas for livelihoods. Often local communities

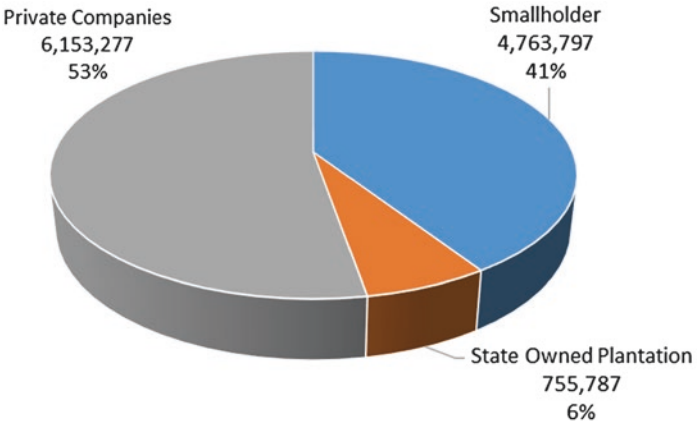

Fig. 11.2 Palm oil land by owners in Indonesia in 2016 (in ha)

are weak in facing the power of corporations engaged in palm oil and other development. In addition to land grabbing by commercial agriculture, there is ongoing grabbing of fishery resources, particularly by modern fisheries.

Grabbing Sea Resources: Trawling and Destructive Fishing

The main cause of fisheries resources depletion is the common practices of destructive fishing. One of the controversies in the application of modern fisheries technology is the trawling operation. Despite being legally banned due to its destructive nature, trawling is common in most Indonesian fishing zones. Therefore, it is one of the illegal, unreported and unregulated fishing (IUUF)[2] activities. One destructive aspect of trawling is that it discards catches. Trawlers are targeting particular fish, that is, shrimp; thus the non-shrimp catches are discarded.

Trawling was first introduced to Indonesia by wealthy Indonesian Chinese fishermen in the late 1960s in Bagan Siapi-api in the Malacca Straits, and then expanded to the Northern Java Sea. Since the early application of trawling, conflicts have arisen with local artisanal fishermen. This is particularly intense in the near coastal fishing zones since the trawl operates in the narrow confines of coastal waters. Conflicts with trawling

operations are also triggered by the destructive nature of fishing practiced by trawlers. This type of fishing uses nets to catch shrimp and other fish on the seafloor. This practice not only catches fish unsustainably but also damages the sea bottom and reduces its biodiversity.

In 1980, the government of Indonesia, through Presidential Decree No. 39, prohibited the use of trawling in Indonesian fishing zones (Purnomohadi 2003). The decree stipulated that the ban would come into effect within one year. In the seas of Java and Bali it was supposed to end by 30 September 1980: in the islands surrounding Java and Bali by the 1 October 1980, and in the Sumatra seas by the 1 January 1981. The ban on trawling aimed to improve fishing resource management and ensure fishing space for artisanal fishermen, as well as prevent further open conflicts between artisanal and modern fisheries. Further to this regulation, in 1982 the government issued Presidential Decree No. 85 concerning Shrimp Trawl, which set the fishing zone where shrimp trawlers can operate. The regulation stipulated that a permit for trawl operation could be issued in the Eastern Indonesian deep seas. However, the trawling operation in shallow seas, including within the three nautical mile zone reserved for artisanal fisherfolk, still continues in Sumatran seas around the Malacca Strait fishing zone.

Illegal fishing practices have also caused coastal resources degradation, including seagrass, coral reef depletion and overfishing. Coral reefs[3] continue to be depleted in various ways, such as *poison fishing*, where cyanide is used for fish capture; *blast fishing*, where small bombs are detonated in shallow reef areas, killing not only target schools of fish but also larvae, juveniles and corals; *coral mining*, where corals are collected and smashed for housing construction and lime production; *sedimentation and pollution*, as a result of logging erosion, untreated sewage and industrial discharge (Leitmann et al. 2009).

Conflicts between local fishermen and the trawlers are prolonged because of failure in adequate monitoring, surveillance and legal action by the fisheries authority (Fisheries Unit, Water Police, Navy). The capacity of the authority to enforce the law is inadequate. Unclear mechanisms for conflict resolution are worsened by the absence of devolution of fisheries resources management to the local community. The sea remains open access, but the authorities are unable to control sea grabbing by modern fisheries. This threatens the livelihood security of artisanal fishermen. Grabbing and dispossession of natural resources are not limited to water resources but also apply to land resources. Sea grabbing by modern and

illegal fisheries displaces artisanal fishermen's livelihoods. This results in the disenfranchisement of rights over natural coastal resources among fishermen, farmers and Indigenous communities in coastal areas. Low access to natural capital is exacerbated by low access to other capital such as financial capital, as illustrated by Table 11.2.

Table 11.2 Comparison of livelihoods assets in research sites

Capital	*Pahawang*	*Margasari*	*Jaring Halus*	*Tanjung Rejo*
Human capital	Low level of education, fishing skills operating low-technology fishing devices, non-commercial-oriented farming skill	Low level of education, medium fishing skills, medium skills of farming	Low level of education, low level of fishing skill, low level of fish-processing skill	Low level of education, medium skill of agriculture, low level of fishing skill
Physical capital	Small engine boats for fisheries, low-technology fishing devices	Small engine boats for fisheries, low-technology fishing devices	Majority of non-motorized fishing boats and small engine boats	Majority of non-motorized fishing boats and small engine boats
Natural capital	Access and entitlement to open sea is permitted; users competing with non-local fishermen, access to land for farming, utilization of sea for seaweed and floating fishing nets permitted	Access and entitlement to open sea is restricted by national park, users competing with non-local fishermen	Access and entitlement to open sea is threatened by modern fisheries (trawling operation), utilization of sea for fishing nets permitted, but only for those who have financial capital	Access and entitlement to open sea is threatened by modern fisheries (trawling operation), utilization of coastal resources for aquaculture is not secure
Financial capital	Savings and credit are introduced by NGOs, livelihoods resources are supported by NGOs, government program of PNPM was introduced	No savings and credit activities	Savings and credit are active	Savings and credit introduced, distribution of aquaculture supports is for selected groups, the poor tend to be excluded from aquaculture support

(*continued*)

Table 11.2 (continued)

Capital	*Pahawang*	*Margasari*	*Jaring Halus*	*Tanjung Rejo*
Social capital	Strong bonding social capital (i.e. community associations), mangrove groups exist and have been officially recognized; reciprocity and collective action; NGO of Mitra Bentala has been in the area for more than five years	Strong bonding social capital (i.e. community associations, reciprocity and collective action); mangrove groups exist; various NGOs have been in the area for more than five years	Strong bonding social capital (i.e. community associations, reciprocity and collective action); various NGOs have been in the area for more than five years	Strong bonding social capital (i.e. community associations, reciprocity and collective action); various NGOs have been in the area for more than five years

NGOs in Indonesia and Response to Access to Resources

NGOs have attempted to defend the rights of the local community in respect to their coastal livelihoods. The existence of NGOs is not new in Indonesian history. Civil society organizations actively engaged in the pre-independence movement, which continued after independence. However, the prominence of NGOs in Indonesia re-emerged during the New Order authoritarian regime. The term "NGO" in Indonesia is commonly known as *Lembaga Swadaya Masyarakat* (LSM, literally community self-reliance institutes). Other terms such as *Organisasi Non-Pemerintah* (ORNOP), which is actually a more appropriate term, are not politically acceptable, including to the government.[4] There are two types of legal entities for NGOs: foundations (*yayasan)* and associations *(perkumpulan)* (Antlöv et al. 2006). Article 1 of Act No. 16 of 2001 concerning Foundations states that "[a] foundation is a non-membership legal entity that engages in activities for social, religious and humanitarian purposes," while an association is an organization that has a membership to achieve its set objectives. Associations in Indonesia are regulated by *Staatblad* 1870–64 and *Staadblad* 1939 No. 570. There has been no recent legal framework regulating associations, but these laws are still effective to date, though a draft bill on associations has been under consideration since 2010.

The high prevalence of poverty, human rights violations and lack of environmental sustainability caused by the economically oriented development strategy of the New Order government called for the active engagement of NGOs. Environmental NGOs emerged in Indonesia in the 1980s, not only at national level but also at provincial and selected district levels. One example of this is *Wahana Lingkungan Hidup Indonesia* (WALHI), which was established on 15 October 1980. By 1994, there were more than 600 environmental NGOs in Indonesia. Out of these, 400 were members of WALHI.

NGOs have also been engaged in the policy process. Bilah sees three types of NGOs in Indonesia: (1) *Parastatal NGOs*, those which do not confront the government but support and are part of the government; (2) *Professional NGOs*, those which are apolitical but socially active in community services; and (3) *Progressive NGOs*, those which actively engage in criticizing the state. Those NGOs classified as *progressive* have been active in influencing state policy, particularly during the period of the 1990s. The exact number of NGOs in Indonesia is not known, but 21,569 existed in 2010, based on data from the Ministry of Law and Human Rights.

NGOs' Response to Resources Entitlement and Environmental Citizenship

Environmental citizenship emerged as a response to growing environmental injustice. Latta argues that environmental citizenship refers to the demand for environmental justice that may involve the struggle for land and livelihoods. In particular, when exclusion of local interests from the resources access is still pervasive, civil society organizations may be able to challenge the powerful actors. Increasing collective actions as a means for resources-access claims by non-state actors is the manifestation of environmental citizenship. Latta and Wittman theorize that access to land and other resources for livelihoods takes place in the context of a political struggle that involves agency. Environmental citizenship is central to analyzing the dynamics of civil society and excluded groups in negotiating access to resources. It aims to restructure the social and political system to include livelihood rights. Embedded in political capital, environmental citizenship helps to support citizens and other non-state actors in negotiating access to and control over resources, in order to influence the policy process.

Basically, Indonesian NGO engagement in the environment can be categorized into five areas: conservation, livelihoods, environmental education, community organizing, environmental litigation and policy advocacy, as shown in Table 11.3.

The roles for NGOs in community organizing, environmental litigation and policy advocacy are very relevant in addressing continuing contestation over resources rights in coastal areas in Sumatra. With these different roles, NGOs engaged in environmental citizenship in response to dispossession, alienation and resources grabbing, which are structurally built into the legislative framework. NGOs as agencies are promoting environmental citizenship to influence pro-poor environmental policy, using a rights-based approach.

However, the Indonesian NGOs' citizenship roles are limited to campaigns in agenda setting and suggestions for policy alternatives in the adoption process. After the adoption of the policy, NGOs may be involved in monitoring and evaluation, including suggestions for policy revisions. In terms of policy revision, NGOs utilize the judicial review process, such as through the Constitutional Court, when they see inconsistency in the existing laws (Abidnego Tarigan, interview, 5 November 2012).

Kamat argues that advocacy NGOs do not directly work at the grassroots level but aim at policy changes at a higher level. In this study, advocacy NGOs are national-level NGOs which have membership or constituent NGOs at the regional or district level. They organize campaigns

Table 11.3 Characteristics of NGOs' activities in Indonesia

No.	*NGOs program areas*	*Characteristics*
1.	Conservation NGOs	Focus their program on natural resources conservation with limited action on community and livelihood
2.	Livelihoods empowerment NGO	Focus their engagement on livelihood diversification such as agriculture and agroforestry, micro-credit, vocational skill development
3.	Environmental education and awareness	Focus their engagement on educating the public on environmental issues, including climate change
4.	Community organizing and social mobilization	Strengthen community organization through self-help groups, water users, mangrove groups, forest watch
5.	Environmental litigation	Work through court and legal system on the issue of environmental justice
6.	Environmental policy advocacy	Activities related to policy changes such as policy research, policy lobby and political pressures

to lobby policymakers for changes in the existing policy or formulation of new policy in order to produce a broader impact.

To influence policy, NGOs attempt to achieve structural changes and address the root causes of injustice, as part of agency action toward socio-political change. NGOs collaborate with the media over monitoring, exerting pressure and lobbying. At the grassroots and public level, NGOs conduct civic education information campaigns on human rights and the obligations of the state in fulfilling and respecting the rights of citizens. NGOs also play a crucial role in educating the public on environmental issues.

NGOs in Indonesia enhance their networks with international alliances and affiliations. International links with the UN and other like-minded organizations contribute to the symbolic and political capital of NGOs at the national level. At the same time, linkages with international fora are also used to bring the practices of environmental injustice in Indonesia to global attention. The case study of WALHI highlights the use of various strategies by NGOs in responding to access to resources for community livelihoods.

Case Study of WALHI as a Network of Environmental NGOs

WALHI is an umbrella NGO for more than 400 Indonesian NGOs that have environmental concerns. As an umbrella organization, WALHI has a national council and regional WALHI branches in 28 provinces. WALHI is also known as Friends of the Earth Indonesia since it is affiliated with Friends of the Earth International.

The history of WALHI's establishment was influenced by the rise of environmental concerns in the late 1970s. Supported by the environmental minister of Indonesia (Emil Salim, from 1978 to 1983), WALHI was established in 1980. At the early stage of its organizational development, WALHI was known to be close to the government. A soft advocacy strategy was chosen which included information exchanges among members, technical conservation issues, and organizational and network capacity development. Then, in the 1990s, this NGO started policy advocacy, including policy research (in collaboration with local universities) which was used to support its negotiations with the government.

WALHI has worked through advocacy in the court system. This is because the court is the last resort in seeking environmental justice. From the perspective of environmental law and sociology, the legal approach has been considered an important means to seek environmental justice. The

Indonesian environmental law provided NGOs with legal standing to act on behalf of the public when environmental issues arose, as regulated by the Act No. 32 of 2009[5] concerning the Protection and the Management of the Environment.

WALHI is active in litigation on environmental cases and conflicts. The first legal action taken by WALHI was to sue for environmental degradation caused by PT. Inti Indorayon Utama (now PT. Toba Pulp Lestari), a pulp and paper company that destroyed the environment based in Porsea, North Sumatra. In a legal suit that was registered in Jakarta District Court, WALHI sued six parties, of which five were governmental agencies. Even though WALHI lost the case, this first legal action became an important milestone for NGOs' legal standing in environmental conflicts in Indonesia. Various legal suits followed, even after the *reformasi*. In most cases, WALHI did not win the legal suit, but did win the most recent case over a palm oil plantation in Rawa Tripa peatland in Aceh. In 2011, WALHI sued the government for issuing a permit for conversion of 1605 ha of peat in Aceh to palm oil plantation. At the appeal court in Medan 2012, the court decided that the permit was illegal and therefore should be amended.

WALHI also engaged in policy advocacy. In 2005–2008, for instance, WALHI attempted to influence policies related to environmental concerns in eight draft bills, including the bill on natural resources management, the bill on coastal areas and small island management and judicial review.

Defending Access to Coastal Resources and Building Political Capital of the Indigenous Community: Case Study of AMAN

Aliansi Masyarakat Adat Nusantara (AMAN) is an independent community organization within Indonesia whose members are Indigenous peoples from across the archipelago. AMAN was formed in Jakarta on 17 March 1999 during the first Indigenous community congress, which was attended by more than 400 Indonesian Indigenous community leaders. This organization was registered with the Public Notary No. 26 of Abu Yusuf Notary and registered with the Ministry of Justice and Human Rights. In 2013, there were 2240 Indigenous communities, representing about 15 million Indigenous people in Indonesia. Of these communities, 322 are in Sumatra.

The declaration to form AMAN represented the consolidation of the political capital of the Indigenous community in Indonesia. Its well-known

motto, "We will not recognize the state if the state does not recognize us," reflects the need for recognition of the resource rights of Indigenous communities. The objectives of the organization are to restore the confidence and dignity of Indigenous peoples, both men and women, and to regain the sovereignty of Indigenous communities to defend their economic, political and cultural rights. AMAN also aims to develop the ability of Indigenous communities to maintain and further develop Indigenous knowledge and practices to protect the earth, water and other natural resources. More importantly, it aims to maintain the struggle for recognition, respect and fulfillment of the rights of Indigenous communities. With this, AMAN has developed links to enhance its political capital.

Strengthening the political capital of AMAN is a part of their political program, as mandated by the fourth congress in 2012. This calls for revitalizing policy and the legislative framework and institutions, to allow recognition and sovereignty of the Indigenous community, enhancing legal and political pluralism and being active in pushing the government to respect customary laws and rights. Since decentralization is important, AMAN strengthens collaboration at the local level, so that local regulations can be influenced to afford greater respect to the Indigenous community, including extending capability in local mapping and reclaiming resources by the Indigenous community. This is supported by increased capacity for litigation and networking to defend the rights of the Indigenous community. AMAN suggests that the government adopt the bill on protection and restoration of Indigenous community rights through national law, regional (provincial and districts) and village regulations. This organization conducts political education for Indigenous community members to enhance their participation in the democratization process.

Political capital is enhanced by stronger organizational capacity. AMAN also strengthens community organizations through its active development of members' capacity in advocacy, cooperatives, savings and credit schemes. In addition, the organization developed two wings: the Indigenous Youth Movement (*Barisan Pemuda Adat*) and the Indigenous Women's Movement (*Perempuan Adat*). It also strengthens internal networks among members, between regions and all organizational components (Table 11.4).

Case Studies of Membership Organizations in Sumatra

Participation in membership organizations by the poor is defined as a form of self-mobilizing and self-organizing groups that aim to defend their

Table 11.4 Range of advocacy strategies by NGOs

Strategies	WALHI	AMAN
Collaboration	Collaborate with the government for policy draft, media collaboration	Collaborate with Land Administration Agency, Ministry of Fisheries and Marines, media collaboration
Persuasion and negotiation	Use research and publication on environmental issues, lobby parliament members for environmental policy	Lobby government agencies, parliament members
Litigation or legal action	Pursue legal suit for government, corporations and judicial courts on the issues relevant to environment including access to resources	Pursue legal action on criminalization of Indigenous community members, legal aid for land conflict, judicial review
Contestation	Protest law, policies and corporates that involve environmental harm. Demonstration at national, provincial and district levels.	Protest unfair land grabbing, through demonstrations, supporting members for land reclaiming and demonstration at the regional levels
Institution and constituency building	Capacity building for NGO members, regional representatives and linkages	Strengthen its regional council and Indigenous community organizations members and facilitate learning, exchange visits and joint action
Modelling Education	Educate public on environment, done through NGO members	Indigenous community education on land rights, agrarian law, communication, publication. Modelling Indigenous community mapping
International Network	Member of Friends of Earth International, active in UN and global environmental forum	Member of international coalition for Indigenous committee, active in UN forum for Indigenous community

Govt. and policy Community and Public International

interests and rights. These organizations are either formed from below or initiated by the middle class, but have members who pay dues and are self-financing organizations. The case studies involve three NGOs, as outlined in Table 11.5.

Table 11.5 Membership NGOs and environmental citizenship

NGOs	*History*	*Membership*	*Program and approach to environmental citizenship*
SERTANI (Lampung)	Established by human rights activists on 23 August 1998 as farmers/peasant association	Memberships open to farmers or have close activities related to farmers; has grassroots membership based in Lampung	Advocacy of access to land and natural resources; policy advocacy on productivity of farming; education in agriculture, fisheries, forestry and livestock raising; enhance farmers' organizational skills and network; enhance justice for farmers
BPRPI (North Sumatra)	Established on 11 April 1953 to reclaim the land rights of Indigenous people from plantations' grabbing	Members are community groups at grassroots levels in 67 villages in Deli Serdang and Langkat Districts (between the Ular and Wampu River basins	Reclaiming rights of Indigenous people in low land areas grabbed by the state-owned plantations. Mobilize the grassroots-level organizations for land reclaiming, develop networking and alliances with national organizations for agrarian reform and Indigenous people's movement
KNTI (North Sumatra)	Established on 12 May 2009 as organizations for artisanal fishermen in Indonesia	Members are traditional fishermen in 17 provinces of Indonesia, grassroots-based artisanal fishermen	In North Sumatra (Langkat district) has been active in defending the rights of fishermen in the conflict between artisanal fishermen and trawling and private corporations which converted mangroves to palm oil plantations

Environmental citizenship enacted by the NGOs includes channeling community voices into the environmental resources policy process. Different strategies for citizenship engagement are followed by NGOs to influence policy or to reclaim access to land and natural resources. Influencing policy takes place at village, district, provincial and national levels, as shown in Table 11.6.

As indicated in this table, different strategies are employed by different NGOs in enhancing access to resources use. As Gaventa indicates, three types of spaces for participation—closed, invited and claimed/

Table 11.6 Membership NGOs' advocacy strategy

NGOs	*Advocacy at local level*	*Advocacy for local policy*	*Advocacy for national policy*
SERTANI (Lampung)	Social mobilization of farmers groups at basic level Support local community resistance to eviction	Lobby local parliament Facilitate links between farmers and policymakers Marches and demonstrations to push for agrarian reform	Successful nomination of its members to participate in the election of Senate (2009–2014) Participate at the national-level agrarian reform forum
BPRPI (North Sumatra)	Reclaim land grabbed by plantation for Indigenous people Support livelihoods of Indigenous members Mobilize resistance to eviction and reacquisition of land	Marches and demonstrations as pressure for Indigenous people's rights Become a hub of Indigenous people's organization in the provinces Facilitate Indigenous Youth and Women's Group Develop links with local government officials and local parliament members Attempt to nominate its members as local parliament member (2009 election) and regent-head of District (2013 local election)	Networking and become a member of AMAN, an Indigenous people's organization Facilitate public consultation for the draft law of protection on Indigenous people
KNTI (North Sumatra)	Defend fishermen's rights against trawl and mangrove conversion Rehabilitation of mangroves from conversion to palm oil plantation	Modeling mangroves rehabilitation	Networking with KIARA and actively raise awareness on artisanal fisheries

created—occur in negotiations over access to livelihoods resources by NGOs. Invited space can be found in the case of WATALA, in that this NGO has been included in various policy fora initiated by the local government of Lampung. These NGO case studies reflect the claimed spaces, in that they exerted demonstrations and protests as part of participation in negotiating access to resources.

Conclusion

Resources grabbing and alienation are facilitated through policies and regulations, evident in the case of forestry laws, plantation laws and coastal laws. To defend resources rights, therefore, requires active citizenship and engagement in the policy process. Environmental citizenship enacted by national network NGOs in defending the rights of the community to utilization of natural resources varies from demonstrations, lobbying, raising awareness through media and judicial review of the legislation. The legislation on resources management does not provide clear mechanisms to protect the interests of local communities.

The position of all NGOs remains as outsiders in the policy process. Being outsiders in a non-pluralist policy process makes it difficult for them to bring their concerns into the policy arena. NGOs have exerted various strategies to influence policy changes in terms of access to natural resources for the poor. These strategies vary from collaboration, persuasion, contestation, education, modeling and networking. However, the policy process in Indonesia has not yet demonstrated a deliberative system. The public space for consultation with different actors in the policymaking process is not systematically organized, or in a few cases is sporadic. Policymakers monopolize the production of policy, and as a result, adoption of policy is not based on the collective decision-making of different actors, including non-state actors. Therefore, in their active environmental citizenship to influence resources and environmental policy, NGOs are seeking to negotiate spaces in the policymaking process. Moreover, the environmental citizenship enacted by NGOs in influencing policy attempts to maneuver to demand more overt deliberative democracy practice.

Membership organizations of the poor, which is the third category of NGOs in this study, are consolidating political capital. Local associations at the grassroots level do not mobilize their social capital in the village governance process, which covers environmental issues in the village. NGOs pursue various strategies to promote environmental citizenship, in response to deficiencies in environmental injustice in the period of post *reformasi* Indonesia. NGOs respond to continuous land grabbing by plantations and for green purposes. Environmental citizenship is crucial, so advocacy for environmental justice is needed to challenge various policies and legislative frameworks which are politically structured to favor corporations and land grabbing for green purposes. These land grabbing activities exemplify the continuing exclusion of local livelihoods from the plantation and conservation program.

Membership NGOs transform social capital to political capital through networking and alliances, collaborative strategies and demonstrations to influence public policy for more access to natural resources for local livelihoods. Social capital, as indicated by the high level of associational membership, and reciprocity need to link people and their organizations to resources. These findings have demonstrated that the poor and disadvantaged groups are able to exercise their power through membership organizations. Thus, the membership organizations, as self-organization of the poor, are creating bridges and links to higher political structures, enabling them to negotiate their livelihood interests. With participation in membership organizations, collective negotiation is pursued to demand recognition of rights over land, including on reclaiming land which has been grabbed by plantations. Capability in negotiation is key to claiming and reclaiming natural resources rights.

Political capital links the membership associations to the citizenship arena in negotiating access to resources. There are early signs of political capital as indicated by how membership NGOs articulate their members' interests through the alliance of NGO networks. The case of BPRPI demonstrates the land grabbing of plantations by the state-owned corporation in the coastal areas of Langkat and Deli Serdang. BPRPI efforts to reclaim the land were threatened with criminalization and intimidation by gangsters and police (on behalf of the plantation). The resistance of farmers has changed from individual action to open resistance by the landless peasants to protect their livelihoods. Social capital at local (bonding) level has been strengthened through reactivation of membership in BPRPI, which had been under threat during the New Order. The bonding social capital has also been facilitated by collective action to cultivate the land they reclaimed and plant it with cash and food crops. Collective action has mobilized defensive actions when land has been reacquired by the plantation.

While Sertani, as a farmer's organization, has enhanced the capacity of local farmers through formal associations at the grassroots level, it has also supported the defense of the local fishermen when evicted from conservation areas, even though this resulted in the criminalization of its members. Since it has been able to nominate a national senate member representing the Province of Lampung, Sertani has been able to bring agrarian issues in Lampung to the national level.

The transformation of social capital to political capital by membership organizations has emerged through the mobilization of linking social capital, which enables them to be involved in the policy process. The engagement lies in the form of infra-politics, such as demonstrations, petitions and

other pressure forms. Mobilization of links, networks and alliances also enables them to participate in policy processes, such as lobbying parliament and the National Human Rights Committee, which enables their symbolic capital to resonate at the local level. Networks with other Indigenous communities, such as in the case of BPRPI, also enhance their confidence level when they bargain with the local government and the plantation company.

Engaged environmental citizenship has been exercised through membership-based NGOs. The three case studies of NGOs (SERTANI, BPRPI, KNTI) show their resistance toward blocked and obstructed access to resources. Through social capital in membership associations and collective actions, community members have been able to display their resistance to land grabbing. Collective action in the form of reclaiming lands has been documented in the case studies in North Sumatra. Members of BPRPI cultivate the land grabbed by the plantation. The collective action, however, does not guarantee *de jure* ownership of the land. Similarly, collective action facilitated by KNTI has been able to restore the mangroves previously converted to palm oil plantations.

NGOs pursue three different roles in environmental citizenship. First, advocacy NGOs demand space in the field of policymaking in order to influence pro-poor access to natural resources. These NGOs demonstrate the capacity to exercise their political capital to defend the agrarian rights of smallholder farmers and artisanal fishermen. Second, community development NGOs strengthen local associations and enhance livelihood opportunities, but have limited roles in reclaiming and negotiating access to natural resources. The third group, membership-based NGOs as people organizations, is grassroots based and actively engages in reclaiming access to coastal resources, including land tenure.

The key finding of this chapter is that linkages, networks and alliances of civil society actors help to enhance political capital which can be mobilized to achieve improved representation and articulation of the interests of local communities in the struggle for resources rights. Collective actions to demand spaces in the policy process to reclaim resources have become the pattern of environmental citizenship in Sumatra.

Notes

1. Expansion of palm oil on Sumatra took place particularly in the East Coast. Because of its suitability for coastal lowland areas, most coastal and low land areas of Sumatra have been converted to palm oil plantations. Palm oil is suitable for growing in the areas 10–500 m above sea level, at an elevation

of between 16–30 degrees, and a temperature range of 24–28°C and rainfall of 2,000–3,000 mm per year as well as sun for 5 to 7 hours per day.

2. According to FAO, illegal fishing refers to fishing activities without the permission of the State, or in violation of national laws or international obligations.
3. Indonesia is rich in terms of coral reefs. With 50,000 to 100,000 km^2 of coral areas, Indonesia has one of the richest coral reef resources in the world. Sjafrie, in his analysis of coral reefs in Belitung Island, highlights some direct and indirect services of coral reefs to local communities. Direct services include contribution of reefs to fisheries. In those areas where coral reefs are present, there is a larger number and variety of fish stocks. In addition, reefs are used as building materials for housing construction. Indirect benefits include blocking tides and acting as biodiversity habitats.
4. In a conference of WALHI (*Wahana Lingkungan Hidup Indonesia*) in 1976, when translated to ORNOP, the authoritarian New Order government reacted against the term. In a workshop on integrated rural development held by Sekretariat Bina Desa, 13–18 April 1978 in Central Java, two terms were proposed: *Lembaga Swadaya Masyarakat* (Community Self-Reliance Institutes) and *Lembaga Pengembangan Swadaya Masyarakat* (Community Self-Reliance Development Institutes).
5. The first environment act in Indonesia was Act No. 4 of 1982, which has been renewed with Act No. 23 of 1997 concerning Environmental Management. The Act No. 32 of 2009, is the most recent revision of the previous act.

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CHAPTER 12

Landslide Hazard in Chin State: A Case Study in Hakka and Its Environs

Kyaw Htun, Cho Thae Oo, Tun Naing Zaw, and Day Wa Aung

Introduction

Tectonically and geomorphologically, Myanmar can be subdivided into three provinces: the Western Fold Belt (WFB) in the west, the Central Lowland (CL) in the middle and the Shan-Tanintharyi Block in the east. Therefore, geologically, Myanmar has two mountainous provinces: the Western Ranges and the Eastern Highlands. These provinces are inherently unstable areas of the country. They have steep slopes, unstable geology and intense monsoon rains. These features make the mountainous areas one of the most hazard-prone regions in Myanmar.

Location

Chin State is situated in western Myanmar. The 36,019-square-kilometre (13,907 sq. miles) state is bordered by Rakhine State in the south, Bangladesh in the south-west, Sagaing Region and Magway Region in the

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east, the Indian State of Manipur in the north and the Indian State of Mizoram in the west.

The population of Chin State was about 478,801 in the 2014 census. The capital of the state is Hakka (Fig. 12.1). The state is a mountainous region with few transportation links. It is sparsely populated and remains one of the poorest and least developed areas of the country.

Fig. 12.1 Location of the study areas

Physiography

The study area lies in the northern segments of the Indo-Burma Ranges. The ranges consist of ridges and valley high relief, trending NNE to SSE. Maximum elevation of the Chin Hills is about 4000 ft (1219 m), but the highest peak of Mt. Victoria is about 10,018 ft (3053 m), while Mt. Kennedy in the Falam Area attains an elevation of 8871 ft (2703 m). In these ranges, slopes are steep and landslides are common. Streams flow mostly through boulder-strewn valleys and locally in rock gorges. The drainage in the Chin Hills characteristically shows a herringbone pattern with short tributaries draining into major streams (Hang Khan Lian 1983).

Climate and Vegetation

The study areas lie in the southwest monsoon belt and consequently the climate is characterised by a very marked seasonal variation. The monsoon season extends from mid-May to October; rainfall exceeds 100 inches (254 mm) in the Chin Hills. During the cool season (November to January), there is little rain; daily maximum temperatures rarely exceed 29.4 °C and minimum temperatures fall to −4 °C. In the hot season (February to May), which is also dry, temperatures often exceed 40.5 °C in the valleys along the eastern side of the areas.

Dense forest with bamboo and mixed timber covers much of the Chin Hills. Pine forests are widespread above 4000 ft elevation. Surrounding the towns of Falam and Hakka, extensive areas of forest have been destroyed to supply firewood. In the eastern margin and southern Chin Hills, forest is mostly relatively thin.

Regional Geologic Setting

In terms of plate tectonics, the study areas lie within the Western Burma Plate, bordered by the Eurasian Plate to the east, the Indian Plate to the west and the Shillong Plate to the northwest. The tectonic setting of the Myanmar Region during the Mesozoic to early Tertiary shows the regional geologic setting of the study areas and their environs. Therefore, the regional geologic setting indicates that the flysch which is associated with ophiolites was laid down offshore possibly in a trench to the west from Middle Triassic through Late Eocene. During the subduction, some of the

flysch was probably scraped off against continental mass, while some was carried to a considerable depth where it was metamorphosed at high pressure and low temperature before rising towards the surface. Again the accretion of sediments along the continental margin produced a new thick belt which gradually widened and became progressively younger westward. Therefore, the study areas which are parts of the Indo-Burma Ranges are composed of sedimentary, metasedimentary, intrusive and volcanic rocks that have been interpreted as an accretionary prism including slivers of dismembered ophiolites obducted above an east-dipping subduction zone (Win Swe 1981).

Geology and Geological Structures Around Hakka and Its Environs

Geology of Hakka and Its Environs

As the study areas are composed of the flysch types of sedimentary and metasedimentary rocks, they can be divided into three different units according to the lithology, stratigraphic position and faunal content: Falam Mudstone-Micrite Formation, Chunsung Mudstone-Turbidite Formation and Kennedy Sandstone Formation (in ascending order), as shown in Fig. 12.2 (United Nations Team 1979).

(a) **Falam Mudstone-Micrite Formation**

The type section of this unit is located in the bottom and lower slopes trending north to south near the Falam area. The rock units exposed in the study area are faulted through contact with the Chunsung Mudstone-Turbidite Formation at the east and west of this formation.

This formation is composed of grey to black mudstone, silty mudstone and sandstone turbidites. Sandstones are mostly fine-grained and some are calcareous and carbonaceous. In a few localities, conglomerates and grits are interbedded with mudstone fine-grained micritic or porcellanous limestones are present throughout the formation as beds and exotics, mostly ranging from 5 m (16.4 ft) to a few centimetres thick.

(b) **Chunsung Mudstone-Turbidite Formation**

The type section is located in the vicinity of the Chunsung area northwest of Hakka. This formation is also exposed in the east and west of the

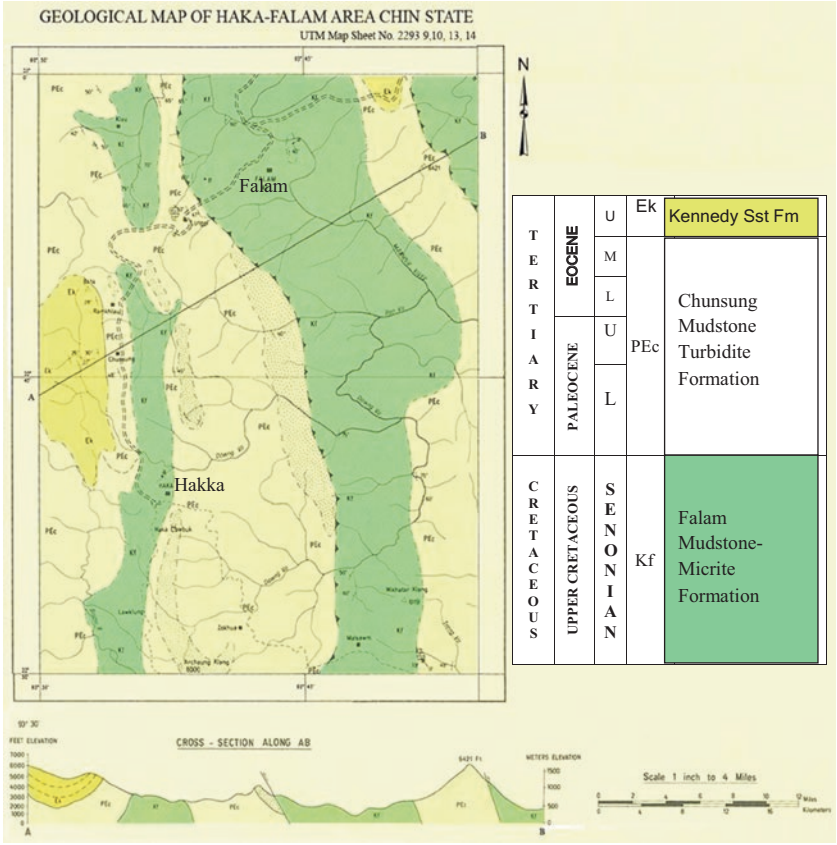

Fig. 12.2 Geological formation of Hakka-Falam Area (United Nations Team 1979)

study areas, forming a faulted contact with Falam Mudstone-Mircrite Formation. This formation consists mainly of mudstones, siltstones and minor sandstones. The lower part of this unit is similar to much of the Falam Mudstone-Micrite Formation; however, micritic limestones with thin fine-grained sandstones interbedded are not observed throughout the formation. There are also numerous units consisting of thicker sandstones interbedded with thin mudstones, which locally form topographic features. The thin-bedded sandstones mostly show sharp bases and tops and lack both sole marks and distinct internal sedimentary structures.

Interbedded mudstones and siltstones are mostly grey, but a faint purple to green colour is present in some weathered exposures. The thicker units which are up to 1.8 m (6 ft) thick are mostly medium- to coarse-grained with abundant mudstone pebbles. Some show erosive bases with grading and sole marks. In the thin section, the sandstones resemble those in the underlying Falam Mudstone-Micrite Formation.

(c) **Kennedy Sandstone Formation**

The type section is situated in the northwest of Kalemyo and southwest of Tiddim at Mt. Kennedy, the highest peak in the study areas, about 8858 ft (2700 m) high. Unlike the underlying formations, the best exposures of the Kennedy Sandstone are in ridge crests and adjacent upper slopes of the higher mountain ranges. The sandstones, mostly fine- to medium-grained and micaceous, are up to 3 m thick with erosive bases resulting in rapid lateral variations in thickness. Interbedded shales are of grey to grey-green silty mudstone, commonly carbonaceous, ranging from a few centimetres to more than 10 m thick. North of Hakka, the Kennedy Sandstone is observed at the maximum elevation of 8414 ft (2564 m).

Geological Structures of Hakka and Its Environs

According to aerial photographic interpretation and field observation, the geological structures found in the study areas are regional and local faults, joints and folds, as shown in Fig. 12.3.

(a) **Regional and Local Faults**

Two regional faults are observed as thrust faults. They are also the lithologic boundary between Chunsung Mudstone-Turbitite Formation and Falam Mudstone-Micrite Formation. One regional thrust fault lies west of Hakka about 16 km (10 miles) away and the other thrust fault is located west of Hakka about 36 km (22 miles) away. Some local faults are noted according to the field observation and aerial photographic interpretation as shown in Fig. 12.2. They lie mostly parallel to each other; some tributaries flow in alignment with these local faults. They can be found north of Hakka-Myohaung Ward. These local faults are one of the causes which create many types of landslide in this area.

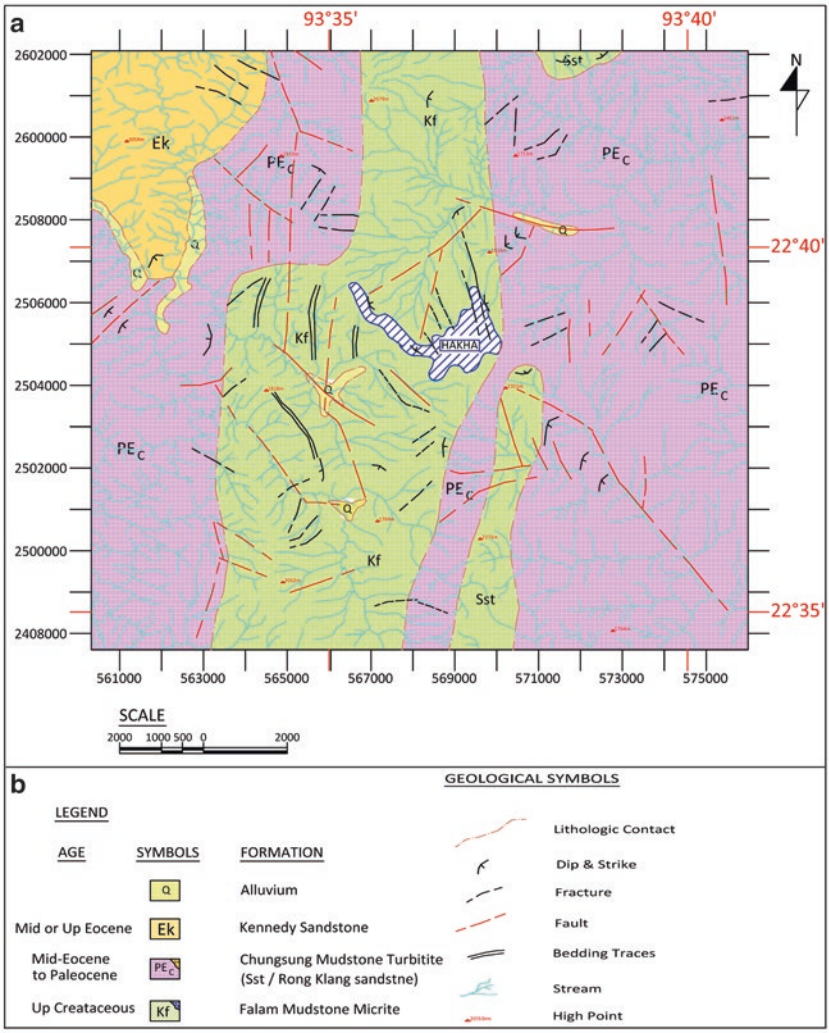

Fig. 12.3 Aerial photographic interpretation of the study areas

(b) **Folds and Joints**

Due to the intense tectonic activity, both regional and local scale folds occur in the study areas. Figure 12.3 shows regional synclinal and anticlinal folds. Local folds are also noted in the study areas. As Chin State is

related to the subduction zone, this area has experienced many tectonic activities throughout geologic time. Therefore, close joints, fracture zones, steep dipping and daylight fractures were occasionally observed during the field trip (Fig. 12.4).

Types of Soil and Slope-Washed Deposits

Residual Soils

As residual soils are formed by the weathering of the bedrock immediately beneath it, they occur about one to three metres thick in the study areas, as depicted in Fig. 12.5. However, the thickness of the residual soil in the most devastated area of the landslide in Myohaung Ward in Hakka cannot

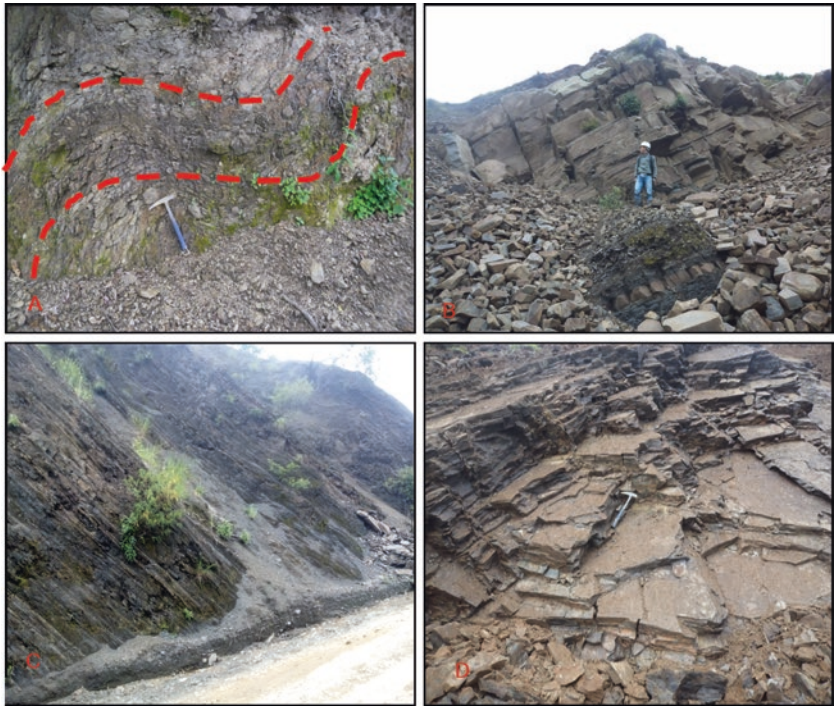

Fig. 12.4 Photographs showing folds (**a**), steep slopes (**b** and **c**), and daylight features (**d**)

Fig. 12.5 Residual soil occurring along the slope of road section

Fig. 12.6 Photographs showing the old landslide debris and colluvial deposit under Hakka-Myohaung Ward

be measured due to the covering of debris from the previous landslide. These soil types are not found in Hakka-Myothit Ward due to the exposure of outcrops.

Debris and Colluvial Deposit

The occurrence of thick debris and colluvial deposits in Hakka-Myohaung Ward indicates that the old landslide materials have accumulated there; that is, Hakka-Myohaung was founded on these unconsolidated materials. Figure 12.6 also reveal that the ancient landslide events have taken place before the settlement of people.

Causes of Landslide in Hakka and Its Environs

The main causes that influence all types of landslide in Hakka and its environs are: (i) the presence of steep slopes, (ii) increase in pore-water pressure in the slope, (iii) erosion processes, (iv) geological structures of the Hakka area, (v) presence of troublesome earth materials, (vi) triggering event and (vii) man-made activities.

Presence of Steep Slopes

The slopes around the Hakka and Falam areas are steep and in some places vertical. These slopes are inherently unstable areas in Chin State. In this situation, the driving forces become higher and the resistant forces tend to become lower, which leads to slope failure. When the driving force is equal to or less than the resistant force, the slope may be stable. However, the rainfall in Chin State is usually more than 250 mm in the wet season and landslide events occur more than in other seasons as the rainwater adds to the driving forces, which destroy the stability of the slope, as shown in Fig. 12.7.

Increase in Pore-Water Pressure in the Slope

Hakka and Falam areas are mainly composed of two lithologic formations as mentioned above. The Chunsung Mudstone-Turbidite Formation consists mainly of impervious indurate shale and pervious thicker sandstones interbedded with thin mudstones. Falam Mudstone-Micrite Formation is

Fig. 12.7 Photographs of slope failure due to steep slopes

composed of impervious indurated shale and mudstone, and pervious sandstone turbidites. The perched water table builds up very fast in the monsoon season on impervious surfaces of shale and mudstone. The choked, perched water raises pore-water pressure along the slip surface. This pressure washes out the cementing material from soil and rock masses. This saturation destroys capillary tension in soil and reduces its cohesion. Therefore, plain failure and debris flow occur in Chin State during the monsoon season.

Erosion Processes

Discontinuities in rock mass in the study areas caused by tectonism became wider due to the long-term erosion of rainwater and pore-water pressure; then they were refilled with soil. In this situation, these rock masses existed as a weak zone (Selby 1993). Besides, due to the deforestation and heavy rain, the uncontrolled flow of rain water on slope surfaces washes out soil and boulders. These processes occurred on the Rung Mountain in Hakka and a deep landslide event struck Myohaung Ward, damaging many settlements at the base of this mountain (Fig. 12.8).

Geological Structures of Hakka Area and Its Environs

Geological outcrops exposed in Hakka and its environs are indurated shale, mudstone and sandstone, which are interbedded with each other and steeply dipping. During the rainy season, the rain water infiltrates

Fig. 12.8 Photograph showing slope failure due to erosion processes at Falam in Rung Mountain (**a**) and in the Falam-Laizo Landslide (**b**)

through the sandstone and between the bedding planes. When the rainwater reaches the impervious rock (shale and mudstone), it is prevented from seeping through and it acts as a lubricant. Then soil, debris and all the settlements on the slope slide down to the ground along the dip direction, as shown in Fig. 12.9.

Presence of Troublesome Earth Materials in Hakka and Its Environs

According to the aerial photographic interpretation and field observation, the present Hakka-Myohaung Ward is located on ancient landslide materials. They are composed of unconsolidated soil and debris into which water can easily infiltrate, leading to increased pore-water pressure and driving forces. Landslide events in Myohaung Ward are due to these reasons (Fig. 12.10).

Fig. 12.9 Photograph showing slope failure along the Bedding Plane

Fig. 12.10 Multi-landslide events on troublesome materials in Myohaung Ward

Triggering Event in the Hakka Area

Chin State has experienced many types of slope failure and many places are potentially exposed to landslide hazards. In this situation, the recent landslide in the Hakka area in 2015 was the result of the torrential rain caused by Cyclone Koman on 27 July 2015. Some 180 mm of rain fell within a short time span. This rainfall exceeded the threshold value of the Hakka area, leading to triggering causes. Figure 12.11 shows the comparative rainfall from 1989 to 2015 and rainfall data during July 2015.

Man-Made Causes

Slopes and their toes were excavated without engineering sense for the road construction, which is leading to slope instability. Many slope failures occurred along the connection road between Hakka and Falam. Large-scale indiscriminate deforestation due to mass production of timber in the Hakka area is also causing rapid slope erosion.

Types of Landslide Occurring in Hakka

The main types of landslide found in the Hakka area are rock falls, flow, plane failure and rotational slide. Figs. 12.12 and 12.13 depict types of landslide observed in the Hakka area during the field trip.

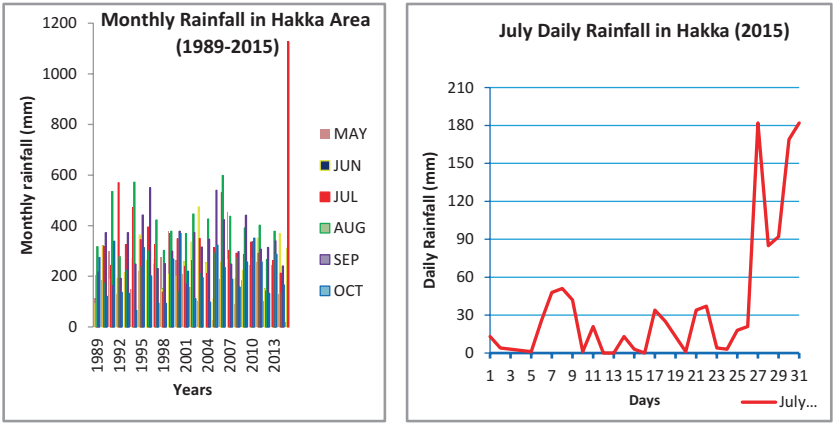

Fig. 12.11 Monthly rainfall from 1989 to 2015 (*left*) and July daily rainfall in 2015 (*right*)

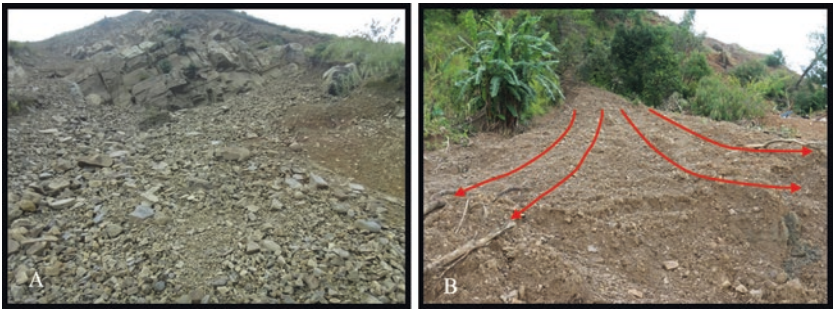

Fig. 12.12 Types of landslide: (**a**) Rock Falls, (**b**) Debris Flow

Fig. 12.13 Types of landslide: (**c**) Translational Slide, (**d**) Rotational Slide

Landslide Zonation Map of Hakka and Its Environs

From the results of field observation and aerial photographic interpretation, the field party attempted to prepare a landslide zonation map for Hakka and its environs.

Data Considered to Prepare Landslide Zonation Map

To prepare a zonation map, the following are considered: (a) slope inclination, (b) geological condition such as rock types, lithology, geological structures, valley side, existing initial crack signs and so on, (c) land use, (d) human activities (construction of road, gutter and buildings), seepage or spring. These facts are selected as input data to apply GIS (Geographic Information System) (Anbalagan 1992).

Table 12.1 Characteristics of landslide zones

Landslide hazard description	
Low	The landslide potential is very low although the surrounding areas could be impacted. This zone is more suitable for construction.
Moderate	Landslides seldom occur in this zone. This zone is also suitable for construction, provided systematic measures are taken to reduce the risks.
High	Landslide may occur in this zone under critical rainfall conditions. This zone is not recommended for construction. To prevent impact on other areas, mitigation and monitoring measures must be undertaken with early warning systems.
Very High	Landslide is very high risk in this zone. Settlement and construction are not recommended in this zone.

Landslide Zonation Map

The factors that cause landslides are analysed one by one and then they are defined as weighted scores to apply as input data for GIS. In landslide zonation, hazard zones are divided into four grades according to their potential hazard. They are (a) very high hazard zone, (b) high hazard zone, (c) moderate hazard zone and (d) low hazard zone. The explanation of these hazard zones is illustrated in Table 12.1, and the zonation map is depicted in Fig. 12.14.

Landslide Mitigation Measures for Hakka Area

The most suitable mitigation methods for Hakka and its environs are recommended as follows: (a) avoidance, (b) reducing of driving forces, (c) increasing resistance forces, (d) structural support measures, and (e) application of bioengineering (Wang Sijing 1999).

(a) **Avoidance of high-risk areas**

As the areas of Hakka-Myohaung Ward and the foothills of Rung Mountain are very high-risk areas, no settlements should be established. Human settlements should be shifted to one of the low-risk zones defined in the landslide zonation map of the Hakka area.

(b) **Reducing driving forces**

To reduce the driving forces, the slopes in the Hakka area should be flattened by benching and removing the head of the slope. A systematic

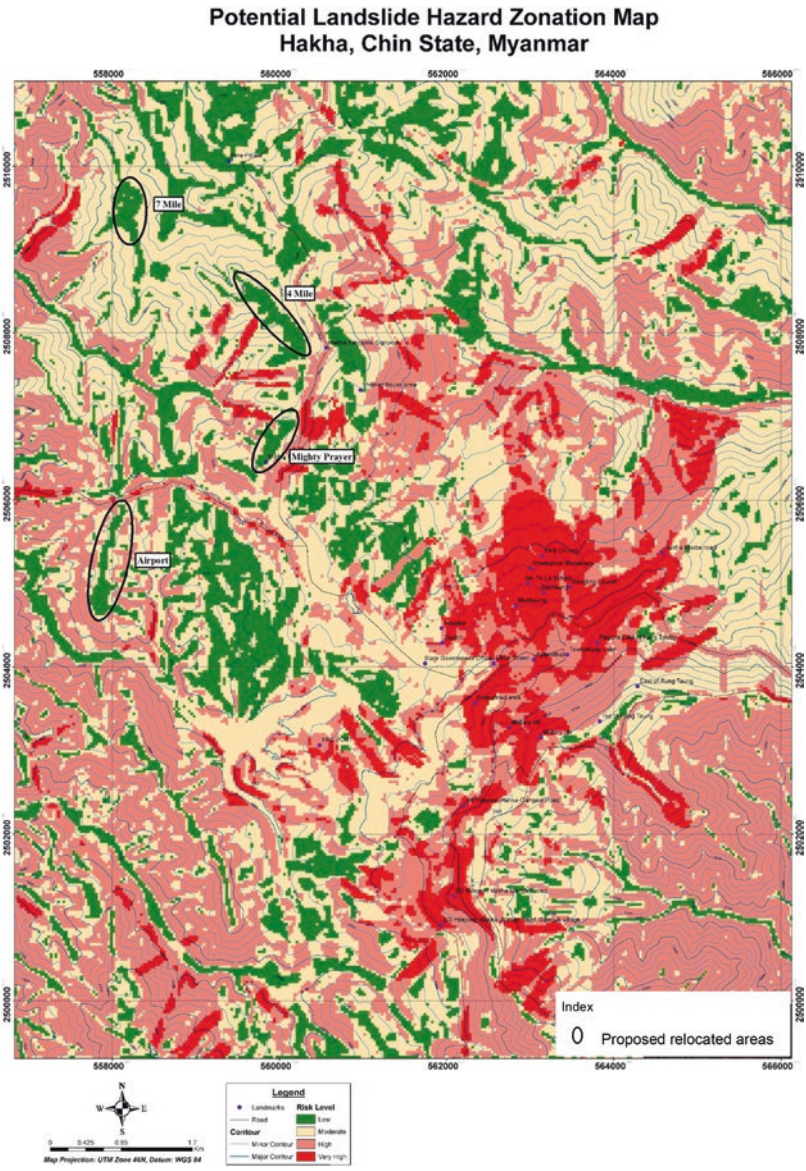

Fig. 12.14 Landslide zonation map of Hakka area

surface drainage network should also be installed to prevent infiltration of water into the ground.

(c) **Increasing resistance forces**

To increase shear strength, sheared zone materials should be removed and replaced with stronger materials. Buttresses, gravity walls and beams should be constructed in the toe area of the landslide. To reduce pore-water pressure, boreholes should be drilled into the slope and perforated pipes installed. These methods can improve shear strength of the slope materials.

(d) **Structural support measures**

Structural support measures include retaining walls, anchored structures, rock bolts and anchors. These structures improve the stability of slopes by increasing stabilising components of sliding mass. However, the most suitable structural measure should be selected with the help of structural engineers.

(e) **Application of bioengineering**

In the Hakka area, deforestation is broader and wider year by year as a result of overexploitation of firewood. Due to these activities, surface erosion and bracing effects in the soil have been lost. Bioengineering is the use of living vegetation, either alone or in conjunction with civil engineering structures and non-living plant material, to reduce shallow-seated instability and erosion on slopes. Bioengineering measures can contribute to the following (Geo-Environmental Unit 1999): (i) prevention of scour erosion, (ii) reduction of shallow planar land-sliding and (iii) provision of support to the base of the slope and trapping material moving downward. Therefore, it is recommended that easily developed trees and grass, such as vetiver grass, deer grass, switchgrass, should be grown in all potential landslide areas.

Recognition of Landslide Warning Signs

The people living in landslide-prone areas in Hakka and its environs should be aware of the landslide warning signs to evacuate from this hazard. These warning signs are: (i) uncontrollable rainwater flowing on the slope

after the rainstorm; (ii) the trees on the slope progressively leaning; (iii) sticking of doors and windows, visible open spaces between them and their frames; (iv) appearing of new cracks in plaster, tile, brick and foundation; (v) sudden appearance and rapid expansion of cracks on road pavement and ground surface; (vi) outside walls or stairs pulling away from the building and abnormal seeping of rainwater from the roof and (vii) tilting or moving of fences, retaining walls, utility poles.

Suggestions for the People Living in Landslide-Prone Areas

If someone is in an area susceptible to landslides, he/she should leave that area as quickly as possible. The appearance of unusual sounds due to tree cracking and boulders knocking together, sudden increase or decrease of stream water flow and sudden changes from clear water to muddy water indicate debris flow activity in upstream areas. Therefore, it is very important to move immediately without caring about taking one's belongings. He/she should inform his affected neighbours of the potential threat, which may help save lives. He should not build on or at the base of unstable slopes, at the base or top of an old fill slope, or at the base or top of a steep cut slope.

Conclusion

Hakka and its environs encountered different types of landslides during July 2015 due to Cyclone Koman. The torrential rain from that cyclone was only one triggering effect. The background reasons are that the whole Chin State is inherently an unstable area of the country; it has steep slopes, unstable geologic conditions and heavy monsoon rains; it also has poor engineering properties of rock and soil. Therefore, these facts combine to make the mountainous Chin State one of the most landslide-prone areas in Myanmar.

The biggest landslide events occurred at Myohaung and Zayhaung Wards in Hakka. These two wards are situated beside two small streams which start from the steep Rung Mountain and flow along the local fault trends. They are also located on ancient colluvial deposits, which are composed of troublesome materials. Due to these reasons, many buildings were damaged and lives lost.

According to the data from field observations and aerial photographic interpretation, the landslide zonation map was prepared on the basis of

inclination of slope, types of soil, lithology, geological structures, condition of valley side, presence or absence of initial crack signs, land use, human activities and groundwater or spring. A total of four danger zones have been classified: low zone, moderate zone, high zone and very high zone. The characterisation of each zone is explained. Four new satellite areas which indicate a low hazard zone are plotted on this map. Moreover, landslide warning signs and some facts to assist the people living in the landslide-prone areas are provided.

The people living in the landslide-prone areas should be educated about the nature of landslides and their effects. A study group should be formed to explore their environment during the rainy season, which will assist them.

The prevention and control work is actually carried out in the landslide areas based on two concepts. The first is to save human lives and the second is to avoid placing buildings, public structures and roads in the landslide-prone areas unless there are preventive measures. Therefore, it is anticipated that this chapter will be very beneficial for the people living in landslide-prone areas.

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CHAPTER 13

Women, Water and 'Wicked Problems': Community Resilience and Adaptation to Climate Change in Northern Pakkoku, Myanmar

Helen James

Introduction

Myanmar has been identified as one of those developing countries whose populations are very highly exposed to the future risks associated with impacts of climate change and multiple hazards, including drought, flooding, landslide, and extreme temperatures, as well as wildfires, cyclones/storm surges, tsunami, and earthquakes. Northern Pakkoku in the dry zone of Magway Division, central Myanmar, is recognized by all socioeconomic indices as a very poor area where the challenges of climate change impacts and variation in rainfall and temperatures are compounding the difficulties of developing sustainable livelihoods from leached soils, unreliable water resources, and population growth. More than a million people live in this area which historically was known as a trading center based on riverine traffic along the Chindwin and Ayeyarwady

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Rivers. Rural Northern Pakkoku exhibits the numerous 'wicked problems,' that is, those for which a ready long-term solution is not immediately apparent, and which have conditioned the lives of villagers in this region for generations. Because of this combination of climate change impacts, underdevelopment, and poverty, Pakkoku was one of two areas (the other was Laputta at the foot of the Myanmar Delta) selected by the UN-Habitat/DMH report 2017 to be the focus of its analysis on *Assessing Climate Risk in Myanmar: Technical Report*. It states (p. 13): 'Myanmar's climate is projected to shift dramatically in the coming decades, having a lasting and significant impact on Myanmar's ecosystems and, in turn, on human health, agriculture, food security, infrastructure, local livelihoods and the larger economy.' The changing climatic conditions are already being observed in variations in Myanmar's prevailing monsoonal season precipitation patterns, beginning slightly later and ending earlier (Lwin 2002; UN-Habitat/DMH 2017), which are leading to farmers reconsidering which crops and types of seeds to plant to stave off food insecurity.

In rural villages of Northern Pakkoku, this set of dynamics is evidenced in the interplay between lack of water as already low annual rainfall reduces, too much water when torrential monsoonal downpours impact on the baked hard gullies causing serious erosion and flash floods, soaring temperatures in the dry season (November–May), and the struggle to eke a living from the difficult soil. In Myanmar, Northern Pakkoku exhibits many of the major challenges to implementing the Sustainable Development Goals (SDGs): water and food insecurity; human development needs; gendered labor conditions; the need for access to quality health and education; poverty alleviation measures; and lack of critical infrastructure. Based on fieldwork in Northern Pakkoku in February 2015 and discussions with NGO Action Aid, this chapter explores the interactions between measures to enhance community resilience to climate change and the enduring interplay with the 'wicked problems' which have long conditioned the villagers' livelihood outcomes.

Northern Pakkoku: Interface with Climate Change Impacts

Climate change impacts on Northern Pakkoku and other parts of the Central Dry Zone (Magway Division) reside in both increasing temperatures in the dry season (November to May) and more severe rainfall

incidents which are damaging to crops, homes, and livestock, thus putting already fragile livelihoods at risk. Drawing on weather data from 19 sites collected by the Myanmar Department of Meteorology and Hydrology (DMH) 1981–2010, the 2017 *Assessing Climate Risk in Myanmar* report concluded (p. 25) that average daily temperatures in Myanmar have increased by around 0.25 °C per decade and average daily maximum temperatures by 0.4 °C per decade, an outcome said to be consistent with global averages for the same time span. However, these outcomes belie the fact that villages and towns in the Central Dry Zone often experience heatwave temperatures as in 2010 of over 50 °C during the hot dry season February–May, thus putting lives and health at risk and reducing crop yields even in irrigated fields. Based on data from just nine inland weather stations, the same report concluded that inland temperatures in the Central Dry Zone have risen more sharply than those in coastal areas. 'Inland regions warmed faster than coastal ones, both in terms of average temperature (0.35°C per decade increase in inland regions versus 0.14°C per decade coastally) and maximum temperature (0.57°C increase per decade inland versus 0.23°C increase per decade along the coasts' (UN-Habitat/DMH 2017, p. 25). These rising temperatures are driven by climate change and are not merely the reflection of the inland location between two mountain systems, the Arakan Yoma and the Pegu Yoma.

A significant factor contributing to the extreme temperatures has been the widespread deforestation in both hill and valley areas, a correlation implicit in the various afforestation programs across these areas since the mid-1990s. Figure 13.1 shows the location of Pakkoku in relation to Bagan and Chauk, other cities in this zone which experience similar impacts of changing climatic conditions. A 'Greening Program' since 1993 has sought to address these outcomes through concerted tree-planting activities on a national scale. Ironically this is helping to contribute to more intense rainfall in the area during the monsoon season, thus opening up the possibilities of more severe flooding as in 2015 and flash floods and landslides as in 2017. Bagan, with its thousands of historical temple sites, has been able to benefit from international tourism to generate alternate sources of income and recent irrigation programs drawing water from both the Ayeyarwady River and underground sources. However, Northern Pakkoku, situated some three hours by four-wheel drive from the Bagan UNESCO heritage listed sites, has been characterized by sparse vegetation landscapes, 'badlands'-type gullied surfaces from severe rainfall downpours, lack of availability of alternate permanent water

Fig. 13.1 Map of Myanmar showing Pakkoku and the Central Dry Zone

resources, and poor soils. Until recently, it was possible for village households dependent on rain-fed agriculture here to grow only one rice crop a year, thus bringing them face-to-face with the specter of food insecurity (Figs. 13.2 and 13.3).

In coastal areas of Myanmar, rainfall has been markedly increasing across the years for which data has been collected; however, in land, only slight increases in rainfall have been observed, at around 37 mm (or 2.5%) per decade. This has been mostly during the monsoon season June–October, with little to none in the dry season. 'While there has been no statistically meaningful trend in the number of rainy days (defined as days with rainfall >1mm) per year over 1981–2010, annual precipitation totals have increased, implying that rainfall events have become more intense' (UN-Habitat/DMH 2017, p. 25). Causing widespread catastrophic floods in Myanmar during monsoon season, overflowing dams, and destruction of rain-fed agriculture, these intense rainfall downpours are extremely damaging to the human and natural environments, particularly in fragile landscapes.

Fig. 13.2 Dry Zone landscape Bagan 1997

Fig. 13.3 'Greening' the Central Dry Zone 2002

Water Resources and Food Security: Then and Now

Traditionally, water resources among the villages of Northern Pakkoku were scarce. Water had to be brought from streams, wells, or ponds by village women carrying the water to the household. Water insecurity was one of the 'wicked problems,' as sources dried up in the hot dry season, and became raging torrents in the wet season June–October. Unreliable rainfall meant that only one rice crop per year could be harvested, thus compounding the problems by exposing the villagers to food insecurity. Women's work often revolved around the time necessary to harvest water from scarce sources.

In 2014, the NGO Action Aid began an integrated development program among the villages of Northern Pakkoku, beginning with enhancing the availability of permanent natural water sources. Taking advantage of the terrain of steep natural gullies and ravines carved out by downpours during the rainy season and hillsides which could serve as catchment areas down which rainfall could run and be channeled in desired directions, Action Aid organized the building of a large horizontal dam whose waters

are held back by rammed earth. When the rainfall comes, it no longer runs away down the gullies, but is trapped behind the earthen wall of the dam. This addresses the first two parts of the problem: alleviating the workload of women by lightening their burden and freeing them from being tied to seeking scarce water resources. Second, having a permanent water supply nearby has meant that this water can be piped to each household in each village in the project area. With government support, Action Aid operationalized this project, thus implementing the public/private partnership principle in the SDGs. Each household now has its own reticulated water, tap, and holding tank, thus greatly improving the position of women and their household members in the project area. I saw this in practice during fieldwork in 2015 and witnessed the pride and happiness of women as they turned on the taps in their homes.

Water resources in Northern Pakkoku will always be variable, conditioned by the increasingly hot dry seasons with soaring temperatures and the intense sudden downpours in monsoon season which often cause flash floods. It is also an area which in recent years has felt the lash of cyclonic rains carving a path up through the northwest and down to India and Bangladesh as in 2015 when an unusual circular track taken by Cyclone Komen caused devastating floods in Magway and Sagaing in northwest Myanmar as well as in Rakhine and Chin States. When over 840 mm of rain fell in three days, affecting Kalay and Paletwa, a state of emergency had to be declared and a call for international assistance made, as over 1.2 million people had to be evacuated. Cyclone Komen is considered the worst natural disaster since Nargis in 2008, evidenced by the devastating impact of flooding on homes and agriculture, and loss of employment for casual farm laborers.

In this fragile area, lack of water or too much of it, both impact severely on the livelihoods and community resilience of villagers. Water from the dam has meant that in a good season now, villagers can grow two rice crops, thus enhancing their food security. But when cyclonic rains destroy the crops, food aid is necessary to meet villagers' needs until the next growing season. Of concern also is the strength of the earthen wall keeping water back in the dam. Should this fail, water would rush through the villages downstream, leading to disaster.

Another element introduced by the Action Aid program to reduce the vulnerability of villagers in this area is the herds of goats which now wander at will throughout villages. These provide additional protein food, can live off sparse vegetation, and are sufficiently hardy to withstand the higher summer temperatures.

Adaptation and Community Resilience

Given the intersecting 'wicked problems' arising from the interplay between poverty, climate change, and women's gendered labor relations, creative approaches to adaptation measures have been essential to build community resilience. Poverty alleviation required adaptation measures independent of climate change; income generation needed to extend beyond growing an additional rice crop or keeping herds of goats. Community empowerment programs by Action Aid sought to mobilize the resources of the community's women's networks in order to provide more varied livelihood options. This approach is basic to addressing the 'wicked problems' and meeting the challenges of implementing the SDGs.

In a much-quoted 2008 article, Norris et al. projected their theory of the four sets of networked resources which underpin resilience as theory, metaphor, and strategy: information and communication; economic resources/poverty alleviation; social capital; and community competence. They reflected these in Fig. 13.4.

Where resilience is defined as the capacity to adapt positively to a challenging environment, by operationalizing these four sets of networked

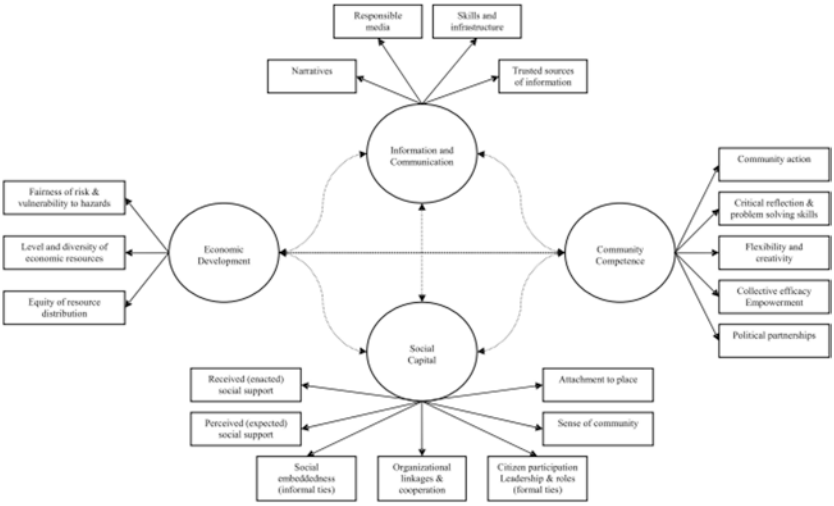

Fig. 13.4 Community resilience as a set of networked adaptive capacities. (Source: Norris et al. 2008)

resources, the Action Aid integrated program for community empowerment has been able to redefine future risk for the rural villages in this area. First, drawing on the inherent bonding level social capital among village women's networks, a rich source of leadership and community competence has been developed. Working with Action Aid, the women's networks have generated a new ecotourism industry; cabins in the hills above the dam cater for visitors from around the world and now produce income in excess of USD1 million per year for the area. These economic resources have changed the lives of inhabitants. As a result of the information and communication expertise provided through Action Aid (bridging and linking social capital in operation), eco-tourism, education, health, and income generation programs now enrich the lives of villagers here.

Adaptation to the challenges brought by climate change has led the villagers to develop alternate forms of livelihoods, and to complement these with human resource development activities and maternal and child health programs. New income generation programs have also been extended to a local handicraft industry whose products are marketed in the tourist centers of Yangon. One of the critical elements of sustaining the adaptive capacities of the Northern Pakkoku villages will be whether the younger demographic, both male and female, continues to live in the region, or whether it migrates to the urban areas in search of higher education and better economic opportunities as is happening in other areas of Myanmar.

Conclusion

In 2005, the Hyogo Framework for Action 2005–2015, *Building the Resilience of Nations and Communities*, defined 'resilience' as

> The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures.

Working with the bridging-level social capital represented by the NGO Action Aid and harnessing their own bonding-level social capital, villagers in Northern Pakkoku have demonstrated their capacity to adapt to the challenges of climate change and poverty alleviation. Women's groups

here have organized themselves to make their social system more robust while maintaining an 'acceptable level of functioning and structure,' while activating risk reduction measures to mitigate future risk.

Moreover, the villagers in Northern Pakkoku, it could be argued, also exemplify some of the key principles of the Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR), successor to the Hyogo Framework. The integrated development programs here led by the community with capacity building assistance from Action Aid demonstrate the SFDRR goals to 'increase resilience' and 'decrease losses.' The local communities have been empowered through taking initiatives such as the eco-tourism project, to transform their lives through adaptation and innovation. Social learning practices within and between villagers have been facilitated by the engagement of women's groups in these community development projects.

In the longer term, it will be important that the positive advantages of these initiatives are maintained. Should the eco-tourism projects fail to attract the same level of support from international clients as they have in the past two years, or should the earthen wall of the dam fail, or unusually heavy monsoonal rains bring devastating floods or landslides, the gains in terms of the enhancing the resilience of villages in this fragile ecosystem will be lost. Other possible threats to the ongoing adaptation and transformation program could lie in the movement of young people from the area to the urban regions as in many other parts of Myanmar. If this accelerated, demographic aspects, including an aging profile, could undermine the enhanced resilience of the villages of Northern Pakkoku. In the longer term, the challenges to implementing the SDGs for this region will cohere in the mixed impacts of adaptation to future and ongoing climate change, population pressures, and policy frameworks which recognize the inherent fragility of the ecosystem on which the villagers' lives are dependent.

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CHAPTER 14

Socio-Political Transformation After the 2011 Floods in Thailand

Ladawan Khaikham and Helen James

Introduction

Thailand has experienced serious floods, which normally occur about once every 15–20 years, on the Chao Phraya River, the longest and most important river in the country. Its tropical location, the influence of seasonal monsoon rains and local alluvial plain landscape make the country prone to floods (Fredrickson 2010; Dutta 2011; Gale and Saunders 2013). However, the floods in 2011 were especially severe and precipitated the worst flood crisis in Thailand in the past 50 years in terms of the extraordinary volume of water, the extent of land inundated, the number of people affected and the duration of the disaster (Boonyabancha and Archer 2011; '2011 Thailand Flood Executive Summary' 2012; Yoda et al. 2016). The floods affected 66 out of 77 provinces. It was estimated that more than 884 people were killed and 13 million people were left homeless or displaced (Imudom et al. 2012; Ghaderi, Som and Henderson 2015).

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While most attention has been focused on economic losses, there are few studies of the political and social adaptation and transformation after the flood event. According to the World Bank report (2012), the flood caused the nation THB1.4 trillion (USD 42 billion) in economic losses. Moreover, it was predicted that it would take the country more than two years to recover, with a financial outlay of approximately THB1.5 trillion (USD 45 billion) in rehabilitation and re construction costs (Head 2012; Imudom et al. 2012; World Bank 2012; Poaponsakorn & Meethom 2013). This chapter aims to discuss firstly the 'adaptation as transformation' framework of Mark Pelling. Secondly, it sets out the reasons why the flood in 2011 was so damaging economically and politically. Thirdly, the chapter analyses the post-disaster situation in Thailand in order to highlight the Thai social and political dynamics after the severe flood in 2011.

Adaptation as Transformation

Individuals and socio-ecological systems have always responded to environmental change. However, climate change brings a particular challenge to human adaptation because of its uncertainty, pace and scale of impact combined with the lack of transparency of causal linkages in everyday life (Pelling 2010). In *Adaptation to Climate Change: From resilience to transformation*, Mark Pelling identified two attributes of adaptation. Firstly, adaptation as backward-looking action 'is revealed by capacity to cope during moments of stress or shock' (Pelling 2010, p. 15). Secondly, adaptation as forward-looking action includes components associated with the adaptive capacity which enable positive change and transformation. In this work, Pelling concentrates on forward-looking adaptation attributes that 'ha[ve] the potential to intervene in development policy and practice through progressive risk reduction' (Pelling 2010, p. 15). Pelling states:

> Where transitional adaptation is concerned with those actions that seek to exercise or claim rights existing within a regime, but that may not be routinely honoured (for example, the active participation of local actors in decision-making), transformational adaptation describes those actions that can result in the over-turning of established rights systems and the imposition of new regimes.

Pelling identifies adaptation as the transformation in relation to the idea of the social contract in which 'a just society is one where those

with power are held to account over their ability to protect core and agreed-upon rights for citizens' (Pelling 2010, p. 122). He proposes that the notion of a social contract can help in the analysis of crises of legitimacy that precede political regime change, and potentially can be used to avoid such crises.

Although disasters associated with climate change do not guarantee transformational change, evidence of the potential for transformational change within national boundaries and at the regional level can be found in Myanmar after Cyclone Nargis, as well as in Japan after the Tohoku Triple Disaster (2011) and in Taiwan after Cyclone Morakot (2009). Cyclone Nargis showed that, at the time of crisis, the ruling military elite initially felt that it had to demonstrate its control over society by impeding the international request for access to deliver aid to the cyclone victims. In addition, the leadership of the Association of Southeast Asian Nations (ASEAN) in responding to Cyclone Nargis showed an important regional adaptation, when it joined with the international community and the government of Myanmar to establish the Tripartite Core Group (TCG) which managed the relief and recovery efforts. The governance of the 2011 floods in Thailand demonstrated similar socio-political alignment of self-interested vested interests in the country which operated contrary to the imperatives of the social contract.

What Made the 2011 Flood Severe

Bangkok, the capital of Thailand, is situated on the banks of the Chao Phraya River, a highly navigable river which gives good access to the open seas. The centre of Bangkok is about 50 kilometres north of the Gulf of Thailand. Its location as a fertile delta and port means it has emerged as an important agricultural, economic and commercial hub. Canals, or *Klong prapa*, have been constructed in Rattanakosin Island, as a means of providing security, storage of water for crop production and consumption, and transport. Bangkok residents are used to seasonal floods which have become one of the primary ecological systems. Floods bring fertile sediments to the lower plains of the rivers around Bangkok. Therefore, the surrounding areas of the city are suitable for agriculture, especially rice growing. However, major flooding in 2011 precipitated the worst flood crisis Thailand has ever experienced. While Bangkok has developed and changed significantly due to population growth and rapid unplanned urbanisation, the flood crisis arose due to governmental mismanagement

of unexpectedly large flood waters which had descended from the northern provinces and sought to flow out to the Gulf of Thailand.

Population Growth and Rapid Unplanned Urbanisation

Demographic growth and urbanisation contribute to environmental change which compounds flood risk. Thailand's population was 65.5 million in 2010 (National Statistical Office 2010). In Bangkok, population fluctuates between 8.25 and 10.3 million because of domestic migration, when people come into the city to work during the day, then return to their homes in surrounding regions (National Statistical Office 2010). The significant population growth in Bangkok over the past three decades has led to a number of issues including rapid unplanned urbanisation, negative changes to urban land use and high demand for resources.

Rapid unplanned urbanisation makes the city prone to flooding. Over the past three decades, traditional wooden houses and canals have been replaced by solid concrete buildings and modern construction due to the implementation of the *1961 National Economic and Social Development Plan* (NESDP) after World War II. The plan was closely associated with rapid economic growth which brought weak infrastructure such as roads, telecommunications, water and sewerage supply and transportation to the city without sufficient planning. As a result, the lower plains of Bangkok have been encumbered with heavyweight urban structures which make the city vulnerable to flooding (Engkagul 1993).

Moreover, demographic growth and urbanisation have resulted in change in urban land use. This change has resulted in unplanned sprawl, which is ineffectively regulated by the central government and local authorities. One hundred per cent of nearby agricultural areas were converted to urban uses as Bangkok expanded to become the Bangkok Metropolitan Region (BMR). These lands now serve as residential areas and support many industrial estates that are the hub of foreign investment (Dalpino 2012; Losiri et al. 2016). The most serious change has occurred in the reduction in waterway systems. These infrastructures have been built without thinking of proper drainage systems or water flow and flood prevention. As a result, with unplanned urbanisation, the natural floodways and drainage systems in BMR became blocked and eventually disappeared.

Population growth results in high demand for resources. In addition to regular pipe water, groundwater is extensively used in the BMR. During

1998–2001, the total groundwater abstraction was over 2.2 million cubic metres per day, 60 per cent of which was used for industrial purposes (Fornés and Pirarai 2014; Lorphensri, Nettasana and Ladawadee 2016). In 2008, the volume of groundwater abstraction decreased to 0.75 million cubic metres per day due to the imposition of a groundwater tax and charges (Kataoka and Kuyama 2008). Consequently, the excessive pumping of groundwater has caused severe subsidence in some areas in and around the capital which has tended to exacerbate vulnerability to floods. Currently, Bangkok is only about 0.5–2 metres above sea level. According to a study by Thailand's National Reform Council in 2015, Bangkok risks being submerged in less than 15 years and by 2030 the entire city may be five feet underwater (*The Economist* 2000; *The Weather Channel* 2015; Promchertchoo 2017). With the explosion of the Bangkok population and exploitation of the natural resources, Bangkok not only is at severe risk of floods, but also the problems of floods that stay longer than usual, land subsidence and rising sea levels. This also contributes to floods in Bangkok becoming serious problems.

The Thai Government's Response to Flood Risk

It is partly true that the flood happened naturally. The water level of the Chao Phraya River increased in 2011 due to the highest average rainfall[1] from a series of five monsoons and tropical depressions[2] that occurred between June and October 2011 (Poaponsakorn, Meethom and Pantakua 2015; Singkran and Kandasamy 2016; Sayama, Tatebe and Tanaka 2017). Nevertheless, one main problem that can turn normal events into potential disasters is the inefficiency of the crisis management provided by the government (Lebel, Manuta and Garden 2011).

The flood crisis in Thailand also intensified partisan tensions between central and local governments. The consequences of this flood challenged the governance capacities of the newly elected Pheua Thai government. Yingluck Shinawatra's government was officially installed on 10 August 2011 when the flood crisis was severe (Maier-Knapp 2015). The Pheua Thai officials blamed the previous government of Abhisit Vejjajiva (2008–2011) for water mismanagement and the flood in the southern areas of Thailand (Dalpino 2012; Maier-Knapp 2015). However, it was the Pheua Thai government which did not release the large quantity of water from the Bhumibol and Sirikit dams located upstream of the Chao

Phraya River, before a series of monsoons hit Southeast Asia (Singkran and Kandasamy 2016).

At the time, Prime Minister Yingluck was confident that the capital would stay dry. Therefore, the government failed to prepare for and respond urgently to the flooding, because they believed that bad news might cause residents to panic. At a time of political conflict, 'the response has become tangled in politics, with rival ministers sometimes issuing contradictory directives and warnings' (Mydans 2011, p. 1). This was not a promising landscape for effective risk and emergency management.

On the one hand, the elected governor of Bangkok, M.R. Sukhumbhand Paribatra, (2009–2016), from the Democrat party, realised that Bangkok would encounter severe floods. He sought to protect Bangkok, the economic and political centre, at all costs. On the other hand, the Yingluck government initially sought to alleviate flooding upstream. The different objectives and political alliances led to conflicting communications and policies. This dispute between the central government of Yingluck Shinawatra and the Bangkok government of Sukhumbhand Paribatra delayed effective protection of the capital. Instead of responding urgently and working collaboratively, Sukhumbhand engaged in rival posturing with the central government by telling Bangkok residents to 'listen to me and me alone' (Mydans 2011).

> The implication of his order was twofold: that Yingluck might survive even poor performance in a natural disaster because of her parliamentary majority, and that other governors were not as accountable to their constituents because they were not elected. (Dalpino 2012, p. 200)

Furthermore, the *Bangkok* Metropolitan Administration (BMA) relied heavily on large sandbags and water pumping. A huge sandbag barrier was built up to 18 kilometres along Khlong Prem Prachakorn canal southward to Vibhavadi Rangsit Road. These sandbags were expected to protect the inner city from the floods, but they created zones of 'sacrifice' and 'protection' while delaying the outflow of flood waters from certain areas. Sukhumbhand also added 24 water pumps to enhance capacity to move water (*AAP* 2011; Fredrickson 2011). Nevertheless, one significant reason why the flood flowed quickly into the city was because of the breakdown of the water pumps in the eastern part of Bangkok.

In Thailand, while flooding in rural areas and urban riverfront settlements occurs regularly, many urban and suburban areas have not experi-

enced flooding for more than 10–15 years. Bangkok accounts for 40 per cent of Thai GDP, so the central government tried every means, including diverting enormous amounts of water to rural areas, to ensure that urban and suburban areas of BMR were not inundated (Poaponsakorn and Meethom 2013; Marks and Lebel 2016). The rural-urban divide was highlighted when Prime Minister Yingluck Shinawatra (2011–2014) thanked the rural Thais for their sacrifice, saying that

> [I]f we let the floodwall collapse or if the sluices fail, the water will burst into Bangkok, the capital of our nation ... foreigners will lose confidence in us and wonder why we cannot save our own capital. (Shinawatra 2011 cited in Fuller 2011)

Surprisingly, Thailand does not have a single regulation related to water resource management due to its sensitive political nature and the lack of shared interest between the governmental institutions (Netherlands Embassy in Bangkok 2016). For example, some governmental water management agencies in Thailand are under three major ministries[3] and none of them has direct responsibility for flood management (Boonyabancha and Archer 2011). As a result, most public information was diverse, unreliable and showed a lack of policy coordination between the various flood and disaster management agencies (Pongsudhirak 2011). Fragmentation in the central government's response created the impression of a government in crisis, without a concerted plan of how to manage the emergency.

Underestimation of the risk is also one of the keys to the failure of the government's approach to flood risk reduction. When the Chao Phraya River reached its highest level in seven years on Saturday 21 October 2011, the Justice Minister Pracha Promnok, who was head of the flood relief centre, stated that 'people should not worry too much, because the overflow ha[s] been drained off' (Branigan 2011). When the flood waters flowed from the north and were about to reach Bangkok, the central government ordered local authorities, who were responsible for decision-making related to the floods throughout the country, to open water gates to redirect flood water through canals in an effort to keep the capital dry. The local government refused (Branigan 2011; Daniel 2011). The conflict was amplified when the Yingluck Shinawatra government implemented the *Disaster Prevention and Mitigation Act of 2007* to give the central government sole authority to manage the floods without consulting local government (Maier-Knapp 2015; Marks and Lebel 2016). This one

authoritative voice (i.e., the central government) was unable to establish confidence; a lot of contradictory information in the public media appeared; and vague, confusing and contradictory information provided by the government made affected people confused about what they should do immediately (Branigan 2011), thus delaying effective response to the risk of the rising flood waters.

Ineffective Evacuation and Relief Programme

Besides political conflict, the evacuation programme during the big flood in Thailand was also a disaster. In mid-August, the government set up emergency operation centres at the national, provincial and district levels. During the political vacuum in early August 2011, the late King Bhumibol Adulyadej (Rama IX) (1927–2016) asked the Royal Thai Army (RTA) to do its best to help flood victims. During the flood disaster, Thailand's Commander-in-Chief General Prayuth Chan-ocha used the disaster situation as an opportunity to showcase the army's friendlier side by providing 50,000 troops and 1000 vehicles,[4] including hundreds of engineers from the Department of Army Engineers to help flood victims immediately (Maier-Knapp 2015). As the result, the Dusit Poll in 2011 indicated that 56.17 per cent of the Thai population was impressed by the Royal Thai Army as the most effective flood relief organisation (*Post Today* 2011).

The government and military could have done a better job if they had established mutual trust. The General's command of army mobilisation added more concerns and pressure to the newly elected Yingluck Shinawatra government. Although these military movements were conducted for disaster relief and mitigation in the time of disaster, Thailand's political history suggests that the populace is wary of Thailand's military actions (Maier-Knapp 2015).

In October 2011, Prime Minister Yingluck Shinawatra took direct command to heighten the urgency of flood-control efforts. She admitted that 'flooding has overwhelmed [the] government' (*The Guardian* 2011, p. 1) when Nonthaburi province, in the north of Bangkok, was inundated and roads became rivers. This was an obvious sign that the water would reach the capital sooner, as the mass of water made its way to the Gulf of Thailand. The government did not provide enough assistance to affected people. The governmental relief programme was ineffective to help rural people around Bangkok to cope with the floods. This left hundreds of people in the rice fields without shelter, food, drinking water and medicine (Bland 2011).

At its Rangsit campus, Thammasat University set up an evacuation site at the gymnasium which could accommodate more than 3600 people. Nevertheless, by mid-October, the evacuation centre had already reached its full capacity before the floods reached the Rangsit area resulting in the evacuation centre being overwhelmed (Laotharanarit 2011). The electricity was cut off, causing about 4000 people to be moved to Rajamangala Stadium in central Bangkok (Hancocks 2011). Moreover, by 2 October the headquarters of the government's flood relief operations and an evacuation centre for evacuees at Don Muang airport were also inundated (*BBC News* 2011).

By late October, the Yingluck Shinawatra government had still not ordered Bangkok residents to evacuate. An extended holiday between 27 and 31 October was announced to provide time for evacuation; however, the Chao Phraya River had already reached its peak. The government's lack of coordination and failure to call for international assistance caused national anger and frustration. International aid agencies, such as the Red Cross, had prepared relief supplies and financial support, but the government never called for help, afraid that it would lose face if it did so. Tens of thousands of people took the decision to flee from their homes to temporary shelters. The government waited until the last minute to order Bangkok residents to evacuate, as the water continued to flow into the inner city (McKinnon 2011). In this disaster, there was plenty of time for 'early warning and early action' to be implemented.

Social Learning and Socio-Political Transformation After the Flood

Normally when the country has been in crisis, the general public in Thai society has come up with a plenitude of 'how-to' campaigns from both the private and public sectors. The campaigns provide a wide range of general knowledge from waterproofing the home to health care during a flood. This advice includes precautions needed when cleaning accommodation and buildings after a long period of inundation. In contrast, the public's awareness, knowledge, education and understanding of the nature of the flood are overlooked.

Social Learning and Social Transformation

This major flood event has transformed some aspects of Thai society, especially in the sense of social learning. According to Pelling, social learning

'describes the capacity and processes through which new values, ideas and practices are disseminated, popularised and become dominant in society or a sub-set such as an organisation or local community'. Social learning is a property of social collectives. If transformative adaptation, as Pelling presents (p. 88), builds on alternative values and connects individuals to social learning from personal beliefs to culture, then social collectives and informative learning play important roles in social transformation.

In response to the flood crisis, social capital played a vital role in helping people to adapt and survive during the flood period. During the 2011 crisis, many Thais suffered financially and emotionally, especially the urban poor (Stanton-Geddes 2013; Ahsan 2013). More than 4 million households and 13 million people were affected. About 2300 houses were completely destroyed. More than 800 people died and at least 3 people were reported missing (Thai Water 2012). There were also many conflicts and protests over sandbags and watergates.

On the other hand, the residents who shared a collective identity in communities were willing to work together to organise support for affected residents to overcome flooding problems and for their recovery (Aldrich 2017). During the flood disaster, three main categories of affected people chose to stay in the flooded areas. The first category consisted of people who are adept at living with water. They generally live and survive in parts of Thailand that continue to face annual floods, such as the central provinces in Thailand, including Ayutthaya, Pathum Thani, Samut Prakan and Samut Sakhon provinces. The Sai Noi community, for example, were able to work together because of their shared identity as people migrating from the north of Thailand (Aldrich 2017). Some communities can efficiently cope with floods of up to two to three metres in height with simple safety measures in place. This is possible because they are able to rely on their bonding social capital (i.e., relations within the group), especially in their local communities, to gain basic assistance and financial support from their neighbours or from their relatives at a distance (bridging social capital).

The second group includes people who had the resources to fight off encroaching waters with strategy and capacity. These people were the middle-income group who monitored flood levels. For example, Muang Ake residents, located in the city of Pathum Thani province, helped each other throughout the two months of 2.5-metre-high flood crisis in 2011. Before the flood reached the village, they had the resources to build barriers, purchase and install small water pumps and sandbags to prevent the

flood coming into their protected areas and properties. In many instances, this particular group was well positioned to provide neighbourhood logistical support to others. They delivered food and drinking water and provided medical services to fellow residents (Aldrich 2017).

The final category was people who decided against moving into evacuation centres because of various social and economic reasons, but at the same time lacked the resources either to move away or be self-sufficient at home. This group largely relied on assistance and support for their overall well-being and meeting of basic needs during the emergency (Sophonpanich 2012). In some urban poor communities, local villagers produced their own sandbags, borrowed portable water pumps from nearby villages and assisted their neighbours to move household items to higher ground or through the distribution of relief goods and food (Benfield 2012; Aldrich 2017). In this case, some affected people who decided not to evacuate their homes joined together as community patrol units in their neighbourhoods for those who decided to relocate, and as distributors of assistance to those less able to cope with the flood while remaining at home (Sophonpanich 2012; Aldrich 2017).

Paton has shown that the characteristics of collectivistic cultures that promote group harmony and cohesion, prioritise group goals over personal ones and define people by the groups to which they belong become significant factors that influence the capacity of Thai residents to confront future hazard consequences. These characteristics are very important in fostering recovery from a disaster and in producing new policies which promote social and political transformation after a crisis. While individualism is rampant in modern Thai society, traditional Thai collectivistic culture played an important role in helping people to adapt and survive during the flood period. During the 2011 crisis, urban and rural communities joined together to organise support for affected communities.

Thai local residents could expect very little from the government. Hence, they found self-reliance better in providing assistance to each other, especially in the immediate relief phase. Affected villagers in the remote areas in several provinces, including Nakhon Sawan, worked together on small infrastructure projects and housing repairs. With technical assistance and financial support from the Community Organization Development Institute (CODI), poor urban villagers worked together when 'they realised that something more permanent was needed to strengthen the resilience of communities [for] the future disasters' (World

Bank 2015). Villagers carried out construction works by themselves. These development projects included 'paving roads, building or upgrading drainage ditches, and installing a proper water pump station'; they were expected to 'help build a better disaster risk management system for their communities' (World Bank 2015, p. 1).

> We have full cooperation like never before because people saw concrete outputs like new roads built with their own hands … From 20-30 villagers helping, we now have more than 100. We know that it benefits everyone. (Mr. Sakol Bamrungit cited in World Bank 2015, p. 1)

Some communities have become more aware of the need for an effective early warning system. For example, in 2011 some of Muang Ake residents took the initiative and decided to flee from their homes without waiting for official early warning. As they learned from this past experience, they established Muang Ake Rescue Centre in Muang Ake village after the village became dry. Today its 3357 Facebook group members receive real-time report of an incident in the community, and their early warning system is always active (Fig. 14.1).

Fig. 14.1 Muang Ake Rescue Centre. (Source: Ladawan Khaikham, 25 October 2017)

In both rural and urban communities, social capital can be observed in the way that local people 'overcome barriers [by] collective action before the floods and to mitigate the coming disaster' (Aldrich 2017, p. 358). In general, the flooding brought communities together in terms of providing assistance during the immediate relief phase, because the government could not provide enough support. Both in rural and urban communities, collaborative behaviour underpinned social capital. It can be observed in the way that people helped their neighbours to move household items to higher ground or through the distribution of relief goods and food (Benfield 2012). Although the social fabric was found to be more fragile in urban areas, because of a limited number of community associations and infrequent interactions between communities and local leaders, urban low-income groups were able to rely on local and community leaders to access support (Benfield 2012).

Online Social Media as Social Transformation

During the 2011 floods in Thailand, people could not rely solely on central and local governments. This event saw the emergence of new technology such as online social networks that helped to circulate information about the flood, education and humanitarian volunteers. In the modern world, 'digital technologies such as computers, mobile phones, and internet … have become an integral part of operations for disaster preparedness, mitigation, response, and recovery' (IFRCRCS 2013, p. 195). Individuals who have access to these technologies increasingly use online resources when natural disasters occur. In many cases, social media can provide regular updated information regarding on-going flooding status, unmet needs and volunteer opportunities faster than traditional media or government sources (Allaire 2016). The use of social media platforms has become overwhelming as the online contents are publicly accessible via the internet.

During the severe flooding, the use of social media such as mobile-phone texting, Facebook and Twitter increased from 19.5 per cent to 25.1 per cent in metropolitan Bangkok and 18.8 per cent to 24.3 per cent in the other provinces (Perry 2011). University lecturers and students from various institutions set up Facebook pages to provide safety information during the flood crisis (Winijkulchai 2012). Twitter has shown its potential to be an effective tool for Thai citizens to obtain and disseminate up-to-the-minute information. With its real-time-enabled platform, Twitter

allowed traditional journalists as well as citizen reporters to report the situation instantly. From September to October 2011, the number of Twitter messages increased by 52 per cent. The number of messages continued to grow. In November 2011 when the water covered 10,196 square kilometres, hashtags for flood information such as #thaiflood, both in Thai and English, were the most frequent hashtags in Thailand (Perry 2011; Kongthon et al. 2012; Liew et al. 2016).

Besides Twitter, online websites played an important role in flood education and provided updated flood information. Websites such as www.thaiflood.com together with its Facebook page and mobile crowdsourcing applications attempted to fill the flood information management gap (ThaiFlood 2017). In addition, to cut through the confusion and calm down a worried public, RooSuFlood was created by a group of young animators who got together. Its series of informative videos were uploaded to the YouTube website. RooSuFlood's videos were designed for education while keeping the audience entertained (Schearf 2011). The content was easy to understand for both children and adult viewers to help them make informed decisions. The mapping service from RooTanNam also provided information on the approaching flood and its likely effect on individual homes (*The Nation* 2011a). With this expanding and diverse range of actors, coherent coordination and consistent information management were often identified as the greatest challenges (Fig. 14.2).

Although online social media has shown its effectiveness, there were some difficulties that online users had to be aware of. Communities and households with little or no access to the internet were less likely to receive assistance and support in a timely manner. On the other hand, outdated, false and inaccurate information could be reported and circulated without users' accountability. This could complicate situational awareness of a crisis and hence slow down relief efforts (Kongthon et al. 2012).

These campaigns were starting points for the country to pay more attention to disaster education and early preparedness. Although there was no single social media platform for the future disaster, people had an idea where to look for the most updated flood news. For example, Facebook page, Twitter and the mobile application of JS100 Radio became useful during the major disaster. JS100 Radio was firstly designed to receive telephone reports of real-time traffic from local residents who needed road assistance around Bangkok, whilst its online platform provided live streams of traffic events and related information newsfeed and important incidents. Its Facebook page has more than 800,000 followers. Its mobile

Fig. 14.2 'Roo Su Flood Ep1: Know more about Flood' Short Video Clip. (Source: RooSuFlood 2011)

application was downloaded 100,000 times and more than 2.62 million names follow its Twitter account (@js100). This mobile application was intended to 'bring [the users] the complete coverage of safety travelling [around] Bangkok' (GlobeTech 2017). Followers would get the latest news and plan their events according to the real-time traffic information and incidents, including but not limited to road accidents, via radio and mobile application. Its features are important and accessible by everyone when a disaster occurs (Fig. 14.3).

The massive floods also affected approximately 3.8 million children. Therefore, in terms of education, child-centred disaster preparedness in Thailand has come into the lexicon. The storybook entitled 'Alert Little Mole' was produced and distributed to 30 schools in Ayutthaya, Chai Nat, Kanchanaburi, Pathum Thani and Samut Sakhon provinces. This storybook was designed by USAID and Save the Children (SC). It aimed to educate Thai primary school students and their communities about simple ways to prepare for and respond to disaster situations. With this

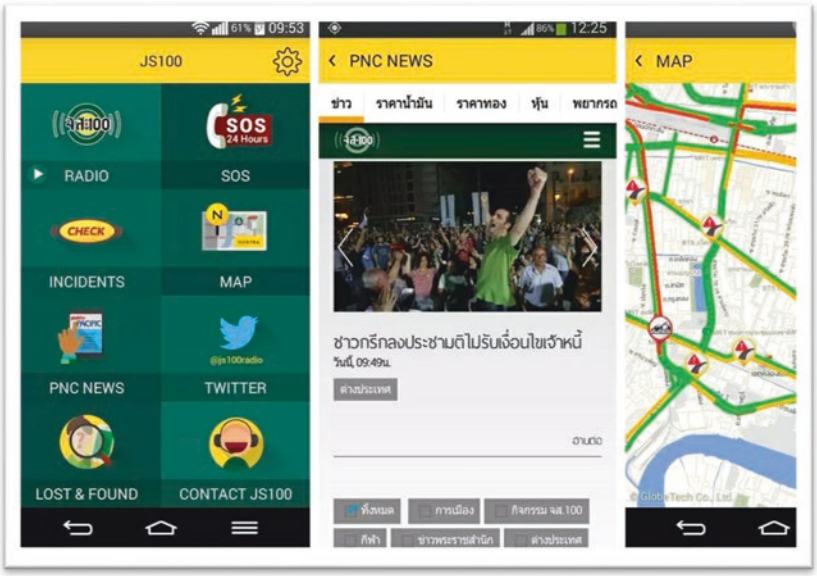

Fig. 14.3 The features of JS100 mobile application (Source: GlobeTech 2017)

educational tool, students not only learn how to prepare for a disaster but also become motivated to educate others and share the storybook with their families.[5] Although this campaign was initiated by INGOs, this transformation has been a starting point for the country to pay more attention to disaster education and early preparedness for a future disaster.

Political Transformation After the Severe Flood

In Thai politics, policy and political attention focus only on flood and disaster management in emergencies and the immediate aftermath of serious events including flash floods and more predictable seasonal flooding. Focusing attention on addressing immediate problems enables politicians to make simplistic promises without long-term plans to permanently solve the problem. New budget becomes available for rehabilitation and recovery in the short term, while effective longer-term planning is absent (Lebel, Manuta and Garden 2011, p. 54).

In the short term, the Thai government initiated a four-phase relief and recovery plan and package for immediate response, flood assistance and post-crisis rehabilitation. Yingluck Shinawatra's government was caught unprepared for the 2011 floods; the government faced a lawsuit by a civil society organisation (CSO), the Stop Global Warming Association (SGWA), with 45 village representatives since July 2012 for flood mismanagement (Maier-Knapp 2015). The legal issues were settled with the Administrative Court's dismissal of the cases in 2014 (*Thairath Online* 2014).

There has been little transformation in Thailand's political culture. Effective longer-term planning for future disaster is still absent due to political conflict and instability. The Yingluck Shinawatra government attempted to initiate the process for renewal of its national contingency planning for natural disaster including the establishment of a *flood protection scheme* and a single command centre to manage the early warning system (Sophonpanich 2012; World Bank 2012; Sarnsamak 2013). However, political deadlock made these policies related to disaster difficult to maintain. All these projects were suspended when Thailand's coloured political division led to the military coup on 22 May 2014.

This coup was seen as an attempt to break the political deadlock resulting from a massive political demonstration that had shut down most of the government's offices in Bangkok since the end of 2013. Coup leader, General Prayuth Chan-ocha, promised to solve the political deadlock, restore peace and order and 'return happiness to the people'. After more than three years in power, the military has been paying more attention to solving the drought problem in agricultural areas during the dry season (*Prachachat Online* 2015a). Sustainable flood prevention programmes have been discontinued. As Marks and Thomalla (2017, p. 1147) pointed out 'the government [had] only made minor efforts to reduce flood risk [which] focused on building floodwalls to reduce risk to large-scale enterprises [and] redistribute risk to unprotected areas'. Bangkok and the southern part of Thailand still experience small temporary floods in the rainy season (*Prachachat Online* 2015b).

In August 2017, Prime Minister Chan-ocha was preparing to use the special powers under Article 44[6] to improve water management by establishing the National Office of Water Resources under the Office of the Prime Minister to make coordination between water management agencies possible and productive. The five main water problems that the gov-

ernment had to solve were consumption, agriculture and industry, ecosystems, flood relief and drought relief (*The Nation* 2017). Although this policy was initiated by the Yingluck Shinawatra government, it has never been implemented successfully. In the month of the royal cremation ceremony for His Majesty King Bhumibol Adulyadej, a flash flood on the night of 13 October 2017 reminded the government that an early warning system is still lacking. Affected people in Bangkok received no warning at all, as the night before the Thai Meteorological Department underestimated the storm which hit Thailand, and thought it was just a passing monsoon (Thai Meteorological Department 2017; *Khaosod* 2017; *BBC Thai* 2017). This flood, caused by the heavy rain and the drainage blockage,[7] damaged more than 3155 cars and costed more than THB45 million (USD 1.355 million) within one night (*Thai PBS* 2017).

Thai people have become more aware of the need for an effective early warning system. The Yingluck Shinawatra government attempted to initiate the process for renewal of its national contingency planning for natural disaster including the establishment of a *flood protection scheme* and a single command centre to manage the early warning system (Sophonpanich 2012; World Bank 2012; Sarnsamak 2013). A THB350 billion (USD 10.50 billion) budget was allocated for water resource management and disaster education. However, all the projects of the Yingluck Shinawatra government were suspended due to the political movement in 2013 and the military coup in 2014.

Ironically, BMA does not have any strategy to deal with drainage capacity and the sinking land. This slow and silent problem is difficult for people to realise (Promchertchoo 2017). Land use policy has remained the same or worse (Marks and Thomalla 2017). A new 315-metre high building entitled 'MahaNakhon' was built in 2016; it became Thailand's tallest building. In addition, in June 2017 the military government approved a plan to build a THB4.6-billion (USD 138 million) observation tower on land belonging to the Treasury Department located near the Chao Phraya River in Khlong San district (*Naewna* 2017; *Bangkok Post* 2017). These constructions will create drainage blockage and add more weight to accelerate the sinking land problem.

The Role of the Military in and After the Flood Disaster

During the political vacuum in early August 2011, the Late King Bhumibol Adulyadej (Rama IX) asked the Royal Thai Army (RTA) to do its best to

help flood victims. In a country deeply divided over the military's role in civilian life, Thailand's military, as an armed bureaucracy, was seen as a tool of Thai political elites to perform political interventions to protect their privileges and interests, as well as to maintain their position in the political arena (Farrelly 2013; Maier-Knapp 2015). Therefore, Thai people see the military as the main character who conducts coups d'état and kills civilians.

During the flood disaster, Thailand's Commander-in-Chief General Prayuth Chan-ocha used the disaster situation as an opportunity to showcase the army's friendlier side by providing 50,000 troops and 1000 vehicles, including hundreds of engineers from the Department of Army Engineers to help flood victims immediately (Maier-Knapp 2015). In addition, the Navy provided 2510 barges, ten cargo ships and a number of other boats including 'eight medical units, eight counselling teams and three aircraft assigned to fly relief-related flights' to help flood victims (*The Nation* 2011b). As a result, the Dusit Poll in 2011 indicated that 56.17 per cent of Thai population was impressed by the Royal Thai Army as the most effective flood relief organisation (*Post Today* 2011).

However, the government and military could have done a better job, if they had established mutual trust. The General's command of army mobilisation added more concerns and pressure to the newly elected Yingluck Shinawatra government. Although these military movements were conducted for disaster relief and mitigation in the time of disaster, Thailand's political history suggests that the populace is wary of Thailand's military actions (Maier-Knapp 2015).

The Dusit Poll in 2011 indicated that 58.59 per cent of Thai population believed that the political conflict remained. Two years after the flood, Thailand's coloured political division led to the military coup on 22 May 2014. This coup was seen as an attempt to break the political deadlock resulting from a massive political demonstration that had shut down most of the government's offices in Bangkok since the end of 2013. The coup leader, General Prayuth Chan-ocha, promised to solve the political deadlock, restore peace and order and 'return happiness to the people'. After three years in power, the military has been paying more attention to solving the drought problem in agricultural areas during the dry season (*Prachachat Online* 2015a). Sustainable flood prevention programmes have been discontinued, whilst Bangkok and the southern part of Thailand still experience small temporary floods in the rainy season (*Prachachat Online* 2015b).

Conclusion

Mark Pelling's framework on adaptation as transformation concentrates on forward-looking adaptation. His idea, developed from the idea of the social contract, requires a strong sovereign state that shows responsibility towards its citizens in a time of crisis. Moreover, transformative adaptation focuses on actions that lead to established rights systems and emphasise the obligation of new regimes. Social learning and social capital are important elements to help society to transform in the right direction. Thailand's 2011 flood disaster showed the flaws in the social contract, the deep chasms between the elite political classes in Bangkok and the citizens outside the protected areas. Adaptation and transformation came from within those excluded groups, rather than from within the political elite, despite some minor attempts at the margins to show responsibility for the crisis.

Thailand's major flood in 2011 was the result of demographic growth and unplanned urbanisation which contributed to flood risk. Importantly, the political conflict turned normal events into potential disasters and resulted in inefficiency in crisis management. This event transformed Thai society in some social aspects but not political ones. Transformative adaptation can be observed as Thai local villagers rely deeply on social capital in their local communities to adapt to the flood. When information from the government was less reliable, informative learning via new technology driven by private sectors such as online social media helped circulate flood knowledge, education, information and the presence of humanitarian volunteers. For the future disaster, local Thais know where to look for news updates, whilst local infrastructures were repaired and ready for short-term floods. In contrast, the Thai government did not learn much as the political transformation did not occur constructively. In October 2017 inundated areas increased nationwide, whilst the government was overwhelmed with the preparations for the royal cremation ceremony for His Majesty King Bhumibol Adulyadej (*Reuters* 2017) and underestimated the impact of the monsoon season (Thai Meteorological Department 2017; *Khaosod* 2017).

Notes

1. Thailand's annual rainfall in 2011 was the highest (about 24 per cent above average) in the 61-year (1951–2011) record. Between January and October 2011, the average rainfall was 1781 mm. This was the highest on

record, and was 35 per cent higher than the 50-year average (Poaponsakorn et al. 2015).

2. In 2011, five tropical monsoons (Haima in June, Nock-Ten in July, Haitang in September, Nesat and Nelgae in September to October) had some effects on Thailand's rainfall. Only Nock-Ten hit Thailand on 31 July 2011.
3. For example, the Royal Irrigation Department (RID) is under the Ministry of Agriculture and Cooperatives, the Department of Disaster Prevention and Mitigation is under the Ministry of Interior and the Department of Water Resources (DWR) is under the Ministry of Environment and National Resources (Netherlands Embassy in Bangkok 2016).
4. In addition, the Navy provided 2510 barges, ten cargo ships, and a number of other boats including 'eight medical units, eight counselling teams and three aircraft assigned to fly relief-related flights' to help flood victims (*The Nation* 2011a).
5. This storybook was also translated into Burmese and Karen to educate communities in the areas along the Thailand and Myanmar border.
6. This article of Thailand's interim constitution allows Prime Minister to have 'absolute power to give any order deemed necessary to "strengthen public unity and harmony" or to prevent any act that undermines public peace' (*The Straits Times* 2015).
7. It was estimated that the average rainfall was 40 mm/hour which was not considered extremely heavy. The flood occurred because of the drainage blockage (*BBC Thai* 2017).

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CHAPTER 15

The Impact of Floods on the Socio-Economic Activities of Yangon

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Introduction

Floods in urban areas can be caused by flash floods, coastal floods or river floods, but there is also a specific flood type that is called urban flooding. High-intensity rainfall can cause flooding when the sewage and drainage systems do not have sufficient capacity to drain away the amounts of rain that are falling.

Adebayo (1987) recognized four major mechanisms that increase the flooding potential of urban catchments. The first is increasing the percentage of impervious surfaces which prevent water filtering into the ground and increase in the total volume of runoff. Second, paving, straightening or otherwise improving stream channels reduces the time lag between rainfall and channel runoff. Third, landscaping and subdivision of land into building sites shorten the distance over which the water flows before reaching a drainage way and hence reduces the time lag between rainfall

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and channel runoff. Last, filling in and human settlement on floodplains reduce the space available for storing flood waters.

The impact of floods can affect urban areas in different ways. Much depends on the type of flood because urban areas are typically associated with economic growth and development; local, regional and even global supply chains can be disrupted, if businesses are not allowed to function normally as a result of the urban flood. Infrastructure used in cities is often highly concentrated; an urban flood affects roads, public transport services, electricity, telecommunication and water/sanitation. Floods can greatly reduce the ability of a city to return to its normal functions for weeks.

Aim and Objectives of the Study

The aim of this study is to examine the causes and effects of flooding on the environment and socio-economic activities of the people of Yangon city. The specific objectives of this study are as follows:

- to examine the causes and effects of flooding on Yangon city
- to discuss the drainage as well as sewage system and solid waste disposal in Yangon
- to explore the impact of flood on socio-economic activities of Yangon residents
- to highlight measures to improve health and living conditions of the residents
- to improve the economic functioning of the city

Study Area

Yangon city's population is 5.14 million at present and is expected to reach above 10 million in 2040 as a result of urbanization and industrialization; it is forecast to become a megacity in the future (Yangon Region Government, YCDC & JICA 2013). Heavy monsoon rains since the beginning of May 2017 caused flooding in Yangon city, and residents suffered the effect of urban flooding.

One hundred respondents from urban areas were interviewed to study the causes and effects of urban floods. Latha and Tamwe townships were chosen to survey the relationship of flooding to the drainage system, sewage system and solid waste disposal and to investigate the impact of floods on socio-economic activities of Yangon, because these two townships were

heavily populated areas with many business interests including vendors and shops. Economic development is almost always accompanied by urbanization as development both pushes workers out of rural areas and pulls them to the cities, thus increasing pressure on water, sewage supply, resources and transport services.

Urbanization

To cater to increasing population and economic activity, successive governments since independence in 1948 have built satellite towns in the Yangon region such as Thaketa, North Okkalapa and South Okkalapa in the 1950s, Hlaingthaya, Shwepyitha and South Dagon in the 1980s. Yangon city now has an area of 794.4 square kilometers across 33 townships, making it one of the largest spatial extents in South East Asia (Morley 2013). At the confluence of the Yangon and Bago Rivers, Yangon city is surrounded by rivers. Lying northeast of the Ayeyarwady Delta to which Yangon River has been connected by Twante Canal (Seekins 2014), the city's rivers and creeks experience tidal and saline water intrusion within and beyond the limits of the city (Nakagami et al. 2009).

Being Myanmar's commercial capital and political capital (until 2005, ASH Center 2012), Yangon is the logical destination for migration from rural areas, pushed by the effects of climate change on rural agriculture productivity and the pull factors of seeking better economic opportunities in a large urban area. As a result, the area of Yangon city has extended as the population has increased (Tables 15.1, 15.2 and 15.3).

Urban Water Supply

In the Yangon city urban area, water supply comes from reservoirs (80%) and groundwater (20%). The city water supply is treated before delivered to the clients. People using their own tube wells regularly also use water filtration systems. Yangon cannot meet the demand for urban water supply

Table 15.1 Extension of city's area

1907	72.52 square kilometers (28.00 sq. mi)
1941	86.2 square kilometers (33.3 sq. mi)
1974	208.51 square kilometers (80.51 sq. mi)
1985	346.13 square kilometers (133.64 sq. mi)
2008	598.75 square kilometers (231.18 sq. mi)

Table 15.2 Thirty-three townships of Yangon city

Western district (downtown)	*Eastern district*	*Southern district*	*Northern district*
Ahlon	Botataung	Mingala Taungnyunt	Insein
Bahan	Dagon Seikkan	Dala	Hlaing
Dagon	East Dagon	Dawbon	Hlaingthaya
Kyauktada	North Dagon	Seikkyi Kanaungto	Kamayut
Kyimyindaing	North Okkalapa	Tamwe	Mingaladon
Lanmadaw	Pazundaung	Thaketa	Shwepyitha
Latha	South Dagon	Yankin	Mayangon
Pabedan	South Okkalapa		
Sanchaung	Thingangyun		
Seikkan			

Table 15.3 Increased population

Year	*Population*	*Increased %*
1950	1,302,000	160.4%
1960	1,592,000	22.3%
1970	1,946,000	22.2%
1980	2,378,000	22.2%
1990	2,907,000	22.2%
2000	3,553,000	22.2%
2010	4,348,000	22.4%
2020	5,361,000	23.3%

due to a lack of maintenance in the system and the urban expansion. Not only Yangon but also many other Myanmar cities need standards for service pipe connections, water meter, storage tank installation and groundwater extraction (Figs. 15.1, 15.2, 15.3 and 15.4).

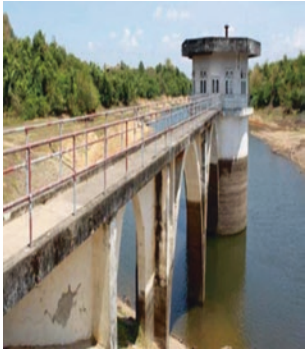
Sanitation and Sewage

Sanitation and sewage for the Yangon city area is the main responsibility of the Engineering Department (Water and Sanitation) under Yangon City Development Committee. The existing conventional sewage system consists of Gravity sewers, 39 pneumatic ejector stations, air distribution main, two sewage force mains and outlet. At present existing sewage system covers only 4.33 square kilometers area of the CBD and serves around 350,000 people, 7% of the city population. Daily volume of sewage disposal is 111,840 gal. (508 m^3). This means that most of the city is not served.

Hlawgha Reservoir
Catchment Area -10.5 sq miles
Water Surface area -4.4sq miles
Effective Capacity - 48x106 m^3
Total Capacity - 54x106 m^3
High Water Level - 62ft
Low Water Level - 47ft

Gyobyu Reservoir
Catchment Area -12.7 sq miles
Water Surface area -2.8sq miles
Effective Capacity - 38x106 m^3
Total Capacity - 75x106 m^3
High Water Level - 215ft
Low Water Level - 138ft

Phugyi Reservoir
Catchment Area -27.27 sq miles
Water Surface area -6.8sq miles
Effective Capacity - 90x106 m^3
Total Capacity - 104x106 m^3
High Water Level - 119ft
Low Water Level - 90ft



Ngamoeyeik Reservoir
Catchment Area -160 sq miles
Water Surface area -17.19sq miles
Effective Capacity - 207x106 m^3
Total Capacity - 222x106 m^3
High Water Level - 107ft
Low Water Level - 81ft

Fig. 15.1 Data for four main reservoirs

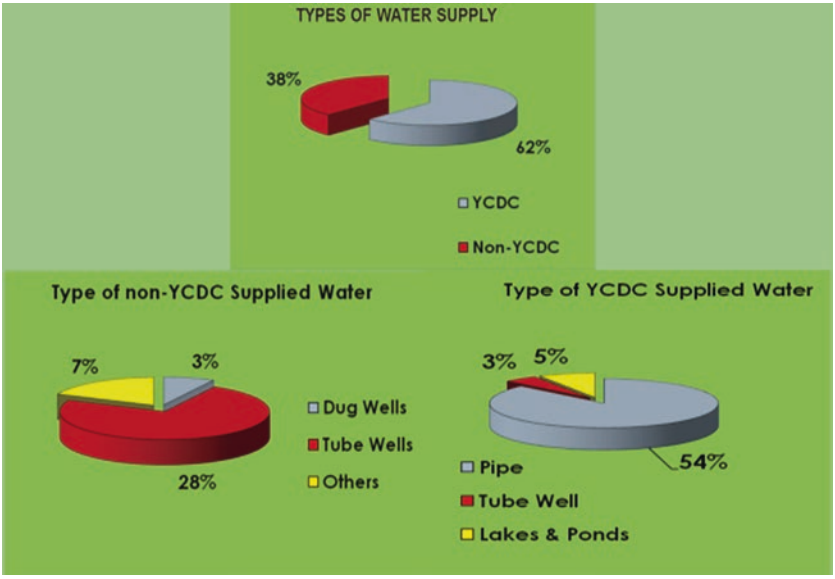


Fig. 15.2 Types of water supply

Fig. 15.3 Sewage system downtown Yangon

Fig. 15.4 Creeks in Yangon city

Solid Waste Management

In Myanmar, solid waste management is the responsibility of the local authorities. Systems are weak and management of solid waste hardly exists, hence polluting the living environment. Dump sites hardly exist, so much of the solid waste ends in open rivers and gullies, thereby hindering water

management and filling the drainage channels. Solid waste collections in Yangon city are

- bell ringing system (in this system, collection vehicles pass through streets with bell ringing sound so that people can come out to dispose garbage)
- collection at street dumps, and
- limited collection of market wastes and other wastes

Methodology

A questionnaire survey with 100 habitants of Yangon, in-depth interviews with Ward Administrators (Latha Township, Tarmwe Township) and Township Administrators (Tamwe Township, Yangon City Development Committee) and Focus Group Discussions were used to obtain information on socio-economic connections and perception analysis of urban flooding in Yangon city. Data for this research were collected through the use of questionnaires with respondents within the study area to obtain the necessary data for this research. The data collected for this study were analyzed using the simple percentage statistical method to analyze the flooding problems which affect the socio-economic activities of the people of Yangon city. This study could be the basis for further research.

Results and Discussion

From the survey, Table (15.4) shows the demographic and economic characteristics of the study area in Yangon city. Altogether, 100 respondents from the urban region were interviewed, 63% were female and 37% were male. Maximum age of the interviewed respondents was 58 years and minimum age was 16 years. They are a mixture of graduates, self-employed persons and students. The average of the total household income per month was about 651,442.3 kyats. One half of the respondents have stayed in their place for ten years while others have lived in these places for about two to five years.

Table (15.5) reveals the experiences of floods. Some 91 respondents responded to the questions on flood experiences. According to Table (15.6), 67 respondents answered the frequency of flood experiences: 31.3% suffered once, 19.4% suffered twice, 6% suffered three times and 43.3% encountered the urban flooding very often. Among these, 49% of the respondents answered that the urban flooding disturbed their daily activities (Table 15.7; Figs. 15.5, 15.6 and 15.7).

Table 15.4 Demographic and economic characteristics

Variables	*N*	*Minimum*	*Maximum*	*Mean*	*SD*
Age	74	16	58	24.78	9.804
Family monthly income	52	100,000	5,000,000	651,442.3	814,368.7
Family monthly expenditure	51	80,000	2,500,000	430,000	400,844.1
Family members	78	1	10	4.53	1.807

Table 15.5 Experiences of flood

	N	*%*
Yes	67	74
No	24	26
Total	91	100

Table 15.6 Frequency of flood experiences

Response categories	*N*	*%*
One time	21	31.3
Two times	13	19.4
Three times	4	6
Very often	29	43.3

Table 15.7 Effect of floods on daily activities

	N	*%*
Yes	33	49
No	34	51
Total	67	100

Yangon region in the tropical monsoon climate region has three seasons: summer (March to May), rainy season (June to October) and cool season (November to February). In Yangon region, the average monthly rainfall is high, around 600 mm in the months of the rainy season, however, that becomes nearly zero in the period from November to April. There are three meteorological stations in Yangon region such as Kaba Aye, Mingalardon and Hmawbi. Kaba Aye station is located in the city and the other two stations are located near the water supply reservoirs of Yangon city. According to Tables (15.8) and (15.9), high-intensity rainfall

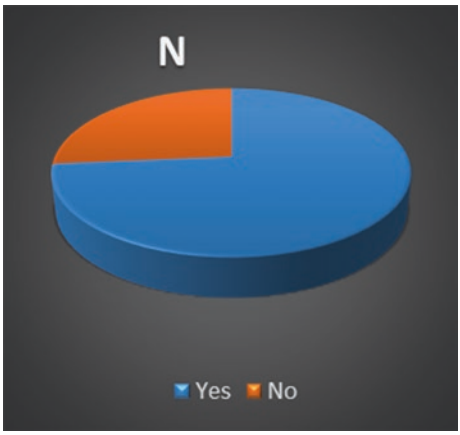


Fig. 15.5 Experiences of flood

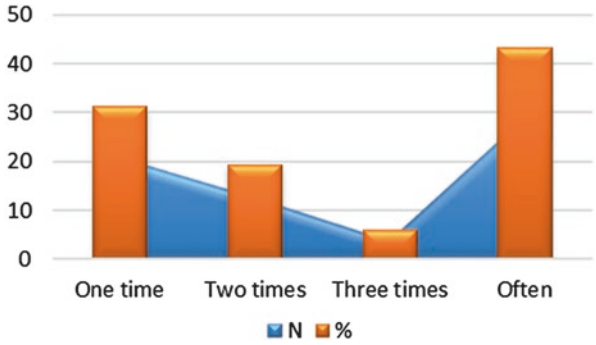


Fig. 15.6 Frequency of experiences of flood

Fig. 15.7 Effect of flood on daily activities

Table 15.8 Rainfall in 2015

Day	*Jan*	*Feb*	*Mar*	*April*	*May*	*June*	*July*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*
1	0	0	0	0	0	7	2	12	0	0	0	0
2	0	0	0	0	0	0	Trace	29	6	23	0	0
3	0	0	0	0	0	10	26	35	1	6	Trace	0
4	0	0	0	0	0	21	7	5	2	24	Trace	0
5	0	0	0	0	0	20	36	0	16	5	0	0
6	0	0	0	0	0	1	4	0	56	63	0	0
7	0	0	0	0	0	5	56	Trace	Trace	28	0	0
8	0	0	0	0	0	0	10	2	7	19	0	0
9	Trace	0	0	0	0	10	16	0	3	21	8	0
10	0	0	0	0	0	20	0	Trace	16	12	56	0
11	0	0	0	0	0	5	Trace	28	0	6	5	0
12	0	0	0	0	0	26	8	Trace	21	7	0	0
13	0	0	0	0	0	0	0	27	16	2	0	0
14	0	0	0	0	0	15	0	19	4	21	0	0
15	0	0	0	0	0	19	3	5	17	0	0	0
16	0	0	0	0	0	23	1	49	5	0	0	0
17	0	0	0	0	0	1	37	5	40	13	0	0
18	0	0	0	0	0	Trace	34	27	22	0	0	0
19	0	0	0	0	22	Trace	9	5	86	0	0	0
20	0	0	0	0	5	35	29	1	Trace	96	0	0
21	Trace	0	0	0	1	31	36	2	0	1	0	0
22	0	0	0	0	52	34	19	5	0	0	0	0
23	0	0	0	0	15	65	8	27	0	0	0	0
24	0	0	0	29	23	16	25	32	0	0	0	0
25	0	0	3	6	0	51	59	2	1	0	0	0
26	0	0	0	0	2	48	42	18	0	8	0	0
27	0	0	0	5	Trace	34	24	10	Trace	0	0	0
28	0	0	6	Trace	0	35	62	7	10	0	0	0
29	0		0	Trace	15	0	69	Trace	Trace	0	0	0
30	0		0	0	28	48	53	13	0	0	0	0
31	0		0		22		17	43		0		0

occurred from June to October which left several parts of Yangon heavily flooded (Figs. 15.8 and 15.9).

The Effect of Urban Flooding on Socio-Economic Activities

Most of the respondents think that solid waste disposal is the main cause of the urban flooding in Yangon city. Some of the respondents answered that people have to take responsibility for the proper management of solid

Table 15.9 Rainfall in 2016

Day	*Jan*	*Feb*	*Mar*	*April*	*May*	*June*	*July*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*
1	0	0	0	0	0	6	0	13	66	0	0	0
2	0	0	0	0	0	Trace	33	0	22	0	0	0
3	0	0	0	0	Trace	1	20	8	5	10	0	0
4	0	0	0	0	0	1	14	6	7	0	0	0
5	0	0	0	0	0	Trace	1	28	44	0	0	0
6	0	0	0	0	0	2	16	4	29	4	0	0
7	0	0	0	0	0	3	48	43	35	Trace	Trace	0
8	0	0	0	0	0	13	46	65	3	Trace	Trace	0
9	0	0	0	0	0	53	60	39	0	9	Trace	0
10	0	0	0	0	0	26	48	1	0	Trace	0	0
11	0	0	0	0	0	5	30	15	47	54	1	0
12	0	0	0	0	0	84	5	29	4	13	0	0
13	0	0	0	0	0	9	10	9	Trace	0	0	0
14	0	0	0	0	0	10	1	5	5	0	0	0
15	0	0	0	0	0	6	41	28	92	0	0	0
16	0	0	0	0	0	12	50	21	4	29	0	0
17	0	0	0	0	0	10	Trace	3	0	Trace	0	0
18	0	0	0	0	0	13	1	3	0	3	0	0
19	0	0	0	0	0	1	0	23	2	0	0	0
20	0	0	0	0	12	Trace	5	0	8	Trace	0	0
21	0	0	0	0	24	7	18	6	2	0	0	0
22	0	0	0	0	71	0	Trace	31	3	3	0	0
23	0	0	0	0	5	0	49	0	7	8	0	0
24	0	0	0	0	75	1	Trace	Trace	3	23	0	0
25	0	0	0	0	39	38	Trace	0	9	2	0	0
26	23	0	0	0	0	50	17	60	9	11	0	0
27	Trace	0	0	0	21	16	Trace	0	68	12	0	0
28	0	0	0	0	23	8	2	15	4	8	0	0
29	0		0	0	Trace	11	59	10	45	1	0	0
30	0		0	0	0	0	24	35	20	37	0	0
31	0		0		18		20	26		0		

waste in their township as they had already paid the tax. Half of the respondents thought the current situation which YCDC provided was better than the previous year, but others said that there was not much difference in the solid waste management (Table 15.10).

Most of the respondents use the treated water from private companies for drinking water, because the groundwater is polluted due to unplanned solid waste dumping and the sewage leaking from it. Most of the respondents said that the floods have also caused frequent electricity cuts, which leave traffic lights unpowered. This has caused hours-long traffic jams

Fig. 15.8 Flooding in Yangon city (2015)

Fig. 15.9 Flooding in Yangon city (2016)

Table 15.10 Causes of floods in Yangon

Causes	*N*	*%*
Throwing rubbish into ditch and blocked water current by rubbish	32	78
Near river and river flood due to rainfall	3	7
Lower land/not plain land	5	12
Deforestation	1	2

Fig. 15.10 Illegal disposal of refuse

across downtown Yangon. Some of the Yangon residents have blamed the floods on the ineffective drainage system of the city, which remains poor despite the government's efforts in the past few years to regulate water flow and reduce overflowing within the city. They had to take great care when walking because the currents were strong. Tamwe residents said that floods occur in Tamwe whenever it rains and water reaches mid-thigh in some streets near the Tamwe mosque.

Some of the respondents said that they suffered health problems such as irritations and flu during urban flooding. Shop and business owners also complained about the flooding that the situations were more than a minor inconvenience. Some roadside stalls have had to close altogether (Fig. 15.10).

The administrator from Tamwe Township, Yangon City Development Committee, said that the YCDC's financial resources are inadequate to cope with its infrastructure responsibilities. This is a major problem. Other administrators said that further systematic water drainage systems are needed to tackle flooding more effectively.

The YCDC provides water, sewage, drainage, street lighting and some of the transportation infrastructure in the city. It apparently relies primarily on revenues from license fees collected from businesses and households; these fees are apparently based on the size of the business or housing unit and thus function much like a property tax. But the tax rates must be low because the YCDC's annual budget for infrastructure is reportedly only 55 billion kyat or about 10,000 kyat (US$ 12) per person. Clearly, the taxes, user charges and other financial resources available to the city must be increased considerably if the infrastructure backlog is to be addressed. At present, the YCDC carries out the Cleaning Activities of Yangon city such as

Fig. 15.11 The performance of YCDC to clean the city

Fig. 15.12 Water distribution system and sewage system in Latha Township

- Providing initial trash removal programs—Lamandaw, Latha, Kyauktada, Pabaedan, Botahtaung and Pazuntaung as first priority (August 15 to September 4, 2016)
- Providing cleaning activities township by township and garbage trucks to be used for the peoples' own cleaning activities by the Pollution Control and Cleansing Department (PCCD) (Figs. 15.11 and 15.12)

Conclusion

This survey provides a situational analysis of the impact of flood for further research. From the study, the solid waste disposal was one of the main problems causing the urban floods in Yangon city. Effective planning and improved governance require high-quality information to raise awareness among urban residents to promote behavior change. Public participation is needed to promote recycling, reuse and reduce as 3Rs. There is also a need for the construction of more drainage channels and rehabilitation of the old drainage system within the study area.

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CHAPTER 16

State of Forest Governance in Vietnam: Where Are the Local Communities?

Mucahid Mustafa Bayrak

Introduction

The Socialist Republic of Vietnam has been rated by the World Bank as a lower-middle-income economy. The country has been opening up its economy since the *Doi Moi*, or opening up, reforms in 1986. These reforms transformed Vietnam's economy into a socialist market economy. The *Doi Moi* reforms triggered fast economic growth in the Socialist Republic. According to a report of the World Bank (2014), the GDP per employed person more than doubled between 1990 and 2010 in Vietnam. Poverty successfully declined, and due to agricultural efficiency and a shift towards higher productivity non-farm jobs, Vietnam has lifted itself out of the lower-income country category. Additionally, the reforms de-collectivized agricultural production, prices were reformed and subsidies were removed. Vietnam's currency, the Vietnamese Dong, devalued and became free-floating, and the Vietnamese banking system was reformed. Lastly, private sector production and foreign investment were allowed, and foreign trade was liberalized (Witter 1996; Sunderlin and Huynh 2005). The *Doi Moi* reforms furthermore established basic property rights

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for farmers and firms, and provinces and local governments gained more autonomy. This, among other changes, resulted in a devolution of land-use-related decisions (World Bank 2008a, b).

The *Doi Moi* triggered two important changes for Vietnam's forests. The first change directly resulted in the devolution and decentralization of Vietnam's forest governance through increased decision-making power for lower government agencies, and forestland allocation to non-state actors, as well as the introduction of community forestry. The second change, on the other hand, spurred an increased demand for timber and other forest products because of the nation's increasing engagement in the (global) market economy (McElwee 2016).

The way Vietnam's forest governance has evolved in the past few decades could provide important insights and lessons learned for other Southeast Asian countries and beyond (see also the landmark study by McElwee (2016)). This is especially important as many countries in Southeast Asia continue to struggle with high deforestation rates and forest mismanagement. Forest cover in Vietnam, on the other hand, has been growing steadily from 24.7 per cent in 1992, to 38.2 per cent in 2005, and to 39.7 per cent in 2011. This expansion has been caused by two main drivers: government policy and the enormous growth of plantation forests (Meyfroidt and Lambin 2009; To et al. 2014). While forest cover in Vietnam has significantly improved, it has not been clear to what extent this success can be attributed to the involvement of local communities. Therefore, this study aims to answer the following question: How did forest governance in Vietnam since the *Doi Moi* reforms change, and how did the roles of local communities change concomitantly? Through a literature review as well as secondary data analysis and expert interviews, I aim to provide in the subsequent sections of this chapter an overview of forest governance trends at the national and local level in Vietnam, as well as important lessons learned. In addition, using four case studies in Vietnam's Central Highlands concerning forest-dependent and Indigenous communities, who are integrated in Vietnam's formal forest governance to various degrees (respectively the Co Tu, K'ho, Bru-Van Kieu, and M'nam), I will supplement this review with empirical findings from my doctoral research (see Bayrak 2015). The research, conducted from 2012 until 2015, consisted of both qualitative and quantitative research methods, such as semi-structured interviews and households surveys. Ultimately, the overarching question of this study is whether we can really speak of forest *governance* in Vietnam. Is

it truly decentralized, or does it remain a top-down form of forest management disguised only as a successful social forestry approach?

Customary Ways of Managing the Forests: Vietnam's Highlanders

Like its Southeast Asian neighbours, Vietnam is a multi-ethnic country consisting of 54 officially recognized ethnic groups. The ethnic groups according to the 1999 Census are represented as follows: Kinh (Viet) 85.7 per cent, Tay 1.9 per cent, Thai 1.8 per cent, Muong 1.5 per cent, Khmer 1.5 per cent, Mong 1.2 per cent, Nung 1.1 per cent, and others 5.3 per cent (CIA World Factbook 2017). With the exception of the Hoa (ethnic Chinese) and Cham people, all other ethnic minority groups in Vietnam are considered forest-dependent, poor and living in the mountainous regions of Vietnam. Many of the ethnic groups belonging to Central Vietnam and the Central Highlands can also be found in Laos and Cambodia (Salemink 1997, 2003). Some of these groups can be considered Indigenous to the region, whereas others have migrated to Vietnam in the past 200–300 years (Dang 2010). For the sake of simplicity, I will interchangeably refer to these groups as either Highlanders or Indigenous communities. It should, however, be noted that the official Vietnamese definition for its ethnic minorities is "*dân tộc thiểu số*" or ethnic minority group, as Vietnam does not recognize the concept of indigeneity (ADB 2002).

Since Highlanders in Vietnam consist of various cultures and ethnic groups, it is impossible to treat them as a relatively homogenous group (Salemink 2003). However, the following observations could be made about their livelihood systems and practices. First of all, the Highlanders are characterized as traditionally practising various forms of subsistence swidden agriculture or shifting cultivation, and being largely dependent on the natural environment (Hickey 1967, 1982; Evans 1995; Salemink 1997, 2003; ADB 2002; Tran 2003). Many Highlanders practise animal husbandry, fish farming, hunting, logging and collecting non-timber forest products (NTFPs). Nowadays, they are involved in wet-rice cultivation and grow cash crops and agroforestry (ADB 2002; Tran 2003; Tran et al. 2006; Vuong 2008; Dang 2010; To 2011; CIRUM 2012). Second, Highlander communities have been traditionally governed by a village patriarch (*gia lang*), elderly, and other customary institutions responsible

for sociocultural affairs as well as land and forest management through customary laws and practices (Hickey 1982; Evans 1995; Salemink 1997, 2003; Dang and Schuyt 2005; CIRUM 2012). Lastly, many Highlander communities have developed their own customary forest management systems and forest classifications. They have usually divided their forests into three or four types: sacred or ghost forests, exploitation forests and watershed-protection forests. Sacred and watershed-protection forests were usually off limits for use or exploitation due to spiritual beliefs, folktales and customary laws (Salemink 2003; Dang and Schuyt 2005; Tuan 2006; Arhem 2009).

While Highlander communities have never lived completely isolated from Vietnamese mainstream society and its previous colonial rulers, in the past they could more or less make use of the forests according to their own customary ways. The respective regimes adopted a laissez-faire approach to forest management, mainly focussing on exploitation and establishment of plantations. Since the 1970s, however, this has changed drastically.

Sedentarization Programmes, the Vietnam War and Severe Deforestation

In 1968, the Vietnamese State officially launched a campaign for swidden agriculturalists to practise sedentarization and fixed cultivation. This policy was considered to be an important step in poverty reduction and hunger elimination in Vietnam's mountainous regions. Sedentarization and resettlement strategies included providing support for agricultural production and livelihoods to facilitate fixed settlement and cultivation; providing assistance for capacity building, technical training and transfer; and awareness raising (Evans 1995; ADB 2002). The sedentarization and resettlement policies also resulted in a ban on swidden agriculture and the creation of new economic zones in the Highlands. These new economic zones facilitated mass emigration of Kinh people to the Highlands; they were considered to be development centres for the areas. In the Central Highlands the Kinh population in 1945 was 5 per cent, which grew to 50 per cent in 1975 and 70 per cent in 2002. Land-use-related conflicts between the Indigenous communities and the new settlers often occurred (Evans 1995; ADB 2002; HRW 2002; Tan 2006).

The Vietnam War caused severe, long-lasting damages to Vietnam's forest, mainly due to Agent Orange, a herbicide and defoliant chemical

sprayed by the American forces, and 13 million tons of bombs. The post-war period, after 1975, saw an increase in deforestation and forest degradation in Vietnam. The major causes of Vietnam's forest losses included large-scale logging activities and mismanagement of state forest enterprises (SFEs). Other causes and drivers of degradation and deforestation included infrastructure expansion, establishment of timber plantations, government resettlement programmes, internal colonialization and migration, and swidden agricultural practices of households and communities (Sunderlin and Huynh 2005; Meyfroidt and Lambin 2009). In 1992, only 24 per cent of Vietnam was covered with forests, which were often barren or severely degraded (Meyfroidt and Lambin 2009). As a response to the devastating state of the country's forests at that time and the *Doi Moi* reforms, Vietnam decided to undertake the enormous challenge of reforming its forest governance system through decentralization and devolution. The general assumption was that top-down and state-controlled forest management had not been effective and a new forestry approach had to be adopted.

A New Forest Approach

Forest governance in Vietnam has evolved from a laissez-faire attitude in the 1970s, and centralized top-down management focusing on forest exploitation in the 1980s, to decentralized forest management and conservation in the 1990s and 2000s. There have been at least five important changes in Vietnam's policies, reflecting a new approach to forest management and governance (Tu and Burgers 2012). First of all, land classification and rules for forest protection were reformed (Laws on Forest Protection and Development 1991 and 2004). Second, private organizations and individual households were allowed to acquire land-use rights through the Forestland Allocation (FLA) programme (Land Laws of 1993 and 2003). Third, communities became recognized as legal recipients of forests and land-use rights in 2004. Non-state actors, such as individual households and communities, can now obtain land-use certificates or so-called Red Books once forestland is allocated to them. Fourth, there was an increase in afforestation programmes such as the Greening the Barren Hills programme in 1992 and the Five Million Hectare Reforestation Project in 1998 (McElwee 2016). Lastly, SFEs were reformed. They were required to become self-funding and to adopt more efficient and sustainable forms of logging (Tu and Burgers 2012).

These five important changes resulted in the allocation of 30 per cent of total forestland in Vietnam to non-state actors, including individual households, groups of households, private organizations and communities. Because of Vietnam's FLA programme, non-state actors acquired legal rights to use, manage, protect and develop forestland (de Jong et al. 2006; Clement and Amezaga 2009; Thi 2009; Bayrak et al. 2015). This social forestry approach was intended not only to improve forest protection and management but also to integrate forest development objectives with economic development and poverty alleviation (Castella et al. 2006; Bayrak et al. 2015; McElwee 2016).

Under the FLA programme, forests are divided according to ecological criteria into three categories: production, protection and special-use. Table 16.1 shows the different categories according to their area size and type in 2012 (To et al. 2014). They can be described as follows:

- *Special-use forests:* These types of forest have a high level of biodiversity. For this reason they remain under state forest control and are off limits to people wishing to exploit them. Special-use forests are usually designated as national parks, nature conserves, and landscape or seascape areas (Binh 2009). Special-use forests are managed by management boards or the Ministry of Agriculture and Rural Development (MARD) and are not allocated to households or communities (Tu and Burgers 2012). Human use is limited in special-use forests to logging, hunting for animals or collecting forest products and specimens (McElwee 2004; Zingerli 2005; Bayrak et al. 2013).

Table 16.1 Forest classifications in Vietnam in 2012

Forest category	*Area in "000" ha*	*Per cent (%)*	*Natural forest in "000" ha*	*Planted forest in "000" ha*
Special-use forest	2011	15	1931	80
Protection forest	4645	34	4019	626
Production forest	6677	50	4293	2384
Non-designated	182	1	NA	NA
Total forested land	13,515	100	10,243	3090
Barren land for forestry purposes	2500			

Source: MARD (2012) in To et al. (2014)

- *Protection forests:* In these forests local people are allowed to collect NTFPs and timber for their own non-commercial use. When forestland allocation began, these forests were assigned to SFEs and other state organizations. Since 2004, on the other hand, protection forests became available for allocation to local and Indigenous communities where they served as community forests. Communities and groups of households can now acquire Red Books for the protection of forests to manage them communally. Very often, ghost and sacred forests either belong to this category or to the special-use forest category (Bayrak et al. 2015).
- *Production forests:* These forests are designated for exploitation, reforestation and agroforestry (e.g. rubber, acacia, and coffee). Exploitation practices should be in compliance with management and development plans approved by relevant forestry agencies. Many production forests are former swidden plots and on barren or degraded lands. Forestland allocated to individual households are usually production forests (Bayrak et al. 2015).

In Vietnam, forestland can be allocated to households and individuals, groups of households, Commune People's Committees (CPC), economic entities, state-owned organizations, other types of organizations, joint-venture companies, foreign companies and communities. Through Red Books, households, groups of households and communities are able to own production and protection forestland for 50 years. Households are able to exchange, transfer, inherit, mortgage and lease their production forestland. Communities and groups of households are not entitled to do so, since they are not legal entities within Vietnam's civil code. Through so-called Green Books, households, groups of households and communities can also be contracted to help protect and conserve the forests or to plant trees. Table 16.2 shows forestland area sizes of each forest user group in Vietnam for 2012 (To et al. 2014). The amount of forestland which communities own is just as much as the army (2 per cent), which indicates that community forestry is still on a very marginal scale in Vietnam.

Even though households, groups of households and communities are able to receive forestland, it is still the government who decides how it should be used. If a household or community does not use their land according to the rules stipulated, they could have their Red Book revoked. Therefore, the FLA programme in Vietnam is far from being truly "decentralized" (Hardcastle 2002; Sunderlin and Huynh 2005; Sikor and

Table 16.2 Forest management per user group in Vietnam in 2012

Forest user group	*Area in "000" ha*	*Percent (%)*
Management boards	4522	33
State-owned enterprises	1972	15
Other economic entities	143	1
Army	265	2
Households	3510	26
Communities	299	2
Other organizations	701	5
People's committees	2103	16
Total	13,515	100

Source: MARD (2012) in: To et al. (2014)

Nguyen 2007; Nguyen 2009b; Burgers et al. 2011; Tu and Burgers 2012; Bayrak et al. 2013).

Vietnam's Current Forest Governance and Stakeholders

Table 16.3 presents the management structures of forest governance in Vietnam. The Ministry of Agricultural and Rural Development (MARD) and Ministry of Natural Resources and Environment (MONRE) are in charge of forest management in the country, having divisions up to the commune (subdistrict) level (Pham et al. 2013). The Provincial People's Committee (PPC) is mainly responsible to translate the national policies into the provincial context. The District People's Committee (DPC) allocates forestland to households and communities. However, in order for households and communities to apply for a Red Book, they need to apply through the Commune People's Committee (CPC), who in turn send the application to the DPC.

The new forest governance arrangements in Vietnam restructured and introduced various institutions and actors at the village and commune level. These actors brought new types of management and control. As discussed in the previous section, Highlander communities had been organized through the village patriarch and elderly. Now, these traditional institutions have to compete with, or work parallel to, representatives of formal government agencies, such as village headmen, secretary, CCP and forest management boards. If local households or communities would like to apply for Red Books of forestland, they must do this through these new

Table 16.3 Formal forest governance system of Vietnam

National level	**Central Government**	
	Ministry of Agriculture and Rural Development (MARD) Director General of the Vietnam Forestry Administration (VNForest)	Ministry of Natural Resources and Environment (MONRE)
Provincial level	**Provincial People's Committee (PPC)**	
	Department of Agriculture and Rural Development Division of Forest Protection Division of Forests	Department of Natural Resources and Environment
District level	**District People's Committee (DPC)**	
	Forest protection stations Division of Agriculture and Rural Development	Division of Natural Resources and Environment
Commune level	**Commune People's Committee (CPC)**	
	Forest and agricultural staff	Land management staff
Village level	Village headman, secretary, sub-headman and community forestry management board	

Source: Pham et al. (2013)

actors and structures. In order to apply for a Red Book, a household needs to request this through the village headman. The headman will transfer this request to the relevant agencies. The village headman, who is elected by the villagers, serves as a middleman between the local people and relevant government agencies. These new forest governance arrangements could have both positive and negative effects on Highlander communities. While these communities are now able to obtain official recognition and the possibility of acquiring Red Books for forestland, their institutions, Indigenous forest management systems and ways of life are often irreversibly restructured or eliminated (Bayrak et al. 2015).

Impacts of the FLA Programme on Local Communities

FLA has had mixed outcomes on poverty alleviation and forest conservation in Vietnam. Positive impacts of FLA include increased forest rights for local people, improvement of forest cover and forest products, secured irrigation water, greater agricultural input and diversified livelihood strategies. Furthermore, many communities and households saw their allocated

forestland as an investment, a collateral to obtain a loan, or, in case of community forestry, a symbolic revival of their customary forest management (Sunderlin and Huynh 2005; Castella et al. 2006; Bayrak 2015).

On the other hand, FLA also negatively affected local communities in various ways. These negative impacts include the following (Sunderlin and Huynh 2005; Castella et al. 2006; Vuong 2008; Burgers et al. 2011; Bayrak 2015):

- Land-use and land tenure conflicts between different households, state forest enterprises and other entities
- Incompatibility with local livelihood practices and customary arrangements
- Inequitable distribution of forestland allocation (usually, Kinh households were better off due to their social and human capital than were non-Kinh households)
- Geographic and logistical constraints (some households did not want to have the allocated forestland since it was geographically too remote or too costly to manage)
- Policy errors
- Weakened traditional forest management systems and institutions
- Lack of financial and/or social capacity to invest in allocated forestland

It remains a question whether the positive impacts outweighed the negative ones. My own research has shown that for many poor households, FLA brought hardly any benefits due to lack of capacity to invest in their allocated lands. This was especially the case among the Indigenous Co Tu communities residing in Thuong Nhat commune, Thua Thien-Hue province. While wealthier households could invest in *acacia* or rubber trees on their allocated forest plots, poor households would sometimes sell their lands due to their inability to invest in it. However, in another case study, among K'ho communities in Bao Thuan commune, Lam Dong province, FLA did bring positive changes, because it was able to solve land-related conflicts among coffee smallholders. Most Indigenous M'nam swiddeners in Hieu commune, Kon Tum province, had yet to own Red Books for their forestland, even though they expressed a strong desire to grow cash crops such as industrial cassava. These households depended directly on the natural forests to sustain their livelihoods. Lastly, while many Bru-Van Kieu households in Huong Hiep commune, Quang Tri

province, owned Red Books for *acacia* plantations, they often decided to work as land workers instead as it would take at least five years to harvest their trees (Bayrak 2015). Therefore, FLA's impact remains very dependent on the local context.

Trends in Vietnam's Forest Governance

FLA has been the backbone of the following five trends in forest governance in Vietnam. These trends are forest rehabilitation, benefit-sharing mechanisms, community forestry, payment for environmental services, and the Reducing Emissions from Deforestation and Forest Degradation programme (REDD+).

Trend 1: Forest Rehabilitation

The devastating state of Vietnam's forests in the 1990s prompted the Vietnamese government to introduce the Greening the Barren Hills programme (Programme 327) in 1992 and the Five Million Hectare Reforestation Project (5MHRP or 661 programme) in 1998 to deal with the daunting task of recovering and improving the nation's forests (McElwee 2016).

Programme 327 focused on forestry, agriculture, aquaculture, fixed cultivation, sedentarization and economic zones. Its purpose was to re-green open land and barren hills, enhance forest protection, enable natural regeneration and reforestation activities, develop long-term industrial crops and fruits trees, develop infrastructure and promote social welfare, amongst others. Programme 327 was the first programme in Vietnam which explicitly acknowledged that forest protection and rural development needed a multidisciplinary approach. In order to fulfil its goals, substantial amounts of funds were transferred to provincial and district authorities who were put in charge of its implementation. Building upon the previous programme, the 661 programme aimed at reforesting 5 million ha of land, of which 2 million ha was for special-use forest and protection forest, and 3 million ha was for production forest. The objective was to restore forest cover in Vietnam to 43 per cent by 2015. The programme furthermore aimed to assure a forest product supply of 1.5 million m^3 of timber and 20 million steres of fuelwood, and to create employment for 2 million people in rural areas.

Both programmes involved the devolution of responsibilities to lower authorities, and both programmes utilized the FLA programme in order to reach their respective objectives. All three programmes are therefore intrinsically linked to one another. In order to fulfil its objectives, the Vietnamese government has been supported by many international and multilateral donors. Between 1985 and 2000, it has been estimated that 80 per cent of all the overseas development assistance (ODA) to Vietnam went to the natural resource and rural development sectors. These donors included the World Bank, UNDP and FAO. NGOs assisting Vietnam included the WWF, CARE, OXFAM and others (Do and Le 2001; Sunderlin and Huynh 2005).

Trend 2: Benefit-Sharing Mechanisms

In Prime Minister's Decision No. 661/QD-TTg, the policy document which introduced the 661 programme, the Vietnamese State acknowledged that it was essential to include local communities in planting, protecting and regenerating their forests for conservation and livelihood improvements. It was up to the state to create a favourable legal context which would encourage and enable local communities to be able to do so. This resulted in three decisions on benefit-sharing mechanisms in forest protection and conservation: Decision 08/2001/QD-TTg, Decision 178/2001/QD-TTg and Joint Circular 80/2003/TTLT/BNN-BC. These policies included the following benefits for local people for the allocated or contracted forest types in Vietnam (Do and Le 2001; Nguyen 2009a):

- *Special-use forests:* Local people are allowed to implement activities in scientific research, sociocultural practices and eco-tourism. Local people are still restricted in exploiting these types of forests.
- *Protection forests:*

  – *Natural forests in critical and very critical conditions zoned for protection and regeneration:* People are entitled to monetary support from the state. People are allowed to collect NTFPs and dead or damaged trees. They are allowed to collect bamboo and rattan, depending on the amount and forest cover. Furthermore, they are able to practise selective cutting: this should be less than 20 per cent of the total forest cover and they will get benefits of 85–90 per cent after tax. The remaining benefits will be transferred to the local authorities such as the CPC or DPC.

  - *Unforested land which is classified as protection forests:* Local households receive financial support for reforestation activities. They are allowed to plant perennial agriculture trees and native tree species. They can use 20 per cent of the area for agricultural production. They can benefit from 100 per cent of the products of mixed-plantation trees. In the case of self-investment, they are entitled to 100 per cent of the forest products after tax.

- *Production forests:*

  - *Natural forests planted with household investment:* Households are allowed to plant mixed plantations of agriculture trees. They can make full use of the forest products. They can harvest timber for house construction. However, they need to seek permission from the CPC or DPC first. Depending on the type and age of forest (secondary, restored, medium, rich and bamboo), they can get benefits ranging from 100 per cent to 2 per cent per hectare.
  - *Production forests planted with state budget:* Households are allowed to plant mixed plantations of agriculture trees. They can make use of products after thinning. They can harvest timber for house construction. Depending on the type and age of forest they can use up to 75–85 per cent of its products.
  - *Unforested land which is classified as production forest:* Households receive financial support for plantations. They are allowed to use 20 per cent of the area for agricultural production. In the case where they self-finance their plantations, they are allowed to decide the plantation purpose and modality, and they receive 100 per cent of the benefits of the newly acquired forest products.

Trend 3: Community Forestry

In 2004, community forestry was introduced in Vietnam. The forests allocated to local communities, however, were mainly degraded—31.4 per cent of the allocated forestland to communities consisted of barren land and denuded hills (Nguyen 2009a). Community forestry initiatives in Vietnam were closely linked to the FLA programme, and it allowed communities to formally receive benefits from forest protection and reforestation. There are broadly four types of community forestry in Vietnam: traditional, introduced, groups of households managing forestland, and

individual households, who all individually own forestland, collaborating in forest management (Nguyen 2009a).

Community forestry in Vietnam can be characterized as follows (Nguyen 2009a; Sunderlin 2006):

- *Legal dimension:* Communities are formally recognized as forest owners. However, they are not allowed to transfer their forest to individuals as well as convert, transfer, offer, mortgage or use it as collateral for receiving financial capital, such as loans. As stated before, the community is not recognized within Vietnam's civil code.
- *Regulatory dimension:* Communities have to use the forest according to the stipulated rules and regulations on a long-term basis. It is still a top-down decision.
- *Rights:* Local communities can make use of their community forests to harvest forest products, collect NTFPs and firewood, and receive other benefits from the forests, both for individual households and the community. Furthermore, local communities may engage in joint agroforestry and fishery production activities. They are also entitled to be rewarded financially and in-kind for protection, conservation, rehabilitation and reforestation activities. The state provides technical guidelines and financial support.
- *Obligations:* Communities need to develop village forest protection and development regulations and plans, report to the higher authorities about the developmental state of the forest and forestry activities, report financial issues and set up community forest management boards in charge of patrolling the forest and discussing its strategies. If the community decides not to make use of their community forest anymore, they need to return it to the state, and their Red Book will be revoked.

Sunderlin (2006) identified the main threats to and opportunities for community forestry in Vietnam. The threats include the reluctance of SFEs to reallocate forestland and responsibilities to local communities; (strongly) weakened traditions and customary institutions; and influences from powerful outsiders, such as middlemen, encouraging illegal logging, undermining local authority and the ability of villagers to manage forests effectively. However, in some cases it has been proven that local communities are able to practise effective community forestry, through reinventing

and restrengthening traditions and customary institutions, livelihood diversification and poverty alleviation (Sunderlin 2006; Nguyen 2009a).

Trend 4: Payment for Environmental Services

The fourth trend in the FLA programme is Payment for Environmental Services (PES) or Payment for Forest Environmental Services (PFES). PES is a scheme in which service providers manage and protect an ecosystem, such as a forest, which service users are willing to pay for. PFES was first introduced in 2008 as a pilot programme in Lam Dong and Son La provinces, in the south of the country, by the Vietnamese government through Decision 380/2008/QD-TTg. In 2011, through Decree 99, PFES was nationally implemented, and in the same year around 20 PFES projects were implemented in Vietnam (To et al. 2012).

The service users in Vietnam are hydropower companies, organizations and individuals engaged in (eco)tourism, clean water production and supply companies, and industrial companies. The services include protection and prevention of soil erosion and sedimentation in reservoirs, rivers and streams beds; regulation and maintenance of water sources for hydropower, clean water production and industrial production; and protection of natural landscape and conservation of biodiversity. The service providers are local households, communities, SFEs, communes, management boards or other organizations. The levels of payments are 20 Vietnamese Dong per kilowatt hour (VND/kWh) of electricity generated by hydropower companies; 1–2 per cent of the profits for tourism organizations; and 40 VND/m^3 for commercial drinking water production and supply companies. Decree 99 established the legal foundation for PFES which is based on the following formula (Dam et al. 2014; Kolinjivadi and Sunderland 2012):

> The amount of payment to an ES in a year (VND) = Norm of payment for one ha of forest (VND/ha) × Area of forest managed by an ES provider (ha) × K factor

Organizations are entitled to receive a payment for their ES, if they have the forest-use rights over the forest area within the PFES scheme, either through allocation or contracting. The K factor is determined by the forest status, type of forest (special-use, protection or production), origin of the forest (planted or unplanted), and unfavourable or favourable condi-

tions for forest protection. The K factor is decided by the provincial authorities in accordance with the local conditions and context. The user fees were decided by the MARD following the pilot programme in Lam Dong province (IGES 2011; Dam et al. 2014).

It would be beyond the scope of this chapter to discuss PFES in Vietnam extensively (see Winrock International (2011) for a study on PFES in Lam Dong province). However, both To et al. (2012) and Dam et al. (2014) found many factors hampering the progress of PFES in Vietnam. These include the difficulty to calculate and apply the K factor, unstable land tenure, high transaction and opportunity costs, unequal distribution of PFES payments, and the risk that PFES will mainly benefit the powerful elite, therefore exacerbating pre-existing inequalities within communities. Pham et al. (2013) also mention that the different K values have led to inequity among the households. Many households engaged in a PES scheme according to the study of Pham et al. (2013) stated that the K factor should always have the value '1'.

Trend 5: REDD+ in Vietnam

Vietnam is a signatory to the United Nations Framework Convention on Climate Change (1994) and the Kyoto Protocol (2002), and meets all the requirements for the Clean Development Mechanism (CDM), having had 49 CDM project designs approved in 2010. Vietnam, furthermore, signed various international agreements to joint global efforts to combat climate change and overcome environmental problems, including the Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and Forest Law Enforcement, Governance and Trade (FLEGT).

Vietnam is also involved in the REDD+. REDD+ is an international climate change mitigation strategy with a very straightforward objective: developed countries will pay developing countries to store carbon dioxide in their forests to combat global climate change through forest conservation and sustainable management. Vietnam is one of the first countries who committed itself to REDD+ and is participating in a relevant United Nations programme on REDD+ (UN-REDD), the World Bank's Forest Carbon Partnership Facility and various international and national NGOs' pilot projects on REDD+ (Pham et al. 2013; The REDD Desk 2014). However, as of today, REDD+ has not been implemented on a national scale, as many elements of the programme remain unclear, such as the

Table 16.4 Differences between PES and REDD+

Dimension	*PES*	*REDD+*
Scope	Mainly project based.	Programme-based for multilateral organizations and the government. Project-based for NGOs and other organizations.
Objectives	Clear objectives. Specific activities lead to payments. Clear input and output.	Objectives are less clear. Sustainable forest management is a contested term. Input and output are not clear.
Environmental service providers	Organizations, households, communities, SFEs and so on.	Governments, local communities and authorities, and other organizations.
Environmental service users	Companies, users of the services, government, and other organizations.	Not clear.
User fees	Decided by the activities involved, value of the end product, and local context.	Carbon payments, but still not clear.
Source of resources	From the ES users.	Carbon markets, governments, and development assistance. Still not clear.

establishment of a carbon baseline, funding of carbon credits, and monitoring and evaluation.

The Forest Protection and Development Fund (FPDF) was created to manage PFES revenues in Vietnam. The Vietnamese government is currently exploring ways to also manage REDD+ revenues through a subfund of the FPDF. REDD+ is in many ways similar to PFES; however, there are also some essential differences (see Table 16.4). To (2013) stated that there is even a chance that REDD+ will be part of the national PFES scheme in Vietnam, since there are more revenues to be earned from PFES. Decree 99 also specifically mentions carbon services as one of the ES to be eligible for payments.

Discussion and Conclusion

The overarching question of this study is whether we could really speak of forest *governance* in Vietnam. The answer to this question remains ambiguous. One cannot deny the huge progress Vietnam has made

since the 1990s in reforesting the country. In many ways, Vietnam has served as a model to other Southeast Asian and developing nations for its social forestry approach through forestland allocation, and devolution and decentralization of forest management. Linking poverty alleviation with forest conservation and taking multiple planning objectives into account has also provided various benefits to Vietnam's local and Indigenous communities. Hence, Vietnam has come a long way since its birth as the Socialist Republic. Therefore, Vietnam could provide many lessons learned to other nations, including the introduction of smallholder agroforestry, community forestry, a pro-poor landscape approach to forest management and the establishment of a nation-wide PFES scheme. Vietnam continues to focus on poverty alleviation, biodiversity conservation and sustainable decentralized management through the Vietnam Forestry Development Strategy, which will be implemented until 2020.

On the other hand, recent developments in Vietnam's forest governance have not benefited everyone. There has been a lack of inclusive development. The winners are those in the community with the capital to manage and invest in agroforestry, cash crops or wet-rice cultivation (such as the wealthy households in Thuong Nhat or the coffee smallholders in Bao Thuan), whereas the losers are the marginalized, subsistence farmers, women, and those who simply lack the means to engage in the market economy. More often than not, I found Indigenous land workers in Thuong Nhat or Huong Hiep ploughing the soil of land they previously owned for just meagre wages. While the pro-poor policy within Vietnam's governance approach remains commendable, the FLA programme has sometimes excluded the most marginalized in a community.

Where are the local communities in Vietnam's forest governance? They were there when they followed the stipulated rules attached to their Red or Green Book, such as the coffee smallholders in Bao Thuan or rubber farmers in Thuong Nhat. However, they did not really own their forestland, as all land in Vietnam belongs to the state, nor were they able to decide how they would manage their forests. For local communities, this was even more problematic as they are not recognized by Vietnam's civil code. They were able to make use of their, often barren or degraded, community forests as well as engage in forest patrolling activities, but they were, by law, not able to formulate rules, create monitoring and sanction mechanisms, or use their forestland for commercial purposes. Could we therefore still speak of community forestry, or should we reformulate it as

'top-down forestry approach *also* incorporating local communities'? The answer to this question lies, again, somewhat in the middle. On a technical level, there are also many legal and practical hurdles to overcome, including effectively implementing PFES, funding and legal status of carbon sequestration, the sustainability of reforestation schemes and the rationale and inclusiveness of benefit-sharing mechanisms.

To conclude, even though Vietnam's forest governance remains a top-down system, I argue that there are many opportunities to improve the system in its current state. In the short term, this may include revitalizing customary institutions and forest classifications, providing realistic agro-forestry models for subsistence and marginalized farmers, improving food security of swidden agriculturalists and the poor, and resolving land-related conflicts between SFEs and local communities.

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CHAPTER 17

Laws Relating to Environmental Conservation in Myanmar

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Introduction

According to *the Constitution of the Republic of the Union of Myanmar (2008)*, the State is the ultimate owner of all natural resources, whether found above or below the ground, above or below the water, or in the atmosphere.[1] The Law provides that the Union shall protect and conserve the natural environment.[2] According to this law, State and Division legislatures have power to regulate environmental protection, within the boundaries of national legislation.[3] It also provides that every citizen has the duty to assist the Union in carrying out environmental conservation.[4]

Myanmar's *National Environmental Policy*[5] *(1994)* has constituted sound environmental policies in the utilization of water, land, forests, minerals, marine resources and other natural resources in order to conserve the environment and prevent its degradation. The policy aims to mainstream environmental considerations by balancing the integration of environmental concerns with economic and social development. The policy builds up the following points:

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- The wealth of the nation is its people, its cultural heritage, its environment and its natural resources.
- It is the responsibility of the State and every citizen to preserve its natural resources in the interests of present and future generations.
- Environmental protection should always be the primary objective in seeking development.[6]

Myanmar Agenda 21 (NCEA 1997) aims to implement integrated management of natural resources and to reach targets of environmentally sustainable development. Myanmar Agenda 21 contains programs and activities that will promote environmental protection and prevent environmental degradation. It has four main sections relating to sustainable use of natural resources, sustainable social development, sustainable economic development and sustainable institutional development. The programs are social, economic, institutional and infrastructural strengthening as well as environmental protection and conservation programs that aim to put the country onto the sustainable development path.[7]

The Strategic Policy Framework

Myanmar's National Sustainable Development Strategy (hereinafter NSDS) was launched in *2009* and reaffirmed its commitment to create a framework that integrates environmental considerations into future national development plans. The strategy spelled out the country's goal for sustainable management of natural resources; sustainable energy production and consumption; biodiversity conservation; sustainable freshwater resources management and sustainable management of land resources and mineral resource utilization.[8]

Myanmar's NSDS proposes preventive measures, besides traditional reactive policies, to address emerging environmental issues, man-made disasters and climate change. The establishment of the proposed National Council for Sustainable Development will certainly serve as a vehicle toward mainstreaming sustainable development objectives into national and sectoral policies and strategies. The Myanmar NSDS intends to open up new opportunities for the interdisciplinary approaches, and an avenue for the green economic policy, green investment and green jobs.[9]

The Legal Framework

In Myanmar, *the Environmental Conservation Law (hereinafter ECL) (2012)* is a national framework law which contains certain provisions with respect to the protection of environmental matters. The objectives of ECL include the systematic integration of environmental conservation in the sustainable development process; a healthy and clean environment; and the conservation of natural and cultural heritage for the benefit of present and future generations. It is also intended to provide a legal base for the restoration and protection of specific ecosystems, the sustainable management of natural resources, international cooperation as well as the promotion of public awareness and cooperation in educational programs for dissemination of environmental perception.[10]

The ECL is based on the "polluter-pays principle" with compensation for environmental impacts to be paid to a fund to be set up by the Ministry of Natural Resources and Environmental Conservation (hereinafter MNREC). According to this law, the duties of the Ministry include compelling the polluter to compensate for environmental impact, contribute funds by the organizations which obtain benefits from the natural environmental service system, contribute a part of the benefits from the businesses which explore, trade and use the natural resources in environmental conservation works.[11] Regarding monitoring, the Ministry shall monitor the carrying out of waste disposal and sanitation works; development and constructions; and other necessary matters relating to environmental pollution.[12]

The ECL mentions the possibility that certain categories of companies, whose activities can impact on the environment, may be obligated to request authorization from the Ministry.[13] In addition, the Law entails that any business that requires prior permission must have insurance cover for impacts on the environment.[14] The Law provides for criminal penalties, if these apply to business entities, and payment of compensation for damages.[15] According to this law, any person without the prior permission, who operates a business, work site or factory or workshop which is required to obtain the prior permission under this law shall, on conviction, be punished with imprisonment for a term not exceeding three years, or with a fine from a minimum of 100,000 kyats to a maximum of one million kyats, or with both.[16]

The *Environmental Conservation Rules (2014)* determine whether or not the categories of projects, businesses, services or activities shall

conduct an initial Environmental Examination (hereinafter IEE) or Environmental Impact Assessment (hereinafter EIA) for such projects.[17] Moreover, the Environmental Conservation Rules stipulate the basic policy and concept of an EIA application for the development of a project: to prepare the EIA system and submit it to the Ministry,[18] and to implement and carry out an environmental management plan (EMP) within the time stipulated by the Ministry along with the performance situation for the consideration of the Ministry.[19]

Under the *Environmental Impact Assessment Procedure (2015*), a project proponent or qualified third party must conduct an IEE or EIA report and prepare an EMP.[20]

The National Environmental Quality (Emission) (hereinafter NEQE) Guidelines, (2015) were issued by the MNREC in the exercise of its power under ECL (2012) Section 42 (b). The emission guidelines shall apply to any project subject to EIA procedure, as adopted by the Ministry. Moreover, the emission guidelines specifically apply to all project types listed in the EIA procedure. These guidelines shall be reflected in investment projects of EMP and Environmental Compliance Certificate (ECC).[21]

The NEQE Guidelines include general guidelines, industrial-specific guidelines, guidelines for agriculture, livestock and forestry development, guidelines for manufacturing, guidelines for waste management, guidelines for water supply, guidelines for infrastructure and service development and guidelines for mining. These guidelines include the standards (criteria) of water quality which are uniform throughout the country.

Myanmar has enacted many laws relating to the environment for different sectors, such as administrative sector, agriculture and irrigation sector, culture sector, city development sector, finance and revenue sector, forestry sector, health sector, hotels and tourism sector, industrial sector, livestock and fisheries sector, mining sector, national planning and economic development sector, science and technology sector, transportation sector, hazardous waste management sector and so on.

The following are the sector-wise environmental management and relevant national environmental laws.

Administrative Sector

In the administrative sector, the salient Myanmar laws include the Explosive Act (1887), the Yangon Police Act (1899), the Explosive

Substances Act (1908), the Poisons Act (1919), the Emergency Provisions Act (1950), the Territorial Sea and Maritime Zones Law (1977), the Police Act (1945) and the Penal Code (1861).

The Explosive Act (1887) and the Explosive Substances Act (1908) stipulate the prohibitions on production, possession and use of explosives without permission.

The Yangon Police Act (1899) and *the Police Act (1945)* include provisions on offenses which affect the human environment.

The Territorial Sea and Maritime Zone Law (1977) mentions measures for the protection of marine and coastal zone environments and for the conservation of marine biological diversity.[22]

The *Penal Code (1861)* of Myanmar provides prohibitions against contaminating public springs or reservoirs, making the atmosphere harmful to health and offenses affecting the public health, safety, convenience, decency and morals.

Agriculture and Irrigation Sector

In the agriculture and irrigation sector the salient laws include the Embankment Act (1909), the Plant Pest Quarantine Law (1993), the Pesticide Law (1990) and the Fertilizer Law (2002).

The Embankment Act (1909) includes the prohibitions on damaging or trespassing on embankments, or construction of and maintaining embankments without prior permission.

The Pesticide Law (1990) and *Fertilizer Law (2002)* have provisions for systematic use of pesticides and fertilizers. They provide measures to take precautions to prevent adverse impacts on the environment from the misuse of pesticides and fertilizers. The Pesticide Law was revised in 2016. According to this law, users of pesticides are required to have the certificate for pesticide use by attending training of the Plant Protection Division. This training also provides instructions and methods for systematic disposal of pesticides.

The Plant Pest Quarantine Law (1993) is to prevent the entry of exotic pests into Myanmar and the spread of local pests to other countries. Embankments are important structures for the development of the agricultural sector.

Cultural Sector

According to the *Protection and Preservation of Cultural Heritage Region Law (1994)*, actions which may damage the cultural heritage region, including exploration for petroleum, natural gas, precious stones, and minerals; building roads; construction of bridges, irrigation canals, and embankments; and digging wells and ponds are prohibited. Fish breeding ponds in such regions without permission are also banned. Moreover, destroying ancient monuments and voluntarily altering the ancient buildings in the cultural heritage zone so as to change the ancient design or art are prohibited.

City Development Sector

The laws related to the city development sector are the Yangon Waterworks Act (1885), the Water Power Act (1927), the Underground Water Act (1930), the City of Yangon Municipal Act (1922), the Nay Pyi Taw Development Law (2009) and the Yangon City Municipal Law (2013). These laws provide measures for systematic and sustainable use of underground and surface water, and protection of the human environment from unplanned urbanization and industrialization. Moreover, construction works are required to abide by the city plans.

The Water Power Act (1927) prohibits using or polluting public water for extraction of electric power or mining without a license.[23]

The Nay Pyi Taw Development Law was enacted in **2009**. Altogether 23 functions and duties are prescribed in the Law; they are being used to carry out works for water supply; construction and maintenance of reservoirs and pipelines; and works for sanitation and sewage.[24]

Yangon Municipal Act (1922) deals with penalties for polluting bodies of water within the municipal jurisdiction. The Yangon Municipal Act also provides that it is actionable, if any person commits any act of polluting or changing the quality of water provided by the Yangon Municipal waterworks, destroying or allowing cattle to trespass on any land near the water areas, throwing other objects into such water, or bathing or washing in those areas.[25]

The City of Yangon Municipal Law (2013) is the law related to the local level. This law is applied only in the Yangon municipal area, not in the whole country. It includes protection from environmental degradation as one of the responsibilities of Yangon City Development Committee

(YCDC). The responsibilities of YCDC include the constructing, demolishing and resettlement of squatter houses, buildings and wards; water supply; sanitation and public health and so on. According to the City of Yangon Municipal Law, YCDC undertakes the works in respect of the construction of buildings, drains and roads within the city limits. Regarding these works, the YCDC has the right to discharge effluents from all or some of the drains owned by it into the Yangon River, the Hlaing River, the Bago River and NgamoeYeik Stream within the city limits. In addition, the committee may discharge effluents from the said drains in appropriate places either within or outside the city limits.[26] However, no person is allowed to dispose of or discharge any kind of waste generated from any pipes of construction, business, factory and gardening into public places such as drains, lakes, roads, streams, creeks and valleys without the permission of YCDC.[27]

Finance and Revenue Sector

In the finance and revenue sector, the *Myanmar Insurance Law (1993)* was enacted. It requires the entrepreneurs or organizations which conduct any business operation to insure their general liabilities with Myanmar Insurance. Under the Myanmar Insurance Law, an entrepreneur or organization operating an enterprise which may cause pollution to the environment shall take out compulsory general liability insurance with an insurance company.

Forestry Sector

The laws related to the forestry sector are the Protection of Wild Life, Wild Plants and Conservation of Natural Areas Law (1994), the Forest Law (1992), the Forest Rules (1995), the Community Forest Instruction, 1995, National Forestry Action Plan (1995), the Format and Guideline for District Forest Management Plans (1996), the Criteria and Indicators for Sustainable Forest Management (1999) and the National Code of Practice for Forest Harvesting (2000).

The Forest Law (1992) aims to implement forest policy and environmental conservation policy, to promote public cooperation in implementing these policies and to develop the economy of the state. The provision of the Forest Law includes the protection of water and soil.[28]

The Forest Rules (1995) place emphasis on sharing of forest management responsibility with the local communities, the establishment of fast-growing plantations on degraded forest lands to conserve soil, water and biodiversity, and harvesting of timber and other forest products in an environmentally sound manner. This law prohibits any person from causing river channels to change, prevent the river flowing or blocking the waterways without permission.[29]

The Protection of Wild Life, Wild Plants and Conservation of Natural Areas Law (1994) aims to implement government policy for natural areas conservation.[30]

Health Sector

Myanmar national laws in the health sector relating to the environment are the Union of Myanmar Public Health Law (1972), the National Drug Law, (1992), the Prevention and Control for Communicable Diseases Law (1995), the Traditional Medicine Law (1996), National Food Law (1997), the Control of Smoking and Consumption of Tobacco Product Law (2006) and the Law relating to Private Health Care Services (2007). They were enacted for the general welfare of public health, including protection of the human environment.

The Union of Myanmar Public Health Law (1972) is concerned with protection of people's health by controlling the quality and cleanliness of food, drugs, environmental sanitation and epidemic diseases.

According to the *National Food Law (1997)*, production or storage or sale of food under situations which endanger health, allowing entry into or employing any person who has any infectious disease to be near the food manufacturing is actionable.

The National Drug Law (1992) provides for conserving the endangered species of plants which are raw materials for traditional drugs, in consultation with relevant ministries.

The *Prevention and Control of Communicable Disease Law (1995) (revised in 2011)* requires the disposal of wastes in a healthy manner under the supervision of the health officer. Waste management is also another important sector for environmental management. The Law describes functions and responsibilities of health personnel and citizens in relation to prevention and control of communicable diseases. It also describes measures to be taken in relation to environmental sanitation,

reporting and control of outbreaks of epidemics, and penalties for those failing to comply.

Hotel and Tourism Sector

The only sectoral law in the hotel and tourism sector which concerns environment is the *Myanmar Hotel and Tourism Law (1993)*. One of its objectives mentions preventing damage to cultural heritage areas or sites of natural beauty, caused by the hotel and tourism industry.

Industrial Sector

The laws related to the industrial sector are the Oilfield Act (1918), the Petroleum Act (1934), the Factories Act (1951) and the Private Industrial Enterprises Law (1990).

In the industrial sector, *the Oilfields Act (1918)* includes provisions to supervise the waste output from oil and natural gas exploration. In 2010 the Law Amending the Oilfields Act extended this issue to include prevention of environmental pollution by petroleum operations.

The Petroleum Act (1934) regulates production, storage and transport of oil so as not to cause pollution or outbreak of fires.

The Factories Act (1951) provides for disposal of waste and effluents in factories, treatment of wastewater, regulations for health and cleanliness in factories, and the prevention of hazards.[31]

The Private Industry Enterprises Law (1990) was enacted to prevent environmental pollution. Under the requirements of this law, the registration of private industrial enterprises is intended to prevent actions injurious to public health and the environment or that cause pollution.[32]

Livestock and Fisheries Sector

In the livestock and fisheries sector, the salient laws include the Law relating to Fishing Rights of Foreign Fishing Vessels (1989), the Animal Health and Development Law (1993), the Freshwater Fisheries Law (1992), Myanmar Marine Fisheries Law (1990) and the Law relating to Aquaculture (1989).

These laws were enacted to ensure sustainable use of marine resources. These laws prevent extinction of fish species; safeguard fisheries waters and fisheries management; prohibit unlicensed fishing, water pollution, the

use of explosives, poisons and dangerous materials in fishing; and guide the issuing of licenses, management and inspection of fisheries.

Mining Sector

In the mining sector, the salient laws are the Land Acquisition (Mines) Act (1885), the Salt Enterprise Law (1992), Myanmar Mines Law (1994), Myanmar Mines Rules (1996), Myanmar Pearl Law (1995) and Myanmar Gemstone Law (1995).

The Land Acquisition (Mines) Act (1885) has provisions to prevent injury and minimize danger for mine workers.

The Salt Enterprise Law (1992) prohibits manufacturing of salt by means of energy derived from charcoal or firewood.

The Myanmar Pearl Law (1995) has provisions to protect loss of oyster species, prevent oyster fishing by poisoning, explosion, using chemicals or dangerous objects, and prevent the discharge of pollutants, including oil and lubricants, into the fishery water.

The Myanmar Mines Law (1994) aims to prevent pollution, improve natural resources conservation, and reduce environmental impacts related to mining activities.[33] The *Myanmar Mines Rules (1996)* incorporate provisions aimed at preventing damage to the environment and the local water supply caused by mineral resources.[34]

The Myanmar Gemstone Law (1995) provides for the conservation of mineral resources. It intends to prevent environmental damage due to mining activities.

National Planning and Economic Development

In National Planning and Economic Development, the salient laws are the Myanmar Special Economic Zone Law (2014) and the Myanmar Investment Law (2016).

The Myanmar Special Economic Zone Law (2014) has provisions instructing investor compliance with existing laws related to the conservation and protection of the natural environment and the ECL.

The Myanmar Investment Law (2016) aims to develop responsible investment business which does not cause harm to the natural environment and society.

Science and Technology Sector

The laws relating to the science and technology sector are the Atomic Energy Law (1998) and the Science and Technology Development Law (1994).

In this sector, *the Atomic Energy Law (1998)* aims to develop the use of atomic energy, to ensure safety in using atomic energy and to carry out measures for the prevention of atomic radiation effects.

The Science and Technology Development Law (1994) provides provisions for development in the area of environmental conservation.

Transportation Sector

The salient Myanmar laws in the transportation sector which have environmental provisions are the Obstruction in Fairways Act (1881), the Canal Act (1905), the Defile Traffic Act (1907), the Ports Act (1908), the Highways Law (2000), the Conservation of Water Resources and Rivers Law (2006), the Conservation of Water Resources and Rivers Rules (2013), the Fast Highways Law (2015), the Motor Vehicle Law (2015), the Inland Water Vessel Law (2015) and Myanmar Port Authority Law (2015).

The Conservation of Water Resources and Rivers Law (2006) is the direct law relating to inland river conservation. This law aims to conserve and protect the water resources and river systems for beneficial utilization by the public; to smooth and safeguard waterways navigation along rivers and creeks; to contribute to the development of State economy through improving water resources and river systems and to prevent serious environmental impacts.[35] In order to conserve water resources and protect them from pollution, the Conservation of Water Resources and River Law must be implemented under the *Conservation of Water Resources and River Rules (2013)*.

The Obstruction in Fairways Act (1881), the Defile Traffic Act (1907), the Ports Act (1908) and the rules, procedures, orders and directives issued under the said laws may continue to be applicable in so far as they are not contrary to the provisions of this Law.[36]

The Obstructions in Fairways Act (1881) is one of the very early statutes that deal with the prevention of pollution of fairways leading to the port. This law includes the provisions to remove or destroy any obstructions in any fairway leading to any port in Myanmar if deemed an obstruction or danger to navigation.[37] The Law empowers the president

to make rules to regulate or prohibit the throwing of rubbish in any fairway leading to a port causing or likely to give rise to a bank or doing of any other act which will cause or be likely to cause obstruction or danger to navigation.[38]

The Canal Act (1905) and *the Embankment Act (1910)* regulate the use of water in rivers, streams, natural channels and lakes and lay down measures for the prevention of flood and erosion of soil, construction and maintenance of embankments, dams, canals and so forth. The Canal Act includes prohibitions against the destruction of, damage to, or pollution of the flow of water in any canal or drainage work.

The Ports Act (1908) concerns waste management in the port or the rivers. This act requires that the port, river and bank be kept clean; it prohibits the removal of protection from the bank or shore of the port. Under the Ports Act, drastic actions are being taken by port and local authorities against leakage of fuel and oil from vessels and willful disposal of waste into water. The port authorities also prevent danger to public health from any infectious or contagious disease from the vessel arising at, or being in, any such port, and the conveyance of infection or contagion by means of any vessel sailing from such port.[39] This Ports Act prohibits throwing of ballast or rubbish or any other thing likely to form a bank or which shall be detrimental to navigation, into either the port or upon any place likely to be washed by the tides, storm or land flood.[40]

The Defile Traffic Act (1907) includes the provisions to prevent river traffic danger on the Ayeyarwady River between the village of Sinbo, Myithkyina District, and the town of Bahmo District.[41]

The Inland Water Vessel Law (2015) requires vessels to make systematic checking, storage and transport of dangerous goods.[42] The Law prohibits any person taking or delivering any luggage or parcel of dangerous goods on board a vessel without giving notice of their nature to the owner or master of the vessel.[43] The Law also prohibits the disposal of engine oil, chemicals, fumes, pollutant substances and other materials which may cause environmental damage into inland waterways.[44]

Port Authority Law (2015) assigns the authority to carry out the distribution of information and technology, taking precautionary measures not to cause oil spills from vessels which carry petroleum, oil and chemicals plying within the port boundary, or from oil test wells, and oil pipelines, or from collision and grounding of vessels.[45] If an oil or chemical spill occurs, such authority shall arrange and carry out in coordination with the experts on water pollution, clearing and sanitation. In doing so,

the cost may be claimed from the responsible person in accord with the stipulations.[46]

The Motor Vehicle Law (2015) requires the motor vehicle board to check the motor vehicle, before issuing a registration certificate, whether it emits gas pollution or oil spill on the road. *The Highways Law (2000)* and *Fast Highways Law (2015)* provide provision to prevent pollution.

Natural Disaster Management Sector

In the Natural Disaster Management sector, the salient Myanmar laws include Myanmar Insurance Law (1993), Natural Disaster Management Law (2013), Natural Disaster Management Rules (2015) and Myanmar Fire Services Law (2015).

National Disaster Management Law (2013) supports the implementation of disaster management interventions. The Law provides for the management for reduction of natural or man-made accidents or negligence, including landslides, floods and erosion, fire, earthquakes and so on.[47]

Hazardous Waste Management Sector

The Prevention of Hazards from Chemical and Related Substances Law (2013) is the central law of chemicals management in Myanmar. This law states that a person who wants to operate chemicals and related substances business shall apply to obtain a license in accordance with the stipulations. Moreover, this law stipulates that when chemicals and related substances are to be transferred, stored, used or disposed of, an operating approval certificate should be obtained in accordance with the regulations based on the international treaties.

The Prevention of Hazard from Chemical and Related Substances Rules (2016) specify the duties and powers for the different authorities and regulate how license holders and applicants shall comply with these. It also has regulations on how to control banned chemical and related substances and inspections.

Conclusion

In conclusion, Myanmar has made some progress in developing a set of policies, laws and regulations to define the framework for environmental management. There also exist related laws and regulations to protect the

environment. Nevertheless, some of them were enacted before gaining independence in 1948 and they were primarily prevention-oriented with less emphasis on conservation and sustainable use. On the one hand, recent laws enacted by a number of ministries constitute elements or provisions that are directly related to environmental conservation and protection.

The existing laws, however, do not provide detailed and specific mechanisms for the implementation system, for establishing funding resources and capacity building for human resources in respective fields. There also is no clear provision to raise public awareness. Therefore, Myanmar urgently needs to raise environmental awareness of the public at the national level in order to effectively implement the different pieces of legislation concerning environment and development. Moreover, it is suggested the government and Ministry of Education teach basic environmental education to the classes at basic and higher education levels within the country. The rule of law, independent judiciary and good governance in general and as special cases in environmental issues are crucial concerns. Last, but not least, public participation in decision-making on environmental matters should be considered in each and every case concerning the environment.

Appendix

International Environmental Instruments Entered into by Myanmar[48]

Air and Climate Change	UN Convention to Combat Desertification (UNCCD), Paris, 1994 (Accession, 1997) UN Framework Convention on Climate Change (UNFCCC), New York, 1992 (Ratification, 1992) Kyoto Protocol to the Convention on Climate Change, Kyoto, 1997 (Accession, 2003) Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985 (Ratification, 2003) Montreal Protocol on Substances That Deplete the Ozone Layer, Montreal, 1987+ amendments (Ratification 1993, 2012 for recent amendments) ASEAN Agreement on Transboundary Haze Pollution, Kuala Lumpur, 2002 (Ratification, 2003)

Pollution Control	Stockholm Convention on Persistent Organic Pollutants (POPs), Stockholm, 2001 (Accession 2004) Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, Basel, 1989 (Accession 2015) International Convention for the Prevention of Pollution from Ships (MARPOL), London, 1973 amendment in 1978 (Accession 4/8/1988) ASEAN Agreement on Transboundary Haze Pollution, Kuala Lumpur, 2002 (Ratification 2003)
Outer Space	Vienna Convention for the Protection of the Ozone Layer, 1993 (Accession, 1993) Montreal Protocol on Substances That Depletes Ozone Layer, 1993 (Accession, 1993) Treaty on the Non-Proliferation of Nuclear Weapons, 1992 (Accession, 1992) Copenhagen Amendment to the Montreal Protocol on Substances That Deplete the Ozone Layer, 2009 (Accession, 2009) Convention on the International Civil Aviation Environmental Protection
Biodiversity and Natural Resources	Convention on Biological Diversity (CBD), Rio de Janeiro, 1995 (Ratification, 1995) Cartagena Protocol on Biosafety to the CBD, Cartagena, 2000 (Ratification, 2008) Nagoya Protocol on Access and Benefit Sharing (ABS) to the CBD, Nagoya, 2010 (Accession, 2004) Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington, D.C., 1973+ amendment (1979 Bonn, Germany) (Accession, 1997) Agreement on Establishment of ASEAN Regional Centre for Biodiversity (Ratification, 2009) ASEAN Agreement on the Conservation of Nature and Nature Resources, Kuala Lumpur, 1985 (Signatory, 1997)
Biodiversity and Natural Resources	Ramsar Convention on Wetlands of International Importance Especially Water Flow Habit, 1971+ amendments 1982 and 1987 (Ratification, 2005) Agreement on the Networks of Aquaculture Centers in Asia and the Pacific Region, 1990 International Tropical Timber Agreement (ITTA), 1996 (Signatory, 1997) Convention on the Law of the Sea, 1996 (Ratification, 1996)

Cultural Heritage	The Convention for the Protection of the World Culture and Natural Heritage, Paris, 1972 (Acceptance, 1994) Declaration on ASEAN Heritage Parks (Signatory, 2003)

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11. Ibid., s.7 (o).
12. Environmental Conservation Law 2012, s.13 (d, e, f).
13. Ibid., s.21.
14. Ibid., s.26.
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17. The Environmental Conservation Rules 2014, rr. 51–53.
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21. Ibid.
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25. The Yangon Municipal Act, 1922, s.118.
26. The City of Yangon Municipal Law 2013, s.19 (e).
27. Ibid., ss.58 (j), 63 (l) (q).
28. Forest Law 1992, s. 5(a).
29. Forest Rules 1995, r.60.

30. The Protection of Wild Life, Wild Plants and Conservation of Natural Areas Law 1994, s.3 (b).
31. Factory Act 1951, s.3.
32. The Union of Myanmar Private Industrial Enterprises Law 1990, s.11 (c).
33. The Myanmar Mines Law 1994, s.3.
34. Myanmar Mines Rules 1996, rr.69, 70, 71,72, 73, 105,106.
35. The Conservation of Water Resources and Rivers Law 2006, s.3.
36. Ibid., s.33.
37. The Obstruction in Fairways Act 1881, s.2.
38. Ibid., s.8.
39. The Ports Act 1908, s.6.
40. Ibid., s.21.
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42. The Inland Water Vessel Law 2015, s.27.
43. Ibid., s.28.
44. Ibid., s.34.
45. Myanmar Port Authority Law 2015, s.23(b).
46. Ibid., s.23 (c).
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Myanmar Fire Services Law 2015

National Forestry Action Plan 1995

Myanmar Gemstone Law 1995

Myanmar Hotel and Tourism Law 1993

Myanmar Insurance Law 1993

Myanmar Investment Law 2016
Myanmar Marine Fisheries Law 1990
Myanmar Mines Law 1994
Myanmar Mines Rules 1996
Myanmar Pearl Law 1995
Myanmar Port Authority Law 2015
Myanmar Special Economic Zone Law 2014
The Animal Health and Development Law 1993
The Atomic Energy Law 1998
The Canal Act 1905
The City of Yangon Municipal Act 1922
The City of Yangon Municipal Law 2013
The Community Forest Instruction 1995
The Conservation of Water Resources and Rivers Law 2006
The Conservation of Water Resources and River Rules 2013
The Control of Smoking and Consumption of Tobacco Product Law 2006
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The Embankment Act 1909
The Emergency Provisions Act 1950
The Environmental Conservation Law 2012
The Environmental Conservation Rules 2014
The Environmental Impact Assessment Procedure 2015
The Explosive Act 1887
The Explosive Substances Act 1908
The Factories Act 1951
The Fast Highways Law 2015
The Fertilizer Law 2002
The Format and Guidelines for District Forest Management Plans 1996
The Forest Law 1992
The Forest Rules 1995
The Highways Law 2000
The Freshwater Fisheries Law 1992
The Land Acquisition (Mines) Act 1885
The Law relating to Aquaculture 1989
The Law relating to Fishing Rights of Foreign Fishing Vessel 1989
The Law relating to Private Health Care Services 2007
The Motor Vehicle Law 2015
The National Code of Practice for forest Harvesting 2000
The National Drug Law 1992

The National Environmental Quality (Emission) Guidelines 2015
The National Food Law 1997
The Natural Disaster Management Law 2013
The Natural Disaster Management Rules 2015
The Nay Pyi Taw Development Law 2009
The Obstruction in Fairways Act 1881
The Oilfield Act 1918
The Penal Code 1861
The Pesticide Law 1990
The Petroleum Act 1934
The Plant Past Quarantine Law 1993
The Prevention and Control for Communicable Disease Law 1995
The Prevention of Hazard from Chemical and Related Substances Law 2013
The Prevention of Hazard from Chemical and Related Substance Rules 2016
The Private Industrial Enterprises Law 1990
The Protection and Preservation of Cultural Heritage Region Law 1994
The Protection of Wild Life, Wild Plats and Conservation of Natural Areas Law 1994
The Poison Act 1919
The Police Act 1945
The Ports Act 1908
The Republic of the Union of Myanmar Constitution 2008
The Salt Enterprise Law 1992
The Science and Technology Development Law 1994
The Territorial Sea and Maritime Zones Law 1977
The Traditional Medicine Law 1996
The Underground Water Act 1930
The Union of Myanmar Public Health Law 1972
The Yangon Municipal Act 1922
The Yangon Police Act 1899
The Yangon Water-works Act 1885
The Water Power Act 1927

CHAPTER 18

Effects of Rural-Urban Migration on Agricultural Production in Taungdwingyi Township, Magway Region, Myanmar

Khine Myint Cho, Kyaw Kyaw, and Phyu Phyu Khaing

Introduction

In Myanmar, agriculture is the main economic activity in rural areas. Approximately, 70 percent of the total population live in rural areas in which the main source of livelihood is based on agriculture. In recent years, people from rural areas in Central Myanmar have left their farms behind and have gone to the cities or abroad in search of better livelihoods. The results of the movement of people from these areas can affect their economy. So, geographers are worried about the migration patterns of rural areas. Thus, they started to investigate *where* people migrate from and *where* they migrate to, whereby the process of migration is subcategorized into immigration and emigration. Immigration is the migration to a location and emigration is migration from a location. The difference

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between the number of immigrants and emigrants is the net migration. '*Migration is defined broadly as a permanent or semi-permanent change of residence. No restriction is placed upon the distance of the move or upon the voluntary or involuntary nature of the act, and no distinction is made between external and internal migration*'.[1] These migration patterns have been found in many areas in Myanmar, especially in the study areas.

There are three main factors, such as economy, culture and environment, which influence migration. The principal cause of migration is due to economic reasons. People decide to migrate because of push and pull factors. Here, a push factor includes people moving out of their present location, whereas a pull factor refers to people moving into a new location. In this study, people migrate from rural areas to urban areas and developed regions due to the low profits to be made from their farms, the lack of job opportunities in their regions and the poor education and healthcare systems. These push factors make them move to other places where they can find better chances for their lives. Consequently, people migrate to urban areas and developed regions. They want to seek more opportunities to enrich their future. In urban areas, they can access higher standards of living such as better facilities for education, better health care and higher job opportunities than in rural areas. Thus, urbanization and industrialization become pull factors for those people. Apart from the movement to urban areas, people in the case study areas also migrate to foreign countries to improve their income levels. Hence, economic factors are important elements in the process of immigration and depopulation.

Aim and Objectives

It is the aim of this study to identify the effects of rural to urban migration on the agricultural production. The specific objectives are to investigate the reasons for the migration, to analyze the distance of migration and to examine the characteristics of migrants.

Study Area

In Magway Region, in the Central part of Myanmar, about 85 percent of the total population live in the rural areas. Taungdwingyi Township is situated in this region, located between north latitudes 19° 47′ and 20° 14′ and east longitudes 95° 28′ and 98° 48′. The area of Taungdwingyi Township is 1988.4 square kilometers (760 square miles). Taungdwingyi Township has

10 wards in the urban area, 72 village tracts and 275 villages in the rural areas. Satthwar, Chaungnet and Lethar-2 village tracts have been selected for the case study areas in Taungdwingyi Township (Fig. 18.1). The first one, Satthwar Village Tract, is located along the Yangon-Magway Highway 31 kilometers (12 miles) away from Taungdwingyi Town. The total population of Satthwar Village Tract is the fourth largest in the rural area. The second area is Chaungnet Village Tract which is 15.5 kilometers (6 miles) away from Taungdwingyi Town. It is also located along the Yangon-Magway Highway. The total population is the third largest among the villages. The third one is Lethar 2 Village Tract which has the tenth largest population in this area. It has the highest amount of migration in Taungdwingyi Township.

Data and Methods

This chapter is intended to investigate the causes of rural-urban migration in the study areas. The general conditions of the migration pattern and its effect on the study areas are investigated by field observation and structured interview methods in these areas. Primary and secondary data collected from the study areas are used. Secondary data from various rural offices and primary data from field observation and structured interview questionnaires were collected from 180 households in the study areas, including 61 households in Satthwar village tract, 41 households in Chaungnet village tract and 58 households in Lethar-2 village tract. By means of the structured interview method, the information of the migrants was compiled from their family members. Through the data collected from these three areas, it is clear how the rural-urban migration impacts on the economy of the study areas. Qualitative analyses supported the description of the advantages and disadvantages of rural-urban migration.

Reasons for Migration

People move from one place to another for a lot of reasons mostly as a result of economic, social, political or environmental factors. In this chapter, the economic and social factors are the main reasons driving migration in the study areas. In the context of labor migration, push factors are often characterized by the lack of job opportunities in sending areas or countries, and pull factors are the economic opportunities presented in receiving areas or countries.[2] Pull factors and push factors which cause people to migrate are prevalent in the study areas.

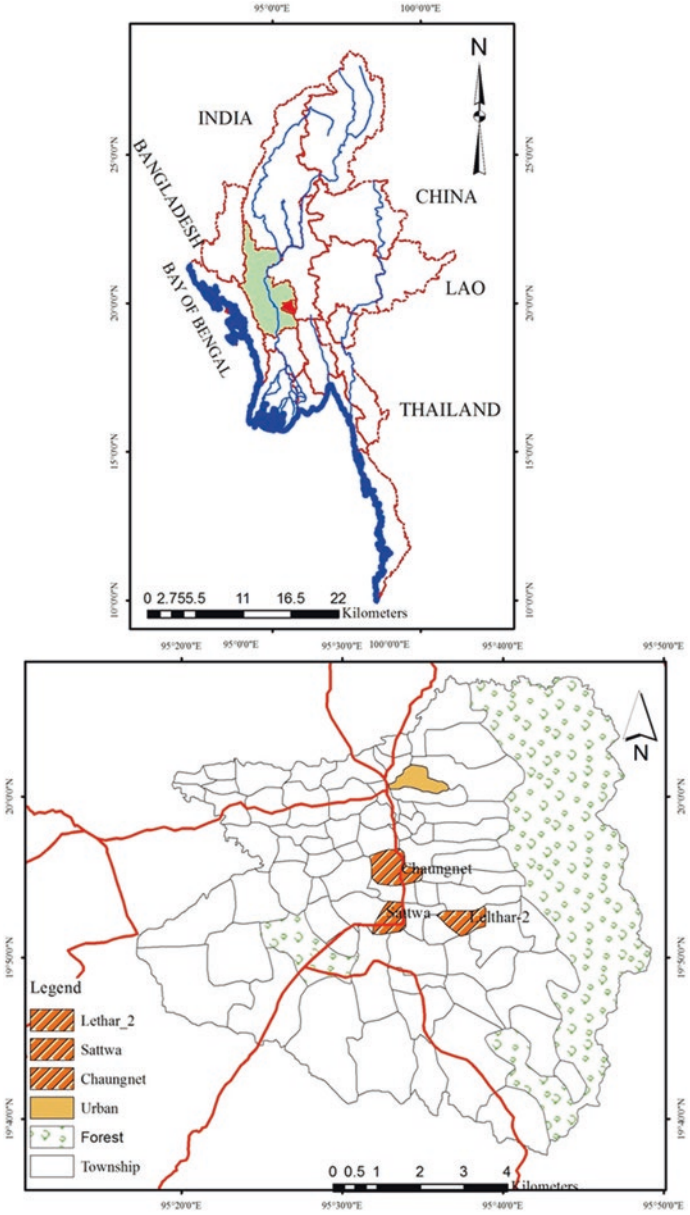

Fig. 18.1 Location of study area in Taungdwingyi Township. (Source: General Administrative Office, Taungdwingyi Township)

Push Factor Migration

First of all, one of the main push factors for migration is the economic condition in the study areas. It is apparent in different forms such as low profits in farm production, low wages and fewer job opportunities in the study areas. The poor economic condition of the study areas is the main motivation behind the migration.

In the study areas, about 80 percent of people are farmers: some farmers own less than five acres (2.02 hectare) of land, but many do not have their own farms. The profits of the farm owners have been gradually decreasing year by year because of the changes in weather patterns, high expenditure on farm inputs and fluctuations in the farm output price. In the dry zone, rain is an essential factor for farming. Crops cannot get the required amount of water in their early stages because of the bad weather or irregular rainfall. In this situation, farmers lose their crops because of drought. Sometimes, rain is too heavy in their blooming time or during the harvest season. At that time, crops are destroyed by the heavy rain. The results of the weather pattern changes lead to low farm productivity. As a result, farmers lose their investment, they cannot save their income for sustenance and they cannot provide adequate supplies for their family. Although the government gives subsidies to farmers, their loans are not enough for farming. For this reason, farmers try to obtain capital from private money lenders, paying exorbitant interest rates to get a loan. They have to pay interest from 10 to 15 percent on loans to those lenders. These interest rates have led the farmers to sink into debt, either when crop prices fall or when unexpected disasters occur. As a result, some younger family members of those farmers who own farms or of those who do not, in the age group 20–40 years, become interested in seeking jobs in city areas or in other countries.

The second factor is income variation which is a significant one that causes rural-urban migration. In rural areas, farm workers have to work during the cultivation and the harvest times. Farm owners have to work on their farms for eight to ten months per year; landless people get part-time jobs in farming activities. For landless people, their income per day is 3500 kyats for a man and 3000 kyats for a woman. For about 20 or 25 days per month during the growing and harvest times, their income may be about one lakh or less. Apart from the growing and harvest times, they do not have any regular income for the rest of the year. On the other hand, some farmers have big family sizes with many dependents. So, their income becomes insufficient to support the whole family, including education and health expenditures. But, some have only a few dependents. Although

they have enough income to live, they do not have extra cash for saving. So, these people in the rural areas want to move to new places to get well-paid jobs to support their families.

Third, the high dependency ratio is also a push factor for migration. The number of dependents in a family is related to the family income. The higher the number of family members, the more income they need. If they have enough income, they can supply what their family members need, including education or health costs. Some families cannot depend only on the adults' income. Thus, both boys and girls under 18 years have to work to increase their family income. They have to go to the urban areas or the foreign countries. In Myanmar, those under 18 years are regarded as child labor. So, they are not allowed to be part of the workforce. They work as informal workers such as housemaids, babysitters and waiters and waitresses at teashops and sales assistants in retail shops. Within the country, their average income is about 20,000 to 50,000 kyats per month. For adult workers with no education, their wages may be about 4000 kyats per day or one lakh per month. They have to work as general workers in construction sites, as security guards, industrial workers and so on. But, some adult workers migrate to neighboring countries, especially Thailand, Malaysia and Singapore. They get about two or three lakhs per month, and they send about one or two lakhs per month to their families in the study areas. These are the reasons why most people in rural areas are interested in working in other places away from their homes. All these factors push people in the study areas to migrate to the urban areas or other neighboring countries in search of work.

Pull Factor Migration

Social and economic opportunities are the key pull factors for migrants. The wages of people in rural areas are quite different from those of people in urban areas or in foreign countries. People hope to get the highest wages and they want to save money for their future. So they seek better opportunities to improve their lives. As a result, the more these opportunities are desired, the higher the rate of rural-urban migration.

In the study areas, most people go and work in Yangon, Naypyitaw and Mandalay, Thailand and Malaysia. Within the country, Yangon, Naypyitaw and Mandalay are the attraction points for the people in rural areas. Yangon, the old capital city, is a commercial city which is the most densely populated in Myanmar. It has better healthcare services, education and job opportunities for people who thirst for them. Migrants from other states in Myanmar believed that they will get better job opportunities by moving to Yangon;

therefore, Yangon has become an attraction point for migrants from other states. As a result, many migrants from other regions in Myanmar have moved to Yangon. They hope to get better opportunities such as well-paid jobs, good education and healthcare services. If they get well-paid jobs, they can support their families as well as save money for their future. Therefore, the largest number of migrants in the study areas can be found in Yangon.

The second attractive place for migrants is Naypyitaw, the capital city of Myanmar, founded in 2005. Most of the government offices were moved to Naypyitaw from Yangon. There are a lot of construction sites such as government buildings, hotels, guest houses, restaurants where a number of workers are needed to work there. During the last few years, there has been an enormous increase in the number of migrants in Naypyitaw. The second largest number of migrants in the study areas is found in Naypyitaw because it offers more job opportunities and the wages are higher than those of rural areas.

Besides Yangon and Naypyitaw, Mandalay is the third attraction point for migrants. It is the second largest business center in upper Myanmar. In the study areas, one fifth of the total population of migrants move to Mandalay. The numbers of migrants in Mandalay are fewer than those in Yangon and Naypyitaw.

For international migration, Thailand and Malaysia are also attractive points for people from the rural areas. People from these areas can get jobs easily there. These countries need unskilled workers in many sectors, including agriculture, manufacturing and some service work, especially domestic and construction work. In Thailand, migrant workers have to work in fishery, agriculture, construction sites, restaurants and domestic work. The wages of Thailand are ten times higher than what workers can get in Myanmar. So, if these migrant workers get jobs in foreign countries, they can send money, one or two lakhs per month, to their home. Some job agencies persuade people from the study areas to go and work overseas. As a consequence, some people become interested in working in foreign countries.

Internal and International Migration

People move to a new area or country in order to find work or better living conditions. Some move within their own country but some go to other countries. Their migrations are either internal or international. Internal migration means that people move from urban to rural or from rural to urban, and from rural to rural. International migration means the movement of people from rural or urban areas to other countries. Both internal and international migration can be found in the study area.

According to the Population Census of Myanmar, 2014, the distribution of total migration from different states of Myanmar (Fig. 18.2) shows that Yangon Region has the highest percentage of total migrants with 33.7 percent in Myanmar. Mandalay, Chin and Ayeyarwady Regions have the second highest rate of total migration at nearly 20 percent of their respective population working or living abroad. In Magway Region, 15.6 percent of the total migration is living abroad.

According to the table 18.1, the total number of internal migrants is larger than that of international migrants for both the entire Myanmar and the entire Magway Region. But, the numbers of international migrants of the study area are higher than the internal migrants of the study area. This is possibly due to news given by those working overseas to those back home on better working conditions and relatively higher pays. These international migrants have informed them about their improvements in living and working conditions. Some international migrants send more money to their families than internal migrants do. Mostly good news sent by international migrants to those back at home and the high rates of remittance have certainly served as encouragement for many to move overseas for employment. This is why most migrants are interested in moving to foreign countries such as Thailand and Malaysia (Table 18.1).

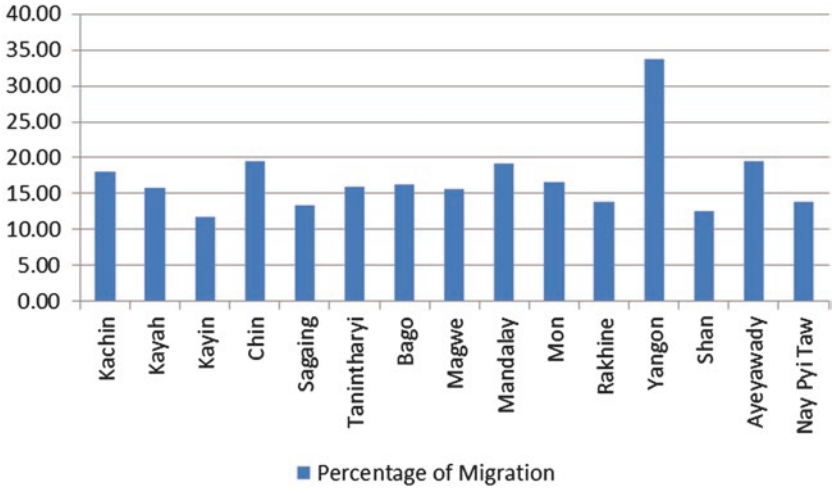

Fig. 18.2 Distribution of migration from abroad to Myanmar. (Source: Population Census of Myanmar, 2014)

Table 18.1 Internal and international migration

Location	*Type of migration*			*Percent of migration*	
	Internal	*International*	*Total*	*Internal*	*International*
Myanmar	7,369,216	2,021,910	9,391,126	78.47	21.53
Magway	526,574	84,422	610,996	86.18	13.82
Taungdwingyi	Not available	4464	4464		
Study area	646	999	1645	39.27	60.73

Source: Population Census of Myanmar in 2014 and Rural Administrative Office of Study Area 2015

*Study area—Chaungnet, Satthwar and Lethar 2 Village Tracts

In the study area, people migrate to nearby places within the same region, Magway Region, such as Taungdwingyi, Satthwar village. Most people migrate to other villages due to marital ties with people from distant villages. Satthwar village has the highest number of migrants from rural to rural migration from nearby villages. This village has a basic education high school, private training schools and hostels, a wholesale center for seasonal products. The wholesale center needs many workers in summer. Some workers from other areas come and work in this village because of its seasonal products. So, seasonal migration is found in this village. Both part-time workers and permanent workers from other areas work in this village.

Chaungnet is located along the Yangon-Pyay Highway road and Magway-Naypyitaw highway road. In the study areas, most farm owners need to work in their farms, because after 2010 some people who were skillful in farm work went to the urban areas or foreign countries. Thus, farm workers from nearby villages migrated to fill the gaps by working in agriculture activities.

Within the country, people from different regions migrate to Yangon, Mandalay and Naypyitaw because of job opportunities, education and health services. In the same way, people from the study areas are also interested in these cities. According to the field survey in 2015, there are 150 migrants from Chaungnet village; 92 went to Yangon, 49 to Naypyitaw and 9 to Mandalay (Table 18.2). They migrated from rural to urban areas, whereas 61 migrants went from rural to rural areas. In Satthwar village, of 159 migrants, 51 went to Yangon, 58 to Naypyitaw and 50 to Mandalay. The numbers of migrants from Satthwar village are more than those of Chaungnet. There are 25 people from Lethar 2 village who moved to Naypyitaw. In the study areas such as Chaungnet, Satthwar and Lethar 2 villages, 334 people migrated to

Table 18.2 Gender of migrants in Myanmar

Gender	*Myanmar*		*Magway*		*Taungdwingyi*		*Study areas*	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Male	4,453,017	47.4	295,150	48.3	–	–	1094	66.5
Female	4,938,109	52.6	315,846	51.7	–	–	551	33.5
Total	9,391,126		610,996				1645	
Internal								
Male	3,219,849	43.7	229,127	43.5	–	–	302	46.7
Female	4,149,367	56.3	297,447	56.5	–	–	344	53.3
Total	7,369,216		526,574				646	
International								
Male	1,233,168	61.0	66,023	78.2	3620	81.0932	792	79.3
Female	788,742	39.0	18,399	21.8	844	18.9068	207	20.7
Total	2,021,910		84,422		4464		999	

Source: Population Census of Myanmar in 2014 and Rural Administrative Office of Study Area, 2015

the cities, Yangon, Mandalay and Naypyitaw. Among these three villages, Satthwar village has the highest numbers of emigrants.

The international migration pattern is also found in the study areas. They migrated to such countries as Thailand, Singapore, Malaysia, China, the United States and the United Kingdom. Large numbers of migrants moved to Thailand and Malaysia, because these countries need many workers for industrialization and urbanization. According to the Census of Myanmar, 2014, 70 percent of total migrants from Myanmar can be found in Thailand. About 43.4 percent of the total migrants are from Magway Region. A higher percentage of migrants from Magway Region moved to Thailand than to Malaysia and China (Fig. 18.3).

The reason for the international migration is the fact that the wages they get from their own country are much lower than wages in those countries. The migrants get higher wages in other countries than they do in Myanmar. So, they can support their families well. According to field observation and interviews in 2015, the number of migrants moving to these countries increased after 2010. In the study areas, over 600 people migrated to Malaysia and over 200 people to Thailand (Census of Myanmar 2014).

The percentage of international migration of Lethar 2 Village is higher than the others (Fig. 18.4). The wages of the migrants from these countries are so high that they can provide better supplies to their family. Thus, migration to other countries becomes popular in these study areas.

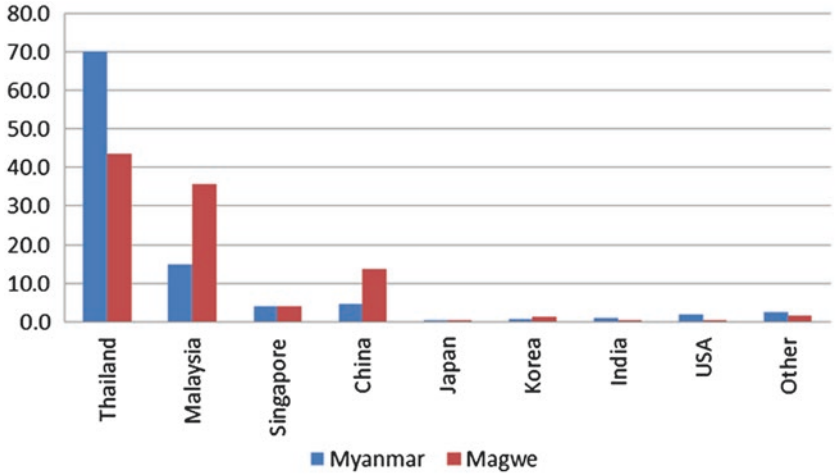

Fig. 18.3 International migration of Myanmar and Magway Region. (Source: Census of Myanmar 2014)

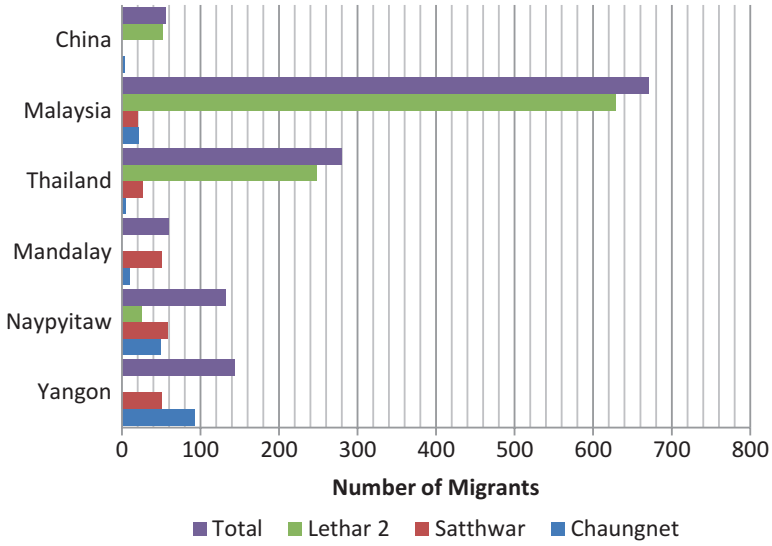

Fig. 18.4 Internal and international migration in the study areas. (Source: Field observation and interview in 2015)

Characteristics of Migrants

According to the population census of Myanmar in 2014 and data from the rural administrative office in the study area in 2015, 52.6 percent of total migrants moving out of the area are females and 47.4 percent are males. The numbers of female migrants are more than those of males. For internal migration, the numbers of female migrants are higher than those of males (Table 18.2). Ravenstein's laws stated that 'females are more migratory than males within the kingdom of their birth, but males move more frequently abroad'.[3] Thus, for international migration, the numbers of male migrants are higher than those of females. This is because women have to take care of their families and some are not allowed to go to other countries by their family members. So, culture, environment and language are large barriers for female migrants. In the study areas, the high number of female migrants can be seen in internal migration. But, in international migration, 79.3 percent of males and only 20.7 percent of females are found in the study area. The numbers of male migrants are higher than female migrants. As a result, farmers in the study encounter a number of difficulties in their farming because they cannot hire skilled farm labor. If they get some workers, those workers do not have enough skills. A shortage of skilled labor in agriculture activities has caused a huge impact on farm production.

The age groups of migrants are not the same depending on the location where they migrate, internal or international. Most migrants are over 20 years old and under 40 years old. In the study areas, the highest numbers of migrants are between 20 and 24 years. The second and third highest of migrants are in the 25 and 29 years of age group and the 35 to 39 years age group. Education levels of migrants are mostly primary and middle school level in the study areas. A few migrants have graduated. Although there are elderly persons over 44 years and children under 15 in the study areas, they cannot work in farm production. Besides, some laborers from these areas have moved to other areas. As a result, the high percentage of migration in these rural areas can cause a great impact on agriculture activities and farm production.

Discussion and Suggestions

People migrate from their native areas to other areas due to constant need. They want to seek better opportunities such as jobs, health and education and social standard. These better chances attract people from the rural

areas to urban or foreign countries. Poor infrastructure, inadequate job offers, bad educational chances and poor healthcare services push people from their native area to other areas. These factors influence the movement of people in the world.

In the case study, the focus areas included three village tracts. The main reason for migrants to leave is the economic reason. Most people are farmers and they did not have a regular income and received only a low profit for their farm products. Climatic conditions, high investments and fluctuation of farm products prices and increasing wages of labor affect farm profits. Although they try hard in their farming, they cannot get profit from their farms. Therefore, they move to the cities and foreign countries. The wages they get from their areas are quite different from the cities and foreign countries.

If Small and Medium Enterprises (SME) and job opportunities emerge in the rural areas, rural to urban migration will decrease in these areas. The government has plans for rural development, but these projects are slow and have little effect on development in rural areas. Therefore, large numbers of migrants are a big problem for the agricultural sector and economy of rural areas. Thus, the government must develop new policies to find ways to decrease outward migration from rural to urban, and rural to international.

Notes

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2. AAG Center for Global Geography Education,[website], 2011 http://cgge.aag.org/Migration1e/ConceptualFramework_Jan10/ConceptualFramework_Jan105.html
3. D.B. Grigg, 'E. G. Ravenstein and the laws of migration', *Journal of Historical Geography*, 3, 1 (1977) 41–54.

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CHAPTER 19

Effects of Migration on Two Small Villages Between *Pyalin* and *Gonmin Chaungs*, Pantanaw Township, Ayeyarwady Region

Kyaw Kyaw

Introduction

This study examines the present socio-economic situation of migrants in two native villages in Myanmar and the effects of migration on their households. These migrants do not settle permanently in new areas. Push and pull factors are very important, but these factors may change over time. Where once the conditions of their native village were push factors, later they become pull factors. One of the reasons for migration is the lack of employment opportunities to secure regular income in their villages while the major pull factor is the opportunities for higher income in the areas to where they migrated. The higher incomes enable the migrants to send remittances to their home village and thus contribute to improving the lives of those left behind.

In this chapter, the objectives of our study are to observe the environmental situation, to examine the reasons for migration, to make a demographic analysis of the migrants and to analyse how the migrants earn their

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livelihoods and effects on the environment. Our research questions are: (1) Why do people migrate to other areas? (2) What are the motivations for migrants to send remittances? and (3) What are the effects of migration on migrants?

Methods

For primary data, we took photographs, conducted interviews and questionnaires, and held open discussions within field observations. Data are collected from randomly selected international migrants, that is, those who went abroad and have now returned to their native villages. Primary data are derived from field observations and open discussions with migrants. These data are analysed by utilizing both quantitative and qualitative techniques. Secondary data are obtained from relevant departments; map sources are derived from the Myanmar Survey Department and Google Earth.

Questionnaires include background information, reasons for migration (out-migration and in-migration), information about the work (current and previous), working conditions in the areas to where they migrated, information about family and plans for the future and so on. This research represents 70 in-depth interviews with international migrants from two small villages in the study area.

General Physical Features of Pantanaw Township

Pantanaw Township is one of the 26 townships in the Ayeyarwady Region. It is located between 16° 48′ and 17° 13′ north latitudes and also between 95° 38′ and 96° 16′ east longitudes. Its neighbouring townships are Danubyu township in the north and northeast, Nyaungdon Township in the east and northeast, Maubin Township in the east and southeast, Wakema Township in the south, Einme Township in the southwest and Kyonepyaw and Kyaunggon Townships in the west and northwest. It has an area of about 1292 square kilometres and consists of 52 village tracts and 442 villages (Fig. 19.1).

Pantanaw Township is a plain area in the central part of the Ayeyarwady Delta. The main rivers are Ayeyarwady River, Pantanaw River and Shwelaung River. Pantanaw Township is subject to regular flooding during the rainy season. Embankments along the rivers protect the cultivated crops from flooding. However, these are frequently broken by floods, leading to loss of agricultural lands and villages.

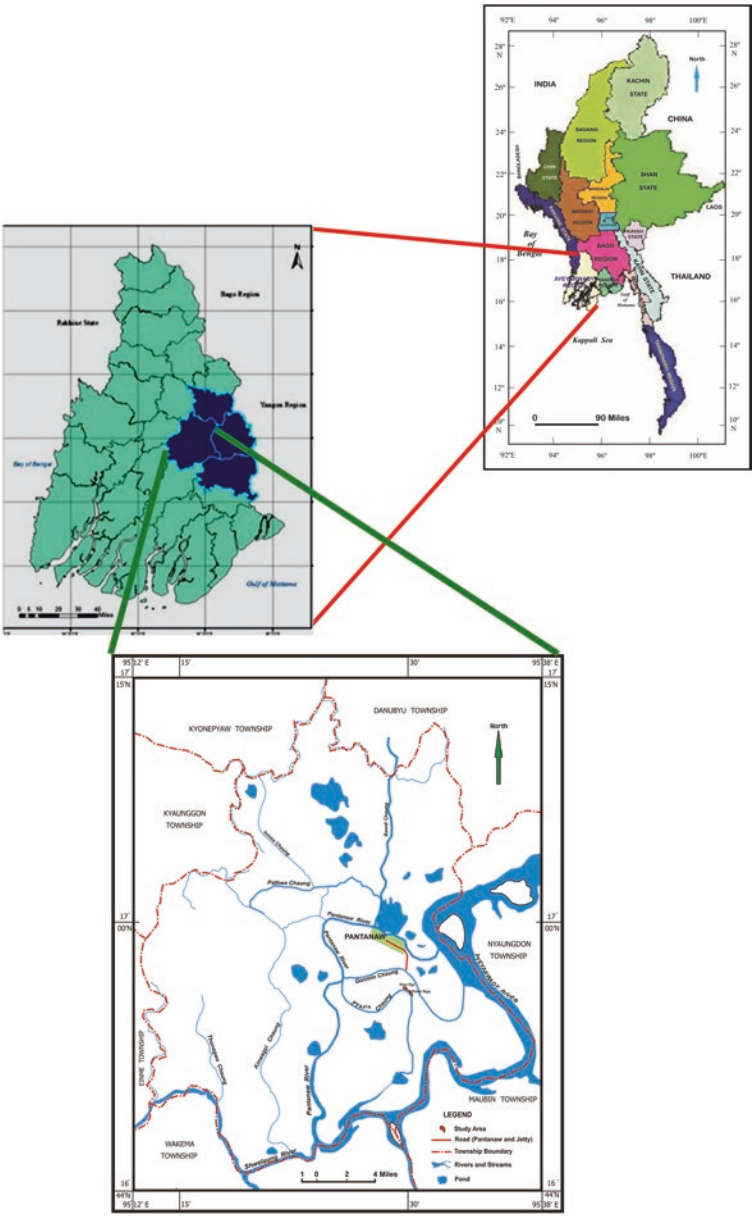

Fig. 19.1 Location of study area. (Source: based on Myanmar Survey Department, Yangon)

Pantanaw Town has no meteorological station; climatic data are derived from Maubin Meteorological Station, which is over 30 kilometres away from Pantanaw town. The average monthly maximum temperature is 31.8 °C, the average mean monthly temperature is 26.8 °C and the average monthly minimum temperature is 21.8 °C. April is the hottest month of the year. The maximum temperature is 37 °C in April while the minimum temperature is 16.7 °C in January. Pantanaw Township experiences a slightly moderate temperature condition.

Pantanaw receives its rainfall during May to October. The total annual rainfall of Pantanaw Township was 2280 mm in 2015. The highest rainfall is 519 mm in July. The climate of Pantanaw Township is a tropical monsoon climate (Am) (Table 19.1).

Most of the culturable wastelands are still virgin lands, mostly covered by grasses and reeds. These areas are scattered all over the Township. Most of these lands are waterlogged areas which generally lie in distant places away from settlements. Although these lands are classified as wastelands, some of these wastelands contain good fishing grounds. The availability of reeds and fishes provides the villagers with commercial products. Reed, like *Dhani*, is a valuable plant for the rural population. Reed mats (*Thin* = *Clinogynedichotomata*) are used in several ways. They are used as a house wall for poor people who cannot afford bamboo or timber. They can also be used as placemats.

General Background of Study Area

The study area is located between *Pyalin Chaung* and *Gonmin Chaung* (Fig. 19.2). It consists of Hse Gyi village and Yone Ngu village, situated on the bank of the *Pyalin Chaung*, a tributary of the Pantanaw River. *Pyalin Chaung* flows from west to east and turns south to enter the Ayayarwady River. *Gonmin Chaung* is a distributary of Ayeyarwady River and flows from east to west. It then enters into the Pantanaw River. The study area is subject to regular flooding during the rainy season and has no embankments along these *Chaungs*. The linear distance between these two villages and Pantanaw Town is nearly eight kilometres, but the time distance is nearly two hours by waterway transportation along *Pyalin Chaung* and *Gonmin Chaung* and one hour by earth road using a motorcycle during the dry season. During the rainy season, time taken is over one hour by waterway transportation. Hse Gyi and Yone Ngu villages are linked to earth road and the time distance is nearly five minutes. Most of

Table 19.1 Climatic data of Maubin Township, 2015

	Jan	*Feb*	*Mar*	*Apr*	*May*	*June*	*July*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*	*Total/Avg.*
Rainfall (mm)	2	5	9	27	262	432	519	469	330	155	54	10	2280
Minimum temp (°C)	**16.7**	16.8	20.0	23.2	24.4	24.3	24.2	24.1	24.2	23.5	21.7	18.3	21.8
Mean temp (°C)	**23.5**	25.0	27.8	30.1	29.0	27.3	26.9	26.8	27.2	27.4	26.4	23.9	26.8
Maximum temp (°C)	30.3	33.2	35.7	**37.0**	33.7	30.3	29.6	29.5	30.3	31.4	31.1	29.5	31.8

Source: Meteorology Department of Maubin Township

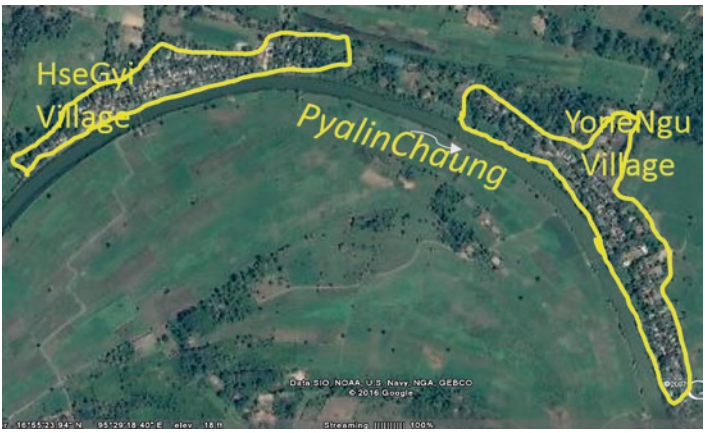

Fig. 19.2 Study area along *Pyalin Chaung*. (Source: Based on Google Earth, 2016)

the inhabitants are Kayin, whose religion is Buddhism. The total population was 215 persons in 2010 and 274 persons (135 males:139 females) in 2014. Of this population, 83 males and 76 females are over 18 years. There are about 106 houses in Hse Gyi village. Yone Ngu village has 284 persons (145 males:139 females) and 125 houses. Of this population, 79 males and 87 females were over 18 years in 2014.

Agriculture is the major economic activity in this area, but only cool season crops such as pulses and chilli are grown in the dry season. Hse Gyi village and Yone Ngu village have no paddy land; most of the lands are *Kaing* lands and small areas of garden land. This area has no embankment along *Pyalin Chaung and Gonmin Chaung*. *Kaing* lands are situated near rivers and streams. These are usually inundated by flood water during the rainy season. When the flood water subsides, the deposition of silt creates fertile *Kaing* lands.

Kaing crops are pulses, chilli, groundnut and sunflower. The cultivation of these crops is very important in this region. But these *Kaing* crops such as chilli occupy a very small area because they need more input and get less output. Garden land includes betel leaf, *Thin*, coconut, mango and others. Among them, betel leaf and *Thin* are very famous in the Ayeyarwady Region. Betel leaf is grown scattered in small high ground near the houses. *Thin* is grown during the rainy season. It is grown by cutting its shoots and transplanting them in a small pit of about 15 or

Table 19.2 Working calendar of crop cultivation in the study area

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Cool Season Crops (Pulses and Chilli)												
Flood duration												
Thin mat-making and Betel-leaf Cultivation												

Source: Based on Field Surveys

20 cm (6 or 8 inches) in diameter and width nearly 1 m (3 feet) apart. After planting, a period of about one year is required for the plant to mature. After one year, *Thin* plants need to be cleared of weeds, creepers and grasses.

Kaing land is the second most important type of agricultural land. *Kaing* crops are cool season crops cultivated during the last week of October and harvested during the last week of April. Most of the villagers depend on cool season crop cultivation, while some rely on *Thin* cultivation related to *Thin* mat-making business (Table 19.2).

Analysis of Causes of Migration

The causes of migration are previous migration experience, relatives' or other family members' migration experience, and many other actors, as indicated in Table 19.3. Working people in the study area do not have year-round employment, especially from the last week of April to last week of October. Most of the working people have no regular income for six months. Some have a relatively small amount of income and depend on cool season crops. Therefore, some of the young working people are keen to migrate to higher income or regular income areas. Finally, they return to their families or relatives. These migrants (the respondents) came back to their native village within the last two to five years and some returned during the last five to seven years.

In this study, each of the 35 international migrants from the two small villages were thoroughly interviewed. All of the migrants were over 18 years of age (see Table 19.4).

Table 19.3 Field survey analysis on migrants

Sr. No.	*Causes of migration*	*Sr. No.*	*Real situation of migrants*
1.	Wish for better income	1.	Enjoy better income
2.	Poverty	2.	Can save money
3.	No investment	3.	Can send remittances
4.	Rare work	4.	Can choose suitable work
5.	Low level of education	5.	Have language difficulty
6.	Depend mainly on cool season crops	6.	More working time
7.	Subject to floods	7.	Very hard work
8.	No ownership of agricultural land and business	8.	Easy to change occupation
9.	Lack of regular income	9.	Division of family members
10.	Vulnerability to weather situations	10.	Strong relationship between friends
11.	Chain migration (based on previous migration experiences of relatives or friends)	11.	Marriage
12.	To upgrade their standard of living	12.	Illegal occupation in migrated areas
		13.	Anxiety over stay or constraints to their living and working
		14.	Homesickness

Source: Based on Field Survey data, June 2016

Table 19.4 Number of respondents in study area

	Hse Gyi		*Yone Ngu*	
	Over 18 years		*Over 18 years*	
	Male	*Female*	*Male*	*Female*
No. of population	83	76	79	87
No. of migrants	32	3	35	0
Percentage of migrants	94	6	100	0

Source: Based on Field Survey Data, June 2016

In Hse Gyi village, according to the field survey data, 94% of the respondents are male migrants. About 14% of the migrants are in the age group 18–25 years, while about 77% are 25–45 years of age. Therefore, about 91% of the working age group (18–45 years) migrated to other countries. Of these respondents, about 57% have primary-level education, 26% have middle school–level and 17% high school–level education.

Table 19.5 Types of occupation in migrated areas

Types of occupation	*Hse Gyi*		*Yone Ngu*	
	No. of workers	*%*	*No. of workers*	*%*
Iced fish work	20	57	26	74
Factory (plastics and ice)	7	20	6	17
Restaurant or shop	3	9	0	0
Related to construction work (esp. masonry)	5	14	3	9
Total	**35**	**100**	**15**	**100**

Source: based on a questionnaire survey, June 2016

According to the field survey data, in Yone Ngu village, 100% of the respondents are male migrants. Nearly 26% of the migrants are in the age group of 18–25 years, while about 74% are 25–45 years of age. Of these migrants, 43% have primary and middle-level education and about 14% have high school–level education. All migrants from the two villages migrated to Thailand and Malaysia via Kawthaung (southern tip of Myanmar).

The respondents are engaged in many different types of occupation within the countries to where they migrated. All of them earn a relatively high income. The situation of their jobs is very tough, physically hard work as well as mentally very tiring. Four types of occupations are shown in Table 19.5.

According to respondents, all types of occupation have very hard working situations. They have no experience and they are not skilled labourers. Working hours per day vary from place to place and job to job. Working hours depend on types of occupation. They work in plastic factories and ice factories. Construction works are related to welding, masonry, carrying bricks and materials in building construction. Some change from one type of occupation to another, such as from construction work to either iced fish work or restaurant, shop or factory. These changes are related to the job situations of friends' and relatives' works (Table 19.6).

According to field data, the duration of previous work in the migrated areas varies from person to person. Fifty-five per cent of the migrants were employed six to eight years, 19% are three to five years, 14% are under three years, 9% are nearly ten years and 3% are approximately 18 years. These migrants have several reasons to return to their native village (Table 19.7).

According to the questionnaires, over 50% of respondents have saved money for their parents, and about 20% of respondents of Yone Ngu village returned to fulfil the desire of their parents. These situations exhibit their strong family ties. About 20% of the respondents of Hse Gyi village

Table 19.6 Working hours per day at the migrated areas

Working hours per day	*Hse Gyi*		*Yone Ngu*	
	No. of workers	*%*	*No. of workers*	*%*
8 hours	18	51	26	74
9 hours	9	26	7	20
10 hours	5	14	2	6
12 hours	2	6	0	0
15 hours	1	3	0	0
	35	**100**	**35**	**100**

Source: Based on a questionnaire survey, June 2016

Table 19.7 Reasons to return to the native village

Reasons	*Hse Gyi*		*Yone Ngu*	
	No. of respondents	*%*	*No. of respondents*	*%*
Have saved money	20	57	24	68
Insufficient income (assumed)	7	20	4	12
Married	6	17	0	0
Health	1	3	0	0
Parents (family tie) or homesick	1	3	7	20
Total	**35**	**100**	**35**	**100**

Source: Based on a questionnaire survey, June 2016

returned as married persons. Some 20% of the respondents of Hse Gyi village explained that they earned insufficient income at the migrated areas. All migrants of Yone Ngu village and about 80% of migrants of Hse Gyi village can send remittances to their relatives such as parents, wives and families in their village. These situations enable them to contribute towards the development of their village through investing in new housing, household needs and investment in economic activities such as agricultural inputs. At present, these migrants are engaged in their traditional agriculture with their own investments. Types of occupation for migrants differ prior to migration and after return to the native village.

The main types of occupation within the two villages are *Kaing* cultivation, *Thin* mat-making and related activities, and cultivation of betel leaf. Other activities include miscellaneous shops, buying and selling commodities and a motorcyclist or boatman. Occupations vary from season to season in the two villages (Table 19.8).

Table 19.8 Occupational conditions of respondents in the two villages

Types of work	*No. of respondents*		*No. of respondents*		*No. of respondents*	
	Prior to migration		*Present*		*Rainy season*	
	Hse Gyi	*Yone Ngu*	*Hse Gyi*	*Yone Ngu*	*Hse Gyi*	*Yone Ngu*
Kaing	21	23	6	8	0	0
Thin mat-making	6	8	17	12	19	12
Betel leaf	3	2	9	10	15	17
Others	5	2	3	5	1	6
Total	**35**	**35**	**35**	**35**	**35**	**35**

Source: Based on a questionnaire survey, June 2016

Prior to migration, over 20 respondents were engaged in *Kaing* cultivation, while 10 persons engaged *in Thin* mat-making, betel-leaf cultivation and so on. At present, 6 persons are engaged in *Kaing* cultivation. Nearly 35 persons of Hse Gyi village do *Thin* mat-making and betel-leaf cultivation in the rainy season. About 30 respondents of Yone Ngu village engage in the above occupation in the rainy season. Types of work for migrants differ between past and present situations.

Conclusion

International migrants interviewed in this research sacrificed for their parents and family. The people of the rural area migrate to high-opportunity areas from low-opportunity areas or low-income areas. This chapter has analysed the reasons for out-migration to other areas and in-migration back to Hse Gyi and Yone Ngu Villages in Pantanaw Township, Ayeyarwady Region; it examines the recent situation of migrants who migrated to Yangon city and Kawthaung, and to Thailand and Malaysia. The majority of migrants have a low level of education and are aged between 18 and 45 years. Each of the 35 migrants (key informants) from these two villages actually embody the causes and effects of migration on their native villages.

There are six reasons to migrate, such as (i) poverty, (ii) rare work, (iii) dependence on cool season crops, (iv) subject to floods, (v) chain migration and (vi) no ownership of agricultural land and business in their village.

There are six factors for migrants returning to their native villages: They (i) have saved money for their family and (ii) send remittances for their family; also, (iii) very tough work which is very tiring physically as well as mentally, (iv) division of family members, (v) marriage and (vi) anxiety over stay permit or constraints to their living and working conditions.

There are many reasons for migration, but only one factor is strong enough. The major push factor is the lack of year-round work in their native village. Flooding conditions are experienced every year and people depend on cool season crops and *Thin* mat-making. The majority of migrants send money back to their households. There are internal migration from the native villages to Yangon and Kawthaunng, and international migration to Thailand and Malaysia via Kawthaung. Types of work vary from person to person and also region to region.

The effects of migration are the reluctance to be engaged in agricultural activities, ageing, loss of farms, lack of investment in agriculture or other economic activities. This situation expresses the long-term circulation of rural to urban as well as international migration in which the rural link is never broken. Furthermore, the migration of rural people to urban areas or abroad is basically an individually motivated process in the broader context of family and household decision-making. Finally, these migrants return to their native village. Push and pull factors may change over time. Therefore the native village was once a push factor, after which it becomes a pull factor.

Migration affects not only young rural people but also village activities. Some internal migrants cannot send saved money, because their salary is just enough for their life. They get a very low amount of labour fees. Most of the international migrants send saved money to relatives in their village. There are many effects of remittances on their native village: from farming implements (agricultural needs), to household needs such as furniture, solar lighting system, household utensils, TV sets for news and entertainment, brick houses, and to schools, monastery, healthcare centre, bridge, and roads for village welfare. Changing occupations has developed the migrants' livelihoods and their human environments. Consequently, migrants will seek to develop their standard of living and rural welfare activities.

Plate 19.1 Betel-leaf Cultivation. (Note: High ground betel-leaf farm near house at background image)

Plate 19.2 *Boquake* Bean Cultivation. (Note: *Boquake* bean plants)

Plate 19.3 Collection and storing of *Thin* fabric bundle. (Note: Preparation to dry and storing for *Thin* mat-making)

Plate 19.4 Collection and storing of *Thin* fabric bundle. (Note: Preparation to dry and storing for *Thin* mat-making)

Plate 19.5 Two-storey wood building. (Note: Building construction based on a concrete pole)

Plate 19.6 Bamboo huts. (Note: Houses on stilt and flat plain)

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CHAPTER 20

An Overview of Post-disaster Regional Administrative Management in Japan: Actors and Responsibilities

Adam Jon Lebowitz

Introduction

Disasters are disruptive events. After a disaster, operational capacity of an area can be compromised by impairment of infrastructure just as needs are greatest. Roads can become impassable although required by evacuating residents, and hospitals damaged while facing an inflow of injured patients. Administrative capacity faces similar challenges: a city government can find itself unable to manage shelter for residents and coordinate outside support if its main operational facility, the City Hall, is damaged.

Jôsô city, located 50 km NE of Tokyo in Japan, faced this situation in September 2015 when banks of the river bisecting the city broke following heavy typhoon rains. Water flooded over 40 km of the city, making road travel untenable. The Self-Defense Forces (SDF), Fire Department, and other emergency services rescued survivors from rooftops and other locations with helicopters and boats. Buildings and homes were not only inundated with water; some were pushed from their foundations by the force of the flooded river. Fatalities were minimal with two deaths, but the

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City Hall was heavily damaged. Mud flowed hip-deep through the first floor and up to car roofs in the parking lot. As a result, peri- and early post-disaster managerial capacity was seriously impaired, creating a vacuum filled by other public agencies.

This chapter is a qualitative, retrospective case study that examines the general administrative framework for city disaster response. The main focus is the structural organization of public entities envisioned by policy documents for disaster response, how these plans were implemented during Jôsô city flood, and if the experience of the flood has created any changes in the organization. Public policy before and after the event is examined through documents and data from governmental and academic sources. One aspect of the response—mental health counseling for shelter residents—is provided in more detail.

Reconceptualizing Disaster Management: The 2014 White Paper

The Government of Japan Cabinet Disaster Management Office publishes White Papers (WH) (http://www.bousai.go.jp/kaigirep/hakusho/) explaining disaster policy administration. These publically available documents contain data on recent events, research (such as surveys), and regional initiatives related to management and response. WH-2014 illustrates the framework in which Jôsô city authorities were operating. Accordingly, evaluation of this framework's effectiveness during the flood is in later White Papers.

Chapter 3 of WH-2014 explains reforms to disaster administrative planning based on 2013 revisions to the Basic Law on Disaster Response (Government of Japan Cabinet Office Disaster Management Office Executive Committee for Disaster Management 2014). A major theme is recognizing the limits of government assistance (*Kōjo*). Results from a December 2013 opinion poll indicated dissatisfaction with perceived "paralysis" of public administration during the 2011 combined earthquake-tsunami-nuclear disaster. Many casualties were members of local bureaucracy, resulting in insufficient staff to act on federal orders. In the survey, respondents selected the type of peri-disaster assistance considered essential: Government, Local, Self, or a balanced combination. Compared to 11 years earlier, the most significant change was for Government Assistance (8.3 percent, down from 24.9 percent) and a balanced combination (56.3 percent, up from 37.4 percent).

Reforms were operationalized through a conceptual plan of "community assistance". Community assistance has two components: Local Assistance (*Kyōjo*) and Self-Assistance (*Jijo*), and is considered separate from Government Assistance (*Kōjo*). Ideally, non-civil servant community members would have competencies to respond during and early post-disaster if the public sector were disabled. In effect, cities, towns, and villages were reconceptualized as regional communities with their own administrative capability, allowing for more "bottom-up" decisions.

In the White Paper, four levels of disaster administrative management—Central Government, Prefecture/District, City/Town/Village, Household/Business—were hierarchically arranged (Fig. 20.1). Each level has a mandated responsibility: Central government creates guidelines, the Prefecture systematically implements these guidelines, cities and townships have on-the-ground decision-making authority, and all are supported by suggestions by individual households and businesses. Therefore, in theory, residents of a locality would be able to contribute to response planning, and cities and towns could make sure rules created at the prefectural level were adaptable to their particular needs.

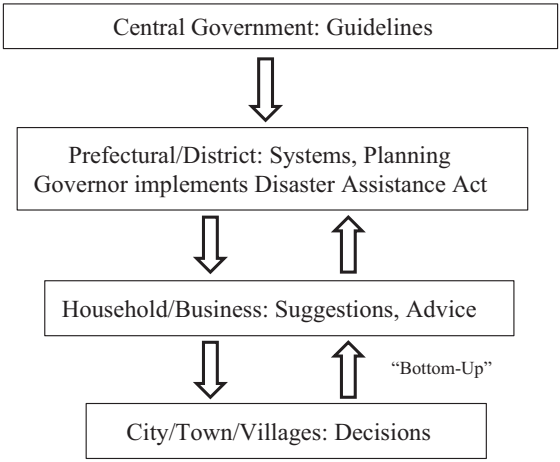

Fig. 20.1 Administrative conceptual plan from WP 2014. (Source: Government of Japan Cabinet Office)

Jôsô City and the 2015 Flood

Jôsô city (123.52 km², 2015 pop. 62,957) in central Ibaraki Prefecture has two rivers (Fig. 20.2). The Kinugawa River bisects the city, and the Kokaigawa River runs along the eastern border. There are four hospitals and 37 clinics. The City Hall in the south of the city is 1 km east of the Kinugawa River. There are 522 full-time city workers in the City Hall; in

Fig. 20.2 Jôsô city political map showing Kinugawa River in the middle and Kokaigawa River on the right border. (Source: Google Maps)

2014, ten were in charge of disaster management as Public Safety Section under the Division of Civic Life. Kinugawa ("Angry Devil") River is a major 177 -km-long waterway originating north of the city in neighboring Tochigi Prefecture. It is important economically for agriculture, hydropower, and tourism. Until the construction of an upstream dam, its steep gradient made it very vulnerable to flooding after heavy rains, and 13 major floods occurred between 1885 and 2002.

Severe tropical storm Etau formed northeast of Guam on 2 September 2015, and was identified by the Japan Meteorological Agency (JMA) as Typhoon 18 early on 7 September. It proceeded along the Ogasawara and Izu island chains, leading directly to the middle of the country. On 9 September at 10 a.m., it reached the Chita Peninsula in Aichi Prefecture, and four hours later had crossed over to the Sea of Japan (Republic of Korea: East Sea). Heavy rains centered on the central and lower northeast areas of the country, known as the southern Tohoku, Kantô, and Chubu regions. Oku-Nikkô, about 110 km north of Jôsô city where the Kinugawa River originates, received 326 mm of rain in 24 hours.

The JMA issued an alert for possible flooding due to heavy rains at 4:36 p.m. on 9 September. Chikusei city upriver from Jôsô reported water had risen to flood level at 11:20 p.m., and Jôsô established its Emergency Response Center shortly after midnight on 10 September. The city issued its first evacuation orders to three districts at 2:10 a.m. (see Fig. 20.3). Throughout the early morning, the river was closely monitored with regard to pre-established levels; by 4:20 it had exceeded the "Flood Caution" level, and one hour later had swelled to where evacuation could be an appropriate response. At 6:30 a.m., the Ministry for Land, Development, and Infrastructure announced a lock was breached in the north of the city. For some reason, it was not announced to Jôsô residents by the city until 70 minutes later. Shortly thereafter at 7:45 a.m., the JMA announced a general flood alert for all Ibaraki Prefecture, and 45 minutes later the Governor mobilized the SDF. The city announced further evacuations between 8:45 and 11:30 a.m. within 50 m of the river. At 1:00 p.m. the Kinugawa River rose to 8.08 m, the highest level recorded, and broke its levee (Fig. 20.4). The City Hall made the announcement at 1:15 p.m.; five minutes later the Ministry for Land confirmed. At 1:30 p.m. evacuations were announced for all areas east of the river. Partial blackouts and water cuts were reported in various areas throughout the afternoon and evening. Then, around midnight of 11 September, the City Hall itself was flooded (Fig. 20.5).

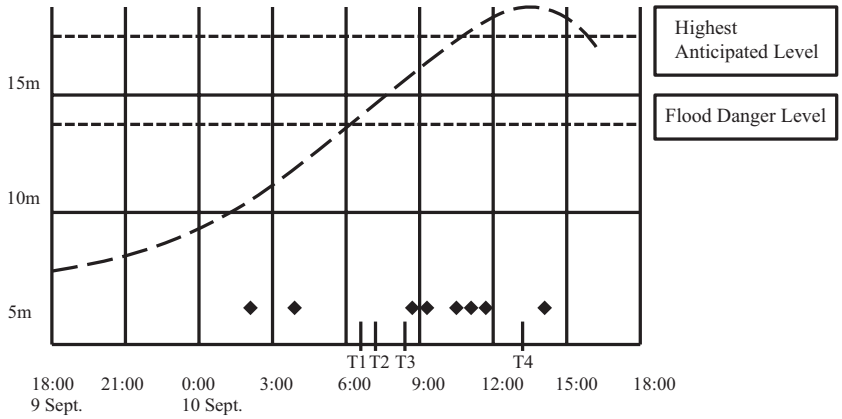

Fig. 20.3 Time-scale graph of flood warning announcements and responses. Dashed line is water level. Diamonds represent evacuation orders. Time 1: Gate breached, prefecture flood warning. Time 2: Gate breach announcement. Time 3: SDF dispatched. Time 4: Riverbank breached. (Source: Komazawa University, Dept. of Meteorology)

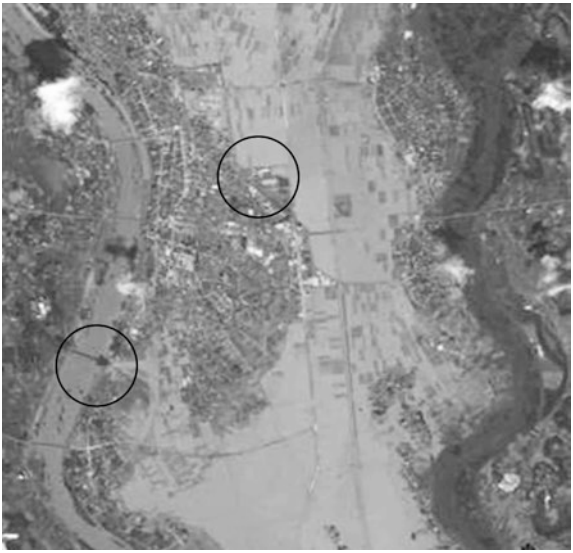

Fig. 20.4 Satellite photo of the flooded city with riverbank breach circled at left, and the City Hall location circled near center. (Source: Photo Ministry of Science and Education)

Fig. 20.5 City Hall flooded. (Source: Photo Ministry of Science and Education)

Initiative Outside The City: The Disaster Mental Health Service

One specific population, evacuees with pre-existing mental health issues, is the next focus of this report. With the City Hall incapacitated by flood damage, city administration essentially lost the capacity to manage the disaster event. In addition, with two of four general hospitals losing function, the city's medical capacity was also impaired. Therefore, there was a "vacuum" for post-disaster healthcare administration. While a disadvantage for the city in the early post-disaster period, there was opportunity for other public organizations to enter and provide care without going through the usual city administrative structures.

The first step was taken by the University of Tsukuba Hospital Psychiatry Department from neighboring Tsukuba city. As a national university, the University of Tsukuba is one component of the public health service. On 10 September, hospital staff contacted the Ibaraki Prefectural Medical Center of Psychiatry, another public mental health facility, and created a mailing list of potential participants for a Jôsô visitation. The next day, the Prefectural Welfare Division for the Disabled and Mitsukaidô General Hospital in Jôsô city were contacted. Evacuee information collected on-

site by the Japan Disaster Medical Assistance Team was requested. Officially organized on 12 September 2015, the Disaster Mental Health Service (DMHS) members began patrolling shelters with the Japan Disaster Psychiatric Assistance Team and the Japan Medical Association Team.

Overall, 115 staff, including 35 psychiatrists, 39 nurses, 15 psychologists, 9 pharmacists, and 8 psychological social workers, participated and assembled health records for 134 clients. A total of 114 shelter consultations were held, with 9 in private residences. Members of DMHS met every night with local hospital staff to determine which shelters would be visited and by which staff. The goal was to work in cooperation with the other emergency health services and the city authorities. Meetings were also held in the second floor of the City Hall after floodwater was pumped from the first floor.

The DMHS continued to operate through the end of the year and offered counseling and screening to municipal employees. Losing one's home can be a very difficult experience for otherwise non-injured survivors. For the elderly especially, losing a home is a major factor for post-disaster depression (Lebowitz 2016). Therefore, new cases of morbidity continued to present even one month after the event. Luckily, Jôsô was a short distance away from a public institution—a national university—specializing in disaster mental health. The university was able to organize and enter the disaster site by coordinating with both national and prefectural-level entities. Ironically, the lack of a city-led initiative probably allowed the DMHS to enter more quickly. However, the city response should be examined against the pre-disaster administrative framework.

Examining the City Response

As there were two deaths and limited injuries out of a population of over 60,000, outcomes for disaster policy measured by mortality and morbidity were largely successful. However, this discounts the extremely widespread air and land rescue efforts by the SDF and Coast Guard, and by fire and police services from nine prefectures. It is plausible that there would have been fewer rescues if fewer people had been trapped by floodwaters after the river burst its banks. Therefore, earlier decision-making at the prefectural level was key.

During this extreme weather event, Jôsô city authorities had two main responsibilities. Since disasters are essentially events that overrun capacity, the first was to observe the behavior of the river, that is, confirm it remained within the bounds of the infrastructure containing it. The next responsibility

was to protect residents in case it did not. Observation was essentially a mechanical task to see if the rising river exceeded established threat levels. Protecting residents is much more complex, since it entails more subjective decisions. For example, at 5:40 a.m. on 10 September as the river passed its "evacuation consideration" level, evacuation orders were only to those residents within 50 m of the river, plus "recommendations" provided to some in low-lying areas. It is possible the later order for all residents east of the river would have been appropriate for this point, even if the disaster itself did not technically commence until 6:30 a.m. when the lock was breached in the north of the city. Certainly, if the announcements had been made earlier, businesses would not have opened. In fact, the largest department store in town opened for business on 10 September and put its staff at risk; it too was flooded later. Overall, 148 structures were partially or completely destroyed, with 3072 flooded entirely. Over 4000 people required rescue, and over 6200 ended up in 39 shelters in and around the city (Jôsô City Government 2016).

Shelter management is another challenging task that requires maintaining a healthy and safe living environment for individuals with different needs in a confined space. Different facilities were established for evacuees in need of shelter, for example, a sports center, a recreational hostel, various district halls and schools. The city department normally responsible for managing the facility was tasked with shelter administration. One DMHS staff told me this system did not encourage shelter managers to communicate with each other. Another problem was the lack of training for these managers. Problems about decisions regarding evacuations and shelter management indicate low levels of competency—the skill set necessary for effective disaster response at the city level.

The 2016 White Paper and Other Policy Observations

WP-2016 conclusions are directly responsive to proposals from 2014. As stated earlier, the WP-2014 proposed investing in individual and community levels of support, the *Jijo/Kyōjo* model. Disaster competency at this level would purportedly provide more effective response than efforts led at the prefectural and federal level. However, designing programs to develop these competencies were not part of the 2014 paper. As a result, no programs were implemented. Of course, it is possible 18 months from the time of the WP-2014 to the disaster was not sufficient, and even if programs were implemented, competency levels would not have been raised to a sufficient level.

Two general conclusions regarding *Jijo/Kyōjo* competencies are stated at the outset. First, there was little apparent understanding of the importance of hazard maps. Hazard maps are a useful and efficient way of illustrating potential patterns of disruption during a disaster. For example, digitalized hazard maps illustrate the flow of traffic and the potential for congestion as populations evacuate dangerous areas. In short, hazard maps illustrate risk. The map for Jôsô residents is now available on the city's website (http://www.city.joso.lg.jp/ikkrwebBrowse/material/files/group/6/00705.pdf). Another problem was timely info about weather, and river conditions were not publically broadcast in a consistent manner. However, due to low general knowledge among residents, the general population lacked the ability to correlate water level with the need for evacuation. Therefore, it is possible information about river conditions alone would have had limited usefulness with additional directives for evacuation.

Another general problem was the designation of authority. Because apparently no individual in the City Hall was designated to be responsible for notifying the public to evacuate to which shelter, evacuation orders were delayed. It is plausible the small staff tasked with disaster management was insufficient. Coordination between the City Hall and the hospitals was also lacking. Therefore, it was not clear which staff should attend to which shelter, and rescue missions occurred on an incident-by-incident basis.

Other competency issues raised by WP-2016 regarded early post-disaster strategies for accepting aid. This organizing capability was seriously impaired after the City Hall was flooded. Outside assistance is only useful insofar as it can be used effectively. As a result, there was confusion since provided aid and support could not be assigned to designated needs. However, the lack of structure allowed the university and other public entities a free hand in administering mental health support to shelter evacuees. Therefore, a well-organized outside effort can overcome internal deficiencies, especially if the effort is supported by structures encompassing the municipality, in this case, the prefecture.

The Mayor of Jôsô spoke at the National Mayor's Forum on Water Disasters, a yearly meeting of city mayors focusing on flood disaster threats and mitigation. While the Cabinet-level WP focus is conceptual, the Mayoral summit looked more at inter-administration communication at the local level in cities, towns, and villages. According to the website, the Forum examines how the policy relationship between federal, prefectural, and local level can be quantitatively assessed; how responsibilities can be divided within a municipal administration; and how information can be more effectively shared within an administrative system.

The Mayor of Jôsô's comments were brief but informative: "I was under the strong impression that people did not want to evacuate. Unfortunately, the 'It could never happen here' sentiment was very pervasive. Can you protect your own life (*Jijo*) without depending on others locally (*Kyōjo*)? Is the federal government going to support this approach, and can people reform their own thinking regarding this? All these issues are very important" (Flood Damage Summit Executive Committee Office 2016).

This comment, examined in the context of the history of disaster response in Japan, reveals much about disaster psychology in contemporary society. The disaster historian Kitahara Itoko considers the modern-age (*kindai*) approach to disaster management as distinct from what preceded it in the early modern (*kinsei*) period. The *kindai* modern approach was part of what is regarded as Japan's most intense period of industrialization in the last half of the nineteenth century. Major institutions of society—economic, educational, and military—were transformed using Western models. Until then, river floods were the most common disaster. Previously, communities organized into water protection brigades responsible for maintaining flood barriers, and disaster evacuation and communication. In other words, there was distribution of responsibility within communities to maintain levels of watchfulness. Scientific and technological advancements of the *kindai* period brought new flood management techniques based on large-scale projects (such as concrete dams), and professional engineers tasked with these responsibilities. Incidents of flooding reduced. However, consciousness of flood risk also reduced as local brigades were disbanded (Kitahara 2006). With reduced local participation in flood management, it can be argued there was reduction in general competency of disaster response.

Historical and cultural approaches, however, do not address social and psychological impacts of disaster with precision if they are not empirical. In other words, how does "local knowledge" or individual competency quantitatively mitigate psychological impacts? Assessing associations between these concepts depends on operationalizing knowledge as a measurable construct. For example, Paton and colleagues developed an "intention" variable from hazard awareness and resilience (Paton et al. 2005). This variable is derived from three factors: desire for hazard education, increased preparedness, and cooperation. The first two factors plausibly cohere with *Jijo* self-assistance in the White Papers, and the third cooperative factor with *Kyōjo* if civic agencies are at local level. Examining this model in Kyoto, Japan, and Napier, New Zealand, found moderate associations between sense of collective efficacy and empowerment. In addition, empowerment moderated by trust in local information sources (e.g., civic organizations

and local government) was slightly yet significantly associated ($r \leq 0.15$) with intention to prepare (Paton et al. 2010).

Another approach is Norris et al.'s analysis of resilience as capacity (Norris et al. 2008) consisting of four major categories: Information and Communication, Economic Development, Community Competence, and Social Capital. The latter two appear connected to *Jijo* and *Kyōjo*: Community Competence denotes individual ability and Social Capital desires for action related to disasters. These two factors appeared to endure in flooded communities in Brisbane, Australia, with "collective efficacy" tapped for Community Competence (Wickes et al. 2017). However, how these factors predicted the mental status of survivors was not investigated.

Overall, it is necessary to consider how rigorously behavioral models have been tested. Psychological outcomes may clarify model efficacy, but studies are few (Drury et al. 2016). Disaster research itself is difficult because sample populations usually lack pre-disaster data (Wickes et al. 2017). The Brisbane study attempts to address this shortcoming by using a non-impacted community as control. Cultural bias is another factor: Just as negative views of minority culture may enable views of community "disorder" (Sampson and Raudenbush 2004), positive views of local or Indigenous knowledge might overestimate their effectiveness.

In short, valid quantitative outcomes from qualitative cultural analysis remain a challenge in disaster research. More studies are necessary. Although government policy document analysis may not illuminate the "heart" of disaster behavior, at least it provides a "before/after" framework for inquiry.

Conclusion: Toward a Framework for Competency Development

Reviews of disaster policy effectiveness during the Jôsô flood from both federal and municipal level come to similar conclusions. *Jijo/Kyōjo* modes of assistance, in order to be put into practice effectively, require competency development. Disaster medicine education has core competencies (e.g., see Walsh et al. 2012). Competency development is equally important for municipal employees responsible for disaster response and administration, and metrics to measure levels of competency (Gupta et al. 2016).

Precluding raising competency level of public workers, a more structured administrative framework may be necessary. Disaster administration

in Japan now is a patchwork of departments, offices, sections, and groups within prefectural governments. The position of disaster offices within bureaucratic hierarchy differs with each prefecture; for example, some are independent departments, and some are sections under health departments or public safety. A more standardized administrative structure could clarify the development and implementation of competencies, and in turn create better cooperative models between bottom-up capacity and central governance for community resilience.

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CHAPTER 21

Family Recombination in Post-disaster Reconstruction: A Case Study of the Earthquake-Stricken Area in Wenchuan, SW China

Yang Chenggang

Introduction

According to official estimates, over 10,000 families were broken in the catastrophic Wenchuan earthquake on 12 May 2008. Mianyang, an adjacent city, alone saw over 3723 widowed females.[1] Some studies have pointed out that a year after the disaster would witness the peak of family recombination. And this is verified in the study on Wenchuan, where the remarriage peak appeared in 2009, just one year following the earthquake. Two major reasons could be attributed to this phenomenon: one is the need for family functions; the other is the pressure to restart a new life after the disaster.

Family, the most basic and fundamental living environment for human beings, is deemed the "cell of the society". It combines the function of producing children, economic productivity and providing emotional support. Many families were broken in the disaster and thus dysfunctional.

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Building new ones is one of the important means to compensate for the loss. The emergence of many broken families in the quake-stricken area formed a unique basis for remarriage. Examples abound where people rush into marriage just for practical reasons, which is to get a family back on track. Most of those who register a marriage around half a year after the quake boast very realistic considerations. "We moved down from the mountains to the makeshift homes on August 15 in the lunar calendar. Some started dating from September, some simply lived together right away. Why in such a hurry? Because men have to seek work away from home and there has got to be someone to keep an eye on what's left from the disaster."[2]

According to the survey of the Sichuan RCCK, those already remarried couples say that the need to care for both themselves and their respective families is the primary reason for them to remarry. Meanwhile, 79% of still widowed victims say that they want to remarry for the same reason as those who have already remarried (Fig. 21.1).

Fig. 21.1 A recombined family after the Wenchuan earthquake

Major Barriers to Family Recombination in the Post-disaster Context

Despite the fact that forming new families during post-disaster reconstruction is quite practical and realistic for many people, there are many obstacles such as financial and emotional reasons and complicated relationships within family members.

Financial Reasons

The demand for new partners is high among those who have lost their former spouses during the disaster, yet a selection mechanism is at work. People with better "financial conditions" have an advantage over others and chances are that they will find partners quite easily and in a rather short period of time. Since practically all properties were lost in the catastrophe, "financial conditions" here does not refer to the relative abundance of wealth, but rather physical health, age, sexual ability and so on, which directly correlate to their reproduction capability and the ability to confront the burden of looking after the family.

First and foremost, it is, comparatively speaking, more difficult for those in poor health to find partners. Physical health is the number one factor in choosing a partner. The loss of a spouse means more than emotional sufferings for a victim; there are more practical matters such as the need for a companion to take care of things and deal with the economic pressures and so on. The majority of victims choose to remarry simply to cope with the various real-life demands after the disaster, such as building a house, taking care of the old and young and so on. Thus the physical health of the potential partner plays a vital role in the rehabilitation of the new family.

Second, there is a big gap between different age groups when blending families. By October 2009, widowed victims aged between 31 and 40 years had the highest rate of success as regards remarriage, accounting for 19.2%, a percentage which is higher than those who have not yet remarried in the same age group.

Third, it is more difficult for widows to reconstitute a new family. Because of traditional concepts of marriage, males could marry females that are either younger or older than them, whereas females could only choose to form families with men older than themselves and thus more

difficult. As a result, it is quite common in the quake-stricken area that men are "in greatest demand".

Finally, victims with a heavy cross to bear have a slimmer chance to rebuild a new family. In the process of family recombination in the stricken area, families with bigger responsibilities for family members face more difficulties, especially those with children to take care of. Deputy Director of Beichuan county civil affairs bureau, Yong-Fu Yang, said, "It is most difficult for families with children of school age to succeed in blending a new family." Hong-Mei Liu of Beichuan County An Chang town states: "Those with fewer family responsibilities and a job find it much easier to find a partner, whereas those with heavy burdens like two children, especially children of school age, are very unlikely to find a new spouse. Once the potential mate hears of the situation, he or she would not even meet with you. Families with children that are old enough to find work are less difficult. The government provides compensation of over 90,000 RMB for each dead child of school-age, and only 5,000 RMB for an adult. Yet for those children that survived but are of school age, there are no subsidies at all, so they become a kind of burden in this case."[3]

Apart from child raising, the need to care for the elderly is another major burden for a broken family. The situation is, according to a survey by the Sichuan Bureau of Statistics, quite dire in the quake-stricken region. Many of those interviewed shoulder the responsibilities of caring for not only their own parents but also for the parents of their deceased spouse's. The survey finds that among those interviewed, 74.51% of people have to support at least two or more elders; some individuals even have a total of six elders to provide for; on average, each individual family has 2.57 elders to look after. With remarriage comes the need to support the parents of the new spouse. This is especially burdensome for rural residents in the disaster area where many elderly people have no endowment insurance or pensions at all and thus the family is responsible for all the expenses of the elderly. For this very reason, reconstituted families are faced with even heavier burdens in supporting the elderly. In 2009 the state selected 320 counties in which to launch a new rural endowment insurance pilot program, and special policies were granted to these regions. However, many of the worst-hit towns and counties, such as Beichuan, Pingwu, An'xian and so on, were not included in the first batch of pilot counties (cities, districts). For blending families that have been through the earthquake, the burden of staggering pensions becomes one of the huge barriers in their efforts to rebuild their lives, and up till now, the government and

Fig. 21.2 Including elderly relatives in a recombined family

society are not yet able to provide enough pension security for these regions (Sichuan RCCK 2010) (Fig. 21.2).

Emotional Factors

Emotional reasons are what make some people give up on the idea of remarrying even though they do need a family. According to the survey, among the widowed victims, many say that they are not planning on remarrying mainly because they cannot "get over their former spouse". The proportion of female respondents who chose this reason is as high as 44.7%, while that of male respondents is 40%. Apparently the percentage of women who are reluctant to form new families due to their emotional bonds with their former spouses is significantly higher than that of the males.

The overwhelming majority of families are forced to become broken families because of sudden natural disasters, yet the strong emotional bonds between the couple would not disappear suddenly On the contrary, such affection and love for their spouse may even deepen with their death.

In a blended family, both the husband and wife would have sustained feelings from the previous marriage and such feelings are not easy to forget. The survey by the Sichuan Provincial Bureau of Statistics shows that 42.9% of those interviewed say that the primary reason that influences the stability of a blended family is that "affection and love for the former spouse is hard to forget". This could result in differences in living habits. In addition, natural expression of feelings for the former spouse will often come up in daily communication, which inevitably leads to psychological barriers for the remarried couple. What is worse, women usually express more delicate emotions and tend to be more nostalgic and sentimental; therefore, it is even harder for them to truly get over the previous marriage. Women thus face more challenges in reconstituting a family.

In August 2009, Liu Zengbing of WoPing Town and Wu Aofang of Xiaoba Village from Beichuan County registered their marriage, but a crisis soon emerged. On the one hand, Liu always carried a photo of his deceased wife and would "take a look at it from time to time when not occupied", which greatly annoyed Wu. On the other hand, Wu's former husband's name would often slip off her tongue unconsciously. All these incidents would lead to quarrels and unpleasant arguments. In May 2010, when deciding whose spouse's grave to visit first on the two years' anniversary of their departure, neither of the couple would compromise. Their marriage was once again faced with a huge crisis. As a result, just nine months after remarrying, they ended up divorcing.[4]

Members of a blended family have often joined together in a rather short period of time, yet the emotional transfer for the couple, especially for women, usually takes a long time. There is generally no need for a transfer of love or affection if it is the first marriage or marriage after a divorce. Nevertheless, a reconstituted family in this situation who lost their loved ones very suddenly and unexpectedly is not really prepared for another marriage. Feelings and love for the former spouse pose a great challenge for both members of the new family. It inevitably takes a rather long time for the couple to really blend in and build a new family of love, solace, mutual trust and economic interdependence.

Factors Relating to Family Relationship

For many broken families with children, a major barrier to starting a new family is that the children's inherent bond for the original one is usually quite strong. Their perception of parents has long been focused on two

particular persons and that unique status is not easily replaced. The loss of either one of their biological parents would cause great suffering to the children that are hard to ease. Therefore, with the death of a parent and the ensuing life of a single-parent family, many children undergo some personality changes. They may become more withdrawn, suspicious and sensitive, even to the degree of being depressed and hostile to other people. As a result, an instinctive distrust and resistance toward the stepfather or stepmother is inevitable in some blended families. It may take a long time for children to truly accept the stepfather (mother) because, in their eyes, a blended family is just a simple joining together of two broken families, which may never result in a happy family life.

This is particularly true for stepfamilies formed after a disaster. The sudden death of a parent due to a natural disaster renders the children completely unprepared. There is no means for them to express their love for their parent and this love cannot simply be transferred on to other people either. So in the early stage of a stepfamily, the couple often faces significant difficulties in how to get along with each other's children from the previous relationship. Meanwhile, it is also a challenge for the couple to truly treat their stepchildren without discrimination.

According to *The Reproduction Policy for Families with Casualties in the Catastrophic Wenchuan Earthquake by the Standing Committee of the Sichuan Provincial People's Congress*, blended families that meet the following two conditions are allowed to have another child and all the costs will be covered by the Family Planning Departments. First, either one or both of the couple are widowed during the earthquake, and second, there should be no more than two children in the present blended family. Such an attractive and generous fertility policy could exert a positive effect on maintaining the bonds between the husband and wife, because having a child of their own blood could greatly increase the likelihood of a successful family recombination. However, this will not change the already complicated relationship within the family; instead, it will only worsen the situation further. For instance, in some blended families, both the husband and wife have children from their previous marriage. Thus a complicated family relationship could arise, including a two-way indirect relation such as that between the stepchildren and between the biological child and the stepchild, as well as a two-way single person blood relation such as that between the husband and wife, between the couple and their respective biological child and between the couple and their stepchildren. All these relationships could lead to instability in the new family. Consequently,

the divorce rate among the blended couples is much higher than that of the first marriage, up to 24 times higher (Xu Jinkui 1988).

Reconstituted families formed after the Wenchuan earthquake are also faced with such problems. And such issues become even more prominent because in this case with the death of a spouse in the disaster, the one that survived has to take care of all the children alone. Not only is it difficult for children to truly accept and blend in the newly blended family, but also for the couple themselves to embrace the children of their spouse's previous marriage, particularly when some important decisions have to be made concerning their stepchildren such as further education, their marriage and so on. Both the couple would have to consider many questions such as how to get on with them, how emotionally involved they should be with them, how much money they should spend on them and so on.

Guo Shunqing and Qiao Liping of LeiGu town Beichuan County blended a family after the earthquake. Each has a son from their previous relationship and there will also be grandchildren in the future when both sons get married. The couple claims that they would be absolutely impartial and fair when it comes to their sons' marriage and would look after the grandchildren of both sons' alike without discrimination. But is it really possible to be absolutely fair and square in family relations? "This blended family cannot be said to be happy and complete until we die. As long as we are alive, everything remains uncertain," Guo Shunqing said.[5]

The parent-child relationship is more complicated in a blended family formed after a disaster than that in the usual remarried families. During the post-disaster reconstruction process, psychological recovery of the affected family members should not be neglected. In order to avoid a possible second trauma to the blended family due to the issue of children, parents should try to respect their children's choice as much as possible when choosing a partner and to communicate with them as openly and candidly as possible. Besides, outside help and assistance from friends, relatives, teachers and professional psychological counseling agencies should be resorted to so that the children could have a smoother and quicker transition.

Couples of a blended family often have divergent economic conditions, so how to use and allocate their assets often becomes a focal point of argument within the family. This is particularly prominent when it involves the inheritance rights of the children and the elderly from the previous mar-

riage. As a result, how to properly handle the finances becomes a kind of hot potato within the family.

Wang Xiaowan and Liu Quanhui of Beichuan County blended a family in April 2009 but their life was not easy after their marriage. Wang and his ex-wife have two sons. "Because my family is better off, my two sons are concerned about their future stepmother's right of inheritance." They thus strongly oppose their father's remarriage. "They did not even show up for the collective wedding ceremony."

A similar opposition came from the two daughters of Liu Quanhui. "My husband was killed in the earthquake, so my two daughters worry that they might lose their inheritance of the death compensation if I married Wang," Liu Quanhui said.[6]

There are still no clear and specific policies and regulations regarding the premarital property and land assets of blended families in disaster-stricken areas. Some broken family members give up on the idea of remarrying because of concerns about possible land and property disputes. Those who have already remarried also face such concerns.

A Practical Choice for Blending Families in the Post-disaster Era: Trial Marriage on the Rise

The so-called trial marriage refers to the premarital cohabitation of a man and a woman without any legal obligations to see if they are compatible for marriage. This could better the understanding of each other because by living together like a family, both parties could learn about each other's philosophy of life, core values, personalities, hobbies and interests, lifestyles and how they deal with other people and so on and thus form a better and fairer judgment. Such a comprehensive understanding of each other before settling down for marriage increases the possibility of successfully blending a family and also enhances the stability afterward.

Trial marriages have become quite popular after the Wenchuan earthquake. Many broken families chose to join together in this way for some realistic reasons. In the process of post-disaster reconstruction, victims have to deal with several matters, and reasonable coordination and division of labor in a family are needed in order to get life back on track as soon as possible. Besides, it is practically impossible to truly get to know your partner and his family background within a short period of time. Without an official marriage register, issues such as the complex divorce

procedures and property divisions can be avoided when the couple find each other incompatible for marriage. This is what makes trial marriage not only an acceptable but also a popular choice for people in the disaster area.

According to relevant reports, in May 2009, "trial marriage" has quietly become a temporary way of life for people who lost their spouses in some concentrated makeshift home areas such as LeiGu, Yongxing, Bamboo Street and so on.[7] There used to be a total population of 1177 people in Xinjie village of Qushan Town, but about a third of the population was killed in the earthquake, leaving only 857 people now. Among the dozen couples that live together there, "those who do not register outnumber those who do register".[8] This is out of concern for not only the uncertainty of a blended family but also practical needs. The majority of those who have experienced a "trial marriage" did so because of uncertainty about the future. "On the one hand, they do want to find a partner; on the other hand, they are also very concerned about a possible divorce after remarrying." Trial marriage can to some extent reduce the risk of breaking the family once again after registering. Meanwhile, it can also help broken families confront and solve many problems following the disaster.

In contrast to a trial marriage is a formal one which, however, is often very unstable. Based on the statistics from Beichuan County civil affairs departments, dozens of divorces were filed after remarriage just two years after the Wenchuan earthquake.[9] Similar things have also happened in Tangshan after the huge quake in 1976. Statistics by Tangshan Municipal Bureau of Civil Affairs showed that "[b]y the end of 1986, there were more than 8,000 blended families in total, among which 2,300 ended in divorce, accounting for 29%. The peak time of divorcing occurred in the third year after the quake".[10]

Therefore, trial marriage, in reality, is reasonable and rational to some degree, though problems do exist. The primary concern is a lack of legal protection. China has no clear regulations regarding cohabitation before marriage, so it is a legal blind spot. Should any disputes occur, the rights and interests of both parties could not be protected, especially those of the vulnerable party. In the special context of post-disaster reconstruction, both parties in a trial marriage have experienced a double blow of psychological and property losses. Should anyone be hurt again in trial marriage, serious consequences would emerge (Fig. 21.3).

Fig. 21.3 A mass wedding for recombined families after the Wenchuan earthquake

Conclusion: Possible Institutional and Policy Intervention

Blended families formed after a catastrophe differ not only from first marriage families but also from stepfamilies in the usual sense. It is a unique remarrying context at the time of post-disaster reconstruction. Such family recombination occurs out of the rational choices of the victims of the earthquake. However, in order to effectively avoid any harm to the vulnerable group, unnecessary social conflict and negative influences on the progress and stability of post-disaster reconstruction, it is necessary for the government to establish a good, effective and feasible institutional mechanism to allow for appropriate institutional and policy interventions. Measures could include further improving policies for the pre- and post-marital property management and ownership, to ensure that the interests of both parties can be protected by the law and to promote the healthy development of the reconstituted family. Grassroots communities, village committees and relevant departments should also play a corresponding role in managing and serving the people by fairly coordinating

their economic conditions, and the property divisions of the blended families. In this way, the potential risk of a divorce due to disputes concerning wealth and property divisions can be greatly reduced.

Notes

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CHAPTER 22

Ahi Kā Roa, Ahi Kā Ora Ōtautahi: Māori, Recovery Trajectories and Resilience in Canterbury, New Zealand

Christine Kenney

Introduction

Māori share an "ensemble" identity that is genealogically linked across local communities, pan tribally and to the land, which is understood within Māori cosmogony as Papatūānuku the earth mother, from whom all Māori are descended (Buck 1949). This socio-ecological genealogy imposes relational obligations on Māori to enact guardianship roles and responsibilities to ensure the well-being of the inhabitants and the broader environment (lands, rivers and seas) of New Zealand (Mead 2003). In the aftermath of major natural hazard events, these obligations devolve to tribal communities with historical ties to regional lands. In the Christchurch context, the local Māori tribe, Ngāi Tahu, was accountable for ensuring the recovery of resident Māori, the broader Christchurch community and the entire region. Anecdotal evidence indicated that the Māori approach to earthquake recovery was rapid and effective. While Māori approaches to addressing adversity had been briefly noted in historical literature,

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systematic research to explore the ways in which Māori approach disaster recovery had not been conducted. The Joint Centre for Disaster Research partnered with Te Rūnanga o Ngāi Tahu to conduct a community-based participatory research (CBPR) project that explored Māori approaches to disaster recovery and building community resilience following the Christchurch earthquakes. In this instance, CBPR was considered an appropriate research approach, as it facilitates relationships of trust with community research partners and is an effective method for promoting the well-being of Indigenous communities (Israel et al. 1998).

Research Design

The Research project was centred within and controlled by the "researched community" in accordance with the statutory principles of partnership, protection and participation developed by the New Zealand Royal Commission on Social Policy from the articles of the Treaty of Waitangi. Te Whakamārmatanga, a Kaupapa Māori qualitative research methodology, framed the research design (Kenney and Phibbs 2014). Thus, the research was designed by and for Māori, addressed local Māori community concerns and was conducted by Māori researchers in accordance with Māori cultural values and research practices (Smith 1999). Methodological concepts included whakapapa (genealogy, continuity), whakaritenga (negotiation), whakawhanaungatanga (building relationships), whakarurutanga (ethical security, safety), Ōritetanga (equity), whakarurutanga (building trust), whakaaetanga (acceptance, agreement consent), whakamama (enablement) and mana motuhake (self-determination). Thus, research participation by local Māori was initially determined by iwi governance and elders as well as through individual self-selection, then subsequently through snowballing. Initial data collection focused on ascertaining the perspectives of key stakeholders and disaster response personnel with Ngāi Tahu and the local Māori community. The oral tradition of passing down Māori knowledge values and practices through stories is highly valued within Māori culture. Accordingly, participants' narratives were collected through semi-structured individual and group interviews (n = 100), and factors that enhanced Māori resilience to hazards were identified. Dialogical interviewing and approaches to knowledge development are considered tools for disrupting power differentials between researchers

and participants (Freire 1967). This method of data collection was therefore deemed suitable for ascertaining information in a post-disaster context where local Māori participants were potentially vulnerable and/or traumatised. Overarching interview topics were also collaboratively determined, and evolved as issues were identified as important by participants. Broad topics for discussion encompassed: iwi and organisational responses; the concerns and unmet needs of Māori; ways in which Ngāi Tahutanga (cultural beliefs, values and practices) created organisational and community resilience; distinctive cultural and geographical knowledge that could inform urban and civil defence planning as well as recommendations for disaster risk reduction in the future.

Digitally recorded interviews were transcribed verbatim and member checked by participants. A bricolage approach, which drew on theoretical concepts from Western European Social theory and the Māori paradigm, was applied to analysing participants' stories. Texts were analysed in paragraph format using a narrative unit's approach in order to reduce the risk of decontextualised findings. Research analysis identified that when the sequence of earthquakes commenced, Māori predominantly resided in the low decile Eastern suburbs of the city, which were also the areas that were most severely affected by the earthquakes. In theory the local Māori community was comparatively disadvantaged in relation to the wider population, yet the Māori approach to ensuring community recovery was rapidly instituted and proved to be highly effective. Evaluation of research participants' discussions suggested that the Māori community had drawn on cultural attributes including extended familial relationships to facilitate development of the Māori Disaster Recovery Network and implementation of earthquake response initiatives.

Demographics, Relationships and the Māori Disaster Recovery Network

Amongst Māori, genealogical connections (whakapapa) that impose moral obligations to enact environmental guardianship and care for others (Mead 2003) also create a hereditary form of relational capital (Still et al. 2015). This kinship-based capital is understood by Māori as whanaungatanga, and may be drawn on by collectives to facilitate community recovery during times of adversity. After the 22 February 2011 earthquake, Ngāi

Tahu demonstrated the effectiveness of drawing on such capital, through partnering with Māori representatives from government, private organisations and other tribes to establish a collaborative earthquake recovery response. The initial meeting was well attended by Māori representatives from the Christchurch Urban Māori Authority, the Ministry of Māori Development, the New Zealand parliament, the New Zealand police, non-government organisations (NGOs) and other tribes. The collective reached an agreement regarding the structure of the Māori earthquake recovery network within 15 minutes, and the overall leadership role was delegated to Ngāi Tahu in acknowledgement of the tribe's role as regional guardian (Kenney and Phibbs 2014).

The tribe subsequently liaised with external stakeholders involved in the recovery and coordinated the delivery of Māori support and resources forwarded from throughout New Zealand to households in Christchurch. Specific activities included providing a 24-hour telephone helpline, receiving and distributing donated goods, arranging financial support, as well as hosting and providing logistical support for the Māori wardens and Māori medical teams that were working in the eastern suburbs (Kenney and Solomon 2014). Following the 22 February 2011 earthquake, Marae (Māori community centres) located throughout the South Island offered shelter and provided comfort, food and water to displaced residents. The broader Māori community shared resources, located missing family members, ensured families were in safe environments, secured and cleared damaged property as well as assisted Christchurch residents to negotiate the bureaucracy of responding government agencies. Navigating relationships with government agencies was often enhanced by working through relational connections as one recovery worker stated:

> The communication between our staff and other services was good. We kept in touch with Te Puni Kōkiri, they are friends as well as family so we knew if the whānau (families) weren't getting the assistance that was needed they would contact us. (SO)

Financial support was also made available. Grants to subsidise the purchase and operation of generators were offered to Māori Marae that were acting as welfare centres and emergency accommodation. Relocation grants were extended to residents and households regardless of ethnicity,

because the Māori response was conceptualised as inclusive of all communities and enacted in ways that respected and valued diversity:

> I asked the Māori community if we could include the Asian and migrant communities because they would be outside (the main networks), to which I got an immediate agreement… Look! Everything we do is based on the community it is all of us! We are part of this community and have responsibilities. This disaster has hit everyone and our response is for the people, the community of Christchurch. (SMS)

Māori kaupapa (cultural values) constituted the drivers for the Māori recovery network's highly effective recovery approach, specifically kotahitanga (unity), manaakitanga (hospitality), and more particularly the value *Aroha nui ki te tangata* (extend love, and support to all) (Kenney and Phibbs 2016). As recovery initiatives were implemented though drawing on Māori relational capital (whanaungatanga) as well as other cultural attributes, Māori responses were characterised by collective authority, agency, actions and accountability. Research (Johnston et al. 2008) suggests that such communitarian responses to disaster recovery are highly effective in facilitating social resilience in the aftermath of hazard events. However, despite successfully embedding a collaborative approach within the Māori response, the Māori Recovery Network encountered difficulties integrating Māori community-led resources and initiatives with the mainstream emergency response.

Recovery Challenges and Tensions

Emergent tensions were identified within the formal disaster response infrastructure, as well as the health and voluntary sectors. As an example, Ngāi Tahu stakeholders reported that after the 22 February 2011 earthquake, it took eight days to develop a relationship with the Ministry of Civil Defence and Emergency Management, the government agency tasked with governing the earthquake recovery. A working arrangement was eventually established with the assistance of an external corporate mediator:

> It was a bit slow in us [the Māori Recovery Network] getting involved with the authorities, in fact it took us eight days to break in… [And]… from that single meeting we then had a link directly to Civil Defence, so every day from then on all our reports went to Civil Defence. (SMS)

The delayed communication exacerbated difficulties related to integrating Māori volunteers and resources, including Marae that had previously been registered as civil defence hubs, within the mainstream response (Tau 2012). Volunteering by Māori responders was also constructed in some instances as unnecessary. Nikau Contractors arrived in Christchurch the day after the February earthquake (McCrone 2012). When their initial offer of help was refused by local authorities, they connected with overseas urban search and rescue teams in order to access and provide support in the central city. At the time of writing (June 2017), Nikau Contractors was still assisting with the demolition of damaged infrastructure in the city centre. The actions of Māori (community peace) wardens constituted a further example. The wardens were deployed to Christchurch by Te Puni Kōkiri (Ministry of Māori Development) to assist in the recovery. The police attempted to limit the wardens' activities to providing urban security services but were unsuccessful, and the wardens continued to assess needs and deliver essential items to an average of 4800 people per week until late April 2011 (Te Puni Kōkiri 2011).

During this period, the wardens worked closely with the health sector response team. Community access to health and well-being services in the eastern suburbs was limited as a result of liquefaction, fractured roading and the traumatisation of healthcare personnel (Sullivan and Wong 2011). Collegial support was made available when several Māori tribes fielded mobile medical teams to provide door-to-door primary healthcare in the most inaccessible suburbs Aranui, Dallington and Bexley (Batt et al. 2011). These Māori health professionals also encountered barriers to practice from the local Primary Health Care Organisation (PHO). This organisation is funded by the Canterbury District Health Board (DHB), which said that as medical centres in most parts of the city were functional, practitioners' services were not required. Although authorisation to provide healthcare in New Zealand is readily accessible online, issues around proof of professional competence were also raised by the DHB (Kenney 2016). However, health services were needed by residents who lacked the resources, or mobility, due to disability or illness, to commute to medical centres. In addition there were some instances where residents were reluctant, or refused to leave their homes to seek necessary healthcare, because they were fearful of another earthquake occurring, their homes being burgled or vandalised (Phibbs et al. 2012).

Cultural tensions were also a concern in the formal recovery infrastructure. Māori police officers and fire service staff stated that non recognition of cultural practices within Urban Search and Rescue (USAR) protocols created an unsafe work environment for frontline professionals. The absence of appropriate cultural procedures for caring for the deceased was identified as particularly problematic; this had the potential to undermine the psychosocial and spiritual well-being of responders who did not follow a culturally correct code of behaviour (Phibbs et al. 2015). Māori USAR staff managed these issues, drawing upon cultural practices in order to keep themselves safe while working in the red zone. Having access to water for cleansing after leaving the temporary mortuary and saying prayers were identified by Māori rescue workers as essential forms of protection.

> The tarpaulins that we had set up had basically been covered with deceased people… so we had to transport them to the next mortuary site… without anyone realising it, when they were in the back of the van ready to go, I did a little karakia before I closed the doors… No one knew because I didn't want to make an issue of it. I was worried… I was scared someone would say 'Oh we don't have time for any of that sort of thing'. I felt at that stage things were not looked after properly, spiritually you know? (BK)

A Māori world view accepts that the soul of a deceased person may take up to three days to leave the person's body (Buck 1949). Māori responders suggested that non-Māori colleagues lacked understanding in this regard and that as a consequence Māori spiritual traditions associated with looking after the dead were inadequately attended to. Rescue workers felt unable to voice their concerns in case they were dismissed as trivial; they reported regularly enacting tikanga (appropriate cultural practices) in secret. The aforementioned tensions infer that both Māori responders and recovery concerns identified by Māori were marginalised within earthquake recovery activities, yet there were mainstream responders from other nations who, in addition to Māori residents, sought out support from Ngāi Tahu and/or Urban Māori:

> On about the third or fourth day we had people from [Urban] Search and Rescue. They came up for whakanoa [to have tapu (spiritual restrictions) removed][1] so we were able to remove the burdens that were upon them, from having to recover the remnants of dead people. (RT)

Māori involvement with external actors was not limited to engagement with frontline personnel. Despite initial tensions around engaging with the formal recovery infrastructure, Ngāi Tahu and other Māori authorities worked with central government to develop the Canterbury Earthquake Recovery Plan. Public/private partnerships were also established with corporate stakeholders and local authorities to enable implementation of specific longer term recovery initiatives that would promote regional sustainability. These endeavours have enabled Ngāi Tahu to enact guardianship responsibilities through strategising and implementing programmes that address social and economic vulnerability, as well as promote restoration of the community and environment.

Māori, Recovery Challenges, and Ensuring Regional Resilience in the Longer Term

During the acute recovery phase immediately after the earthquake, Ngāi Tahu instituted recovery initiatives that were designed to address factors associated with earthquake vulnerability such as inadequate accommodation and unemployment. Social housing ventures were developed in partnership with the Canterbury Community Trust and Ngā Maata Waaka, the urban Māori authority (Watson 2013). Urban land owned by Ngāi Tahu was also set aside for the rebuild and the creation of new housing estates in the north and west of the city. The tribe also ensured that in 2011 profiteering from Māori real estate sales at the expense of displaced residents did not occur, by setting the price for all Māori land incorporated into housing developments prior to the earthquakes at September 2010 rateable values (Solomon, Sir M. W. 2012).

Increased unemployment in the aftermath of the earthquakes was identified as a potential contributor to family poverty as well as social unrest amongst Māori youth. In response, Te Rūnanga o Ngāi Tahu partnered with Christchurch Polytechnic Institute of Technology (CPIT) and construction company Hawkins Group to establish He Toki ki te Rika (a Māori Pre-Trades Training Scheme). The programme focused on upskilling Māori workforce capabilities through leveraging the strengths, knowledge, experience and capabilities of partner organisations. Māori unemployment rates equate to three times the national average, (Ministry of Social Development 2016), and the training initiatives have generated apprenticeships and employment opportunities in the Canterbury rebuild

and construction industries. To date, the programme has had 500 graduates, 40 per cent of whom have transitioned into employment and a further 30 per cent of graduates have continued their studies in tertiary education (Te Rūnanga o Ngāi Tahu 2016a).

Five years on from the earthquakes, the success of the initial work skills programme has advanced the development of professional workforce initiatives, including the He Toki ki te Mahi Trades Training, which is enabling Māori to gain qualifications in construction-related trades. Fully subscribed since inception, the programme currently has 29 apprentices employed in the Christchurch rebuild and a further 100 students enrolled nationwide. A new student intake has been planned for 2017 (Te Tapuae o Rēhua 2017). Māori youth aged 15–24 experience the highest levels of disengagement with the labour market, training and education—21.1 per cent compared to 9.2 per cent for Europeans in 2016 (Ministry of Business Innovation and Employment 2016). The consistently successful outcomes generated by these schemes are therefore exceptional.

Programmes that focus on developing workforce capability in the agricultural sector have also been introduced. Whenua Kura, an initiative designed to assist local Māori into farming and related industries, commenced in 2014. Māori students enrolled in the programme of study towards university qualifications in land-based studies; a range of courses in dairy, sheep and beef farming, horticulture and apiculture is offered. Approximately 90 students have enrolled since the initiative began two years ago. Currently, 27 Ngāi Tahu graduates from this programme are in industry-related employment, with a further nine employed on Ngāi Tahu farms. Like the other educational programmes, the initiative follows a Māori approach to learning and also provides professional guidance and support to students through to employment.

The Christchurch urban recovery programme has continued to generate employment opportunities for Māori, fuelling a 14 per cent increase in the urban Māori population and a 20 per cent increase in the percentage of Māori employed within the region (Statistics New Zealand 2014a). The Māori value *Ahi kā roa, Ahi kā ora* (keep the home fires burning) has also contributed to the 11.7 per cent increase in the number of Ngāi Tahu (n = 12,248 individuals) residing in Christchurch (Statistics New Zealand 2014b), as Ngāi Tahu living outside the region have returned to Christchurch to assist with regional recovery. The majority of Māori are still employed in the building and agricultural sectors. However, in contrast to previous years, nearly 30 per cent are cur-

rently employed within the professional sector, and a majority of those employed is Ngāi Tahu (Statistics New Zealand 2014a). This statistic reflects the tribe's commitment to building the capacity of future generations through offering incentives such as tertiary education subsidies and professional internships with tribal companies, subsidiaries and investment partners abroad. New initiatives include Manawa Nui, an associate director programme, and the Matakahi cadetship programme which aims to place tertiary students studying commerce-related degrees into tribally owned commercial entities. A pilot programme with Ngāi Tahu Tourism to accelerate career paths for Ngāi Tahu students into the tourism sector is underway (Te Rūnanga o Ngāi Tahu 2016a), and a series of workshops focused on tribal leadership development and succession planning has been held.

As of December 2016, Ngāi Tahu stewardship of the New Zealand government's 1998 settlement in recompense for longstanding tribal grievances has resulted in a tribal net asset worth of 1.2 billion NZD (Te Rūnanga o Ngāi Tahu 2016a). Therefore, it is not surprising that the tribe's economic (and social) successes have facilitated increasing political recognition and fostered acknowledgement of Māori concerns within policy and legislation. Increased collaboration between local Māori, regional authorities and central government has contributed to reshaping urban governance and the redevelopment of Christchurch. Te Rūnanga o Ngāi Tahu and Te Rūnanga o Ngā Maata Waka (urban Māori authority) were initially assigned statutory governance roles in the Christchurch rebuild that were stipulated in the Canterbury Earthquake Recovery Authority Act (CERA 2012). The CERA legislation has now been superseded. However, as Ngāi Tahu remains a significant local land owner, the tribe has been well positioned to communicate Māori concerns to the Crown. Ongoing tribal relationships with central government and local authorities have thus ensured that the Māori community has been engaged in all decision-making processes related to urban renewal (CERA, Christchurch City Council and Te Rūnanga o Ngāi Tahu 2012). Key concerns such as the establishment of housing developments on Ngāi Tahu and Māori reserve lands, restoration of local rivers as well as the preservation of culturally significant sites have been addressed within the urban recovery programme. Services that are relevant to the wider urban Māori community have also been developed and/or linked with performing arts venues, sports facilities and health services.

The extended recovery process has created opportunities for Ngāi Tahu and other Māori stakeholders to collaborate with central and local governments in developing value-based initiatives to address broader environmental recovery concerns in the Canterbury region. Local authorities have statutory obligations under the Local Government Act (2002) and the Resource Management Act (1991) to recognise, protect and provide for resident tribal values and interests. Iwi (tribal) Management Plans assist urban and regional councils in meeting these obligations, and are afforded statutory recognition under the Resource Management Act (1991). Local government is also bound to take Iwi Management Plans into account when drafting or altering regional policy statements and district plans. Consequently, in response to the 2010 and 2011 earthquakes, the six Ngāi Tahu subtribes (rūnanga) residing in Christchurch developed the Mahaanui Iwi Management Plan (Rūnanga et al. 2013) to facilitate regional recovery; funding support was provided by the Christchurch City Council and Environment Canterbury. The plan has constituted a tool for Ngāi Tahu to express their tribal identity, authority, relationships and guardianship responsibilities in regard to the Indigenous flora, fauna, water and other natural resources in the Christchurch surrounds.

Ngāi Tahu is separately engaged in a broader environmental management partnership with Environment Canterbury, a regional institution that works with local government to provide environmental management and facilitate sustainable development within the Canterbury region. The joint initiative, Te Rōpū Tuia, focuses on ensuring the biodiversity, environmental restoration and sustainability of the region for the future (ECan Environment Canterbury 2013). The public/private partnership is considered a new approach to management of natural resources in Canterbury, with both project governance and work programmes being jointly conducted by Ngāi Tahu and Environment Canterbury staff. Current projects include the geophysical profiling of Ngāi Tahu lands and earthquake changes, documentation of sites of tribal significance and restoration of traditional food-gathering sites. The various projects are facilitating the management and protection of cultural heritage values, providing a reliable information base for informing planning maps, enhancing policy guidance for local authorities, supporting economic development and enhancing tribal food security. Additional possible outcomes include the development of Heritage Risk Models, and frameworks that map and define future risks to heritage sites such as mahinga kai centres (traditional

food security sites). Consideration is also being given to developing Heritage Risk Alert Layers that categorise graduated outcomes in regard to levels of risk exposure, which may be noted on urban planning schedules.

The aforementioned public/private partnerships have enabled Ngāi Tahu and other local Māori stakeholders to make important contributions to the longer term resilience of Christchurch and the wider Canterbury region. The effectiveness of introduced initiatives has challenged social perceptions of Māori within Christchurch as a vulnerable Indigenous population. As restoration of urban Christchurch has progressed, the focus of the Māori community has shifted to identifying innovative mechanisms for promoting community resilience and environmental sustainability in the longer term. To that end, Ngāi Tahu has introduced green technologies, value-led business practices and intergenerational leadership mentoring to transform the ways in which the tribe's diverse social and commercial enterprises operate in Christchurch (Te Rūnanga o Ngāi Tahu 2016a). The relationship-based and value-centred approach to conducting activities is a common practice amongst Māori, but not frequently seen within the governance, community and corporate sectors. The effective Māori approach to urban recovery, restoration and sustainability has influenced the ways in which local stakeholders now address shared concerns, including the recent effects of the major earthquakes that occurred in Canterbury during November 2016.

Revisiting the Canterbury Earthquakes

An initial severe earthquake (7.8 Ms) occurred 15 kilometres north of Culverden in North Canterbury on 14 November 2016 (United States Geological Survey 2016), and was followed by a sequence of severe aftershocks. Although the Kaikōura region was most severely affected, the North Canterbury, Marlborough and Wellington regions all experienced major damage. The Ministry of Civil Defence and Emergency Management (MCDEM) issued a tsunami warning, and residents in the coastal areas of Christchurch, Kaikōura and Wellington were evacuated from their homes. A large tsunami measuring seven metres (23 ft) impacted Oaro, Goose Bay, just south of Kaikōura (Daly 2017), while a further tsunami estimated at five metres (16.5 ft) struck the Little Pigeon Bay area on Banks peninsula (Geonet 2016; Weatherwatch.Co.NZ 2016). An additional wave

measuring 2.5 m (8.2 ft) was recorded at Kaikōura, followed by a wave measuring 1 m (3 ft) which reached Christchurch (Geonet 2016).

Although Christchurch residents were not as geographically impacted by the earthquakes as residents further north, the earthquakes were a reminder of the psychosocial and economic stresses imposed on the community following the Christchurch earthquake sequence. Kaikōura is situated only 59 miles from Christchurch, so a reasonable percentage of Kaikōura residents commuted to work in the city during the week, with some returning home only at weekends. Other urban Christchurch residents maintained a second home in the Kaikōura surrounds in order to maintain well-established familial connections between Christchurch and Kaikōura. The Ngāi Tahu community in Christchurch was particularly affected as many tribal members belonged to the local Kaikōura Rūnanga and hapū (extended families) and/or had immediate family residing in the Kaikōura surrounds. The region most severely impacted is also home to an internationally recognised marine ecosystem and sanctuary, and has become a renowned tourism destination. As Te Rūnanga o Ngāi Tahu in partnership with local Ngāi Tau families own and conduct one of the largest tourism ventures in Kaikōura, the rapid economic recovery of the region constitutes a significant concern for tribal members. Recovery lessons learned from the Christchurch experience have rapidly been implemented in Kaikōura, by the Māori community. The local Ngāi Tahu Marae, Takahanga, immediately opened as a welfare centre for community members and tourists. Approximately 500–1000 people registered within the first 48 hours and several hundred slept at the Marae, including a hundred or more individuals who slept in their cars in the Marae car park (Te Rūnanga o Ngāi Tahu 2016b).

Te Rūnanga o Ngāi Tahu management in Christchurch organised the tribal earthquake recovery response. Three volunteer teams were separately operationalised. Team One coordinated logistics at the Te Rūnanga of Ngāi Tahu office in Christchurch, while Team Two supported Takahanga Marae's efforts by providing manpower and resources as well as conducting outreach to households in Kaikōura. Team Three, based in Cheviot, received and arranged transport for Kaikōura evacuees to one of three Marae in Christchurch where displaced residents and tourists were subsequently hosted by local Ngāi Tahu (Te Rūnanga o 2016b). A review of the Māori response indicated that Takahanga Marae had distributed over 10,000 meals to the community within the first week following the

initial November 14 earthquake. Te Rūnanga o Ngāi Tahu also funded 50 helicopter trips to carry volunteers and resources to Kaikōura as well as evacuate people desperate to leave (Te Rūnanga o Ngāi Tahu 2016c). The Māori tribes of New Zealand again offered volunteer and resources support, but very few volunteer teams were needed or deployed.

In the Canterbury earthquakes' recovery context, the Māori response to the Kaikōura earthquake(s) engaged with the disaster recovery infrastructure within 24 hours through a direct link with the MCDEM in the Department of Prime Minister and Cabinet. Further to some tensions developing between Māori and NGO volunteers following the Christchurch earthquakes, the local Māori community had established a closer working relationship with New Zealand Red Cross. Effective communication between both actors ensured rapid distribution of appropriate material, financial and human resources to the Kaikōura Welfare Centre (Takahanga Marae) and local households. With the exception of Māori media outlets, there was an absence of recognition for the role played by local Māori and the Nationalised Māori Recovery Network in Christchurch; this was different following the Kaikōura earthquakes. Main stream television channels broadcast live from Takahanga Marae on a daily basis, and showcased the effectiveness of both the Marae's response and more broadly the Māori and the wider community's earthquake recovery efforts.

However, some challenges around inter-sectoral engagement that were evidenced in the aftermath of the 2010–2011 Canterbury earthquakes reoccurred following the Kaikōura sequence of earthquakes. An argument has been advanced that inadequate communication and knowledge sharing between frontline responders, regional emergency managers and NGOs continues to undermine development of an integrated approach to regional recovery (Solomon 2017). Changing current emergency management policies and practices to promote interagency collaboration has been advocated as a mechanism for addressing these tensions.

Implications for Resilience Policy and Practice Development

The Māori community's strategic response to the 2010–2011 Christchurch earthquakes, characterised by collaborative governance, agency and actions, has successfully fostered economic, environmental and social resilience for Ngāi Tahu and others residing in both urban and rural areas of

Canterbury, New Zealand. Research findings regarding the effectiveness of Māori cultural attributes and approaches for facilitating sustainable communities have been widely disseminated, including to key governance stakeholders (Kenney and Phibbs 2014; Kenney and Solomon 2014). As a consequence, lessons learned from Canterbury are being applied to developing and implementing strategic policies that will ensure regional resilience in some instances. Progress in this regard is particularly manifest in the closer working relationships evidenced between iwi, civil defence sector groups, local authorities and hazards scientists working in hazard-prone areas, including Kaikōura, Nelson, the Bay of Plenty and Hawke's Bay.

To date, Māori approaches to addressing hazards risks and resilience have not been integrated into central government policies, strategies, and practices. However, the New Zealand government has increased funding for large-scale hazard mitigation research through the Endeavour Grant Research programme and the National Science Challenge Research Platform, specifically the Resilience to Nature's Challenges Research programme (Ministry of Business Innovation and Employment 2017). Outcomes from these significant research streams will shape New Zealand's future strategies for mitigating natural, financial, environmental and social hazards in order to create a thriving and sustainable nation for the future. Inclusion of Māori knowledge and science is integral to all government-funded research in accordance with the Vision Mātauranga Strategy. Thus, in time Māori knowledge pertaining to disaster resilience derived from current Māori research programmes will enrich existing policies and enhance development of strategies for ensuring New Zealand's resilience. In addition, the MCDEM has been tasked by the government with developing a new National Disaster Resilience Strategy. While learnings from the Canterbury context have fostered some recognition of core Māori cultural concerns in the draft strategy, further engagement with Māori is planned to ensure that Māori perspectives and resilience promoting strengths are fully acknowledged in the final iteration of the new strategy (Ministry of Civil Defence and Emergency Management 2017). The Civil Defence sector's planned engagement with Māori constitutes a significant step towards addressing priorities outlined in the Sendai Framework for Disaster Risk Reduction that advocate the inclusion of Indigenous knowledge and perspectives in national strategic planning for risk reduction and resilience.

Conclusion

In summary, the collaborative inter-sectoral response to the Kaikōura earthquakes has re-highlighted the effectiveness of Māori value-based and community-led recovery initiatives; these were initially demonstrated following the Christchurch earthquakes. Māori moral and relational attributes promote a unified response, commitment to environmental restoration and the extension of hospitality as well as respect for others during adversity. Such tenets are considered highly relevant by central government to disaster recovery policy, planning and strategising national resilience. Increased collaboration between local Māori and central government has reshaped urban governance and redevelopment of Christchurch. Māori currently participate in all decision-making processes related to urban renewal and rebuilding. Multi-stakeholder engagement has fostered opportunities for Ngāi Tahu to tackle drivers of social and economic vulnerability within the Māori community, specifically inequities in education, employment and housing. The extended recovery process has also created opportunities for Ngāi Tahu and other Māori to collaborate with local authorities in designing projects that will address environmental recovery concerns. Successful Māori approaches to urban recovery, restoration and sustainability have influenced the ways in which local Canterbury stakeholders address shared concerns, including the current social environmental and economic impacts of the recent Kaikōura earthquake. Māori approaches to ensuring that communities thrive following major disasters also have national relevance. Accordingly, Māori disaster recovery experiences and lessons learned following the Christchurch and Kaikōura earthquakes are informing regional resilience planning in some areas. In conjunction with forthcoming research outcomes from national hazards management and resilience research, these lessons will shape conceptualisation and implementation of New Zealand's new national strategy for resilience to major natural hazard events.

Note

1. To transform the sacred that is associated with burial rites into the mundane and ordinary.

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CHAPTER 23

Poverty Alleviation and Community Empowerment in the Bagan-Nyaung-U Area of Central Myanmar

Nilar Aung

Introduction

Poverty is a state or condition in which a person or community lacks the financial resources essential to enjoy the minimum standard of well-being that is considered acceptable in society to support human rights—economic, that is the right to work and have an adequate income; social, that is access to health care and education; political, that is freedom of thought, expression and association; and cultural, that is the right to maintain one's cultural identity and be involved in a community's cultural life. Poverty reduction is a key global objective of the Sustainable Development Goals (SDGs) 2015–2030 (and their forerunners, the Millennium Development Goals 2000–2015). The term, "poverty reduction," means not simply increasing income levels, but rather creating conditions in which all humans lead healthy and creative lives with sufficient food, shelter, clothing, guaranteed freedom, dignity, self-esteem and freedom from unfair treatment by the government and the community so that they are able to participate in society. It has been internationally agreed that poverty is a multidimensional issue; poverty reduction needs a comprehensive

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approach to improve the political, sociocultural, economic, human and protective capabilities of the poor.

One of the key issues in rural development is how to reduce rural poverty. More than 70 percent of the world's poor are to be found in rural areas where hunger, illiteracy and low educational achievement are common. Improving educational access and achievement for a large number of people in rural areas is crucial for achieving sustainable development. As the majority of the world's poor, illiterate and undernourished live in rural areas, it is a major challenge to ensure their access to quality education. The lack of learning opportunities is both a cause and an effect of rural poverty. Hence, education and training strategies need to be integrated within all aspects of sustainable rural development through plans of action that are interdisciplinary. Education is widely recognized as essential to the processes of alleviating and reducing the incidence of poverty. Education, needless to say, is a priority sector in every well-functioning society. Burch referred to it as a major force in economic, intellectual, social and cultural empowerment. Its value in bringing about character and attitudinal change is considered as important as its ability to reshape human potential for desired development.

In Myanmar, a majority of the population lives in rural areas where poverty and capacity deficiency are severe. Most rural households depend directly or indirectly on agriculture. The development of the rural economy through increasing employment opportunities can contribute to reducing regional income disparities, rural-urban migration and ultimately poverty. In Myanmar, there are significant regional differences in the incidence of poverty, especially in Chin, Rakhine, Northern Shan States and Sagaing. The Integrated Household Living Conditions Survey (IHCLS) showed that nationally the incidence of poverty fell from 31 percent in 2005 to 25 percent in 2010. Food poverty fell from 10 percent to 5 percent over the same period. Poverty is highest in rural areas at 29 percent compared to 25 percent in urban areas. The incidence of poverty is linked to limited access to public services and education by the poor, which impact their life opportunities. Because of this combination of factors, the Bagan-Nyaung-U area was selected to study the incidence of poverty in the dry zone of central Myanmar, which is one of the at-risk areas for drought.

Study Area

The Bagan-Nyaung-U area includes Nyaung-U Township within Mandalay Division in the Central Dry Zone of Myanmar. It is located in the southwestern part of Mandalay Division. Bagan is one of the famous tourist sites in Myanmar. It is attractive not only for international tourists but also for local travelers and pilgrims who throng to see the thousands of ancient Buddhist temples there. The Dry Zone is one of the most food insecure areas in Central Myanmar due to scanty rainfall. Water shortage here is a regular threat to rural livelihoods. Dominant characteristics of the Dry Zone are very high temperatures, very low precipitation, high transpiration, dry soil and strong wind, so the climate of the Bagan-Nyaung-U area is characterized by hot and dry conditions. The average temperature of the coldest month, January, is 21.21 °C and annual rainfall is less than 1016 mm (40 inches). The climate strongly influences the economy of the Bagan-Nyaung-U area. It especially impacts on the vegetation, soils, agriculture and variety of cultivated crops, as well as the tourist industry which supports the economy of the region. Eight percent of households are poor, 30 percent of households live on the borderline while only 61 percent of households have an acceptable level of food consumption.

Data and Methodology

The purposive sampling technique was applied to select the study areas. One sample village from Nyaung-U Township and two quarters from Bagan-Nyaung-U town were selected as study areas. One of these, Magyisauk village, is located 24.1 kilometers away from Bagan-Nyaung-U along the Bagan-Myinchan road. It is only 20 minutes' drive from Nyaung-U. It has 145 households, involved in farming and non-farming economic activities. According to official data, the development level of the study village is high, because it is located beside the main road; it has basic (i.e. primary) and middle schools; electricity and water are already provided. Although basic infrastructure has been developed in the study village, household incomes are still low and half of the households rely on remittance money from relatives.

To understand the causes and consequences of poverty and the real situation of the study village, quantitative and qualitative mixed method data collection and analysis were employed. Semi-structured interviews

were conducted with individuals from 55 households. Respondents were both male and female. They ranged in age from 25–51 years. Following Aref, focus group discussions were conducted in a group setting and were used for obtaining a better understanding of participants' attitudes. To obtain detailed information for further investigation of the study area and to collect data from local residents, focus group discussions were conducted by some elderly people, authorized village persons and authorized ward persons (Fig. 23.1).

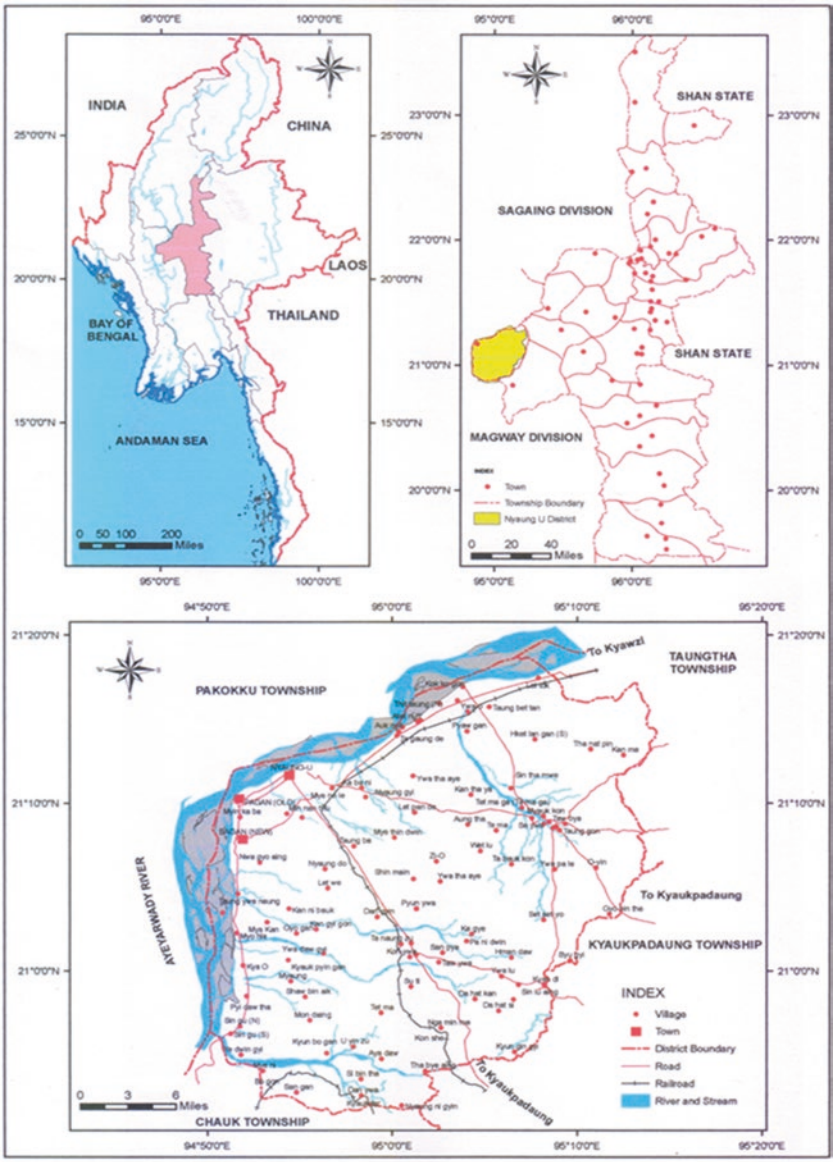
According to the conceptual framework, the major causes of poverty in the Bagan-Nyaung-U area are the low level of education of farmers, lack of capacity to adapt to climate change and lack of knowledge of modern agricultural practices. Figure 23.2 shows the intricate interlocking causes and consequences of these factors.

Results and Discussions

Although the major livelihood in the study area is agriculture, the contribution of the agriculture sector in the study village has not changed much over time, and accounts for more than half of the economic activity for this area. The existing climatic conditions, especially the pattern and amount of rainfall, determine the agricultural outputs; crop productivity drops as rainfall decreases. The root cause of rural poverty in the Bagan-Nyaung-U area is shortage of rainfall, resulting in water scarcity and loss of cultivable farmland. According to the field survey results, previously 85 percent of farmland could grow crops as dry farming. Regarding land ownership, 56 percent of farmers own more than six acres (2.43 hectares), whereas the rest, 46 percent, own fewer than three acres (1.214 hectares). Each farmer has at least 30 palm trees. According to Fig. 23.3, the amount of rainfall has decreased; the pattern of rainfall has also changed, so the productivity of farmlands decreased during 2010–2015. Farmers from Magyisauk village suffered from both rainfall pattern and temperature changes which affect the agricultural production.

Poverty and Changes in Livelihood

In 2010, 85 percent of rural people in this area worked in agricultural activities. As the survey results show, in 2016 only 48 percent of people were involved in agriculture; they had 15 years' experience in farm work. Some 28 percent of people are casual laborers (former farmers), while 24



Source : UTM Maps 2094/13, 2094/16, 2095/1,2095/3 and 2095/4. Zone 46, WGS 84.

Fig. 23.1 Location of Bagan-Nyaung-U area, Mandalay Region

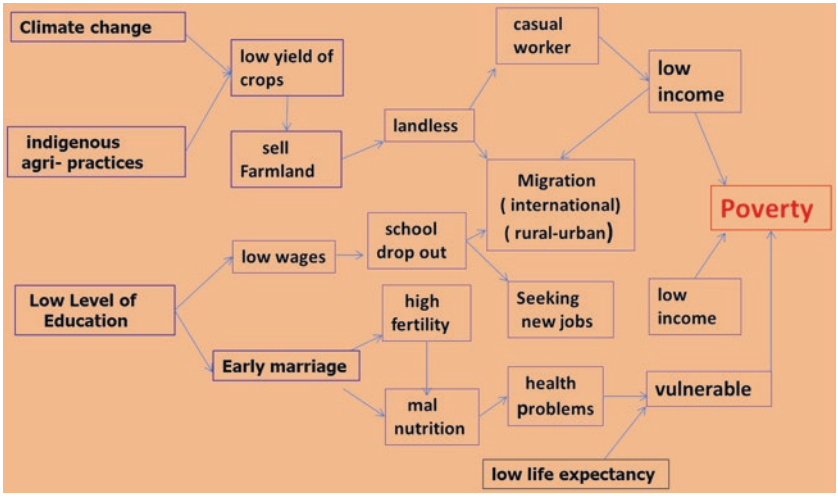


Fig. 23.2 Conceptual frameworks on causes of poverty in the study areas

Sr.	Year	Raining Days	Rainfall(mm)	Temperature	
				Summer (C)	Winter (C)
1	2010	42	829.56	45.2	10.4
2	2011	48	1024.63	40.8	11.0
3	2012	34	466	44.3	10.6
4	2013	42	797	45	20.4
5	2014	36	574	43.5	11.6
6	2015	23	422	45	21.2

Fig. 23.3 Rainfall, raining days, temperature of Nyaung-U Township. (Source: Meteorological Department, Yangon)

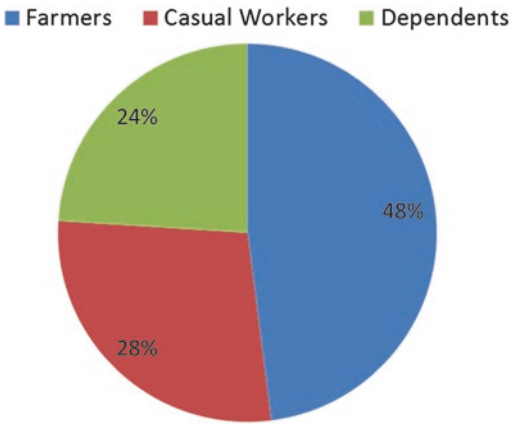


Fig. 23.4 Changes in types of livelihoods. (Source: Based on semi-structured interview results)

percent of people are dependents who rely on remittance money (Fig. 23.4). More than half of the people have become casual laborers or dependents. Climate change is having a severe impact on the types of livelihoods pursued in Magyisauk village.

Major items being grown are groundnuts, pigeon pea, palm, plum and tamarind trees. Pigeon pea is prevalent in the study area; their growing period is usually 4–5 months long. Although farmers grow these crops on their farmland regularly, they are often unable to harvest; if they are able to harvest some, the crop yields have been very low during the last five years. Harvesting of the crops is highly dependent on climate conditions in the area. Palm and plum trees often have no fruits because of scanty rainfall and drought. Furthermore, even if the palm trees do produce fruits, there is often a lack of skilled labor available for climbing the palm trees.

Young people no longer want to work in farming; they often sell their farmlands to seek a job abroad, especially in Malaysia and Thailand. This can cost between 3,000,000 kyats (2238 USD) to 6,000,000 kyats (4477 USD) according to the job opportunities. So, an acute local labor shortage can occur in the study village. Although young people go abroad to seek employment, they are often unable to find jobs because of their low level of education and skills. Then they return to their native villages. Eventually, they become landless and have to work for wages as casual workers, so their income is very low. As a consequence, local people are getting poor compared to the situation in former times.

Poverty and Income Distributions

It is generally agreed that the capability to diversify income is beneficial for households at or below the poverty line. However, diversification does not have an equalizing effect on rural incomes overall. Rich families are typically able to diversify in more favorable labor markets than poor rural families. Total income and the share of income derived from non-farm sources are often completely correlated in the study areas. As a result, there are inequalities of household income based on people's education level, skills and jobs in the study village. The agricultural production efficiency of farmers also varies in relation to the environmental conditions of their farms. As for casual workers, their average working days are between 10 and 15 days per month. There are differences in wages between men and women. Male wages are 5000 kyats per day, while female wages are only 3500 kyats per day. Diverse income sources may have strongly differing impacts on rural inequality. Working hours for a casual worker are 8 hours per day. Average family size is four persons per household in the study village.

According to the survey results, half of the current populations in the study areas are casual workers and dependents. Most of the dependents are aging people and children. They rely on remittance money from their relatives working in other cities and abroad. There are three major income groups in the study village. They are less than 100,000 kyats per month (60 percent of households); between 100,000 kyats and 200,000 (30 percent of households) and more than 200,000 kyats to 1,500,000 kyats (10 percent of households) (1340 kyats = 1 USD). Based on these results, the majority of the population in the study areas is poor.

Poverty and Level of Education

Education has emerged as an essential prerequisite for reducing poverty and improving the living conditions of rural people. Education is widely recognized as essential to the processes of poverty reduction. The rural poor face three fundamental problems: few opportunities for productive employment in agricultural or non-agricultural activities; inadequate nutrition, poor health services and absence of educational opportunities; lack of sufficient levels of organization needed to lobby effectively for rural interests.

Though both basic primary school and middle school are located in the village, the school dropout rates of children are still high because they

need to help their parents at work. The female dropout rate is higher than the male dropout rate. According to the results, there are various education levels in the study village. More than 69 percent of people finished primary school level, 15 percent are at middle school level, 14 percent are illiterate and only 2 percent are graduates. According to Oxall (1997), the levels of education among the population are highly correlated with levels of economic development. In the study village, most of the businessmen who run their own businesses are graduates. The major businesses are jaggery business, oil filling station, edible oil business, and store for farm equipment. Businessmen know well how to establish and manage their businesses systematically. If there are any changes (markets, price) in their business, they can decide how to manage and control their business in a changing environment. Therefore, education is important for the rural economic development and essential for poverty alleviation.

Poverty and Sanitation

According to the focus group discussion, formerly people could only access domestic water from one and a half miles away from the village. Now, a water pipeline system is supported under the rural development project for both drinking and household consumption in the study village. Every household in the study village can easily access the water. The cost of water is only 500 kyats per one unit. Although people can easily access water at their home, knowledge of water and sanitation is still low in the study area. They all use the toilet provided under the rural development project, but some households use one toilet to two households. Houses in the study area are mainly made with bamboo and thatch (70 percent), bamboo and zincoid (20 percent), brick and zincoid (10 percent). The results show that 60 percent of respondents have a mobile phone and 30 percent possess a motorcycle. For health care, a 50-bed hospital is located in the study village. It practices the cost-sharing base for payment system, so most of the poor people in the village cannot access the hospital for their health care (Fig. 23.5).

Poverty in the Bagan-Nyaung-U Urban Areas

Two quarters from urban areas were selected as study areas to compare the poverty conditions here with those in the rural area. According to the survey results, 60 percent of households from these quarters are migrant

Fig. 23.5 Aging people, water supply, and women laborers in the study village

families. They migrated from rural areas to seek better jobs. Most of them have less than five years' experience in their current job. They have had to shift two or three times within the Bagan-Nyaung-U urban areas. Various types of livelihoods can be observed here such as making and dancing of puppets at hotels in the Bagan-Nyaung-U area, casual workers, carpenters, and sellers. According to the in-depth interviews with two tourist guides, they are graduates who earn USD 35 per day. They mentioned that they have to compete with local tourist guides who are registered with the local authority and whose wages are USD 10 per day. Because of high competition with local tourist guides, their income has decreased. Another reason for their income decreasing was sharing of information and experiences of the traveling programs, and sharing the guides between tourists. At the moment, tourists use package tours, so they do not need to hire a guide. Finally, the incomes of tourist guide have also decreased. Like the tourist guides, other tourism-related businesses have also decreased in income. According to official data, although the number of tourists entering Myanmar increased in the last two years, improvement in tourism-related business cannot be expected, because most of the businesses rely on foreigners for only four months per year. Though local tourists visit the Bagan-Nyaung-U area year round, they cannot afford to buy expensive things compared to foreigners.

Poverty Alleviation and Community Empowerment

The key extension strategies for poverty alleviation include community empowerment and formation of farmers associations. Community empowerment is the vital role people have in shaping and improving their own area. At the heart of community empowerment are motivated people actively engaged in making a difference to the places that they know best.

Agricultural extension plays a significant role in reducing poverty, including livelihood improvement, education of farmers, increased production and improvement in crop yields. Community empowerment is not just for communities changing as they become empowered. Infrastructural facilities have a significant impact on poverty reduction by contributing to the integration of national economies, improving the working of markets, speeding the flow of information, and increasing the mobility of people, resources and outputs. The projects on the promotion of one village, one product system can improve the livelihood and strengthening capacity of smallholder farmers for competitive and sustainable agriculture. The second project recognizes the need to raise the capacity of small-scale farmers to produce products that are competitive in the market. There is little doubt that the past neglect of the diversified nature of rural livelihoods has sometimes resulted in local-level policies and projects that are insensitive to local priorities, mistaken in their assumptions about the availability of time, wrong in their understanding of the key income sources of poor people, and inadvertently misdirected toward the better-off rather than the rural poor.

Based on focus group discussions with people from local communities, sustainable livelihoods in the study areas and water availability are extremely important. Although basic infrastructure such as roads, water supply for household consumption, electricity supplies, both primary and middle school, 50-bedded hospital was already supported under the rural development project, local people are still poor because of their low level of education and knowledge. Therefore, the rural development program should be launched after understanding the actual conditions of people in the study areas. People mentioned that the productivity of their farmland has decreased because of changes in the amount and pattern of rainfall over the last five years. The implementation of the water pumping project from the river and the introduction of drought-tolerant crops should be encouraged by the Ministry of Agriculture. For investment in agriculture, government loans for major crops should be provided. The protection law for farmland should be regulated by the government. Existing land regulation laws cannot protect the farmland of farmers. For example, according to land regulation law No. 7, farmers can get an agricultural loan, and because of it, farmers can sell their farmlands. As a consequence, 40 percent of farmers in the study village became landless over the last ten years. At present, farmers are mainly relying on loans from PET Myanmar that is only for female-headed families in both rural and urban areas. To alleviate

poverty, education is the crucial factor. Education means not only school education but also alternative education, formal and informal education. Before launching effective and appropriate education development programs, livelihoods, social issues, income and educational level of people in the study areas should be observed.

In urban areas, although Bagan-Nyaung-U is one of the booming tourism areas, the participation of local people in this business is still low because of their low education level and skills. In accordance with the survey results in 2014, the education level of workers in the food and beverage industry in the Bagan-Nyaung-U area was high school level (75 percent), graduate (25 percent). The education levels of workers in hotels, motels and inns were high school level (57 percent) and graduate (43 percent). Therefore, to apply for middle salaries jobs, people need to have at least a high school education level. Upgrading the education level of people is crucial to allow them to be involved in non-farm economic activities in both rural and urban areas. The diversity of livelihoods is an important feature of rural survival. Diversity is closely allied to flexibility, resilience and stability. In this logic, diverse livelihood systems are less vulnerable than undiversified ones; they are also likely to prove more sustainable over time precisely because they allow for positive adaptation to changing circumstances. Everyone is vulnerable to environmental impacts, but the ability of people and societies to adapt and cope is very different. Vulnerability is not spread in the same way, and some groups (e.g. poor people, children, women, and aging people) are at greatest risk.

Based on the findings of this study, community empowerment was found to be the most suitable strategy for alleviation of poverty. The promotion of economy in a sustainable way has the potential for increasing employment opportunities in both rural and urban areas, reducing regional income disparities, slowing premature rural-urban migration, and ultimately reducing poverty. If agricultural activities cannot be an engine for poverty reduction in developing countries, an alternative way is needed to be found and explored. Emphasis should be placed on education so as to equip people with the necessary information they need to move out of poverty. Farmers should be encouraged to form associations so as to enable them to easily obtain loans and credit facilities, build social capital, pool resources and obtain loans and credit easily from financial institutions. This suggests that poverty reduction efforts must be multitargeted and are expected to show wide and diverse dimensions. Keys to overcoming

Fig. 23.6 House situations in urban areas and Zaytawun monastic education

rural poverty have to overlap different disciplines and must encompass economic, social, political and institutional factors.

Good leadership is important to find out community needs. Zaytawun monastic education center located near the slums and squatter areas of Nyaung-U can support the poor people's education. Although the basic primary school exists in this area, most people rely on the monastic education. Total student enrollment was 240 students in 2016. The monk (*Sayartaw*) is a good leader for this education center. He organized well the parents and children from slum and squatter families although at first they had negative thoughts about participating in his works. All respondents revealed that they have to rely on Zaytawun monastic education for both their children's education and social warfare. When the students enroll in monastic education, the education records, family background and interests of students are collected and recorded. Then, if students fail the exams more than twice, the monk arranges for them to attend other vocational trainings such as workshop, painting and architecture. After finishing the training, they can apply for jobs based on their skills. Now, some of them run their own businesses and experience success in their work such as make-up artist, painter and designer (Fig. 23.6).

Conclusion

Based on these findings, the lack of local organizational capacity in the study village is one of the main barriers related to poverty. Hence, for education to contribute to rural development it should be locally organized, applied, practical, problem-posing, and focused on functional specialization. Although education has an important role in poverty reduction, as poverty is multidimensional, education alone cannot solve all problems.

Solutions to rural poverty have to draw on different disciplines for practical application.

The four policy areas of education, infrastructure, micro-credit and enabling environments are of course not by any means the only policy themes worth pursuing in relation to promoting sustainable rural livelihoods. Nevertheless, some combination of them is likely to feature in any current list of micro-policy priorities, and other policy themes are often found to overlap or involve extensions to one or other of these areas.

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CHAPTER 24

Rural Economy and Poverty in the Myanmar Delta: A Case Study of Ahmar Sub-township, Ayeyarwady Region

Myint Thida, Nwe Yin Min, Khin Myat Myat Mon, and Nyi Nyi Aung

Introduction

Poverty is one of the most widespread and persistent problems in developing countries (Cobbinah et al. 2013; Deguara 2008; Knowles 2000; Lehning et al. 2006; Todaro and Smith 2006). The term 'poverty' is described in different ways in the research literature because it has a multidimensional nature. Whereas some researchers in different geographical regions view poverty as deprivation, others are concerned with social exclusion and inequality in resource distribution. Despite the differences in definitions, many countries in the developing world have adopted universal poverty

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reduction approaches often aligned with World Bank approaches (Cobbinah et al. 2013).

Myanmar today is one of the poorest countries in Southeast Asia. With a population of 51.4 million at the 2014 Census, it has an estimated official poverty rate of 37.5 per cent; most of the poor live in rural areas, where the poverty rate in 2010 was around 76 per cent, which is higher than an earlier estimate of 26 per cent (World Bank 2014).

Ahmar Sub-township was selected as the study area for this chapter because it is an area where widespread poverty is endemic. Most of the people live below the official poverty line. The current, most widely accepted definition of extreme poverty is living on less than $1.25 per day (ECOSOC 2016). In the study area, poverty is directly related to low and irregular income derived from rural economic activities; it affects migration patterns, education, health, life expectancy and so on.

In the study area, farming and non-farming economic activities are the bases of the rural economy. Major economic activities are agriculture, fishing and making thatch. In agriculture, farmers practise the traditional cultivation method. Harvest failure is a key risk caused by saltwater intrusion in the rainy season, and some farmers lose all their crops. They call this *ta zinlut*, which means 'no need to harvest'. Moreover, inadequate agricultural support from the government affects production and most farmers are unable to get loans from the Agricultural Bank. According to interviews, some households depend on non-farm income sources such as fishing, but they are obstructed by persons who have received a fishing licence from the government. Their income is low because they do not have a regular income. Since most people have only attained high school level, their education is low. Health facilities are insufficient and life expectancy of the rural people is less than 60 years.

In Ahmar Sub-township, most people are poor and some have given up agriculture due to high crop loss. They cannot get sufficient income by engaging in fishing and making thatch. Therefore, the rural economy cannot support their living costs and they are below the poverty line. The objectives of this chapter are to examine the rural economic activities that cause poverty in the area, to understand present socio-economic conditions of the people who live in the area, to explore the means to reduce poverty in the area and to examine the consequences of poverty.

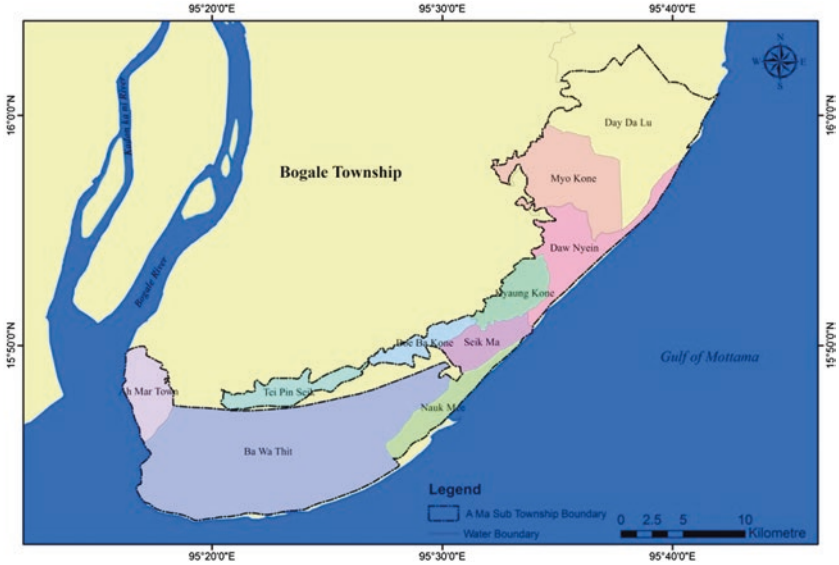

Fig. 24.1 Wards and Village Tracts in Ahmar Sub-township. (Source: General Administrative Department [Ahmar Sub-township])

Study Area

Ahmar Sub-township in Phyapon Township in the Myanmar Delta is composed of four wards and nine village tracts (Fig. 24.1).

It has an area of 2.8 sq. km (691 acres) and a total population of 126,899 of which 63,865 were male and 63,034 were female in 2014 (General Administrative Department, Phyapon Township). Major economic activities are agriculture, fishing and making thatch. About 70 per cent of the population engaged in agriculture and the rest in fishing and making thatch. Therefore, most people have insufficient household income to meet their daily living requirements.

Data and Methodology

To obtain primary data for the study, a participatory rural appraisal was conducted to get a detailed understanding of the socio-economic conditions in the area. From nine village tracts, five village tracts in which people

engaged in agriculture, fishing and making thatch were selected for data collection. For this chapter, primary data such as family income, jobs, education, health, number of school dropouts and children were collected by using semi-structured questionnaires and in-depth interviews with 30 people, including farmers, fishermen and thatch makers. Socio-economic and demographic questions were asked to obtain information about the profile of respondents for the purpose of illustrating the poverty of the local people. To get a thorough understanding, discussions on poverty and the rural economy were conducted not only with local people but also with authorities from the General Administrative Department and Ministry of Agriculture. Secondary data such as area cultivated, production activities were also obtained from the departments concerned.

Results and Findings

Factors Causing Poverty in Ahmar Sub-township

A range of economic and social factors are responsible for the poverty in Ahmar Sub-township. The key driver causing poverty in the area is the ineffective rural economy. Agriculture, making thatch and fishing are the major economic activities, but they produce low incomes. Local people fall into a vicious debt cycle. Moreover, low accessibility to infrastructure such as an all-season road network, little government aid and lack of other income-generating opportunities are also factors causing poverty in the area.

Rural Economy in Ahmar Sub-township

There is a strong link between low economic growth and poverty. In the area, three major economic activities, agriculture, especially paddy and sea sesame cultivation, fishing and making thatch, are the predominant ones.

Agriculture

Agriculture is always associated with economic and natural risks. In developing countries like Myanmar, the poor farmers, who practise subsistence agriculture, are very vulnerable to these risks. In the area, risk in agriculture is mainly related to saltwater intrusion. In this area, the majority of the poor are engaged in agriculture without alternative income sources which could reduce their vulnerability.

Fig. 24.2 Ploughing the land by using drought animals. (Source: Myint Thida (17.6.16))

In the study area, farmers use drought animals to plough their farmland, because of the traditional cultivation method and low investment (Fig. 24.2). They practise the broadcasting method in paddy cultivation to reduce labour costs (Fig. 24.3). They do not carefully make the land bank (*kanthin*) to store water and to protect against saltwater intrusion because of high cost. Therefore, it is difficult to keep water in the farm, and saltwater intrusion takes place annually.

Although paddy is a major crop in the area, the cultivated paddy acreage has decreased due to crop loss as a result of the saltwater intrusion, which is probably a result of the effect of climate change causing rising sea levels in the area. Saltwater intrudes into the paddy field just when the ears of the paddy begin to appear and causes grain loss. According to the questionnaire's results, 88 per cent of the farmers cultivate paddy; 62 per cent of the paddy cultivars said that they have reduced their cultivated paddy area and left some paddy land as fallow land due to saltwater intrusion, crop loss and lack of productivity.

Fig. 24.3 Traditional broadcasting paddy cultivation in an unsystematic paddy field. (Source: Myint Thida (11.6.16))

The potential yield of rice varieties in Myanmar is about 6.1 tons (120 baskets per acre), but Myanmar farmers can only produce around 3.6 tons per ha (just over 70 baskets per acre) (Than Htike Oo and Myo Myo 2009). In the area, according to interviews, the actual average productivity of paddy was about 1 ton per ha (20 baskets per acre) in 2014. This low productivity is mainly caused by saltwater intrusion. Low agricultural productivity is thus one of the key factors causing poverty.

Therefore, using the traditional cultivation method and the unsystematic land bank are the major factors that cause low productivity and poverty in the area.

In April and May each year, farmers collect organic waste and send it to their fields. Then they set fire to paddy stalks and organic waste to increase fertility. Land preparation for paddy cultivation is done in June and July. The monsoon sets in at that time and ploughing is done only by using cows and water buffalo. Farmers in the area do not use agricultural machinery because of the cost of investment. In August, paddy seeds are broadcast in the fields. They use only the broadcasting method in paddy cultivation due to the high labour cost. Some farmers add fertilizers and

pesticides, but most farmers cannot afford to buy them due to the high cost, so they do not use these inputs in paddy cultivation. The ears of the paddy begin to appear in November. At that time, rainfall decreases and saltwater intrudes into the paddy field. Then paddy plants become wilted and most of them die. Harvesting of the remaining crop is done in December. Crop loss is high and yield per unit area is low.

Farmers know that the fertility of the soil has been decreasing due to saltwater intrusion and that the consequent low fertility causes low yield. Paddy cultivation is sufficient to support household consumption only in some years. Because of the long period of saltwater intrusion causing high crop loss, the farmers in Ahmar often have no crop to harvest.

Pests and poor access to agricultural inputs also increase vulnerability. Harvest failure affects not only the wider rural economy but especially also the households in the area.

Although agriculture is one of the major economic activities, most farmers do not have cows and buffaloes for paddy cultivation. Some farmers leave their land as fallow because they do not have sufficient funds to invest in paddy cultivation.

Some farmers who cultivate land get a loan for paddy cultivation at the rate of 100,000 kyats per acre (250,000 kyats per ha). But most farmers cultivate unregistered land and they do not get loans for cultivation.

Fishing

As the study area is located near rivers, fishing is also widespread in the area. Fishermen must enter into contracts with the government to get permission to fish the waterways, but few people are able to enter into contracts because most fishermen have insufficient money. The first authorizing contract is formally negotiated with the government, and the subsequent one is allowed by the first contract. The first contract must pay about 10,000,000 kyats to the government to get permission for fishing in the whole area and about 2,500,000 kyats for the second contract. The second group has permission to fish along a stream. Under the second contract, various groups are allowed to fish in the area. The individual fishermen have to obtain permission from these groups to fish in the approved stream (Fig. 24.4)

The individual fishermen sell the fishes caught in the river at the depot to get income for their survival (Fig. 24.5).

Fig. 24.4 Selection of fish on the boat. (Source: Myint Thida (20.6.15))

Fig. 24.5 Fish depot. (Source: Myint Thida (20.6.15))

Making Thatch

As the study area is located near the coastal area, there are large areas of Nippa land. Most farmers depend on the Nippa land for making thatch. Leaves of thatch are cut twice per year: November and April. The leaves cut in November are old and are known as summer leaves, and those cut in April are young and are known as rainy season leaves. The rainy season leaves are not as expensive as thatch cut in November due to their being young leaves.

In the area, two approaches to making thatch are found. Some families buy a pack of thatch leaves and make them into thatch (Fig. 24.6). These families make thatches by using family members and get an average income of about 3000 kyats per day ($ 2 per day) (Fig. 24.7).

Some persons go to the thatch depot and work as daily wage earners. According to interviews, a man or woman can earn about 1000 kyats per day (about $ 1 per day) by working at the depot. Thatches are sent to Yangon by boat.

As the area is located in the coastal area, waterways are the major mode of transportation. There are also earthen roads, which are muddy in the

Fig. 24.6 Nippa leaves shop (Tebinseik Village). (Source: Myint Thida (24.4.15))

Fig. 24.7 Making thatch by family members. (Source: Myint Thida (24.4.15))

rainy season and almost impassable. Therefore, accessibility is a problem, and a major factor contributing to poverty is the lack of infrastructure, which inhibits the transport of goods to market.

It is difficult to diversify income from other sources. Therefore, the people in the area find it difficult to escape from poverty.

Role of Females in Rural Economy

Women in the area also engage in paddy cultivation, in sorting fish at the depot and in making thatch. They work at least ten hours per day (Fig. 24.8). But they do not get sufficient income for daily living expenses and their quality of life is low. In the rainy season, they work in their field and some at the fishing depot select types of fish. They earn money by making thatch in the summer.

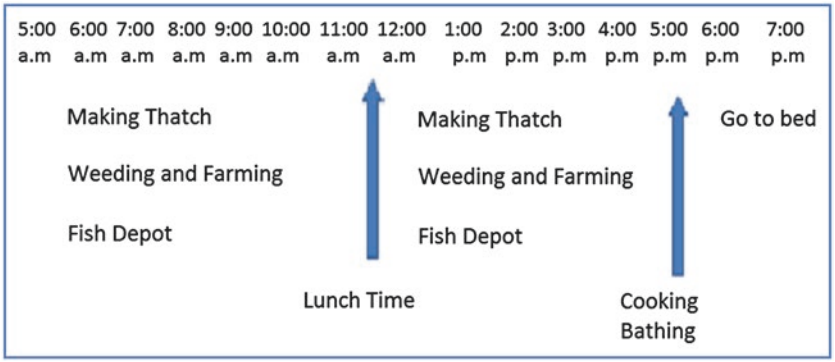

Fig. 24.8 Working plans of females in rural economic activities. (Source: Interviews by Participatory Rural Appraisal (24.4.15))

Consequences of Poverty

The consequences of poverty in the rural areas in developing countries are inadequate nutrition, poor human rights, insufficient income and livelihood opportunities, low life expectancy, high fertility, corruption, insecure property rights and macroeconomic instability. In Ahmar Sub-township, although there are many consequences, migration, low access to primary healthcare and education and low life expectancy are significant factors.

Generally, family income affects the level of school enrolment. As the education of the people who move to other areas is low, it is difficult to get a higher income and they earn money as casual labourers. Only 14 per cent of the population has graduated from university. Eighteen per cent of the population living in the area have only primary education level, 28 per cent middle school level and 40 per cent high school level.

Parental characteristics also play a significant role in determining school education (Gouda and Sekher 2014). Most people do not encourage their child to be educated, and the dropout rate is high because their family income is low, and it is insufficient to meet the needs of daily life. According to the field survey, the dropout rate is highest at high school level because they can earn money as child labourers at the age of 14 or 15.

The rate of dropout is also affected by education facilities in the area. The area of the township is 2.8 sq. km and has only one high school.

Although it is not far from home to high school, it takes two and a half hours for students because of poor infrastructure and low accessibility. It is one of the underlying reasons that impact on the dropout rate. On the other hand, schools in the village tracts are in poor condition. Therefore, storm shelters are being used as teaching places in some village tracts such as Tebinseik, Mayan and so on because they are safe places.

Early marriage is directly related to poverty and the dropout rate. In the area, after dropping out, they work as casual labourers in other urban areas and then get married. According to the field survey, 42 per cent of the young adults get married before they are 20 years old. Nearly 70 per cent of their spouses are from other areas and the rest from their native places. As a consequence of early marriage, the fertility rate is high. Sixty-six per cent of the women have four children, 24 per cent three children and the rest two children.

Migration is one of the consequences of poverty. There are three types of migration: permanent, circular or seasonal and commuting (Mendola 2006). According to the interviews, one or more family members of 60 per cent of the families move to other places to get a higher income. Most young adults move to other urban areas, especially Hlaingtharyar Township in Yangon Region, for the purpose of getting better jobs in textile factories and higher income as temporary workers.

The labour force in the Ahmar area has decreased due to migration, affecting farming methods. According to the interviews, labour cost sharply increased from 2000 kyats per day in 2010 to 3000 kyats per day in 2015 in this area. Due to the high cost of labour, most farmers in Ahmar practise the broadcasting method of growing rice, which causes low productivity.

In the study area, there are only two health assistants and six midwives. Therefore, it is difficult to obtain healthcare and medical advice. Sick people must go by boat to other villages to seek medical assistance.

Aluko (2012) said housing is the second most important essential need of man after food. More than 60 per cent of the houses in the area are made of bamboo, and thatch is used as roofing material. The people save rainwater in a large pot for drinking water (Fig. 24.9). They use the water from artesian wells donated by NGOs. Some were destroyed due to lack of maintenance. There are no fly-free toilets, and the people use an unhygienic toilet which drains directly into the river (Fig. 24.10).

Fig. 24.9 Rainwater collection in large pots for drinking water. (Source: Myint Thida (24.4.15))

Among ASEAN countries, Myanmar has the lowest life expectancy (World Bank 2014). Life expectancy is one of the key health indicators. It is directly related to malnutrition caused by poverty. In Myanmar, average life expectancy for males is 63.4 years and for females it is 67.1 years (UNDP 2014). In the area, 75 per cent of the families do not have any elderly persons aged more than 60 years. This indicates that the life expectancy of the area is lower than 60 years. Malnutrition, and lack of modern medical facilities and awareness of health issues are major factors that cause low life expectancy.

In Myanmar, about 75 per cent of the population lacks access to electricity, and the consumption of electricity is one of the lowest in the world (World Bank 2014). The Ahmar area does not get electricity. Formerly, Forest Resource Environment Development and Conservation Association (FREDA) supported electricity to local people by using generators. At present, some local people use solar cells from China. This costs about (30,000 kyats) but it is not durable. In the area, dry batteries are used for solar cells; the people then always throw the dry battery away, which may cause environmental problems in the future.

Fig. 24.10 Unsystematic toilet. (Source: Myint Thida (24.4.15))

Discussion and Suggestions

The pillars of the economy in Ahmar Sub-township are agriculture, fishing and making thatch. Although they play a major role in the economy of the area, the income achieved from these activities is very low and is insufficient to meet their cost of living.

Although most farmers cultivate paddy, the net return is very low because of the amount of saltwater intrusion into paddy fields in October and November. Most paddy plants die and the productivity is only about 1 ton per ha. Therefore, farmers derive low benefit from their work and they are in a vicious cycle of debt. Moreover, because of the lack of agricultural loans, they cannot afford to buy fertilizer and cannot build strong embankments to protect against saltwater intrusion themselves. Some farmers leave their land as fallow land owing to lack of investment, which affects not only the economy of the farmers but also the national economy.

Fishing is one of the rural economic activities that provide income for rural people. But, the wealthy who can afford a large investment achieve high benefits and the rural poor receive little. Their daily income is about 10,000 kyats and they are heavily in debt.

Making thatch is also a rural activity but provides income only twice per year. Moreover, income derived from making thatch is only about 1000 kyats per day.

As a result of the consequences of poverty, migration, low life expectancy, low education and lack of healthcare are prominent in the area. Moreover, as a consequence of migration, labour shortage is a problem for agriculture. The labour shortage affects farming methods and productivity, which are key drivers for poverty. A microfinance project would assist the farmers in obtaining the equipment needed to improve productivity.

Strong embankments (*tar*) are needed to protect against saltwater intrusion in the rainy season, and governmental assistance should be provided to help the farmers by constructing these features.

On the other hand, authorities concerned need to fulfil the requirements in health, education and infrastructure to upgrade the socio-economic conditions of the area.

Governmental authorities also need to supply electricity to the area, which will assist to improve the education, health and livelihoods of the people of Ahmar.

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CHAPTER 25

Conclusion and Policy Implications

Helen James

Introduction

The chapters in this book demonstrate the need for stakeholders to examine the interlinkages between the four research communities when developing innovative approaches to meeting the challenges to implementing the Sustainable Development Goals (SDGs): poverty alleviation, climate change, development, and disasters. Through empirical research the authors highlight the inherent impediments across selected countries in the Asia Pacific to achieving implementation of the SDGs. Such impediments include growing populations, ageing populations (Yang), food and water insecurity (Pittock, Falvey, Prior), over-exploitation of natural resources for the benefit of the few consequently resulting in landslides (Wint Htun, Kyaw Htun), population displacement, and adverse long-term impacts on fragile livelihoods.

Collectively, these chapters support the principle that advances in human well-being should be achieved in tandem with protection of the Earth's life-support systems; and that the security of people and the planet are interchangeable. Environmental citizenship, the responsibility of each citizen to act for the public good as an integral part of the larger ecosystem which sustains human life, is a strong focus in the chapters by

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Robert Cribb and Henri Sitorus. Together with the chapter by Mucahid Bayrak, they argue that environmental conservation and implementing environmental citizenship are inherently political stances which require a rights-based approach to be embedded in public policy and its dispersal throughout the global community. As U Maung Maung Aye has written (Chap. 2): 'Alleviating poverty, empowering women, increasing access to family planning and health care, ensuring human rights, developing more sustainable lifestyles in the developed countries and improving international development policies are all critical to providing a decent quality of life for future generations, without causing irreversible damage to the environment.' These critical issues are explored further below.

Poverty Alleviation, Migration, and Livelihood Adaptation

Poverty alleviation through an integrated approach which combines a number of these elements is the focus of several chapters by Nilar Aung, Myint Thida, Prior, Falvey, and James. Its relationship to the development of water infrastructure, governmental policies for construction of dykes and dams in energy-poor countries, and the negative consequences this approach has on long-term food security are finely argued by Pittock and Tran. Their chapters focus on the lower Mekong basin but hold out lessons for Myanmar and other regional countries. Adaptation practices by Vietnamese farmers, as Tran has shown, seek innovative ways to mitigate adverse structural flood and water control policies. Pittock argues that the lessons of the lower Mekong basin highlight that diminished freshwater fisheries will have consequential effects on shortfalls in food protein and deforestation; further, he argues that decision-makers in developing countries need to better understand the trade-offs between sectoral policies (biodiversity, energy, food, and health) when making policies to address the SDGs.

By contrast, Myint Thida explores the dire consequences of climate change and rising sea levels/salination in the deep delta areas of Myanmar, when rice farmers are unable to reap the rewards of their labour and crops die before they can be harvested. The need to find alternate sources of income means that many either exist on the poverty line or migrate to urban areas to embrace different livelihood options.

Migration plays a key role in decisions rural people make to find alternate livelihoods when their farming activities are unable to support them. The chapters by Khine Myint Cho, Kyaw Kyaw, and their colleagues with respect to rural-urban migration, in particular villages in Taungdwingyi and Pantanaw Townships (Magway and Ayeyarwady regions, respectively), explore the consequences for agricultural communities when the younger generation migrates either overseas or to the larger urban areas of Myanmar. When overseas migration is involved, it often becomes circular migration; that is, there is a cycle of going and returning: going to low-paid jobs in neighbouring countries like Thailand or Malaysia, which enable remittances to be sent back to the home villages, and returning for short times before once again moving overseas. The result is that farm labour is becoming increasingly casualised in these areas affected by significant out-migration away from agricultural communities, and rates of pay are increasing in proportion to the shortage of farmhands.

Migration is also an adaptation practice in some communities in the Vietnamese delta. A more nuanced exploration of the rural-urban interaction paradigm is provided by Tin Tin Mar and Nilar Aung. The location of the township of Hlegu close to the large urban area of Yangon is providing special opportunities for development in some village tracts, especially in the emergence of improved infrastructure and employment opportunities; however, the rural population has not yet achieved success in agricultural intensification, and industrialization in the township of Hlegu is in its infancy.

Across Asia and other areas of the world, people are moving from rural to urban areas in search of better employment, education and livelihood opportunities, and security for their families. Often they migrate overseas either temporarily or permanently. Migration is a major strategy to escape poverty and underdevelopment. Environmental characteristics are major drivers of these human movements (UNDP 2009), often resulting in unanticipated social problems such as the 'left behind' children, that is, those left with grandparents in rural areas of China, Thailand, Myanmar, Vietnam, and other countries while parents are away in the large urban conurbations pursuing livelihood options. In 20 years' time, it is expected that at least 1.1 bn more people in Asia will be living in cities (ADB 2011). Already in 2015, Asia had over 12 megacities with populations of more than 10 million; China had more than 115 cities with populations over 750,000. By 2030, 55 per cent of 4.9 bn Asians, or 2.7 bn people, are projected to live in urban areas (ADB 2011). As climate change proceeds

with adverse effects on vulnerable agricultural livelihoods, these concentrations of significant populations in increasingly large cities expose more and more people to the likely impacts of severe weather events, floods, heatwaves, typhoons (cyclones), and other types of hazards.

Moreover, these ever-larger urban populations hold out the spectre of increasing need for resources: water, food, energy, building materials, transport, and communications networks. Escaping poverty and migration to urban areas can also be linked to increasing energy and resources needs and exploitation. The ADB (2011) 2050 Report showed that by 2050 the purchasing power parity (PPP) of an additional 3 bn Asians is likely to rise to over USD 36,000 per year. This increased consumption capacity can be directly linked to increasing greenhouse gas emissions and climate change impacts, again a serious element in the exposure of urban populations to disaster risk.

At present, around 70 per cent of Myanmar's population live in rural areas, and some 62 per cent of GDP comes from agriculture. However, this does not mean that the country is insulated against the effects of climate change on its food and water security, or the increasing health risks arising from high temperatures in the hot dry season (April–May). As indicated in Chap. 13 (James), Myanmar's agriculture sector and thus its food and water security are highly exposed to rising temperatures, severe weather, floods, and cyclones (e.g. Komen 2015).

Legal Frameworks and New Policy Approaches

The vulnerability of livelihoods in face of climate change impacts, poor development practices, collusion between big business and governmental authorities is everywhere apparent in these chapters. Myint Thu Myaing has laid out clearly the legal frameworks in place in Myanmar for environmental conservation; however, as many of the chapters show, there is a great difference between having such laws on the books and their actual implementation. Khin Mar Wai and her colleagues explore the impacts on livelihoods of riverbank erosion caused by sand dredging, the resources from which will eventually end up in the construction sites of large buildings in the urban areas. Investigation of the effects of mining in the Mogok area led Wint Htun, Ohn Thwin, and Khin Mar Wai to state that land degradation in this area arising from the mining practices has blocked drainage systems, leading to flooding and landslides in heavy rain. They propose a new approach to the problems of deforestation and environmental

impacts arising from the mining with implementation of a proper wastewater management plan and protective policies for ethnic minority miners. Nwe Aung and her colleagues link poor environmental practices in Yangon with economic loss, and this research 'squares the circle.' That is, lack of proper environmental management practices eventually incur severe economic losses, a juxtaposition which is not often acknowledged.

Disasters, Development, and Climate Change

The chapters by Khaikam and James, Kenney, and Lebowitz take the discussion directly into the realm of linkages between the political, social, and cultural contexts of climate change, development, and disasters. As Schipper and Pelling (2006) have argued, vulnerability to natural hazards is increasing due to rising poverty, a growing global population, and underlying development issues. While a hazard does not become a disaster until it connects with both people and poor governance, it is clear that climate change is contributing to disaster risk in rising exposure to high temperatures, floods, fires, rising sea levels, more frequent and intense windstorms, and so on. Measures to mitigate risk need to focus on reducing vulnerability in the context of development efforts which include alleviating poverty and improving human development through access to better education and health services. Climate change and disaster risk have clear consequences for development, as natural disasters reduce the gains won by development particularly for the developing world where large concentrations of population inhibit national development policies and the empowerment of women can be held back through lack of gender equity principles in public policies. In the case of the Thai floods, as Khaikham and James argue, it was the lack of political competence to manage the crisis which led to the huge economic losses, again connecting environmental mismanagement and economic costs.

Kenney's chapter on the Christchurch earthquakes opens another key aspect of the argument in the fine perspective she brings to the role of Indigenous knowledge and approaches to community resilience in the reconstruction process through sharing and drawing on collective social capital, a concept also explored in a comparative context by Prior (Chap. 7). Lebowitz continues this theme in his exploration of how alternate sources of agency fill the gap when local authorities are absent; in this case, the Jôsô Flood of 2015 in Japan saw other public entities come to the fore to contribute to overcoming the aftermath of the disaster when

governmental expertise was absent. Both Indigenous knowledge and practices and innovative interactions between the public and private key stakeholders find their place prominently in the Sendai Framework for Disaster Risk Reduction 2015–2030. They highlight the need to overcome the lack of links between policy dimensions/institutions and local disaster risk reduction and management policies and practices. To integrate disaster risk reduction and climate change policy into development plans, there is a clear need to make the principles of sustainable development a core requirement and facilitate more integrated approaches to reducing the losses from disaster through more frequent interactions and joint approaches between the four communities of practice.

Conclusion

The authors in this book demonstrate clear perspectives on the multilayered challenges to implementing the SDGs. None has any reservations that these challenges will be easy to meet, or that the institutional frameworks will need to be modified, in all countries confronting the impacts of climate change and its relationships to population pressures, development, and imperfect environmental management practices. While the book elucidates particular aspects of public policy in selected countries, there is no doubt that the issues explored apply to all countries and that global cooperation will be required to achieve and maintain intergenerational quality of life in a future conditioned by anthropogenic climate change.

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