



SUMERNET

Research Projects

Policy Briefings

Phase 3 (2013-2018)



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Editors: Rajesh Daniel, Clemens Grünbühel, Vanessa Hongsathavij

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SUMERNET Secretariat

Stockholm Environment Institute (SEI) Asia
15th Floor, Witthayakit Building
Chulalongkorn University 254
Chulalongkorn Soi 64, Phayathai Road, Pathumwan
Bangkok 10330 Thailand
www.sei.org

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PREFACE

Even as the Mekong Region continues to undergo a socio-economic transformation, with regional integration for economic growth, environmental concerns remain a critical challenge. Natural resource degradation, with its toll on both ecosystems and local livelihoods, poses risks for achieving sustainable development.

Since 2005, the Sustainable Mekong Research Network (SUMERNET) programme has aimed to inform and influence sustainable development by supporting credible, collaborative research and regional assessment, stimulating independent discussions on key regional issues, and engaging with decision-makers and stakeholders to foster more effective and sustainable policies and programmes.

The Asia Centre of the Stockholm Environment Institute (SEI-Asia) has hosted the Secretariat since the programme's inception. Now at the end of its third phase (2013-2018), SUMERNET has expanded to involve more than 100 researchers and 50 affiliated institutions across the region.

In this phase, SUMERNET has generated research studies and findings as well as policy-relevant recommendations on sustainable development in the Mekong Region. SUMERNET partners have lead interdisciplinary, cross-national studies on major policy issues; engaged with policy-makers, planners and stakeholders; and built capacity among researchers and policy-makers as well as the media and others. The collaborative research projects addressed various sustainable development issues under three themes: Climate compatible development; Ecosystem services for local development; and, Sustainable regional economic integration. In addition, five case studies under a Regional Assessment (RA) study on water scarcity were also implemented by SUMERNET partners in five Lower Mekong countries.

The SUMERNET policy briefings compiled in this booklet are the fruit of this collaborative research work and engagement with policymakers and other stakeholders by the SUMERNET partners. The briefings are written by our research partners with consideration of policy relevancy and based on the engagement of the project teams with local and national policymakers.

We hope that this SUMERNET booklet of policy briefings will prove beneficial for researchers and also for policymakers and others towards understanding the various policy needs for sustainable development of the Mekong Region. Additionally, we hope that this booklet will enable other researchers in the region to realize the importance of communicating research findings for influencing policy development.

Dr. Chu Thai Hoanh
Chair
SUMERNET Steering Committee

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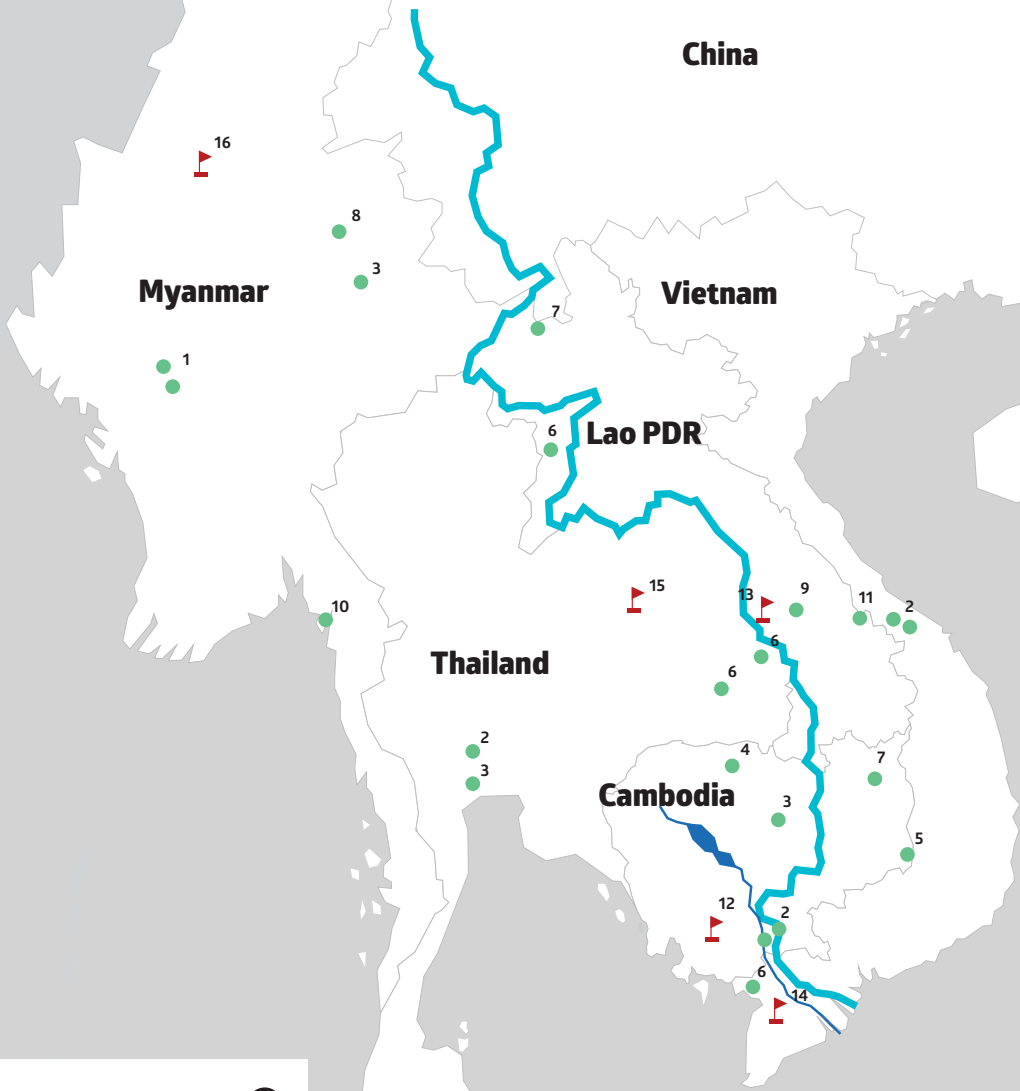
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*Dr. Chayanis Krittasudthacheewa
SUMERNET Programme Manager
Deputy Director, SEI Asia*

THE MEKONG REGION



Legend

- SUMERNET projectsite
- ▴ RA case study site
- Mekong River
- Country boundary



SUMERNET projects

- 1 - Adaptation Pathways for Climate Resilient Development: The Case of Cambodia, Lao PDR and the Philippines (adaptation pathways)
- 2 - Turning rice straw into cooking fuel for air quality and climate co-benefit in selected GMS countries (RS co-benefits)
- 3 - Comparative study on national REDD+ strategy in Cambodia, Myanmar and Thailand (REDD+ in the Mekong) (REDD+)
- 4, 5 - Understanding, Classifying and Mapping Human Use and Natural Resources in Pilot Wetlands of Cambodia and Vietnam to Promote Sustainable Development (small wetlands)
- 6 - Recovering and valuing wetland agro-ecological systems and local knowledge for water security and community resilience in the Mekong Region (RECOVER)
- 7, 8 - Gendered impact of cross-border agricultural investment: Case of rubber plantations in Northern Lao PDR, Myanmar, and Cambodia (gender-rubber)
- 9, 10, 11 - Impacts of the East-West Economic Corridor on local livelihoods and forest resources in the Mekong Region: Case studies of selected forest-dependent villages in Vietnam, Lao PDR and Myanmar (EWEC)

Regional Assessments (RA)

- 12 - Hydrological modeling for agricultural development based on climate change in Prek Thnot River Basin, Cambodia
- 13 - Addressing climate change and water scarcity impacts in Champhone district, Savannakhet province in Lao PDR
- 14 - Urban water insecurity in Can Tho City, Mekong Delta
- 15 - Addressing uncertainties in water scarcity management in Huay Sai Bat River Basin, Thailand
- 16 - Water scarcity amidst plenty in the Chindwin River Basin, Myanmar

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THEME 1

Climate compatible development

Climate-compatible development means promoting human development while addressing both mitigation of, and adaptation to, climate change.



01 Effective adaptation strategies to climate change among rural farmers in Cambodia

Key findings

- Droughts, floods and storms are the most severe climate risks facing rural farmers whose livelihoods depend primarily on natural resources.
- Access to small loans has been a common adaptive strategy among farmers to recover agricultural productivity and to address emergency cash needs.
- Other adaptations include changing seed varieties, shifting from seeding to broadcasting, and using additional chemical inputs. These have been a response to climate variability and insufficient labor availability.
- For most communities, migration to other provinces or to neighboring countries is a key adaptation option especially when local adaptation strategies have failed.

Introduction

Cambodia is one of the most vulnerable countries in Asia to climate risks such as droughts, floods and storms. This has trapped rural communities in poverty who face various issues including food shortages, lack of clean water and sanitation, and health issues. A study by the NGO Forum on Cambodia (2014), for example, confirmed that Prey Veng and Battambang are the provinces most vulnerable to climate risks.

In responding to these issues and concerns, the Royal Government of Cambodia established a climate change adaptation policy and framework in 2006. The policy is aimed at defining the roles and responsibilities of institutions from national to grassroots levels to implement adaptation programs for the purpose of reducing climate risks and improving the adaptive capacity of the people. Along with government bodies, development agencies have set interventions to enhance knowledge and provide technical assistance for farmers to cope with the impacts of climate change.

Despite the establishment of the climate change adaptation policy, local adaptation strategies have been pragmatic and reactive, rather than pro-active. Adaptation varies across the country because of the different impacts from climate change faced by local communities. While pragmatic adaptation has evolved over time, it has been observed that some measures are not effective, and moreover, partially unsafe in the long term. It is therefore necessary to devise mechanisms that help improve adaptive techniques to be more secure and effective.

Climate change impacts and adaptation mechanism of rural farmers

· Droughts and floods are the common climate risks facing rural farmers whose livelihoods depend primarily on the agricultural sector. While rural farmers are frequently exposed to these two major climate risks, droughts seemed to be dominant in terms of intensity. This has brought about great loss and damage to farmers' agricultural productivity especially of rice, cash crops, vegetables and livestock. These losses lead to further trapping farmers in a cycle of food shortage and poverty.

· Receiving loans from local lenders or Micro Credit Institutions (MCIs) is a common adaptive strategy among farmers as this has assisted them to recover their agricultural productivity and to address cash emergencies, such as food shortages and ill health. The monthly interest rate varied between 2.8% to 3% for MCIs, whereas it is between 40-50% for local lenders.

· To respond to the issues of climate change and insufficient labor, farming techniques have shifted from seeding to broadcasting, and from long-term (6 months) to short-term (3-4 months) rice varieties. These changes have required farmers to increase the use of chemical fertilizer, pesticide and herbicide. While the use of these chemical substances is likely to

help maintain agricultural yields, the farmers' health, however, is affected by the impacts of these chemicals. Moreover, most farmers do not have knowledge of the safe use of agricultural chemicals. The study found that a number of farmers experience illness immediately after spraying pesticides and herbicides in their rice fields, whereas others reported that they feel weaker and are more easily affected by diseases.

· Migration to other provinces or to neighboring countries for employment has been one of the key adaptation strategies for farmers especially when local adaptation strategies have failed. The study found that many families receive loans from MCIs or local lenders for recovering their agriculture production following extreme weather. After several failed attempts to recover, however, Prey Veng farmers decided to move to other provinces such as Mondulkyri or Ratanakiri as well as migrating to neighboring Thailand, Vietnam, Malaysia or Korea. While some migrants report that they send remittances back home, many others are not able to save from their meagre incomes. The process of migration, moreover, has created more pressure and tasks for women and elderly people in the rural areas as they become responsible for household chores during the absence of the mostly male members of the household.

Recommendations

· The Royal Government of Cambodia in partnership with academia and civil society needs to focus on improving the knowledge about climate change, and capacity to adapt, of local farmers. Better knowledge will help farmers to choose adaptation options to climate risks. By understanding the key attributes of climate change impacts, local people will be better able to use and conserve natural resources.

· Since chemical usage in agriculture continues, the government agencies need to provide training to farmers on the safe use of chemical substances, especially pesticides and herbicides, to protect from impacts to their health and environment. Non-chemical farming options also need to be encouraged.

· Regulating the interest rate for credit lenders or MCIs may be a possible way to help local farmers repay their debt reasonably quickly without losing their assets such as farmlands and houses. If a seed grant or free interest loans were made more easily available to local farmers, they could expand opportunities to exploring better local adaptation strategies that can also provide long-term security for their family and community.

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About this brief

This policy brief was developed by Ms. Dulce D. Elazegui, Dr. Maria Ana T. Quimbo, and Ms. Samantha Geraldine O. delos Santos of the College of Public Affairs and Development, University of the Philippines Los Baños based on the results of the SUMERNET research project on Adaptation Pathway for Climate Compatible Development: The Case of Cambodia, Lao PDR and the Philippines - a joint research project across three countries (The Philippines, Cambodia and Myanmar). The information for this policy brief is exclusively collected from the Cambodian study areas in Prey Veng and Battambang province in Cambodia. Another policy brief titled "Enhancing institutional coordination for a climate change-sensitive land use planning", based on findings of the research in Paombong, Bullacan in the Philippines, provides lessons for localities in the Mekong Region facing or likely to experience similar situations, and is available from the authors on request.

Contact for more information

Dr. Maria Ana T. Quimbo, University of the Philippines Los Baños
Email: mtquimbo@up.edu.ph.

02 Promoting a non-burning alternative by turning rice straw into cooking fuel

Key findings

1. The majority of rice farmers in the Mekong Region burn rice straw (RS) after the harvest is done: in Thailand (95%), Vietnam (59%), and Cambodia (16%).
2. Thailand has drawn up a masterplan to avoid open burning but no similar masterplans exist in Vietnam and Cambodia.
3. Rice straw derived fuel can be used in improved cookstove systems implemented to substitute RS open burning.
4. Using RS as cooking fuel leads to a significant reduction in greenhouse gas (GHGs) emissions.
5. The proposed cooking and fuel technology is already being widely accepted by farmers in Vietnam, Thailand and Cambodia.

Large amounts of rice straw (RS) are generated annually after the rice harvesting period in the Mekong Region. Most farmers in the region prefer to burn the straw residues as it is considered an inexpensive method to clear surface biomass for faster crop rotation and, at the same time, to control undesirable weeds, pests and diseases. There has been some reported reuse of rice straw for animal feed, mushroom growing and ploughing, but the majority of crop residue is still burnt in open fields. The burning of rice straw leads to the release of toxic pollutants that result in health impacts especially respiratory problems. Moreover, open burning emits GHGs that contribute to climate change. There exists enough evidence that RS open burning is linked to a deterioration of air quality in many locations, and adverse health effects, especially for women.

Research was conducted to comprehend current generation and utilization of RS in the region, to develop RS derived fuels for cooking, and to assess the potential benefits of dual-stove systems as an alternative to open burning. Training and showcasing of the proposed intervention for farmers in Vietnam and Thailand was conducted to gain acceptance and to create an environment for multiple applications of the adapted RS fuel-cookstove systems. This collaborative research led to RS burning alternatives that are acceptable to farmers and avoid open burning.

Densification of RS has proven to be technically feasible and economically viable. The fuel is combusted in improved cook stoves to gain lower emission of air pollutants. An emission scenario study showed that if the total current rice straw burnt openly would be converted into cooking fuel in Vietnam and Thailand, there would be a significant reduction of global warming potential emissions.

Turning RS into cooking fuel helps to relieve the emission burden from open burning activity. Therefore, a policy instrument should be developed to transition away from open burning to efficient and viable alternatives. For a substantial shift from open burning to non-open burning practices to occur, the proposed alternative measures need to be accepted by farmers. In this case, by turning RS into cooking fuel, farmers' dependency on fossil fuel and fuelwood is greatly reduced and, therefore, saves money and contributes to reducing deforestation. Institutional arrangements are important, however, to inter-connect relevant government organizations who deal with agricultural practices, alternative energy, air pollution and climate change. Implementation of measures improve indoor air quality, and, hence, improve human health, especially for women and children.

Policy recommendations

1. Local government agencies in the Mekong Region need to raise awareness among local farmers about the impacts of open burning of rice straw.
2. The Mekong country governments need to strengthen enforcement of the existing open burning related policies (Thailand), and initiate a masterplan to control open burning (Vietnam and Cambodia).
3. Transfer of knowledge to extension departments, small enterprises, implementing agencies and end users can help promote alternatives and encourage farmers' acceptance of new technologies.
4. The proposed technologies need to be incorporated within regional strategies on non-open burning alternatives.

About this brief

This briefing was produced by the research team of the SUMERNET research project "Turning rice straw into cooking fuel for air quality and climate co-benefit in selected GMS countries".

Contact for more information

Prof. Nguyen Thi Kim Oanh, Asian Institute of Technology (AIT), Thailand
Email: kimoanh@ait.asia.

03 Social and environmental safeguards : Lessons from Cambodia REDD+ pilot projects

Introduction

The United Nations Framework Convention on Climate Change (UNFCCC), refers to REDD+¹ as policies and measures that aim at reducing emissions from deforestation and forest degradation and promoting forest conservation and sustainable management as well as enhancing forest carbon stocks. While policy goals may be achieved, it is important to mitigate potential risks to environment and society. Therefore, adequate social and environmental safeguards need to be installed when implementing REDD+ policies. Safeguards are processes or policies designed to avoid or mitigate potential risks of negative environmental and social impacts and to ensure the social and environmental benefits of implementing development projects.

The UNFCCC mandates REDD+ participating countries, including Cambodia, to establish a national safeguard system and periodically provide a summary of information on how safeguards are addressed and respected throughout the implementation of REDD+. This brief captures several practical lessons that warrant incorporation into the design of the national safeguards information system currently being developed by the Cambodia REDD+ Taskforce Secretariat.

REDD+ safeguards

REDD+ safeguards can be categorised into two groups. The first are decision texts adopted by the UNFCCC which include the Cancun Agreements, Durban Guidance, Warsaw Framework for REDD+ and the recent Paris Agreement. The second group includes requirements developed external to the UNFCCC process by proponents of voluntary carbon markets such as the Verified Carbon Standard (VCS) and the Climate, Community and Biodiversity Standard (CCBS).

The Royal Government of Cambodia decided to implement REDD+ pilot projects in the Oddar Meanchey Community Forestry, and the Seima Protection Forest in Mondolkiri. Both projects have applied social and environmental safeguards to meet VCS and CCBS requirements (see more details in the two case studies below). Lessons drawn from experiences of the two projects help reduce different risks, but also show how some safeguards are failing and need improvement.

¹ REDD+ is a voluntary climate change mitigation approach that has been developed by Parties to the UNFCCC. It aims to incentivize developing countries to reduce emissions from deforestation and forest degradation (REDD), conserve forest carbon stocks, sustainably manage forests and enhance forest carbon stocks.

Case study 1. Oddar Meanchey Community Forest

The Oddar Meanchey Community Forestry REDD+ pilot project is located in northwestern Cambodia. It covers 13 CF sites with a total area of 64,318 hectares, and 58 villages with a total number of about 10,000 households. The project has secured tenure rights with a 15-year agreement between the Forestry Administration and community forestry groups. This requires intensive efforts to assemble stakeholders, provide training and coach communities through the processes and requirements for CF legalisation. In accordance with the CF Agreement, communities' rights for the subsistence use of timber and non-timber forest products (NTFP) are recognised. Villagers are also allowed to continue to use existing agricultural land inside CF boundaries as long as they do not expand the areas.

Case study 2. Seima Protection Forest

The Seima Protection Forest REDD+ pilot project aims to engender public support for, and participation in, the protection of ecologically significant old-growth forest within a core area of 180,515 hectares in the eastern province of Mondolkiri. The area is renowned for an abundance of globally important species. Within the project area are 20 villages, home to some 10,000 Bunong indigenous people. As of May 2016, Seima REDD+ project has passed the validation phase required by VCS and CCBA and is currently being verified. To be able to sell carbon credits, voluntary REDD+ projects must pass both validation and verification. Although the crediting period continues for 60 years, it is estimated that the project will generate some 58 million tonnes of carbon dioxide (CO₂) emission reductions over its first ten years.

Informed consent

In both REDD+ projects, lead implementers designed their consultation processes based on the principle of free, prior and informed consent (FPIC). This can be done by, e.g., facilitating workshops in concerned villages and at district and provincial levels to raise communities' awareness of REDD+ and the planned project activities. Thereafter, communities are provided with ample time and space to consider whether or not to join the project. Consequently, communities in both project areas decided to join the projects. Nevertheless, despite a clear FPIC process, CF community representatives could not provide details when asked about key elements of the agreement (e.g. consent provisions, duration, grievance mechanism).

The FPIC process needs to be improved, adapted to the local socio-cultural context, and fitted with redundant communication as well as feedback mechanisms.

Delivering on promises

One notable aspect of the consultation process was that the project proponents informed the communities that they would receive significant payments from the REDD+ project. This may have been one of the main reasons behind the communities' decision to participate. Information about significant REDD+ payments, however, has raised expectation of monetary benefits for the communities. Delay in REDD+ payments has created challenges in assuring CF members' continuous support for, and participation in, project activities.

Care needs to be given to the communication of expected benefits from CF. Building over-expectation leads to disappointment and disengagement. A frank and honest assessment of outcomes ensures improved expectation management.

Equal participation

Although the project has involved various groups of stakeholders, intense efforts are needed to promote gender equality and enhance women's participation. Community representatives are predominantly men: among the 13 CF representatives, there is only one woman.

The project proponents engage multi-stakeholders at the project sites in extensive consultation covering various REDD+ and non-REDD+ topics. Yet communities raised two issues during focus group discussions. First, they pointed out that further stakeholder consultations should focus on the activities or any restrictions that would come with the implementation of REDD+. Second, they emphasised the importance of increasing women's participation in consultation processes.

Efforts are needed to ensure gender equality is adopted and respected in practice when making decisions on important aspects of community forestry projects.

Safeguards

The REDD+ projects apply measures to protect and monitor biodiversity in dry deciduous and evergreen forest ecosystems, with special attention to high conservation value areas important to rare wildlife species. The strategy entailed creating greater awareness among local communities of the value of biodiversity, as well as patrolling, fire prevention, and habitat restoration to safeguard against degradation of critical habitats. However, the projects do not have explicit measures to manage the risks of reversal and displacement. In fact, ongoing encroachment by the military poses a critical threat. The projects consequently face imminent risk of reversal with some communities being intimidated by armed loggers. There is also a lack of clarity about who is responsible for protecting the forest in the leakage belt—the buffer zone surrounding the community forests.

Safeguards need to extend beyond the duration of projects to prevent reversal and ensure the sustainability of community forestry.

Communities have been given usufruct rights to timber and NTFPs and are allowed to continue subsistence farming practices on legally occupied land. They also secured tenure rights on agricultural, fallow and residential lands. This means there should be no involuntary relocation of legitimate occupants from either residential land or farmland. Even so, informants reported a concern that local landowners and residents may inadvertently be considered under the law as informal settlers or land grabbers. They therefore fear being arrested by the authorities on grounds of occupying state or community land illegally, removed from their lands without compensation, and possibly prosecuted or even imprisoned.

Safeguards need to include legal arrangements for community land and common property to ensure land security for CF communities.

The REDD+ projects seek to maintain a variety of forest cover types and to increase wildlife populations of conservation importance. To that end, the projects aim to reduce environmental threats such as habitat loss, hunting in all its forms, selective logging and NTFP over-harvesting. This shall be achieved through agricultural intensification and through inclusion of all anthropogenic non-forest land located within the project zone in a leakage management area around settlements. This area is the focus of activities such as ecotourism and NTFP management, which contribute to alternative livelihoods. Yet interviews suggested that illegal logging, mainly by outsiders, continues at an alarming rate within the villages.

Project proponents need to investigate and respond to logging concerns because failure to stop illegal activities may result in leakage and risks of reversal.

Despite recognition of local communities' right to manage their lands and preserve their traditional agricultural practices, shifting cultivation has been identified as a major deforestation and degradation threat. Informants reported that a huge influx of migrants has created confusion as to whether local/indigenous people or outsiders (non-indigenous) are practicing shifting cultivation.

There is a need to know and understand the composition of local communities to ensure that project implementation does not infringe upon customary activities, such as shifting cultivation.

Grievance mechanism

The REDD+ project proponents introduced a grievance mechanism that allows local people to submit complaints directly to the project implementation team for assessment and resolution. In addition, commune councillors in the project zone have a legal mandate to receive complaints from their constituents on issues of any kind and either direct them to the appropriate place or seek to resolve them directly, often by mediating between the affected parties. However, when asked about the issues they currently face regarding forest management in their villages, communities' complaints to the authorities about illegal logging activities have not been addressed satisfactorily. This issue has raised a lot of doubt among the communities about the effectiveness of REDD+ for ending deforestation caused by external actors.

Grievance mechanisms need to be taken seriously and complaints addressed efficiently and effectively to maintain trust and ensure community commitment.

About this brief

This briefing was written by Dr. Nguon Pheakkdey, Research Coordinator, Department of International Studies, Royal University of Phnom Penh, and Chhun Delux, Chief of Office of Forest Carbon Credits and Climate Change, Forestry Administration based on the results of the SUMERNET research project titled "Comparative study on national REDD+ strategy in Cambodia, Myanmar and Thailand".

Contact for more information

Dr. Nguon Pheakkdey, Royal University of Phnom Penh, Cambodia
Email: pheakkdey.nguon@gmail.com.

THEME 2

Ecosystem Services for local development

Ecosystem services need to be appropriately valued and protected to ensure they can benefit local development in rural and peri-urban settings.



04 Human use of small wetlands in Kulen Promtep Wildlife Sanctuary, Cambodia

Key findings

- Wetlands in dry deciduous forests in Cambodia are home to many critically endangered species and provide resources critical for the livelihoods of local communities. Yet, the ecosystem services provided by these wetlands are often underestimated by government agencies.
- The local community in the Kulen Promtep wildlife sanctuary plays an important role in wetland protection because many people depend upon its ecosystem services.
- Small wetlands in the sanctuary have high value because of water availability, fish species diversity, birds, and large riparian trees, and ecotourism. These small wetlands are protected and managed by the sanctuary management and the local community. However, community forestry and the eco-tourism community have failed to protect the numerous small wetlands in the dry open dipterocarp forest.
- There are many related stressors on small wetlands, such as agricultural land expansion, deforestation, internal migration, and human settlement in the area. These drivers are not being adequately considered by the local communities and the wildlife sanctuary authorities.
- The primary threat to wetlands is the overexploitation of wetland resources and conversion to land for agricultural expansion. Another challenge is population growth in the area, which both decreases wetlands habitat through land conversion and puts additional pressure on other resources. Even though the sanctuary has a set of regulations to address population growth, these do not seem to be effective.
- People fishing in the wildlife sanctuary use electrofishing and poisonous substances, even though these activities are illegal. People also cut trees around the wetlands, which they believe leads to siltation of the wetlands.

Background

Although there are likely more than 12,000 natural, small wetlands in Cambodia alone, these important ecosystems have not been examined in much detail anywhere in the Mekong Basin. Through the efforts of the SUMERNET project titled "Understanding, Classifying and Mapping Human Use and Natural Resources in Pilot Wetlands of Cambodia and Vietnam to Promote Sustainable Development", researchers sought to gather information for wetland management, including biodiversity conservation, forestry protection, and especially for public awareness of wetland resources. The main objective of the project was to improve our understanding of the role that small wetlands within dry, open dipterocarp forests play in supporting ecosystem services and sustainable livelihoods. This information is critical for assessing the impacts of any development project being considered in the region. Field surveys gathered bird, fish, plant and soils data through direct-sampling, and social surveys were conducted to understand current human population uses of wetland and water resources.

Unsustainable management of ecosystem services is a challenge in the Mekong River Basin countries, especially for rural people who depend directly on these resources. Effective wetland management is also dependent on the level of agreement among the ministries involved. The researchers worked actively with the sanctuary staff, and the Department of Wetlands and Coastal Zones, under the Ministry of Environment as boundary partners.

Wetland values

Wetlands perform a wide range of ecological functions and provide environmental benefits. Environmental benefits include: water purification, flood protection, groundwater recharge, stream flow maintenance, habitat for fish and wildlife, recreation, scientific and educational values, and human service such as food, energy, wood, and agricultural commodities. Results indicate (82% of respondents) that most of the local people understand clearly that the wetlands play a vital role in improving their livelihood through using natural resource from small wetlands.

Wetland threats

The pace of development in the region has led to a high demand for natural resources, and it is important to gather information on the ecological functions and resources for environmental impact assessment, informed decision-making, and sustainable development planning. The study found that some wetlands located in the open forest have been converted to paddy fields. Expansion of agricultural land has been increasing due to the needs of a growing population. Because of increased pressure on resources, communities are using unsustainable practices such as illegal fishing methods. Furthermore, the government has granted economic land concessions for rubber plantations inside the Kulen Promtep Wildlife Sanctuary. The boundaries between economic land concessions, protected area, and community settlements are increasingly unclear, leading to conflict between the local community and industry.

Policy recommendations

The objective of this SUMERNET research project is to highlight the importance of small wetlands to relevant government ministries and protected area managers in terms of ecosystem services and sustainable livelihoods. This will inform decision-making processes regarding development planning and resource management.

- The Royal Government of Cambodia should develop a management plan with clear regulations and wetland policies, especially for small, scattered wetlands in the dry, open dipterocarp forests.
- The management plan should be focused on all wetlands, not only the few wetlands that are protected as an ecotourism attraction.
- Improved communication and land use mapping regarding the economic land concessions are needed to resolve conflicts between local communities, the wildlife sanctuary, companies, and the government.
- The wildlife sanctuary should be involved in proposals to establish community forestry and eco-tourism communities developed by local residents.
- Law enforcement must be strengthened in order to effectively protect small wetland resources
- Increased community stakeholder engagement, especially regarding benefits from eco-tourism, to ensure that there is adequate buy in from the communities.
- Given increase in settlements and human activities inside the wildlife sanctuary, policies concerning agricultural land expansion and human settlements should be developed in the context of the sustainability of ecosystem services.

About this brief

This briefing is produced by the team of the SUMERNET project titled "Understanding, Classifying and Mapping Human Use and Natural Resources in Pilot Wetlands of Cambodia and Vietnam to Promote Sustainable Development".

Contact for more information

Mr. Sok Pheak, Royal University of Agriculture, Cambodia
Email: sopheakstar14@gmail.com; Website: www.rua.edu.kh.

05 The role of small wetlands for birds and wildlife conservation in Yok Don National Park, Vietnam

Key findings

- Lack of scientific data, conservation planning, understanding and concern about small wetlands is a key challenge that needs to be addressed.
- Wetlands play an important role in maintaining biodiversity in dry-open forest ecosystems as well as regional history.
- Many globally threatened species use wetland habitats for feeding, grazing and breeding such as Sarus Crane, Giant Ibis, White-shouldered Ibis, Bangteng, Gaur, Asian Elephant, Fishing Cat.
- Approximately 110 bird species rely on small wetlands in Vietnam.
- Utilization of wetlands by the local population is extensive; for example, they are sources of fish and vegetables, or used as animal grazing land.
- Conversion of natural wetlands to farmland is the biggest threat to small wetlands in Yok Don National Park.
- Another challenge is deforestation inside Yok Don National Park and its fringes; the conversion of dry-open forest to rubber plantations is occurring rapidly, which may cause loss of biodiversity and impact on livelihoods of local residents.

Introduction

Yok Don National Park (YDNP) is the largest protected area in Vietnam (115,545 ha), and dry dipterocarp forest is the main ecological system of the park. Although wetlands are key to influencing the distribution and abundance of a large portion of species that utilize the dry, open dipterocarp forest, they are not recognized as important for wildlife conservation. Using remote sensing and ground data collection we have encountered many hundreds of small wetlands scattered across YDNP. Many of them have been converted to farmlands, and some were destroyed by digging or plowing for other purposes. Moreover, all dipterocarp forest surrounding YDNP has been cleared over the last 15 years.

Previous research recorded a number of threatened species, which rely directly on small wetland habitats. Among them, at least 6 species of birds were listed as “vulnerable” (VU) or “critically endangered” (EN or CR) in the IUCN Red List 2016: the White-winged Duck (*Asarcornis scutulata*, EN), the Masked Finfoot (*Heliopais personata*, EN), the White-shouldered Ibis (*Pseudibis davisoni*, CR), the Giant Ibis (*Thaumatibis gigantea*, CR), the Lesser Adjutant (*Leptoptilos javanicus*, VU), and the Sarus Crane (*Grus antigone*, VU). These species were recorded breeding in the wetlands of YDNP in 2004; now these wetlands have dried out. Threatened mega mammals also depend on small wetlands, including the Bangteng (*Bos javanicus*, EN), the Gaur (*Bos gaurus*, EN), Asian Elephant (*Elephas maximus*, EN).

It is estimated that about 110 bird species often use small wetlands as their significant habitats. The small wetland habitat is equally important to the forest although the total area of wetlands is estimated at about 1% of the park.

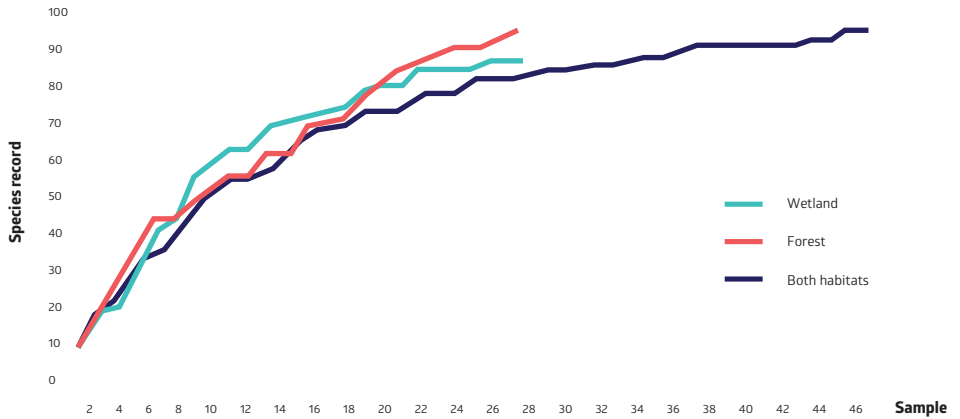


Figure 5.1 Bird species recorded at wetlands versus forest habitats

Role of small wetlands

The small wetlands are scattered randomly across YDNP. They support life resources for wildlife, especially water in the dry season, mineral salt, and important food including grass, insects, fish, frogs, birds and mammals. Results of our studies have shown that these small wetlands are undivided parts of dry-open forest ecosystem and that losing wetlands will lead to loss of biodiversity. For instance, wetlands used by Sarus Crane as breeding habitat in 2004 have now disappeared and, therefore, the Crane is no longer seen in the YDNP. Other rare species like the Giant Ibis and the White-shouldered Ibis have also not been seen since they were last recorded in 2003.

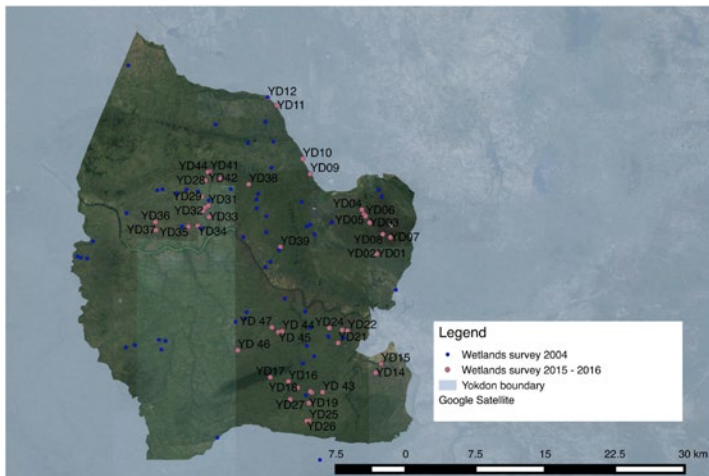


Figure 5.2 Distribution of small wetlands in YDNP

Recommendations

Relevant government ministries and protected area managers need to recognize the importance of small wetlands, and use information on ecosystem services and sustainable livelihoods to inform decision-making processes regarding development plans and resource management. The following recommendations result directly from the project's findings

- The Government of Vietnam (Conservation Division, MARD) should develop a management plan with clear regulations and wetland policies, especially for small, scattered wetlands in the dry, open dipterocarp forests.
- The National Park Management Board should consider and study possible impacts before digging in wetlands to store water or replant forest.
- The National Park Administration should consider regular patrols to wetlands as these areas concentrate mammals and birds and often attract poachers to set up traps.

About this brief

This briefing was produced by the team of the SUMERNET research project titled "Understanding, Classifying and Mapping Human Use and Natural Resources in Pilot Wetlands of Cambodia and Vietnam to Promote Sustainable Development".

Contact for more information

Mr. Nguyen Hoai Bao, Center for Wetland Studies, University of Science, Vietnam National University (VNU).
Email: nhbao@hcmus.edu.vn.
Website: The University Network for Wetland Research and Training in the Mekong Region (WUN) <http://www.wetlandnetwork.org>.

06 Producing knowledge together for recovery of wetlands, agroecological farming and livelihoods in Southeast Asia

Key findings and policy pointers

- A contemporary sustainability challenge in Southeast Asia is how to protect wetlands and support associated agroecological farming practices for regional resilience.
- Knowledge coproduction is a promising methodology to co-design and undertake research projects jointly between researchers, state and non-state actors that meet their shared goals, and that ultimately produces usable knowledge for real-world problems.
- Knowledge co-production methods can foster trust and collaboration in cases where there has been a history of conflict, but only within limits.
- Capacity for knowledge coproduction needs to be built amongst researchers in Southeast Asia and with stakeholders with whom they collaborate.



Photo 6.1 Farmers collect freshwater fish in the floating rice fields during the flood season in Vietnam (Credit: Huynh Ngoc Duc).



Photo 6.2 Montage of the wetland survey in Nong Kae sub-district, Thailand, June 2015 (Credit: Phongtep Bungkla).

Introduction

The Mekong Region contains extensive wetlands of great biodiversity that provide a wide range of ecosystems services and that are also important to human well-being (ADB, 2012). Within these wetlands, local communities often practice agroecological farming, including growing rice and vegetables, animal raising, fishing, and collecting non-timber forest products. Unfortunately, many wetlands in the Mekong Region have been degraded or even lost, including due to agricultural intensification, large-scale water infrastructure development, and land use changes associated with urbanization (Hughes, 2017). The loss of wetlands is a threat to regional sustainable development. Furthermore, as wetlands are lost, so too is the local knowledge associated with their ecosystems and how to practice agroecological farming there.

In this policy brief, we detail the process and outcome of a “knowledge co-production” research project in Thailand, Vietnam and Lao PDR intended to contribute towards the recovery and more inclusive governance of degraded wetlands and associated agroecological farming systems and livelihoods. Knowledge co-production refers to a designed process that encourages interaction amongst multiple stakeholders. Each contributes their own knowledge and experience, and as a result of this interaction, new knowledge is created to influence decision-making and outcomes on-the-ground.

Knowledge co-production

It is now widely recognized that addressing real-world complex environmental problems, such as wetland loss, requires a range of different types of knowledge, including scientific (expert), local, practical, and political knowledge. Lorrae van Kerkhoff and Louis Lebel astutely observe that it is “... the interaction between research and other sources of knowledge that is often crucial for understanding the role of research-based knowledge in action” (van Kerkhoff and Lebel, 2006:448). In other words, in the real world, expert knowledge alone is not enough for taking decisions that would lead towards decisions and actions on-the-ground for inclusive and sustainable development.

Emerging from this recognition, there is now growing experience amongst researchers who would like to see their work meaningfully translate into action for sustainability. They are exploring how “knowledge co-production” approaches to their research can catalyze interaction amongst researchers and multiple state and non-state stakeholders to can create useful knowledge together. For such a process to be successful requires a shared understanding of the problem amongst all the stakeholders, a genuine constituency formed to solve it, as well as appropriate representation, capacity, trust, and commitment to learning amongst the individuals involved.

In this policy brief, we briefly outline the main findings from our work applying a “knowledge co-production” approach to three cases in Thailand, Vietnam and Lao PDR. The first case focuses on collaborative wetland zoning and educational tourism at the Rasi Salai and Hua Na Irrigation projects in Sisaket province in Northeast Thailand. The second case addresses four floodplain floating rice fishing-vegetable agro-ecological systems in An Giang and Dong Thap provinces, Vietnam. The third case is on transition to organic rice production in two villages in Xayboury district, Savannakhet province, Lao PDR.

Knowledge co-production as research method

Our research method aimed to encourage learning through knowledge co-production in which our research team engaged with other stakeholders in an iterative process of research and action. In each case study location, stakeholders were first identified by the research teams including communities, government agencies, civil society groups, and business (Table 6.1). We first undertook qualitative scoping surveys with each stakeholder to define the diverse visions, goals, values and beliefs towards the wetlands and the associated agroecological farming system. An initial analysis defined areas of agreement and divergence amongst stakeholders (Smajgl and Ward, 2013). This led to inception workshops in each location that brought all stakeholders together and initiated a co-design process. At the workshops, participants shared perspectives and deliberated goals and potential research projects.

The inception workshop and subsequent activities and meetings can be understood as intentionally created “arenas of knowledge co-production” (van Kerkhoff and Lebel, 2006). Within these arenas we encouraged the open sharing of knowledge; inclusiveness of multiple types of knowledge (expert, local, practical, political); and an exploration of the legitimacy of different types of knowledge (Frantzeskaki and Kabisch, 2016). Whilst power imbalances inevitably persisted between stakeholders, the research team were consciously attentive to power relations through the design of the process to ensure inclusivity (Schuttenberg and Guth, 2015).

Following the inception workshop, divergent pathways were taken in each country, according to the proposed project emerging from the inception workshops as briefly summarized in the following sections.

	Rasi Salai and Hua Na dams, Thailand	Floating rice, Vietnam	Organic agriculture, Lao PDR
Community	Community leaders from Nong Kae sub-district	116 households growing floating rice	25 farming households
Civil society	Khon Taam Association, Taam Moon project	Farmers' association at four communes, and district	
Local government	Nong Kae Sub-district Administrative Organization	Vinh Phuoc and Luong An Tra People's committee (commune), Tri Ton district people's committee; My An and Tan Long people's committee	
State agencies	Royal Irrigation Department (RID), and several related line agency offices	Department of Environment and Natural Resources and Department of Agriculture and Rural Development	Provincial Agriculture and Forestry office (PAFO) and District Agriculture and Forestry Office (DAFO)
Business		Rice producers, traders and nutritional business, Tourist companies	Resettlement Management Unit of the Nam Theun 2 Power Company (NTPC)

Table 6.1 Stakeholders collaborated with in each case study

Collaborative wetland zoning and educational tourism in northeast Thailand

In 1993, the Rasi Salai irrigation dam was built on the Mun River in Si Sa Ket Province, northeast Thailand that would lead to over two decades of at times intense conflict between the communities whose livelihoods were harmed by the project and the government agencies that built and operated it. In response, affected communities organized protests, including occupying the dam for 189 days in 2007, after which the government began to provide long-promised compensation. Since 2012, there have also been activities to recover degraded wetlands for food security and ecological services, demonstrate local development activities (organic agriculture/green market), and promote integrated farming system and fish conservation.

Following several rounds of individual meetings with each stakeholder (Table 1) in February 2015, a joint workshop, held in late March 2015, and several follow-up workshops led to an agreement that the research would focus on two themes:

- Collaborative wetland zoning, on the basis that there was a shared perceived need to clearly categorize the wetland area affected by the Rasi Salai dam, and designate permitted uses within it.
- Educational ecotourism, which was particularly supported by the community-based organizations, who had recently opened a “community learning center” nearby to the Rasi Salai dam.

For the collaborative wetland zoning, another workshop in mid-June 2015 finalized the research strategy that allowed for the diverse forms of knowledge of those involved, ranging from GIS techniques by the government agencies, to knowledge of local ecosystems and their uses amongst the communities. The research itself was collaboratively undertaken over three days, and in three subsequent workshops the group verified the data. The degree of collaboration between the state and non-state stakeholders was acknowledged amongst all as unprecedented. However, it soon emerged in the post-mapping meetings that wetland zoning remained a contested issue between the groups participating. In addition, long-standing disagreements over the level of water in the reservoir also reemerged. Thus, despite the goodwill generated on all sides through the collaborative research, it became apparent that more time and resources beyond the scope of the project would be required to work through the issues.

For the educational tourism, over a series of meetings, tourism experts from the Faculty of Liberal Arts, Ubon Ratchathani University worked with the stakeholders. In this project, civil society and community members emerged as most active over time as it was intended that students would come to stay at the community learning center near the Rasi Salai Irrigation Dam. The community members prepared an ecotourism brochure, agreed tourist hot spots and stories associated with each place, designated tour guides, and prepared various logistics. Over the subsequent year, at least five tours were hosted that included university students, NGOs, academics and independent researchers. The educational tourism raised the profile of the wetlands as a resource for local livelihoods and ecological services for the visitors. Community members could generate income from the activity, whilst government officers accomplished their mandate on sustainable wetland management.

Floodplain floating rice-based wild fish and vegetable agro-ecological systems in Mekong Delta, Vietnam

Deepwater rice – also known as floating rice – is native to the Mekong River Delta in Vietnam. Before 1975, the total area of floating rice was estimated to be greater than 500,000 hectares; by 1994, this had reduced by 80 percent, and as of 2012 only very small pockets of tens of hectares remain, mostly in An Giang province (Nguyen et al, 2015). The reduction is linked to Vietnam's agricultural policy promoting agricultural intensification including introduction of high yielding variety (HYV) rice and extensive dike construction (Nguyen and Pittock, 2016). This increased food production for domestic consumption and export, but also created a range of environmental and health challenges including agrochemical pollution and reduced soil fertility (Käkönen, 2008).

In order to map out the opportunities and challenges faced by floating rice farmers on the ground, and to co-design an intervention, Participatory Rural Appraisal (PRA) was first undertaken between December 2014 and March 2015 in four communities: Vinh Phuoc and Luong An Tra communes of Tri Ton district, and My An commune of Cho Moi district, An Giang province; and Tan Long commune of Thanh Binh district, Dong Thap province. In addition to the 126 farming households who cultivate floating rice, the research team worked together with the state agencies identified in Table 1. Analysis of quantitative data from the PRA found that although relative to HYV rice the yield of floating rice is low, when combined with dry season agriculture (cassava/ leeks/ chili/ corn) the annual economic value of floating rice-based farming generated more financial returns to farmers per hectare.

A shared objective amongst boundary partners that emerged from the PRA and several workshops was to improve the marketing of floating rice. They proposed to emphasize that floating rice production is nutritious, tasty and without chemical input. Therefore, the researchers worked with farmers to promote floating rice via the local media, conferences, workshops, and the floating rice harvesting festivals, and to connect farmers directly to consumers as well as rice traders. Before the project in 2014, in Tan Long and My An communes, most farmers only cultivated floating rice to feed animals (stems from rice) or to sell to local customers who are old people or religious groups in various temples in Ho Chi Minh City, and in other sites they only sold to local farmers at a low price (VND 5000 /kg). From 2014 to 2015, when the farmer groups began marketing floating rice including via the local media, the price rose to between VND 12,000 to VND 15,000/kg. In 2015, a major challenge experienced by floating rice farmers was that the Mekong River's flood was very small leading to much of the floating rice paddies destroyed by rats. The Research Centre for Rural Development (RCRD) of An Giang University conducted interviews with the farmers in August 2016 to evaluate how floating rice farmers could adapt to and cope with droughts. Whilst the drought severely affected floating rice production, it was found that having the diversity of growing vegetables in the dry season resulted in a resilient farming system so that farmers could recover from the shock of income loss following the serious drought. Most farmers interviewed said they would continue to grow floating rice because they needed the straw for dry season crops. They also noted that their income had improved since 2014 due to the significant rise in floating rice sale price.

The research process helped farmers – and the other stakeholders – to appreciate the value of floating rice for safe food production, maintaining biodiversity, recovering inland fisheries, improving the environment, and maintaining good soil quality and other necessary resources (straws) for upland crop production. According to interviews with floating rice farmers, the co-designed and implemented research made them feel more connected and more trust towards the government, researchers and business.

Organic rice production in Savannakhet province, Lao PDR

Savannakhet province is the most important province for rice production in Lao PDR. In recent decades, intensity of agrochemical use has risen for dry season rice, and to a lesser extent, wet season rice. Recent Government of Lao PDR (GoL) policy, however, has encouraged “Good Agricultural Practices” (GAP) for rice production that are aligned with organic agricultural practices. Our project was located in Phonethan and Dong Yang villages in Xayboury district, Savannakhet province. Both villages are mainly engaged in rice farming although many family members also seasonally migrate to work in Thailand. Fishing and livestock raising are also important secondary occupations. Both villages are located nearby to the Xe Bang Fai River. Since 2010, the flood regime of the river has been altered by the operation of the Nam Theun 2 (NT2) dam impacting water levels, rice production, fisheries, riverbank gardens and wetlands (Baird et al, 2015). Some of these impacts have been experienced in Phonethan and Dong Yang villages, but this has been a sensitive issue and can be difficult for the community to raise with the GoL.

In January 2015, our research team undertook a series of individual interviews with the stakeholders identified in Table 1, and from these interviews it became apparent that improving agriculture was the key concern. Subsequently at a workshop organized in March 2015, it was proposed by farmers to undertake organic rice production with a goal of increasing income. The research team and DAFO offered technical support based on GAP principles. In May 2015, a meeting was organized between 15 farmers from Phonthan village and 9 farmers from Dong Yang village, and the researchers and DAFO to detail the strategy for organic rice production. The farmers believed organic rice production would be low cost, offer higher market prices, be safer for the environment, produce healthier final products, and was aligned with the governments new policies to promote rice export. They also said that they had experience on organic production in the past, as this was how they used to grow rice.

It was agreed that each family would plant one rai of organic rice, which ranged between 10 percent and 30 percent of their total land area. Our research team and DAFO provided training on the principles of GAP and how to produce organic manure and bio-extract. The researchers and DAFO team also visited several times over the duration of the season to provide technical advice. With a satisfactory yield during the first wet-season of production, organic production continued over three further wet and dry seasons, and the number of participating farmers also grew, together with the area under production.

Farmers and DAFO both stated the project had enabled a closer collaboration through the knowledge coproduction approach, whereby new farming techniques were combined with local knowledge and existing practices and values. In the process, other issues could also be broached, such as the impact of the large dam upstream on farmers' livelihoods.

Conclusion

Agroecological farming has long been practiced in the Mekong Region's productive and biodiverse wetlands. A contemporary challenge faced both by policy and on-the-ground practices is how to support wetlands and associated agroecological farming practices as an important foundation for regional resilience. Our research has explored a "knowledge co-production" methodology in three case studies in Thailand, Vietnam and Lao PDR. We have collaborated with stakeholders to co-design and undertake research projects that meet their shared goals, and ultimately to produce usable knowledge towards real-world problems. A key feature of the research method is to combine a range of types of knowledge, including scientific and local knowledge.

To catalyze knowledge coproduction, one key role of the researcher is to create "arenas of knowledge coproduction" and convene boundary partners together around shared challenges (van Kerkhoff and Lebel, 2006). Such arenas do not emerge spontaneously but must be designed within the opportunities and constraints of existing power relations and historical conflict associated with the particular case. We find that, within limits, knowledge coproduction can contribute towards conflict resolution, through building trust, expanding networks and constructively deepening collaboration between stakeholders, whilst also encouraging each actor to broaden their understanding of the problem from others' point-of-view. However, entrenched conflicts, such as wetland zoning at Rasi Salai dam, also reveal the limits of this approach.

Recommendations

Overarching

- Promote co-production of knowledge methods as a meaningful way to integrate social and physical science research with other forms of knowledge to meet sustainability challenges.
- Widen the range of case studies to explore under what conditions knowledge coproduction can contribute towards conflict resolution.
- Build capacity for knowledge coproduction amongst researchers in Southeast Asia and with stakeholders with whom they collaborate.

Thailand

- Continue to develop and support wetland educational tourism, in particular for students and tourists, as it is committed to and perceived as useful by all stakeholders.
- Wetland zoning is an urgent issue that requires further work. Since the dam and human activities have dramatically degraded wetlands, wetland zoning is needed to better manage each area through participatory means.
- Enhance the capacity of all stakeholders on how to manage wetlands sustainably through co-design and participatory action research.

Vietnam

- Research on floating rice should be conducted to test its adaptive capacity to different levels of floods, given the risk of drought years.
- Explore how to integrate other crops or fish with floating-rice based farming practices.
- Explore non-farm based incomes, such as agro-ecotourism to improve floating rice farmers' income.
- Consider seeking organic certification for floating rice.

Lao PDR

- Expand the experience of organic rice production promoted through knowledge coproduction methodologies to other nearby villages.
- Explore how to certify the GAP rice to be organic, and develop a brand for improved marketing.
- Continue to strengthen farmer capacity for soil improvement and inter cropping.
- Consider the gendered dimensions of farming in the villages, and increase inclusiveness through diversifying organic production to other crops (vegetables and mushrooms) and animal raising.

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About this brief

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The research was undertaken jointly by: the Center for Social Development Studies, Faculty of Political Science, Chulalongkorn University (Dr. Carl Middleton/carl.chulalongkorn@gmail.com / www.csd-chula.org); the Mekong Sub-region Social Research Centre, Ubon Ratchathani University (Dr. Kanokwan Manorum/kanokwan.m@ubu.ac.th / www.mssrc.la.ubu.ac.th); the Research Centre for Rural Development, An Giang University (Dr. Nguyen Van Kien/kienanu@gmail.com / <http://rcrd.agu.edu.vn>); and the Northern Agriculture and Forestry College, Luang Prabang, Lao PDR (Dr. Outhai Soukky/outhainafc@yahoo.com / <http://nafclao.org/>).

Contact for more information

Dr. Carl Middleton, Center for Social Development Studies, Chulalongkorn University, Thailand
Email: carl.chulalongkorn@gmail.com; website: www.csd-chula.org.

THEME 3

Sustainable Regional Economic Integration

Both environmental sustainability and social equity are essential in a region experiencing rapid economic growth while poverty and inequality remain significant.



07 Gender impacts of land use conversion in Luang Namtha, Lao PDR

Key findings

- Drastic changes in the last two decades have been observed due to the expansion of rubber production in northern Lao PDR with various impacts on local livelihoods:
 - (1) upland rice production decreased, (2) wage labor increased, (3) NTFP extraction decreased, (3) cash income of some households increased, while (4) subsistence rice production decreased.
- The process of land conversion from traditional farming to rubber plantation has led to increased disparity in the area.
- Land managed by external investors for rubber and banana plantations has led to a rise in wage labor among village residents. This particularly affects women.
- Intra-household gender discrimination does not change with increase in income, with girls still given less importance for education.
- There are some good examples where investment from profits led to a decrease in women's workload.

Expansion of rubber production in Luang Namtha province

The Government of Lao PDR has been promoting rubber to supplement farmers' income since 1994. To expedite expansion of rubber production, Chinese companies were awarded land concessions. In 1997, an MoU was signed between the governments of China and Lao PDR to enhance trade and promote cross-border investments. Chinese investment in rubber stretched over 33,642 ha in 2013. Of investment projects approved in Luang Namtha, 70% were in rubber. Along with the plantations came 6 new processing facilities in the province.

Uncontrolled expansion led to rubber and eucalyptus plantation area to reach 196,615 ha in 2015 in the province (ADB 2015:48). As the Government of Lao PDR became concerned, it banned new rubber plantations in 2010 and stopped permits for rubber investment in mid-2012. Since 2013, there has been no legal expansion of concession areas.

Changes in livelihood

The entry of rubber plantations led to large-scale changes in livelihood among women and men in the villages. Before rubber, main sources of livelihood for local households were upland rice, livestock, and Non-Timber Forest Products (NTFP) collection as well as wage labor for cash supplement.

Since the arrival of rubber, upland rice cultivation has declined in all studied villages, although the level of decrease varies significantly (Figure 7.1). Similarly, NTFP collection also declined as forests were cut down to plant rubber. Although the price of NTFP has increased, it is not enough to compensate for the loss of NTFP available in the forest.

The number of cattle also decreased due to unavailability of grazing land. With rubber plantations, it is getting increasingly difficult to maintain cattle, which traditionally roams freely in the forest.

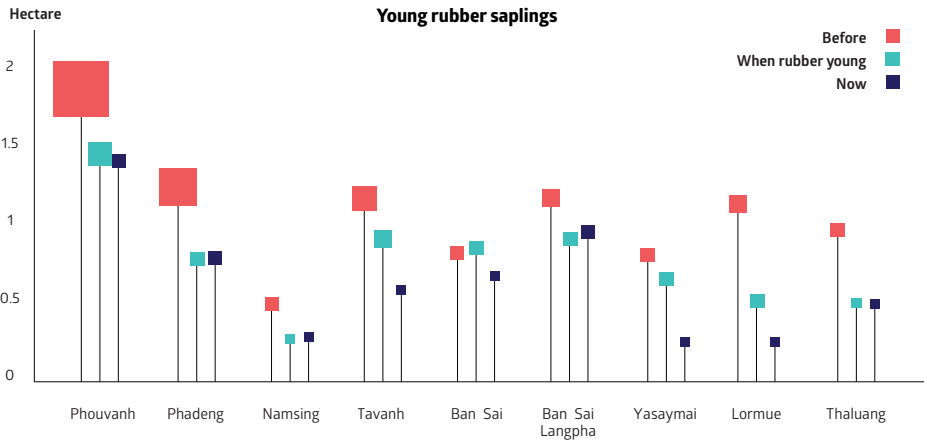


Figure 7.1 Changes in upland cultivated area before starting rubber plantation, with young rubber saplings, and in 2015

An increasing number of households are dependent on wage labor on plantations, or on construction sites in the surrounding area. For example, in Tavanh village, wage income has increased nearly six-fold from before rubber was introduced. In Xing District, many villagers rent out their paddy land to Chinese investors who convert it into banana plantations. Such land rent is significant enough to feed the family for the whole year. Now that they have rent out their paddy land to the Chinese investors, women have less work to do at home. Women go in groups to be engaged in hired labor in China.

Impact of change

With rubber and other cash crops, as well as improvement in road and transportation, cash income of households has increased, but not to the degree of significantly improving household livelihoods. Most villages have decreased their upland rice cultivation, which means they now buy rice from the market for home consumption (Figure 7.2).

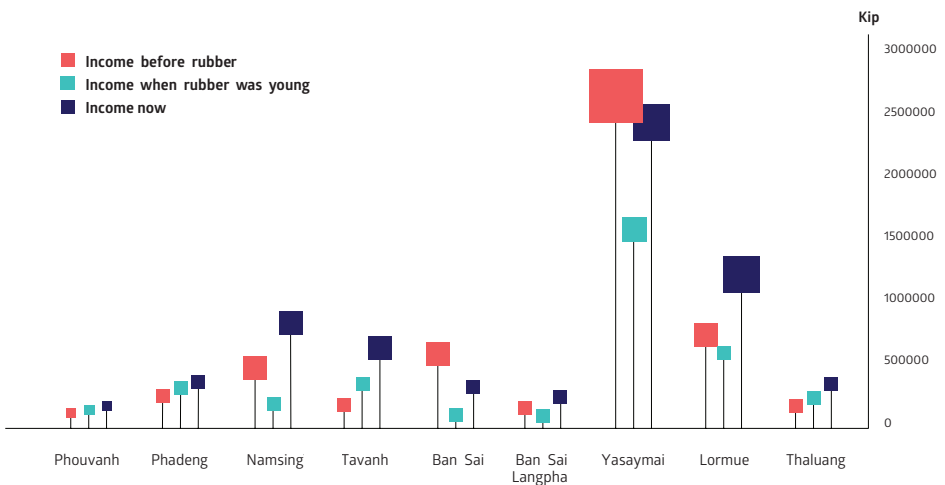


Figure 7.2 Average annual cash income before, during, and after rubber plantation (adjusted with year 2010=100)

In Phouvanh and Bang Sai Langpha villages, residents have an overwhelming perception that income before the introduction of rubber was higher than currently. Few households have their own rubber plantation in Phouvanh, even though they are surrounded by economic concessions of rubber. Hence, they were not able to benefit from the introduction of rubber.

The perception of women and men on the changes in income depends on which income increased and over which income generation activities do women and men have more control over. Phadeng women claim that their income now is higher than before, while men perceived the opposite. Phadeng has increased their income from wage labor, which is activity conducted mostly by women. In Namsing, the perception was opposite, and men perceived that the income is better now while women find it was better before. It is noted that Namsing maintained relatively large paddy fields, which men are more in charge. This shows that the benefit is experienced by different women and men based on what they are doing.

The increase in income has led to villagers reporting that they are eating more than before. However, it is a matter of concern that some people did reply that they are eating less than before. For example, in Phouvanh, where both women and men are surrounded by economic concession, while 10% of men said that they eat less than before, 20% of women indicated the same. It is also noted that Ban Sai is the only village where the adjusted income is lower now than before and where some women perceived that they are eating less than before. The benefit from rubber is not distributed equally between villages, between households and within households, and seems to be creating more disparity among and between villages.

Impact on women

Collective investment decisions on how to use the proceeds from rubber and other cash income has considerable impact on women's workload and well-being. In Yasaymai, Lormue, Tavanh and Ban Sai, women are feeling less busy than before rubber, as compared to men, while in other villages, women tend to say that they are busier than before. It is noted that in Yasaymai, Lormue and Ban Sai, villagers have collectively agreed to invest in water supply system in the community by using their increased cash income from rubber production. This has considerably reduced women's workload, and most of the women who said that they are not busier than before mentioned water supply system investment as the reason for decreasing their workload. In other villages, there is not much investment to decrease women's household work; on the contrary, women are now working more as hired labor and feel that their workload has increased.

Perception whether they feel busier than before rubber production

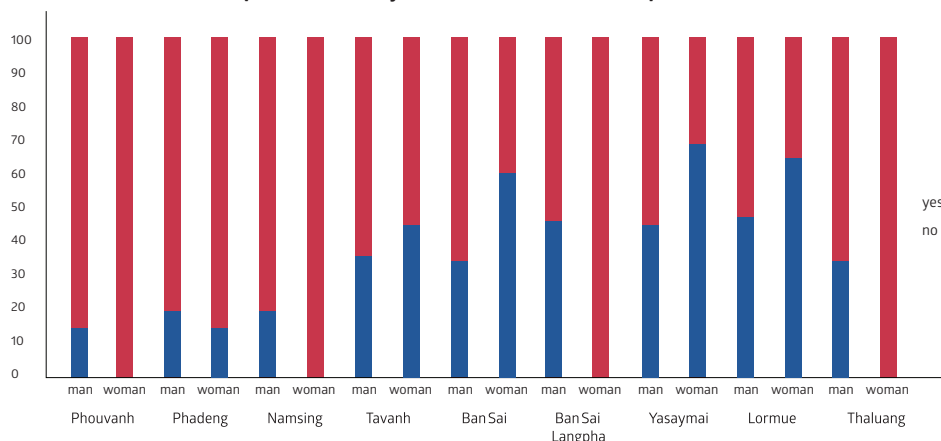


Figure 7.3 Respondents' perception on whether they feel busier than before starting rubber production

Although some villages increased their cash income, some villages/households have increased perceived food intake, and some villages have decreased women's workloads. Still, more than 80% of planting and other decisions are made by men such as whether to plant rubber and for buying large assets. There is no statistical difference in such

decision-making pattern by household income, showing that an increase in income does not affect traditional gender-differentiated decision-making patterns.

While the overall increase in income has led to increased investment in children's education, such investment is still marked by discrimination and disparities. Those who increase their investment in children's education have higher incomes than those who said they did not increase their investment. Those who invested more in their daughter's education have slightly higher income on average than those who invested in their son's education. More respondents increased their investment in their son's education (73%) rather than for their daughters (70%).

This shows that there is still a tendency to prioritize boys' education over girls', and girls only get the opportunity to be educated once the household has sufficient income to first cover the education for boys.

Recommendations

- Provide communal land management rights to local villagers, with a management committee composed of women and men.
- Raise awareness on land rights and forest management among villagers.
- Promote investments whose income is derived from economic land concessions to develop infrastructure that benefit women, such as water supply and electricity.
- Actively target support for girls' education and thereby decrease the gap between girls and boys.
- Provide agriculture extension so that farmers can decide on crop alternatives for their own benefit.

About this brief

This brief was written by Dr. Kyoko Kusakabe of Asian Institute of Technology and Dr. Chanthavisith Chanthoumphone of PTI as part of the SUMERNET supported project "Gendered impact of cross-border agricultural investment: Case of rubber plantations in Northern Lao PDR, Myanmar, and Cambodia". Special thanks go to Veena N. of Asian Institute of Technology (AIT) and Phommy Somboon of Provincial Department of Planning and Investment, Luang Namtha.

Contact for more information

Dr. Kyoko Kusakabe, Asian Institute of Technology, Thailand.

Email: kyokok@ait.ac.th.

08 Avoiding economic hardship for women affected by land use change in northern Shan State, Myanmar

Key findings

- With the expansion of rubber in Northern Shan State in Myanmar, households are losing land to commercial rubber plantations, while not being adequately compensated for their loss of land and livelihoods.
- Upland rice, pineapple and maize areas previously benefitting local households are being replaced by commercial cash crops.
- Cash income has generally increased, but food security has deteriorated. This has impacted women more, since they are in charge of feeding the family.
- Expansion of rubber plantations has led to a decrease in non-timber forest products (NTFP). Women are impacted more than men since they depend on NTFP for food and for cash income.
- The shift in land use forces households to increase small livestock production and engage in wage labor. These new activities are disproportionately being carried out by women, thus increasing women's workload.

Expansion of rubber plantation

The Government of Myanmar has set ambitious long-term export goals for agricultural products under its 30-year master plan (2000-01 to 2030-31). One of its targets is to plant rubber on 600,000 ha throughout the country (Ministry of Agriculture, Livestock and Irrigation, 2015). In its promotion of large-scale industrial agricultural production throughout the country, the government has issued rubber concessions in the northern, eastern and southern Kachin State as well as northern and eastern Shan State since 2005. In 2015, there were 12,000 ha of rubber plantation in Lashio district, northern Shan State, with rubber production of 1,726,902 tons. Today, there are 7,913 ha of rubber plantation, of which 3,909 ha have been developed by various enterprises owned by Chinese or local business as well as local insurgent militia. The livelihoods of rural farmers in the concession areas are threatened because they are at risk of losing upland cropping area, grazing land, and communal land for ancestor worship to rubber concessions. Villagers do not possess title for upland areas and their traditional ownership is not recognized. Compensation was made only for lowland areas (MMK 120,000/ha or US\$ 90/ha).

Changes in livelihoods

With the introduction of rubber plantations, local farmers in Lashio district are forced to change their livelihoods and cropping patterns. The table 8.1, below, shows changes in household cash income between 2005 and 2015 (adjusted). In both villages, cash income increased following the introduction of rubber.

Table 8.1 Changes in income by village

Income Group (kyat)	Village 1		Village 2	
	Before (%)	After (%)	Before (%)	After (%)
< 2,000,000	98.5	70	86.7	21.4
2,000,001 - 4,000,000	1.5	23.8	12.2	21.4
4,000,001 - 6,000,000	0	4.6	1	18.4
6,000,001 - 8,000,000	0	0.8	0	8.2
> 8,000,001	0	0.8	0	30.6
Total	100	100	100	100

Note : V1 = village type 1 (villages near economic concession),
 V2 = village type 2 (village where farmers cultivate rubber by themselves.)

In the villages located near the economic concession areas (village 1), before rubber, the main income sources of households were upland rice and paddy for home consumption, upland cash crops (pineapple) and livestock breeding. Since the arrival of rubber, 75% of households have lost land to rubber concessions, and households have shifted to producing corn and sugarcane in limited areas, earn income through wage labor, and rely more heavily on remittances from migrating family members (Figure 8.1). Formerly, each household used to produce an average of close to 300 kg of upland rice for home consumption. Now upland rice and pineapple production have virtually stopped.

Similarly, respondents reported having stopped raising cattle due to the lack of grazing area. While the amount of rice for home consumption and income from upland crops and livestock has decreased, households now depend more on remittances and wage labor. At present, nearly 30% of the village population work in neighboring countries. Here, non-farm incomes are incomes from shops, groceries, retailing, trading, renting vehicles, and restaurants.



Figure 8.1 Income composition from different sources before and after rubber plantation

For the village that was not affected by economic land concessions (Village 2), before shifting to rubber production, they were producing upland rice for home consumption, upland corn and earning income from non-farming activities such as trading and working as staff in local organizations. Around 30% of households in Village 2 were better off than before, because they were able to plant rubber by themselves and earn cash income from rubber. They were able to retain their right to use their land (although without legal documents). This village also prevented their land from being taken away by the Forest Department in order to establish a reserved forest.

Impacts of the changes

After the introduction of rubber plantations, average household cash income in both study villages increased. However, the impact of the changes is not the same between the two. Even before rubber was introduced, Village 2 was focused on commercial production and market integration; Village 1 was subsistence-oriented and depended on non-timber forest products (NTFP) as well as upland rice production for home consumption. Before rubber concessions, they hardly bought food in the market. Figure 8.2 shows the percentage of respondents who said that they are buying more food in the market than before in Villages 1 and 2 (2005 vs. 2015).

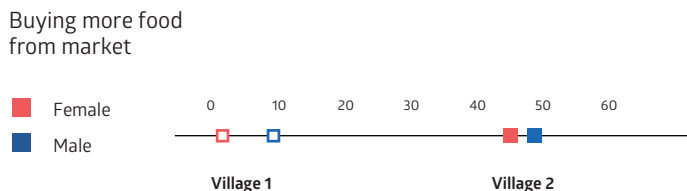


Figure 8.2 Buying more food from market (female and male)

Even though cash income increased, half of the respondents said that they are eating less than before (Fig. 8.3). This points to possible nutritional deficiencies among village residents.

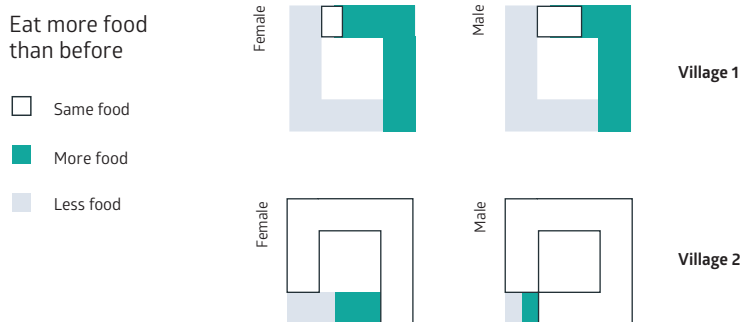


Figure 8.3 Eating more food than before (female and male)

Over half of the respondents in the villages around economic concession areas (Village 1) said that they have less food than before. This may be due to less access to NTFP, as well as less land to cultivate vegetables. The increased income may not be sufficient to cover higher expenses for food purchases. In Village 2, however, food intake seems to have remained the same.

Impacts on women

In both villages, household income generally increased after the introduction of rubber. Around half of the women and men said that they are busier than before. While traditional farm tasks are gender-divided, newly introduced activities are predominantly carried out by women, such as wage labor and small animal raising. Women used to collect NTFP, which was an important food source to the household. Now, their labor is consumed in income-earning activities. A 50-year-old widow explained:

" My upland area of about 1.5 acres [0.6ha] of upland rice, groundnut and pineapple was taken by a company for rubber. I got MMK 900,000 for 3 acres [1.2ha] of lowland area, but I faced bad conditions, so I had to find work. In addition, I cultivated paddy and groundnut. I reduced household expenditure for food. My sons could not attend school. One son migrated to Thailand to send back money. Now, the condition of my family is getting better due to the cultivation of corn, which is in high demand, as well as the remittances. However, it is still difficult to survive ".

Women are traditionally responsible for reproductive work and face a double burden of income generation and household maintenance, which leads to time constraints. Women, especially from planting rubber households, spend more of their daily hours on productive and reproductive activities than men. Additionally, women do not participate in decision-making processes within the household and community. Even though the percentage of women who access education is higher than that prior to rubber, their education level is still lower than that of men.

Recommendations

- Government to consider social impacts of large-scale economic concessions of agricultural and forest land.
- Communities to manage communal land with a committee composed of women and men.
- Local authorities to acknowledge traditional land rights and forest resources use.
- Use income from economic land concessions to develop infrastructure that benefits women, such as water supply and electricity.
- Businesses to provide agriculture extension so that farmers can invest in planting cash crops for their own benefit.

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About this brief

This briefing has been written by Ms. Aye Chan Myae with inputs from Dr. Kyoko Kusakabe of Asian Institute of Technology and Win Myo Thu of EcoDev/ALARM. The report is part of the SUMERNET supported project "Gendered impact of cross-border agricultural investment: Case of rubber plantations in Northern Lao PDR, Myanmar, and Cambodia". Field work for this report has been conducted from December 2015 to February 2016 in five villages in Northern Shan State, interviewing a total of 141 respondents.

Contact for more information

Dr. Kyoko Kusakabe, Asian Institute of Technology, Thailand
Email: kyokok@ait.ac.th.

09 Road to shared prosperity: The dominant transboundary policy narrative around the East-West Economic Corridor (EWEC)

Introduction

Large-scale transboundary infrastructure projects often require the support of multiple elite actors to succeed. In the Mekong Region, the Asian Development Bank (ADB) has promoted economic corridors as a way to achieve regional economic integration and reduce poverty. The East-West Economic Corridor (EWEC) is one such example; stretching across four countries, more than 1,320km long, and in its first phase

(2001-2008) costing about US\$0.9 billion: 80% of which came from JBIC and 10% from ADB. Apart from upgrading and building transport infrastructure, the economic corridor also includes other projects; for instance, aimed at simplifying border procedures, cooperation on tourism, and establishing special economic zones in border areas.

Story

The dominant transboundary policy narrative around EWEC for almost two decades has been on improving transport infrastructure, together with policies that facilitate the free flow of trade, investment, tourists and labor across borders; which when combined, will reduce poverty and bring about shared prosperity to the region. Economic corridors for this purpose, are portrayed as the “backbone” or “arteries” for regional connectivity, economic integration and development. Border rivers are crossed on “friendship” bridges.

Shared prosperity policy narratives linked problems, solutions and promises. Thus, after arguing that roads

were poor and bridges missing, the solutions proposed were to upgrade roads and build bridges and promise shorter travel times and costs. Complex border procedures that hinder business logistics are improved through supporting the negotiation of bilateral and multi-lateral agreements on cross border procedures on transport, such as the Cross-Border Trade Agreement (CBTA). Problems of poverty however, are addressed in narratives mostly by supporting business with promises that this will lead to increased investment, trade, tourism and employment opportunities, which will then in turn raise incomes.

Reality

The power of narratives, like those promising shared prosperity, lies in the way they simplify complex realities; making it appear like there are no victims, burdens or risks. It is not easy to be against ‘better roads’. A storyline promising shared prosperity is hard to argue against in terms of vision; the issue of course lies in actual distribution of benefits and burdens, and whether or not the costs are justified.

A certain level of ambiguity with respect to how economic corridors were supposed to come about

was also useful for building a supporting coalition, because there was not much common understanding or agreement on this key point. It also made it hard to criticize, as it is easy to be accused of not seeing ‘the bigger picture’. A lack of clear targets and indicators for evaluation also made it difficult to criticize program performance. The initial Cross Border Trade Agreement (CBTA), for instance, came out in 2003, but it took several more years of negotiation before all annexes and protocols were agreed to and finally ratified.

Policy insights

- The purpose of a transboundary infrastructure project should be clear and become the basis for its evaluation and re-design.
- Investment in transboundary transport infrastructure should be critically evaluated; when a project does not deliver expected benefits, further investments should not be automatic.
- It is not sufficient to build physical infrastructure to link areas in different countries, attention is also needed to incentives, market structure and border institutions.
- Consultation with local governments and communities affected is critical for international infrastructure projects even where these are formally negotiated by national governments.
- The environmental impacts of transboundary infrastructure should be assessed and incorporated into decisions and planning from the outset and be updated as new information is acquired.
- The consequences of possible changes in climate should be taken into consideration in the design and maintenance of long-lasting infrastructure.
- Not all components of a large project or program design need to be implemented if individually they are no longer worthwhile, and the need for new components may become evident as conditions change.
- The promotion of large-scale infrastructure projects through narratives emphasizing benefits should be tempered by analyses of actual performance, as well as costs and impacts.

Conclusion

The story of a connected and prosperous Mekong Region crisscrossed by economic corridors was created by Japanese aid experts, scripted by ADB, and the roles interpreted by GMS governments and big business. The narrative was successful, in part, because it focused on positive messages – solutions, promises, and heroes. This approach helped maintain a coalition of support from governments in the region, for a program that in many respects, has failed to live up to its promises.

About this brief

These briefings have been written by Dr. Bui Duc Tinh, Hue University of Economics, Hue University with inputs from Dr. Louis Lebel, Unit for Social and Environmental Research (USER), Chiang Mai University. The briefing is part of the SUMERNET supported project “Impacts of the East-West Economic Corridor on local livelihoods and forest resources in the Mekong River region: Case studies of selected forest-dependent villages in Vietnam, Lao PDR and Myanmar”.

Contact for more information

Dr. Bui Duc Tinh, Hue University of Economics, Hue University, Hue City, Vietnam
Email: bdtinh@yahoo.com.

10 Sustaining livelihoods of local villagers under the East-West Economic Corridor and regional economic integration in Myanmar

Myanmar has undergone political transition with a shift from a military dictatorship to a nominally civilian government. The process of political liberalization has been coupled with economic liberalization and regionalization, opening up the country to foreign investors. The East-West Economic Corridor (EWEC) project was agreed upon in 1998 at the Ministerial Conference of the Greater Mekong Subregion (GMS). The project aims to promote development and integration of the Mekong Region countries. In Myanmar, the project aims to improve roads and

connectivity of Kayah and Mon States to Yangon and to Thailand as well as other countries in the GMS.

The Union Government of Myanmar expects that the EWEC directly supports strengthening infrastructure linkages, facilitates cross-border trade and investment, and enhances private sector participation in its development and competitiveness. It also aims to reduce poverty by supporting the development of rural and border areas, increasing income and providing employment opportunities of low-income groups.



Figure 10.1 The East-West Economic Corridor (EWEC) running from Myanmar to Vietnam

EWEC and changes in government policy narratives

The dominant transboundary policy around the EWEC in Myanmar has been based on a narrative of improving transport infrastructure. The development of transport infrastructure will support local producers of agricultural products and handicrafts to access income generation and employment opportunities, associated with new consumer market, as well as their access to established local and tourism markets in Mon, Yangon and at Myawaddy-Mae Sot border with Thailand.

Myanmar is fully supportive of the EWEC, has invested in infrastructure development, and has made changes to relevant policies for socio-economic development. Three laws have been enacted to facilitate investments in rural lands: the Farmland Law (2012), the Vacant, Fallow and Virgin Lands Law (2012), the Foreign Investment Law (2012) and the Special Economic Zone Law (2012).

EWEC: Benefits for regional trade

It is important to note that the EWEC has made a significant contribution to economic regionalization and cross-border trade between Myanmar and other Lower Mekong countries. Total goods export turnover transported on the EWEC reached US\$419.9 million in 2014, which is many times higher than that of Myanmar before the operation of the EWEC. Most products traded through EWEC are consumer goods and agricultural products; specifically, the volume of trade in timber products has increased sharply since 2006.

Further, the EWEC region can present itself as a single, stable, and attractive investment location to the agro-industry. Other benefits can also be realized through sharing of knowledge and information about production, processing technologies, and establishment of linkages between producers, processors and markets

The Myanmar Government has requested loans from various financial institutions, such as the ADB (US\$100 million), the AIF (US\$20 million), and the Thai Government among others. However, the State Owned Economic Enterprises Law specifies a long list of economic activities reserved for the government, e.g., the government can determine the level of participation by the private sector. In addition, state enterprises have access to highly subsidized imports, which are not available to the private sector.

Meanwhile, in Myanmar, micro-, small-, and medium-sized enterprises account for 90% of all businesses and are the largest source of employment, accounting for 70% of the total workforce. This means that there have been less job opportunities generated from EWEC construction than stated in the dominant policy narrative.

across the entire Corridor region. However, as Myanmar has given priority to state-owned enterprises, the private sector, particularly micro and small-scale enterprises, has less opportunity to benefit from the EWEC. This means that EWEC's income and job generation for the local population can only be found in the government policy narrative, not in reality.

Changes in the relevant policies of Myanmar in order to facilitate economic integration have also caused impacts on the livelihoods of large number of people. About 14,114 households are affected by land acquisition for the project, comprising about 8,718 m² of residential land, 113,324 m² of garden land, and 19,528 m² of cropland. Land acquisition and resettlement impacts for the project affect both land and non-land assets in Kayin State.

Local people face income and livelihoods challenges

It is argued that the economic corridor construction is aligned with the Myanmar Government's priority to create jobs and generate income to reduce poverty. It is important to recognize that the EWEC has generated a new trend of investment, with many factories from other provinces relocating to take advantage of cheap labor in Myanmar. There has been a rapid increase in the number of enterprises from 218 in 2000 to 300 enterprises in 2009, of which about 80% of factory owners are non-local.

About 55% of the state's population is self-employed, operating micro and small-scale enterprises that sell agricultural products such as processed foods and handicrafts including bamboo and woven products. This points to the fact that small and medium-sized enterprises (SMEs) often do not belong to local people and deal with many difficulties, such as insufficient products, poor access to processing technology, lack of skilled employees, and little access to markets. These constraints prevent the residents of the state from developing productive enterprises that can supply value-added products to expanding local and regional markets. This means that there has been less than expected income and job opportunities generated for local residents due to the operation of the EWEC.

There have been significant changes in local livelihoods since the operation of the EWEC in Kayin state where paddy rice, vegetables and fruits are cultivated for household use and for sale at local markets. Since the operation of the EWEC, large land areas have come under rubber plantations, which provide labor opportunities to local workers. Households residing along the road make their living on small businesses and restaurant services. There has been migration of large numbers of people of working age to Thailand for income. In many villages, more than half the households depend on money sent from family members working in Thailand. In many villages, children and elderly people are overrepresented in the population, while the majority of working age residents are absent.

The establishment of special economic zones and road construction has brought new threats to local residents such as tenure insecurity, loss of livelihoods, loss of farm and forest land due to an emerging land market and increased land prices. The EWEC projects on the ground are being contested by civil society organizations and local community groups due to social and environmental impacts caused by increased land speculation and escalating land prices; the formalizing of a new private property system based on existing farmland; past and ongoing land confiscation by the military for construction projects; and mining and large-scale plantation concessions in the areas along the project corridors.

Policy implications

1. Government policy securing land tenure for villagers:

The Union Government of Myanmar needs to draft and implement regulations to prohibit land speculation and forced land sales. In addition to setting up an effective land tenure policy, the government should ensure land access for local residents under conditions of an emerging land market and escalating land prices.

2. Maintaining equity among state-owned enterprises and private SMEs:

SMEs play an important role in generating jobs and income for local residents. The government should enable fair participation in trading and access to subsidies under the operation of the EWEC.

3. Increasing local access to regional market and technologies:

It is important to note that local residents have been dealing with many difficulties under EWEC, such as poor access to processing technology and lack of skilled employees, thus constraining villagers from developing productive enterprises. It is strongly

recommended that the government should give priority access to regional markets for villagers as well as facilitate rural access to processing techniques and inputs.

4. Controlling encroachment of forest land: It is also important to note that the construction and operation of the EWEC corridor has resulted in forest clearance for building the corridor and Special Economic Zones (SEZ), and for establishment of rubber plantations. It is important to issue and implement regulations to better protect forests from cash-crop production in villages along the EWEC.

5. Increasing connectivity for local villagers: There has been significant improvements in regional and international connectivity. The government should support and promote local actors to get their products into the value chains of tourism destinations and exports in order to increase value added for local products, thus helping them to increase their income.

Contact for more information

Dr. Bui Duc Tinh, Hue University of Economics, Hue University, Hue City, Vietnam
Email: bdtinh@yahoo.com.

11 Towards sustainable livelihoods of forest-dependent villages and forest management under regional economic integration in Vietnam

The East-West Economic Corridor (EWEC) is an attempt to promote socio-economic development and the regional integration of Myanmar, Thailand, Lao PDR and Vietnam. In Vietnam, one of the highlights is the road network of about 1,450 km, starting from Mawlamyine in Myanmar in the west to its end point in Da Nang City, Vietnam in the east.

It was constructed across many forest areas and affected many forest dependent villages. Since it became operational in 2006, EWEC has attracted private investment and contributed to socio-economic development but has also resulted in impacts on forests and local livelihoods, particularly those of forest dependent communities.

Benefits for regional trade

Total goods export turnover transported on EWEC reached US\$ 1,351 million in 2008, which is 7.5 times higher than that of 2002. Cross-border trading revenue between Vietnam and Laos through the EWEC is US\$155.6 million USD in 2008 compared with the amount of about US\$ 80 million in 2000. Most of the products traded through EWEC are consumer goods and agricultural products; the volume of trade in timber products has increased sharply since 2006. For instance, the total export value of timber products increased from US\$ 61.96 million in 2010 to US\$ 319 million in 2014.

Impacts on regional trade

Rapid increase in export - import turnover between Laos and Vietnam.

million US\$

Significant impact on natural resource trades, particularly timber product between Laos and Vietnam.

- Gypsum / 10 million US\$
- Timber / 10 million US\$
- Copper / 10 million US\$

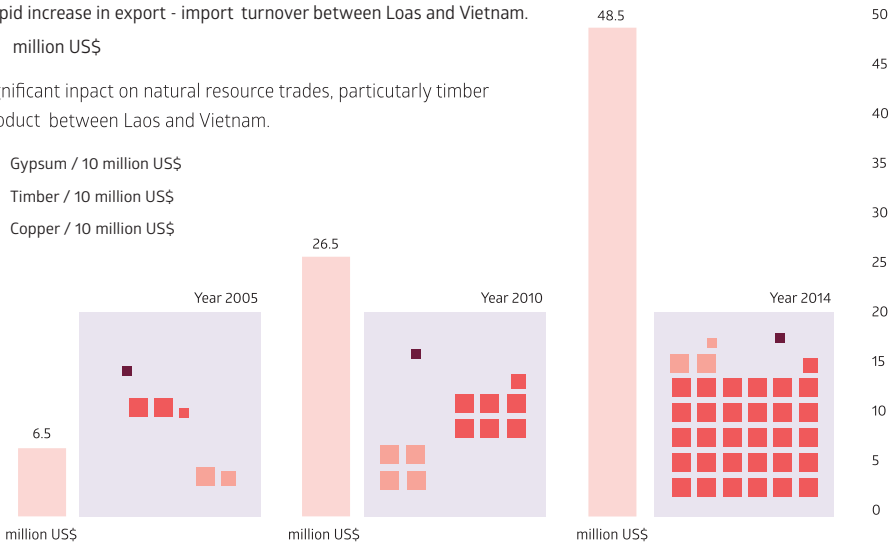


Figure 11.1 Benefits for regional trade

Do village livelihoods benefit?

It is important to note that EWEC has increased the income of forest dependent villagers. Our study result revealed that the income of households living within the EWEC area has significantly increased from VND 26.95 million to VND 88.42 million per household over ten years of EWEC operation (equivalent to US\$1200 in 2005 to US\$4000 per household in 2015).

The sources of village income are various livelihood practices such as crop cultivation, livestock, non-timber collection, hired labor and other services. Of these, cash-crop production formed the major share of their income, of about 57% of the total annual income. The study results show that the income of the surveyed forest-dependent villagers living without EWEC is much lower than that of the EWEC forest-dependent villagers. The annual income reached about VND 21.95 million (equivalent to US\$1000/households) in 2005 and reached about VND 66.9 million per households (equivalent to about US\$3200 per households) in 2015. A number of people who are forest dependent, have migrated out of their villages for non-farming job; in EWEC areas, there is noticeably more people in forest-dependent villages who migrate away in search of jobs.

The position of forest dependent villagers in the supply chain of agricultural products is very weak. They gain about 35–40% of total net benefit in supply chain of agricultural products while the cost shares are about 80% of total cost of that product. Meanwhile, about 90% of agricultural products, such as banana, rubber, ginger, and coffee are exported to regional markets, mainly in China. The export prices are known to dramatically fluctuate as the prices are set by Chinese buyers and driven by collaboration between key collectors and Chinese importers.

Large area of forest land and agricultural land are being allocated for infrastructure construction and Special Economic Zones (SEZs), while not many forest dependent villages have taken job opportunities in this corridor. Special Economic Zones located along EWEC have shown its bankruptcy, for instance, in the Lao Bao Free Commerce Zones. There were many private investors who withdrew their investment from SEZs or Commerce Zones along the Corridor.

Household income

There is a significant difference in income gains between forest dependent living on the EWEC and those who are far from the EWEC. Households close to the EWEC have much higher income

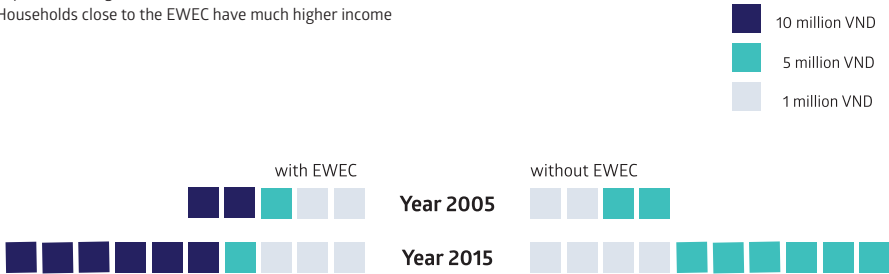


Figure 11.2 Household incomes with and without EWEC

EWEC with better social welfare but more risks

The EWEC has provided some improvements in the lives of forest dependent villagers such as access to social welfare and more livelihood options, such as better education, health care, housing and access to finance. However, the EWEC has also affected local livelihoods such as through the decline in social capital among forest dependent villagers and an increase in

social violence which are challenging the sustainability of local livelihoods. Although the rapid development of cash-crop production in forest dependent villagers has provided cash income, this has also resulted in villagers adopting monocropping for the market and falling victim to debt due to sudden fluctuations in crop prices.

Policy implications

1. National actions for forest resources: The action plans for the EWEC should include provision to protect forest resources. In addition to policies for socio-economic development, government should ensure forest resources are protected.
2. Less dependency on forests for local livelihoods: The national government should consider the introduction of new livelihood strategies so that rural communities can transition away from a large dependence on natural resources, particularly forest resources.
3. Land use planning: The provincial government should strongly control land use allocation for cash-crop production at the commune and district level to avoid excessive expansion of monoculture plantations.
4. Controlling encroachment of forest land: It is important to issue regulations to protect the forest in villages along the EWEC so that they are not destroyed by the expansion of cash crop production.
5. Managing migration in EWEC: Increased job opportunities have resulted in an influx of outside migrant labor into forest areas that has adversely affected forests and forest dependent villagers along the EWEC. The government needs to put in place regulations to better manage the influx of outside migrants into these villages.
6. Increasing collaborative groups: The government should establish a farmers collective as a group of villagers who can cultivate cash crops and better manage the demand and supply of the product and price fluctuations.

Contact for more information

Dr. Bui Duc Tinh, Hue College of Economics, Hue University, Hue City, Vietnam
Email: bdtinh@yahoo.com.

REGIONAL ASSESSMENTS (RA)

SUMERNET, in collaboration with national, regional and international experts, has been conducting a “Regional Assessment” study focusing on water scarcity management in the Mekong Region involving five case studies at the sub-national level in Thailand, Myanmar, Lao PDR, Cambodia and Vietnam.

The overall objectives of this regional assessment are to help improve the understanding on the current situation of water scarcities and the existing policies, strategies and plans concerned in different countries. The Robust Decision Support (RDS) has been introduced and applied in each of the five case studies as a multi-stakeholder engagement tool to explore the ways to improve existing strategies, policies and plans in addressing water scarcity while considering uncertainty in climate, development and other factors in the future.

This section provides the key findings and policy recommendations from the five country case studies conducted as part of the SUMERNET regional assessment.



12 Hydrological modeling for agricultural development based on climate change in Prek Thnot River Basin, Cambodia

Key findings

- Agricultural production in the Prek Thnot River Basin hinges on future uncertainties that confront water management in the dry season based on climate-change, land-use change, and hydropower development.
- According to climate change projections, water shortages would occur if downstream flow is significantly reduced or curtailed, during the period from March to July, or from July to August (the start of the wet season cropping and productive period). A disruption in water supply during this period could reduce crop yields and increase the risk of crop failure.
- Large infrastructure development, such as dam and reservoir construction in the upstream portion of the river basin, is likely to increase the likelihood of failure (and increase vulnerability) for the required environmental flows (quantity, timing, and quality of water flows) to sustain freshwater ecosystems and local livelihoods, and to achieve the minimum water level required for transportation.
- According to the failure matrix on water level for transportation, the downstream part of the Prek Thnot river will be impacted strongly by climate change and land-use change due to hydropower development and expansion of upstream irrigation areas. These impacts will lead to increased water demand and thus reduce future water availability.
- In addition, future hydropower development and expansion of irrigation areas will lead to reservoir storage that rarely exceeds half of the expected capacity. River flows in the downstream of the reservoir is projected to be dramatically reduced. Reservoir volume is most likely to fall below the limiting value (> 52%), which indicates that water shortages are expected in very dry years during the dry season.
- Both flood and drought are expected to intensify in the project's study area. This increased frequency and magnitude of peak flows and consequent flood inundation, especially under the maximum flow change condition, would damage infrastructure, crops, economic assets, houses and other property.
- Adaptation measures are recommended to be put in place, including mainstreaming of climate resilience in drainage and storage capacity design based on predicted flow and water level change, flood management measures and investment in proper maintenance of existing irrigation systems; to date, these measures have been largely neglected.

Introduction

Water scarcity for agriculture remains a large challenge in the Prek Thnot River Basin, which is vulnerable to drought and natural variability influences that result in an unstable water demand and supply. These conditions have exacerbated the impacts of climate change and development in the area, specifically changes in land use. With the yearly expansion of developed areas and uncertainty related to climate change that could increase the risks of flooding and

drought in the Prek Thnot region, water availability and the demand for water need to be considered in defining development policies. The hydrological modeling SWAT was carried out in conjunction with the robust decision support (RDS) framework scenarios related to (i) climate change, (ii) land use change and (iii) large infrastructure development upstream. The goal was to capture the impact on water availability for agricultural development in the study area under these scenarios.

Water Level



Sub Basin 5

L4	56 %	58 %	50 %	56 %	58 %	51 %	56 %	58 %	51 %
L3	30 %	33 %	28 %	30 %	34 %	28 %	30 %	34 %	28 %
L2	56 %	58 %	50 %	56 %	58 %	51 %	56 %	58 %	51 %
L1	30 %	34 %	28 %	30 %	34 %	28 %	30 %	34 %	28 %

Sub Basin 3

L4	38 %	39 %	34 %	38 %	39 %	34 %	38 %	39 %	34 %
L3	38 %	39 %	34 %	38 %	39 %	34 %	38 %	39 %	34 %
L2	38 %	39 %	34 %	38 %	39 %	34 %	38 %	39 %	34 %
L1	38 %	39 %	34 %	38 %	39 %	34 %	38 %	39 %	34 %
	Avg. Climate	Dry Climate	Wet Climate	Avg. Climate	Dry Climate	Wet Climate	Avg. Climate	Dry Climate	Wet Climate

1. High Rate of Deforestation

2. Medium Rate of Deforestation

3. Low Rate of Deforestation

Sub Basin 3 and Sub Basin 5 (color) broken down by Strategy vs. Land Use Change and Climate Change.

Figure 12.1 The failure matrix of water level for transportation based on the combined climate change and land-use change

		Strategy L2		
		Avg. Climate	Dry Climate	Wet Climate
1. High Rate of Deforestation		48 %	52 %	41 %
	2. Medium Rate of Deforestation	48 %	52 %	41 %
	3. Low Rate of Deforestation	48 %	52 %	41 %

Figure 12.2 The failure matrix of water volume in the reservoir

Policy implications

The greatest scope for action is to improve adaptive capacity and respond to changes in water demands; however, the implementation requires a revamping of current water policies, adequate training for farmers and viable financial support. Adaptation responses for the Prek Thnot River Basin should be based on needs and priorities in the short, medium and long-term. Responses should focus not only on the most

vulnerable hotspots, but also on sector-specific plans. It is observed that agriculture, water resources, and infrastructure developments have different implementation timeframes; therefore, a holistic landscape approach would be an effective approach to place all sectors into a common implementation timeframe.

The following action points should be considered for addressing the uncertainty in climate and land-use change:

- 1) Consolidate overall adaptation activities and apply a coherent and strategic adaptation approach.
- 2) Ensure continuity and learning in planning and implementing adaptation, and communicate progress through iterative outputs.
- 3) Fully integrate adaptation into existing planning systems and prioritize activities that prevent negative climate impacts on development.
- 4) Identify the level of climate risk which can be addressed given economic, social and ecological constraints.
- 5) Encourage the provision of adequate and predictable support which takes into account the comprehensive, continuous and iterative nature of the National Adaptation Planning process.
- 6) Create confidence in agencies to support local communities (water use communities), which requires action beyond the implementation of projects.
- 7) Contribute to learning about how to manage multiple stress factors that combine in complex ways across the region of Prek Thnot.

The projected climate and land cover changes could seriously affect the hydrological regime of the Prek Thnot River downstream of the dam, which is modulated only by environmental flows, and restrictions may still be necessary for a substantial number of months. Policymakers need to look at strengthening support for agricultural extension services including promoting seed diversity for different kinds of climate risks (photoperiod-insensitive, drought-or flood-tolerant varieties) and creating off-farm livelihood opportunities.

Contact for more information

Dr. Sothea Khem Mekong Institute of Cambodia, Phnom Penh, Cambodia
Email: ksothea@gmail.com.

13 Addressing climate change and water scarcity impacts in Champhone district, Savannakhet province in Lao PDR

Introduction

Climate change and water scarcity is one of the most pressing issues in Lao PDR. This policy brief is based on findings from the case study in Champhone district, Savannakhet province. Based on these findings, the briefing advocates for a holistic approach to climate change adaptation as well as to build resilience to climate change and water scarcity impacts in Lao PDR.

Champhone district, Savannakhet province

Champhone district, Savannakhet province is located in the central part of Lao PDR, about 54 km southeast of the Savannakhet provincial centre. With a total land area of 1,114 sq. km., the district shares borders with Outhomphone, Xayphouthong, Xonbouri, Atsaphanthong and Songkhone districts. The district is abundant in natural resources, particularly forests and plant biodiversity. The district has become an important rice and crop production area for not only Savannakhet province but also other provinces in Lao PDR.

The predominantly rural district is still highly dependent on subsistence agriculture production, using traditional mode of production. At the same time, Champhone district is highly vulnerable to climate change and water scarcity, particularly to droughts, floods, storms, and fluctuations in temperature.

Climate impacts and water scarcity

Champhone district is located in the hottest and driest location of Lao PDR; the average mean temperature is estimated as 26.13 °c and the average rainfall is estimated to be 1,478.5 mm a year. The district has experienced significant impacts of climate change during the last 40 years: increased temperatures making summers hotter, decline in rainfall during the rainy season, changes in the timing and intensity of rain, and strong winds. According to the analysis of historical climate data, the mean temperature in the district has increased approximately 0.05 °c while rainfall has declined 5.7 mm annually.

According to climate projections, climate change impacts in Champhone are expected to continue. According to the climate projection made by the Atmospheric General Circulation Model (AGCM), the mean temperature in Champhone district will increase by the end of the 21st century; according to climate projections, the annual rainfall in Champhone district will increase by 14% or approximately about 255mm from 2015 onwards. According to projections made by these climate models, the dry season in Champhone district will be dryer and longer, and the wet season will be wetter and shorter. Extreme climate related events as such intensive rain, flood, drought, water shortage, wind storms, sharp temperature rises, etc. are projected to continue in the future.

Potential impacts of climate and water scarcity

These projected changes in climate will have wide potential impacts on physical and natural sites as well as local people's livelihood. The increased temperatures, and longer and dryer dry periods, will facilitate growth of invasive species and thus accelerate the closing of open wetlands by vegetation cover, making lake and ponds shallower, and reducing their water storage capacity.

Other related impacts are loss of habitats and declining biodiversity along with hotter and longer and dryer periods. This would increase water evaporation from soil and cause decline in water quantity. It would also reduce soil fertility and the soil's capacity in providing ecosystem services and mitigating salinity. As more rivers, lakes, pools and ponds become isolated and dried out, it will potentially flora and fauna, and critical endangered species like Asiatic soft-shell turtle, Siamese crocodile.

The increase in temperature and rainfall at the wrong periods will increase humidity, facilitating breeding of many insect species, leading to impacts on human and animal health as well as agriculture production. The increase in rain intensity in the wet season will increase soil erosion and run-off into the rivers and streams, which then further contribute to making the river wider and shallower while forming blockages that constrain water flows. There will be more incidents of floods as is already evident in Champhone district in the last few years. The intensive floods have been damaging local housing as well as irrigation and road infrastructure.

These impacts are of particular concern to poor people who often have limited access to improved water sources, sanitation facilities, housing, clothing, and food security. The poorest sections of the population are often the most affected by, and vulnerable to, climate change and water scarcity impacts.

Policy recommendations

This policy briefing is aimed to support the efforts of the government of Lao PDR, and local agencies in Savannakhet province, and Champhone district authorities, to consider and undertake several measures for climate adaptation:

- **Improving the reservoir and irrigation system** : Currently, the district still has over 6,000 ha of rain fed rice field which are considered a high risk due to being vulnerable to fluctuations in rainfall and water scarcity. Improving the reservoir and irrigation systems in some areas can help increase resilience and support agricultural production.
- **Developing and implementing an effective water and watershed management plan** : Champhone district needs an effective and clear water and watershed management plan that allocates and prioritises water use and protects watersheds that can enable better management of water resources especially in times of scarcity.
- **Continuing and increasing research and development work to support climate change adaptation for agriculture sector** : Agricultural production is the key livelihood activity and main income source in Champhone district. But the sector is affected significantly by droughts, floods, salinity, and pest infestation. Hence, the sector needs to be supported to adapt to changed climate circumstances through building knowledge and capacity development.
- **Breeding, nursing and releasing native fish back into rivers, lakes and ponds** : Climate change with its impacts on rivers, ponds and waterways affects the breeding and survival of many native fish species with corresponding impacts on local livelihoods. The breeding and releasing of native fish back into natural rivers, lakes and ponds will help to sustain local fisheries and fish populations.

- **Improving access to improved water sources** : A high percentage of the population in Champhone district still has no-access to improved water sources, including protected wells or public water supply system. More effective water supply systems can prevent the prevailing incidence in the district of water-related diseases such as diarrhea, dysentery, and smallpox.
- **Promoting livelihood activities that are less or indirectly dependent on water resources** : Champhone district needs to improve diversification of livelihoods to non-farm sectors so farmers have alternative livelihood options. For example, the district can provide short term vocational training for people and promote work in SEZs in Savannakhet provincial center or across the border in Thailand. The district can also promote micro/household businesses in non-agriculture sectors as well as promote crop and livestock diversification.

Contact for more information

Dr. Saykham Voladet, National Institute for Economic Research (NIER), Lao PDR
Email: saykhamv@yahoo.com.

14 Urban water insecurity in Can Tho City, Mekong Delta

Introduction

As the economic engine of the Vietnam Mekong River Delta, Can Tho City is at the forefront of climate change adaptation. The city faces a number of threats to sustainable development and poverty reduction, with the leading issue being water resources management. A necessity to daily living, water is critical to households and underpins regional agriculture and aquaculture that are essential to the people of the Mekong Delta.

The impacts of climate change and economic growth threatens the availability of adequate water supply in the future. These threats include: increased exposure to floods and droughts; salinity intrusion from rising sea levels; water treatment infrastructure investments not keeping pace with rapid urbanization demand; unsustainable water management practices that include over exploitation, pollution, and lack of resource replenishment.

The study

To address these climate-related threats to sustainable growth and development, the College of Environment and Natural Resources, Can Tho University created a Robust Decision Support (RDS) framework to better inform city managers and planning departments on improving urban water management practices.

This comprehensive framework consists of several elements, based on the critical first step of involving stakeholders in discussions on water challenges and potential solutions. Stakeholders include local provincial government, business leaders, community groups and experts. In the study, a survey on urban household

water demand and gender roles in household water management was conducted; this was the first study to provide detailed information on domestic use and gender roles in Can Tho City. Information collected from stakeholders, household surveys and other sources were fed into the system's dynamic model (VENSIM) and storm water management model (SWMM), which analyzed urban water quality and quantity. Findings from these models were presented at a discussion workshop with local decision makers to confirm their validity, usefulness and solicit feedback. From this process the following set of broad recommendations were generated.

Recommendations

- Researchers need to work with the municipal government to increase investments in domestic wastewater treatment to cope with rapid urban growth and industrialization to reduce health risks and economic and environmental losses.
- Researchers can offer targeted expertise to support planning departments in improving flood management, as floods are a leading cause of clean water scarcity.
- The relevant government agencies need to consider the installation of large storage facilities to harvest rain water during storms that can be used to replace ground water pumping during increasingly long dry seasons; this could be achieved by Build-Operation-Transfer (BOT) schemes or joint ventures.
- The relevant government agencies need to focus on wasteful water use in households and industry and empowering women to take the lead in water saving activities.
- The relevant government agencies need to work with industry and the private sector to develop education campaigns that support them in avoiding pollution and clean water scarcity.

Contact for more information

Dr. Nguyen Hieu Trung, DRAGON-Mekong Research Institute for Climate Change Can Tho University, Vietnam
Email: nhtrung@ctu.edu.vn.

15 Addressing uncertainties in water scarcity management in Huay Sai Bat River Basin, Thailand

Key findings

- The absence of a long-term comprehensive water resources management strategy in Thailand has been of long-standing concern; in its place, a number of ministries (7) and departments (30) are tasked with implementing water development projects across the country leading to management challenges.
- Drought management focuses on short-term actions (e.g. emergency response by providing water supply during critical condition in drought prone areas) rather than on long-term solutions, e.g. expanding irrigated areas; building small reservoirs in arid lands to store more rain water during wet season; improving capacity of existing water ways/storages; and developing a model for drought management and warning system.
- Unlike drought mitigation, flood prevention and management are clearly outlined by the National Strategic Plan on Water Resources Management which stresses the improvement of water channelization and drainage systems, as well as the improvement of water detention areas.
- In the Huay Sai Bat Basin, dredging the existing Nong Yai swamp to increase its capacity could partially help to alleviate drought situations for sub-basin in Kranuan district.
- Using groundwater as an alternative water supply for small-scale irrigation is an effective strategy for sub-basins in Samsong district.
- Delaying rice planting for 1 month is effective only for the rice farming areas outside irrigation serviced areas, while shifting the crop calendar strategy could have negative impacts for irrigated areas.
- Building cascaded weirs along the river in the upstream part could help to improve water scarcity situation at the local level by maintaining water in the upstream of weirs as a small water supply source.

Introduction

Drought in Thailand has recently become more frequent and severe, affecting the level of water stored in reservoirs. Northeastern Thailand has often experienced inter- and intra- annual drought phenomena; as recently as in 2015, the region faced a seasonal shift with unexpected cultivation consequences.

Huay Sai Bat basin (Figure 15.1), a sub-river basin of the Chi, is recognized as one of the most severe drought prone areas in the region. The upper and middle parts of the Huay Sai Bat River Basin suffer greatly from water shortages during the dry season as the water supply for farming activities and household consumption is severely limited. Both an expected change in rainfall and the shift from monsoon season stable crops, like lowland rice and cassava, to rubber farms, will have a high degree of impact, for instance with crop loss (Cadena et al., 2014). Meeting the increasing demand for water from agricultural activities during dry season, especially from irrigated rice farming, is an important challenge for policy makers.

This study aimed to enhance the capacity of stakeholders in exploring the appropriate water scarcity policies or projects under a wide range of uncertainties (including both climatic and non-climatic factors) through a participatory approach. In collaboration with local stakeholders (Mahasarakham University, Rajamalanga University of Technology Isan, Department of Water Resources, Provincial Office, Royal Irrigation Department, Department of Disaster Prevention and Mitigation, Provincial Waterworks Authority, Department of Groundwater Resources, local governments and Huay Sai Bat River Basin Organizations), the Robust Decision Support (RDS) framework (Figure 15.2), integrating different tools (water allocation model and Geographic Information System) and approaches including continuous multi-stakeholder engagement during implementation, was applied to build and raise awareness of multiple stakeholders in the basin to integrate various type of plausible scenarios into water scarcity management and planning processes.

After a series of consultations meetings and expert group discussions with local stakeholders, climate change and land-use change were identified as key uncertainty factors in the Huay Sai Bat River Basin. Four possible water scarcity management strategies were identified by local authorities and relevant agencies during the national workshops. Business as usual (i.e. when there is no effort to address the uncertainties) was added to the proposed strategies.

Table 15.1 summarizes the plausible scenarios that were considered under this study. In total, sixty scenarios were considered. Water allocation model (Water Evaluation And Planning – WEAP) was used as a tool to estimate water allocation for different sectors, such as domestic, agriculture, industry and environment, to assess the performance of the proposed water strategies under uncertain conditions.



Photo 15.1 Consultation meeting with local stakeholders to discuss about findings from the study during the final workshop in August 2016

Water demand for each sector identified during the consultation meetings were used as an indicator to evaluate performance of the water strategies. The thresholds or indicators are dynamically changed, and there are many suggestions for thresholds to be used for strategy performance assessment

(e.g. amount of water required for irrigated rice per rai, amount of water demand per capita per day for domestic consumption, minimum streamflow that needs to be maintained in the river for environmental purpose).

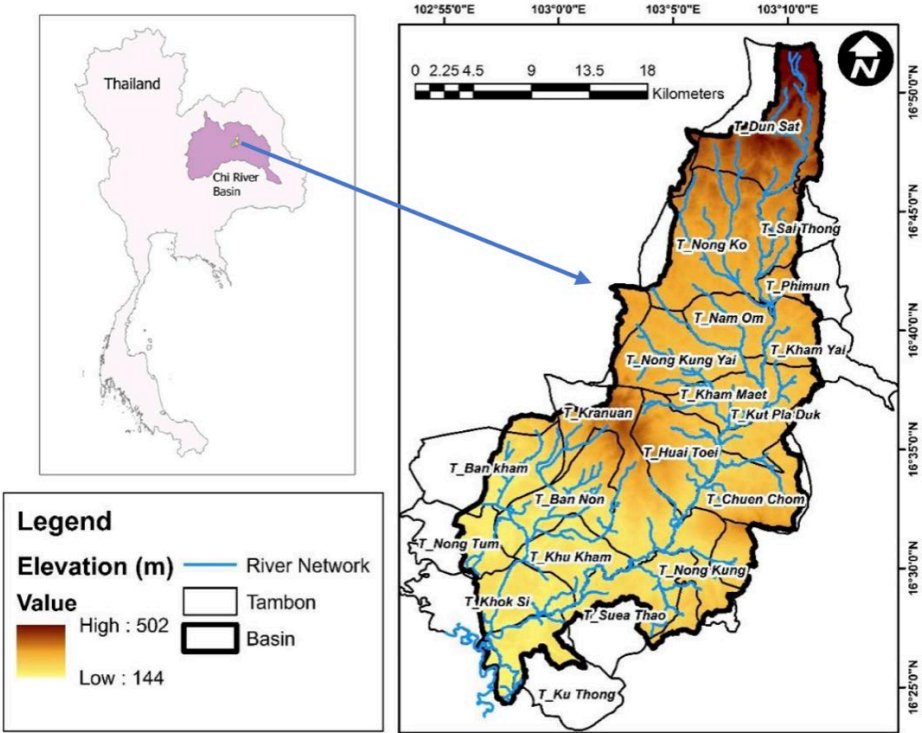


Figure 15.1 Location of Huay Sai Bat River Basin

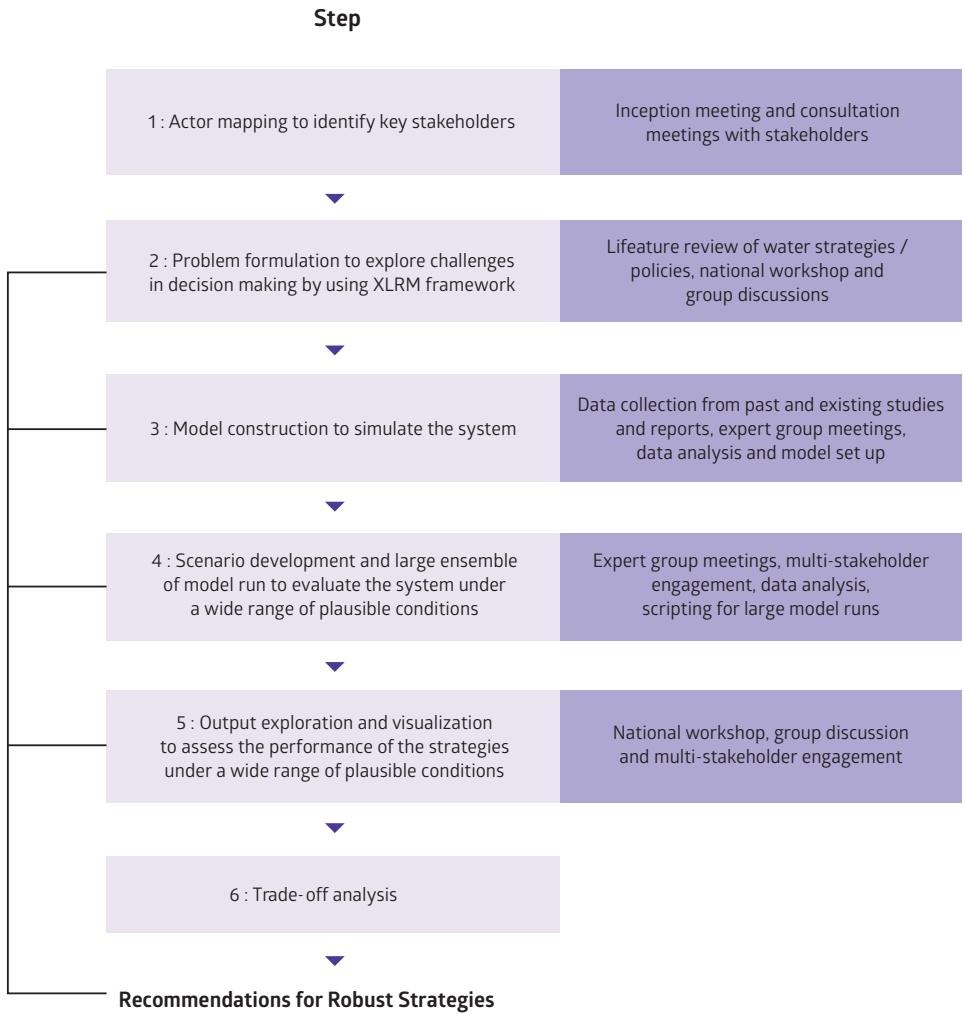


Figure 15.2 Diagram of Robust Decision Support (RDS) framework with major activities during implementation

Table 15.1 A broad range of scenarios in the Huay Sai Bat River Basin

Climate	Land - use	Water strategies
1. Normal condition	1. No land-use change	1. Business as usual (no strategy implementation)
2. Dry condition	2. Sugarcane to rubber in upper region and rice to sugarcane in middle region	2. Dredge existing swamp in Nong Yai to increase existing storage
3. Wet condition	3. Expansion of irrigation in lower region	3. Use groundwater as alternative water supply for small scale irrigation / household farming
	4. Combination of 2 and 3	4. Shift crop calendar
		5. Cascade weir construction in the upper region

Recommendations

- The strategy for groundwater usage should consider the impacts of salinity intrusion into groundwater in Huay Sai Bat River Basin. Further study is needed to understand the impacts and limitations of using groundwater for domestic use and small-scale irrigation purposes.
- Effective engagement between the River Basin Committee and relevant agencies is necessary in order to identify and prioritize strategies. This includes increasing the awareness of river basin planners and enabling them to integrate uncertainties in water resource planning and management.
- Trade-off analysis to investigate potential economic and social impacts on the implementation of the robust strategies should be conducted to inform decision making processes.
- Mainstreaming gender into development planning is necessary to ensure gender equality and women's empowerment. This approach should not be merely limited to inviting female participants to engage with the implementation processes, but gender concerns should be discussed and integrated in development planning and implementation.

Contact for more information

Dr. Chusit Apirumanekul, Stockholm Environment Institute (SEI) Asia, Bangkok, Thailand
 Email: chusit.apirumanekul@sei.org.

16 Water scarcity amidst plenty in the Chindwin River Basin, Myanmar

Key findings

- The dry climate change scenario projects a decrease in monthly water flows during January to June, and increased water shortages (for domestic and agricultural demand) during March to June. It is observed that there is a significant increase in domestic water shortages in the Chindwin Basin downstream along with an increased water demand.
- Projected increase in deforestation of 20 percent by the year 2045 and an additional 10 percent by 2075 shows a significant increase in water flows during the wet season (May to October) which increases the probability of more severe flooding in the future.
- Reduced loss in the existing irrigation systems from 40 percent to 10 percent helps increase the irrigation coverage, particularly during the driest months of March and April.
- There are no specific laws or policies that govern drought and water scarcity in Myanmar. However, numerous pieces of legislation and policy related drought management are mainly covered under disaster management, water resources management, climate change adaptation, agriculture and forestry
- The national water policy of Myanmar (2014) signifies an integrated water resource management (IWRM) approach that addresses a wide range of issues, namely fair water allocation, adaptation to climate change, water use efficiency, conservation, and management of drought and extreme-weather events while providing for integration through river basin planning.

Introduction

The Chindwin River is the largest tributary of the Ayeyarwady River in Myanmar. The river is critical for sustaining the livelihoods of six million people, facilitating the socio-economic development of the region, and providing ecosystem services especially for poorer and more vulnerable sections of the population. An extreme drought event in 2010 caused the depths of the Chindwin River during the dry season to drop to levels much lower than those seen in the past, making it difficult for boats to travel upstream. The low water levels also severely affected agricultural activities due to insufficient water supply.

During the wet season, the Chindwin River faces extreme floods. Losses to life and the economy from the most recent flood in Myanmar in 2015 were the highest ever in the Chindwin River. Compounding these extreme events, water resources in the Chindwin River Basin has come under pressure from economic development that includes agriculture, mining, logging and navigation, resulting in land-use changes, deforestation, increased water demand and water insecurity, and environmental degradation, with consequent impacts on people's livelihoods. Securing water for different needs under the context of a changing climate and landscape has therefore become a complex issue, and a critical challenge for water resources management in the Chindwin River Basin.

The study

The study applies a Robust Decision Support (RDS) framework and the WEAP model through a participatory approach to assess the impacts of climate change, land-use change and population growth on key aspects of water security in the Chindwin River Basin, and to support policy makers into identifying robust strategies of for drought management to cope with

various uncertainties in the future. Policy review on water scarcity and drought management in Myanmar was conducted to take an in-depth assessment of existing water scarcity and drought management approaches related to laws, policies, strategies and plans as well as relevant management institutions.

The key stakeholders in this study were:

- State agencies from both the central and the Sagaing regional government, such as the Directorate of Water Resources and Improving River System, Irrigation Department, Department of Meteorology and Hydrology, Water Resources Utilization Department and Forestry Department.
- Academic institutions, including Monywa University, Mandalay University, and Sagaing University of Education.
- Local communities in Hthamathi, Homalin, Kalewa, Kale, Kani, and Monywa.
- Local and international non-government organizations such as Myanmar Environment Institute and Asia Development Research Institute.



Photo 16.1 Stakeholder meeting to assess existing water scarcity and drought management approaches

Recommendations

- Using groundwater is recommended as an effective strategy to improve domestic and industrial water shortages and reduce the impacts of drought. Basin-wide assessments of the groundwater yields are required.
- Exploring low-cost methods to reduce losses (i.e. seepage, leakage and percolation losses) in the existing irrigation systems such as canal lining, pipe and sprinkler systems.
- Pumping groundwater has the potential to increase domestic water coverage in Myittha, Monywa, Yinmabin and Lower Monywa sub-basins by 25-62% and increase industrial water coverage for the Monywa Industrial estate by 54%.
- Promoting flood- and drought-tolerant crops can help cope with impacts of climate change and extreme events.
- Protecting the forest area of the upper Chindwin River and its tributaries from illegal mining and logging is crucial to maintain water regulation services such as attenuating floods and maintaining flows and groundwater level during dry periods.
- Conducting an in-depth analysis in the lower parts of the Chindwin River Basin can help address critical issues associated with drought and water scarcity. Other alternative strategies and measures such as increased water storages, and expansion of wetlands and flood retention should be further identified and investigated.
- Strengthening collaboration among different actors and agencies is important to integrate drought and water scarcity management into development plans.
- Mainstreaming gender in water resources management is needed to increase awareness and enhance gender equality in the decision-making processes in water and drought management.

Contact for more information

Dr. Thanapon Piman, Stockholm Environment Institute (SEI) Asia, Bangkok, Thailand
Email: thanapon.piman@sei.org.

The Sustainable Mekong Research Network (SUMERNET) programme was established in 2005 with the purpose of supporting sustainable development in the Mekong Region. SUMERNET aims to inform and influence sustainable development by supporting credible, collaborative research and regional assessment, stimulating independent discussions on key regional issues, and engaging with decisionmakers and stakeholders to foster more effective and sustainable policies and programmes.

The policy briefings compiled in this booklet are the fruit of this collaborative research work and engagement with policymakers and other stakeholders by the SUMERNET partners. The briefings have been developed with consideration of policy relevancy and based on the engagement of the SUMERNET project teams with local and national policymakers.

Further inquiries, please contact

SUMERNET Secretariat

Stockholm Environment Institute (SEI) Asia
15th Floor, Witthayakit Building
Chulalongkorn University 254, Chulalongkorn Soi 64
Phyathai Road Pathumwan
Bangkok 10330 Thailand

Phone: +66(0)2 251 4415-8

Fax: +66(0)2 251 4419

Email: secretariat@sumernet.org

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