

Mangrove Restoration and Rehabilitation for Climate Change Adaptation in Vietnam

World Resources Report Case Study

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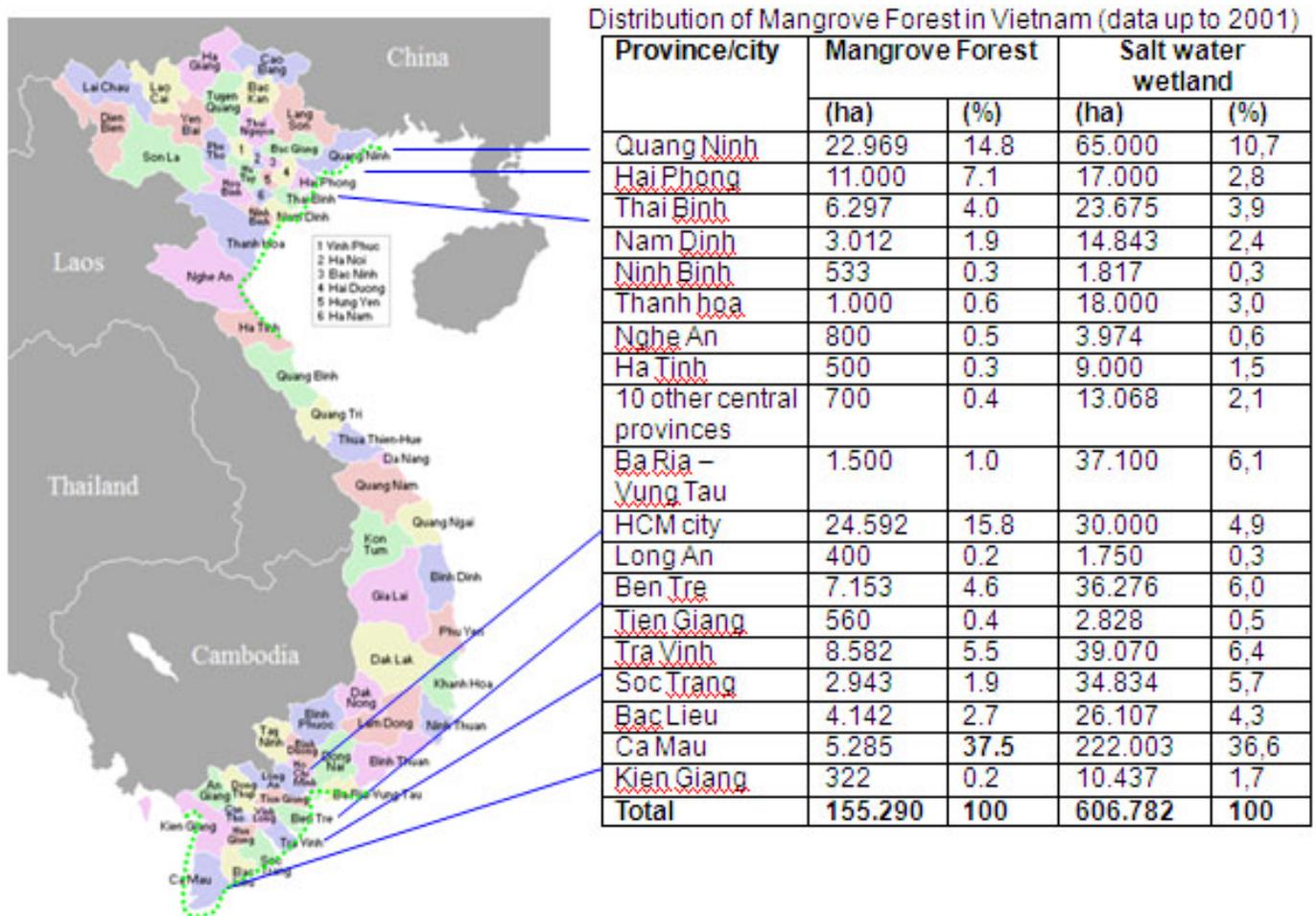
INTRODUCTION

A new set of intractable global problems has precipitated the emergence of more purposeful efforts to govern environment and development in Vietnam. The threat of climate change, rapid fluctuations in food prices, the need for energy provision, and forecasts of severe water shortages cast doubt on the capacity of the market to deliver all goods and services. This, in turn, has re-awakened discussions about the complementary role of a strong public sector in providing the governance needed to enable change. This case study examines the governance enabled by Vietnam's socialist-oriented market economy to meet the uncertainties posed by climate change scenarios and ongoing system-level shocks. More specifically, the governance of mangrove restoration and rehabilitation as a climate change adaptation measure is examined in this regard.

Vietnam's significant natural resource base in coastal areas makes them attractive areas for development. In recent years there has been rapid industrialization of coastal areas supported by Doi Moi, the renovation policy implemented in 1986. Doi Moi marked the official transition of Vietnam

from a centrally-planned to a socialist-oriented market economy. Coupled with the liberalization of the market, the central party passed a resolution allowing for the devolution of rights and responsibility for the management of land and natural resources to households and individuals. This transition has contributed to economic development, but the rapid industrialization has had a major impact on the environment (O'Rourke, D. 2004). Limited coordination between actors and institutions engaged in a wide range of coastal activities has also resulted in an imbalance between development efforts and environmental and social protection (ADB 2005). The partial re-construction of Vietnam's institutional architecture, which previously ensured collective security, has had significant impact on the poor who do not have resources to transcend the risks associated with these imbalances (Chaudhry and Ruysshaert, 2007; Adger, 2002).

The adverse environmental impact attributed to coastal development processes has been further acknowledged in light of the increased frequency of natural disasters in Asia. Climate change scenarios project an increase in storm frequency and intensity coupled with sea level rise, and following the devastating impact of the Asian tsunami,



Map 1. Provinces and key areas with Mangrove Forests (Source: http://en.wikipedia.org/wiki/Provinces_of_Vietnam Sam, et. al 2005)

international organizations have been widely promoting the protection and rehabilitation of coastal areas. In response, a number of Asian countries have initiated large scale mangrove restoration and rehabilitation programs. In Vietnam and Bangladesh these actions have been institutionalized within regulatory frameworks governing coastal areas.

In Vietnam the underlying character of mangrove restoration and rehabilitation is strongly shaped by a worldview that is aimed at a single objective: mitigating the impact of sea level rise and coastal storms. Mangroves are, however, situated in contexts which include stakeholders with a diverse

set of interests and diverging priorities and preferences. The governance processes at play mirror the underlying complexity of the context. This case critiques present and expected developments of Vietnam’s governance regime, and how it enables or hinders mangrove restoration and rehabilitation as a resilient climate change adaptation action.

Vietnam is extremely vulnerable to climate change. It is located within the tropical monsoon belt, with an average of seven storms originating annually from the South China Sea (known in Vietnam as the East Sea). Officially endorsed reports suggest that Vietnam’s average annual temperature has risen by

0.5-0.7°C in the last 50 years (IPNORE, 2009). A sea level rise of 20 cm in the corresponding period, combined with an annual increase in the frequency of tropical storms by 2.15 events and a significant decrease in mangrove forests, have magnified the impact of storm surges on coastal areas (IPNORE, 2009). Climate change scenarios from different institutions provide strikingly divergent storylines of projected changes in temperature and precipitation. Three scenarios are presented in the table below including (1) a dry scenario referred to as IPSL C4 projection from the Institut Pierre Simon Laplace, (2) a wet climate scenario referred to as the GISS-ER projection from the Goddard Institute for Space Studies, and (3) Vietnam's official projection endorsed by Ministry of Natural Resources and Environment (MONRE). Projections also suggest that there will be an increase in frequency and intensity of tropical storms¹ and that sea level will rise between 11 and 68 cm by 2050. Predictions about rainfall are uncertain, with suggestions that there is an equally high chance of either reduction or increase of

Region	Change by 2050	IPSL	GISS	MONRE
Mekong Delta	temperature	1.54°C	1.31°C	1.02°C
	precipitation	(-)6.3%	6.3%	1.5%
Red River Delta	temperature	2.21°C	1.42°C	1.28°C
	precipitation	(-)9.2%	10.1%	3.5%

Table 1. Climate Change Scenarios for Mekong River and Red River Delta between 2010-2050 (Yu, et. al. 2010)

rainfall over this period (Yu, et. al. 2010).

Clearly there is a high degree of uncertainty in these climate change projections. However, even in the absence of the changes suggested by these projections, the agricultural and water resources sectors are increasing vulnerable to impacts from saline intrusion and flood inundation. It has been

suggested that climate change will result in seawater intrusion into groundwater, which provides valuable freshwater supplies for many coastal areas. Rapid conversion and drainage of wetlands, combined with changes in water flows connected to upstream infrastructural developments may increase the incidence of floods and droughts. Storm surges can also severely damage coastal infrastructure and the dikes and structures that support the rapidly developing aquaculture industry. Tidal mixing associated with floods and storm surge leads to saline concentrations that have a widespread impact on terrestrial and aquatic ecosystem goods and services, in particular native species and species with high economic value (IPNORE, 2009). These processes have led to the decline in mangrove forest in deltas and coastal areas (MERC 2007).

The impact of these changes is particularly serious in two of the world's most significant rice baskets, the Red River and Mekong River Deltas. Climate change scenarios for the Mekong Delta suggest that by 2050, 45% of the total land area (or 1.77 million ha) will be salinized (CCFSC, 2001). Saline intrusion could be further magnified if the current trend of decreasing downstream flows persists. A sea level rise of just 1 meter would have a serious impact on 11% of

the population and would reduce the GDP by 10% (Dagupta et al., 2007).

Inappropriate land use planning in urban and agricultural development has amplified the vulnerabilities associated with natural disasters. It is likely the rural poor will have the greatest difficulty coping with climate-related disasters on account of the diminished social welfare attributed to the transition of the Vietnamese state from a centrally planned to a market economy (Chaudhry and Ruysshaert, 2007).

¹This scenario concurs with international opinion, where it is suggested that tropical cyclones will have higher wind speed and more precipitation with CC (Cruz, et al. 2007).

CLIMATE CHANGE ADAPTATION: ACTIONS AND MEASURES

Dikes, a hard climate change adaptation measure:

At the beginning of this century a national sea dike was constructed along the entire coastline of Vietnam minimize the incidence of storm surge and the intrusion of saline water into agricultural areas. Today there are 3000 km² of sea dikes and 5700 km² of river dikes in the country (Hoc, 2010).

Historically, both the capital and technical capacity to construct and maintain dikes was provided by external sources. Within the last decade, both local labor and local tax revenues have been increasingly used to develop dikes.

Historically, sea dike development has been focused on northern and central Vietnam which are the areas most exposed to typhoons. Projections of sea level rise and increases in storm intensity and frequency

show that southern Vietnam is becoming more vulnerable to storm surge and saline intrusion. Motivated by these projections and Typhoon Linda in 2007, a new Dike Development program has begun to focus on the South. This program will restore and upgrade the 900 km sea dike system from Quang Ngai province to Kien Giang province (see Map 1), and was approved by the Vietnamese government on May 27, 2009 under Decision 667. Most of the VND 20 trillion budget that has been allocated to this program will be provided by the national government through a national target program that is discussed later in this chapter. Funding will also be sought from international donors, the private sector, local government and local households. The establishment of a “protective” mangrove forest situated between the

sea dike and the coastline with a minimum width of 500 m is a mandatory condition written into this Decision (667).

Mangroves, a soft climate change adaptation measure:

Vietnam has lost over 80% of its mangroves since the 1950s. Spraying of defoliating agents during the Vietnam War and the rapid expansion of the aquaculture industry during the early 1980s are considered as the two major causes for the decline. In response to this, mangrove restoration and rehabilitation has been ongoing since 1991, but the process of decline was only reversed in 2001, as indicated in Figure 1 below.

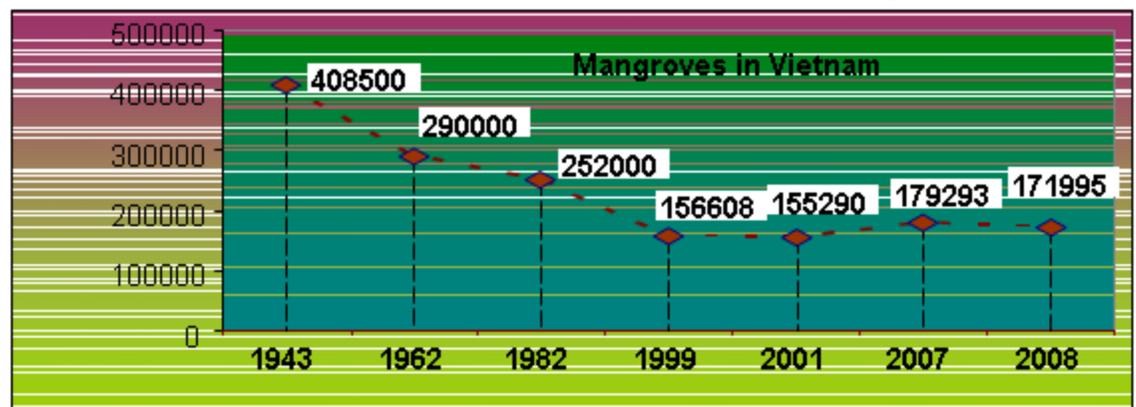


Figure 1. Mangrove Coverage in hectares between 1943 and 2008. (Source: MERC 2010)

The principal functions promoted through mangrove restoration and rehabilitation differ regionally. In North and Central Vietnam, mangrove restoration and rehabilitation has been promoted for disaster risk mitigation and thus its protective function is prioritized. This is reflected in North Vietnam’s most significant mangrove restoration and rehabilitation program, the International Red Cross Disaster Risk Program. Projects have been run in eight provinces in mostly in northern Vietnam with 18,000 ha of mangroves planted along a 100 km stretch of sea dike. Since the program comes from the disaster risk perspective, the stated purpose was protection of human lives and infrastructure. More specifically, mangrove restoration and rehabilitation is seen as a means to enhance and improve the sustainability of

sea dikes. The role mangroves played in protecting sea dikes in Kien Thuy District, Northern Vietnam during tropical cyclone Damrey in 2005 is widely cited in this regard. In this case, it is suggested that the coastline's restored mangrove system led to a reduction of wave height from 4 m to 0.5 m and prevented all damage to the sea dike (see Figure 2). Other areas without mangrove protection, such as the Giao Hai and Giao Long communes, were seriously affected, and costs for urgent repairs alone amounted to more than VND 25.4 billion (Jelligos et al 2005).

Mangrove plantations in the North tend to be monocultures, with *Rhizophora stylosa*, *Kandelia candel*, and *Sonneratia caseolaris* — species which maximize the potential to provide morphological architecture to reduce wave height — being the most common. Local people argue that the habitats provided by mangrove monocultures do not provide productive habitats for wild fisheries, clams and crabs (Osbeck et al., 2010). The Red Cross program, funded by Japan and Denmark, provides mangrove restoration and rehabilitation sponsorship to the local government (commune) level. Local people have in turn been contracted by the commune to plant and protect mangrove plantations. Since Red Cross program support ended in 2006, the compensation local people receive for protecting mangroves has reduced significantly, so much so, that it no longer provides the incentive needed for continued local engagement (ibid.).

In the North, mangroves have been planted in areas which have been designated with a special protective status, not allowing local inhabitants user rights. This has magnified the serious conflicts of interest over claims to coastal wetlands between the very lucrative shrimp aquaculture industry and mangrove plantations. These two competing forms of land use have displaced marginalized groups, and in particular women in coastal communities who are dependent on access to the mudflats to harvest non-

cultivated seafoods, such as clams and crabs. In the Xuan Thuy Ramsar site, there are instances where new ponds are being established on mudflats designated for mangrove plantations.

Lessons from a European Union mangrove restoration research site in Tien Hai district in the Red River Delta suggest that effective community engagement is becoming increasingly difficult to implement. For a number of stakeholders, the program does not adequately compensate for reduced access to crabs and clams. This has led to a general disenchantment within the community and an increase in the incidence of illegal cutting of mangroves. This in turn is beginning to undermine the capacity for this mangrove system to provide the protective function for which it was originally designated (Osbeck, et. al. 2010).

In the South, some attempts have been made to promote and design mangrove restoration and rehabilitation as a multi-functional policy to alleviate poverty and diversify livelihoods. Rather than just being monocultures as in the case of the North, many plantations are both species-rich and exist under a number of different land-use arrangements. Under such conditions, mangroves can provide a host of ecological goods and services as well as livelihood benefits. One such project that reflects this character is the Coastal Wetlands Protection and Development Project, Mekong Delta (1997-2007). In this project, mangrove plantations have been established with the objective of providing protection and increasing ecosystem goods and services such as aquatic resources. Coupled with the mangrove restoration and rehabilitation is a development component which has issued forest land leases to nearly 8000 households. The development component includes capacity building and training, construction of schools and health clinics, and infrastructural development such as roads and electricity. In addition to gaining leases for production forest, many members of these communities have been

contracted to protect state-owned forest stretching along 470 km of shoreline. Statistics suggest that since the inception of this program, forest law violations have decreased from over 1700 in 2002 to 318 cases in 2006 (World Bank, 2008).

Since 2001, mangrove restoration and rehabilitation has reversed the trend of deforestation in Vietnam, with an increase of over 15,000 hectares of mangrove forest by 2008 (see figure 1). It bears mention that figures (Yu, et. al. 2010) show that 50,000 ha of mangroves been planted during this period, suggesting that encroachment into existing mangrove areas is an ongoing process. The mangroves that remain in Vietnam are highly fragmented with the average patch size being 100 ha (Katoomba 2010). The potential for further expansion of mangroves is constrained by the competition with other highly profitable forms of land use for the limited available land resources. Even potential use of abandoned ponds for mangrove restoration and rehabilitation is limited owing to the significant environmental restoration required before growing conditions are suitable for restoration activities.

In Vietnam the response to extreme events has been based on the perception that systems can be controlled. Mitigation and adaptation measures have been focused on reactive measures in determining infrastructure development to control and alter systems (Lebel and Sinh, 2009). Evidence also suggests that reactive stand-alone measures lead to conflicts of interest. This view is manifested in a well-established critique of “engineered flood control measures” which embodies the notion of “living with floods.” Miller (2003) and Sinh et al. (2008) discuss how in the past, people in the Mekong delta used transhumance² as an adaptive approach to floods. Today, dikes and pump stations control the water flows and people live in residential clusters (Beckman 2006). Miller (2003) suggests that in contrast to the earlier adaptive

approach, these fixed structural measures cannot mediate between the conflicts of interest associated with flood protection and the benefits of floods such as soil enrichment and access to fishery resources in this case.

In contrast to stand-alone measures such as dikes, mangrove restoration and rehabilitation has been promoted as a “low/no regret measure.”³ It can be a “precautionary” approach to climate change adaptation and foster “win-win” situations by addressing present multi-sectoral vulnerabilities and future risks. In northern Vietnam the focus of the mangrove restoration and rehabilitation is a disaster risk approach in the form of protective structural measures. In the South, mangrove restoration and rehabilitation has in many cases been promoted as a development “action” to meet multiple objectives. This regional differentiation in function or purpose is perhaps not surprising given that northern Vietnam is in the typhoon belt and is thus most exposed to structural damage from storm surges. Another bio-physical determinant in shaping the difference in the mangrove restoration and rehabilitation programs in the North and South is the different growing conditions: the South provides a much a more fertile environment that allow mangroves to grow more rapidly and establish more species-rich (biodiverse) biological communities. Moreover, the greater incidence of saline intrusion and flood inundation into the Delta areas in the North reduces the area suitable for mangrove restoration and rehabilitation (UNEP, 2009). The bio-physical differences only partially explain the variation in the implementation and adaption of mangrove restoration and rehabilitation. The following section examines the role of the governance system in shaping the implementation of mangrove restoration and rehabilitation.

² Transhumance is the seasonal movement of people and livestock.

³ Low/no regret measure is term cited in Heine B (2009)

FRAMEWORKS TO UNDERSTAND THE ROLE OF GOVERNANCE IN PROMOTING MANGROVES AS CLIMATE CHANGE ADAPTATION ACTION

In order to understand how governance shapes the form and function of emerging climate change adaptation measures such as mangrove restoration and rehabilitation, three resilience frameworks are referenced. In the first, mangroves are viewed as an equilibrium system, whereby their protective function can be assessed in engineering resilience terms, as their “capacity to resist change,” hereafter referred to as *engineering resilience* (Holling, 1996). This function corresponds closely to the notion of “engineered storm control measures” such as dikes. The second framework views mangrove plantations as a non-equilibrium system. In this case a mangrove system is assessed in terms of its robustness, hereafter referred to as *ecological resilience* (ibid.). It becomes unstable or dysfunctional when it transgresses a so-called tipping point.⁴ A tipping point is a threshold which once exceeded, alters the function of mangroves owing to changes in the feedback it requires to maintain its prescribed structure. The third framework views mangroves as stakeholder defined systems or soft systems⁵ which have an inherently “unstable state.” In this case, mangroves have no single prescribed structure or function, and are therefore often contested. The resilience of mangroves is thus assessed on the basis of their capacity deliver *benefits and development pathways* in the face of ongoing changes in the system’s preferred function, hereafter referred to as *epistemic resilience* (Powell and Jiggins 2003; Powell et al., 2010).

⁴Within the resilience literature “tipping points” are the commonly measurable properties defining the resilience of systems. Most notable is the recent publication, “Planetary Boundaries” which presents a set of meta level tipping points which if transgressed will result in disastrous consequences for humanity (Rockström et al.).

⁵ A soft system is social construction defined by the issue it is intended to address or the function ascribed by the institutional environment. See Checkland (1999) for a more in depth discussion of soft systems.

Both the equilibrium and non-equilibrium resilience frameworks imply that mangrove systems should be managed with stability as the priority. The quest for stability is based on assumptions supporting the given function for mangroves. This point of departure corresponds with the form and function of the earlier cited examples of mangrove restoration and rehabilitation in Northern Vietnam, and presents a dilemma for those wishing to manage mangroves *adaptively*. Adaptive management recognizes that uncertainty increases when the purpose of management is contested. It recognizes the precautionary principal as the justification for action. Thus it emphasises multi-functionality in mangrove restoration and rehabilitation as a climate change adaptation action to ensure a continuing capacity to generate *benefits and development pathways* as a response to uncertainty. It is through the lens of these three resilience frameworks that governance in Vietnam will be viewed in shaping mangrove restoration and rehabilitation as a climate change adaptation action.

GOVERNANCE AND ITS ROLE IN SHAPING MANGROVE RESTORATION AND REHABILITATION AS A CLIMATE CHANGE ADAPTATION ACTION

The Doi Moi renovation policy of 1986 opened Vietnam up to international markets and cooperation. One of the preconditions for Vietnam to become an effective player was a minimum level of market liberalization, not least to enable Vietnam to qualify for membership in the World Trade Organisation (WTO). This has led to an ongoing reform process of governance structures resulting in devolution of rights and authority across many sectors in Vietnam (Trang, 2004). Within the country there have been regional differences, particularly between the North and South, in terms of how rapidly and to what degree the socialist-oriented market governance system is being institutionalized within governance structures.

Generally speaking, institutional structures in the North have been less receptive to devolution (Phuong Le 2010, Ca 2010).

Vietnam is described as a direct democracy with a tripartite governance system: the party, the national assembly, and government. The inter-relationships between these three structures were radically redefined after Doi Moi. Today the party ensures that Vietnam adheres to the socialist-oriented market economy by operating within a set of principals defined by the party (ideology). The National Assembly is the legislative body and, since Doi Moi, has become increasingly independent from the party and the government. It is made up of representatives from different sectors and stakeholders from Vietnamese society, including representatives from the party and the government. Civil society organizations are becoming increasingly important as representative bodies within the National Assembly. The National Assembly, with its goal of being a direct democracy, tries to actively involve the general public in all consensus-based decision taking. The role of the National Assembly is intended to resemble a multi-stakeholder platform. The government is the executive body and implements the strategic decisions such as laws, five-year socio-economic development strategies, and national programs approved by the national assembly.

The unique blended approach to socialist-oriented market governance in Vietnam has shown to be resilient at different levels in terms of the economic crisis of 2008. Recent reports indicating how different countries in the region have adapted to the ongoing economic crisis that began in 2008 suggest that Vietnam has been less affected than many of its regional neighbours who have opted to liberalize their markets more dramatically (FAO, 2009). Although figures reported by the Institute of Policy and Strategy, under the Ministry of Agriculture and Rural Development (MARD), suggest that exports have decreased, preliminary statistics suggest that Vietnam's neighbors have been much more affected

by global price swings (pers. com, MARD, October 2009).

Vietnam has had a long history of adapting to natural disasters and this is reflected in its institutional structures. In 1955, the Central Committee for Flood and Storm Control was established. The Central Committee for Flood and Storm Control is situated under the Ministry of Agriculture and Rural Development and is responsible for the coordination, planning, monitoring and evaluation of flood protection and disaster mitigation actions. There are also sub-committees situated under all administrative levels in Vietnam within the People's Committee structure and line ministries. The impact of floods and storms is borne by many sectors and stakeholder groups, most of which are represented within the Central Committee for Flood and Storm Control. The Prime Minister is the chair, which ensures that its actions go beyond the agenda of its host, and are reflective of the broader set of perspectives of the members. This model has proven effective in enabling a reactive approach to disasters perpetuated by storms and floods.

Another important institutional body that responds to natural disasters is the Natural Disaster Mitigation Partnership. This partnership was set up to promote dialogue and a coordinated response between NGOs, the government and donors. Further, its role is to support the coordination of the Second National Strategy and Action Plan for Disaster Mitigation and Development (2001-2020). This strategy stresses awareness raising, stakeholder participation, minimizing loss of life and property, and the importance of co-existence with floods in relevant situations (Chaudhry and Ruyssschaert, 2007).

In 2008, the Prime Minister approved a National Target Programme to respond to climate change. Underpinning this decision, the Ministry of Agriculture and Rural Development announced a plan to invest VND 20 trillion in upgrading the

coastal dike system to withstand an increase in storm surge and flood inundations. As a complementary component to the program, mangroves have been incorporated as a protective mechanism for the constructed dikes. Whilst there is no legislation in place that promotes mangrove restoration and rehabilitation as a dedicated climate change adaptation measure, there are numerous mangrove projects that have been initiated by NGOs supported by international development organizations and donors. Climate change adaptation has also been mainstreamed into forestry-related activities and the Ministry of Agriculture and Rural Development coordinates a number of smaller projects linking climate change adaptation with mangroves.

While promoting mangrove restoration and rehabilitation as a climate change adaptation measure is still relatively new in Vietnam, disaster risk management has been promoted nationally for the last two decades as an intervention to reduce the impact of flood and storms as well as other risks such as environmental pollution, saline intrusion, and loss of biodiversity. The prominent program that addresses these risks is entitled “Restoration and Development of Coastal Mangrove Forest (2008-2015).” The key institutions implementing this program include: the Ministry of Agriculture and Rural Development as the national coordinator; the Ministry of Natural Resources and Environment (MONRE); technical agencies of the Ministry of Agriculture and Rural Development; and the People’s Committee in 29 coastal provinces as the implementing agencies.

In 2008, the Vietnam Administration of Seas and Islands was established under the Ministry of Natural Resources and Environment. Its role is to ensure that different sectors implement a coordinated approach in terms of coastal development. A supporting mandate of this department, written into the legislative framework, is to initiate an Integrated Coastal Zone

Management process. Mangrove forests are not specifically included in the draft plan; however, a senior official from the administration indicated that mangrove forests will be included in a future revision (pers. comm., MONRE, November 2010). The same official suggested that the inter-sectoral cooperation and stakeholder consultation is inadequate owing to limited resources and capacity and, thus, the priorities reflected in the draft Integrated Coastal Zone Management plan are essentially those of the Ministry of Natural Resources and Environment in terms of coastal development (ibid.). A similar risk exists that the new program for dike construction may follow the same path and, therefore, by default will prioritize the agenda of its host, the Ministry of Agriculture and Rural Development. In other words, each Ministry follows its own institutional legacy and prioritizes self-interest with limited interaction with other ministries.

Lessons from the implementation of the Central Committee for Flood and Storm Control suggest that this program has been successful in ensuring that actions reflect the views of participating stakeholders (pers. com. MARD 2010). One key explanation is that the program’s committee’s chair is the Prime Minister, who is accountable only to the National Assembly and therefore ostensibly neutral.

Strategic Environmental Assessment is another relevant planning process in actions across different sectors in Vietnam. In 2005 it was written into legislation under the law on Environmental Protection.⁶ Strategic Environmental Assessment’s scope is to mainstream environmental protection, social development and resource management considerations into the impact assessment of policies, programs and plans. Although Strategic Environmental Assessment has not been fully operationalized, it has great potential to foster inter-sectoral cooperation and stakeholder consultation,

⁶ Law on Environment Protection, National Assembly, Decision 52/2005/QH11, 29 November 2005

as seen during a pilot assessment of Strategic Environmental Assessment in the review of hydropower development in Vietnam and the preparation of the power sector development plan (Ministry of Industry and Trade, 2009). Recently Strategic Environmental Assessment has been also piloted in the forestry sector.

Local Governance of Adaptation in Vietnam

The function and approach by which mangrove restoration and rehabilitation is implemented as a measure varies particularly between the North and the South. This variability is not by design through the type of strategic planning expected from the Vietnam Administration of Seas and Islands and Integrated Coastal Zone Management processes, but because of the bio-physical variability mentioned earlier, and more importantly, because of the fundamental differences in the governance regimes between North and South Vietnam. There is North-South differentiation in the way laws, decrees and programs are interpreted and implemented by provincial, district and local governments. One key piece of legislation in this regard is the application of the land and forest law. According to Land Law (Art. 5), all land in Vietnam is state property. In a revision that was made to the Land Law (Art. 19) in 1992 and in accordance with the market liberalization process in Vietnam, individuals or household can now gain exclusive rights to land

under a leasehold arrangement not exceeding 50 years. Within the current Land Law, land with mangrove forests is referred to as forest land.

All forestry development today is coordinated under the National Forestry Development Strategy which will run from 2006 to 2020. The stated objective of this strategy is to create a favorable legal environment for forest activities and mainstream a market orientation whilst ensuring the broad participation of different stakeholders. Forest land has been classified under three forms of land-use: protection forest, special use forest (nature reserves and national parks) and production forest. By 2010, nearly all forest land had been allocated to individuals, with the exception of special use forest which remains under the authority of provincial governments. Protection forest has been allocated to collectives (groups of households), such as village associations, with the management responsibility being retained by the provincial or district government level. Plantation production forest has been allocated to individuals and households (with an upper allocation limit of 30 ha) and government-owned forestry enterprises and companies. Natural forest has been allocated to government forestry agencies (see Table 2 for more information about tenure and land use rights associated with mangrove forest land).

Type of forest	Management body	Protection	Remarks
Protection⁷ forest	Owner: Government. Managed by government agency (forest management board, state forest enterprise, forest protection agency (belong to the Department of Rural Development), or district government)	Protected by: - local forest protection agency / forest management board - district/communes People committees - households/ individuals through contracting .	Located mostly in the North. Most of protective forest in the North is allocated to local associations (collectives).
Special use forest⁸	Managed by provincial government Department of Agriculture and Development.	Protected by: -local forest agency - district/communes -households/ individuals through contracting.	Located mostly in the South (Mekong delta). People who protect the forest share benefits.
Production forest⁹			Concentrated mostly in the South (Mekong Delta).
Natural production forest	Owner: Government. Managed by government agency (forest management board, state forest enterprise, forest protection agency or district government).	Protected by - local forest protection agency/ forest management board - district/communes - households/ individuals through contract.	Local people who protect the forest have a share in benefits.
Planted production forest	Owner: Government. Managed by government agency (forest management board, state forest enterprise, forest protection agency or district government) if the investment budget comes from local government.	Protected by - local forest protection agency/ forest management board - district/communes - people's committees ¹⁰ . Planted and/or protected by households /individuals through contract	Local people who have contract with forest owner to plant the forest have entitlements to benefits with people who invest their money in their allocated land. Local people who protect the forest share benefits.
	Owner: Local households /individuals if they invest their own money in their allocated/leased forest land.	Protected by forest owner (local households/ individuals).	Forest owner has all right to use of forest land including development of combined agriculture-fishery-forestry model.

Table 2: Mangrove Forest Tenure, Management and Use Categories

⁷ Protection forest to protect resources and mitigate natural disasters (De Jong, et. al., 2006)

⁸ Special use forest, for nature conservation, cultural heritage and tourism (De Jong, et. al, 2006)

⁹ Production forest to supply timber and non timber forest products (De Jong, et. al, 2006)

¹⁰ People's committees are an executive body of the government and are present at national, provincial, district and commune administrative levels.

Government statistics from 2000 show that 77% of mangrove forest land in Vietnam's southern provinces was allocated and leased to 33,000 households and 62 collective groups/organizations (Que, 2003). For example in 2005 there was 13,737 ha protection forest, 15,941 ha special use forest and 84,843 production forest in Ca Mau Province, located at the southern-most tip of Vietnam (Sam et al, 2005). In contrast to the South, almost all mangrove forests in Northern provinces have been classified as protection and special use forest and thus have been allocated to collectives such as village associations.

These fundamental differences in the forest allocation process have defined the operating conditions for mangrove restoration and rehabilitation. In the North, most forest land has not been allocated to individuals or households. This has led to the development of mangrove restoration and rehabilitation as a single purpose measure: protection. While in certain areas of the North, the small number of people who have a contract to protect the forest can develop agriculture- and fishery-related activities within the forest area, provided they adhere to existing regulations, on the whole, the benefit is for the collective, namely as a complementary measure to protect sea dikes, rather than for individuals. The few individuals who benefit directly are those who receive compensation for protecting or planting mangroves. It has also been noted that this compensation is barely sufficient as an incentive, leading to weak management and protection. This fact, coupled with the conflicts of interest between conservation and other land use, has led to illegal cutting and encroachment in many areas. This problem is magnified by the fact that many provinces tend to prioritize development over conservation and are reluctant to enforce rules if they constrain development, for example, within the aquaculture sector (Osbeck et al., 2010; Katoomba, 2010).

In the South, there is a diversity of tenure arrangements, ranging from individual for production forest, and collective and co-management for protection forest. A voluntary market defines the operating conditions for the goods and services provided by production mangrove forests. The outcome of this, at least in terms of production forest, is mangrove forest that is of a no/low regret character, providing protection against sea level rise and storm surge while also providing benefits for the local communities. 70% of mangrove remains classified as protection or special use. Indeed, it is likely that the amount of protective mangrove forest will increase significantly in connection with the decision to plant over 800 km of protective mangrove forest along the Vietnam coastline as part of the dike development program.

It can be assumed that it is entrenched institutional traditions in the North that have in part led to mangrove forest land being classified just as protective or special use forest. This unwillingness to move beyond collective management approaches may have its roots in the deeper political differences between the North and South. It may also stem from the fact that local and provincial governments in the North have strong stakes in promoting reactive approaches to address disaster risk, as one official suggested. Indeed, a very significant institutional structure in the North is maintained through the provision of disaster risk functions. Sea dike development, maintenance and repair are considered as core competencies. Further, it has been possible to fund these structural measures through substantial loans, credits and development funds made available by banks and donors. The long history of employing these types of measures has led to a structure within the governance system in which its stability is dependent on servicing disaster risk through structural measures. Indeed, a commonly expressed view is that the resistance to instituting successful mangrove programs is due to fear that they will reduce the long-term funding

available for the maintenance and repair of dikes. Moreover, there has been limited funding available from the public sector for so-called soft measures such as mangroves, as these type of investments have previously not qualified for bank loans.

Although, as one respondent suggests, the Integrated Coastal Zone Management process is not operating ideally at present owing to capacity and accountability challenges, the vision of Integrated Coastal Zone Management to chart a course to foster the future development of mangrove restoration and rehabilitation as an epistemic resilient climate change adaptation measure appears to hold great potential. In defining this planning process it must be recognized that the governance legacies are only partially shaped by the bio-physical realities. Lessons from implementing mangrove restoration and rehabilitation programs show that these planning processes need to embody a complex set of priorities defined by the different sectors and stakeholders. Moreover, the previous discussion suggests that planning should also be “pre-emptive” in response to changes articulated in different climate change scenarios. A logical conclusion therefore would be that ICZM should promote no/low regret mangrove forests given the high degree of uncertainty and diversity of priorities. Such a conclusion would also imply that it would be necessary to reassign much of the existing areas classified as protection forest to production forest, so it could be allocated to households to ensure that the benefits linked to mangroves were sufficiently attractive to motivate this form of land use. While at the household level this approach has the potential to enable multiple benefits and alternative development pathways, at a landscape level it does not perform equally well. Indeed this approach may reduce the diversity of benefits and pathways at this level. The reasons for this are discussed briefly below.

The earlier discussion suggested that one of the key issues undermining the capacity of mangrove systems to deliver adequate ecosystem goods and services in Vietnam is fragmentation. Further allocation of mangrove forest at the household level, at least under the present system in which only 30 ha can be allocated, is likely to amplify fragmentation of mangroves. In order to ensure that a sufficient critical mass of forest is available to deliver high quality ecosystem services, a market needs to be created which sufficiently compensates individuals engaged in protection and management of mangroves. This would imply that collective arrangements are also still desirable in order to sustain larger tracts of forest.¹¹ The benefits for those working within the collective must be sufficiently competitive compared to other forms of land use such as aquaculture. Public good forests (today’s forest classified as protective forest or special use forest) should also be planned to develop goods and services that are complementary or win-win from the perspective of the aquaculture sector or those dependent on sea harvesting from mud flats, for example. Integrated Coastal Zone Management should ideally be viewed as a patchwork of different mangrove forest types ranging across a continuum from single function to multi-functional, interspersed with other forms of land use. This process should be facilitated by drawing on an enabling institutional framework such as Integrated Coastal Zone Management to elicit consideration of the key priorities of stakeholders and sectors in the plan.

Vietnam’s governance structure is well adapted to enable a two-pronged approach to Integrated Coastal Zone Management planning. By deploying the market for goods and services, including the development of markets for public goods such as protection, water of good quality, biodiversity and

¹¹ Vietnam is running a forest programme entitled “rewarding the upland poor”. Its point of departure is providing compensation to farmers in the uplands for management of forest that provide public goods such as soil conservation, and bio-diversity (see <http://rupes.worldagroforestry.org/ourpeople/3>).

carbon storage,¹² incentives are being developed for individuals and collectives to engage in mangrove restoration and rehabilitation. Moreover, Vietnam's institutional structures are well equipped to foster collective approaches to natural resource management and production. As a result of Vietnam's direct democratic system, the planning horizons are much longer, than in many other representative democracies, where the shelf life of policy and programs is often only as long as the electoral term. The 20 year long National Action Plan for Disaster Mitigation and Management example of this. Long-term planning is crucial to programs supporting climate change adaptation measures such as mangrove restoration and rehabilitation.

CONCLUSIONS

Vietnam has a strong reactive capacity to address natural disasters and this is reflected in the country's governance structures. These structures have shaped the development of mangrove restoration and rehabilitation as a measure to address natural disasters and more recently as an action to adapt to climate change.

The case of mangrove restoration and rehabilitation uncovers multiple realities characterizing the different interests associated with the management of the coastal resources. It shows that approaches aimed at the single objection of protection of coastal infrastructure can lead to conflicts of interest and hinder implementation. Moreover, their development on basis on a single function – designed to address climate change – makes the success of the intervention unpredictable owing to the extreme uncertainty associated with climate change projections.

The implementation of mangrove restoration and rehabilitation, nested within a no/low-regret action planning process, is more likely than the single objective approach to secure a greater set of benefits across stakeholder groups, even in a future characterized by uncertainty. A precondition to this type of implementation is integrative frameworks such as Integrated Coastal Zone Management and Strategic Environmental Assessment, and a governance system that enables the active participation of stakeholders and sectors. In this regard when Integrated Coastal Zone Management becomes part of legislation, then mangrove restoration and rehabilitation can be championed by the legislative structures that actively promote multi-stakeholder participation and long-term planning horizons. Moreover, the ideologies underpinning Vietnam's hybrid socialist-oriented market economy shows a capacity to enhance benefits and incentives at the household level and through collective mangrove forest land tenure arrangements, which ultimately can improve the overall implementation of mangrove restoration and rehabilitation as a climate change adaptation action.

¹² One additional potential benefits that should be explored in this regard is potential of Mangrove forest hold in terms of carbon storage and the possibilities for benefits being made available by way of the CDM and REDD mechanisms (see Katoomba, 2010).

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APPENDIX 1

Below is a table listing a number of the key laws, policies, programmes and decisions are in different ways defining the operating environment for mangroves as a climate change adaptation measure.

Policy/program	Period	Issues	Budget	Coordinating institution	Implementing agency
Law on land	1987-2009--	Property rights	No budget Identified	MONRE	Line agencies (MONRE) Department of Land Management
Law on protection and development of forest	1991-2004--	Protection and Development	No budget Identified	MARD	Line agencies (MARD) Directorate of Forestry (DOF)
Law on environment protection	1993-2005--	Protection	No budget Identified	MONRE	Line agencies (MONRE)
Plan to restore and upgrade the sea dike and dike system in the estuary areas in the Cuu Long delta	1999-2007		2,310 billions VND	MARD	Line agencies (MARD) DDMFC Other related Ministries
Program to restore and upgrade the sea dike system from Quang Ninh to Quang Nam	From 2006		10,000 billions VND ¹³	MARD	Line agencies (MARD) DDMFC Other related Ministries
Program to restore and upgrade the sea dike system from Quang Ngai to Kien Giang	2009-2020		19,481 billions VND	MARD	Line agencies (MARD) DDMFC Other related Ministries

¹³ For the period 2006-2010

Law on Biodiversity	2009--	Ecosystem Services	No budget Identified	MONRE	Line agencies (MONRE) MARD (DOF) and line agencies
Law of Fishery	2003--	Production	No budget Identified	MARD -	Directorate of Fishery and line agencies MONRE/MOH
National strategy for Environmental Protection	2003-2010-2020	Ecosystem	No budget Identified	MONRE	Line agencies (MONRE) Other Ministries and its line agencies
National strategy for management of natural protected area systems	2003-2010	Ecosystem services	No budget Identified	yet to be identified	MOST, MONRE, MARD, MOET, MOC, PPCs and its line agencies
Decision on conservation and sustainable development of wetland areas	2003-	Ecosystem and development	No budget Identified	MONRE	Line agencies (MONRE) MARD and its line agencies PPCs
Vietnam Forestry development strategy	2006-2020	Production	106,759 billion VND (estimated)	MARD	Directorate of Forestry Other line agencies (MARD), MONRE, MOST, MOTI, General Statistic Office, MPI, MOF, PPCs
National Action Plan for Biodiversity Protection	2007-2010-2020		No budget identified	MONRE	Line agencies (MONRE), MARD, MOST, MOET, MOC, MPI, MOF, MOFA

National Strategy for Natural Disaster Prevention, Response and Mitigation	2007-2020	Protection	No budget Identified	MARD	All Line Ministries CFSCs at different level PPCs
National Target Program to Respond to CC	2008 - 2015	Protection	1,965 billion VND ¹⁴	MONRE	All Line ministries PPCs
Restoration and development of coastal Mangroves forest	2008 - 2015	Protection	2,248 billions VND	MARD	Line agencies (MARD), DOF, MONRE, PPCs
National Program on plantation of 5 million ha of forest	1998-2010	Production	31,650 billions VND	National Steering Committee, National Program Management Board, lead by MARD	Line agencies (MARD), PPCs Local Program Management
Integrated coastal management program for the North Central Coastal region (1) and Central Coastal region (2)	2007-2010-2010	Protection Development	650 billions VND MONRE	MONRE	Line agencies (MONRE) Related ministries and provinces

¹⁴ This amount excludes the funds for implementation of the Action Plan of Ministries, sectors, and localities. The structure of the financial source is: foreign capital 50%; central budget 30%; local budget 10%; private and other contributions 10%)

Acronyms above:

MONRE	Ministry of Natural Resource and Environment
MARD	Ministry of Agriculture and Rural Development
MOST	Ministry of Science and Technology
MOC	Ministry of Construction
MOH	Ministry of Health
MOET	Ministry of Education and Training
MPI	Ministry of Planning and Investment
MOF	Ministry of Finance
DOF	Department of Finance (provincial level)
PPC	Provincial People Committee
CCFC	Central Committee for Flood Control
DDFC	Department of Dike Management and Flood Control

APPENDIX 2

Key respondents consulted in order to complement this paper with additional information

Order	Interviewees	Agency
1	Mr. Nguyen Duc Ngai	Vice director, Directorate of Forest, MARD
2	Mr. Nguyen Van Le	Former vice Director, Department of Dyke management and Flood and Storm Control, MARD
3	Mr. Ngo Dinh Que	Expert, Forest Research Institute, MARD
4	Ms. Le Yen Thu	Vice director, Marine Conservation and Development (Vietnamese NGO)
5	Dr Nguyen Chu Hoi	Vice director, Vietnam Administration of Sea and Island, MONRE
6	Mr. Nguyen Thanh Hoang Song	Director, Management Board of Con Chim ecological zone Binh Dinh Province
7	Mr. Nguyen Van Nhung	Officer, Department of Natural Resources and Environment of Binh Dinh Province
8	Mr. Nguyen Duy Lam	Officer, Fishery Division, Department of Agriculture and Rural Development of Binh Dinh Province
9	Ms. Pham Minh Thoa	Director, Science, Technology and International Cooperation Department, Directorate of Forestry
10	Mr. Nguyen Truong Thanh	Researcher Director, Science, Technology and International Cooperation Department, Directorate of Forestry