

Mainstreaming adaptation into local development plans in Vietnam

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Preface

During the last three years, the Adaptation Knowledge Platform (AKP) has worked towards building bridges between current 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. 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 the 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 in strengthening their capabilities to introduce effective adaptation measures. This includes undertaking activities both at the national level to create an enabling policy, regulatory, planning and budgeting environment for the adoption of adaptation measures, and at a sub-national and local level where most adaptation activities are implemented. In each country, the platform facilitated adaptation action and strengthened adaptive capacity.

AKP is being facilitated 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).

Vietnam is one of the thirteen countries supported. This publication highlights the insights gained from the implementation of activities in Vietnam. These insights will catalyze further actions to deepen adaptive action in the region. A consolidated initiative, which will be 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 and 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, Paul Bulcock, and Skye Turner-Walker. 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.

Executive Summary

Climate change adaptation is a relatively new concept for Vietnam, where there is still little awareness of the possible impacts of long-term climate change or how to deal with them, and there are few resources available to do so.

This report focuses on two adaptation projects in Vietnam: a climate change vulnerability assessment in the Cat Khanh Commune, Binh Dinh province, and efforts to 'mainstream' adaptation in the Binh Dinh province's fishery sector. Both studies were participatory in nature, and it was found that the mainstreaming activities benefitted significantly from the activities that were previously undertaken as part of the study, particularly the climate change training and the vulnerability assessment.

Overall, mainstreaming adaptation in Binh Dinh province faces several difficulties: limited availability of accurate data; limited knowledge of adaptation amongst stakeholders (at both the provincial and commune levels); lack of local officers to conduct mainstreaming exercises; and lack of official guidelines for mainstreaming climate change adaptation. Still, provincial leaders lent their support to the mainstreaming of adaptation in the Binh Dinh province, including the Binh Dinh's Climate Change Coordination Office preparation of a legal document to mainstream adaptation into local development plans. Once approved, this document will be Vietnam's first attempt at integrating adaptation into development planning at the provincial level.

Successful mainstreaming of adaptation requires a participatory approach, with a wide range of stakeholders working together with experts, exchanging ideas and building mutual trust. Bringing stakeholders together with adaptation experts also proved to be an effective way to build adaptation capacity. Greater coordination between sectors is also necessary. Unfortunately, within Vietnam there is limited cross-sectoral and/or cross-agency cooperation, if any. Bringing the different groups together, particularly when the sectors/agencies do not fully understand or prioritize climate change, is a major challenge. In this context, the Climate Change Coordination Office becomes a crucial focal point for the diverse representatives from different levels, agencies and sectors.

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Introduction

Climate change poses particular hurdles for developing countries and communities as they work towards sustainable development. The key issue for millions of people in Asia is how to reduce their vulnerability to climate change amid considerable uncertainty about future impacts. For many years, international attention focused largely on mitigating climate change by reducing greenhouse gas emissions. As impacts become more evident, however, adaptation has gained more attention, with an emphasis placed on building and sharing knowledge on how to strengthen people's and systems' resilience and reduce climate risks.

The Adaptation Knowledge Platform (AKP), launched in 2009, is a three-year programme that supports research, policy-making, capacity-building and information sharing to help countries in South Asia, Southeast Asia and the Greater Mekong Sub-region. The AKP programme seeks to facilitate adaptation at the local, national and regional levels, and to strengthen the adaptive capacity of countries within the region by working with existing and emerging networks and initiatives. The AKP's goal is to link current knowledge on adaptation and the governments and agencies that require it in order to strengthen the bridge between adaptation and the sustainable development agenda in the region, whilst also enhancing institutional and research capacity.

Vietnam is very vulnerable to climate change, and the coastal province of Binh Dinh, in central Vietnam, has suffered heavily from climate-related hazards. In December 2008, recognizing the importance of climate change issues, the Vietnamese government approved a National Target Programme to Respond to Climate Change. This programme requires provinces and cities such as Binh Dinh to develop an Action Plan to Respond to Climate Change and to mainstream it into local development plans. However, climate change is a new and complex issue, and there have been no clear guidelines and/or technical support produced to date. Local capacities and resources remain limited, and this creates challenges for mainstreaming – or any climate-related activities.

As part of the AKP, a pilot project was launched in Vietnam to:

- Build awareness and capacity for local stakeholders in the Binh Dinh province on climate change adaptation;
- Implement a vulnerability assessment in a selected commune within the province; and,
- Provide technical support for piloting mainstreaming adaptation into local development plans.

As a first step, a scoping study was undertaken to identify the best ways to build adaptation capacity and to mainstream adaptation into local development plans. In addition, the study sought to determine the main barriers to building capacity and mainstreaming climate change adaptation, and how to address them.

In collaboration with the AKP, the National Institute for Science and Technology, Policy and Strategy Studies (NISTPASS) then conducted several activities, including:

- Two training workshops for local planners, policy makers and local communities;
- A climate vulnerability assessment in Cat Khanh Commune, Phu Cat district, Binh Dinh province;
- Assistance in mainstreaming adaptation into development through a Pilot Master Plan within the province; and,
- A National Round Table discussion on adaptation in Vietnam.

The scope of this study was limited by resource and time constraints. However, the project was successful in enhancing local capacity, and it successfully tested the mainstreaming of adaptation within Binh Dinh's fisheries sector. These activities also provided valuable lessons that could be more widely applied across Vietnam, and they highlighted the significant roles that the social, organizational and institutional aspects play in climate change adaptation – they are, in fact, as important as the technical aspects of the adaptation planning process.

About Binh Dinh province

Binh Dinh is a coastal province located in south-central Vietnam. The province covers 6,309 km² and has a coastline of 134 km. It has a population of about 1.6 million, or 261.5 per km²; 28% of the population lives in urban areas and 72% in rural areas.¹ Binh Dinh is divided into ten districts and one city (Quy Nhon City), which is the socioeconomic, cultural and political centre of the province. The province is geographically diverse, with mountainous regions, plains, islands, rivers, shoreline and lagoons. However, the most common landscapes are mountains and hills. The local economy is mostly dependent on fisheries and agriculture; although other livelihoods include seaport services, industry and tourism. According to development plans, the service sectors, including tourism, will increasingly make a significant contribution to the city's economic future.



Photo Credit: creativecommons | Dmitry Pisanko

Figure 1: Administrative map and location of Binh Dinh province



Binh Dinh province's numerous and interlaced river systems encourage increased climatic interactions between marine and terrestrial environments. Flooding is common, especially during the rainy season from September to December, when 79% of precipitation occurs. Flash floods, droughts, fires, saline intrusion, and desertification are common, as is erosion along river banks and coastline. Major storms occur frequently. In the recent decades, Vietnam has experienced roughly five tropical cyclones per year. The central region, from Binh Dinh to Ninh Thuan, is among the hardest-hit, averaging 1.1 cyclones per year from 1961 to 2008 (The World Bank, 2010). The main impacts of storm events in Binh Dinh have been shoreline erosion, flash flooding and environmental pollution.² The areas most affected by flooding are the lowlands in Tuy Phuoc, An Nhon, Phu Cat, Phu My, and Quy Nhon.³ In 2009, 2010 and 2011, Binh Dinh province was seriously affected by floods. Flooding in October and November 2011 resulted in several deaths and economic losses of around US\$35 million.⁴

¹ Binh Dinh People's Committee (2010). Statistics Book of Binh Dinh Province

² Centre for Hydro-Meteorology of South Central Region, and Department of Science and Technology (2011) *Climate and Hydrology Regime Characteristics in Binh Dinh Province*, p.234.

³ Ibid.

⁴ Committee for Flood and Storm Control of Binh Dinh (2009) *Synthesis Report on Flood and Storm Control of Binh Dinh Province*.

Institutional FRAMEWORK FOR ADAPTATION IN BINH DINH

Policies

In August 2008, the Prime Minister issued Decision No. 158/2008/QĐ-TTg, establishing the National Target Programme to Respond to Climate Change (NTPRCC) and requiring all provinces and cities in Vietnam to develop their own action plans (covering both mitigation and adaptation). Binh Dinh was selected as one of the three locations to pilot this programme, so it is now developing an action plan. However, Binh Dinh does not have the capacity or experience it needs for this, and the budget for the pilot is limited.

Instruction No. 809-CT/BNN-KHCN, issued in March 2011 by the Ministry of Agriculture and Rural Development, requires all areas to integrate adaptation into their strategies, plans, programmes and projects for agriculture and rural development during the period 2011-2015. It identifies the need to:

...integrate climate change into the processes of development, approval and implementation of strategies, planning and plans, and projects in agriculture, forestry, salt making, fishery, water resources and rural infrastructure in the whole country, conforming to the strategies, the NTPRCC, and the national action plan to respond to climate change in the direction to actively reduce greenhouse gas emissions and proactively adapt to climate change.

Still, adaptation has not yet been integrated into Binh Dinh's sectoral development plans, and there is a dearth of national standards and legal guidance for how to mainstream climate change into development. This creates challenges for the second part of our pilot, an attempt to mainstream adaptation in the province's fisheries. The working group identified the Master Plan for Fishery Industry Development to 2010, with the vision to 2020, as the best target for mainstreaming. This is the most important document within Vietnam's fishery sector, as it provides the basis for all programmes, plans and projects. As the Binh Dinh Department of Agriculture and Rural Development (DARD) had recently begun reviewing, revising and updating the master plan, this provided a timely opportunity for the mainstreaming of adaptation into planning.

The province has also developed an action plan to implement the National Strategy for Disaster Prevention and Mitigation to 2020. Each year, various sectors and locations within the province develop and implement their own action plans for disaster prevention and control. These could, in turn, provide numerous opportunities for mainstreaming. Along with state support, Binh Dinh has also received financial assistance for climate programmes from various international organizations, including the Australian Foundation for the Peoples of Asia and the Pacific (AFAP), and the Rockefeller Foundation through the Asian Cities Climate Change Resilience Network (ACCCRN) programme in Quy Nhon city.

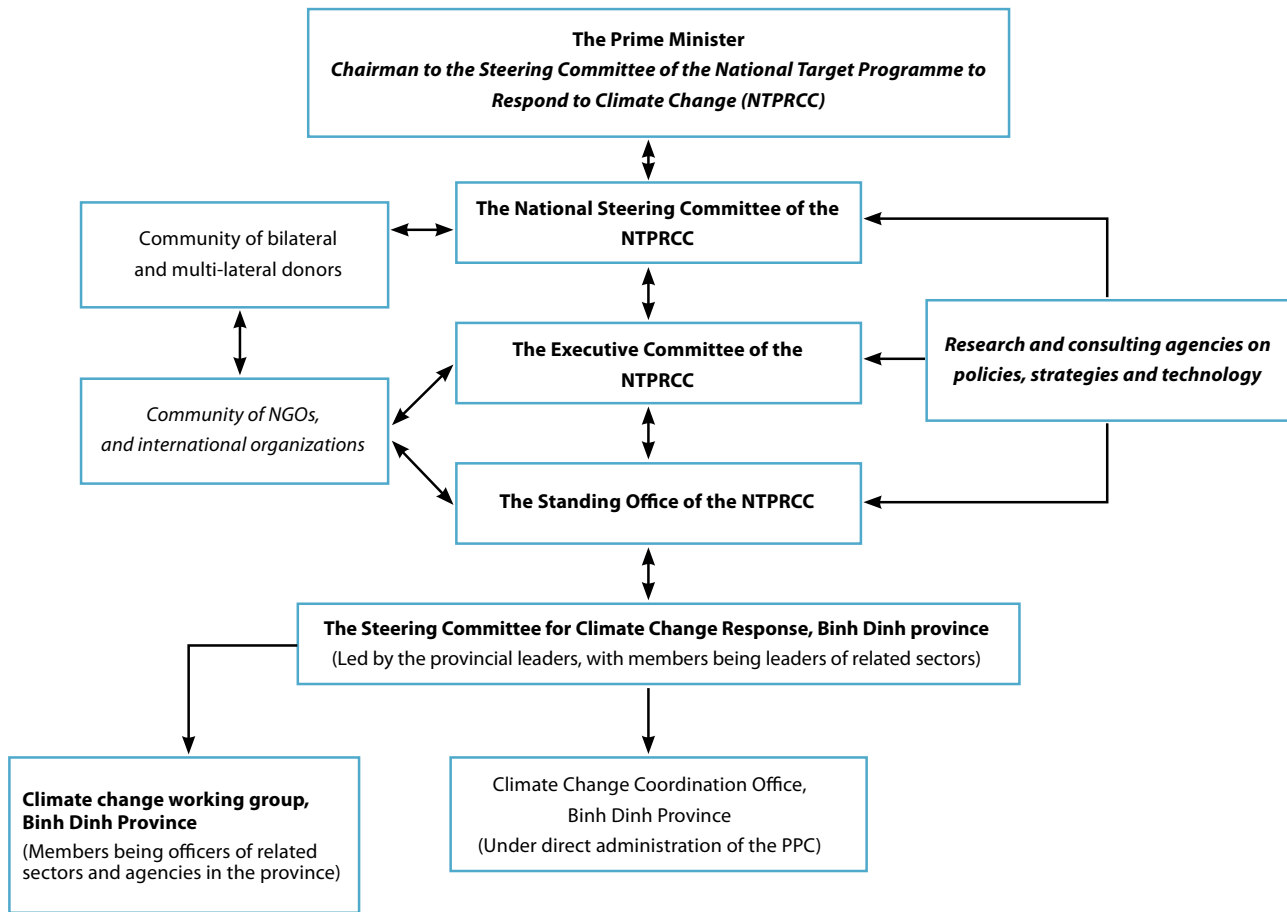
Organizational structure

The Department of Natural Resources and Environment (DONRE) is the state agency responsible for climate change-related matters. However, climate change requires cross-sectoral cooperation. As a result, with support from the Rockefeller Foundation, the Binh Dinh Provincial People's Committee established the Provincial Climate Change Coordination Office in November 2010. This office is under the direct administration of the Provincial People's Committee and is mandated to coordinate the province's climate change-related activities. DONRE is a member of the office's Steering Committee, and the Vice Director of DONRE is the office leader.

The establishment of the Climate Change Coordination Office is expected to enhance cross-level and cross-sectoral cooperation and information-sharing in the province. In addition, the Provincial People's Committee Chairman has set up a Steering Committee to implement the NTPRCC and a task force working group to support it. The Steering Committee is to lead and monitor all climate change-related activities under the NTPRCC and beyond in Binh Dinh province.

Steering committees for flood and storm control and for search and rescue operations have been active from the communal to provincial levels for many years. These are usually led by a leader of the People's Committee. Figure 2 shows the full organizational chart.

Figure 2: Organizational chart for NTPRCC implementation and oversight



Fisheries oversight

At the provincial level, fisheries are overseen by DARD, which has several relevant sub-departments (aquaculture and capture fisheries and resources protection) and centres (agriculture and fishery promotion and fishery breeding). DARD also oversees the management unit of Con Chim ecological zone and the fishery divisions at the communal level. In addition, DARD is the agency in charge of disaster prevention and mitigation for the province through the Office of the Flood and Storm Control (OFSC) Steering Committee. However, most DARD officials lack a good understanding of climate change and adaptation planning, and remain particularly uninformed about mainstreaming.



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However, with support from national and international projects and programmes, the knowledge and capacity of adaptation in all stakeholders from the provincial to community level has increased (Sinh and Toan 2011). Some local agencies, such as the Department of Natural Resources and Environment and the Department of Planning and Investment, can now take the lead in adaptation activities by organizing shared learning workshops on adaptation, preparing adaptation funding proposals, and participating in vulnerability assessments. As climate change is a new and complex issue, further capacity, and awareness-building is required. Furthermore, as the Climate Change Coordination Office is a newly established office, it has limited experience. The roles and responsibilities of the various related agencies in adaptation also are yet to be defined, and mechanisms for cross-sectoral and cross-level coordination will need to be identified.

Vulnerability

ASSESSMENT: BACKGROUND AND METHODOLOGY

Although adaptation mainly addresses the long term, understanding current climate vulnerability is the first step to building a community's long-term adaptive capacity. Many communities are also very interested in understanding and finding adaptive options for the climate-related problems they face. Thus, a vulnerability assessment was conducted in collaboration with local stakeholders, including representatives from commune committees, flood and storm control committees, women's unions, and farmer and fisherman associations. Information regarding future climate change scenarios was limited, but this was not a major obstacle, as the assessment focused on current vulnerability. Following this assessment, it is hoped that the commune will update the assessment with support from the Climate Change Coordination Office.

Our analysis follows the definition of vulnerability used in the Intergovernmental Panel on Climate Change Fourth Assessment Report (IPCC, 2007) and by Kelly and Adger (2000), as a combination of exposure to climate hazards, sensitivity to those hazards, and adaptive capacity. Applied to a concrete example, exposure might mean living in a flood zone, say, next to a river; while sensitivity might mean that your house is made of fragile materials and sits directly at ground level, so that flood waters can easily destroy it; and, adaptive capacity means being able to get out of harm's way, perhaps by moving, or by building a sturdier house on stilts.

More generally, adaptive capacity is the potential or ability to make whatever adjustments needed to moderate the negative impacts of climate change (including climate variability and extremes), cope with unavoidable impacts, and take advantage of opportunities that may arise. Many factors influence adaptive capacity. Economic security can help people better prepare for climate change by building a more resilient house and enabling a more rapid recovery after an adverse event. Education increases people's understanding about climate change, its potential impacts and how best to adapt to them, and helps them gain access to jobs and technology. Institutional capacity affects the level of access to information that supports disaster planning. Good infrastructure can moderate the impacts and damage caused by a disaster. Social capital provides mutual support among villagers during and after disaster.

The vulnerability assessment was conducted in the Cat Khanh Commune, Phu Cat District, Binh Dinh province. The assessment team was divided in two groups, each of which was responsible for four hamlets (Group 1: An Quang Dong, An Quang Tay, Ngai An, and Chanh Loi; Group 2: Phu Long, Phu Dong, Thang Kien, and An Nhue). The survey focused on the agricultural and fisheries sectors, as these were the two dominant sectors in the area.

The process included focus group discussions with representatives of the Commune People's Committee, villages, the Committee for Flood and Storm Control and mass organizations, as well as in-depth interviews with key informants of the Commune People Committee. The team also used several participatory assessment tools, as described below.



Photo Credit: Vu Canh Toan

Secondary data collection

The team gathered background data on the commune and villages, including geography, population, natural conditions, climate patterns, main economic patterns, income levels and other baseline conditions. Information was taken from commune and village profile forms,⁵ other documents focusing on the Annual Disaster Preparedness Plan (at the district and commune levels), socioeconomic development plans (at the district and commune levels) and land-use plans. In addition, government and non-government organization (NGO) disaster mitigation and support programmes were examined.



Photo Credit: Vu Canh Toan

Focus group discussions

The focus group discussions were used to collect and verify information and to gather different opinions on issues related to the vulnerability study. Groups typically consisted of 20 to 25 people from the Commune People's Committee, village clusters and the Committee for Floods and Storms Control (CFSC). Discussions covered participatory assessments of hazards, natural disasters, vulnerabilities and capacities.

Interviews

Researchers interviewed several key informants in the commune, such as the chairman of the Commune People's Committee, land-use planners, village heads, and members of special social groups such as women, children, the elderly and people with disabilities.

Historical profile

Historical profiling was used as a tool in hazard, capacity and vulnerability assessment. Collecting information about disasters that occurred over the last 10 to 15 years, including frequency, severity and changes in nature, helped to identify potential hazards and any evidence of climate change. It also indicated the areas and communities that would most likely be affected in the future, as well as losses and the reasons for them.

⁵ These forms were used to identify key summary information about the commune and villages such as population, gender, poverty rate, and so forth.



Photo Credit: Vu Canh Toan

Mapping

Mapping was regularly used as a visual aid in focus group discussions, to present graphically the layout of the community. It produced a spatial overview of the main features of an area, such as community boundaries, location of residences, paddy fields, roads and rivers. It also actively involves the community in the initial phase of risk assessment, by illustrating the most hazard-prone areas and infrastructure.



Photo Credit: Vu Canh Toan

Problem trees

Problem trees were used during the focus group discussions to identify the most pressing concerns or problems caused by disasters and climate change, as well as for potential solutions to these problems and ways to minimize vulnerabilities.

Ranking

Both scoring and ranking were used as tools throughout the vulnerability assessment to identify potential hazards, the most vulnerable villages in the communes, and the most affected village clusters and sectors.

The identification of potential hazards and the most vulnerable villages required a consensus in the community as to the potential climate change hazards, and the most likely future climate change scenarios. Once participants reached a consensus, they could rank each hazard or vulnerable site both by impact level, the combination of exposure and sensitivity, and adaptive capacity, using the matrix shown in Table 1.

Table 1: Hazards rating matrix

| Impact level | Description |
|-------------------|---|
| Severe | At least three of the following happen: <ul style="list-style-type: none"> • the subject(s) are highly sensitive to climate risks; • climate risks are high and occur regularly (compared to normal); • exposure of the subject(s) to climate risks is high; and, • the subject(s) are impacted by three or more types of disasters. |
| Average | Climate risks occur at average intensity and frequency, sometimes at high levels but not regularly; exposure of the subject(s) to climate risk is average, and the subject(s) are impacted by one or two types of disaster. |
| Low | The subject(s) are not at a high sensitivity to climate risk; exposure of the subject(s) to climate risk is low, and the subject(s) are impacted by only one type of disaster. |
| Adaptive capacity | Description |
| High | More than 70% of the following conditions are met: <ul style="list-style-type: none"> • the subject(s) are aware of, and understand climate risks and ways to protect themselves (due to training, mass media, etc.); • the subject(s) are financially capable (with income, contingent budget, etc.) of responding to climate risks before, when, and after they occur; • local policies and plans are available to support adaptation and disaster risk management (e.g. annual plans and training plans); • local policies are available to support groups impacted by climate risks, such as loans for the poor, livelihood supports, and post-disaster supports; • quality of social services, such as health care and education, meet the national standards; and, • infrastructure, such as transport, water resources, electricity and water supply, meet people's needs. |
| Average | 40% - 50% of the conditions listed above are met, or the conditions are met at only that level, or apply to about that share of the population (for example, 50% of fishermen are aware of climate change, state budget only meets 50% of needs, 50% of social services meet the national standards) |
| Low | 30% or fewer of the conditions listed above are met, or the conditions are met at only that level, or apply to 30% or less of the population (for example, 30% of fishermen are aware of climate change, state budget meets 30% of needs, 30% of social services meet the national standards) |

Profile of Cat Khanh Commune

Cat Khanh is at the East of Phu Cat District, one of the five communes in De Gi Lagoon. Cat Khanh also contains the fishery port of De Gi. The commune covers 31.22 km² and has a population of 14,410, or 424 people per km².⁶ The commune includes eight hamlets: four east of the Lagoon (An Quang Dong, An Quang Tay, Chanh Loi and An Ngai) and four to the west (Phu Dong, Phu Long, An Nhue, and Thang Kien).

Figure 3: Cat Khanh Commune in Phu Cat District



More than 10% of Cat Khanh's households are in poverty, and recent statistics indicate that 16.3% of children under age 5 are malnourished; this represents a small decrease from 2008. Between 97% and 100% of children aged 5 or younger are vaccinated against six diseases. Schools are equipped for basic training and learning activities, although several do not meet national standards.

⁶ Unless otherwise noted, all demographic and economic data in this section are taken from Cat Khanh People's Committee (2011) *Annual Statistical Report of Cat Khanh Commune*.

Fishing and aquaculture – primarily fishing – account for 70% of the livelihoods in the commune. Amongst the five communes around De Gi Lagoon, Cat Khanh has the most boats and ships. Aquaculture has not been doing well in the commune, however, due to an unfavorable environment, low-quality shrimp breeds, and flooding. Currently, the total aquaculture area is about 80 hectares, plus another 25 hectares that are used after the end of the salt-making season.⁷

Agriculture, forestry and services account for the remaining 30% of livelihoods. Rice is the major crop, accounting for 77% of the total plantation area. People plant two to three rice crops annually, or one rice crop and two subsidiary crops on the same land.

Hamlet profiles

An Quang Dong hamlet and **An Quang Tay** hamlet are both situated near the De Gi Estuary. An Quang Dong hamlet has 561 households (2,360 people), of which 89 households are classified as poor and 45 are classified as near poor. An Quang Tay hamlet has 490 households (2,353 people), of which 85 are classified as poor and 43 as near poor.⁸

Fishing is the major livelihood for both hamlets, accounting for around 80% of their total income – 80% of this is generated by offshore fishing. An Quang Dong hamlet has 175 fishing boats and ships, while An Quang Tay hamlet has 170.⁹ Some households in both hamlets are also involved in subsidiary income-generating activities such as farming green onions and peanuts.



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Phu Long, **An Nhue**, **Phu Dong** and **Thang Kien** are the four agricultural hamlets located in the southwest of Cat Khanh Commune. None is near the De Gi Lagoon or the coast. Rice cultivation and production are the dominant livelihoods. The average income in these agricultural hamlets is VND 5 million annually per person (around US\$240).

The **Phu Long** hamlet has 209 households (850 people), of which 46 are classified as poor and 35 as near poor. Around 95% of the households derive their livelihoods from agriculture; there are 43 hectares planted with rice. The hamlet also has about 37 hectares of forest; about 5% of the population works in forestry.

An Nhue is an agricultural hamlet with 156 households (720 people), 38 of which are classified as poor and 30 as near poor. People work in agriculture production and making rice noodles. The hamlet has 30 hectares of rice paddy, which produces two to three crops annually. In addition, households are also involved in rice, noodle manufacture and raising swine.

Phu Dong is the least populated hamlet in the commune, with 112 households (530 people); 25 are classified as poor, and 20 as near poor. The major livelihood of Phu Dong is agriculture, with 90% of the population relying upon rice production (on 50 hectares), 7% rely on forestry (37 hectares) and 3% on services and fishing (on two boats).

Thang Kien hamlet is situated at the centre of the commune, with 420 households (about 1,000 people), including 72 classified as poor and 38 classified as near poor. The major livelihoods include fishing (270 households with 34 boats and ships), agriculture, forestry and services. The hamlet has 41 hectares planted with rice, along with subsidiary crops, which are tended to by about 170 households. Forestry accounts for another 20 households, while the remainder work in small business and services.¹⁰

Chanh Loi is the most populated hamlet in the commune, with 656 households (2,817 people), including 98 classified as poor and 46 classified as near poor. Agriculture is a major source of income, with 96 hectares planted with rice and subsidiary crops. There are also 194 fishing boats and ships, and five households tend to 13 hectares devoted to aquaculture.¹¹

⁷ Annual Statistical Report of Cat Khanh Commune and Cat Khanh People's Committee (2010) Synthesis Report of Fishery Sector in 2009 and Directions for 2010.

⁸ Peer interviews with hamlet leaders of An Quang Dong and An Quang Tay hamlets, May 2011.

⁹ Peer interviews with hamlet leaders of An Quang Dong and An Quang Tay hamlets, May 2011. There is no official information about the number of fishing boats in the commune.

¹⁰ Interview with Thang Kien hamlet leader, May 2011.

¹¹ Interview with the Chanh Loi hamlet leader, August 2011.

Climate conditions

Cat Khanh has a tropical monsoon climate, clearly divided into two seasons. According to the Hydro-Meteorology Station of Binh Dinh, the rainy season lasts from September to December, accounting for 79% of the annual rainfall. Rain is most intense in October and November, when 70% to 72% of rainy-season precipitation occurs. The dry season lasts from January to August, with some rain in May and June. The total annual rainfall typically ranges from 1,900 mm to 2,050 mm. On average, there are 130 to 140 wet days annually, three to four wet days in the driest months, and 15 to 25 wet days in the wettest months (October and November).¹²

The average surface temperature of De Gi Lagoon ranges from 28°C to 32°C in the dry season, and differs by about 5°C to 7°C in other months. In the rainy season, salinity is around 15% to 25% in the area from the middle of the lagoon to its entrance. In the dry season, the salinity is around 25% to 32%. In the area near the river mouth, salinity is 15% to 20% in the dry season, and 5% to 10% in the rainy season.¹³

The coastal area is influenced by an irregular diurnal tidal mechanism, with a cycle of 18 to 22 days. Each month, there are two high tides at the beginning and the middle of the lunar month. At these times, the tides reach 1 to 2 metres. During the low-tide, the tidal amplitude is only 0.3 to 0.5 metres. These tidal characteristics have had a major impact on the development of the ecological systems found in these areas.¹⁴

Development of the De Gi Lagoon area

According to the Master Plan for the Development of the De Gi Urban, Industrial and Service area, the lagoon and its surrounding areas will become the coastal economic development centre of the province. Plans for the area include:

- A step-by-step development of the De Gi Port into one of the biggest fishing ports in the south of the province (replacing Quy Nhon port). Various fishery services are planned, including processing, logistics, boat and ship building and repair, storage and the creation of storm shelters;
- The development of urban and residential areas for fishery and support industry services;
- The development of infrastructure to meet the development needs of the whole region. This will include improved transport facilities, the supply of electricity and water and sewage services; and
- The development of 285 hectares of My Thanh and My Chanh communes in the Phu My district for tourism (in the northern part the De Gi Lagoon).

¹² Centre for Hydro-Meteorology of South Central Region, and Department of Science and Technology (2011) *Climate and Hydrology Regime Characteristics in Binh Dinh Province*.

¹³ Ibid.

¹⁴ Binh Dinh Province, Department of Agriculture and Rural Development. 2010. *Master Plan for development of De Gi Lagoon area up to 2020, vision to 2030*.

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Vulnerability ASSESSMENT RESULTS

Adaptive capacity of Cat Khanh Commune

All of the households in the commune had access to electricity. Their schools and health-care systems were also of good quality and mostly met national standards. Inter-hamlet roads were surfaced. However, most of the smaller, inner roads were not surfaced and were easily damaged by the prolonged floods. Overall, the irrigation and drainage systems for the whole commune were of very low quality, mostly open and dug into the earth. In recent years, some channels had been used for other purposes, constricting the water flow. This worsened floods, during periods of heavy rainfall, and droughts, during periods of low water levels.

As a result, the people and officers of the commune have considerable knowledge and experience of flood and storm control. In fact, every year, the commune develops and implements its own flood and storm control plan, meeting up at the end of each year to discuss lessons learned. Training and extension activities are also organized for people throughout the commune. However, people and officers in the commune do not receive training or education specifically on climate change, its potential impacts and adaptation measures (except for those currently involved with the AKP). In addition, there had not been any training courses organized that addressed climate change, except for the one funded and organized by AKP.

Other problems included a lack of financial support services, and lack of rubbish collection services, waste treatment and waste water systems. This has led to problems with pollution. The flood discharge canal system is also inadequate, characterized by small sluice gates, as there are no water storage systems such as reservoirs or in-farm irrigation systems consisting of earthen channels.

Fishermen have formed fishing associations for mutual support, and there are also fishing and aquaculture promotion officers trained to support fishing activities. Fishermen across the province and in Phu Cat district also received at least two training sessions on fishing techniques by fishery promotion centres every year. In addition, the communal flood and storm control committee organized annual flood and storm control training. However, fishermen still reported that they did not have adequate knowledge of climate change and had not received training on this issue.¹⁵ Interviews with commune officers and observations on house quality, infrastructure, income, etc. indicated that An Quang Dong and An Quang Tay had the greatest economic capacity in the Cat Khanh Commune. For these hamlets, around 70% of households used clean water and modern toilets. Households also had offshore fishing boats and ships equipped with GPS, life jackets and sonar equipment. The majority of households also had fishing insurance, and received preferential lending from state and local credit sources (e.g. family or community funds), for ship repairs or improvements.

Phu Long, Phu Dong and An Nhue hamlets have the highest poverty ratios. However, households in An Nhue hamlet that planted subsidiary crops (corn and peanut), and produced rice noodles were found to be less affected by floods. All of the households in this hamlet had also been connected to the national electricity network since 2000. In Chanh Loi and Thang Kien, 85% of fishing households had fishing insurance and access to loans for boat repairs or improvements.¹⁶ Only Thang Kien and a part of Chanh Loi hamlet had access to a municipal water supply; the rest had to use well-water. Most of the households did not have standard toilets.

These hamlets did not have any flood drainage channel systems; their sluice gates were also small, typically hindering the flow of water to the sea, a situation made worse in low-lying areas by high tides. Agriculture production was also completely dependent on rain water, making it susceptible to drought, and there were no water storage facilities, such as reservoirs. Irrigation channels were dug from the earth, with very few concrete channels, and although a canal was created in 1977, it had not been dredged and was blocked by sediment. Meanwhile, Hoc Xeo lake (or Ho Dap) in Phu Dong hamlet was supposed to be the main water supply for agriculture. However, this too had deteriorated due to sedimentation and was unable to store water for use in the dry season. In fact, in parts of the Nha Tho, the stream which ran through the hamlets was the only running water source. Unfortunately, it could only supply enough water for about 40 hectares out of a total of 250 hectares of paddy fields within the hamlet.¹⁷

¹⁵ Observation based on interviews and focus group discussions with communal officers and local people.

¹⁶ Per 2010 Commune Statistics and focus group interviews.

¹⁷ Interviews with local farmers and communal officer in charge of agriculture sector, August 2011.

Summary of climate vulnerability in Cat Khanh Commune

The main climatic hazards in Cat Khanh were ranked in order of importance of risk level, including: storms, floods, droughts, flash-floods (only in Phu Dong) and changes in temperature (cold spells and heat waves). Every year, Cat Khanh faces three to five storms and tropical low pressure systems.¹⁸ Storms usually bring rain, some of which can be severe, and in turn cause floods and damage boats, fishing equipment, houses, schools and crops. Droughts and high temperatures in the dry season cause crop losses. As the hamlets depend on diverse livelihoods and are located in a variety of topographic areas, their level of vulnerability differs. Following consultation with a large number of local stakeholders through interviews, meetings and focus group discussions, this assessment ranked the hamlets most affected by climate related hazards thus, in order of severity: 1. Ngai An, 2. Chanh Loi, 3. Phu Long, 4. Phu Dong, 5. An Nhue, 6. An Quang Dong, 7. Thang Kien.

The types of livelihoods most affected by climatic hazards were deemed to be fishing, aquaculture and agriculture. The salt making and small businesses were also impacted, but on a much smaller scale.

Fishing

Fishing is the main livelihood in the An Quang Dong and An Quang Tay hamlets, and was an important income source also for both Chanh Loi and Thang Kien. Fishing activity comprised 80% offshore and 20% coastal fishing. Although offshore fishers faced higher risks, they were more financially secure and had better equipped boats, enabling them to travel to other (non-storm) areas during the storm season. During the 2010 storm season, five ships sank and one person died. Of these boats, one was from An Quang Dong, one was from An Quang Tay and three were from Chanh Loi hamlets.¹⁹ Overall, the most vulnerable group was the near-shore fishers, with about 175 boats and ships (accounting for 511 households) in An Quang Dong and 170 boats and ships (accounting for 412 households) in An Quang Tay. The potentially adverse impacts of storms included damage to fishing boats and ships, fishing nets and tools as well as the loss of catches and human lives. Since Cat Khanh was not usually impacted directly by storms, losses to near shore fisheries were not as significant.



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Aquaculture

Aquaculture activities were concentrated in the Ngai An hamlet. Surprisingly, although only 25% of the 654 households worked in aquaculture, it contributed to around 50% of the hamlet's annual income. Households in the hamlet own about 40 hectares that are dedicated to aquaculture. All aquaculture could be classified as extensive,²⁰ with shrimp farming accounting for the majority of production in terms of area and economic production. The Ngoc Chau Company also farms shrimp on an additional 8.7 hectares.²¹ Shrimp are raised in three annual harvests (the first from December to March, the second from April to July, and the third from July to October). In the past, black tiger shrimp (*Penaeus monodon*) was the preferred species. However, due to the white leg shrimp's increased productivity and greater resistance to disease, households switched production to the white leg shrimp (*Litopenaeus vannamei*). Since aquaculture areas were located around the De Gi Lagoon, they were at high risk from storms, high tides, sea water surges, floods, and other extreme weather phenomena, e.g. drought, and severe cold. Storms, along with heavy rain, waves and high tides often resulted in floods, damage to ponds and shrimp and fish escapes. In 2010, in Ngai An hamlet, 80 hectares of aquaculture ponds were flooded and 20 tonnes of fish, 13.8 tonnes of shrimp, 6.3 tonnes of crab and 16.8 tonnes of other sea products were lost.²²

¹⁸ Annual reports on– flood and storm control of Cat Khanh commune and interviews and focus group discussions with local residents.

¹⁹ Cat Khanh People's Committee (2010) *Annual report on flood and storm control of Cat Khanh in 2010*.

²⁰ The Food and Agriculture Organization of the United Nations defines extensive aquaculture systems as those that 'receive no intentional nutritional inputs but depend on natural food in the culture facility, including that brought in by water flow e.g., currents and tidal exchange'. Intensive aquaculture systems, by contrast, 'depend on nutritionally complete diets added to the system, either fresh, wild, marine or freshwater fish, or on formulated diets, usually in dry pelleted form'. See <http://www.fao.org/docrep/003/X6941E/x6941e04.htm>.

²¹ Cat Khanh People's Committee (2011) *Annual Report on Socio-economic Development of Cat Khanh in 2010* and information provided by Ngai An hamlet leader during interviews in August 2011.

²² Cat Khanh People's Committee (2010) *Annual report on Flood and Storm Control of Cat Khanh in 2010*.

Agriculture

Agriculture is the second most common livelihood in Cat Khanh, particularly in Phu Long, Phu Dong and An Nhue hamlets, as well as partly in the Chanh Loi hamlet. The main climatic hazards affecting agricultural activities were floods, storms and drought, with storms normally bringing heavy rains that caused floods. These hazards occurred at the same time every year (from September to December), although the peak period was from October to November. In low-lying hamlets, storms and floods destroyed bridges and roads, prevented travel and business activities, caused crop losses, reduced the productivity of farm land, damaged aquaculture ponds, and prevented students from attending school.²³ Droughts and high temperatures usually occur from May until the end of August, with the highest temperatures normally peaking during July and August.

Table 2: Risks to agricultural activities in Cat Khanh Commune

| Crops (Rice) | Climatic hazards | Impacts |
|--|---|--|
| Winter-Spring crop <i>November to March</i> | Storms, floods (November, December) Drought (January – March) | This crop is affected mostly by storms and floods. |
| Summer-Fall <i>March to June</i> | Drought | The peak period of the dry season is from July to August. So, this crop is less vulnerable. |
| Fall-Winter crop <i>July to October</i> | Drought (July – September) Storms and Floods (September – October) | This is a high risk crop because the sowing usually coincides with the drought season (i.e. July and August) when water supply is low. In addition, floods occur in October when the rice is maturing, leading to a partial or full crop loss. |

All lowland areas (Phu Long, An Nhue, Phu Dong, Thang Kien and Chanh Loi hamlets) were flooded to a depth of around 0.5 to 1 metre. Floods across some areas could last for up to one month during the rainy season. For example, 10 hectares out of a total of 43 hectares of agricultural land used for rice production in the Phu Long hamlet were regularly flooded, affecting 50 land-owning households. One hectare was regularly flooded in the Chanh Kien hamlet. Floods usually affected 5 hectares of lowland fields in Chau Chau area, affecting 25 households in Phu Long hamlet. Meanwhile, in the An Nhue hamlet in Dong Cua Vinh and Dong Bau, 10 hectares out of a total of 36 hectares were flooded, which affected 45 households, with flooding usually lasting between two weeks and one month. According to the 2010 communal statistics, floods and storms destroyed more than 42 hectares of rice fields, 5.2 tonnes of rice seeds, and 3 tonnes of rice seedlings in Phu Dong, Phu Long, An Nhue, Thang Kien, Chanh Loi and Ngai An hamlets, also damaging a further 10 hectares of vegetables. Irrigation infrastructure such as the 10 metres of concrete channel from Phu Long to Phu Dong was also affected. The 25-metre bank of Ca Dam was eroded by 1.5 metres,²⁴ and the field bank was eroded along 30 metres of its length, up to a depth of 1.5 metres. The stream bank was eroded in three sections along a length of nearly 40 metres.

Drought and high temperatures, which lasted up to four months from May to August, also affected agricultural production. Over the last five years, periods of drought have become more severe. This has resulted in a lack of water for the summer-fall rice crop. According to residents of Phu Long hamlet, the fields in Dong Cay, Dong Muong and Dong Be are usually flooded during the flood season, but they are also impacted by drought in the dry season. An Nhue hamlet had 10 hectares of fields in Cua Vinh and Dong Bau facing the same problem. Since the ground water of Chanh Loi contained a significant amount of alum and salt, this area suffered from a serious shortage of water in the dry season. Approximately 12 hectares of agricultural land in Chanh Kien and 20 hectares in western Ngai An also faced annual drought conditions.²⁵

Livestock

Livestock consisted mainly of water buffalo, cows, and pigs, as well as poultry (chicken and ducks) with farming conducted on a small, household scale. Animal husbandry was likely to be at risk from climate change, although livestock contributed only a very small part to the household income. Economic losses were therefore limited when compared with other livelihood strategies.

²³ Annual reports on flood and storm control and interviews and focus group discussions with local people.

²⁴ Cat Khanh People's Committee (2010) *Annual report on flood and storm control of Cat Khanh in 2010*.

²⁵ Annual reports on flood and storm control and interviews and focus group discussions with local people.

Forestry

Forestry was conducted in 7% of households in Phu Dong, and 20 households in Thang Kien. Major climate risks were storms and forest fires. However, no significant events or losses have been recorded.

Environmental pollution

Environmental pollution caused by uncollected garbage, sub-standard sanitary infrastructure, and animal husbandry waste, occurred all year round and was a common problem; one which was further exacerbated by the annual floods. For instance, more than 60% of toilets were temporary. In fact, in Phu Dong hamlet, only three households had standard toilets. This meant that 96% of households did not have any permanent toilets. In the Thang Kien hamlet, flood water often brought garbage, making the pollution in this central hamlet more severe.

Other issues

According to the students and teachers interviewed,²⁶ schools can close for up to one week during the storm season. With respect to transport infrastructure, floods and storms in 2010 damaged 4.5 km of concrete roads from Phu Long to Phu Dong Thang, and the bridge to Chanh Loi hamlet was also impacted. In addition, the road from An Nhue to Phu Dong was flooded by 1 metre and many inter-hamlet and inter-village roads were flooded by 0.5 to 0.8 metres. Fifty households in Phu Long hamlet and 10 households in village three in Chanh Kien hamlet were also affected. Dong Dien area in Chanh Loi was flooded for 1 to 3 days. Here, 210 households²⁷ found themselves in water at heights between 2 to 2.5 m. Overall, in 2010, flooding together with high tides affected 200 households in the commune²⁸ and polluted the surface water.

The results of the vulnerability assessment team are summarized in Table 3.

Table 3: Vulnerability matrix for Cat Khanh Commune

| Vulnerability Rank | Hamlet | Dangerous climatic risks (by order in terms of danger) | Vulnerable groups/main issues |
|--------------------|---------|---|---|
| 1 | Ngai An | (i) Floods (ii) Storms (iii) Drought (iv) Changing temperatures (<i>high temperature and cold snap</i>) | <p>Main livelihood: agriculture (60%), aquaculture (80% shrimp farming) and salt production. Aquaculture, with 40.1 hectares, accounts for 15% of the total area but contributes disproportionately to incomes.</p> <p>Vulnerable groups/main issues:</p> <p>There are 247 households that are more frequently flooded than others amongst the hamlets:</p> <ul style="list-style-type: none"> • aquaculture farming households near De Gi Lagoon are at a high risk (from the impact of storms, storm surges and waves), with the embankment of a low quality. Meanwhile, people have difficulty acquiring loans from the Bank of Social Policy; • households that have paddy fields in Cay Cam Dam in the east of the hamlet (14 hectares), which is prone to flooding; • households that have paddy fields in the west of Ngai are faced with drought, affecting the summer to autumn crop production; and, • long-lasting floods are expected to have a negative impact to the food security of 100 households, while 300 households are expected to have enough food. |

²⁶ Interviews carried out in May 2011.

²⁷ Discussions with representative groups in August 2011.

²⁸ Cat Khanh People's Committee (2010) *Annual Report on Flood and Storm Control of Cat Khanh in 2010*.

| Vulnerability Rank | Hamlet | Dangerous climatic risks (by order in terms of danger) | Vulnerable groups/main issues |
|--------------------|--------------------------------|---|--|
| 2 | Chanh Loi | (i) Floods (ii) Storms (iii) Drought (iv) Changing temperatures | <p>Vulnerable groups/main issues:</p> <ul style="list-style-type: none"> • people who live adjacent to and/or have paddy fields in the Dong Dien area (often flooded from 1 to 3 days, some areas are flooded by 2 metres); • the supply of water for production and domestic use is a big problem in Chanh Loi, because the water is tainted by alum and salt. In the dry season, this area faces issues of water scarcity (according to the people's assessment); and, • in Phu Long, people's health is seriously affected in the flood season due to the contaminated water. Poor households are particularly affected as they do not have easy access to fresh water. |
| 3 | Phu Long | (i) Floods (ii) Drought, (iii) Storms (iv) Changing temperatures | <p>The most dangerous period is October to November (the flood season) and July through to August (drought period).</p> <p>Vulnerable groups/main issues:</p> <ul style="list-style-type: none"> • people undertaking agricultural activities in Dong Cay, Dong Muong, and Dong often face flooding in the rainy season and droughts in the dry season; • the third crop of rice (from July to October) is the most affected, as this coincides with droughts and storms; • the irrigation system, especially the canal system, will be destroyed due to heavy rains or major floods, and • health is another issue; particularly in the flood season, the impact of water pollution is increased as many households do not have access to fresh water or have standard toilets. This is also the problem in the Phu Dong hamlet, which is part of An Nhue and Chanh Loi. |
| 4 | Phu Long | (i) Floods (ii) Flash floods (iii) Droughts (iv) Storms (v) Changing temperatures | <p>Vulnerable groups/main issues:</p> <ul style="list-style-type: none"> • for households with paddy field in low-land areas, hygiene is a big challenge in the flood season, as many households do not have toilets. |
| 5 | An Nhue | (i) Droughts (ii) Floods (iii) Storms (iv) Changing temperatures | <p>Vulnerable groups/main issues:</p> <ul style="list-style-type: none"> • 45 households have 10 hectares of paddy field (out of a total of 36 hectares of the hamlet) in Cua Binh and Dong Bau which are often impacted by during the rainy season and drought in the dry season; • 15 households located near the low-land paddy field of Village No.2 (including 5 poor households). |
| 6 | An Quang Dong and An Quang Tay | (i) Storms (ii) Droughts (iii) Floods (iv) Changing temperatures | <p>Vulnerable groups/main issues:</p> <ul style="list-style-type: none"> • near shore fishermen and people who are hired to work in the fishing vessels; and, • households who plant secondary crops. |
| 7 | Thang Kien | (i) Floods (ii) Droughts (iii) Storms (iv) Changing temperatures | <p>Vulnerable groups/main issues:</p> <ul style="list-style-type: none"> • households who have paddy fields in lowland areas (12 hectares for rice), which are flooded during the rainy season. Some areas face both flooding and water scarcity. |

Adaptation measures

Based on the results of the analysis, the team discussed short- and medium-term adaptation options with local stakeholders. Some of the identified actions were new, whilst others were based on existing measures adapted to cope with climate change. The assessment focused on current vulnerability, with the proposed actions aimed at responses to the current climate related risks. Discussions with local people in the Cat Khanh Commune showed that these measures (actions) can contribute toward solving current issues and are technically and financially appropriate for local government. Most of the people involved in the assessment, meetings and focus group discussions, as well as those interviewed, agreed that implementing these measures would build their capacity to adapt to climate change. There was also strong evidence of links between current vulnerability that focused on current climate-related disasters, current socio-economic conditions, and future vulnerability (which looks at both future climate-related hazards and socioeconomic conditions). Short- and medium-term adaptation options that were identified included:

- Capacity-building and awareness-raising on climate change adaptation and environmental protection for the whole commune and involving all stakeholders;
- Providing support on sustainable livelihood alternatives for resource people in the communes, taking into account the potential impacts of climate change;
- Technical and financial support for revising crops and aquaculture, their timing in the context of a changing climate, new crop and aquaculture variety selection, and experimental programmes to increase crop adaptation to the adverse impacts of climate change;
- Increasing support from the local government for households to be able to access drinking water and install standard toilets,²⁹ especially in Phu Long, Phu Dong, and An Nhue hamlets; and,
- Support for the commune to improve their irrigation systems.

The main economic sector in Cat Khanh is fisheries. Therefore, the results of the analysis included proposed adaptation measures intended for mainstreaming within the fishery sector.

Additionally, although the vulnerability assessment only focused on one commune, its findings and the experiences of the villagers were still applicable to other sites along Binh Dinh's coast.³⁰ Offshore fishing was thought to be at less risk to climatic hazards, as fishers in Binh Dinh usually work in other provinces during the flood and storm season. Shrimp farming remains the most important of the aquaculture activities.

²⁹ According to the criteria of the Ministry of Health in the Decision 08/2005/QĐ-BYT.

³⁰ According to the provincial working group on mainstreaming.

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MAINSTREAMING

ADAPTATION INTO BINH DINH'S FISHERIES PLAN

The importance of fisheries to Binh Dinh's economy

Binh Dinh's territory, with 134 km of coastline, has favourable natural conditions for fisheries. It contains lagoons that connect to the sea via bays, canal gates and seaports, including Quy Nhon, De Gi, and Tam Quang. In addition, Binh Dinh has 1,440 km² of inland waters and 40,000 km² of territorial waters.³¹ These waters lend themselves well to both fishing and aquaculture. The coastal area incorporates five districts, Tuy Phuoc, Phu Cat, Phu My, Hoai Nhon, and Quy Nhon City, which account for 35.6% of the province's total land area and 68% of its population.³²

In 2010, aquaculture in the province covered 4,807 hectares, 2,574 of which were used for freshwater culture and 2,260 for brackish-water (freshwater mixed with seawater) culture. Total aquaculture productivity was 9,632 tonnes. Of these, 6,306 tonnes were produced from shrimp farming, a further 2,219 tonnes from freshwater fish farming, and 819 tonnes from brackish fish farming. Other aquaculture forms produced an additional 378 tonnes of fish and related products. Total capture fisheries productivity was 142,000 tonnes, valued at 3,703,000 million VND (US\$178,000). The fishing fleet consisted of 7,800 vessels, with more than 2,000 ships over 90 CV.³³

Aquaculture production has become a major sector and plays an important role in the economic structure of Binh Dinh province. In 2010, turnover of aquaculture exports was about US\$40 million.³⁴ The province plans to develop the sector and will focus on the creation of large-scale collective fishing areas. In addition, it plans to diversify the structure of its seafood processing industry, stabilize coastal exploitation, and diversify breeding and farming methods. It also intends to improve the fishery sector's technical infrastructure.

The need for mainstreaming

As noted earlier, Vietnam is considered to be very vulnerable to climate change. The Global Facility for Disaster Reduction and Recovery (GFDRR) has noted that Vietnam is 'one of the world's most exposed countries to multiple natural disasters, including tropical cyclones (typhoons), tornados, landslides and droughts' (The World Bank 2010). Vietnam is also very sensitive to these hazards, the GFDRR notes, because such a large share of its population lives either in low-lying river basins, or in the coastal strip. Over the past 20 years, natural disasters killed more than 13,000 people and cost an average of 1% of GDP per year, and there are 'rising concerns' about climate change increasing the frequency and intensity of these climatic hazards (ibid.).

In this context, fisheries are a priority sector both because of their economic significance, and because fishing and aquaculture are done mainly near the sea, where they are particularly exposed to climatic risks and extreme weather. For instance, storms and floods in 2009 sank 74 boats and ships. In 2010, rains and floods also damaged 1,115 hectares of aquaculture.³⁵

The National Target Programme to Respond to Climate Change (NTPRCC), launched in December 2008, directed sectors and localities to integrate climate change issues 'into strategies, planning and socio-economic development plans, sectoral and local development plans, as well as in legal regulations, policies, organization and implementation'.

In March 2011, the Ministry of Agriculture and Rural Development (MARD) issued Instruction No. 809/CT-BNN-KHCN, requiring all areas to integrate adaptation into their strategies, plans, programmes and projects for agriculture and rural development during the period 2011-2015. This instruction states the need to "integrate climate change into the processes of development, approval and implementation of strategies, planning and plans, and projects in agriculture, forestry, salt making, fishery, water resources and rural infrastructure in the whole country'. Binh Dinh had not yet complied when our pilot was launched.

³¹ Binh Dinh People's Committee and Fishery Department (2007). *Fishery Development Master Plan up to 2010, Vision to 2020 of Binh Dinh Province*.

³² Ibid.

³³ Binh Dinh Province, Department of Agriculture and Rural Development (2010) *Synthesis Report on Aquaculture Sector of Binh Dinh Province in 2010 and Directions for 2011*.

³⁴ Binh Dinh Province, Department of Agriculture and Rural Development (2011) *Assessment Report of the Implementation of Sector Plan during the Period 2006-2010 and Directions and Tasks for the Period 2011-2015*.

³⁵ Per Committee for Flood and Storm Control of Binh Dinh annual reports for 2008, 2009 and 2010.



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Initial assessment of the vulnerability of fisheries in Binh Dinh

A qualitative analysis was conducted using a sampling of data from the province, based on the assumption that different areas have similar adaptive capacity, and that an assessment of current vulnerability would contribute toward building future adaptive capacity. However, in order to implement adaptation measures into specific plans, programmes and projects, the vulnerability assessment should be complete and incorporate details for the whole province. This task is expected to be carried out by the Climate Change Coordination Office in the near future. The research focused on aquaculture and fishing, with an emphasis on brackish water aquaculture, particularly shrimp farming. Figure 4 shows the areas where this type of aquaculture is prevalent.

Figure 4: Brackish aquaculture areas in Binh Dinh



Source : Department of Planning and Investment of Binh Dinh Province (Note: "Vung Nuoi trong Thuy San Nuoc Lo" = Brackish water aquaculture areas and "Trai Giong Tom" = Shrimp Variety Production Unit)

The main shrimp farming season runs from February to June/July. This means it is not usually susceptible to rainy-season storms and floods, but rather to dry-season temperature changes and salinity intrusion. Areas such as Tuy Phuoc district and Quy Nhon city accounted for 60% of the total aquaculture area in the province, but only 20% of the total volume. Meanwhile, Phu My and Hoai Nhon districts accounted for about 75% of the total volume for 30% of total area. The main reason for this was that Phu My and Hoai Nhon employed intensive models of shrimp production (see footnote 35), while other areas usually followed an extensive, advanced extensive or semi-intensive model.³⁶ The second shrimp farming season runs from August to October and is often affected by storms, floods, and heavy rains. Centres of farming in Phu My (for example, My Chanh and My Thanh) and Hoai Nhon districts are the most vulnerable, due to their large area and volume of production.³⁷

³⁶ Binh Dinh Province, Department of Agriculture and Rural Development (2010) *Synthesis Report on Aquaculture Sector of Binh Dinh Province in 2010 and Directions for 2011*.

³⁷ The second-harvest area in Phu My is 140.9 hectares out of total area of 415 hectares, with a volume of 850.6 tonnes out of a total of 2,169.9 tonnes; the corresponding area in Hoai Nhon is 199.7 hectares out of total of 415.7 hectares, volume of 1,145 tonnes out of total 2,169.9 tonnes. Binh Dinh Province, Department of Agriculture and Rural Development (2010) *Synthesis Report on Aquaculture Sector of Binh Dinh Province in 2010 and Directions for 2011*.

Major climatic impacts

Abnormal **shifts in temperature** and an associated increase in shrimp disease were a major climate change impact on shrimp farming. There were two sensitive periods: the transition from cold to hot season at the end of April through to early May, and the hot period from July to August. Statistics revealed that during 2009, Quy Nhon and Tuy Phuoc were the most seriously affected areas.³⁸

Floods and inundation, meanwhile, change salinity, pollute water sources (which brings disease), and allow stock to escape. The farms that were most vulnerable to floods included those in Phu My and Hoai Nhon. This was because of their large size and the volume of shrimp produced.

Storms damage ponds, and lead to farm escapes, with farmers in low-tidal areas being the most vulnerable. The second shrimp raising season from September to December was the most vulnerable period. The most vulnerable areas included Phuoc Son, Phuoc Thuan, Phuoc Hoa, Tuy Phuoc, Nhon Binh, Dong Da, and Nhon Phu wards in Quy Nhon city as well as My Chanh, My Thanh in Phu My, and Cat Minh and Cat Khanh communes in Phu Cat.³⁹

High tides and sea water surges lead to salt-water intrusion in high-tidal areas. The riskiest time was during the dry season, especially during June and July. The most vulnerable areas were in De Gi Lagoon and Tuy Phuoc (Phuoc Son, Phuoc Hoa and Phuoc Thuan).

Shifts in the coastal marine temperature and environment lead to a decrease in coastal fishery resources. The most vulnerable areas included Tuy Phuoc, Quy Nhon and Phu My. Storms from September to December often damaged fishing boats and took human lives. The most vulnerable areas were Quy Nhon, Phu My, Tuy Phuoc, Hoai Nhon and Phu Cat, respectively.

The mainstreaming process

Mainstreaming is an iterative process. It needs to be reviewed and updated whenever there is a significant change within the sector to which it is being applied, or whenever new information about climate change is revealed. It should be noted that in the Binh Dinh pilot study, a limited amount of time and resources meant that not all of the steps in this process could be completed.

The mainstreaming benefited from the institutional assessment, training and vulnerability assessment conducted earlier by the project in Cat Khanh. Although the scope was different, most of the climate change-related issues that affected the fishery sector in Cat Khanh affected fisheries elsewhere in Binh Dinh.⁴⁰ The mainstreaming team also conducted a qualitative vulnerability assessment for the provincial fishery sector based on a review of climate change related research and projects.

Mainstreaming climate change into policies, plans, budget allocation, implementation, monitoring and assessment activities, is cyclical and often also time-consuming. It can be visualized as a closed circle composed of mainstreaming steps. The lessons learned in each of these steps lead to improvements in the next cycle, and so on. Mainstreaming requires the participation of various related groups and stakeholders (such as for this study, representatives from the local fishery administration, the private sector and local communities). Although state agencies are in charge of the mainstreaming process, the inclusion of other related parties – especially private entrepreneurs, the research sector and local communities – is essential.

The mainstreaming of climate change does not just involve technical aspects, but also financial, organizational and human resource issues. The Ministry of Agriculture and Rural Development has directed that mainstreaming be conducted 'with a focus, on both short-term and long-term tasks, with priorities given to multi-target activities'.⁴¹ Capital is often limited, so any resources provided by domestic and international organizations should be maximized.

³⁸ Binh Dinh Province, Department of Agriculture and Rural Development (2009) *Synthesis Report on Aquaculture Sector of Binh Dinh Province in 2009 and Directions for 2010*.

³⁹ Our assessment of vulnerability in this section is based on economic losses recorded in the annual reports on flood and storm control in Binh Dinh over the last 3-4 years.

⁴⁰ According to local experts at the Fishery Department and Binh Dinh Climate Change Coordination Office.

⁴¹ Ministry of Agriculture and Rural Development (2011) *Instruction No. 809 about Mainstreaming Climate Change into Development of Sectoral Strategies, Plans, Programmes and Projects for the Period 2011-2015*. Hanoi.

Scope of the mainstreaming pilot

It would have been preferable to conduct mainstreaming activities for the fishery sector for the entire Binh Dinh province. However, due to time and resource constraints, the working team identified the following three priorities:

1. The fisheries and aquaculture sectors, as they are more exposed to climatic risks (than fish processing activities and logistical services);
2. Brackish water aquaculture, as it is the most productive aquaculture activity in the area. For instance, shrimp farming accounts for two-thirds of the total aquaculture production and 89% of the total aquaculture value. Therefore, brackish water aquaculture produces a greater volume and value than the other two types of aquaculture (freshwater and marine) and is conducted in coastal areas, which are highly sensitive to natural disasters; and,
3. Fishing activities and fishermen working in brackish-water and coastal areas, as they tend to be more vulnerable to climate-related shocks than those working further offshore (although the latter contribute much more in terms of economic value). Most of the coastal fishing activities are located in Quy Nhon city, Tuy Phuoc, Hoai Nhon, Phu My and Phu Cat districts. Offshore fishing activities usually move to other areas during the flood season in Binh Dinh and are therefore usually less exposed to the associated risks. In addition, the offshore activities have better financial capacity equipment and ships.

Activities focused on the following areas:

- Mainstreaming the results of a vulnerability assessment concerning the fisheries sector and climate change and its prioritized adaptation measures;
- Mainstreaming the necessary resources, including finance, human resources, capacity, and equipment, to support the implementation of adaptation measures into planning; and,
- Mainstreaming adaptation criteria during the project approval process and in monitoring and evaluation exercises.

Implementation

Mainstreaming activities were conducted by a provincial working group consisting of staff from the Climate Change Coordination Office, the Capture Fisheries and Resource Protection Agency, the Aquaculture Development and Promotion Centre, the Department of Planning and Investment, plus the Department of Natural Resources and Environment, and undertaken with support from the AKP Country Partner – NISTPASS. Mainstreaming activities were conducted in a participatory manner, meaning that all decisions were made based on group discussion and gained group consensus.

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Results OF THE PILOT TO MAINSTREAM CLIMATE CHANGE ADAPTATION

Proposed adaptation measures

After initial discussions and analysis using a simple cost/benefit matrix, the mainstreaming working group⁴² agreed that the following adaptation measures were the most important over the short and medium term, and should be integrated in the master plan of the fishery sector. Many people also stated that capacity-building should be integrated with the fishery master plan, due to the limited awareness of and understanding about climate change, especially among managers and leaders of the fishery sector. Mangrove restoration and rehabilitation was another important issue, as it could reduce storm surges and prevent coastal erosion. Mangroves would also improve the overall quality of the environment, providing additional aquaculture and fishery resources, and further contributing to local livelihoods (Nga and Roijackers, 2004). According to the Climate Change Coordination Office, mangrove restoration is also both technically and financially feasible.

The mainstreaming team concluded that climate change should be addressed at a higher strategic planning level, incorporating potential climate-change impacts into all decision making activities.

Adaptation measures for coastal fishing

Several adaptation measures were proposed for this sector. Unless otherwise noted, they are to be led by the Climate Change Coordination Office, which would also help secure government funds. The proposed measures are:

1. Enhance the awareness and capacity of both fishery administration officers and fishing community, with respect to climate change, its impacts and adaptation measures, so by 2015, all officers and 70% of fishermen are trained. The Climate Change Coordination Office of Binh Dinh province will be the focal point for this activity.
2. Restore and reserve mangrove forests in Thi Nai and De Gi Lagoons, with a goal of 100 hectares restored by 2015. Construct and upgrade the storm safety harbour in De Gi Lagoon (Phu Cat, Phu My), Thi Nai (Quy Nhon, Tuy Phuoc), Tam Quan Bac, An Du (Hoai Nhon), Ha Ra (Phu My) in association with the national disaster prevention and control strategies.
3. Support professional and livelihood shifts for coastal fishery households through preferential lending, training, and job creation programmes, especially in Tuy Phuoc and Quy Nhon. In association with the national target programme for jobs, this will focus on opportunities such as the creation of small businesses and eco-tourism for the Thi Nai Lagoon area.
4. Restore and preserve the coral reef in Ghenh Rang, Nhon Hai, and Nhon Ly, in association with the coastal management programme. In addition, this will include a search for external support from both national and international organizations.

Adaptation measures for aquaculture

Several adaptation measures were proposed for the aquaculture sector (mainly brackish water shrimp farming), some of which overlap with the fishing measures:

1. Increase technical and financial support for revising the breeds farmed and the timing of harvests in the context of a changing climate. Select new aquaculture varieties and introduce experimental programmes for adaptation.
2. Improve the quality of weather forecasts and flood and tide warning (the focal point for this could be the sub-division of fishery and the hydro-meteorology station of the south-central region).

⁴² Core members of this group include staff of the Climate Change Coordination Office, fishery-related agencies, the Agriculture Department, Planning and Investment Department. We also consulted with a number of other stakeholders from the provincial to commune level.

3. Improve the awareness of relevant agencies and stakeholders to the issues associated with climate change, impacts and potential adaptation measures, with the goal of training all officers and stakeholders by 2015; the Climate Change Coordination Office should lead this activity.

4. Plan, restore and preserve mangrove forests in Thi Nai and De Gi Lagoon areas, with a goal of restoring 100 hectares by 2015; the Climate Change Coordination Office should lead this activity.

5. Establish systems for disease monitoring and warnings with respect to climate change, led by the provincial Division of Veterinary, sub-division of Aquaculture, Centre for Agriculture and Fishing Promotion and the Climate Change Coordination Office.

6. Construct and improve irrigation systems for aquaculture activities with respect to climate change to ensure the supply of brackish water, especially in the dry season, focusing on the fresh-water irrigation system and prioritizing areas such as Thi Nai (which accounts for 50% of the total aquaculture area), De Gi, Phu My (shrimp farming in sandy substrate) and Hoai Nhon (Hoai Hai, Hoai My).

Support research identifying new breeds, especially shrimp breeds, that are more resilient to adverse weather conditions and more adaptive to changes in salinity. This could entail establishing a science and technology programme on climate change as well as fishery breeding programmes for different ecological areas, both at the Centre for Fishery Breeds, and at the Department of Science and Technology. In addition, more support for implementation is needed.

Overall recommendations

Improving stakeholders' awareness of adaptation and mangrove forest rehabilitation was identified as the most important adaptation measure by the working team.⁴³ As these measures are cost-effective and technically feasible, they are likely to yield sustainable results. Other measures were already listed under existing planning. However, it was proposed that issues be added to the adaptation planning and implementation process, such as: access to support from the national target programme of climate change adaptation, or coordination with the office for climate change in order to look for international support. The aquaculture planning and implementation processes should involve close cooperation with the Climate Change Coordination Office, as this agency is mandated to support climate change activities.

⁴³ The mainstreaming team has used a simple cost-benefit analysis for ranking.

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Table 4: Mainstreaming adaptation in Binh Dinh's Fishery Master Plan

| Section of the new Fishery Master Plan | Proposed adaptation mainstreaming integrations |
|--|---|
| Opening section | |
| I. Introduction | Proposal to add issues relating to climate change in fishery industry |
| II. Legal bases and reference materials | Add legal documents related to climate change: <ul style="list-style-type: none"> - The National Target Program for climate change adaptation - Instruction No. 809-CT/BNN_KHCN on mainstreaming of climate change into agriculture and rural development plans, programs and projects during 2011-2015 - The National Strategy for Natural Disaster Prevention and Mitigation to 2020 - Provincial and agriculture sector Action Plans for climate change adaptation |
| III. Limit and scope of research | |
| IV. Research methods | Add methods for mainstreaming climate change into development plans |
| PART ONE: Assessment of impact resources | |
| I. Natural conditions | |
| 3. Climatic characteristics | Add information related to climate change and storm surge scenarios, as well as an assessment of the fishery industry's vulnerability to climate change |
| PART THREE: Master Plan for fishery industry development to 2020, with vision to 2030 | |
| I. Analysis and forecast | Add scenarios concerned with climate change and sea level rise, and incorporate an assessment of the fishery industry's vulnerability to climate change |
| II. Conception, orientation and objectives of development | |
| 1. Conception of development | Proactive adaptation to climate change |
| 2. Orientation of development | Consider climate change in providing development orientation |
| 3. Objectives of development | Consider climate change in providing development objectives |
| III. Options for development | Consider climate change and sea level rise scenarios in designing options for development |
| VI. Binh Dinh province Master Plan for Fishery Industry Development to 2020, with Vision to 2030 | |
| VII. Development orientation for fishery industry to 2030 | Consolidation of climate change in providing development orientation |
| VIII. Preferential programs and projects | Possible mainstreaming of climate change elements into preferential programmes and projects |
| IX. Implementation measures | Integration of adaptation into current measures, including implementation and budgeting. Implementation should address the roles of the Steering Committee for adaptation and the provincial Climate Change Coordination Office in supporting adaptation measures in general and mainstreaming of climate change into fishery development planning in particular. The budget should add national and international sources that support climate change work. |

Mainstreaming climate change into Binh Dinh's fishery development master plan

The current process of reviewing and updating the fisheries plan has not involved a great deal of mainstreaming of climate change adaptation, although the need for integration has been acknowledged in a number of legal documents.

The mainstreaming team proposed that climate change concerns need to be taken into account at all stages of the planning process, in order to:

- Strengthen the participation of all stakeholders. Until recently, the task of reviewing and updating the Binh Dinh fishery master plan had been assigned to one single consultancy agency, with limited participation from local communities and related local agencies, such as the agriculture division, tourism department, and local ecological zone management boards (especially in Thi Nai Lagoon, the biggest lagoon in the province). These groups, in addition to the Climate Change Coordination Office, need to be involved more actively in the planning process;
- Improve the review of relevant legal documents. As mentioned earlier, several legal documents relate to both climate change and the fishery sector, yet have never been included in the fishery master plan policy review and analysis process. These documents need to be included as part of the mainstreaming process;
- Enhance the integration of relevant information in the planning process. Currently, climate related information, the vulnerability of fishery sector and adaptation options are not considered in parts of the existing planning process for the fishery sector (such as impacts assessment, analysis and forecast, development orientation of fishery sector). This is an crucial gap with respect to mainstreaming climate change adaptation; and,
- Raise awareness of policy-makers and decision-makers of the need for mainstreaming adaptation into planning and for inclusion into the master plan of the fishery sector. Provincial and fishery leaders need to be aware of climate change issues and their potential impacts on the sector in order to agree on resource allocation for the integrated plan. Before this can occur, the issue of climate change needs to be added to the approval process of the new fishery master plan.

Table 4 summarizes the recommendations and how they should be incorporated into the Master Plan.

Due to limited time and resources, this pilot project was unable to complete the recommended work, which also has yet to receive approval by the provincial People's Committee. However, all relevant provincial stakeholders, including leaders of the province and its fishery sector, have expressed a full commitment to this endeavour. The Climate Change Coordination Office, the focal agency in this pilot, will provide technical and partial financial support for the remaining activities and for implementing the integrated master plan once it is approved. In addition, NISTPASS will also continue to provide technical support to Binh Dinh in the mainstreaming climate change adaptation.

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Discussion AND LESSONS LEARNED

The findings of these pilot projects should be viewed as the first outputs in an ongoing process of adaptation planning. At this first phase, it is too early to measure the full impacts and outcomes of improved climate change awareness in stakeholders, and the contribution of the projects in building local adaptation capacity. However, valuable lessons have been revealed and are outlined below.

Barriers and challenges

One of the biggest challenges was the lack of sufficient and accurate data. The project was originally intended to assess both current and future vulnerability, but there were no future climate projections available for the Cat Khanh Commune. Additionally, there was only limited and inconsistent official data concerning local socioeconomic indicators at many of the vulnerability assessment sites. For example, data on different economic sectors for the whole commune is available, but the same information at the village and hamlet level is not. Gaps were filled by talking with commune officers and/or local people, which may affect the accuracy of the vulnerability assessment results.

The second barrier was even more challenging, as it related to the limited capacity of local stakeholders for adaptation at the provincial and commune level. This was made even more difficult as the pilot relied upon participatory methods. At the commune level, for most of the people in Cat Khanh, the training on adaptation under the AKP was the first time they had been introduced and/or given information on climate change. At the provincial level, a number of training events were provided for the relevant departments and agencies prior to the pilot. Often, these events were the first time people had received training on mainstreaming climate change adaptation.

A further challenge was the availability of local officers for the mainstreaming exercises. Besides a few staff in the Binh Dinh Climate Change Coordination Office, who work full time on adaptation-related activities, all other local officers participate on a part-time basis, taking time out of their existing roles within their respective agencies. Due to this shared workload, it was difficult for the project team to constantly engage with the provincial level during the mainstreaming process, and at the country level during the vulnerability assessment.

Another barrier was that no official guidelines on mainstreaming adaptation in Vietnam have been produced. Vietnam also has limited experience on mainstreaming adaptation at the sector level. Therefore, the project team had to use its own experiences, as well as some existing international guidelines. Significantly more work should be done before trying to apply these approaches on a larger scale. Finally, existing planning practices use a top-down and sectoral approach with limited participation of stakeholders and a focus on short- and medium-term objectives. This lack of participation can be addressed by treating adaptation as a long-term process, one which requires the full involvement of local communities and the private sector.

Major findings and lessons learned

As noted, there is a great need for capacity-building on climate issues in Binh Dinh. Through a process of engaging local people in this project, the pilot discovered that involving stakeholders directly in project activities, with adaptation experts, was the best and quickest way to build their capacity. People learned more quickly by doing things for themselves, rather than from receiving theoretical training or observing work conducted by others. This approach also increased stakeholders' personal investment and continued involvement in climate change adaptation. Also, working closely with local stakeholders and communities helped the pilot to better understand the local context, and consequently improved the analytical skills of the pilot's staff. As Lebel et al. (2010) have noted, often experts on climate change possess a good understanding of climate-related risks, but not of other risks or sources of vulnerability.

⁴⁴ The Climate Change Coordination Office in Binh Dinh is one of the first three such offices established at the provincial level in Vietnam, with support from the Rockefeller Foundation.



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A barrier to the current planning system in Binh Dinh is that people from different agencies and sectors do not communicate with one another. There is little cross-sectoral or cross-institutional cooperation. However, adaptation and mainstreaming adaptation in particular require the cooperation of many relevant stakeholders. Therefore, the first and major challenge is how to bring these different groups together in an effective and participatory manner. Most stakeholders are already very busy with their mandated duties at their respective agencies. In addition, many do not fully understand climate change related issues, and do not consider climate change a priority. The Climate Change Coordination Office has been crucial in bringing a diverse number of local people from different levels, sectors and agencies together. The Climate Change Coordination Office reports directly to the Binh Dinh People's Committee,⁴⁴ and thus has more authority to coordinate all climate-related activities in the province. Binh Dinh's Climate Change Coordination Office and its leaders also have a good understanding of integrated planning, coordination skills and access to a network of local agencies.

Current planning in Binh Dinh is usually focused on the end result (for example, developing an action plan), rather than the process of developing the plan itself. In the pilot project in Binh Dinh, both time and effort were spent in identifying key stakeholders and engaging with them in a meaningful way. This helped facilitate trust and productive discussion between many different people. As a result, provincial leaders helped the Climate Change Coordination Office to draft a legal document on mainstreaming adaptation into local development plans. A strong working relationship was created between the project team and fishery stakeholders in the Binh Dinh province. Once approved, this document will be the first attempt at integrating adaptation into development planning at the provincial level within Vietnam.

Climate change is not a separate and distinct issue. During the vulnerability assessment in the Cat Khanh Commune, issues adversely affecting residents' livelihoods were due not only to climate change, but also human activities. For example, local residents reported that some areas were affected by flooding not because of changes in rainfall patterns, but because of changes to the flood ways (canals, rivers) and drainage systems. Therefore, climate change projects and research activities should also take into account multiple factors.

References

Government documents

Note: These documents are only referenced in footnotes, and some are not explicitly referenced.

Binh Dinh People's Committee and Fishery Department (2007). *Fishery Development Master Plan up to 2010, Vision to 2020 of Binh Dinh Province*. Binh Dinh.

Binh Dinh People's Committee (2010) *Statistics Book of Binh Dinh Province*. Binh Dinh.

Binh Dinh People's Committee (2011) *Report on Implementation Status of Socio-Economic Development Plan, Period 2006-2010 and Key Directions, Tasks and Measures for the 5 Year Plan 2011-2015*. Binh Dinh.

Binh Dinh Province, Department of Agriculture and Rural Development (2011) *Assessment Report of the Implementation of Sector Plan during the Period 2006-2010 and Directions and Tasks for the Period 2011-2015*. Bin Dinh.

Binh Dinh Province, Department of Agriculture and Rural Development (2010) *Master Plan for Development of De Gi Lagoon Area up to 2020, Vision to 2030*. Binh Dinh.

Binh Dinh Province, Department of Agriculture and Rural Development (2010) *Synthesis Report on Aquaculture Sector of Binh Dinh Province in 2010 and Directions for 2011*. Binh Dinh.

Binh Dinh Province, Department of Agriculture and Rural Development (2008, 2009 and 2010) Annual Status Reports of Fishery Sector.

Cat Khanh Commune People's Committee (2008, 2009 and 2010) *Annual Plan Options for Flood and Storm Prevention, Control and Mitigation*.

Cat Khanh People's Committee (2010 and 2011) *Annual Statistical Report of Cat Khanh Commune*.

Cat Khanh People's Committee (2010) *Synthesis Report of Fishery Sector in 2009 and Directions for 2010*.

Cat Khanh Commune People's Committee (2010) *Annual Report on Socio-economic Development of Cat Khanh in 2009*.

Cat Khanh Commune People Committee (2011) *Annual Report on Implementation of Socio-economic Development Plan of Cat Khanh in 2010, Directions to 2011*.

Cat Khanh Commune People's Committee (2011) *Annual Report on Flood and Storm Control, Search and Rescue in 2010 and Direction for 2011*.

Centre for Hydro-Meteorology of South Central Region, and Department of Science and Technology (2011) *Climate and Hydrology Regime characteristics in Binh Dinh Province*. Binh Dinh.

Committee for Flood and Storm Control of Binh Dinh (2009) *Annual Synthesis Report on Flood and Storm Control of Binh Dinh Province*. Binh Dinh.

Department of Natural Resources and Environment of Binh Dinh, Land Use Management Office (2010) *Current status of land use in Cat Khanh Commune, Phu Cat District, Binh Dinh Province*. Binh Dinh.

Ministry of Agriculture and Rural Development (2011) *Instruction No. 809 about Mainstreaming Climate Change into Development of Sectoral Strategies, Plans, Programmes for the Period 2011-2015*. Hanoi.

Quy Nhon City People's Committee (2010) *Quy Nhon CCA Action Plan* (Asian Cities Climate Change Resilience Network Program).

Quy Nhon People Committee (2007) *Action Plan for implementation of Maritime Strategy to 2020 of Quy Nhon city*. Quy Nhon.

Vietnam Ministry of Natural Resources and Environment (2008) *National Target Programme to Respond to Climate Change of Vietnam*. Hanoi.

Other references

Intergovernmental Panel on Climate Change (2007) *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden, and C. E. Hanson (eds.). Cambridge University Press, Cambridge, UK.

Kelly, P. M. and Adger, W. N. (2000) 'Theory and Practice in Assessing Vulnerability to Climate Change and Facilitating Adaptation'. *Climatic Change*, 47(4). 325–52. doi:10.1023/A:1005627828199.

Lebel, L., Lebel, P. and Daniel, R. (2010) 'Water insecurities and climate change adaptation in Thailand'. *Climate Change Adaptation and Disaster Risk Reduction: An Asian Perspective*, R. Shaw (ed.). Community, Environment and Disaster Risk Management, Vol. 5. Emerald Group Publishing Ltd. 349–72.

Nga, B. T. and Roijackers, R. (2004) 'Effects of mangroves forest to mangroves-shrimp systems in the Mekong Delta, Vietnam'. *Scientific Journal, Can Tho University*, 1. 25–29.

Sinh, B. T. and Toan, V. C. (2011) *Climate Resilient Cities – Key Lessons from Vietnam*. National Institute for Science and Technology Policy and Strategy Studies for Asian Cities Climate Change Resilience Network Programme, Hanoi. http://vietnamcityclimatechange.net/attachment/file/acccrn2210202_CC%20Resilience%20Planning%20-%20Lessons%20from%20Vietnam.pdf.

The World Bank (2010) *Weathering the Storm: Options for Disaster Risk Financing in Vietnam*. Global Facility for Disaster Reduction and Recovery, Washington, DC. <http://www.gfdrr.org/gfdrr/sites/gfdrr.org/files/Viet%20Nam%20Fiscal%20Impact%20Study.pdf>.

ANNEX 1: THE VULNERABILITY ASSESSMENT WORKING GROUP IN CAT KHANH

The Vulnerability Assessment (VA) working group included two people from Platform project; three staff members of the Climate Change Coordination Office; two officials from the Department of Agriculture and Rural Development; three officials from the district level (agriculture, aquaculture, planning divisions) and seven people from Cat Khanh Commune (one leader of a communal People's Committee, one member of the Committee for Flood and Storm Control, one land management officer, one planning officer, two agriculture and aquaculture officers and two representatives of women's unions). The core team was divided into two smaller groups, each in charge of one village cluster.

By the end of each day, these two groups met and shared the results, discussed lessons learned and prepared for the next day.

| | Group 1 | Group 2 | Group 3 |
|---|---|--|-------------------|
| 1 | Nguyễn Thị Phúc Hòa | Vũ Cảnh Toàn | Team leader |
| 2 | Fishery officer (DARD) | Nguyen Đình Ký (Red Cross of Binh Dinh) | Key member |
| 3 | CCCO staff | Agriculture officer (DARD) | Key member |
| 4 | Planning officer (Phu Cat district) | Aquaculture officer (Phu Cat district) | Supporting member |
| 5 | Environment officer (Phu Cat district) | Agriculture and aquaculture officer (Cat Khanh Commune) | Supporting member |
| 6 | Land management officer (Cat Khanh commune) | Planning officer (Cat Khanh) | Supporting member |
| 7 | Member of women's union | Member of women's union | Supporting member |
| 8 | Agriculture officer (Cat Khanh Commune) | Leader of Cat Khanh PC – member of flood and storm control committee | Supporting member |

ANNEX 2: PARTICIPANTS AT THE TRAINING EVENT FOR PROVINCIAL STAFF

| No | Name | Organisation | No | Name | Organisation |
|----|--------------------|---|----|-------------------|---|
| 1 | Hoang Dinh Tien | Department of Agriculture and Rural Development (DARD) | 11 | Nguyen Thanh Hung | Department of Planning and Investment |
| 2 | Phan Dinh Hoa | Department of Labour, Invalid and Social Affairs | 12 | Nguyen Van Nhung | Climate Change Coordination Office (CCCO) |
| 3 | Do Nhat Tan | Department of Information and Communication | 13 | Dinh Van Tien | Vice Director of DONRE, Director of CCCO |
| 4 | Nguyen Cong De | Department of Finance | 14 | Huynh Thanh Danh | Department of Trade and Industry |
| 5 | Vo Van Thanh | Department of Health | 15 | Nguyen Duc Hiep | Department of Construction |
| 6 | Ho Thi Thanh Tuyet | Department of Natural Resources and Environment (DONRE) | 16 | Nguyen Thai Quang | Department of Education and Training |
| 7 | Nguyen Le Na | Office of Provincial People Committee | 17 | Le Thuy Trang | Climate Change Coordination Office/DONRE |
| 8 | Mai Kim Thi | Fishery Division, DARD | 18 | Phan Thi Linh | Climate Change Coordination Office/DONRE |
| 9 | Huynh Cao Van | Department of Planning and Investment | 19 | Huynh Xuan Loi | Climate Change Coordination Office/DONRE |
| 10 | Viet Hien | Binh Dinh Newspaper | 20 | Nguyen The Nhon | Climate Change Coordination Office/DONRE |

ANNEX 3: LIST OF PARTICIPANTS AT THE TWO TRAINING EVENTS FOR LOCAL COMMUNITIES

| No | Name | Organisation | No | Name | Organisation |
|----|------------------------|--|----|------------------------|--|
| 1 | Tran Van Thy | Commune Radio | 19 | Nguyen Thi Tuyet Nhung | Phu Long Village |
| 2 | Nguyen Thi Tuyet Nhung | Head of Women's Union | 20 | Tran Quoc Tuan | Phu Dong Village |
| 3 | Le Dinh Cong | PC of Cat Khanh | 21 | Nguyen Thanh Tra | An Nhue Village |
| 4 | Khong Cuu | Thang Kien Village | 22 | Nguyen Van Loi | Thang Kien Village |
| 5 | Tran Thi Nguyen | Secretary of the Party, ChanhLoi Village | 23 | Le Van Trang | Phu Long Village |
| 6 | Nguyen Van Khoan | Thang Kien Village | 24 | Pham Tan Na | Chanh Loi Village |
| 7 | Nguyen Duc Khanh | PC of Cat Khanh | 25 | Nguyen Huu Hung | An Quang Dong Village |
| 8 | Pham Van Nga | Cat Khanh Health Station | 26 | Ngo Hong Hai | Member of elderly association |
| 9 | Le Dinh Chanh | Ngai An Village | 27 | Pham Tan Huong | Cat Khanh PC |
| 10 | Dinh Phuoc Trung | Ngai An Village | 28 | Duong Van Trai | An Quang Tay Village |
| 11 | Nguyen Sang | President of Farmers' Association | 29 | Le Duc Hien | Member of Youth Association |
| 12 | Ngo Thi Kieu | Women's Union | 30 | Cao Duy Tam | Phu Long Village |
| 13 | Thai Viet Binh | | 31 | Mai Hoang | Veteran Association |
| 14 | Tran Trung Hung | An Quang Dong Village | 32 | To Van Cang | Head of Admin Office of Cat Khanh PC |
| 15 | Nguyen Xuan Duong | An Nhue Village | 33 | Do Hien | Secretary of the Party, Cat Khanh |
| 16 | Nguyen Van Ty | Phu Long Village | 34 | Tran Huu Hanh | Chairman of Cat Khanh PC |
| 17 | Mai Thi Hong Phuong | Thang Kien Village | 35 | Nguyen Thanh Tri | Vice Chairman of Cat Khanh PC |
| 18 | Nguyen Thi Trinh Vuong | Thang Kien Village | 36 | Nguyen Kim Cang | Vice Secretary of the Party, Cat Khanh |

ANNEX 4: QUESTIONNAIRE FOR INTERVIEWS

Questions specifically reserved for commune officers/ head of hamlets:

1. Are there/how many households are in your hamlet? How many are poor? Near-poor? How many have invalids?
2. Are there/how many livelihood activities are in your hamlet?
3. What is the percentage of households working in different livelihood activities?
4. What are the main income sources of your hamlet?
5. What are the areas for agriculture and aquaculture in your hamlets?
6. How many households have a boat?
7. How many households have agriculture land?
8. How many households have access to clean water? Electricity? Have a standard toilet?
9. How many households have access to loan for improving their livelihood?
10. How many households buy their insurance for their equipment?
11. What are the current conditions of public works (road, irrigation systems) in your hamlet?
12. How many households have resistant housing (concrete houses) to floods and storms?

Questions specifically reserved for commune officers/ head of hamlets:

1. What are the livelihood activities of your family?
2. What are the main income sources for your family?
3. Does your family have agriculture land? A boat? If not, how do you earn money?
4. (If you have a boat) Do you buy insurance for your boat?
5. Does your family have access to loans for improving income?
6. Does your family have access to clean water? If not, where do you get water?
7. Does your family have access to electricity?
8. Does your family have standard toilets?
9. What do you think about the quality of social services (such as health care, school)?
10. Did you receive any training and awareness building concerning disaster risk reduction and/or climate change?

Questions for everyone:

1. Have you heard about climate change? If yes, what do you understand about it?
2. What are your observations about floods and storms in your commune/village/ hamlet over the last 3 to 10 years?
3. How have natural disasters affected your hamlet/your family/your livelihood activities?
4. What is the history of extreme climate events in your commune/village?
5. Do you think that the damages to your hamlet/household are due to climate related hazards? To other factors?
6. What are the main concerns for you, your family and your commune/hamlet now and in the future?

ANNEX 5: SUMMARY OF THE TRAINING EVENTS HELD

Summary of the training for local policy makers, planners and government officers of Binh Dinh Province

Objectives: To build adaptation awareness and capacity

Subject matter: The main content of the workshop included: key related concepts such as climate change, adaptation, vulnerability, adaptive capacity; National climate change scenarios in Vietnam; Key policy and national program on climate change in Vietnam; National organizational structure on climate change in Vietnam; adaptation planning; Supporting tools for adaptation planning; and, the Methodology for climate vulnerability assessments.

Participants: The participants of the training included provincial planners from key departments such as the Department of Agriculture and Rural Development, Department of Natural Resources and Environment, Department of Planning and Investment, Department of Labour, Invalid and Social Affairs, and the Department of Information and Communication, etc.

Methods: As adaptation was a new concept for most of the participants, the training aimed to create awareness and initial understanding about climate change adaptation. Therefore, although the trainers wanted to promote interactive discussion and active engagement of participants after each presentation, the discussion used a question-and-answer format in order to clarify what participants did not understand or wanted to know.

Outcomes: It was not expected that the participants would completely understand these concepts after only one training event; but, it was considered a useful starting point for a long-term capacity building process. From a long-term perspective, we hope that participants will think about and integrate climate related issues into their daily lives. Some of the participants of this training contributed to the vulnerability assessment in Cat Khanh and the pilot on mainstreaming adaptation into Fishery Master Plan.

Summary of the training for local stakeholders in Cat Khanh Commune

Objectives: To build adaptation awareness and capacity of commune officers, representatives of local mass organizations, and local communities.

Subject matter: The main content of the workshop included: Key related concepts such as climate change, adaptation, vulnerability, adaptive capacity; community based adaptation planning; Methodology; and tools that support climate vulnerability assessment.

Participants: The participants of the training included commune leaders, representatives from the hamlets of Cat Khanh Commune and the communal committee for flood and storm control, of mass organizations (Red Cross, women and youth unions and farmer associations).

Methods: This training adopted a participatory approach and started with presentations, followed by group exercises, the presentation of group work and discussions. Although adaptation was also a new concept for most of the participants (as was the case for participants at the provincial level), the local people were much more active.

Outcomes: As with the provincial case, it was not expected that participants would fully understand these concepts after only one training event; but it can again be considered a useful starting point for a long-term capacity building process. In the long-term we hope that participants will think about and integrate climate related issues into their everyday activities. Some of the participants of this training contributed actively to the vulnerability assessment in Cat Khanh.



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