

Mainstreaming Climate Change into Community Development Strategies and Plans: A Case Study in Thailand

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Preface

During the last three years, the Regional Climate Change Adaptation Knowledge Platform (AKP) has worked to build bridges between existing knowledge on adaptation to climate change and the governments, agencies and communities that need this knowledge to inform their adaptation to the impacts of climate change, while working for poverty reduction and environmental sustainability. AKP's work has been carried out following three key objectives:

1. Promoting dialogue and improving the exchange of knowledge, information and methods within and between countries on climate change adaptation, and linking existing and emerging networks and initiatives.
2. Generating new climate change adaptation knowledge, promoting understanding and providing guidance relevant to the development and implementation of national and regional climate change adaptation policy, plans and processes focused on reducing vulnerability and strengthening the resilience of the poor and women: the most vulnerable segments of society in most Asian countries.
3. Synthesizing existing and new climate change adaptation knowledge and facilitating its application in sustainable development and poverty reduction practices at the local, national and regional levels.

This publication is a result of these objectives. AKP supported thirteen countries in the Asian region to strengthen their capabilities to introduce effective adaptation measures. This includes undertaking activities at the national, sub-national and local levels to create enabling policy, regulatory, planning and budgeting environments. In each country, the platform facilitated adaptation action and strengthened adaptive capacity.

AKP is implemented by the Stockholm Environment Institute (SEI), AIT's Regional Resource Centre for Asia and the Pacific (AIT RRCAP), and the United Nations Environment Program Regional Office for Asia and the Pacific (UNEP ROAP) with funding provided by the Swedish Government through the Royal Swedish Embassy in Bangkok and the Swedish International Development Agency (Sida). The former Swedish Environmental Secretariat for Asia (SENSA) was also instrumental in setting up and supporting AKP.

Thailand is one of the thirteen countries supported by AKP. This publication highlights the insights gained from the implementation of activities in Thailand in partnership with SEA START and Khon Kaen University.

AKP's publications provide insights on adaptation in the region. A consolidated initiative, known as the Asia Pacific Adaptation Network (APAN), has been established and will be fully implemented starting 2013. Its ultimate objective is to assist the region in building the climate resilience of human systems, ecosystems and economies through the mobilization of knowledge and best practices, enhanced institutional capacity, informed decision-making processes, and facilitated access to finance and technologies.

The outcomes of AKP have been made possible by the active participation of partners and various stakeholders. SEI acknowledges the editorial assistance provided by Marion Davis and Pin Pravalprukskul. SEI also expresses heartfelt thanks to John Soussan, Lailai Li, Kai Kim Chiang, Lisa Schipper, Sabita Thapa, Tatirose Vijitpan, Muanpong Juntopas, Nantiya Tangwisutijit, Chanthay Sam, and Dusita Krawanchid for their contributions to AKP.

Abstract

Climate change adaptation planning in Thailand and elsewhere in Southeast Asia has focused primarily on minimizing the impact of future climate change. The resulting preoccupation with the uncertainty of climate change predictions has hindered the implementation of adaptation policies. A paradigm shift toward mainstreaming climate change into development planning, and away from addressing adaptation separately from development, can reduce the inaction of policy makers. By taking into consideration the range of possible risks and vulnerabilities that may arise from future climate and socioeconomic change scenarios, mainstreaming can reduce the reliance on certainty in predictions when developing plans for a community. The subsequent increase in a community's resilience in the face of change is likely to lead to development that is more sustainable. A case study of the Lao-oi district in Thailand illustrates such a paradigm shift in planning, and proposes a framework for mainstreaming climate change into community development plans.

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Introduction

: Broadening the Context of Climate Change Adaptation

In recent years, adaptation to climate change has been brought to the attention of policy planners in Thailand and throughout Southeast Asia due to the region's high exposure to climate risks (ADB, 2009; World Bank, ADB and JICA, 2010). The Thai Ministry of National Resources and Environment launched the National Climate Change Strategy 2008-2012 with an objective to "build up preparedness for adaptation and coping with climate variability and change in extreme weather events". One of the six strategies is "to build adaptive capacity to cope with climate change and to reduce vulnerability of various sectors" (Office of Natural Resources and Environmental Policy and Planning, 2008). Adaptation is featured in the National Master Plan on Climate Change 2011-2050, which is still being finalized (Office of Natural Resources and Environmental Policy and Planning, 2011), the 11th National Economic and Social Development Plan for 2012-2016 (NSEDDB, 2011), and the draft of the National Master Plan to Cope with Climate Change, Energy Price Fluctuation and World Food Crisis (Chula Unisearch, 2010).

In most cases, plans for adaptation have focused on coping with or minimizing the impact of future climate change. However, available long-term climate projections may not be detailed or reliable enough to support an action plan. The uncertainty of climate projections and the lack of sector- or region-specific information have led to a lack of progress on climate change adaptation planning and implementation. This could be partly because planners in Thailand, and perhaps across Southeast Asia, are unfamiliar with scenario-based planning, which addresses uncertainty by looking at multiple possibilities and can produce more robust assessments.

Additionally, the difference between the short time scale of planning and the long time frame of climate change has distanced scientists, policy-makers and local stakeholders from one another. Policy planners in Southeast Asia work within a time frame much shorter than one that would display the effects of climate change. This is particularly challenging given the common preference in the country for engineering solutions to climate risks, which leads planners to seek certainty to justify investments. Short-term planning can also overlook long-term socioeconomic trends that could change risk and vulnerability patterns in the long term. Overlooking socioeconomic change may result in a mismatch between adaptation measures and community needs.

There is therefore a need to take a broader approach to adaptation that goes beyond efforts to address future climate change impacts. Adaptation should consider the long-term consequences of development, and how they might change a community's or sector's risk profile. Adaptation could thus also mean establishing a mechanism or strategy to manage, spread and/or share risk across systems, sectors, areas, and even time frames. Adaptation strategies should consider approaches to development that increase resilience to climate risks and do not create new vulnerabilities under plausible climate change scenarios. In this context, climate change becomes a key factor in sustainable development planning. Mainstreaming adaptation into development planning is therefore a priority – and more effective than addressing climate risks separately.

This paper discusses the mainstreaming approach as an alternative to the conventional approach of treating adaptation as a separate issue with a narrow focus on projected climate change impacts. Instead, scenarios of future climate change are used to support decision-making concerning community strategy and development plans. A case study involving a local community development plan is used to demonstrate how adaptation planning can be an integral part of development planning. In this case, considering climate change helped planners alter their development strategy to ensure its sustainability under future climate change as well as socioeconomic change. This approach also requires less certainty with regard to projections of climate impacts in a specific region or sector.



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A Paradigm Shift in Adaptation Planning

The Intergovernmental Panel on Climate Change's Fourth Assessment Report (IPCC, 2007) presents climate change information in a specific sequence, starting with the scientific basis (Working Group I), followed by impacts, adaptation issues and vulnerability (Working Group II), and so on. This approach has shaped the mindsets of policy planners in Thailand and elsewhere in Southeast Asia, who tend to address adaptation in this order (see Figure 1, upper diagram).

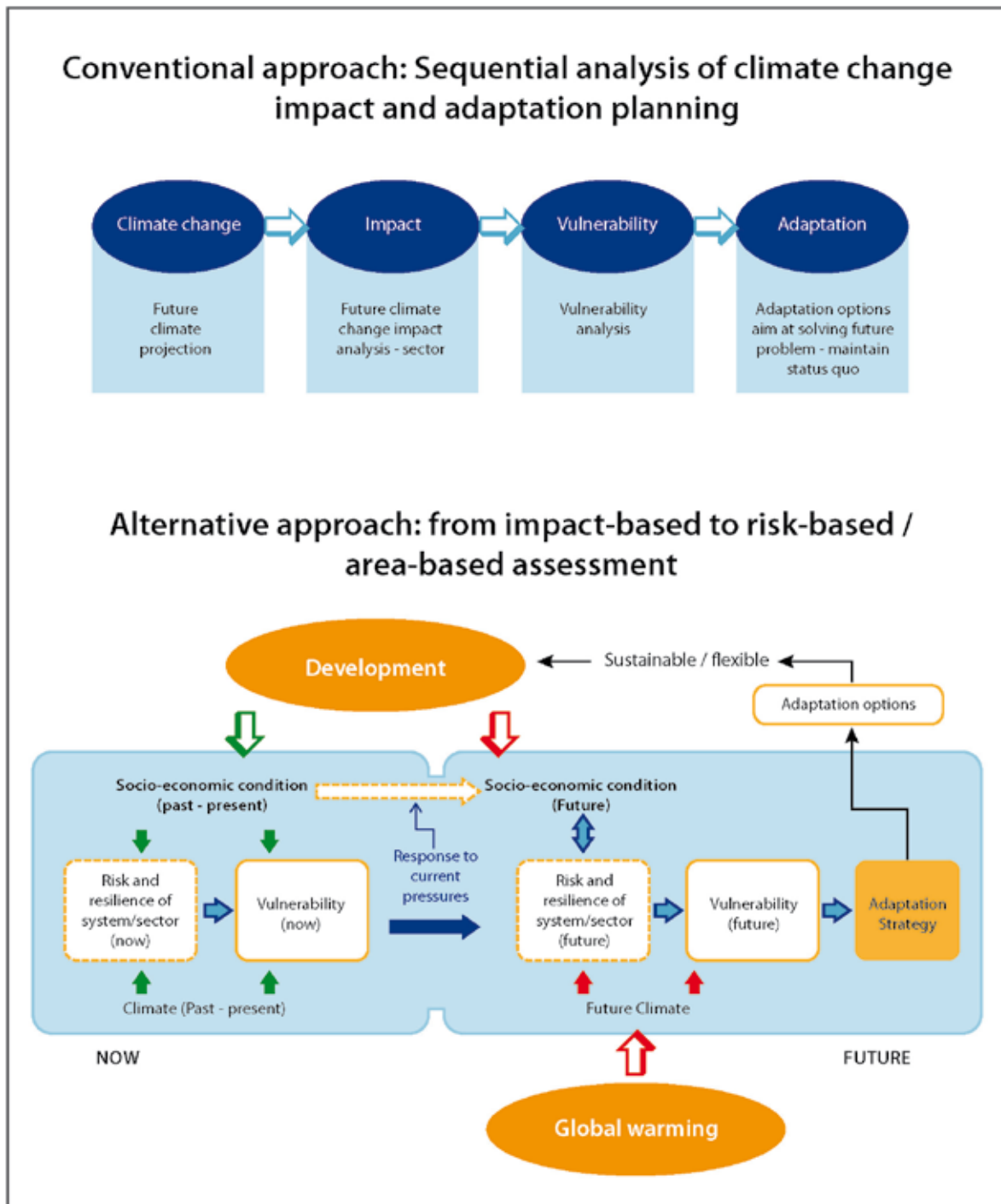
- (1) Future climate projections
- (2) Analysis of the impact of future climate change on systems/sectors
- (3) Analysis of risks and vulnerability of systems/sectors to impact of climate change
- (4) Adaptation plans to address the problems identified

However, when one begins climate change adaptation by focusing on the future impact of climate change based on long-term climate projections, there is inherent uncertainty in the reliability and accuracy of the projections. Using such projections as the basis for planning may therefore lead to dilemmas in selecting proper measures and implementing climate change adaptation on the ground. Policy planners should adopt a paradigm shift in the planning process away from "predict-then-act" and toward the use of multiple scenarios to ensure the robustness of adaptation measures. But such a diversity of future climate scenarios is not yet available in the Southeast Asian region.

Moreover, in most efforts to establish climate change adaptation plans in Southeast Asia, the conventional, sequential approach fails to emphasize and often overlooks socioeconomic dynamics, which are mostly driven by other development plans such as poverty alleviation. Yet the consideration of socioeconomic factors is crucial in developing nations, where private and public sector efforts to push the economy forward can lead to larger and more rapid changes in society than climate change impacts might cause alone. Those changes, in turn, can completely change a society's risk profile to climate threats and affect the climate vulnerability of a community, system and sector. Given the much longer time scale of climate change when compared with development, it would be unwise to base climate change adaptation planning on the present-day social and economic context when Southeast Asian countries are undergoing rapid rates of development. Neglecting to integrate climate change adaptation and development plans will result in adaptation measures that do not suit the future socioeconomic context, and could lead to development plans that do not achieve their long-term goals under future climate patterns. Mainstreaming climate change into development plans can help ensure that development does not increase vulnerability or close off future adaptation options.

Furthermore, adaptation can be done at national, provincial, community and watershed levels. Nationally, adaptation has broad aims, while at the local level it focuses on a specific community or landscape, and on local concerns and preferences in responding to climate threats. Although some communities may face the same climate threat, their risks and responses may vary considerably. Moreover, a community's ways of coping with risks may change over time, as socioeconomic conditions change with development. Adaptation measures can reduce vulnerability not only by reducing exposure to climate risks, but also by reducing sensitivity or by increasing coping capacity. The latter means that development can directly change vulnerability over time. However, addressing climate change over a long time scale is often beyond the awareness and focus of community planning. This calls for a paradigm shift in adaptation and development planning processes, as illustrated in Figure 1.

Figure 1: Integrated approach in climate change adaptation planning by mainstreaming climate change into development planning, with linkages between present and future.



This suggests an alternative approach to climate change adaptation planning that focuses not on future climate risks as the basis of planning, but on the sustainability of efforts to address current climate threats and development needs – and their viability in a changing climate. This would likely correspond better with communities' own priorities and be more feasible, given how little information is available on future climate projections for Thailand and Southeast Asia. In this approach, a broad view of climate change is used to inform the development planning process, using the climate change information that is available to show the future conditions for which a community, system or sector should account in the development plan. Rather than trying to address a specific set of climate threats, planners would assess the various risks and vulnerabilities that a community might face due to both climate change and socioeconomic pressures. They would also assess the sustainability of the plan, which aims to address current climate risks, in the time frame of climate change. This would help address one of the biggest challenges in the existing approach to climate change adaptation planning: the difficulty in justifying investments in specific adaptation measures due to uncertainties about future climate change.



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Case Study : Lao-oi District, Thailand

A case study in Lao-oi district demonstrates how climate change could be mainstreamed into a local community development plan.¹ The development strategy aims to (1) improve livelihoods and/or manage climate risk in the present time, (2) be sustainable in the long term, and (3) be more robust in the face of future change, especially climate change. The case study focuses on how adaptation was incorporated into the plan to address risks and vulnerabilities related to the main source of livelihoods in the community, rice farming.

In this case, the paradigm shift in adaptation planning occurs at the Sub-district Administration Organization² level. However, the involvement of other stakeholders is required in the actual implementation of the plans.

Lao-oi district is located in Kalasin province in northeastern Thailand. The district, administered by the Lao-oi Sub-district Organization (SAO), consists of 12 villages with approximately 1,000 households and a total population of 4,700 people. The community's main livelihood is rain-fed, wet-season rice farming, particularly of a high-priced variety with a high market demand called KDML 105, commonly known as jasmine rice. This variety is photosensitive and matures for harvesting slightly after the rainy season. Lao-oi district is located in the flood-prone lowland area between the Lum-pao and Chi rivers. The major climate threat to local farms is flooding, which can occur for two to three weeks during the late rainy season of October-November. According to the Lao-oi SAO, Lao-oi district has experienced flooding in eight of the past ten years. On average, flooding has destroyed approximately 40% of the total rice production area of 3,200 ha over a decade³ (see Figures 2, 3 and 4).

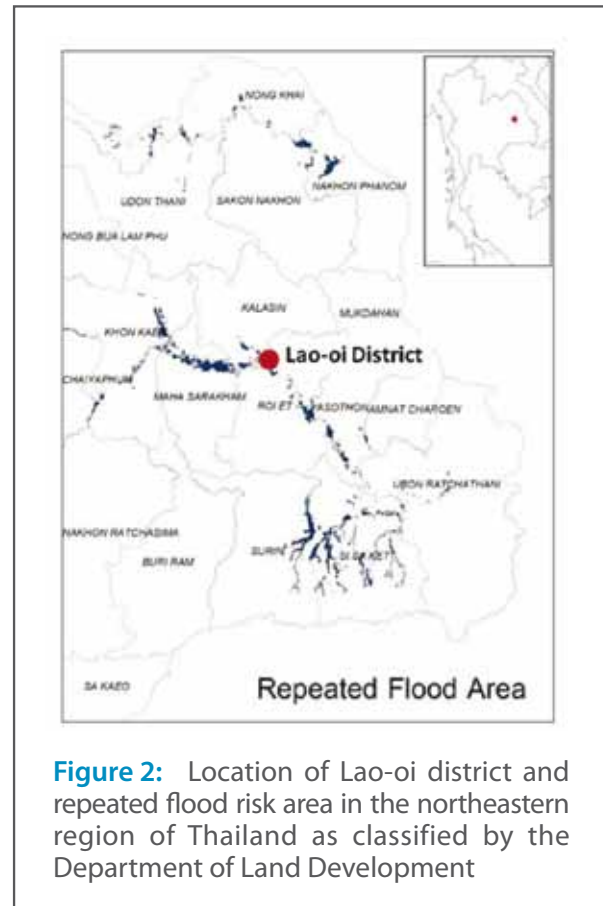


Figure 2: Location of Lao-oi district and repeated flood risk area in the northeastern region of Thailand as classified by the Department of Land Development

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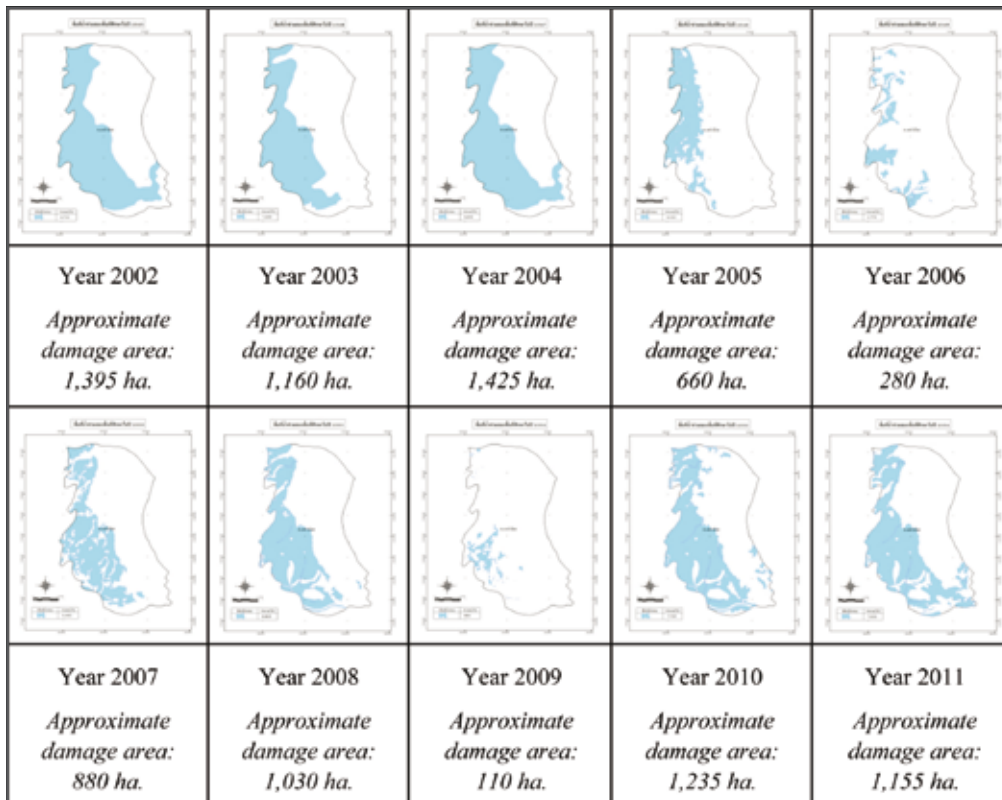


¹ This section summarizes Kerdsuk et al. (2011) a study conducted in 2008-2011 as part of the Thailand Research Fund's climate change research programme.

² The Sub-district Administration Organization (SAO) is a local governmental unit in Thailand. One SAO typically consist of 10 to 15 villages.

³ Interview with Ma Phonesima, president of the Lao-oi Sub-district Administration Organization, March 2009.

Figure 3: Agricultural area damaged in Lao-oi district over the past 10 years. The shaded areas represent areas damaged by floods



Source : Kalasin Provincial Database and Data Center for Flood Relief www.ThaiFlood.com

Figure 4: Typical flood situation in Lao-oi district. The lower right picture shows the watermark indicating flood level during flood season



Source : Lao-oi Sub-district Administration Organization

Currently, Lao-oi district's main livelihood is clearly vulnerable to floods prior to harvest. Table 1 summarizes the vulnerability profile, which considers exposure, sensitivity and coping capacity of the community to climate threats (UNDP, 2004).

Table 1: Vulnerability profile of rice farming in Lao-oi district for wet-season rice production

Climate risk – rice farming vulnerability		
Exposure	Sensitivity	Coping capacity
<p>Flooding before harvest, 7-8 times per decade. High exposure to flooding; the community sits at the junction of two rivers and receives water from two sub-catchments: the upper Chi river and a tributary of the Chi River, Lum Pao River.</p>	<p>Rice crop has very low flood tolerance: Flooding over a 10-day period may result in total loss. Floods have destroyed approximately 40% of the total production area over the past decade.</p>	<p>Limited: Dry-season rice farming is only possible in a small strip of land by the riverside, where there is a network of pipes for irrigation. The community also relies on government compensation and seasonal migrant labour outside its boundaries.</p>

Over the years, the SAO and the community have discussed how to reduce the risk of flooding.⁴ A dyke system along the riverbank was proposed to protect rice paddies and the village. The community, however, preferred to switch from growing vulnerable wet-season rice to dry-season rice production.⁵ In response, the SAO proposed expanding the existing irrigation system, which pumps water from the river through underground pipes to the rice fields (see Figure 5). A small area along the riverbank, approximately 25-30% of the rice paddy area of the district, is currently irrigated; the community development plan proposes irrigation piping to all rice paddy areas in the sub-district.

Figure 5: Dry-season rice farming is the development plan's key strategy. The irrigation system pumps from the river (the top right image shows a pump station) through underground pipes to the rice paddy (bottom left & right).



⁴ Interview with Ma Phonesima, March 2009.

⁵ Dry-season rice cultivation usually involves a 120-day non-photosensitive rice variety. The crop calendar typically starts in December or January, with harvests in March or April.

If fully implemented, the strategy of switching from rain-fed wet-season rice farming to irrigated dry-season rice farming will completely change the community’s risk and vulnerability profile. Rice farming in Lao-oi district will no longer be exposed to flooding, but instead will be exposed to heat stress and potential water shortages as there is little or no rain in the summer.

Table 2: Vulnerability profile of rice farming in Lao-oi district in the future context of dry season rice production

Climate risk – farming vulnerability		
Exposure	Sensitivity	Coping capacity
Drought/heat, as crop calendar moves to dry season and summer.	Rice has low tolerance to drought and heat; the extent of its effect is not recorded.	Limited: single water source.



Photo Credit: creativecommons | vtveen

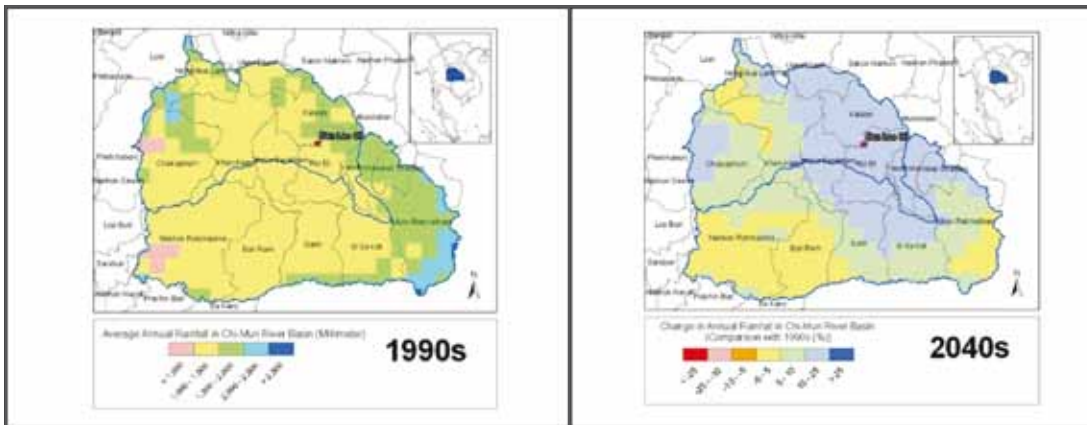
This is where mainstreaming adaptation into development planning comes in. Global climate change projections indicate a likely increase in heavy precipitation events and intense tropical storms (IPCC, 2007). Only one regional climate change scenario was available at the time of the study,⁶ which indicates a trend of higher precipitation in northeastern Thailand (Figure 4). This data implies that flood risks could be more severe in the future; therefore, switching from wet-season to dry-season rice farming seems appropriate.

Had the conventional approach to adaptation been adopted instead, planners are likely to have started by identifying the projected impacts of climate change, and then to have worked to address each of them. They probably would have noted the projected increased severity of flood risks, and would have tried to develop strategies to protect vulnerable wet-season rice farmers, possibly in the form of flood protection. They may have ultimately recommended a shift to dry-season rice as an adaptive strategy, but they could also have proposed measures specific to wet-season rice. However, the community is planning to shift to dry-season rice as a strategic respond to current flood risks; therefore, flood protection to support wet-season rice farmers will be out of context in

the future. By integrating adaptation and development planning, which in this case is the development of small scale irrigation systems, the community was better able to leverage their resources to support the shift to dry-season rice. The key challenge with the integrated approach is planning for irrigation systems that support changes in agricultural practices and are more robust to future climate change.

⁶ The climate change scenario is based on future climate projections from the global circulation model ECHAM4, downscaled using the PRECIS regional climate model. The downscaling operation for high-resolution future climate projection for Southeast Asia region was conducted as part of a research project with financial support from the Asia-Pacific Network for Global Change Research and Thailand Research Fund and with technical support from the Met Office Hadley Center, UK (2007-2008). ECHAM4 is a global circulation model, and is one of the models used in the IPCC Fourth Assessment Report. It was developed by the Max-Planck-Institute for Meteorology (http://www.ipcc-data.org/is92/echam4_info.html). PRECIS is regional climate model developed by The Met Office Hadley Center, UK.

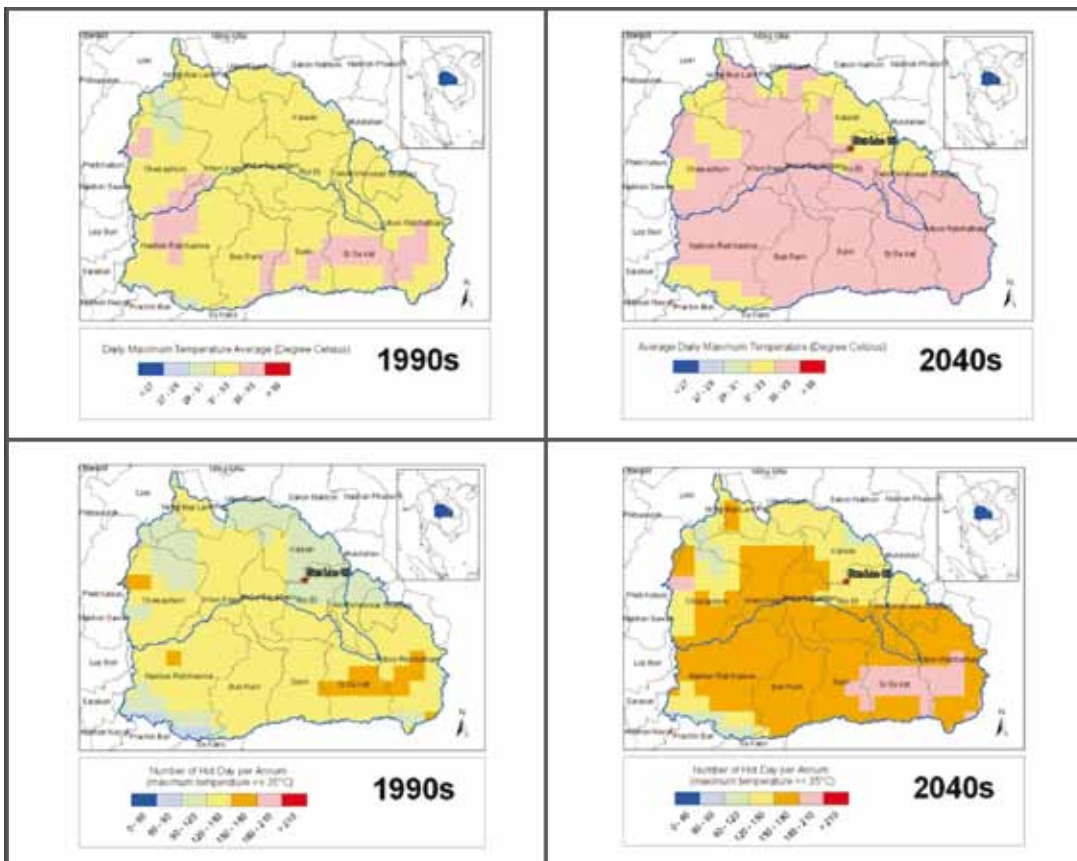
Figure 6: Future climate projections showing higher annual precipitation throughout northeastern Thailand.



Source: Southeast Asia START Regional Center

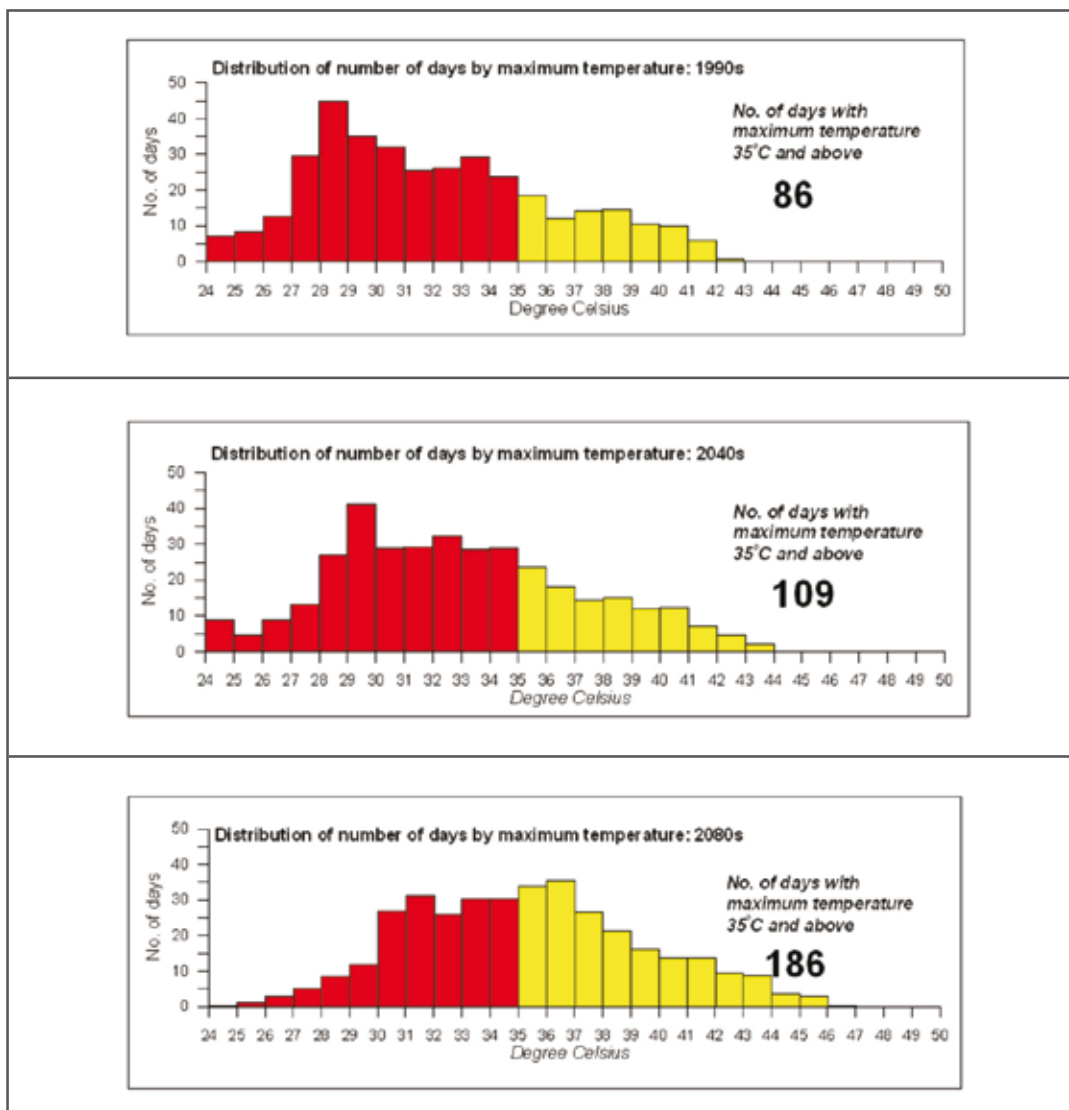
In addition to showing that a shift to dry-season rice would be appropriate in coping with frequent flood risks, the integrated approach also highlights climate-related vulnerabilities of the proposed action plan. As noted, the proposal is to invest in pump stations to draw water from the nearby river to the rice paddy through a network of underground pipes, which also require additional investments. Global climate change projections indicate a rise in temperatures and more frequent hot days (IPCC, 2007). The regional climate change scenario also indicates that, in the future, northeastern Thailand will experience longer and warmer summers (Figures 7 and 8). This could mean reduced river flow and run-off in the summertime, whilst crop water demand is increased to compensate for higher evapotranspiration rates. Moreover, there may be higher demand for water from the river to support other sectors and areas, and for river ecosystem services. Therefore, a development plan based on expanding irrigation through pumping water directly from the river may not be sustainable.

Figure 7: Average temperature and hot day projections for northeastern Thailand.



Source: Southeast Asia START Regional Center

Figure 8: Past and projected distribution of days by maximum temperature in Lao-oi district.



Source: Southeast Asia START Regional Center

Given the climate projections, Lao-oi district may want to find alternative ways to expand irrigation that is less vulnerable to future climate change. For example, there is a natural reservoir north of the district, which over the years has been filled with sediment during the flood season and is now very shallow. Increasing the water collection capacity of the reservoir to harvest water during the flood season – which is already severe and could become more so in the future – could support irrigated farming in the dry season and be a more robust option in light of climate change.

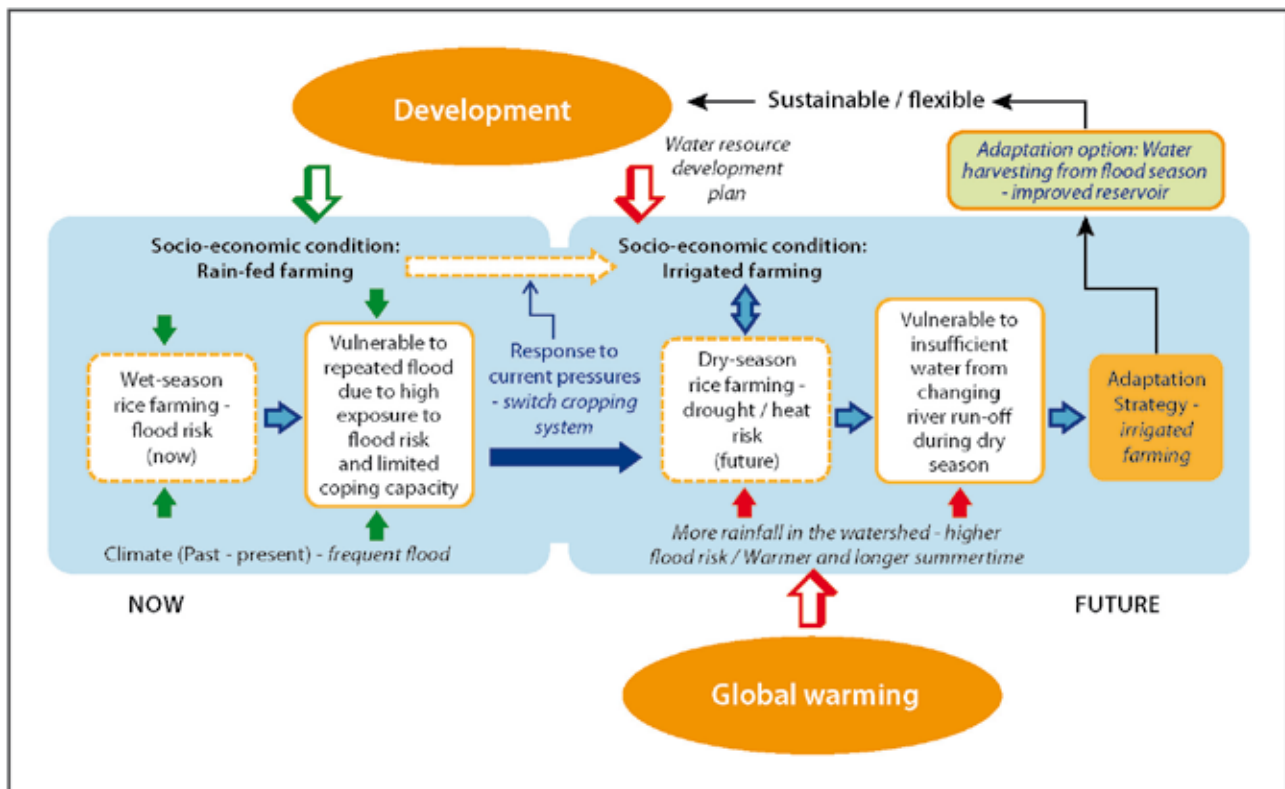
The process of evaluating water-source options to support dry-season irrigation is a form of adaptation planning. Altering the development plan is also adaptation; it addresses not only the resilience of the community, but also the robustness of the development plan itself. Instead of focusing on a “hypothetical problem of the future”, the alternative approach to adaptation planning takes a current problem and seeks a solution that should be sustainable in the future in which climate is changing.

It should be noted that the community in this case study does not anticipate climate change, nor does it prioritize long-term sustainability of the development plan. The community focused its development planning on simplicity of action and challenges of implementation, and favors the river pump/pipe irrigation over improving the natural reservoir. The river pump/irrigation is less complicated technically and can be implemented over multiple phases, thus making it easier to secure financing. In this case study, an evident gap in communication leads to uninformed decision-making and a failure to address the long-term implications of climate change.

Integrating Climate Change into the Development Planning Process

The case study of Lao-oi can be input into the alternative framework for adaptation planning, introduced earlier in Figure 1. Figure 9 demonstrates this below.

Figure 9: Mainstreaming climate change into Lao-oi district development plan.



The diagram above explains the process of mainstreaming of climate change into community-level development planning. However, mainstreaming needs to extend beyond that level. The case study in Lao-oi shows how climate change should be an integral part of water resource development plans, which is beyond the community planning process. Community development plans should therefore be supported by the operation of government agencies, such as the provincial administration organisations, the Department of Water Resources or the Royal Irrigation Department, which mobilize resources when implementation is beyond the capacity of the community. Climate change needs to be mainstreamed into national operations as well.

The development of a small-scale irrigation system, as discussed in this case study, can be initiated by the SAO and escalated to either the Royal Irrigation Department or the Department of Water Resources, whose operations somewhat overlap.⁷ Figures 10 and 11 show how climate change can be mainstreamed into the operation planning of both agencies. Initiation of the water resource development plan by the local administrative unit with water user groups in the community would help planners capture important socioeconomic trends on the ground that could shape future water demand, resulting in a more realistic and effective plan.

⁷ Partly compiled from interviews with the following people in Khon Kaen Province, Thailand: Prasit Warnset, Director of Cooperation and Management – Chi River Basin, Department of Water Resources Regional Office - Region 4; Pranom Suwanarm, Director of Technical Section, Department of Water Resources Regional Office - Region 4; Somchai Taengthai, Director of Engineering Division, Office of Regional Irrigation 6; Nirun Naktubtim, director, Office of Regional Irrigation 6 and Pisut Salapij, Director, Land Development Regional Office – Region 5. Manit Chaipanya, policy and planning specialist, Kalasin Policy and Planning Group, Kalasin Governor's Office, Kalasin Province, was also interviewed. All interviews occurred in February 2012.

Figure 10: Water resource development planning process via the Royal Irrigation Department, which is initiated by the local community with climate change factored in at different planning stages.

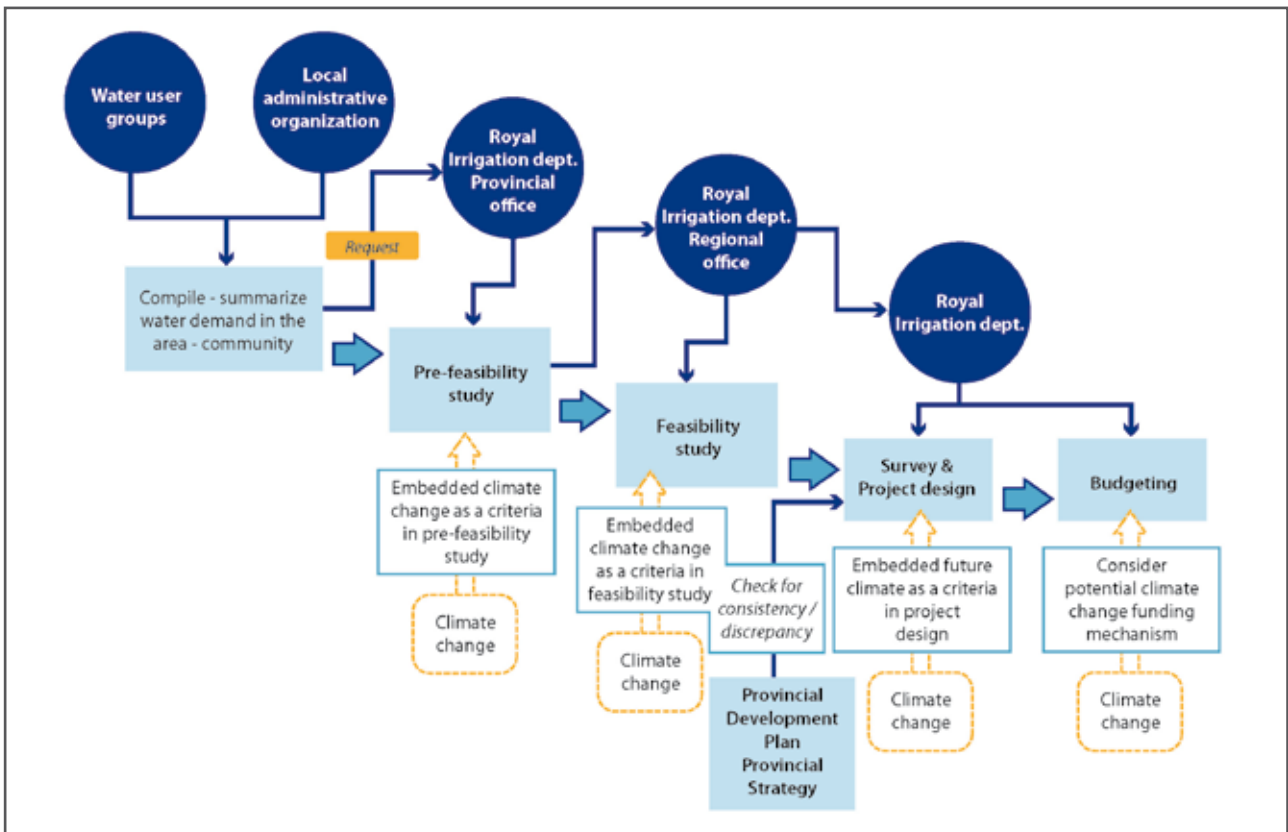
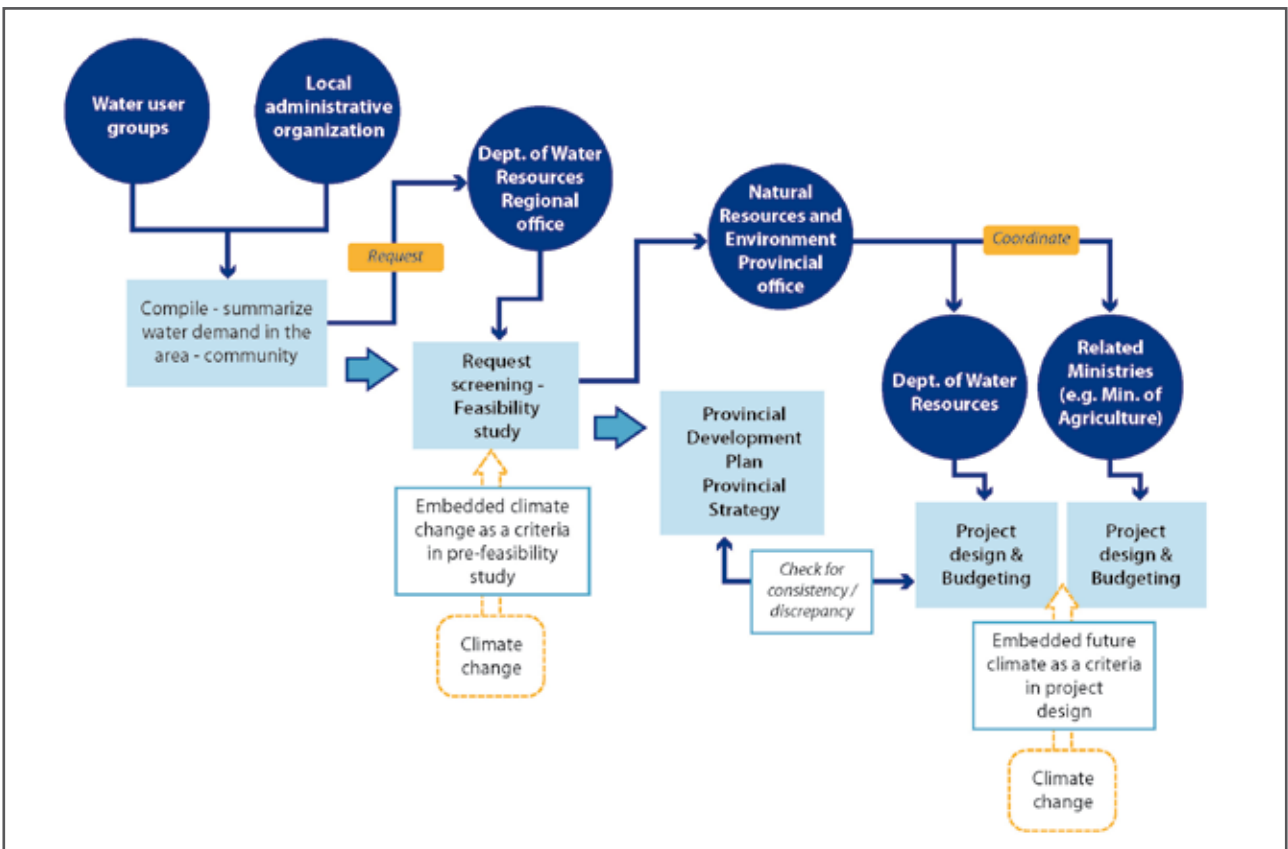


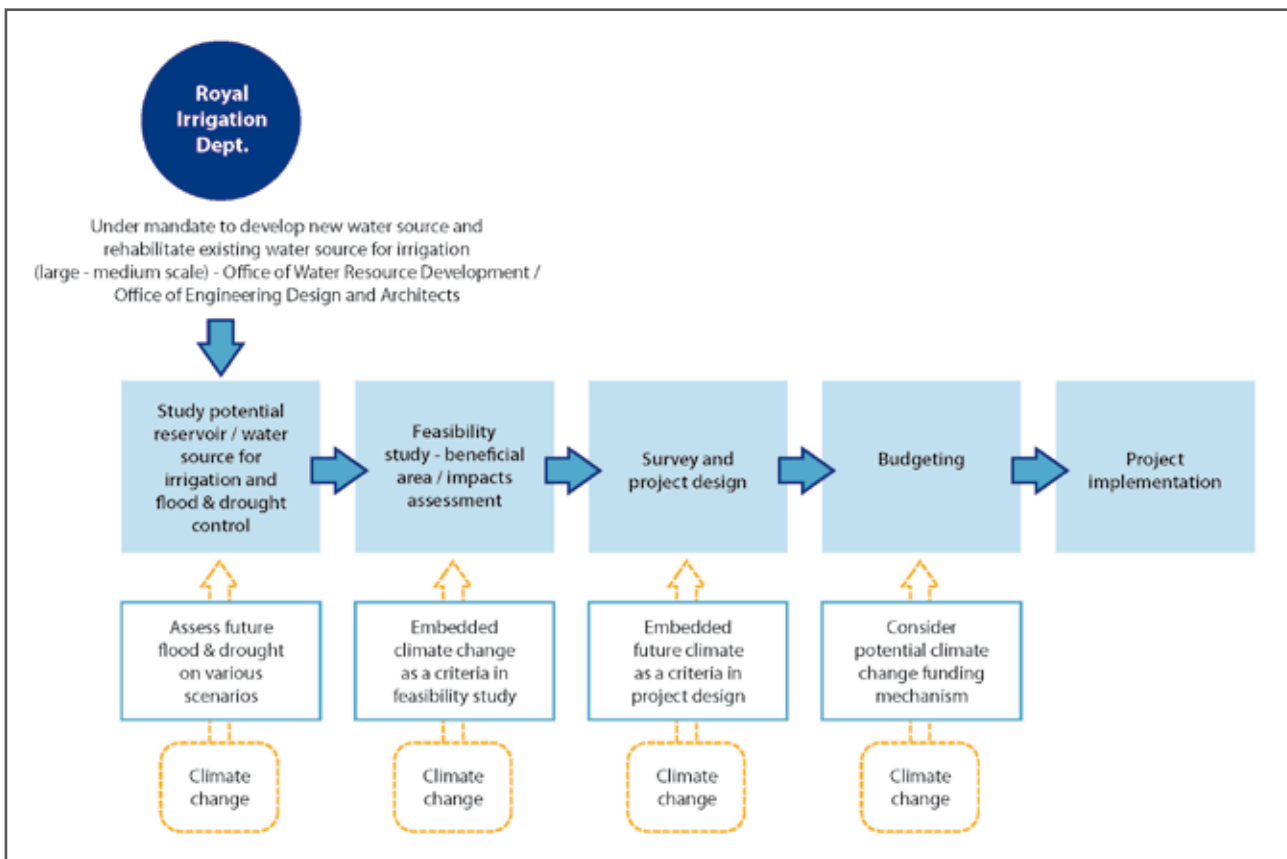
Figure 11: Water resource development planning process via the Department of Water Resources, which is initiated by the local community with climate change factored in at different planning stages.



In the bottom-up approach, the community needs to envisage its future and the sustainability of its development plan in the timescale of climate change: a timescale far greater than a community's usual focus. Currently, the long-term sustainability of a development plan is always overshadowed by the ease of implementation and financing. Moreover, the knowledge transfer mechanism needs to be established so that communities have access to influential climate-change research whilst they are planning.

Water-resource planning can also be initiated from the top down – a planning process common in Thailand – or by a government agency whose mandate is to develop water resources or irrigation systems. Figure 12 shows a simplified representation of the planning process of the Royal Irrigation Department, where climate change could, and should, be mainstreamed throughout the planning process.

Figure 12: Royal Irrigation Department's water resource development planning process, with climate change factored in at different planning stages.



As the implementation of water-resource development planning extends beyond the community, regardless of whether the plan is initiated bottom-up or top-down, climate change will have to be factored into various steps of the planning process of the water resource development agencies. These agencies need the ability to factor climate change into their planning process. Feasibility and technical assessments of water resource development should consider future climate scenarios rather than use investment analysis alone. These agencies need to add capacity on climate change knowledge in order to support planning at each stage. Such capacity can be in the form of an in-house enhancement or external institutional support (this would require establishing a systematic, structured knowledge transfer mechanism). This is still a gap in policy planning if climate change is to be mainstreamed into various development plans as a cross-cutting issue.



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At the national level in Thailand, climate change comes under the jurisdiction of the Office of Natural Resources and Environment Policy and Planning (ONEP) in the Ministry of Natural Resources and Environment (MONRE). MONRE was responsible for launching Thailand's first climate change policy plan, 'The Thailand National Climate Change Strategy 2008-2012', which was followed by the 'National Master Plan on Climate Change 2011-2050'. This master plan clearly stated that the short-term focus would be project integration; the medium-term focus programme integration; and the long term focus policy integration. However, the current version of the National Master Plan on Climate Change (May 2012)⁸ does not clearly address how it may support planning toward sustainable development, nor does it propose a framework for climate change integration or policy on social-economic and environmental development. Perhaps this case study could provide an initial framework to consider, and the National Master Plan on Climate Change could support community development strategy and sectoral planning with an institutional structure to provide climate change knowledge.

The Thailand National Climate Change Strategy 2008-2012 has the following main objectives:

- To develop knowledge on climate change at the national and regional scales to minimize impacts and plan for responses and adaptation in the long-term;
- To build up preparedness for adaptation and coping with climate variability and extreme climate change events;
- Support reduction in greenhouse gas (GHG) emissions while maintaining sustainable development;
- Cooperate with other countries that will support national actions and increase national role in the international climate change community.

The Master Plan on Climate Change 2011-2050 (ONEP, 2011) (draft) has main objectives as follows:

- To guide development toward becoming a sustainable low carbon society in Thai society context
- To support and connect policy and planning of both government and others toward sustainable development
- To define framework goal direction and mechanism in integrating climate change with social-economic and environmental development

⁸ Still in draft form as of May 2012.

Conclusion: Solving the Dilemma in Adaptation Planning

Thailand and other Southeast Asian countries have difficulty planning and implementing climate change adaptation plans under the conventional approach due to doubts about the accuracy of climate change impact assessments. Mainstreaming climate change into development plans and addressing adaptation in a broader context by aiming for long-term robustness and sustainability of the development plan, as well as community resilience both now and in the future, would lead to more realistic and justifiable plans for communities, as adaptation planning also addresses current problems and integrates socioeconomic dynamics.

This broadening of the adaptation context is expected to be seen in the near future. Several agencies are now calling for integration of adaptation into existing/ongoing national development plans. For example, a United Nations Framework Convention on Climate Change (UNFCCC) expert group is working on process, modalities and guidelines for formulating and implementing National Adaptation Plans (NAPs) that combine development and climate change for least developed countries (LDCs) and developing countries.⁹ In addition, climate change was widely discussed at the United Nations Conference on Sustainable Development (Rio+20) as an integral part of sustainable development planning. It is clear there is a trend towards more integrated approaches to climate and development.

In conclusion, policy planners need to recognize that adaptation is an integral part of development at multiple levels: community, regional and national. Adaptation need not always be planned by central government agencies and then implemented through a top-down approach; adaptation planning can also be effectively mainstreamed into the community development planning process. A top-down adaptation approach that frames sectoral strategies and plans, and a bottom-up approach that builds community resilience, can strongly supplement each other. The national plan can focus on strategic directions for the country as a whole, or by sector; the community plan can focus on specific actions that address current risk or development needs, factoring in future climate change. Such integration within the planning process can help ensure that development plans with long-term effects will be sustained under changing climate conditions, and that investments will not be wasted. National policy makers should create institutions to develop and disseminate sufficient knowledge about climate change, to support community decision-making and government agencies' operational planning. Mainstreaming climate change into development planning is possible, but needs to be facilitated.

⁹ See UNFCCC (2011). For more information about NAPs, see http://unfccc.int/adaptation/cancun_adaptation_framework/national_adaptation_plans/items/6057.php.

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Annex 1: Thailand National Climate Change Strategy 2008-2012 (ONEP 2008)

- Strategy 1: Support research and development to increase understanding about climate change.
 - Main focus:
 - To develop multiple climate scenarios for impact assessment
 - To establish portal of scientific knowledge on climate change for policy planning and public sector
 - To develop adaptation framework to reduce risk from climate impact
 - To apply R&D results and technology as well as indigenous knowledge into “Best practice” as demonstration to relevant sectors
- Strategy 2: Build adaptive capacity to cope with climate change and to reduce vulnerability of various sectors
 - Main focus: To improve preparedness and reduce vulnerability to climate variability and extreme weather events and to develop mechanism for integrated natural resources planning. This strategy addresses some key issues as follows:
 - Improve weather forecasting capacity and early warning system
 - Develop action plan for disaster at community level, especially the risk zone
 - Improve land-use planning
 - Improve crop cultivars – more resilience to climate impact
 - Improve healthcare planning based on trends of future epidemics
 - Improve infrastructure in high-risk areas
 - Engage the private sector – use insurance as a mechanism for coping with climate impacts
- Strategy 3: Support reduction of GHG emissions and increase GHG sinks on the basis of sustainable development.
 - Main focus: To reduce total GHG emissions/to increase carbon sink/higher efficiency in energy consumption/higher proportion of renewable energy.
 - As far as the GHG emissions reduction is concerns, this strategy aims at GHG emissions reduction in five sectors
 - Energy – demand side management
 - Industry – clean technology/CDM
 - Agriculture – good agricultural practice
 - Land-use change – conserve/preserve/recover forest area
 - Waste – better waste management scheme/technology
- Strategy 4: Raise awareness and participation in climate change agenda
 - Main focus and objectives:
 - To have framework for education/training/awareness building on climate change issues
 - Improve access to information on climate change
 - Encourage participation of community, and collaboration between public and private sector
- Strategy 5: Build capacity of personnel and institutions engaging in climate change related actions
 - Main focus and objectives:
 - Build up knowledge and streamline the climate change issues into planning processes of relevant agencies
 - Build up roster of experts on climate change issues
- Strategy 6: Develop and engage in regional and international activities that will support national actions and facilitate cooperation on climate change problems and issues.
 - Main focus and objectives:
 - To establish cooperation/collaboration with other countries on climate change issues, especially the trans-boundary impact of climate change
 - Aims for collective action to cope with climate change impact

Annex 2: National Master Plan on Climate Change 2011-2050 (Draft) (ONEP 2011)

The master plan contains strategies for both mitigation and adaptation. As far as the adaptation on climate change is concerned, it addresses the following strategies:

- To create, improve and enhance knowledge on vulnerability and the impacts of climate change to support adaptation by utilizing existing tools;
- Protect food production areas, fresh water bodies and key energy resources in Thailand through implementing land use according to land-use planning and community-based disaster management with an emphasis on avoidance-preparedness rather than corrective action with full community participation
- Support ecosystem conservation via appropriate economic measures
- Restore deteriorated/degraded zones into food production areas and carbon sequestration areas through the private sector and indigenous communities;
- Establish Thailand Adaptation Fund to support adaptation activity with a budget from government and other sources
- Establish a demonstration project

The master plan lists policy recommendations for seven key sectors:

- Urban with focus on key cities
 - Strictly enforcing town planning regulations
 - Urbanization process aimed at long term policy options with goals of sustainable growth, low carbon and low risk
 - Planning for green infrastructure and green logistics along with urban mapping with appropriate energy management, flood and drought plans
 - Use economic instruments to manage building in the city
 - Issue regulations on disaster management of large communities
 - Transfer authority in disaster management to local administration organizations
 - Establish a central agency to coordinate local and national operations on early disaster warning as well as budgeting and technical issues
- Coastal zone and wetland
 - Develop integrated land-use plan for coastal zones
 - Enforce law on land and fisheries and enhance the role of communities in coastal protection tasks
 - Improve law and regulation to support community participation
 - Enhance the capacity of coastal ecosystems to maintain existing capacity in supporting food security
 - Support rehabilitation of mangrove and coastal forests with community participation
 - Improve monitoring and early warning systems
- Inland freshwater ecosystem
 - Conduct risk assessment in terms of quantity and quality to identify risk hot spots
 - Implement integrated water resource management through local and community participation
 - Improve water pricing schemes
 - Increase surface water reservation using public land and establish social water resources
 - Develop conservation plans for discharge areas
 - Support on premises water management
 - Monitor quality and quantity of both surface and underground water

- Public health
 - Support research and improve coping capacity of the public health sector to accommodate future risk
 - Disseminate study results on emerging diseases and vector-borne diseases
 - Prepare for post-disaster disease
 - Healthcare preparedness during crisis
 - Improve efficiency and effectiveness on access to healthcare services
 - Enhance capacity of healthcare networks, especially with regard to risks to health from climate change
 - Improve local healthcare alert systems and emergency response
- Agriculture and rural sector
 - Assess the impact and risk of climate change on various agricultural sectors
 - Assess the role of agriculture in food and energy production that corresponds to proper land utilization
 - Study and establish a compensation system for agriculture on ecosystem service conservation
 - Promote organic farming
 - Invest in green infrastructure in the agricultural sector
 - Study low water consumption agricultural systems
 - Establish funds for adaptation in the agricultural sector
 - Expand crop insurance systems and develop a market mechanism for climate risk management with participation from the private sector
 - Conduct research and development on sustainable upland agricultural systems
 - Establish food security for upland communities in fragile ecosystems
- Terrestrial and forest ecosystem
 - Assess risk zones from inappropriate land-use and natural disaster as well as climate change
 - Rehabilitate forestry ecosystems
 - Introduce tax incentive measures for land and forest conservation
 - Increase usage of economic instruments to support conservation activity
 - Establish pilot projects on community rights and land-use
 - Improve law and regulation to allow more participation from local administration organization and communities in conservation and land utilization
 - Support community learning processes on natural resource management for adaptation to climate change
- Public infrastructure
 - Conduct risk assessment for every infrastructure system
 - Define and design guidelines that lead to reducing climate change risk in line with the greenhouse gas reduction plan
 - Promote green infrastructure
 - Implement cost recovery for road and other infrastructure to be a source of funds for public transportation development
 - Develop conservation and reforestation in catchment and discharge areas to improve water quality in reservoirs
 - Support eco-design in public infrastructure
 - Regulate large communities to have green infrastructure that leads to reducing car usage



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