Feasibility Study: Improving resilience of vulnerable coastal communities to climate change in Vietnam

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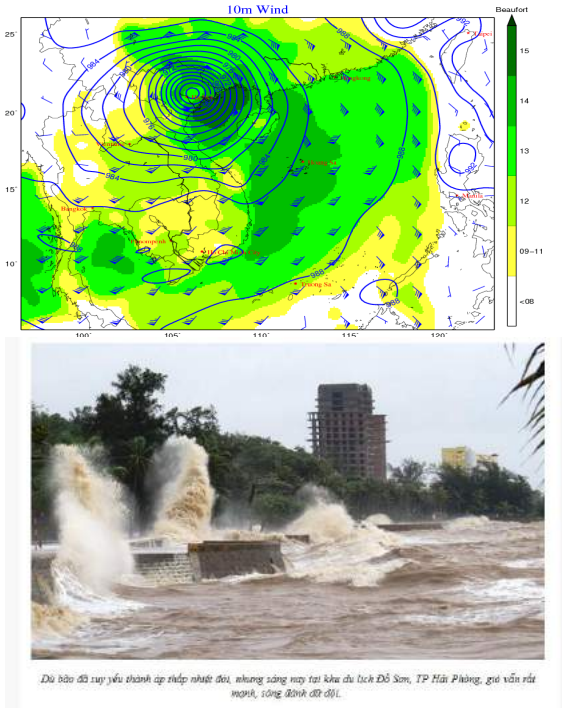

Dù bão đã suy yếu thành áp thấp nhiệt đới, nhưng sáng nay tại khu du lịch Đồ Sơn, TP Hải Phòng, gió vẫn rất mạnh, sóng đánh dữ dội.

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List of Acronyms

DANA:	Damage and Needs Assessment
DMC:	Disaster Management Centre
DRR/M:	Disaster Risk Reduction/ Management
CCA:	Climate Change Adaptation
CCFSC:	Central Committee for Flood and Storm Control
CBDRM: Community Based Disaster Risk Management	
CBDRA:	Community Based Disaster Risk Assessment
GCF:	Green Climate Fund
INDC:	Intended Nationally Determined Contribution
IPCC:	Intergovernmental Panel on Climate Change
IUCN:	International Union for the Conservation of Nature
JANI:	Joint Advocacy Network Initiative
MARD:	Ministry of Agriculture and Rural Development
MOC:	Ministry of Construction
MOET:	Ministry of Education and Training
MONRE:	Ministry of Natural Resources and Environment
MPI:	Ministry of Planning and Investment
NPP:	Net Primary Production
NTP-RCC:	National Target Program to Respond to Climate Change (2007)
SEDP:	Socio-economic development plan.
ToT:	Training of Trainers
ToF:	Training of Community Facilitators
UNDP:	United National Development Program
VAST:	Viet Nam Academy for Science and Technology
VINASARCOM:	Vietnam National Committee for Search and Rescue

Executive Summary

This feasibility study was commissioned as part of preparation for an investment proposal to the Green Climate Fund to improve the resilience of coastal communities to climate related impacts in Viet Nam. The objective of the study is to: identify existing and potential priorities for coastal resilience building in Viet Nam; to establish baseline data for the project to serve as the basis for adopting a comprehensive sustainable strategy for project implementation; and, identify priorities for developing pilot sustainable financing mechanisms and recommend an action plan for implementation at both national and sub-national levels.

Research for the feasibility study was conducted over a ten week period between May and July 2015 by the UNDP Country Office in Viet Nam, together with consultancy support from UNDP's Bangkok Regional Hub office. Research included an extensive literature review and consultation with key stakeholders in Viet Nam and outside of the country. The literature review for the study consisted of review of recent guides and case studies on climate change adaptation in Viet Nam; existing documents on financing, CBDRM, risk assessment and resilience in Viet Nam and, as well as Government policies and programs. A series of consultation meetings were also held with key stakeholders in Viet Nam in June 2015, including roundtable meetings with MARD officials, consultation meetings with MPI, and a 'write-shop' with key stakeholders from MARD and MOC. During the write shop in June 2015, options for resilience strengthening were presented and criteria for pilot projects were discussed. This study was prepared as part of a set of technical studies, socio-economic studies and financial feasibility reviews being undertaken to inform project development.

The report begins by reviewing the policy framework for adaptation and resilience in Viet Nam, and then examines the priority areas of mangrove regeneration, safer housing and risk informed planning in more detail, including reviewing existing pilot projects with potential for scale up and replication, key lessons learned from these pilots, and financial information and models. It then summaries a number of key findings and recommendations for consideration in further planning, and provides additional relevant background materials in a series of annexes to the report.

Overall, the feasibility report finds that Viet Nam has a strong policy based for both climate change adaptation and disaster risk reduction. A number of key legal documents, strategies, and plans have been developed in recent years, including: The National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (2007) and accompanying Action Plan National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020; The National Target Program to Respond to Climate Change (2007) [NTP-RCC] and the The National Strategy on Climate Change (2011).

The general targets of the climate strategy are to bring into play the whole country's capacity in simultaneously taking measures of adapting to the impacts of climate change and cutting down greenhouse gas emissions in order to secure people's safety and property as well as for the sake of sustainable development. It also aims to strengthen people and natural systems' adaptability to climate change while developing a low-carbon economy in order to protect and improve quality of life, guarantee national security and sustainable development in the context of global climate change, and proactively work with the international community in protecting the earth's climate system.

Shelter accounts for the highest amount of monetary losses in climate related disasters. Housing is often the single largest asset owned by individuals and families. It is also the location where other family-owned assets (tools, furniture, stored food, etc.) are concentrated and where many activities fundamental to livelihoods and education occur. Resilient shelters are central to the adaptive capacity of most households. Adaptive capacity is the ability to retain and deploy assets to meet emerging needs as conditions change.

Shelters that reduce or avoid losses under current conditions enable families to retain and build the asset base required to respond to future conditions. Furthermore, because most housing is renewed at periods of 30 years or less (particularly in developing countries), promoting safer housing is an essential component of consolidating sustainable development at the household level. While the costs of direct house construction are relatively low in Viet Nam (a safe two story home of two stories can be constructed for approximately US$5,000) the affordability of this investment is beyond the reach of poor families living on less than US$1 per day. In addition, the calculation of costs will be significantly impacted by the availability of credit, and potential interest rate calculations. For local Government, its essential that these investments are linked to appropriate land use regulation and associated investments in basic infrastructure and services. As such, successful housing projects should consider access to finance for the poor, integrating risk mapping and land use planning in designs, and ensuring associated investment in local infrastructure as part of the provincial budget process.

Mangroves play an essential role in maintaining uniformity of the environment, coping with climate change and generating income. Mangroves create barriers against the intrusion of sea water, storm surge and the impacts of rising sea levels. They also provide essential habitat for fish, crabs, aquatic animals and organism in estuaries. Acknowledging the importance of mangroves, the Vietnamese government has carried out many activities to restore the forests through the program "Mangrove Restoration and Development in the period of 2008-2015". Although restoring mangroves is a cost effective adaptation strategy, replanting and regeneration requires technical skill as well as attention to apply locally feasible solutions and to maintain forests once regenerated. In the first phase of the Government project, it was difficult to establish mangrove areas and rate of established forest was only about 50 %. Reasons for the failure were low seedling quality, a lack of protection of seedlings from the physical effects in the early stage of growth and a lack of species diversity selection and suitable planting methods in each specific site. [1] More recently pilot have addressed these issues and enabled success rates to be increased to over 80%. Government data shows a rapid decline in mangrove cover in Viet Nam since the 1940s to the present date (see chart below). Recent policies however are beginning to stem this decline, and increasingly mangrove preservation and regeneration is seen as a clear Government priority.

There is a clear need to apply integrated coastal management approaches in all 29 coastal provinces. This should include improved risk assessment, planning and capacity development. Management and reasonable use of coastal areas/natural resources should be integrated with other spatial approaches and land use planning. A renewed emphasis on the management, prevention and mitigation of coastal pollution and environmental hazards could also be considered that incorporates climate change co benefits. Increasing community participation and strategies to reinforce livelihoods will be key to this work.

[1] RESTORATION OF COASTAL MANGROVE FOREST IN VIETNAM: CONSERVATION AND DEVELOPMENT OF THE KIEN GIANG BIOSPHERE RESERVE PROJECT; Evaluation Report, February 2012 (unpublished)

Viet Nam has made considerable progress in developing a strong institutional base for effective climate change adaptation in recent years. The National Strategy on Climate Change and the recent Climate Change Law are key policy milestones. The Government has also been clear regarding the importance of both mitigation and adaptation action, and is committed implementing plans both to reduce emissions and protect development through adaptation. However, it is clear that any policy agenda for mitigation must include adaptation actions that have immediate benefits particularly to poorer households in exposed areas.

Viet Nam's policy framework is also beginning to be backed up by clear action to implement adaptation, but these efforts remain small scale and often fragmented. They are also under-funded, and funding constraints are reducing the effectiveness of technical solutions to promote adaptation. Successful pilots exist but these are not being scaled up and opportunities for complementarity to deepen impact are not yet being fully explored. Capacity is unevenly distributed, and there is a need to strengthen linkages and to leverage synergies between different Government technical departments.

In terms of pressing adaptation needs, coastal resilience to storms, sea level rise and associated impacts is a clear priority both in policy and human terms. Efforts to manage coastal flood and storm risk in the context of Viet Nam must be core to any adaptation effort. Given the rapid pace of urbanization and demographic pressures in these areas, efforts should not be delayed, or Viet Nam risks being locked in to unsafe planning and housing patterns for the next generation.

It is also clear that the full potential of actions such as mangrove regeneration have co-benefits in both in term of mitigation, disaster risk reduction and livelihoods that should be fully explored. The issue of integration is however key- programs operate currently in 'siloes' and efforts to regenerate mangroves struggle to convince local populations of their worth. These should be embedded in wider development issues that show how forest regeneration has community benefits not only in maintaining traditional livelihoods, but in protecting assets and development gains.

While the costs of direct house construction are relatively low in Viet Nam (a safe two story home of two stories can be constructed for approximately $5000) the affordability of this investment is beyond the reach of poor families living on less than $1USD per day. In addition, the calculation of costs will be significantly impacted by the availability of credit, and potential interest rate calculations. A numbers of studies on valuation of total economic values of mangroves have been conducted in Viet Nam and this shows that total economic value of mangroves is very significant. Total value of mangroves range is very site specific, ranging from 1,349 – 13,133 USD/ha/year, with a mean average of about 4,200 USD/ha/year. The costs CBDRM commune level implementation applying the Government methodology range from approximately 3,500-8,000 USD depending on the accessibility and size of the commune. Costs for risk mapping and database development cost a fraction of potential losses. In Viet Nam over the past 20 years, natural disasters have resulted in a total loss of life of 13,035 persons average of 652 lives per year), with major damage to residential housing and public-sector property, agriculture, and infrastructure (irrigation, transport, power and telecommunications) valued at VND 91 trillion (US$ 6.4 billion) or an average of VND 4,547 billion (US$ 322 million per year) in current prices. Over this period the annual costs of natural disasters have been equivalent to an average of about 1% of GDP with a peak loss of nearly 3% of GDP in 2006.

Based on this core analysis, the following recommendations are made for consideration in the development of future GCF adaptation proposals for coastal areas:

- Potential actions are closely aligned with National Strategies and with existing Government programs and plans.

- Improving access and understanding of climate change risk information is essential. Without improved access to data and analysis, current investments cannot fully reach their potential. The proposed research into topics including storm surge, salt water intrusion, sea level rise and typhoon impacts on communities and key sectors is important.
- Improving loss and damage accounting, both in terms of current and potential future climate actions should be a priority.
- Access to safe housing, as a key asset of poor families in rural areas can be an effective approach to create tangible and immediate adaptation benefits. Efforts to integrate green approaches, such as energy efficiency or solar power access may wish to be considered. This should be coupled with green municipal design elements that aim to maintain key resources like ground-water and to reduce the footprint of new housing developments.
- Mangrove regeneration projects have shown good results, but success rates can vary considerably based on the approaches employed, and actions considering replication must employ enhanced approaches. There will need to be careful consideration of the extent that GCF projects can engage in replanting, which can be cost in excess of $10,000 USD per hectare, compared to regeneration which can be achieved in easier locations at fraction of the cost. In addition, careful consideration will need to be paid to whether only mangrove regeneration or other techniques, such as grasses, can be deployed in some areas based on the ecological profile of the area.
- Maintaining or improving livelihoods should be considered in all planning.
- Clear indicators to ensure the participation of women and other vulnerable groups will also be key. Information work must enshrine the importance of gender and age disaggregated data collection. This should be complemented by strategies to actively require participation from a range of community constituencies in project design and decision making. Efforts to specifically strengthen two-way information flow in a context like Viet Nam which has benefitted from a strong history of centralized decision making should be encouraged.
- Government systems are still overly reliant on paper and phone communication, and are not effectively leveraging information technology particularly at sub-national level. Projects should consider how information technology can be harnessed to both support information dissemination, collation and analysis. This capacity exists within Viet Nam's private sector but is not yet part of a regular government systems.

1. Introduction

According to an index of the vulnerability to the impacts of climate change over the next 30 years, Viet Nam is ranked 23rd of 193 countries and is one of 30 "extreme risk" countries. The Climate Change Vulnerability Index (CCVI) evaluates 42 social, economic and environmental factors to assess national vulnerabilities across three core areas, including (1) exposure to climate-related natural disasters and sea-level rise; (2) human sensitivity, in terms of population patterns, development, natural resources, agricultural dependency and conflicts; and (3) future vulnerability considering the adaptive capacity of a country's government and infrastructure to address climate change effects. The countries most at risk are characterized by high levels of poverty, dense populations, exposure to climate-related events; and their reliance on flood and drought prone agricultural land[2.]

The Ministry of Natural Resources and Environment (MoNRE), Viet Nam has applied global emissions scenarios for Viet Nam based on the global scenarios taken from the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2007). There are six different global socio-economic scenarios associated with certain levels of future greenhouse gas emissions and consequently more or less severe climatic changes. MoNRE has chosen three of the six scenarios for local use. Of those, the B2 medium emissions scenario: 'an estimate temperature rise of 2.4 °C with a likely range of 1.4 to 3.8 °C and a sea level rise likely range of 20 to 43cm' is officially proposed as the main basis for Vietnamese climate change projections and planning[3]. In 2009, MoNRE published the report: "Climate change, sea level rise scenarios for Viet Nam". The report was updated in 2011 with data for each province. The updated climate change scenario report also includes trends in the climate extremes[4].

The B2 scenario will lead to an average annual temperature rise in Viet Nam by 2100 of about 2-30C compared to the last decades of the 20th century.[5] The temperature increase will be felt especially in Ha Tinh, Quang Binh and Quang Tri provinces. However, recent scientific data suggests that the world is still on a high emissions pathway, and according to the A2 high emissions scenario the average annual temperature rise would be as much as 3.70C in the north-central coastal region.

The frequency of 'hot' days and 'hot' nights has increased significantly since 1960 in every season, with an especially high rate of 'hot' days increase between September and November and 'hot' night increases in June to August.[6] Between 1960 and 2003, the average number of 'hot' days per year in Viet

[2] News in Maplecroft: Big economies of the future - Bangladesh, India, Philippines, Viet Nam and Pakistan - most at risk from climate change http://maplecroft.com/about/news/ccvi_2012.html

[3] MONRE (2009). Climate change, sea level rise scenarios for Viet Nam, Ministry of Natural Resources and Environment, Hanoi, Viet Nam.

[4] MONRE (2012). *Climate change, sea level rise scenarios for Viet Nam*, Ministry of Natural Resources and Environment, Hanoi, Viet Nam.

[5] MONRE (2012) assessment report for the National Center for Atmospheric Research (NCAR-CCSM3) and Common wealth Scientific and Industrial Research Organization (CSIRO-Mk3.0) models.

[6] World Bank (2011) : http://sdwebx.worldbank.org/climateportalb/doc/GFDRRCountryProfiles/wb_gfdrr_climate_change_country_profile_for_VNM.pdf

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, 315-356

41 ADB (2011). Climate change and migration in Asia and the Pacific. Asian Development Bank

Nam has increased by 29 (an additional 7.8% of days); and the average number of 'hot' nights per year increased by 49 (an additional 13.3% of nights)[7]. According to the B2 medium emissions scenario, the number of days above 350C will increase by about 15-30 days[7]. This is a good indicator of the probability of excessively hot weather, which could cause crop failures and deaths from hyperthermia of especially elderly people and children.

If mean temperature rises by 10C, the number of heat waves increases by 100 to 180%, while the number of cold surges decreases by 20 to 40 percent. In the North Central Coast, Central Highlands and Southeast regions mean summer temperatures for 2100 are projected to increase by 3.10C - 3.70C in the B2 medium emissions scenario9, the number of heat waves would thus increase three to six times. [8]

Climate change will increase annual total rainfall everywhere in Viet Nam. According to the A2 high emissions scenario, average rainfall is estimated to increase by up to 10% during the 21st century, and will increase by as much as 18% in the Red River Delta area, falling especially in the wetter months (June to November).

The probability of extreme rainfall events and flooding will also increase, especially in northern regions including cities such as Hanoi (which suffered from unseasonal and extreme rainfall in, e.g. November

In contrast, during the dry months (December to May), average rainfall in southern Viet Nam will decrease by as much as 14%, especially in South Central Coast and Central Highlands regions. In northern Viet Nam, average rainfall will reduce by about 4% in this period, especially by up to 10% in North Central Coast region. Decreasing rainfall in dry months in combination with an increased number of 'extreme' hot days above 350C will lead to increased drought risks. Drought risks rise further because of higher temperatures that increase evapotranspiration.

With increased rainfall in June to November in Viet Nam as well as other riparian countries of the Mekong and Red rivers, there is a strongly increased risk of river flooding. Examples include the devastating river floods that hit the Mekong Delta in 2000, 2001 and 2011 – some of the worst in living memory. In 2000 and 2001, respectively 481 and 393 people perished – the majority of who were children; about 900,000 houses were damaged in 2000 and 350,000 in 2001. The floods in 2011 caused 85 deaths - out of which 75 were children; 177,000 houses were damaged. Increased damming and diversion of water from the Mekong and Red rivers for hydroelectricity, agriculture, industry and household use may reduce the risks of peak floods in the wet season but may have unexpected consequences for risk over the longer term, because they influence risk-taking behaviour. [9] Later diversion in upstream parts of the river basins is increasing and, notably, many dams are being planned

[7] University of Oxford, School of Geography and the Environment, Research: Climate systems and policy http://www.geog.ox.ac.uk/research/climate/projects/undp-cp/UNDP_reports/Vietnam/Vietnam.hires.report.pdf

[8] SR Viet Nam (2010) Viet Nam's Second National Communication under the United Nations Framework Convention on Climate Change. Hanoi: Socialist Republic of Viet Nam, Ministry of Natural Resources and Environment; p 86

[9] Lebel, L., B.T. Sinh, P. Garden, S. Seng, L.A. Tuan, and D. Van Truc, 2009: The promise of flood protection: dykes and dams, drains and diversions. In: Contested Waterscapes in the Mekong Region: Hydropower, Livelihoods and Governance [Molle, F., T. Foran, and M. Kakonen (eds.)]. Earthscan Publications, London, UK, pp. 283-306. Cited in IPCC, 2012: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, UK, and New York, NY, USA, 582.

in the mainstream of the Mekong river (in China, Laos, Cambodia)10, which is highly likely to reduce the dry season water flow and negatively affect water supply and agriculture downstream.

Rising sea levels have been observed over the past decades along the coasts of Viet Nam. According to the National Climate Change Strategy (2011), in Viet Nam, sea level has risen by 20 cm over the past 50 years14. Mean sea level rise is accelerating and will affect significantly the Mekong Delta and Ho Chi Minh City, parts of the Red River Delta and also a significant coastal strip, including small estuaries. The highest IPCC emissions scenario (A1F1) leads models to estimate a global maximum rise in mean sea levels of 59cm by 2100, due to thermal expansion of warmer sea water. According to the B2 emission scenario utilized by the Government for planning purpose, the official Vietnamese prediction is 75 cm, accounting for some melting of land ice. In 2007 the IPCC could not agree on taking into account the melting of land ice, but since then new evidence shows that it is very likely a significant contribution to mean sea level rise in the 21st century.[11]

Viet Nam's own planning parameter is a one meter rise in mean sea levels by 2100, which is consistent with predictions according to the A2 high emissions scenario whilst accounting for some melting of land ice. This figure is used in the National Target Programme to Respond to Climate Change (NTP-RCC), approved by the Prime Minister in December 2008 and in the National Climate Change Strategy in 2011. A one meter mean sea level rise by 2100 is increasingly likely, and according to some of the data published after the IPCC's Fourth Assessment in 2007, mean sea levels may rise by as much as 1.5 meters by the end of this century.

Without major action such as dyke reinforcements and improved drainage, a one meter rise in mean sea levels along the coast of Viet Nam would cause an estimated threat of inundation to 17,423 km2 or 5.3% of Viet Nam's total land area[12]. Specifically, it would threaten 39% of Mekong Delta, 10% of Red River Delta, over 2.5% of Central Coast provinces, and more than 20% of Ho Chi Minh City[13]. Moreover, 33 out of 63 provinces and municipalities, or 5 out of 8 economic regions, are threatened by severe inundation. Among these 33 provinces and municipalities, Kien Giang, Ca Mau, Hau Giang, and Soc Trang are the four provinces that will be most affected by mean sea level rise. With a sea level rise of one meter, Kien Giang has 3,896 km2 or 62.5% of land threatened with inundation, Ca Mau 2,733 km2 or 52.7%, Soc Trang 1,620 km2 or 49.6%, and Hau Giang 1,397 km2 or 86.5% of its land area[14.] The effects of sea level rise on saline water intrusion are significant, especially for the Mekong River Delta. In the period of 1980-1999, the 4‰ salinity level reached about 22.0km in the Red River; 27.5km in the Thai Binh River (in northern Viet Nam); 18.1 km in Thu Bon River (near Hoi An); 73.8km in Sai Gon River; 49.9 in Hau

[10] See: ICEM (2010) Strategic Environmental Assessment Of Hydropower on the Mekong Mainstream Final Report, ICEM – International Centre for Environmental Management, Prepared for the Mekong River Commission, October 2010

[11] Reference: M. Rummukainen, J. Räisänen, H Björnsson & J. Hesselbjerg Christensen, 2010. Physical Climate Science since IPCC AR4: A brief update on new findings between 2007 and April 2010. TemaNord 2010:549. Nordic Council of Ministers http://147.251.192.9/gw/s/nordic_update.pdf

[12] IMHEN (2010a) Sea level rise scenarios and possible disaster risk reduction in Viet Nam, Institute of Meteorology, Hydrology and Environment, Page 24-25. The mean sea level rise and inundation threat data in that report are an update of similar data in MONRE (2009) Climate change, sea level rise scenarios for Viet Nam, Ministry of Natural Resources and Environment, Hanoi, Viet Nam

[13] MONRE (2012)

[14] 18 IMHEN (2010a), page 26

19 IMHEN (2010b) Impacts of climate change on water resources and adaptation measures, Institute of Meteorology, Hydrology and Environment, page 70-71

River (Mekong Delta); and 95km in Vam Co Tay River (Mekong Delta, Long An province). With one meter mean sea level rise, by the end of the 21st century, the 4‰ contour line will penetrate 4.5km further inland into the Red River, 3.8km into the Thai Binh River, 9.1km into the Thu Bon River, and 7.9km further into Sai Gon River, respectively.

1.1 Objective

This feasibility study was commissioned as part of preparation for a possible Green Climate Fund project for Viet Nam to improve the resilience of coastal community to climate related impacts in Viet Nam.

The objective of the study is to: identify existing and potential priorities for coastal resilience building in Viet Nam; to establish baseline data for the project that serves as the basis for adopting a comprehensive sustainable strategy for possible project implementation; and, identify priorities for developing pilot sustainable financing mechanisms and recommend an action plan for implementation at both national and sub-national levels.

1.2 Methodology and consultation process

Research for the feasibility study was conducted over a two-month period from May-June 2015 through an extensive literature review and consultation with key stakeholders in Viet Nam and outside of the country. The literature review for the study consisted of review of recent guides and case studies on climate change adaptation in Viet Nam; existing documents on financing, CBDRM, risk assessment and resilience in Viet Nam and, as well as Government policies and programs. A series of consultation meetings were also held with key stakeholders in Viet Nam in June 2015, including one roundtable meeting with MARD officials, one consultation meeting with MPI, and one 'write-shop' with key stakeholders from MARD and MOC. The team also conducted individual meetings or telephone interviews with a range of national and international experts. During a write shop in June 2015, options for resilience strengthening were presented and criteria for pilot projects were discussed. The team was also able to conduct a field mission to central Viet Nam to meet key provincial officials from the region, and to interview a number of stakeholders, including a number of current safe housing and CBDRM programme beneficiaries.

This study was prepared as part of a set of technical studies, socio-economic studies and financial feasibility reviews being undertaken to inform project development.

Although there is a rich literature of studies and documentation of previous pilot projects in Viet Nam, this study was limited in its timeframe and ability to conduct in depth field verification of data. The Government of Viet Nam was very helpful in sharing available data and expertise with the team, although gaps in some data remain. Key areas for further consideration in the future include more in-depth analysis on the performance of the financial model for the current housing grant-loan scheme, and additional quantitative analysis of mangrove benefits to local economies and livelihoods.

The report begins by reviewing the policy framework for adaptation and resilience in Viet Nam, and then examines the priority areas of mangrove regeneration, safer housing and risk informed planning in more detail, including reviewing existing pilot projects with potential for scale up and replication, key lessons learned from these pilots, and financial information and models.

It then summarizes a number of key findings and recommendation for consideration in further planning, and provides additional relevant background materials in a series of annexes to the report.

2. Climate Change & Coastal Vietnam

The climate risk index by Germanwatch of most countries of the world is made up of GDP losses (in purchasing power party, PPP) and death as a result of climatic extremes such as typhoons, heavy rainfall, and drought. This index shows that over the period 1990-2010 all the ten most affected countries were developing countries. Over that period, globally more than 650,000 people died from nearly 14,000 extreme weather events, with GDP (PPP) losses more than USD 2.1 trillion.

Viet Nam ranks sixth over that period, with annually on average 445 human casualties and average annual GDP (PPP) losses of USD 1.8 billion (in PPP, purchasing power parity) and 1.2 percent of GDP[15.]

The years, 2009, 2010 and 2011 were marked by unusual weather patterns in Asia and elsewhere, including extreme rainfall and major floods, heat waves and also cold spells. For example, Pakistan's 2010 floods left an estimated 6 million people in need of shelter16. All these extremes are associated with global warming, even though individual weather extremes cannot be ascertained as caused by climate change. According to NASA, 2010 and 2005 were globally the warmest years on record (since 1880), followed by 1998, 2002, 2003, 2006, 2007 and 200917. In-depth scientific analysis shows the emergence of a new category of "extremely hot" summers, "with mean temperature at least three standard deviations greater than climatology". In the past few years extreme anomalies have covered about 10% of the Earth's land area, as "a consequence of global warming." In mid-2009 an El Niño period developed, associated with (temporarily) higher temperatures, droughts as well as floods and damaging tropical storms, including typhoons[18.] In 1991-1992, El Niño contributed to famine in Southern Africa and caused billions of dollars of damage. The El Niño in 1998 also caused drought, crop failure and forest fires in for example, Indonesia and Amazonia, as well as flooding in Asia and elsewhere.

Recent research in Viet Nam also concludes that drought is closely correlated with El Niño, i.e. the chances of droughts increase significantly, especially in southern climate regions. The high mean global temperature in 2010 is remarkable especially because in the second half of 2010 El Niño switched to a La Niña situation, which is associated with relatively cooler weather. These are cyclical changes in weather patterns and whether they are affected by climate change is still unclear but climate change makes hazard events more extreme.

[15] Sven Harmeling (2011) Global Climate Risk Index 2012. Who suffers most from extreme weather events? Weather-related loss events in 2010 and 1990 to 2010. Bonn/Berlin: Germanwatch e.V.
[16] Climate and Development Knowledge Network (2012) Managing climate extremes and disasters in Asia: Lessons from the SREX report. CDKN, available online at www.cdkn.org/srex
[17] See various news releases, papers and data on http://www.giss.nasa.gov/ and http://www.noaa.gov/index.html
[18] James Hansen, Makiko Sato, Reto Ruedy (2012) Perceptions of Climate Change: The New Climate Dice, NASA Goddard Institute for Space Studies and Columbia University Earth Institute, Sigma Space Partners. http://www.columbia.edu/~jeh1/mailings/2012/20120105_PerceptionsAndDice.pdf

Viet Nam experiences an average of 6-8 typhoons annually[19]. During ENSO years typhoons appear to be more intense, stronger and with landfall over a wider area. Past observations do not bear out a change in the typhoon pattern or in intensity in the Western Pacific/Southeast Asia as a result of climate change but intensification of hurricanes (typhoons) has been observed in the Southern Atlantic/Caribbean region. Nevertheless, the possibility of gradual intensification of tropical storms and typhoons exists, according to an update of the IPCC's fourth assessment of 2007[20], also in Southeast Asia. Furthermore, damage potential from tropical storms and typhoons appears to increase as a result of increasing population density in exposed areas and higher value economic infrastructure in these areas. The Government has placed strong emphasis on structural measures, such as dykes and seawalls. The country has over 10,600km of 6-9m high river dykes and 2,600km of 3.5-5m high sea dykes that need further expansion and reinforcement[21]. The Government has invested considerably in the dyke system and has ambitious plans for the next decade to expand upon this.

2.1 Key issues for Climate Change Adaptation in Viet Nam

ADB has estimated that the cost of additional stresses and potential losses from climate change on real GDP by 2050 will be 1-3 percent compared with a baseline situation that assumes no climate change.[22] ADB predicts that by 2100 the potential losses caused by climate change to Indonesia, the Philippines, Thailand, and Viet Nam may be as high as $230 billion, or 6.7% of annual GDP (projected GDP in 2100), if the world does not invest in greenhouse gas emissions mitigation to avoid dangerous climate change[23]. They considered the most likely emissions scenarios and modelled climate change effects including rising sea levels, higher temperatures, falling agricultural yields and increasingly extreme climatic events. [24]This estimate is well above the global average cost of climate change effects. An example for the economic losses is the deluge in Thailand in October 2011 that costed $40 billion, the most expensive disaster in the country's history. For example, transportation infrastructure is often damaged or destroyed by storms and floods. During the period of 2001-2005, extreme weather events cost the transportation sector VND 2,571 billion in damage. If mean sea level rises by one meter, 11,000 km of roads could be submerged, i.e. it would be under additional stress unless this infrastructure is made

[19] Nguyen Trong Hieu, Pham Thi Lan Huong, Vu Van Thang and Nguyen Thi Lan (2012) Drought and the relation between ENSO and drought. Paper presented at the 15th National Conference on Meteorology, Hydrology, Environment and Climate Change, Hanoi; page 39-45

[20] Markku Rummukainen, Jouni Räisänen, Halldór Björnsson, Jens Hesselbjerg Christensen (2010). Physical Climate Science since IPCC AR4. A brief update on new findings between 2007 and April 2010. Copenhagen: Norden / Nordic Council of Ministers

[21] UN Viet Nam (2012). Sustainable poverty reduction and natural disaster risk management in the central coastal region: Lessons learned and policy implications

[22] ADB (2009). The economics of climate change in Southeast Asia. Asian Development Bank

[23] Monash University (2010). The Economics of Adaptation to Climate Change: Macro Level Assessment for Viet Nam. Centre of Policy Studies. Melbourne. This is referred to also on page 25 of: World Bank (2010) Viet Nam Development Report 2011: Natural Resources Management. A joint development partner report to the Viet Nam Consultative Group Meeting, Hanoi, December 7-8, 2010 32 Counting the cost of calamities in the Economist http://www.economist.com/node/21542755

[24] Page 84 in: SR Viet Nam (2010). Viet Nam's Second National Communication under the United Nations Framework Convention on Climate Change. Hanoi: Socialist Republic of Viet Nam, Ministry of Natural Resources and Environment

"climate proof".[25] The total length of national highways threatened by inundation in the country will be 695 km and in the Mekong Delta alone 495 km, without measures taken.[26]

A World Bank assessment of the economics of adaptation concludes that as a result of climate change impacts on agriculture the total GDP in 2050 could be reduced by 0.7%-2.4%, depending on which greenhouse gas emissions scenarios and climate change models are chosen. The models used also suggest that by that date the benefits of adaptation measures are 1.3-1.6% of total GDP and so could outweigh the costs. Based on studies of several sectors of the Vietnamese economy, they assert that climate change affects the poorest people mostly, and that appropriate adaptation actions can help avoid the impacts on the poorest. The adaptation measures proposed are mostly "no regret" actions such as increased agricultural research, development and extension; expansion of irrigation for rice and other crops; and maintenance and upgrading of sea dikes and flood defences to protect urban areas and high value agricultural land, especially in the Mekong and Red river deltas.[27]

Disasters, environmental degradation and climate change pose significant and increasing threats to the achievement and sustainability of positive development outcomes. Synergies between these threats and development trajectories are complex. For example, increasing climate variability raises the magnitude, intensity and frequency of extreme events, triggering more disasters. While infrastructure projects could positively affect resilience to disasters and climate change, their environmental impacts can negatively affect resilience. Failure to adequately account for disaster, environment and climate change can leave beneficiaries of interventions with increased exposure and vulnerabilities to disaster, climate, and environmental impacts.[28]

HUMAN MOBILITY AND CLIMATE CHANGE

Three forms of human mobility are of particular importance in Viet Nam: displacement due to disasters, migration - as a proactive or reactive response to climate change, and resettlement/relocation as a long term government response to climatic hazards.[29] It is likely that depending upon investment in sea defence and effective adaptation options, a large number of people will have to move due to climate change and environmental degradation. Viet Nam ranks 6th among countries in the world with the highest proportion of its urban population living in Low Elevation Coastal Zones.[30] A comparative study of 84 developing countries of the effects of rising sea levels suggests that as a result of a one meter mean sea level rise, 10.8 percent of the Vietnamese population could be affected – the highest

[25] Page 84 in: SR Viet Nam (2010). Viet Nam's Second National Communication under the United Nations Framework Convention on Climate Change. Hanoi: Socialist Republic of Viet Nam, Ministry of Natural Resources and Environment

[26] IMHEN (2010a), page 59

[27] World Bank (2010). Economics of Adaptation to Climate Change: Viet Nam. The World Bank.

[28] Guy Jobbins and Dang Thu Phuong; The Case of Viet Nam: Advancing integration of disaster, environment and climate change; ODI Integration Series, Australian Government; 2014, p3

[29] At the international level, displacement, migration and relocation were included within the adaptation framework of the Cancun Agreements in December 2010

[30] LECZ is normally defined as the coastal area maximum 10 meter above mean sea level. See Hugo, G. (2008). Migration, Development and Environment, IOM Migration Research Series, No. 35, International Organization for Migration (IOM), Geneva - figure 8 (page 36): Viet Nam ranks 6th among countries with the highest proportion of their urban populations in the LECZ and 7th among countries with the largest urban populations in the LECZ. See also: Gordon McGranahan, Deborah Balk and Bridget Anderson (2007) The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones. In: Environment and Urbanization 2007 19: 17. Sage Publications on behalf of IIED.

percentage among the countries analyzed.[31] The IPCC (2007) has identified the Mekong Delta as one of three 'extreme' global hotspots in terms of potential population displaced as a result of mean sea level rise. By 2050, as many as one million people risk being displaced in the Mekong Delta (see figure below).[32] Actual displacement is expected to be a result of many factors, including repeated floods and droughts causing accumulated stress on livelihoods. Vulnerable people may migrate temporarily or permanently. Women, children and elderly in particular are vulnerable to flooding and water supply problems.

Cities and industrial parks are also affected. Poorer urban dwellers often live in areas with low quality drainage and flood protection infrastructure, whilst during floods critical services such as clean water supplies are often severely disrupted. Relative vulnerability of coastal deltas as shown by the indicative population potentially displaced by current sea-level trends to 2050 (Extreme = >1 million; High = 1 million to 50,000; Medium = 50,000 to 5,000). Past experiences with environmental degradation suggests that climate change will reinforce existing migration patterns rather than creating new ones. The scale of migration, both internal and cross-border, is expected to rise significantly over the next decades, but only partly as a result of climate change. In Viet Nam, in the absence of comprehensive statistical data, some studies point to environmental pressures as triggers for migration in places where livelihoods are already under stress, for example because of multiple crop failures caused by drought or floods.[33] In Viet Nam rural to urban migration has been significant in recent years, with the urban population increasing by 78.2% from 1990 to 2007.[34] According to statistics of the department of urban development, ministry of Construction, by June 2010 the total population of all urban areas was 33.12 million, accounting for 38.6% of the nation's population, in which the inner city population was 26 million, accounting for 30.5% of national population.[35]

Projections show that the numbers of urban population in Viet Nam who are at risk of multiple hazards (including climatic hazards) may more than triple from 21,158,000 in 2000 to 68,383,000 in 2050.[36]

Migration is often seen as the result of a failure to adapt to a given situation. Migration is, however, also a possible and often successful adaptation strategy[37], especially at early stages of environmental degradation. Migration reduces the reliance on the environment for livelihoods and therefore helps to reduce vulnerabilities to the effects of climate change. For example, qualitative studies undertaken in Viet Nam suggest that remittances from migrant workers add non-"climate-dependent" income to the

[31] Dasgupta, S., B. Laplante, C. Meisner, D. Wheeler, and J. Yan (2007). The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis, World Bank Policy Research Working Paper 4136

[32] This is figure 6.6 and see also box 6.3 (page 327) in: Nicholls, R.J., P.P. Wong, V.R. Burkett, J.O. Codignotto, J.E. Hay, R.F. McLean, S. Ragoonaden and C.D. Woodroffe (2007). Coastal systems and low-lying areas. In: Climate

[33] Dun, O. (2009). Viet Nam case study report - Linkages between flooding, migration and resettlement, EACH-FOR – Environmental Change and Forced Migration Scenarios

[34] ADB (2012). Addressing Climate Change and Migration in Asia and the Pacific. Asian Development Bank

[35] GSO (2009). Viet Nam Population and Housing Census 2009: Migration and Urbanization in Viet Nam: Patterns, Trends and Differentials.
http://vietnam.unfpa.org/webdav/site/vietnam/shared/Census%20publications/7_Monograph-Migration-Urbanization.pdf

[36] ADB (2012). Addressing Climate Change and Migration in Asia and the Pacific. Asian Development Bank

[37] Foresight (2001). Migration and Global Environmental Change. Final Project Report. The Government Office for Science, London.

household and are often used to balance environmental stresses that affect household income.[38] Resettlement/relocation is a government instrument to stabilize livelihoods of people in disaster prone areas in Viet Nam.[39] One of the largest programs of its kind is the "living with the floods program", where residential cluster were built in the Mekong Delta for relocation. By 2015 up to 135,000 households will be relocated for environmental reasons.[40]

FORESTS

The total area of mangrove forests reduced from 400,000 ha in 1943 to less than 60,000 ha in 2008.[41] Sea-level rise will speed up mangrove-fringed shoreline and estuarine erosion, and could wash away mangroves. For one meter mean sea level rise in the southern region, a total of 300 km2 of mangrove forest could be excessively inundated, corresponding to 15.8 percent of the total national mangrove forest area. Mangrove cover should, however, expand rather than contract, because mangroves are protecting dykes, land and people from the impacts of typhoons and storm surges, and are important for marine biodiversity and local livelihoods. Existing mangrove afforestation programmes have facilitated the development of a broad range of social projects and mangrove-related livelihood activities.

By far the largest benefit identified through mangrove afforestation concerns the mangroves' carbon value. Carbon value is calculated by adding the carbon stored in the trees and the carbon stored in soil and then subtracting the CO2 emissions of these forests through soil respiration. According to a recent evaluation report, one hectare of a nine-year old mangrove forest contained 48.02 t of carbon in trees, the equivalent of 176.26 t of CO2. The top 100 cm of soil contained 92.18 t of carbon, which compares to 50.76 t stored in a bare mudflat. The (positive) impact of mangroves on carbon storage in soil is thus 41.[42]
t per hectare, the equivalent of 152.01 t of CO2. The CO2 emissions from one hectare of mangrove forest were found to be minor at only 1.32 t CO2. The overall CO2 equivalent accumulated in one hectare of mangroves is 326.95 t. In addition, a nine-year old forest can absorb another 99.59 t of CO2 per year. Extrapolating from locally conducted research on accumulated carbon and CO2 absorption capacity, the report also estimated that the 8,961 ha of mangroves planted under the Red Cross programme (~4.27% of the total hectares of mangroves in the country) will have absorbed at least 16.3 Mio t CO2 by 2025. Assuming a price of USD20 per t of CO2 emissions and having applied the discount rate of 7.23%, this represents a value of USD 218.81m[42.]

A recent independent cost-benefit analysis reported that the cost of upgrading a dyke by concretizing costs US$200,000/km. Concretization was not necessary where wide and dense mangrove forests

[38] Adger, W. N. (1999). Social vulnerability to climate change and extremes in Coastal Viet Nam, World development Vol.27, No.2
[39] Vietnam (2007). National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020, Hanoi. See specific objective 2 d).
[40] Zetter, Roger (2011). Protecting environmentally displaced people Developing the capacity of legal and normative frameworks, Oxford.
[41] MARD Decision No. 1267/QĐ-BNN-KL (4 May 2009) Announcing the Current Forest Resource Management of the Country (for area of mangroves in 2008); referred to in: World Bank (2010). Viet Nam Development Report 2011: Natural Resources Management. A joint development partner report to the Viet Nam Consultative Group Meeting, Hanoi, December 7-8, 2010, page 72.
[42] IFRC and Red Cresent Societies; Case Study of Mangrove plantation in Viet Nam: measuring impact and cost benefit analysis; 2011; https://www.ifrc.org/Global/Publications/disasters/reducing_risks/Case-study-Vietnam.pdf

already lined a dyke. The analysis assumed that a dense mangrove forest with a width and length of 1km each as a similar protective function for dyke as well as a commune and its assets located behind the dyke. Such a mangrove forest of 100ha in size would cost only USD 84,300 (On average, 1ha of planted mangrove trees costs US$843/km) – less than half of the assumed costs of concretization[43]. Viet Nam has 16 million hectares of officially designated forestland, of which about 10 million hectares are classified as natural forest, almost 3 million hectares are plantations, and 3 million hectares is known as bare land and denuded hills that are usually covered with scrubs and grasses.[44] Forest cover increased on average by 236,200 hectares per year between 1990 and 2000, or an average annual reforestation rate of 2.5%. However, Viet Nam lost 299,000 ha of primary forest over the period 1990-2005.45 Between 1990 and 2009, Viet Nam increased its forest cover from 27 percent of total land to nearly 40 percent.[46]

AGRICULTURE

Without large-scale action, land in the Mekong Delta and also elsewhere in Viet Nam will be increasingly inundated with saline water. Saline water intrusion into estuaries is caused by opening up (draining) of deltas and for example reduced dry season river flow as a result of reduced water retention upstream from for example deforestation, as well as reduced dry season rainfall. Mean sea level rise increases the saline water pressures as well. This means that surface water for irrigation is affected and that groundwater is salinizing too, so soils and crops are already being be affected. According to the Ministry of Agriculture and Rural Development (MARD)[47] there are 1.6 million hectares land of cultivation in the coastal areas in Viet Nam, of which paddy land is 0.9 million hectares. Sea level rise will affect severely the cultivable land in coastal areas, with nearly 1.1 million hectares (70%) threatened by sea level rise of one meter[48,] of which more than 930,000 hectares is in Mekong Delta. Kien Giang is the most affected province with almost 75% of its cultivation land being threatened[49.] UNDP[50] has estimated that: "The Mekong Delta area of Viet Nam, the country's 'rice basket', is a densely populated region that accounts for half of the country's rice and even more of its fisheries and fruit products. By 2030, rising sea levels in the Delta – where four million people live in poverty – would expose 45 percent of the land to extreme salinization and crop damage, with rice productivity falling by 9 percent. Projections indicate

[43] Page 69 in: SR Viet Nam (2010). Viet Nam's Second National Communication under the United Nations Framework Convention on Climate Change. Hanoi: Socialist Republic of Viet Nam, Ministry of Natural Resources and Environment

[44] See: Decision No. 2140/QĐ-BNN-KL of the Minister of Agriculture and Rural Development (9 August 2010); MARD (2009). 2009 Forest Sector Development Report. Prepared for the FSSP Annual Review Meeting in 2 February 2010, Hanoi; and World Bank (2010). Viet Nam Development Report 2011: Natural Resources Management. A joint development partner report to the Viet Nam Consultative Group Meeting, Hanoi, December 7-8, 2010, page 72.

[45] UN-REDD program in Viet Nam (2010). Viet Nam Forest Facts and Figures.

[46] See: Decision No. 2140/QĐ-BNN-KL of the Minister of Agriculture and Rural Development (9 August 2010); MARD (2009) 2009 Forest Sector Development Report. Prepared for the FSSP Annual Review Meeting in 2 February 2010, Hanoi; and World Bank (2010) Viet Nam Development Report 2011: Natural Resources Management. A joint development partner report to the Viet Nam Consultative Group Meeting, Hanoi, December 7-8, 2010, page 72

[47] MARD (2008) Master plan for Agriculture and Rural Development in Coastal Areas in Viet Nam for the National Marine Economic Development Strategy to 2020, cited in IMHEN 2010, page 62

[48] IMHEN (2010a), page 62

[49] IMHEN (2010a), page 63

[50] UNDP (2007) Human Development Report (2007-08) – Fighting climate changes: human solidarity in a divided world. United Nations Development Program

that Viet Nam's gains over 15 years in reducing poverty, as well as solid progress towards achieving the Millennium Development Goals, would be significantly affected". Scientists from the International Rice Research Institute (IRRI) agree that the effects of a sea level rise and related saline water intrusion can be grave. One IRRI scientist has said that "with Viet Nam so dependent on rice grown in and around low-lying river deltas, the implications of a sea-level rise are ominous indeed". Viet Nam, Thailand and India are the most rice exporters of the world. In 2010, they are together accounted 72% of total world rice exports[51]. According to FAO world paddy production for 2010 was 700.7 million tons (467.3 million tons milled). In 2010, Viet Nam and Thailand produced 39.9 and 30 million tons of paddy, and exported 6.83 and 9.03 million tons of milled rice, respectively[52.]

The combination of mean sea level rise, saline water intrusion, higher temperatures, and droughts puts pressure on total agricultural production, the incomes of farmers, local and national food security and rice exports, and is a structural upward pressure on global food prices, even though Viet Nam is still maintaining a very significant and growing export capacity because of productivity improvements. However, the Asian Development Bank (ADB) has estimated that climate change effects could hit rice and coffee production in Viet Nam from as early as 2020[53.] This would imply an increasing pressure on the world market price of rice because Viet Nam is one of the most important rice exporters. However, the total volume of rice traded globally against rice consumed is very small and many domestic staple food markets are regulated. So although world market prices may rise, actual food insecurity in other countries also depends on local production and the regulation of domestic markets.

WELFARE

ADB and IFPRI assessed the change in estimated number of malnourished children between 2000 and 2050 without climate change and under various climate change scenarios. This suggests that there would be a decline in number of malnourished children in Viet Nam without climate change (from 2.8 million in 2000 to 2.1 million in 2050) because of income and agricultural productivity growth. Climate change would eliminate much of the improvement. The number of malnourished children in 2050 might even increase by approximately 10%. However, if CO2 fertilization of crops is effective, the negative effect of climate change on child malnutrition is reduced by a half. [54]

[51] Rice Import Export http://www.riceimportexport.com/world-rice-trade-importers-and-exporters/
[52] Rice Market Monitor, January 2011, Volume XIV - Issue No. 1
http://www.fao.org/economic/est/publications/rice-publications/rice-market-monitor-rmm/en/
[53] News in Investment and Trade Promotion Center in HCM City
http://www.itpc.gov.vn/importers/news/2009/05/2009-05-04.821175/MISNews_view/?set_language=en
[54] ADB and IFPRI (2009). Building climate resilience in the agriculture sector in Asia and the Pacific. Asian Development Bank and International Food Policy Research Institute, page 87-88.

Maps of the Coastal and Risk mapping/assessment

List of Coastal provinces

Northern Coast	North Central Coast	South Central Coast	South East	South West
Quang Ninh	Thanh Hoa	Quang Nam	Ba Ria Vung Tau	Tra Vinh
Hai Phong	Nghe An	Quang Ngai	Ho Chi Minh	Soc Trang
Thai Binh	Ha Tinh	Binh Dinh	Long An	Bac Lieu
Nam Dinh	Quang Binh	Phu Yen	Tien Giang	Ca Mau
Ninh Binh	Quang Tri	Khanh Hoa	Ben Tre	Kien Giang
	Thua Thien Hue	Ninh Thuan		
	Da Nang	Binh Thuan		

As outlined in the risk maps below based on a analysis of DesInventar data, historically the highest storm risk in Viet Nam is clustered in the north and center of the country, with flood risk being higher in the low lying southern and Mekong Delta regions.

Figure 1: Historical Storm Risk (1989-2010) [55]

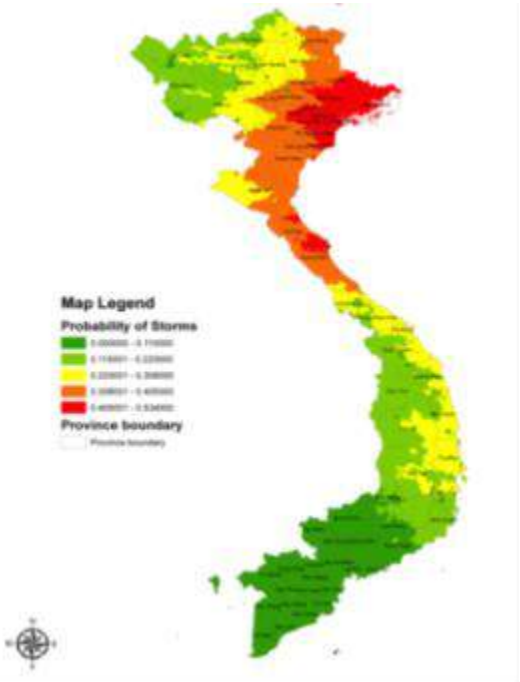


Figure 2: Historical Flood Risk (1989-2010)[56]

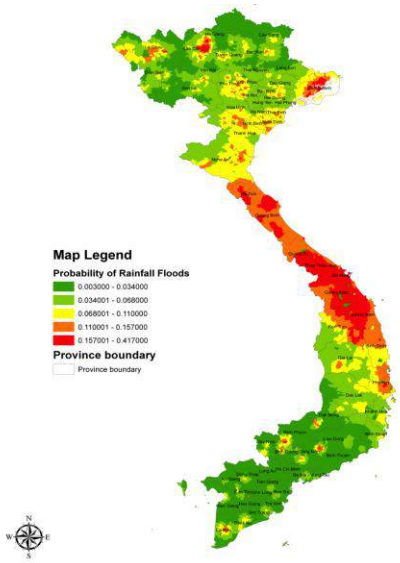
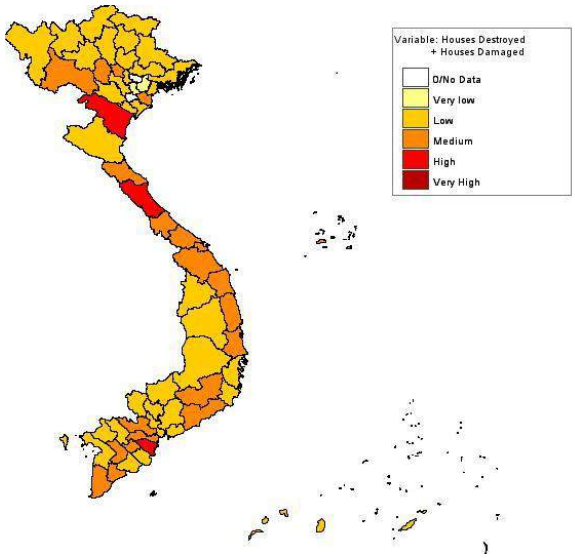


Figure 3: Recorded Damages and Losses of House in Vietnam 1989-2010[57]

[55] http://118.70.74.167:8081/DesInventar/
[56] http://118.70.74.167:8081/DesInventar/



2.2 United Nations and Resilience Building in Vietnam

The capacity of the Viet Nam delegation to the UNFCCC negotiations are being strengthened through training, seminars and workshops, and policy dialogues (UNDP and other UN organisations). Awareness is being raised, for instance by training and other engagement with the media and training of Vietnamese children and youth who attend climate change meetings (UNICEF, UNESCO and UNDP). The UN has four climate change related projects in many Ministries and is thus well placed to support inter-ministerial cooperation and promote a holistic approach to climate change.

The climate change policy project "Strengthening national capacities to respond to Climate Change in Viet Nam, reducing vulnerability and controlling GHG emissions" with MONRE and MARD is supporting climate modelling for regions in Viet Nam (climate change projections); implementation of the National Target Programme to Respond to Climate Change; building capacities of different stakeholders; supporting vulnerability and adaptation research; information management and awareness raising. (UNDP)

A project with MPI aims at strengthening capacity for integrating sustainable development and climate change into national social and economic plans and investment planning. The project provides policy-makers with information and tools in order to mainstream sustainable development into Social Economic Development Plans as well as the National Socio-Economic Development Strategy (SEDS). It focuses on capacity building and supports the Government in mainstreaming climate change in large climate change investment programs. It is also assisting the institutional framework for sustainable development, climate change and energy. (UNDP)

The UN is working with MARD and some local authorities on strengthening institutional capacity for disaster risk management, including the implementation of a national program on community based disaster risk management targeted at 6,000 vulnerable communes, 63 per cent of the total communes in the country. It has supported small-scale water management infrastructure, storm resistant housing

[57] http://118.70.74.167:8081/DesInventar/

and flood resistant schools; the strengthening of 'residential clusters' in the Mekong Delta in the context of flood risks. It is helping to improve Early Warning; to collect and report disaster damage data; and is addressing agricultural vulnerabilities for climatic extremes. The UN supports formulation of disaster risk management policies, a new comprehensive disaster risk management law, coordination and information management, and supports disaster preparedness and response. It also supports the development of Disaster Management Centres (DMCs) at the central and local levels. (UNDP, FAO and other UN organisations).

The UN has done and is doing research on vulnerabilities and adaptation options in collaboration with several national and international partners, including work on coastal rural livelihoods and climate change; gender aspects of climate change and climate change responses; migration, resettlement and climate change; urban development and climate change; children's vulnerabilities to climate change and disaster impacts in Viet Nam; and water and climate change.

The UN is supporting the Ministry of Education and Training (MOET) to implement its Action Plans related to Disaster Risk Reduction and Climate Change, through strengthening institutional leadership and systems capacity for coordination, planning, monitoring and response to disasters and climate change. This also includes support for integration of disaster risk management and climate change in the general education curriculum.

Community-based adaptation projects, to improve land management, use drought resistant crop varieties and change cropping calendars to deal with desertification and drought are supported by the Global Environment Facility (GEF). New adaptation projects are being developed, for example for funding from the Adaptation Fund.

3. Adaptation and resilience in Viet Nam

3.1 Policy Framework for climate resilience and adaptation in Viet Nam

Overall, Viet Nam has a relatively strong policy based for both climate change adaptation and disaster risk reduction. A number of key legal documents, strategies, and plans have been developed in recent years, including:

- The National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 (2007) and accompanying Action Plan National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020
- The National Target Program to Respond to Climate Change (2007) [NTP-RCC]
- Decision 1002/2009/QD-TTg on Approving the Plan for Community awareness raising and Community-based Disaster Risk Management (2009)
- The National Strategy on Climate Change (2011)
- Law on Natural Disaster Prevention and Control (2013)
- Decision 46/2014/QDD-TTg to regulate the forecast, warning and information transmission of disasters
- Decision 44/2014/QDD-TTg to regulate the level of disaster risk
- Other legal documents aimed at strengthening the organization and functions of the CCFSC, the VINASARCOM and its branches at ministries and localities (Decree 66/2014/ND-CP; Decision 76/2009/QD-TTg) and the mobilization, receiving, delivery, and management of relief aid (Decree 64/2008/ND-CP, Decree 67/2007/ND-CP (replaced by Decree 13/2010/ND-CP) and Decision 142/2009/QD-TTg, Decree 94/2014)

Among these legal documents, the National Strategy Climate Change and the Disaster Prevention and Control Law, the National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 can be considered the most important in exemplifying the shirt in viewpoint to emphasize disaster prevention and control in the context of climate change.

Efforts are now underway to implement these approved legal documents mentioned above. All 63 provinces have developed action plans to implement the National DRM Strategy as well as Provincial Committees for Climate Change. Most ministries and sectors represented in the CCFSC have developed action plans for the mainstreaming of DRR in their sectors. DRM action plans are already being implemented in many the provinces and sectors (e.g. dyke construction, relocation, embankments, training, awareness-raising, risk mapping, etc.).

Gender mainstreaming into DRR has been a key element of this approach to promote women's roles before, during and after the disasters occur. In 2013, the CCFSC also accepted the Vietnam Women's Union as an official member through the Decision 216/QD-PCLBTW.

Over the past years, provinces and some ministries have included the construction and reinforcement of the sea dyke system according to the new standards; the upgrading of embankments and the relocation of populations who live in areas frequently affected by natural disasters; training, awareness-raising, risk mapping, etc. A lot of provinces and ministries are developing action plans for CCA according to the requirement of National strategy on climate change. All provinces have developed an action plans for the implementation of national CBDRM program.

Some provinces have also begun to integrate DRR into provincial socio-economic development plans (SEDPs) for 2011-2015 as well as in sectoral 5-year Development Plans. The Agricultural, Forestry and Fisheries Sector Development Strategies (until 2020) have integrated the content of disaster prevention and control or the Ministry of Education and Trainings have integrated the content of disaster prevention and control into training program period of 2011-2015.[58]

Policies are also in place to support integrated coastal management both directly and indirectly, and there are numerous opportunities to strengthen implementation. For example:

- Agenda 21 for Vietnam (2004): Provides direction for sustainable development in Vietnam, in which the coast and sea is one of seven priorities
- National program on marine science and technology in years 2006 – 2010, which was recently extend up to 2020.
- National plan on comprehensive surveys on marine environment and resources (2006 – 2010, vision 2020), 3,000 billion VND for around 30 big projects. One of the tasks of this national plan is to provide inputs for building national database.
- A national system of 16 marine protected areas (MPAs) toward 2020 has been approved in May 2010. Most of them are near-shore or in the coastal areas, only two MPAs are off-shore which are Bach Long Vi in the Northern Bay (Gulf of Tonkin) and Nam Yet in Truong Sa archipelago (Spratly Islands).
- The national system of marine environmental monitoring has been established since 1995.
- The national project on socio-economic surveys in coastal areas and islands (2006-2010).
- Governmental Decree No. 25/2009 on Integrated Marine Resources Management and Environmental Protection dated 6 March 2009 (in force in May 2009).

While it is clear that a strong policy base exists for promoting resilience building, planning and implementation across ministries is still a challenge, and cooperation across programs and approaches is limited. New forums such as the Prime Minister's Climate Change Council are actively aiming to promote more integration of efforts, but may require further well targeted assistance and capacity development support.

3.2 Government priorities for resilience building

The **National strategy on climate change** was issued by Prime Minister Nguyen Tan Dung in Decision 2139/QĐ-TTg on December 05, 2011. The strategy highlights that as one of the worst affected countries, Viet Nam considers the response to climate change a vital issue and that Viet Nam's response to climate change must be closely attached to sustainable development toward a low-carbon economy, at the same time all chances should be utilized in order to renew the thought of development and improve the country's competitiveness and strengths.

The strategy aims to simultaneously adapt to climate change and reduce greenhouse gas emission, focusing on adaptation in the early stage. It outlines that response to climate change is a responsibility of the whole apparatus; the State's decisive role in management must be highlighted, enterprises' creativity and responsibility encouraged, socio-political and professional organizations and communities' participation and supervision brought into full play; it is also necessary to make full use of internal forces and international cooperation. The strategy requires that measures to cope with climate change must be systematic, integrated, interdisciplinary, interregional, and suitable to specific stages and international stipulations; they must be based on scientific foundations, traditional experience and indigenous knowledge; they must take into account socio-economic

[58] PROGRESS REPORT ON THE IMPLEMENTATION OF HYOGO FRAMEWORK FOR ACTION (2013-2015): Interim Report from the Government of Viet Nam, p10; www.isdr.org

effects as well as risky and indefinite factors of climate change. The strategy on climate change must has a century-long vision and be the foundation for other strategies.

The general targets of the climate strategy are to bring into play the whole country's capacity in simultaneously taking measures of adapting to impacts of climate change and cutting down greenhouse gas emission in order to secure people's safety and property as well as for the sake of sustainable development. It also aims to strengthen people and natural systems' adaptability to climate change while developing a low-carbon economy in order to protect and improve quality of life, guarantee national security and sustainable development in the context of global climate change, and proactively work with the international community in protecting the earth's climate system.

It has a number of specific targets which include:

- To guarantee food security, energy security, water security, poverty reduction, gender equality, social security, public health, and better livelihood as well as protect natural resources in the context of climate change;
- To turn low-carbon economy and green growth into main orientations for sustainable development; lower emission and higher absorption of greenhouse gases to become compulsory indicators of socio-economic development;
- To improve relevant parties' awareness, responsibility and capacity of coping with climate change; to develop scientific and technological potential and improve quality of human resource; to perfect the system of institutions and policies, to raise and effectively use financial resources for Viet Nam's higher economic competitiveness and status; to make use of opportunities brought about by climate change for socio-economic development; to encourage and popularize climate system-friendly ways of living and modes of consumption;
- To hardly work with the international community in coping with climate change; to enhance Viet Nam's international cooperation for effectively responding to climate change.[59]

The strategy outlines a number of priority activities with relevance to this feasibility study. These include actions aimed at:

- Proactively coping with natural disasters and monitoring climate and strengthening early warning systems.
- Modernising the observatory system and hydro-meteorological forecasting technologies in order to secure timely warnings and forecast of weather and climate extremes.
- Mitigating damages caused by natural disasters including review and design of development planning schemes and standards of construction in the regions regularly suffering natural disasters in response to the increase of natural disasters due to climate change; to consolidate and build up key and urgent works to prevent and respond to natural disasters;
- Apply the principle of "Four On-sites" while enhancing capacity of professional rescue forces. This work must be the key for directing the close coordination and collaboration among rescue forces, especially in responding to urgent situations;
- To take specific measures for fruitfully preventing and coping with natural disasters, flash floods and landslides;
- To craft a master planning scheme for socio-economic development in line with climate change, paying special attention to the increase of storms, floods, salt contamination, droughts, soil erosion, and environment degradation in key and highly vulnerable regions, including the Mekong Delta, Red River Delta, central coastal region, marine reserves and marine biodiversity parks;
- To speed up the schedule of afforestation and re-afforestation projects, encourage enterprises to invest in planting economic forests. Up to 2020, it is necessary to establish, manage, protect, develop and use 16.24 million hectares of land planned for forestry activities in a sustainable way; raise the forest coverage to 45%; sustainably and effectively manage 8.132 million ha of production forests, 5.842 million ha of preventive forests and 2.271 million ha of special-use forests;

[59] Full text of the Strategy is available on the Government of Viet Nam official information portal, at: http://chinhphu.vn/portal/page/portal/English/strategies/strategiesdetails%3FcategoryId%3D30%26articleId%3D10051283

- To design and implement programs on protecting and managing available natural forests, preventive forests, special-use forests, and production forests;
- To enhance the participation of the entire political system in interdisciplinary organization and collaboration for coping with climate change; to improve efficiency and validity of central-to-local-level management of climate change issues;
- To strengthen communities' capability and participation in activities of coping with climate change; to place importance on experience of on-site response and the role of local governments and grassroots-level mass organizations;
- To pilot and popularize the model of community with low-carbon livelihood; to change people's behaviour and ways of life towards climate friendliness in order to reduce greenhouse gas emission;
- To design proper methods through which all walks of life can access and use climate change information; to diversify modes of disseminating information of impacts, dangers and chances of climate change, paying attention to important communities and localities;
- To develop scientific specialties of managing, evaluating, monitoring and forecasting impacts of climate change on socio-economic development, health care, production and consumption;

The strategy also highlights a number of key programs to support implementation of the strategy including:

a) National Goal Program on Climate Change, with a plan for expansion in 2016-2025;
b) National Scientific and Technological Program on Climate Change;
c) Plan on modernizing forecast technology and hydro-meteorological observatory network up to 2020;
d) Program on water management and adaptation to climate change in the Mekong and Red River Deltas;
đ) Plan to appraise and monitor greenhouse gas emission and manage activities of reducing greenhouse gas emission;
e) Program on responding to climate change in Viet Nam's big urban areas;
g) Program on upgrading and improving the system of breakwater and river dike in conformity with climate change and sea level rising;
h) Plan on upgrading the community health care system in line with climate change and sea level rising;
i) Program on socio-economic development in residential islands in response to climate change and sea level rising;
k) Plan on piloting and popularizing models of community effectively coping with climate change.[60]

The strategy clearly underscores the need for mangrove regeneration and restoration, safe housing and livelihoods, community based disaster risk management approaches and improved information to underpin adaptation planning. These key areas are further explored below:

The **National strategy for natural disaster prevention, response and mitigation to 2020** was issued by Prime Minister Nguyen Tan Dung in Decision 172/207/QĐ-TTg on July 16, 2007. The

The goal of the strategy is to "mobilize all resources to effectively implement disaster prevention, response and mitigation from now up to 2020 in order to minimize the losses of human life and properties, the damage of natural resources and cultural heritages, and the degradation of environment, contributing significantly to ensure the country sustainable development, national defence and security."[61]

The strategy outlines a perspective in which:

1. Disaster management includes preparedness, response to and recovery of consequences caused by disasters in order to ensure the sustainable socio-economic development and national security and defense.
2. Government agencies, social organizations, economic organizations, armed forces, citizens, and foreign organizations and individuals living in the territory of Vietnam all are duty-bound to disaster prevention, response and mitigation.

[60] Full text of the Strategy is available on the Government of Viet Nam official information portal, at: http://chinhphu.vn/portal/page/portal/English/strategies/strategiesdetails%3FcategoryId%3D30%26articleId%3D10051283

[61] http://www.isgmard.org.vn/VHDocs/NationalPrograms/National%20Strategyfordisasterprevention2020.pdf

3. Disaster prevention, response and mitigation are joint actions of Government and citizens that effectively utilize state resources as well as take advantage of all possible resources of the community, national and international organizations and individuals.
4. Disaster prevention, response and mitigation shall be integrated into socioeconomic development master planning and plans of every region, sector, and nation-wide.
5. Disaster prevention, response and mitigation shall be giving priority to disaster preparedness, keeping studying on impacts of the global climate change, storm surge and other extreme climate phenomena for appropriate response actions. 6. Disaster prevention, response and mitigation shall be succeeding and unleashing traditional experience, learnt lessons and combining them with modern knowledge and technologies through international cooperation.

The strategy outlines a number of priority actions relevant to this feasibility study. These include actions aimed at:

a) **The program on improvement of legislation and policies** - Promulgate the Law on disaster prevention, response and mitigation. - Review, amend, supplement related legal documents. - Promulgate disaster relief and recover policies, preventing speculation and price increase, and supporting the environment and production rehabilitation after disaster. - Promulgate assistance policies for disaster prone areas. - Establish financially self-reliant fund for disaster prevention, response and mitigation. - Implement disaster risk insurance in some sectors

b) The program on consolidation of organizational structures - Annually, consolidate the steering mechanism for disaster prevention, response and mitigation at all levels. - Provide training courses to enhance capacities for staff working in the field of disaster prevention, response and mitigation. - Establish organizations supporting disaster management.

c) The programme to make and review planning - Define and map areas highly prone to flash floods, river and sea erosion, storm, earthquake, sea level rise, tsunami. Map out the flood areas to assess risks of flood and drought. - Review and amend the flood prevention and control planning of the Red River and Thai Binh River systems, of the Mekong River Delta, of rivers in the Central region, from Khanh Hoa to Thanh Hoa provinces, rivers in the South Central and the Eastern South of Viet Nam. - Review and amend river and sea dyke system planning - Review and amend the residential planning in flash flood and landslide prone mountainous areas and in erosion prone areas along riverbank, river mouth and coastal areas. - Review and amend the land use planning to link with disaster prevention and control. - Review and amend planning to protect and develop mangrove forests for sea dyke systems and in coastal areas. - Review and amend the construction planning in disaster prone areas. - Review and amend the integrated exploitation and management planning of river basins.

d) The programs on strengthening of disaster warning and forecast capacities - Strengthen flood warning and forecast capacities for the Red River Delta, Mekong River Delta, rivers in the Central region, Central Highlands and the Eastern South of Viet Nam. - Strengthen capacities to forecast and warn storm, flood, earthquake, drought, salty intrusion, and to warn tsunami. - Strengthening flash flood warning and forecast capacities for mountainous provinces

e) The programs on community awareness raising - Include disaster knowledge into school programmes - Conduct trainings for and disseminate information/knowledge/experience on disaster prevention, response and mitigation to communities living in disaster prone areas. - Disseminate information and propagandize on natural disaster issues via mass media.

f) The programs on forestation and protection of upstream forests: - Establish, manage, protect, develop and sustainably use 16.24 million ha of forestry land; increase the area of forest coverage to 42-43% by 2010 and to 47% by 2020. - Pay attention to develop and explore non-wood forestry products in the areas of protection forests to make forests protection beneficial to local people. - Plant trees to protect dyke systems.

g) The program on strengthening of disaster management capacities and science and technology application - Strengthen capacities for disaster management agencies from the central to local level, and for search and rescue forces. - Review and amend/supplement building codes in line with natural disaster characteristics in each region. - Apply scientific and technological advances as well as new techniques and materials for natural disaster prevention, response and mitigation. - Improve information and communication systems and management of

boats and ships at sea - Establish procedures to ensure safety for children, old and disabled people in disaster prone areas: - Establish volunteer networks for natural disaster prevention, response and mitigation

With regards to finance the strategy notes that:

The State budget ensures the investment for natural disaster prevention, response and mitigation projects and the contingency for disaster relief and recovery. The reserved state budget can be used for disaster prevention, response and mitigation if necessary. It can take advantage of ODA and FDI for disaster prevention and mitigation projects, giving priority of non-refundable ODA utilization for capacities strengthening and technological and management experience transfer. The State decentralizes to People's Committees of provinces and districts in investment and mobilization of legitimate resources for disaster prevention, response and mitigation. The strategy aims to gradually increase the annual budget for strengthening the management capacities, implementing new construction projects, upgrading and maintaining structures; and for projects of planning, of improving equipment and facilities for disaster forecast, warning, rescue, relief, and recovery and production rehabilitation. The State has policies to provide preferences and to protect legitimate interests of organizations and individuals investing in disaster prevention, response and mitigation, to encourage national and international organizations and individuals to invest in researching and applying science and modern technologies in the combination with traditional methods. It also aims to encourage national and international organizations and individuals to finance activities of disaster prevention, response and mitigation and conduct humanitarian and charity activities for disaster affected localities. Conduct studies to establish disaster insurance regimes and disaster self-financing funds.

The strategy also aims to ensure that 100% of local staffs who directly work in the field of disaster prevention, response and mitigation at all levels to be trained and strengthened of capacities for disaster prevention, response and mitigation; ensure more than 70% of population living in disaster prone areas to be disseminated of knowledge on disaster mitigation. [62]

Building Resilient Community - Community based Disaster Risk Reduction Programme - Decision 1002 (CBDRM): The Community Awareness Raising and Community-based Disaster Risk Management Programme (CBDRM) – so called Programme 100263 was approved by the Government in Decision No. 1002/QD-TTg on 13th July 2009 with the goal of raising community awareness; building capacity of local government and communities in disaster risk management in 6,000 hazard-prone communes - in order to reduce casualties and loss of property (caused by disasters); limiting the destruction of natural resources, the environment and cultural heritage caused; ensuring the sustainable development of the country, national security and defense. The programme sets the financial requirement of approximately US$ 50 million for 2009-2020, of which 45% will be from Government budget, 5% would be contribution from people and the remaining to be mobilized from international partners and other sources.

4. Safer housing

4.1 Background

Shelter accounts for the highest amount of monetary losses in climate related disasters.[64] Housing is often the single largest asset owned by individuals and families. It is also the location where other family-owned assets (tools, furniture, stored food, etc.) are concentrated and where many activities fundamental to livelihoods and education occur. Resilient shelters are central to the adaptive capacity of most households. Adaptive capacity is the ability to retain and deploy assets to meet emerging needs as conditions change.

Without such resources, individuals and households have limited options for adapting. While shelter design elements are important, design is only one aspect that contributes to resilient shelters; materials, training of

[62] http://www.isgmard.org.vn/VHDocs/NationalPrograms/National%20Strategyfordisasterprevention2020.pdf
[63] http://www.ccfsc.gov.vn/showlaws.aspx?ladid=42
[64] Comerio, M. C. (1997). Housing issues after disasters. Journal of Contingencies and Crisis Management, 5(3), 166–178. doi: 10.1111/1468-5973.00052

builders, and use behaviour are also central. Although such shelters may be technically feasible and economical, the private sector has little incentive to develop innovations for the poor and most vulnerable sectors.

Information asymmetries among poor urbanizing households and masons who are the de facto architects and engineers of the structures and the technology available contributes to losses in extreme flood, storm, and temperature events. Shelters that reduce or avoid losses under current conditions enable families to retain and build the asset base required to respond to future conditions. Furthermore, because most housing is renewed at periods of 30 years or less (particularly in developing countries), promoting safer housing is an essential component of consolidating sustainable development at the household level.

Designs that address current conditions and those anticipated over the short term can make a substantial contribution to the adaptive capacity of large population groups. Recurrent costs for responding to natural disasters represent a significant drag on the ability of governments and other organizations to invest in adaptation and resilience at a societal level. Shelter designs that are capable of withstanding storms, reducing the impact of flooding, and mitigating temperature are central to the ability of households, organizations, and governments to build and retain the assets required to respond and adapt to the impacts of climate change. [65]

Since the beginning of economic liberalization in Viet Nam in the 1990's housing space has improved significantly, with the country's average urban housing floor area rising from 5.8 square meters per head in 1996 to17.5 in 2010. Social groups such as students, workers at industrial parks, and urban low-income people have started to benefit from social housing programmes. The private sector has grown significantly, helping to bring buoyancy in housing and real estate markets. The real estate industry in general, including housing in particular, has contributed significantly to the country's GDP growth. The population is relatively young with a median age of 28 years. Viet Nam can be considered as under-urbanised or late in urbanising, with just 30 percent of its population living in urban areas. According to UN projections, the urban population will not exceed the rural population until 2040. [66]

In recent years the Vietnamese government has developed legislation covering subjects which have an impact on housing processes. For example the Land Law (2003), the Construction Law (2003), the Investment Law (2005), the Enterprise Law (2005), the Real Estate Business Law (2006) and the Urban Planning Law (2009) are just some examples of the efforts being made to create a legal environment for the housing market to work. Many laws and regulations have been enacted to ensure the right to use land and to own housing as well as legal provisions enabling the transfer and sale of these rights. Regulations have been enacted that aim to improve housing market mechanisms and insure fairer rules. Some decision making powers have been decentralised to local levels. Comprehensive urban development and housing policies have been articulated, and housing has been recognised as an important part of government socio-economic plans. As a result of all these measures, the country's housing stock has increased dramatically.

Certain decision making powers have been decentralised to local levels. Provincial people's committees (PPCs) are responsible for local housing development programmes, establishing city or provincial housing development funds, developing annual capital plans for housing development, and issuing regulations on selling and renting social housing. The government has encouraged the private sector to participate in the development of social housing.

The Ministry of Construction (MOC) has the primary technical oversight of the construction sector. The MOC is responsible for the state's management of construction, construction materials, housing, public works, architecture and development planning. The decision to grant a construction permit is made by the Chairman of the Peoples' Committee at the provincial level and the relevant director of the Department of Construction.[67]

Figure 4: Estimated New Household Formation in Rural Areas (2019-2049)

[65] Moench, M., & The Sheltering Team. (2014).Sheltering from a gathering storm: Synthesis report. Boulder, CO: ISET-International.
[66] Viet Nam Housing Sector Profile, UN Habitat, 2010
[67] Viet Nam Housing Sector Profile, UN Habitat, 2010

YEAR	POPULATION	ASSUMED HH SIZE (PERSONS PER HH)	HHS	ADDITIONAL HHS
2009	60.4	3.9	15.49	
2019	60.7	3.7	16.41	0.92
2029	57.8	3.5	16.51	0.11
2039	52.1	3.3	15.79	-0.73
2049	44.8	3.2	14.00	-1.79
Total	-	-	-	-1.49

Source: Viet Nam Housing Sector Profile, UN Habitat, 2010

Resilient housing designs can cost-effectively reduce losses by vulnerable communities due to floods, storms, and high peak daily temperature events. As climate changes, resilient designs contribute substantially to the adaptive capacity and resilience of poor communities by reducing structural, asset, and income losses. Access to affordable resilient housing designs and the funding required to implement them is especially important to the poor and near-poor who have access to land and housing. Shelter design measures cannot address the needs of the most marginalized groups, who are unable to access permanent housing or afford to make existing shelters resilient. These features contribute to the resilience of shelters to floods and extreme storm events. They are cost-effective and in some cases reduce costs below those of standard construction practices.

Access to affordable financing coupled with awareness and training of builders are the primary barriers vulnerable populations face in accessing climate resilient designs. In some areas, climate resilient elements are already being adopted by wealthy sectors of the population. Local masons and contractors are a key intervention area for training on climate resilient design principles. While shelter designs can reduce the impact of extreme storms and floods, the ability to address increases in temperature through shelter design changes alone is limited. Extended increases in hot season night time minimum temperatures in combination with humidity (the overall heat index) may prove particularly challenging without active cooling. [68]

In Viet Nam, risk of death from disasters is closely linked to housing quality. Disaster deaths have decreased in recent years in northern Viet Nam in part because of improved housing quality. The fact that many storm victims in central and southern Viet Nam live in bamboos or sub-standard structure is a major contributor to their high disaster risk levels.

This program, although very successful in helping many families at risk from expensive river based flooding to access improved homes, was noted to be less effective in helping coastal populations where the risk of extreme typhoons and associated impacts such as storm surge and excessive wind damage is highest. In particular, the traditional raised floor design is not effective for floods in areas where water levels due to typhoons can reach 3 meters or more.

4.2 Applicable pilot projects

On-going MOC targeted programme for disaster resilient housing in coastal Vietnam – Decision 48

Recognising the need for strengthened design specification for particularly high risk coastal areas, the Government developed a Target Programme to provide support policies and solutions for poor households to build storm and flood resilient houses in Central Region (2014-2016) that was approved by the Prime Minister Decision 48/2014/QĐ-TTg.

[68] Moench, M., & The Sheltering Team. (2014).Sheltering from a gathering storm: Synthesis report. Boulder, CO: ISET-International.

The programme was built on the pilot GoV programme in 2012 by MoC (Decision 716) to pilot 700 flood resilient houses to "living with floods" in 7 coastal provinces of Vietnam. The Final Report of the first phase of implementation covering 700 houses in 7 provinces was submitted to the Prime Minister in August 2013. A summary of key findings are provided below. [69] Overall there was high demand for the project, and ministries and agencies have done a good job of guiding, urging and test execution. Capital central budget support and loans under the provisions had been undertaken to schedule. Some provinces already allocated from the Budget further local support poor households build improved housing from their own budgets. The authorities of the commune, village officials have been actively propagate and disseminate policies, select the object support; while implementing good results mobilization, poor construction guide hut prevent floods.

This program focuses on the typhoon prone central coast, and aims to:

- Support 14 North Central and Coastal Central Provinces highly prone to flood/storm
- Prioritized target for 25,000 poor households of ethnic minorities, household living with special difficulties, households living in difficult locations. Of which, it targets 2014: 20% households, 2015: 40% households and 2016: 40% households
- Support VND12m/household (from combined central and local budget) for poor households; VND14m/household if living in difficult areas (as listed in Decree 1049/QD-TTg or VND16m/household if living in special difficulties communities. The support will be provided in 02 instalments (70% for first and 30% for second instalment)
- Local household access to 3%/year credit from Bank for Social Policy (Bank for the poor) in 10 years time, with 5 years concession period.

Programme targeting

The housing programme was built base on MOC survey for households that are highly at risk of flood and storm in the central coastal Vietnam. All targeted households are poor and living adjacent to river basins, estuaries, etc. where they are highly vulnerable to flood and flash flooding as well as medium vulnerable to storm risks.

The selection of the targeted beneficiaries of MOC under Decision 48 can be summarised as bellowing:

1. Selection criteria:
   - Household is currently the poor household following the Decision No. 09/2011/QĐ-TTg of the Prime Minister dated 30 Jan 2011 on the issuance of poverty criteria for the period of 2011-2015. The household must be in the list of poor households that is currently supervised by the Commune People's Committee. The household must be an independent household (separated from their household registration) for at least 02 years since the application of new poverty line under Decision No. 09/2011
   - The household is NOT concretized but does not have a raised foundation or sitting above 1.5m from the flood level, or
   - The household is concretized but does not have a raised foundation or sitting above 1.5m from the flood level
   - The household is under the housing programme supports of either Government, provinces, mass organisations, etc. but does not have a raised floor/sitting above the 1.5m from the flood level.
   - The household is not in the list of the housing support programme under Decision No. 22/2013/QĐ-TTg dated 26 April 2013 of the Prime Minister, specifically targeted for households whose members had served the army and contributed significantly during the war time.
2. Villages proposed the targeted beneficiaries following selection criteria and must be participatory and publically informed to all population in their communities. The list of selected households will be submitted to Commune People Committee for review and appraisal
3. The Commune People's Committee reviewed and appraisal the consolidated list of households that have needs for support of both grant and loan scheme under the Decision 48. The commune then submitted the list to the District People's Committee for approval. The District People's Committee will submit to the Provincial People's Committee for synthesised and consolidated reporting for the whole Provinces.

[69] FINAL REPORT: Results implement pilot program solutions to support poor households improve safety conditions for accommodation, coping with floods and North Central Coast Central accordance with Decision 716 / QD-TTg dated 14/06/2012of the Prime Minister, August 2013 (Government of Viet Nam official communication)

4. Based on the survey and needs, the Provincial People's Committee will prepare and approve the full Provincial Plan for support flood and storm resilient housing plan in the provinces.
5. The order of prioritisation is:
   - Household is the ethnic minority group
   - Household with difficult living circumstances (old age members, single/only one old member in the e house or household with people with disabilities, etc.)
   - Household who is living in the most difficult administrative locations of highly disadvantaged zones and villages of the provinces
   - Household who is locating in the most poor districts under the Government poverty targeted programme, following national resolution No. 30a/2008/NQ-CP dated 27 July 2008 of the Government.
   - The the rest of households
   -

Example of household selection minutes in the communes under Decision 48:

Figure 5: Village selection process

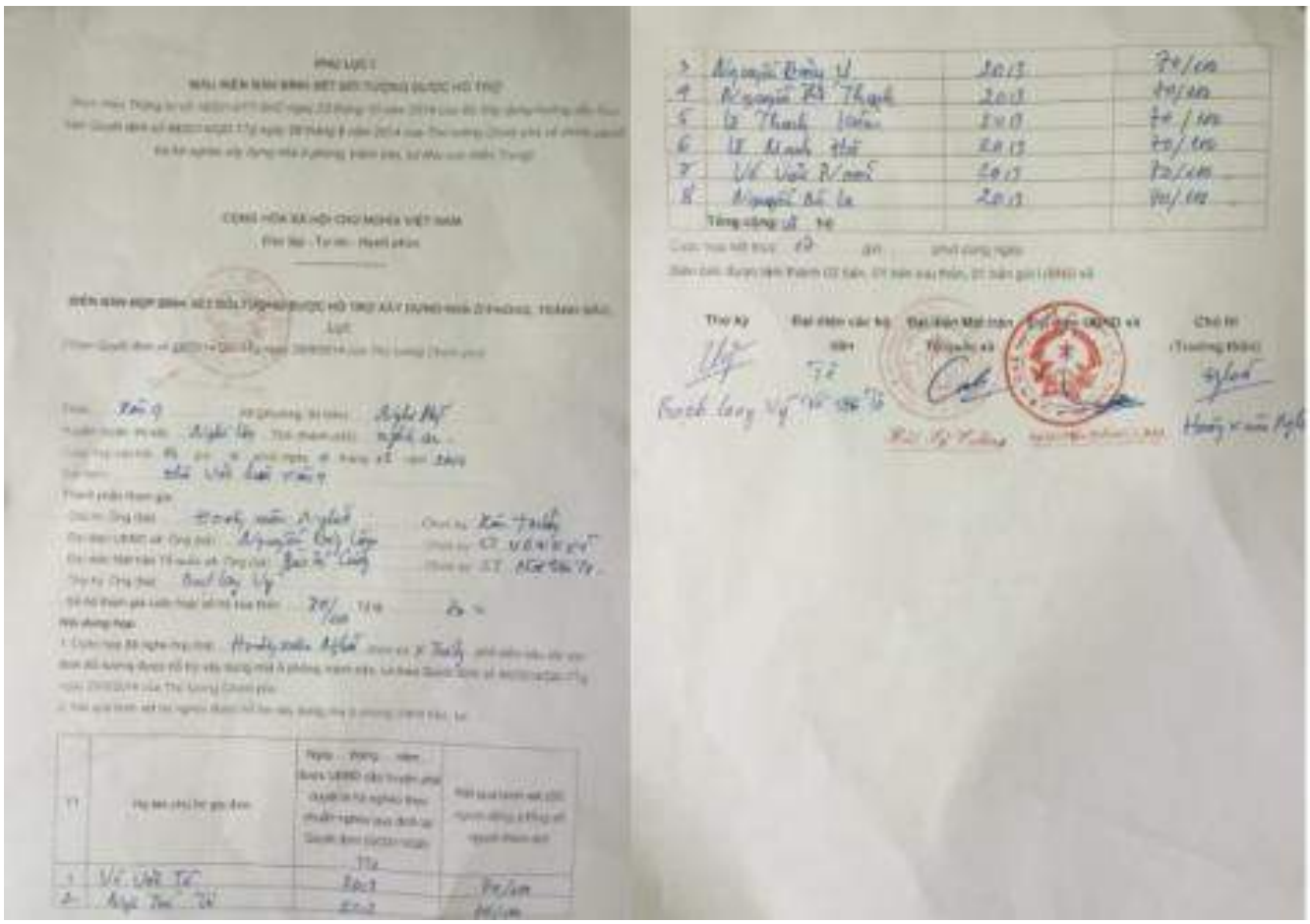


Figure 6: Commune review process

ỦY BAN NHÂN DÂN
XÃ BÌNH SƠN

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

BIÊN BẢN HỌP BÌNH XÉT HỖ TRỢ HỘ NGHÈO XÂY DỰNG NHÀ TRÁNH BÃO TRÁNH LỤT THEO QUYẾT ĐỊNH 48/2014/QĐ - TTg

Hôm nay, ngày 07 tháng 8 năm 2014.
Địa điểm: Tại Hội trường Ủy ban nhân dân xã.
Thành phần: - Hội đồng xóa đói giảm nghèo xã. Tổng số: 11, Có mặt: 11/11, Vắng: 0.
- Trưởng thôn 8, 11.
Chủ trì: Đồng chí Dương Công Ngọc – Trưởng ban xóa đói giảm nghèo xã.
Thư ký: Văn phòng ủy ban nhân dân xã

NỘI DUNG:

Họp bình xét hỗ trợ hộ nghèo xây dựng nhà tránh bão, lụt theo Quyết định 48/2014/QĐ – TTg

1. Đồng chí Dương Công Ngọc quán triệt chủ chủ trương hỗ trợ xây dựng nhà tránh bão lụt theo Quyết đinh 48/2014/QĐ – TTg ngày 28/08/2014của thủ tướng chính phủ về chính sách hỗ trợ hộ nghèo xây dựng nhà ở tránh bão, tránh lụt.

2. Đồng chí Bùi Thị Nguyệt- Công chức LĐTBXH thông qua biên bản họp bình xét của thôn và danh sách thôn đề nghị hỗ trợ xây dựng.

Gồm: - Thôn 8 có 3 hộ: + Lê Văn Vinh, Sinh năm 1988
+ Lê Văn Hùng, Sinh năm 1953
+ Vi Văn Trung, sinh năm 1986
- Thôn 11 có 1 hộ: Hoàng Văn Phương, Sinh 1986.

3. Căn cứ vào các tiêu chí để được hỗ trợ xây dựng và tình hình thực tế. Hội đồng xóa đói giảm nghèo xã tiến hành họp xét duyệt các hộ có danh sách nói trên và nhất trí theo danh sách đề nghị của thôn đề nghị hỗ trợ xây dựng nhà tránh bão, tránh lụt.

Hội đồng biểu quyết 100% nhất trí.
Hội nghị kết thúc vào hồi 17h cùng ngày.
Biên bản được lập thành 3 bản, lưu xã 1 bản và 2 bản gửi huyện.

Thư ký

Nguyễn Thị Nhung

CHỦ TỌA

Dương Công Ngọc

Programme support process

The MoC support assists poor households in central region to build flood and storm resilient houses following MOC guidelines but with designs tailored to the local culture and risk profile. It also provides training for villages/communes and provide all technical assistance to the beneficiaries.

Mass organisations such as the Fatherland Front, Veteran's Association and Viet Nam Youth Union had been actively involved in supporting, helping poor families build huts to prevent floods. Households also provided additional funding to help cover the full costs of constructions, contributing materials such as sand, gravel, bricks and in some cases labour.

In most cases, families chose to invest additional funds to enable them to build structures that exceeded the project's minimum standards in terms of size, quality; and design.

The model built homes to reduce floods were assessed by local governments and citizens to have many advantages compared with other models and to be realistic and flexible to the needs of the target provinces. Public support for the project was high both from poor people and local Government.

A number of challenges were encountered however. For example, according to the policy, those whose houses were flooded depth more than 3.6 m, should not be eligible through the project but instead should be relocated

through other Government projects. However, in practice, the displacement of people is very difficult, and further work to integrate and link various national projects was highlighted.

Figure 7: A low-income homeowner stands in front of an improved flood and typhoon resistant home constructed with help from the Ministry of Construction's improved pilot project

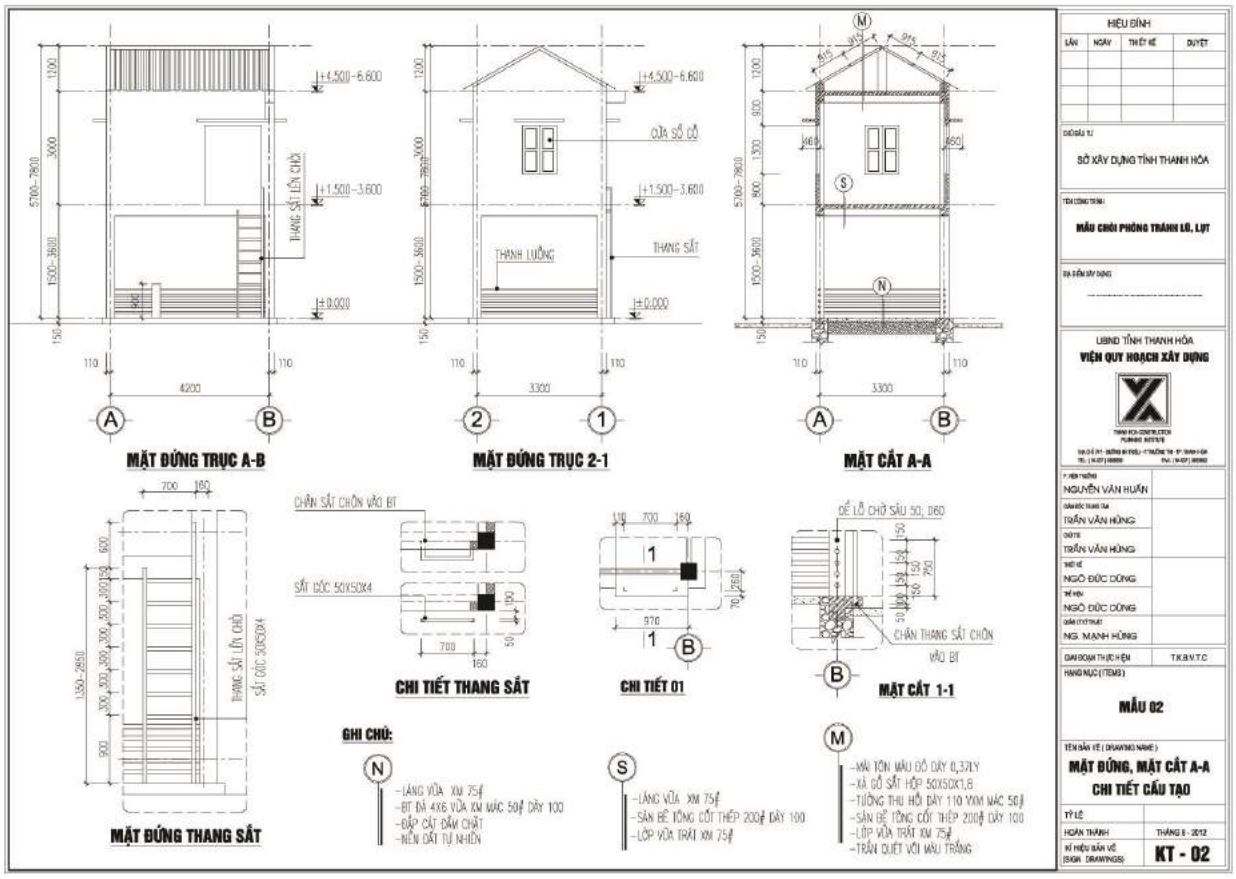
The regulations on grants and loans has been developed based on minimum flood safe housing standard. However, in difficult areas the level of support remains low particularly due to the high cost of transporting materials. Therefore, research is needed to improve the level of support for the residents in disadvantaged areas and highly vulnerable villages.

The need to better organize work done from the central to the provincial, district and commune levels was also highlighted as a key lessons learned. Establishing the Steering Committee made at all levels, tasked the agency with responsibility as permanent body was recommended as a means of increasing community oversight and strengthening coordination. The need to assign responsibilities clear, specific to each organization and individual units was also highlighted, as was the need to outlined clearly the responsible persons for implementation, monitoring and supervising the staff responsible for each district, each commune and village . Ensuring effective monitoring of these systems was also highlighted as an emphasis area. It was noted that relevant departments must promptly remove difficulties and obstacles and create favourable conditions for the local people.

The need to disseminate policies to all levels to all sectors and citizens; and advocacy organizations, advocacy, persuading the people to actively participate in the State to implement the policy effectively was also noted. Further replication to other areas, and establishing cross visits between pilot provinces and potential new locations was also strongly encouraged.[70]

[70] FINAL REPORT: Results implement pilot program solutions to support poor households improve safety conditions for accommodation, coping with floods and North Central Coast Central accordance with Decision 716 / QD-TTg dated 14/06/2012of the Prime Minister, August 2013 (Government of Viet Nam official communication)

Figure 8: Design Specifications for improved housing designs



The current needs for flood and storm resilient houses as well as the current plan of MOC to address the most vulnerable households of combined exposures to flood and storm risks

Figure 9: Specific progress and investment plan of MOC in 14 central provinces under Decision 48 (Phase 1)

#	Province	Total houses hihgly vulnerable as at survey	Estimated budget for implementation (billion VND)			Estimate time of implementation	Total houses to be supported by MOC phase 1	Total # of house constructed by Jun 2015	Districts in the tageted support programme of MOC
			State budget	Loan	Total				
	Total	**40,533**	**567**	**608**	**1,175**		**24,690**	**3,773**	
1	Thanh Hóa	4,775	66.85	71.63	138.48	2014 -2016	3,336	668	17 districts/townị: Nga Sơn, Hậu Lộc, Hoằng Hóa, Hà Trung, Tĩnh Gia, Nông Cống, Thạch Thành, Triệu Sơn, Yên Định, TP Thanh Hóa, Như Thanh, Cẩm Thủy, Yên Định, Thọ Xuân, Thiệu Hóa, Lang Chánh, Bá Thước
2	Nghệ An	3,160	44.24	47.40	91.64	2014 -2016	1,010	173	13 districts: Anh Sơn, Diễn Châu, Hưng Nguyên, Nam Đàn, Nghĩa Đàn, Nghi Lộc, Quế Phong, Quỳ Châu, Quỳ Hợp, Quỳnh Lưu, Thanh Chương, Tần Kỳ, Tương Dương
3	Hà Tĩnh	7,839	109.75	117.59	227.33	2014 -2016	844	660	6districts: Hương Sơn, Hương Khê, Vũ Quang, Đức Thọ, Kỳ Anh, Can Lộc
4	Quảng Bình	9,164	128.30	137.46	265.76	2014 -2016	3,881	550	8 districtsị: Quảng Trạch, Bố Trạch, Ba Đồn, Tuyên Hóa, Minh Hóa, Lệ Thủy, Quảng Ninh, TP Đồng Hới.
5	Quảng Trị	2,665	37.31	39.98	77.29	2014 -2016	2,665	263	8 districts: Vĩnh Linh, Gio Linh, Hải Lăng, Triệu Phong, Hướng Hóa, Đăk rông, TP Đông Hà, TX Quảng Trị
6	Thừa Thiên - Huế	3,102	43.43	46.53	89.96	2014 -2016	3,107	285	8 districts: Phú Vang, Phú Lộc, Nam Đông, A Lưới, Hương Thủy, Hương Trà, Phong Điền, Quảng Điền
7	Đà Nẵng	648	9.07	9.72	18.79	2014 -2016	407	15	1 district: Hòa Vang
8	Quảng Nam	2,005	28.07	30.08	58.15	2014 -2016	3,563	650	17 districts/town: Điện Bàn, Nông Sơn, Thăng Bình, Núi Thành, Duy Xuyên, Bắc Trà My, Nam Trà My, Quế Sơn, Tiên Phước, Phú Ninh, Tam Kỳ, Hiệp Đức, Phước Sơn, Đông Giang, Nam Giang, Hội An, Đại Lộc,
9	Quảng Ngãi	3,673	51.42	55.10	106.52	2014 -2016	3,223	254	10 districts/townị: Bình Sơn, Sơn Tịnh, Tư Nghĩa, Mộ Đức, Đức Phổ, Nghĩa Hành, Minh Long, Trà Bồng, Sơn Hà, TP Quảng Ngãi
10	Bình Định	328	4.59	4.92	9.51	2014 -2016	1,169	44	11 districts/townị: Tuy Phước, Phù Cát, Phù Mỹ, An Lão, An Nhơn, Vĩnh Thạnh, Hoài Nhơn, Tây Sơn, Hoài Ân, Vân Canh, TP Quy Nhơn
11	Phú Yên	2,486	34.80	37.29	72.09	2014 -2016	420	110	6 districts/town: Sông Cầu, Đông Hòa, Tuy An, Đồng Xuân, Phú Hòa, TP Tuy Hòa
12	Khánh Hòa	194	2.72	2.91	5.63	2014 -2016	308	42	3 districts/townị: Cam Lâm, Khánh Vĩnh, TX Ninh Hòa
13	Ninh Thuận	475	6.65	7.12	13.77	2014 -2016	757	59	6 districts/townị: Bác Ái, Ninh Sơn, Ninh Phước, Thuận Bắc, Ninh Hải, TP Phan Rang.
14	Bình Thuận	19	0.27	0.28	0.55		0	0	

Future Housing Programme for Coastal Vietnam – Storm resilient Housing

In additional to the above Decision 48, MOC has recently working on the preparation for Storm Resilient housing programme along the coastal line of 20 provinces from Quang Ninh to Ba Ria Vung Tau. These targeted households are those who are highly exposure to story and super-typhoon. The programme concepts was proposed to the Government in close cooperation with MARD and MONRE, following the Government lessons learn from super typhoon Haiyan in 2013. The programme, if approved, will support an estimated of 80,000 households to withstand typhoons and storms, who are on average living within 5-25km distance from the coastal line.

Initial survey of the upcoming proposed programme of MOC, following Decision 48, also suggested a very high demands for strengthen housing for local population along the coastal lines of Vietnam to withstand from typhoons and storms. The programme will likely be approved for implementation from 2017 onward. Lessons learn from Decision 48 for flood and storm resilient housing will be incorporated into the full design and investment plan of the Government of Vietnam in the coming years. The initial survey of the housing programme can be specifically summarised as below:

Figure 10:

Preminary Survey results of needs for storm resilient housing in coastal Vietnam (under GoV review) primary target the population of 5-25km distance from coastal line

#	Province	Total houses	Of which the needs for		Total budget need (billion VNĐ)	Of which	
			Newly built	Upgrade or strengthern		proposed state buget (billion VNĐ)	Loan (billion VNĐ)
	Total	**85,100**	**37,700**	**47,400**	**1,648**	**855.70**	**792.80**
1	Quảng Ninh	1,905	860	1,045	37	19.50	17.94
2	Hải Phòng	2,698	1,337	1,361	54	26.84	26.84
3	Thái Bình	2,278	1,587	691	56	28.16	28.16
4	Nam Định	3,436	2,091	1,345	78	38.84	38.84
5	Ninh Bình	650	338	312	14	7.17	6.66
6	Thanh Hóa	7,060	5,682	1,378	198	101.21	96.42
7	Nghệ An	4,758	3,000	1,758	114	58.59	55.03
8	Hà Tĩnh	5,344	4,551	793	156	79.51	75.99
9	Quảng Bình	9,010	4,121	4,889	178	92.85	85.49
10	Quảng Trị	4,371	701	3,670	56	29.99	25.90
11	TT - Huế	4,086	1,595	2,491	74	38.93	35.48
12	Đà Nẵng	1,000	700	300	25	12.40	12.40
13	Quảng Nam	6,657	1,988	4,669	107	56.35	50.48
14	Quảng Ngãi	11,500	3,687	7,813	191	100.27	90.24
15	Bình Định	7,462	1,773	5,689	109	57.88	51.12
16	Phú Yên	8,754	2,198	6,556	131	69.27	61.39
17	Khánh Hòa	466	235	231	10	5.06	4.68
18	Ninh Thuận	663	384	279	15	7.77	7.26
19	Bình Thuận	500	300	200	12	5.98	5.60
20	Bà R - V.T	2,502	572	1,930	36	19.15	16.87

Other pilot projects and programmes

A number of pilot projects have contributed valuable lessons learned to the evolution of safe housing programs in Viet Nam.

- These include the Pilot Programme for storm safe housing led by MoC based on Decision 716 to pilot 700 flood resilient houses to "living with floods" in 7 coastal provinces of Vietnam.
- A second improved phase of the project was then developed to be the Target Programme to provide support policies and solutions for poor households to build storm and flood resilient houses in Central Region (2014-2016) – Prime Minister Decision 48/2014/QĐ-TTg. This program aimed to support 14 North Central and Coastal Central Provinces highly prone to flood/storm and prioritized target for 40,000 poor households of ethnic minorities, household living with special difficulties, households living in difficult locations. A third phase of this project, which will directly complement proposed GCF action has recently been approved.
- Residential Cluster for Flood resilience in Mekong Delta (02 phases already) – done by MOC, MARD, Bank for Development and Bank for the Poor. Phase 2 (2008-2010, however, phase 2 has been extended to 2013 and has been recently completed in 2014). This project tis co-Implemented by MOC-MARD-Development Bank. Under this program 50% of the costs of investment for basic infrastructure development in the cluster (electricity, road, school and health centre) are covered by the Government. The program aims to provide 100% cover embankment and river erosion protection and provides local households access to 0% credit from the Bank for Development in 10 years to build house foundation. Households can further access 3%/year credit from Bank for Social Policy (Bank for the poor) in 10 years,

with 5 year concession period. To date a total of VND9207 b has been allocated to the programme, of which VND3270b allocated in phase 2 and about 200,000 households (1m people) are living in areas covered by the project. [71]

- The National Programme on Resettlement of residents in areas of disaster prone, special difficulties, borders, islands, and spontaneous migration, critical protected forests - Prime Minister Decision 193/2006/QD-TTg is providing support to households living in very unsafe locations. The project is implemented by MARD and aims to reach 150,000 households by end of 2015 and additional 60,000 households by end of 2020. From 2006-2011, about 115,900 households were reallocated to safer location, of which 4,164 households are from coastal zone. Total budget allocated: VND6,455b (73% from central budget and 27% from local budget) Between 2013-2020 the Government targets to resettle 91,300 households (32,100 households between 2013-2015) with a total budget of VND10,470b of which 60% is provided by central and 40% from local budgets.
- The National Poverty Reduction Support Programme also has a housing component that aims to reach 500,000 poor households but which does not specifically target disaster prone areas.

In addition a coalition of international and national NGOs under the umbrella of the ECHO Funded JANI network recently completed a successful pilot project to develop a Housing Atlas for Viet Nam. The Atlas of House Vulnerability and Strengthening, produced by DWF- JANI in 2010 was very effective in providing a sample set of safe housing designs, and for developing appropriate awareness raising materials on how to reinforce local housing stock, prepare for storms, and build a one-story flood resistant house. The costs of the JANI program homes were more than the traditional Government model, as they included solid foundations and in many cases required cement construction. Many of the designs and awareness raising materials, such as the typology of damage and risk outlined below are highly relevant and are being increasingly used by provinces, MOC and communities around Viet Nam.[72]

Figure 11: Example of awreness raising materials devleoped under the JANI Atlas Program[73]

[71] http://www.baoxaydung.com.vn/news/vn/thoi-su/hieu-qua-ro-ret-tu-chuong-trinh-xay-dung-cum-tuyen-dan-cu-vuot-lu-db-song-cuu-long.html

[72] Atlas of House Vulnerability and Strengthening, DWF- JANI, 2010

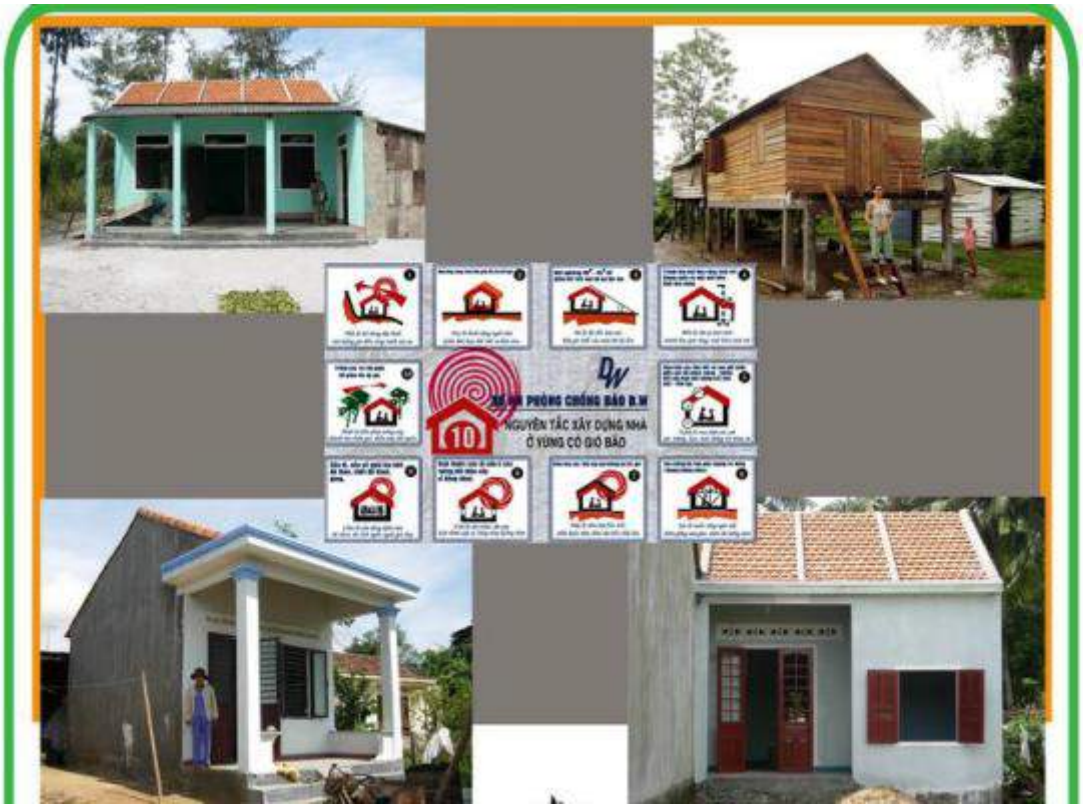
[73] Atlas of House Vulnerability and Strengthening, DWF- JANI, 2010

Who can reduce shelter vulnerrability

Hazard		 Storm			 Whirlwin	 Flood		
Area		Coastal plains		Highland/ Mountain	Mekong Delta	Coastal plains		Mekong Delta
Risk & vulnerability		High risk; common event (Storm Level 9 to 12)		Rare event	High vulnerability but until now a rare event	High and known risk	High risk (after cyclone or heavy rain)		Regular & warning possible
Who can reduce shelter vulnera-bility? Options for safe houses	Family	Awareness	Strengthen house components planting round house; *Protect assets (safe storage)*	See Whirlwind	Low priority for families; in new houses, encourage key strengthen -ing principles in all new build	Strengthen roof	Strengthen house High foundation (above annual flooding level)	*Prepare food-water; safe storage and escape at roof level*	House on small stilts; House on raised platforms Resettlement
	Local authorities	Awarenes s for families on safe building technique s; suggest safer locations for building	Advice & training for builders *Preparati on / move families Cyclone early warning*		Awareness for builders & families on safe building techniques; suggest safer locations for building	Advice & training for builders Awareness for families on safe roof strengthening Awareness campaigns	Advice for builders and awareness for families	*Flood warning Preparatio n / move families Suggest safer constructio n sites*	*Flood warning* Relocation in safe area
	Government	Safe constructio n guidelines; technicians training; applied provincial strategy;	*Cyclone early warning*		Start awareness raising	In temporary house replacement programmes, make sure roof is strong and structure has good connections	Guidelines Technicians training	*Flood warning*	*Flood warning* Support for income generating
Notes						Recognise the choice families make between safer location and safe income generation. Some families prefer to remain in risky location for economic reasons (and spend more on house)			

However, these designs have serious limitations in their applicability. The figure below provides examples of safe housing designs advocated by the DFW-JANI projects. Although these designs are effective for regular extensive flooding in many areas of Viet Nam, they are not considered appropriate for protecting highly exposed coastal locations from the kind of storm surge associated with a super-typhoon or similar event where water levels can reach 3-7 meters.

Figure 12: Examples of current housing designs

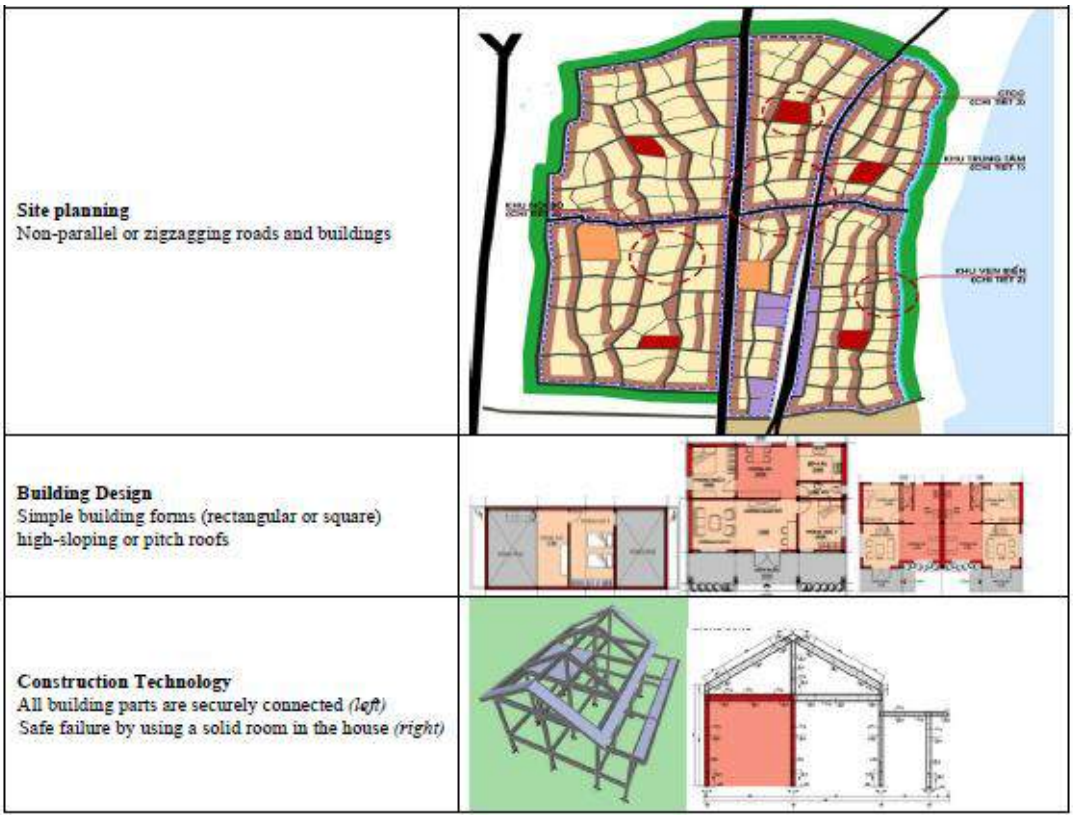


In addition to the housing Atlas, there are numerous examples where the NGO sector has been effective in typhoon prone areas in piloting safer housing methods. A recent ADPC case study for Danang examines pilot projects for where safe housing action was combined with community based disaster risk management approaches. The case study highlighted the benefits, particularly in increasing the effectiveness of risk map application and in capacity building of local communities. The reviewed a joint CBDRM and safe housing approach in Binh Dinh, run by the Norwegian Red Cross. The study particularly noted that the inclusion of CBDRM particularly helped raise the profile of community voices, concerns and capabilities, and supported the local population in improving its capacity to deal with disasters. The CBDRM approach was more effective than traditional forms of disaster risk management planning, in which each group (community representatives included) participates in turn. The CBDRM project has increased local awareness of disaster preparedness, disaster response and related issues. As CBDRM is a process, however, time is needed to evaluate its eventual impact. In addition, as limited resources may affect the overall sustainability of this project, greater participation by local authorities in the project planning stage is also required. The second case study examines the flood protected residential cluster (FPRC) programme in An Giang Province, identifying factors that supported successful outcomes, versus factors that limited success.

Ensuring that safe housing investments are linked wider local risk planning and provincial investment is essential. Below are site plan deigns from an award winning project for safe housing design undertaken in Danang, Viet Nam[74]

[74] Tran Tuan Anh and Tran Van Giai Phong; Opportunities to Build Disaster-Resilient Shelter and Settlements: Lessons Learnt from a Housing Architecture Design Competition; Journal for Civil Eng. Architect. Res Vol. 1, No. 1, 2014, pp. 24-31

Figure 13: Examples of integration of site planning and house design



4.3 Key lessons learned

The factors that contributed to success of this integrated approach include:

- Applying a participatory approach to the planning process that increased the involvement of the community;
- Combining both structural and non-structural measures;
- Promoting and sharing information about the programme with the wider community;
- Integrating the programme with international organizations working in Vietnam; and
- Prioritizing the quality of housing and provision for essential services.

Factors that limited success of the project include:

- A focus on structural measures (i.e. a focus on the quantity of housing provided);
- Taking a top-down approach to planning; and
- Overlooking non-structural measures (e.g. capacity-building).

Recommendations made by the pilot to further improve future programs included the need for more effective planning and coordination of the flood protected residential cluster, especially with respect to climate change adaptation, the need to give closer consideration to site-specific issues and the need to consider closer integration with wider CBDRM approaches. The importance of increasing Government capacity to implement scaling up of these approaches, both in terms of technical capacity and other resources was also noted.

4.4 Financial and Economic Analysis

Ensuring effective implementation of disaster resilient housing requires (i) Local expertise and knowledge on risk reduction is valuable for building disaster resilient housing, (ii) improving local awareness and supporting local economy are key essential parts to raise resilience, and (iii) applying planning and construction regulations through building permits is significant to ensure a resilient housing system. These findings also generate some policy implications related to the demand of improving governance mechanisms.[75]

While the costs of direct house construction are relatively low in Viet Nam (a safe two story home of two stories can be constructed for approximately $5000) the affordability of this investment is beyond the reach of poor families living on less than $1USD per day. In addition, the calculation of costs will be significantly impacted by the availability of credit, and potential interest rate calculations. For local Government, it is essential that these investments are liked to appropriate land use regulation and associated investments in basic infrastructure and services. As such, successful housing projects should consider access to finance for the poor, integrating risk mapping and land use planning in designs, and ensuring associated investment in local infrastructure as part of the provincial budget process.

The banking and financial sector in Viet Nam went through remarkable changes following the introduction of the Doi Moi economic reforms. Until 1988, Viet Nam's economy was dependent on a one bank system comprising the State Bank of Viet Nam. Until June 2013, there were six state-owned commercial banks, several dozen joint stock banks, foreign bank branches, joint venture banks, credit cooperatives and finance companies. The sector is dynamic and evolving both legally and institutionally. Much transparency has been accomplished and credit rating agencies and performance standards for joint stock banks have been established by the government. However, Viet Nam remains largely a cash-based society. Estimates reveal that the key sources for households to finance housing are still personal savings (44 percent) and informal sources from friends and relatives (35 percent). Culturally, Vietnamese like to save if possible and are averse to holding debt. The burden of debt and the worry of meeting repayments have kept many families away from formal sources of credit for housing. For many Vietnamese it seems absurd to be locked into twenty years of high monthly payments. They make a rational decision to forego current consumption of housing goods, accumulate savings, and then purchase the unit with a combination of cash and informal sources. The 2003 Land Law and the 2005 Housing Law provided important rules to enable banks and financial institutions to engage in housing finance, including the use of land use certificates, collateral, and mortgages. The 2006 Real Estate Business Law provided additional provisions on transactions with land and real estate properties. Housing finance products remain largely conventional, with large loan size, long maturity term, market interest rates (14 - 18 percent per annum), and requiring land and/or property as collateral. However, these services have not expanded rapidly due to a risk-averse attitude from financial institutions regarding the quality of collaterals (LUCs and BOLUCs), cumbersome property foreclosure procedures, lack of recorded verification of income and limited access of lending banks to long-term funding sources.[76]

Review of financial scheme for housing programme of MOC to provinces

Overall assessment of financing schemes for the housing programme has been positive and successful, drawing from the evaluation of MOC evaluation of the pilot project for building 700 houses for flood resilient in 07 coastal provinces of central Vietnam.

About 697/700 targeted households successfully completed building their houses to withstand the flood under the pilot financial schemes. 03 other households withdrawal from the programme due to (i) 01 household decided to move to other province and (ii) 02 households were not afford for mobilising additional finance and household

[75] Tran Tuan Anh and Tran Van Giai Phong; Opportunities to Build Disaster-Resilient Shelter and Settlements: Lessons Learnt from a Housing Architecture Design Competition; Journal for Civil Eng. Architect. Res Vol. 1, No. 1, 2014, pp. 24-31

[76] Viet Nam Housing Sector Profile, UN Habitat, 2010

contribution to built the houses at the beginning of selection process. After that, 03 other households were added, taking up the full support pilot scheme for all 700/700 households.

Figure 14: Fund mobilisation and disbursement under the pilot housing programme (2012-2014)

Report of fund use in Pilot housing project 2012-2014 (as at Nov 2014 report of MOC to Prime Minister)	**Total fund mobilized**	**Total fund disbursed**	**Note**
Central budget	7	6.92	
Provincial budget	0.85	0.75	
Concessional loan	7	6.06	*fully disbursed 7b by now*
Household contribution & other social mobilization	14.31	14.16	

Unit: Billion VND

5. Mangrove Regeneration and Restoration

5.1 Background

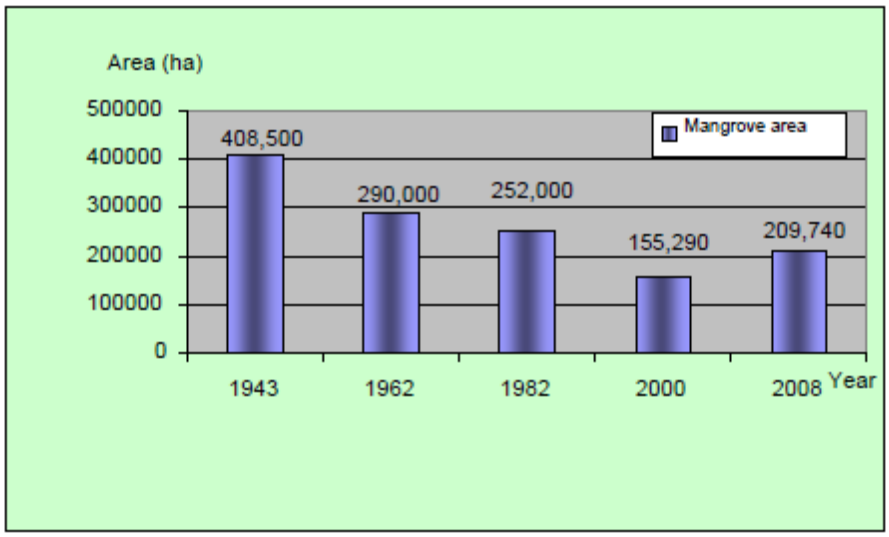
Mangroves play an essential role in maintaining uniformity of the environment, coping with climate change and generating income. Mangroves create barriers against the intrusion of sea water, storm surge and the impacts of rising sea levels. They also provide essential habitat for fish, crabs, aquatic animals and organism in estuaries. Acknowledging the importance of mangroves, the Vietnamese government has carried out many activities to restore the forests through the program "Mangrove Restoration and Development in the period of 2008-2015". Although restoring mangroves is a cost effective adaptation strategy, replanting and regeneration requires technical skill as well as attention to apply locally feasible solutions and to maintain forests once regenerated. In the first phase of the Government project, it was very difficult to establish mangrove areas and rate of established forest was only about 50 %. Reasons for the failure were low seedling quality, a lack of protection of seedlings from the physical effects in the early stage of growth and a lack of species diversity selection and suitable planting methods in each specific site. [77] More recently pilot have addressed these issues and enabled success rates to be increased to over 80%.

Government data shows a rapid decline in mangrove cover in Viet Nam since the 1940s to the present date (see chart below). Recent policies however are beginning to stem this decline, and increasingly mangrove preservation and regeneration is seen as a clear Government priority. For example, Viet Nam's current INDC document draft notes mangrove forest regeneration as a priority for mitigation action, second only to energy sector reductions. [78]

[77] RESTORATION OF COASTAL MANGROVE FOREST IN VIETNAM: CONSERVATION AND DEVELOPMENT OF THE KIEN GIANG BIOSPHERE RESERVE PROJECT; Evaluation Report, February 2012 (unpublished)

[78] IMHEN, Draft Intended Nationally Determined Contributions Outline, Powerpoint presentation, 8 July 2015

Figure 15: Total mangrove forest in Viet Nam (1943-2008)



Source: Paul Maurand, 1943; Rollet 1962; FIPI 1982, 2006, Institute of Forestry Science 2000.

Vietnam has 29 provinces and cities with coastal mangrove forests and tidal zones along from Mong Cai to Ha Tien province. These include the five Northern coastal region provinces of Quang Ninh, Hai Phong, Thai Binh , Nam Dinh and Ninh Binh, the 14 central coast region has provinces from Thanh Hoa to Binh Thuan and the 10 Southeastern and the Southwest coastal areas of Ba Ria Vung Tau, Dong Nai, Ho Chi Minh city, Ben Tre , Tien Giang , Tra Vinh, Soc Trang, Bac Lieu , Ca Mau and Kien Giang.

In the areas where rainfall is usually well below 1.200 mm/year, have no natural mangrove distribution. Total annual rainfall in the whole territory of Vietnam reached 630 km3. Northern Vietnam is located in the transition zone between tropical and subtropical climate.

Recent projects have reinforced the need to tailor mangrove species to local conditions. In the Northern regions of Viet Nam, successful species include:
- Sonneretia caseolaris, Sonneretia caseolaris + Kandelia candel or Sonneretia caseolaris + Dioscorea (in tidal estuaries)
- Kandelia candel, Rhizophora apiculata or Avicennia marina (where the land has high salinity and high sand content)

In Sourthern and Mekong delta areas there are twelve main natural forest species that are being use for both replanting and regeneration. These include:
1- Sonneratia caseolaris (L.) Engl. Grows naturally and planted into large population near estuaries in Soc Trang, Tra vinh, Ben Tre and Tien Giang.

2- Avicennia alba Bl. Grows naturally in coastal area on muddy clay soil far from river estuaries in Ca Mau and Kien Giang.

3- Avicennia marina (Forsk.) Grows naturally on mixed sand and clay in coastal areas of Bac Lieu and Kien Giang. Is planted for experiment in Kien Giang.

4- Rhizophora apiculata BL. Is a popular species on rich clay and mixed sand clay behind Avicennia forest in all Southern coastal provinces.

5- Rhizophora mucronata Lume. Is planted scatteringly in shrimp ponds in Ca Mau and Bac Lieu.

6- Bruguiera parviflora (Roxb.)Wight &Arn. Grows naturally and planted for experiment in Ca Mau, Bac Lieu, Soc Trang and Kien Giang.

7- Bruguiera cylindrica (L) Bl. Grows naturally and planted for experiment in Ca Mau, Bac Lieu, Soc Trang and Kien Giang.

8- Ceriop decandra (Griff.) Ding Hou. Planted for experiment in Ca Mau, Bac Lieu, Soc Trang, Kien Giang.

9- Lumnitzera racemosa Wild. Grows naturally and planted for experiment in Bac Lieu.

10- Xylocarpus granatum Koenig. Grows naturally in Bac Lieu, Soc Trang, Kien Giang.

11- Nypa frutican van Wurmb. Planted in large areas in Tien Giang, Ben Tre, Tra Vinh, Soc Trang, Ca Mau, Kien Giang.

12- Threspecia populnea (L.) Soland. ex Cor. Planted in experiment in Bac Lieu, Soc Trang, Kien Giang.

12- Threspecia populnea (L.)

According to figures published by the MARD in 2008, the coastal countries are divided into five regions. The total area planned for a purpose of mangrove development was 323,712 ha, of which non-forested area was 113,972 ha and forested area was 209,741 ha (152,131 ha of forest plantations and 57,610 ha of natural forests), distributed in the following areas:

- Coastal area of Quang Ninh province and Northern Delta consists of 5 provinces (Quang Ninh, Hai Phong, Thai Binh, Nam Dinh and Ninh Binh): 88,340 ha, of which the forest area was 37,651 ha, distributed mainly in Quang Ninh area accounting for 18 %.
- North Central Coast Region (NCC) includes 6 provinces (Thanh Hoa , Nghe An, Ha Tinh, Quang Binh, Quang Tri and Thua Thien Hue): 7,238 ha, of which 1,885 ha of forest area, distributing primarily in Thanh Hoa province (1%).
- South Central Coast Region (SCC): 6 provinces (Da Nang, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen and Khanh Hoa): 743 ha , of which forest area was negligible.
- Coastal Southeast (CSE) consists of 5 provinces (Ninh Thuan, Binh Thuan and Ba Ria - Vung Tau, Dong Nai and Ho Chi Minh City): 61,110 ha , of which forest area was 41,666 ha, distributed mainly in Ho Chi Minh city accounted for 19.8%.
- Coastal Mekong Delta (CMD) comprises 8 provinces (Long An, Tien Giang, Ben Tre, Tra Vinh, Soc Trang, Bac Lieu, Kien Giang and Ca Mau): 166,282 ha, of which the area had 128,537 ha of forest, mainly distributed in the provinces of Ca Mau and Kien Giang provinces accounted for 61 %.

Figure 16: Zoning of coastal mangroves and tidal zones of Viet Nam

Country	Region	Sub-region	Note
A. North Coast	I. Northeast (Quang Ninh)	1. Móng Cái – Cửa Ông. 2. Cửa Ông – Cửa Lục. 3. Cửa Lục - Đồ Sơn	
	II. Northern Delta	4. Đồ Sơn –Văn Úc. 5. Văn Úc – Lạch Trường	Thai Binh river system Red river system
B. Central Coast	III. North Central Coast	6. Lạch Trường – Ròn 7. Ròn – Hải Vân	
	IV. South Central Coast	8. Hải Vân – Vũng Tàu	
C. South Coast	V. Southeast	9. Vũng Tàu – Soài Rạp	Ba Nạ 586km Vũng Tàu – TP HCM
	VI. Southern Delta	10. Soài Rạp – Mỹ Thạnh 11. Mỹ Thạnh – Bản Háp (mũi Cà Mau) 12. Bản Háp – Hà Tiên (Mũ Nai)	The Mekong Delta, South west of Ca Mau peninsula West of Ca Mau peninsula

[Phan Nguyen Hong, 1999]

Figure 17: Area and distribution of mangroves in Viet Nam

No.	Coastal regions	Total	Mangroves area (ha)			Non-mangroves area (ha)
			Sub-total	Natural forests	Plantation	
1	Quang Ninh and Northern Delta	88,340	37,651	19,745	17,905	50,689
2	NCC	7,238	1,885	564	1,321	5,353
3	SCC	743	2	2		741
4	CSE	61,110	41,666	14,898	26,768	19,444
5	CMD	166,282	128,537	22,400	106,137	37,745
	Whole of country	**323,712**	**209,741**	**57,610**	**152,131**	**113,972**

[MARD, 2008]

The Government aims to support mangrove replanting and regeneration in 323,712 ha. Within 153,294 ha of protected forest, 115,950 ha will be targeted. In special use forest 28,311 out of 41,666 ha, and within production forest 65,480 ha out of 128,752 ha is targeted.[79]

In the context of Viet Nam, efforts to support mangrove regeneration must be part of an integrated coastal resource management approach. Integrated management is designed based on the principle of ensuring that the decisions of all economic sectors and all levels of government are harmonized and consistent with the national coastal policies. In Vietnam, the main areas to be considered include:

- Area planning with the primary objective of optimizing the economic and social development opportunities that the marine and coastal ecosystems can support, proposing plans for present and future uses of coastal and marine areas, with a long-term vision. –
- Promoting economic development: promote appropriate uses of coastal and marine areas, e.g aquaculture, ecotourism, port development.
- Management of resources: protect the coastal and marine ecosystems, preserve biodiversity and ensure sustainable uses of coastal and marine resources.
- Conflict resolution: harmonize and balance existing uses and resolve conflicts among uses of coastal and marine resources.
- Protection of public safety: protecting public safety in coastal and marine areas from natural and man-made disasters.
- Ownership of public submerge lands and waters: manage government-held areas and resources wisely and with good public economic returns.[80]

A recent Oversees Development Institute study for Viet Nam on the integration of climate change adaptation and disaster risk reduction found significant benefits in previous case examples in Viet Nam, including the It noted that the inclusion of an Environmental Sustainability pillar – including climate change and disaster risk reduction – in the Viet Nam Country Programme Strategy provides a strong example for other countries, and should be actively institutionalized within donor frameworks.[81]

[79] RESTORATION OF COASTAL MANGROVE FOREST IN VIETNAM: CONSERVATION AND DEVELOPMENT OF THE KIEN GIANG BIOSPHERE RESERVE PROJECT; Evaluation Report, February 2012 (unpublished)

[80] Nguyen Tac An, Nguyen Ky Phung and Tran Bich Chau; "Integrated Coastal Zone Management in Vietnam: Pattern and Perspectives;" Journal of Water Resources and Environmental Engineering, No. 23, November 2008

[81] Guy Jobbins and Dang Thu Phuong; The Case of Viet Nam: Advancing integration of disaster, environment and climate change; ODI Integration Series, Australian Government; 2014, p3

Figure 18: Salt production and aquaculture are key threats to natural mangroves

Photo GIZ (via IUCN)[82]

Aquaculture and Mangrove Forest Regeneration

Mangroves in Viet Nam are threatened by expanding aquaculture and salt farming on the land side, and coastal erosion induced through wave's forces especially during storms (on average 7 typhoons per year), as well as climate change induced sea level rise on the coast side. Planned dikes for coastal protection restrict mangrove ecosystem functioning as the tidal trees require constant water exchange.[83]

In recent years, aquaculture in the Northern coastal provinces has witnessed a significant growth in terms of area (the area of aquaculture in 2005 was about 35,215 ha) and yield (in 2005 reached 22,150 tons). Increasingly pilot studies have been developed in which aquaculture can co-exist and even enhance mangrove regeneration efforts.

Key products are sugpo prawn which thrives in brackish water as well as other species such as prawn, nipper shrimp white shrimp and some other native species of shrimp. Brackish water prawns are farmed in regions close to salt production, bare land, coastal sand- bank, low-yield rice fields, fallow land and garden. Farming methods vary from intensive shrimp farming, to shrimp - rice rotation farming, to small shrimp ponds located in forests.

Some mollusk farming for clams and oysters is also being developed to exploit the natural conditions of estuaries, coastal tidal flats. Blue crabs are also being raised in some coastal provinces with specialized methods or shifting farming, intercropping crab with other objects. Most varieties of mollusks and crabs are local, however efforts are underway to increase quality of local storms through improved breeding techniques. In 2005, Quang Ninh, Hai Phong, Ninh Binh and Nam Dinh province had crab yield of 1,700 tons, 1,500 tons, 1,100 tons and 1,000 tons, collectively.[84]

Historically, shrimp farming has a long tradition of coexisting with mangrove forests in traditional coastal livelihoods systems, particularly in southern regions. However,
shrimp yield is low because forest cover reduces light intensity in the waters, limiting development of natural food resources. This method however is now being adapted.

For example in Ca Mau province pilots of tested a number of models of aquaculture in mangrove areas. The alternative extensive shrimp farming models without mangroves are not very effective, but the models of shrimp –

[82] V. Q. Tuan, and Dr.C. Kuenzer (2012). Can Gio Mangrove Biosphere Reserve Evaluation 2012: Current Status, Dynamics, and Ecosystem Services. Hanoi, Viet Nam: IUCN.
[83] V. Q. Tuan, and Dr.C. Kuenzer (2012). Can Gio Mangrove Biosphere Reserve Evaluation 2012: Current Status, Dynamics, and Ecosystem Services. Hanoi, Viet Nam: IUCN.
[84] RESTORATION OF COASTAL MANGROVE FOREST IN VIETNAM: CONSERVATION AND DEVELOPMENT OF THE KIEN GIANG BIOSPHERE RESERVE PROJECT; Evaluation Report, February 2012 (unpublished)

crab farming in mangroves show differences with different rate of mangrove areas. The models with 30 – 60% of mangrove areas are the most efficient. While the effect of models with over 60% mangroves is lower than that of models with less than 30%.

Overall, farm sized less than 5 ha actually were able to produce the highest yields, most likely due to the intensity of management and nurturing the sites received. The Rhizophora – shrimp farming models bring a profit per labour at VND 3.31mil/ha and the percentage of profit and investment cost is 157%. Meanwhile those of the crab monoculture models are VND 1.65,1 mil/ha and 89%.

In the Mekong area, pilots found however that farming of shrimp in Rhizophora is not very profitable, as a sole livelihoods source, and was best suited as a form a supplemental income for families. For example, in a mangrove with the density of planted Rhizophora of two trees per square meter, after 90 days of cultivating shrimp reach a mature size (about 30 per kg) and can be harvested. After that growers can increase up to two harvests each month in the next six months, with harvest time lasts from three to five days. The harvesting will finish by the seventh month with shrimps range from 13 to 15 individuals per kg.

In the first two or three years of farming, the productivity is 0.5 ton/ha per year, but the productivity will decrease to 0.25 ton/ha in the following years. Obviously, extensive shrimp farming in mangroves only yield high profit in the first couple of years as the productivity declines almost a half. The profit is about VND 60 mil on average, which is about VND 4.8 mil/ha each year.

The income structure on mangrove forests in Can Gio district varies and each farming household can earn from VND 15.2 to 16.8 mil each year. The percentage in turn is from forest protection (21 – 25%), aquatic products (20.5 – 32%) and other sources (11 – 12%). Receivers of granted forest land not only collect products from the 25 forests but also earn considerable profit from aquaculture farming with VND 3.5 to 4 mil for each household each year.

Studies have also looked at advanced extensive model of shrimp (Metapenaeus) in mangroves in Yen Hung district –Quang Ninh province. In surveyed areas, a total feeding area of 5 ha part of which was canal was able to create significant livelihoods. In the sample area nipper shrimp (Metapenaeus) size was 2.5 grams/shrimp was stocked with 151 kg (approximately 60,400 shrimp). The stocking density was 1.21 shrimp/m2. In 55 days after stocking, shrimp was harvested by using bags and assisted by light and was able to yield approximately 0.061 tons / ha.

The same area also has experience with crab farming which was introduced to the area in 1990. Crabs are raised in bamboo cages (1.2m x2mx5m size or 3 m3 each) which are tied together with floats and placed under water in mangrove areas. Similarly, rock hind fish (Epinephelus adscensionis) farming in mangroves was introduced to Can Gio district in 1995. The pond area is usually 200 m2, the farming density is 0.18 fish per m2 or 30 to 40 fish in each pond. Young fish are introduced when they weigh 200 to 300 grams each and will weigh 0.6 to 0.7 kg each when harvested.

Mud creeper farming in mangroves was in introduced to Can Gio district as a method that does not require high investment cost. A net is used to fence an area of muddy soil. The breeding density is around 200 kg of snail per 100 m2, the snail size is around 100 to 150 snails per kg, with cost from VND 1,500 to 3,000 per kg. After four to six months of cultivating without any extra feeding, the snails can reach up to 30 to 50 snails per kg, selling at VND 6,000 to 12,000 per kg.

Oysters are also framed in the Southern and a part of the Northern coastal area (such as Quang Ninh) in mud flats. Nets are stocked with 300-800 units /kg, and take 6-8 months to mature, yielding 10-25 oysters / kg.

c. Aquatic advantages in some localities having mangroves

Survey results of advantages of natural harvest and aquaculture in several localities having mangroves found that:

- Natural harvest (Lucina philippinarum, earth worm, shrimp, fish, octopus): approximate 200 tons, creating a turnover of 3,274,000,000 VND.
- Aquaculture (shrimp, fish) with extensive method: 230 ha, creating an income for aquaculture households of 400,000,000 VND/year, gaining about 1,750,000 VND/ha/year in average.
- In Thai Đo commune, Thai Thuy district, Thai Binh province, 200ha mangroves created the yield of aquatic products as follows:

- Natural harvest (fish, crabs, oysters,...): about 6,300,000,000 VND/year
- Aquaculture (Nipper shrimp (Metapenaeus), bass) with semi-intensive method: area of 300 ha created an income of 9,000,000,000 VND/year, gained 30,000,000 VND/ha/year in average.

In Thụy Thường commune, Thái Thụy district, Thái Bình province 1,000 ha mangroves created the yield of aquatic products as follows:

- Natural harvest (shrimp, crab, fish, snail...): about 7,680,000,000 VND/year.
- Semi-intensive aquaculture (Nipper shrimp (Metapenaeus), bass, crab): area of 700 ha created an income of 14,000,000,000 VND/year, gained 20,000,000 VND/ha/year in average.
- Intensive aquaculture (oyster): area of 50 ha created an income of 14,000,000,000 VND/year, gained 280,000,000 VND/ha/year in average.

The survey results of aquatic benefits obtained based on mangroves (wild-caught and aquaculture) in some localities has shown that mangroves were well protected and maintained, that has given local people very substantial income from fishing and aquaculture.

5.2 Applicable Pilot Projects

Ongoing Mangrove Projects (Decision 120)

ID	Project name	Project type	Donor	Grant (USD)	Contribution fund (USD)	Total fund (USD)	A refo
Total				**4.019.188**	**300**	**4.319.188**	
1	Mangrove reforestation programs disaster preparedness (Chương trình trồng rừng ngập mặn phòng ngừa thảm họa (do Hội Chữ thập đỏ Nhật Bản tài trợ))	Grant	Japan Red Cross	1,743,938		1,743,938	
2	Investment projects developed protective mangroves in the coastal communes of Hau Loc district, Thanh Hoa province (Central Disaster Fund financing) (Dự án đầu tư phát triển rừng ngập mặn phòng hộ tại các xã ven biển huyện hậu Lộc, tỉnh Thanh Hóa (Quỹ thiên tai miền trung tài trợ))	Grant	Fund for Central Natural Hazards	925,250		925,250	
3	Sustainable forest management towards FSC forest certification for forest produce (Quản lý rừng bền vững tiến tới cấp chứng chỉ rừng FSC đối với rừng sản xuất)	ODA (grant)	NGO	150		150	
4	Combining coastal protection and restoration of mangrove belt Ca Mau (KFW) Kết hợp bảo vệ bờ biển và khôi phục đai rừng ngập mặn tỉnh Cà Mau (KFW)	Loan	Germany	1,200,000	300,000	1,500,000	

Planted project on mangrove reforestation (Decision 120)

ID	Project name	Project type	Donor	Grant (USD)	Contribution fund (USD)	Total f
1	Restoration and conservation of mangrove ecosystems in the Thai Binh (Phục hồi và bảo tồn hệ sinh thái rừng ngập mặn tại tỉnh Thái Bình)	ODA (Grant)	Korea	1,900,000		
2	Strengthening the adaptive capacity based on mangrove forest ecosystems and forest border zone (Tăng cường năng lực thích ứng dựa trên hệ sinh thái rừng ngặp mặn và rừng vùng biên giới)	ODA (loan from WB)	IDA	110,000,000	10,000,000	12
3	Planting, restoring mangroves in some coastal provinces (Quang Ninh, Thai Binh, Ha Tinh, Ninh Thuan) (Trồng, phục hồi rừng ngập mặn tại một số tỉnh ven biển (Quảng Ninh, Thái Bình, Hà Tĩnh, Ninh Thuận))	ODA (grant)	Đan Mạch	2.000.000		
4	Conservation projects and development of natural vegetation on sand (Dự án bảo tồn và phát triển thảm thực vật tự nhiên trên cát)	Grant		200		
5	Sustainable Forest Management Project (DA Quản lý rừng bền vững)	ODA	USAID	4.000.000	400	
6	DA Afforestation BauTrang erosion control protection (DA Trồng rừng chống sạt lở bảo vệ BàuTrắng)	ODA		1.000.000	100	

7	DA forest development investment coastal PH limit coastal erosion, protect sea embankments, dykes renovated beach with solution components combine mechanical barrier against wind and accumulation of mud in the coastal districts of Tra Vinh (DA đầu tư phát triển rừng PH ven biển hạn chế xói lở bờ biển, bảo vệ kè biển, đê biển bằng giải pháp cải tạo thành phần cơ giới kết hợp rào chắn gió, tích tụ bùn ở các huyện ven biển tỉnh Trà Vinh)			5.000.000		
8	Reforestation projects ecotourism combined Phu Tan, Tan Phu Dong (Tien Giang) (Dự án trồng rừng kết hợp du lịch sinh thái xã Phú Tân, huyện Tân Phú Đông (Tien Giang))	ODA		1,100,000		
9	Restoration and sustainable protection of coastal protective forest in Bac Lieu (Phục hồi và bảo vệ bền vững rừng phòng hộ ven biển tỉnh Bạc Liêu)	Vốn ODA		5,000,000	500	

5.3 Key lessons learned

The 2012 IUCN evaluation of mangrove regeneration projects in to Can Gio recommended extensive training and capacity building programs be incorporated in regeneration efforts. The study highlighted the need for specially tailored to different groups, such as school teachers, students, stakeholders, and especially shrimp farmers. It also flagged the need to further work on political measures to monitor compliance of forest protection as well as to promote alternative cooking- or fuel supplies to replace timber-based cooking. Other findings included establishing clear guidelines for tourist carrying capacity, and new political regulations banning – or at least limiting – freight ship traffic on some of Can Gio's river branches and canals. It also highlighted the need for further reforestation- and forest cultivation and protection efforts should continue in close exchange with other programs, granting the exchange of experience and knowledge.

With regards to scientific recommendations included

- High precision remote sensing based forest area mapping be undertaken based on specifically acquired below-1m resolution Quickbird data and image segmentation approaches. Mapping of classes such as 'lightning gaps', 'illegal logging scars', 'thinning scars', 'reforestation areas', different 'mangrove density' classes, 'settlement', industry', 'salt and aquaculture pond' differentiation and assessment of water quality within the reserve's and districts canals (sedimentation load, colored dissolved organic matter)
- Other recommendations include remote sensing based monitoring of mangrove area's development and land use change over the upcoming 3-5 years, accompanied by field validation and mapping campaigns
- Net Primary Production derivation (NPP = annual additional carbon uptake) and biomass derivation based on time series of remote sensing data based on dynamic NPP derivation models, to assess NPP development since the year 2000 up to today.
- Measurement campaign of Above Ground and Below Ground Carbon storage in mangroves, separated for green biomass (leaves and litter), woody biomass (stems and twigs), root biomass (below ground biomass) for the major different mangrove species in Vietnam; including installation of Eddy Flux Towers in Can Gio Mangrove Biosphere Reserve and other mangrove areas.
- In depth analyses of the legal framework including the informal sector explicitly applicable n the regeneration areas to assess, how the enforcement of laws, rules, and regulations is happening. Such an assessment can pave the way for effective implementation of protection measures well embedded in a local, regional and national political context.
- Development of a PES scheme for mangrove regenerated areas if feasible.[85]

[85] V. Q. Tuan, and Dr.C. Kuenzer (2012). Can Gio Mangrove Biosphere Reserve Evaluation 2012: Current Status, Dynamics, and Ecosystem Services. Hanoi, Viet Nam: IUCN. 102 pp.

Case Study: Community perceptions mangrove value in Can Gio

During the Vietnam war nearly all of Can Gio's mangroves were destroyed due to defoliant spraying. Also forest extraction by the – at that time – very poor population aggravated the problem. Large replanting and protection efforts led to a rehabilitation of the mangroves and nowadays a very large diversity of mangrove and tree species as well as other flora and fauna can be found. Nowadays people are partially aware of the ecosystem services, which the mangroves provide and most agree that mangrove forest must be protected.

The forest supplies construction wood, fire wood, fish catch, crab catch, clam and oyster harvest, as well as indirect values such as storm and erosion protection, or water filtration, and carbon sequestration. A big threat for the mangroves in Can Gio are increased shoreline erosion through large freight ships, the ever expanding aquaculture and salt farming activities, illegal wood extraction by locals, as well as negative consequences of urbanization, increasing tourism, and socio-economic transformation, manifested in an increase in solid and fluid waste accumulation and general pollution..

Based on 289 socio economic household surveys undertaken in Can Gio in November 2011, the following findings were derived. Educational level is relatively low in Can Gio – less than 20% of the people have a high school education, and total household income averages 4,148 USD per year. Over 50% of people in Can Gio use mangroves for different purposes. A major role plays the supply of wood for construction and firewood. 50% of interviewed households claim to extract wood from the forest for construction and fire wood, knowingly aware that this is illegal. Even forest managers extract fresh wood, as replacement costs to buy the wood on the market would add up to 1,457 USD per year, which is over 30% of the annual income. Furthermore, locals profit from mangrove related fish catch, and mangroves as tourism or resting places. Mangrove related products are a major part of the income for over 85% of forest managers, and over 65% of fishermen. However, also shrimp farmers and other job groups utilize mangroves – even though they are not as aware of it as the other two occupation groups.

The household survey made very evident that it is especially the fishermen, who are very aware of the mangrove's benefits and ecosystem services. On average, they have a better knowledge on the local ecology than the forest managers, which went through extensive training programs. They are also the most dependant on the mangrove forests, as they are aware that most of their catch depends on mangrove health. Even though forest farmers also depend on the mangroves, as they receive a monthly salary for their forest monitoring work, the knowledge on mangrove's ecosystem services is slightly lower. Illegal behaviour of wood extraction is accepted by all, and also not really reported if observed with others.

However, the largest 'threat' to mangrove forest is the group of shrimp farmers. When asked if mangroves should be protected, 33% do not think so, and over 60% think that it will have no big effect if all mangroves in Can Gio disappear. With respect to mangrove related knowledge it is the least accentuated in the group of shrimp farmers. For them, mangroves mean a restriction to further expansion opportunities of their aquaculture business. As shrimp farmers live already 'further away' from nature, rather than with nature, the understanding of local ecology – especially of long term effects of shifts and disturbances – is not so clear.

While fishermen and forest managers clearly hope for a further expansion of the forested area in the next 10 years, most shrimp farmers assume that the mangrove covered area will stay the same in size or even decrease.

At the same time, all Can Gio inhabitants are somehow – even if only in a blurry way – aware of the high value of this ecosystem. When asked how much they think one hectare of mangrove is worth, the average answer is 17,656 USD. Multiplied by a tree covered area in Can Gio, of 38,293 ha, which we derived from up to date remote sensing data, this would be an overall value of 676.10 million USD. The annual protection value of Can Gio reserve is 38,293 times 725.000 VND, which equals 27.76 billion VND or 1.31 million USD (conversion rate 11/2011).

Based on clearly set up baseline definitions, as well as numerous quantitative information on the value of direct, as well as indirect values, as well as based on own travel cost calculations, we can decipher the ecosystem service values of mangroves with respect to timber utilization, natural inner-mangrove and offshore fish catch, tourism, as well as indirect values of erosion control, and carbon sequestration. For all the values we presented lower and upper limits, and calculated them for a forest covered area of 38,293 ha, as well as with a slightly smaller area of 35,265 ha.

Each year, Can Gio mangroves supply 12.72 million USD of timber products to the local inhabitants (construction wood and fire wood, not even including souvenir carving benefits). The travel cost value of tourism ranges between 104 million USD and 176 million USD, depending on if one calculates with the complete or only 20% of international tourist's airfare. The coast protection value ranges between 137.42 and 149.21 million USD, depending on if one calculates with the smaller or the larger area. Carbon sequestration can reach a value of up to 68.89 million USD for only one year. The overall value of the mangrove ecosystem based on the values we could quantify ranges between 358 and 503 million USD per year. However, this is probably only one third of the realistic value, as several very important indirect ecosystem services such as water filtration, soil purification, biodiversity maintenance, or also cultural values could not be specified. Local people valued their ecosystem ranging between 622 and 672 million USD. If one adds up these numbers, considering the local people's judgement as the existence value, the Can Gio mangrove ecosystem reaches an annual value of well above one billion USD. (Source: V. Q. Tuan, and Dr.C. Kuenzer (2012). Can Gio Mangrove Biosphere Reserve Evaluation 2012: Current Status, Dynamics, and Ecosystem Services. Hanoi, Viet Nam: IUCN.)

5.4 Financial and Economic Analysis

Mangroves pay an important role in providing materials and environmental services for living and production. Three basic services provided by mangroves are provisioning services (direct use value such as timber, firewood, medicinal plants, fishery sources etc), regulating services (coastline protection, sedimentation facilitation, carbon sequestration etc) and cultural services (eco-tourism, culture etc). Of these values, direct use values are commonly recognized, but other values are not fully captured as the failure of the market. A numbers of studies on valuation of total economic values of mangroves have been conducted in Viet Nam and this shows that total economic value of mangroves is very significant. Total value of mangroves range is very site specific, ranging from 1,349 – 13,133 USD/ha/year (see below).

Figure 19: Estimated total economic value of mangroves

Services	Values	Unit	Observations	Means	Max	Min
Provisioning Services	***Sub-total value***	***US$/ha/yr***		***1,791.55***	***5,128.58***	***184.44***
	Timber	US$/ha/yr	15	58.00	332.37	0.77
	Firewood	US$/ha/yr	18	12.05	92.63	0.55
	Medicinal plants	US$/ha/yr	5	7.74	30.61	0.85
	Fish catch	US$/ha/yr	20	267.83	1,013.07	2.33
	Aquaculture	US$/ha/yr	15	1,436.82	3,627.45	179.74
	Other direct use	US$/ha/yr	5	9.12	32.43	0.20
Regulating Services &	***Sub-total value***	***US$/ha/yr***		***959.38***	***4,122.81***	***64.89***
	Soil protection	US$/ha/yr	2	6.81	8.87	4.75
	Water regulation	US$/ha/yr	0			
	Coastal protection	US$/ha/yr	6	845.98	3,896.53	26.50
	Carbon sequestration	US$/ha/yr	5	106.59	217.40	33.64
Cultural Services & others	***Sub-total value***	***US$/ha/yr***		***1,462.25***	***3,881.62***	***1,100.16***
	Landscape	US$/ha/yr	2	17.42	26.62	8.23
	Tourism	US$/ha/yr	11	334.93	2,726.45	0.69
	Micro-climate stabilization value	US$/ha/yr	1	1,029.41	1,029.41	1,029.41
	Option value	US$/ha/yr	1	45.21	45.21	45.21
	Existence value	US$/ha/yr	2	35.28	53.93	16.63
Total economic value		**US$/ha/yr**		**4,213.19**	**13,133.01**	**1,349.49**

Source: Vu Tan Phuong et al. 2014. Report on preparation of national forest accounts. Unpublished. WB and Viet Nam Academy of Forest Sciences.

The financial and economic analysis of mangrove regeneration and restoration based on several assumptions: i) investment inputs (2 options: regeneration and replanting); ii) Total economic values of mangroves (use minimum average value gained from studies as conservative estimation); iii) interest rate (3 options: 5, 10 and 15%); and iv) the rotation of mangroves is 20 year with no conversion and damages.

The cost and benefits analysis show that in all case the NPV is greater than zero, meaning that the proposed measures of regenerating and replanting mangroves is financially and economically feasible (see below).[86]

Figure 20: Results of Cost and Benefit Analysis for Regenerating and Replanting mangroves[87]

[86] Vu Tan Phuong et al. 2014. Report on preparation of national forest accounts. Unpublished. WB and Viet Nam Academy of Forest Sciences.

Items	Regenerating mangroves	Replanting mangroves
Total investment (US$/ha)	1,500	4,000
NPV (5%, 20 years rotation) (US$/ha)	8,550	6,201
NPV (10%, 20 years rotation) (US$/ha)	6,087	5,624
NPV (15%, 20 years rotation) (US$/ha)	4,823	4,744

This analysis may not reveal the environmental benefits from regenerating and replanting mangroves as these values are very site specific. However, the regeneration and reforestation of mangroves greatly contribute to mitigation of climate change impacts in coastal areas such as coastline erosion, damage reduction for sea dykes system and reduction of impacts of sea wave on production and lives of local community. Implementing mangrove component also contribute to job generation by engaging local people in mangrove related activities. Other impacts are that capacity of local people and officials are enhanced through the trainings. Livelihoods of local people are improved through practicing sustainable aquaculture farming and harvest of fishery sources in mangrove areas.

Payment for Ecosystem Services, PES, is a topic with increasing significance – especially in the context of REDD+ - and is also increasing in relevance in Vietnam. However, numerous authors have demonstrated that no real PES schemes have been established in the country so far. Major hindrances in this respect are predominant land ownership schemes, overlapping or missing administrative responsibilities in a governmental institutional framework defined by both, the MARD and the MONRE, as well as pressing supply needs of local people still living close to the poverty line.[88]

6. Community Based Disaster Risk Management, Risk Assessment, Risk Mapping and Land Use Planning

6.1 Background

The Government of Vietnam has systematically considered disaster preparedness and mitigation as an important component of development in the country as outlined in the "National Strategy for Natural Disaster Prevention Response and Mitigation". The Government has made significant progress in disaster preparedness and emergency response, however, experience illustrate the need for innovative approaches that involves the participation of the people at the village levels, whose very lives are at stake when disasters strike. Therefore the National CBDRM programme (1002) was developed to strengthen the capacities of villages and communes and the disaster management institutions to become more responsive to the short and longer-term needs of the most vulnerable villages through participatory risk assessment and identification and implementation of risk reduction measures.

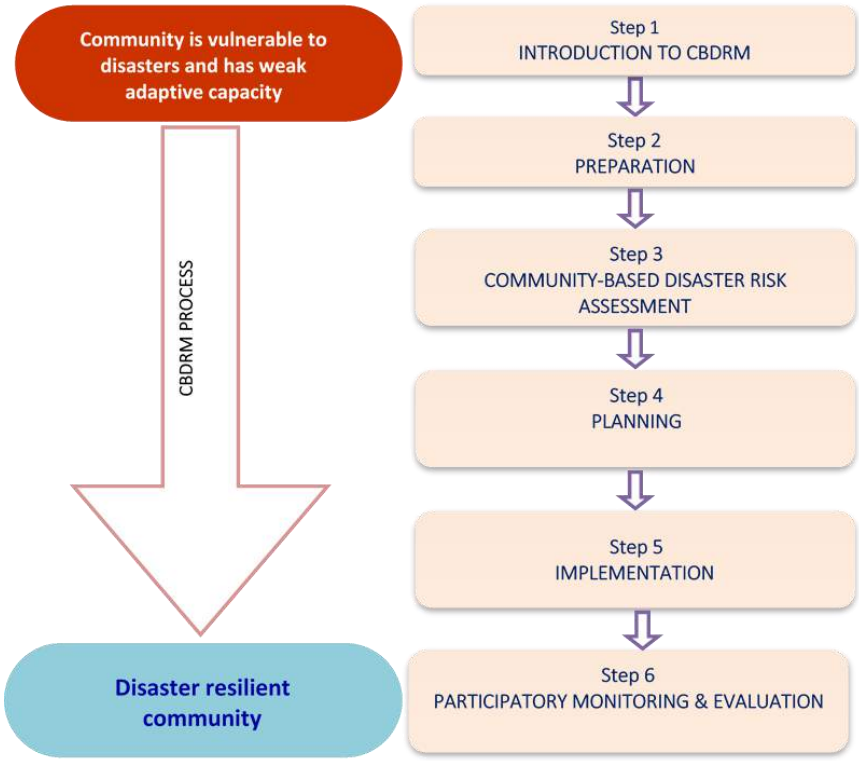
The CBDRM Project directly supported government efforts, especially provincial and commune levels, for sustainable development by helping reduce human, economic, and financial losses from disasters, including climate change related risks. Through the project, communes develop CBDRM plans that focus on long term intervention and preparedness measures and empower communes to prevent and reduce the impact of disasters and secure and protect their livelihoods.

[87] Dr. Vu Thang Phuong, individual communication

[88] V. Q. Tuan, and Dr.C. Kuenzer (2012). Can Gio Mangrove Biosphere Reserve Evaluation 2012: Current Status, Dynamics, and Ecosystem Services. Hanoi, Viet Nam: IUCN. 102 pp.

The CBDRM process has six steps, as outlined below:

Figure 21: The CBDRM Six Step Process



The programme grew out of a collaboration between a Viet Nam Red Cross and NGO Consortium (JANI) and the Government. The civil society sector had long experience in community based approaches both globally and in Viet Nam, and this learning was leveraged to develop a program suited to the particular requirements of government systems at the provincial level. The SCDM II program continued to provide essential support to the Government's efforts.

The program was designed to be underpinned by seven technical building blocks to ensure the quality of implementation. These include: 1) the development of National Implementation Guidelines; 2) CBDRM Training Materials; CBDRM M&E Guidelines, 4) CBDRM Risk Assessment Guidelines; 5 Financial Implementation Modalities; 6) A Guidelines for Provincial CBDRM Planning and 7) A Guideline for Commune CBDRM Planning.

Implementation is supported by a technical working group chaired by MARD with secretariat assistance from the UNDP SCDM-II Project. Relevant stakeholders including the Red Cross, Women's Union, Oxfam, Malteser, UN Women, the World Bank and others attend regular meetings CBDRM to provide technical input and recommendations for strengthening materials and implementation of the program.

In 2014 the two Guidebooks and the CBDRM M&E Guidebook were institutionalized through the approval and issuance by MARD under the following decisions:

- Material on "Community-based Disaster Risk Management for commune level" is issued at Decision number 315/QĐ-TCTL-GNTT, dated 29 April 2014 of the Water Resources Directorate.

- Material on “Community-based vulnerability assessment for commune level” is issued at Decision number 389/QĐ-TCTL-GNTT, dated 04 June 2014 of the Water Resources Directorate.
- “The set of Monitoring and Evaluation indicators and its guidance” is issued as Decision number 742/QĐ-BNN-TCTL dated 14 April 2014 of the Ministry of Agriculture and Rural Development.

All three guidebooks were printed for distribution and used in 2014 by DMC and implementing Partners, and have been made publicly available for other NGOs. In addition, a set of CBDRM training guidance materials, aimed at assisting provincial and district level officials to provide training on how to carry out the CBDRM and CBDRA processes to the commune level were also developed. These materials include lesson plans, agendas, pre & post-tests, PowerPoint presentation templates, and some additional reading materials.

Using the CBDRM materials, the DMC and co-implementing partners provided a seven day CBDRM & CBDRA Training of Trainers (ToT) to selected Provincial/District level officials from 20 target provinces. Those ToT participants then returned to their home province and in groups of three carried out 10 day CBDRM & CBDRA training (Training of Facilitators) to selected commune officials. This training period also includes carrying out the CBDRA at commune level and writing the commune NDPCP.

To date more than 1,000 officials at central and provincial level have been trained in implementing CBDRM in their areas. In 2014 alone DMC and partners conducted eight CBDRM & CBDRA Training of Trainers (TOT) courses in 20 provinces for Provincial and District level officials to become CBDRM & CBDRA Trainers in their home provinces. The ToT trained 184 provincial and district trainers from the C/CFSC (119 males and 65 females) providing knowledge on CBDRM and how to carryout implementation at the commune level. During the training the standard sets of CBDRM & CBDRA materials were utilized by facilitators and adjusted to regional and participant requirements.

Participants were selected by Provincial officials and comprise staff with responsibility for DRR from within the CFSC and other relevant stakeholders such as the Women’s Union, Farmer’s Union, etc. A special emphasis was placed on identifying women and representatives from other vulnerable groups in the selection process. Feedback on the methodology and materials was collected during the ToTs for updating with the materials package expected to create the base CBDRM training model for future replication across the country by both government and other organizations.

Selected Provincial and District officials who participated in the ToTs then carried out the ToF training course and the CBDRA assessment in three communes in their province. As part of this process, commune officials were asked to establish a Technical Assistance Group from among the training participants to carry out the CBDRA. This group was required to have 30% female participation and to including representation of the wider community including organizations like the women’s, farmers and youth unions, etc.

The 2014 ToFs trained 814 commune officials of which 608 were male and 206 female. During the CBDRA process 356 consultation meetings were conducted with the participation of 8,789 villagers. Using the CBDRA report the Technical Assistance Group completed the Natural Disaster Prevention and Control Plan (formerly known as flood prevention or DRM plan) for submission to the commune leader.

The ToF process allowed commune officials together with the local community to assess vulnerabilities and capacities using participatory methods and begin identifying appropriate solutions to increase preparedness and resilience. Unfunded priority projects can then be referred through official Government channels for inclusions in the official socio-economic development planning

The CBDRM M&E Indicators and Guidebook were approved in April 2014 and include 29 indicators for measuring progress within the 1002 program, looking at policy, implementation, school integration and EWS linkages. In 2014, DMC also took over a CBDRM database created by Plan International/JANI and information from past and current projects is in the process of being entered into the database.

The project is also assisting DMC to collect information on CBDRM activities of other organizations from across the country to provide a more detailed and accurate picture of CBDRM national activities. To support the implementation of the M&E indicators and database system, in December 2014 the project recruited a short term consultant to assist DMC to update information in the database and identify areas for further strengthening systems in the future.

In December 2014, a lessons learned workshop was held where key trainers as well as CIP, UNDP and government staff were able to share experience, document learning and to suggest areas for further improvement in 2015.

Risk Assessment, Risk Mapping and Land Use Planning

There is a clear need to apply integrated coastal management approaches in all 29 coastal provinces. This should include improved risk assessment, planning and capacity development. Management and reasonable use of coastal areas/natural resources should be integrated with other spatial approaches and land use planning. A renewed emphasis on the management, prevention and mitigation of coastal pollution and environmental hazards could also be considered that incorporates climate change co benefits. Increasing community participation and strategies to reinforce livelihoods will be key to this work.

More resilient coastal management in the face of climate change is not only a social, but also an economic issue. Coastal Management must balance among economic, social and environmental aspects and should not only be viewed under scientific perspective. Coastal and marine areas in Vietnam have been managed by 15 ministries/sectors in a sectoral manner which has caused overlap and fragmentation. There is a lack of a national agency in cross-sectoral coordination for coasts, seas, and islands as well as inter-sectoral policies in coastal management.

Major challenges/obstacles in Coastal Management implementation in Vietnam are the lack of an institutional arrangement for ICM at different levels, the lack of national system on ICM policy and laws and low enforcement and the weak incorporation of ICM into national and provincial socio-economic plans is weak and lack of special technical guidelines. Climate change and sea level rise have not been factored into long-term planning and there is a lack of human resources and capacity in ICM development and implementation. Finance is also an issue, and there is a lack awareness and participation of local community through the program cycle. Academic training and education program on ICM are limited and the skill of the staff from agencies responsible to ICM at both central and local level is still very weak.

More broadly in Viet Nam there is a lack of credible longitudinal data on disaster frequency, damage in key sector and losses is currently a major constraint to the development of scientifically robust risk models and data for Viet Nam. In recent years, with UNDP support, the MARD has invested in establishing a basic DesInventar based disaster damage and loss database, however this needs to be further institutionalized an upgraded. This system has tended to be focused primarily on post disaster data collection for medium and large events, and updates are therefore linked to incidents, rather than part of regular data collection for damage and loss. Loss reporting data is uneven and standards for quantification of losses appropriate to the Vietnamese regional context is lacking. Some sector profiles, for example in agriculture, require additional data indicators to be agreed and added to the system. In addition, a national programme on community based disaster risk management (CBDRM Programme 1002) is being rolled out across high risk communes and this process collects valuable data on historical disaster events that can add to the historical record of damage and loss data.

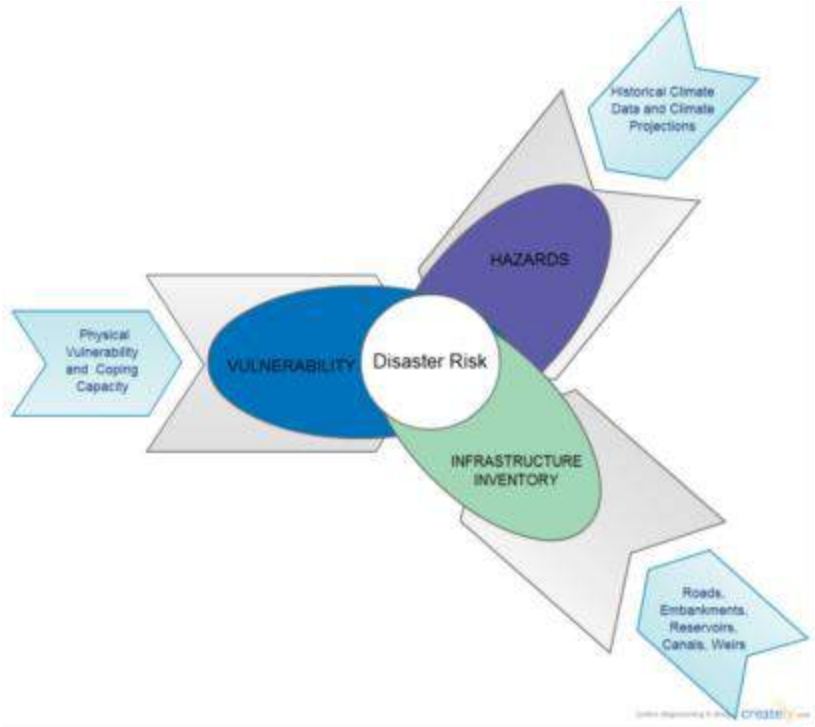


Figure 22: The Conceptual Framework for Vulnerability Assessment Applied in the UNDP-ADB Joint Project on Climate Resilient Infrastructure for the Northern Mountainous Provinces of Viet Nam

In 2013 and 2014 UN Spider conducted Technical Assistance Missions to review current capacity in Viet Nam for geo-spatial technology. The mission concluded that Vietnam has an excellent institutional foundation and capacity in the areas of disaster management as well as space technology. The organisations of MARD, MONRE and VAST are implementing numerous projects with national and international partners employing space technology which are directly or indirectly benefitting disaster management. The challenge is to make effective use of this data and products in decision making by CCFSC and the Vietnam National Committee for Search and Rescue (VINASARCOM). The resources under these ministries are scattered and lack the much needed coordination. The assessment and recommendations of the UN-SPIDER mission provide a basis to develop a long-term vision and a master plan for its implementation. These recommendations have strong linkages to the National Strategy for Disaster Prevention, Response and Mitigation to 2020, the Implementation Plan and Disaster Management Law of Vietnam. This ensures that the assessment and recommendations can be effectively reinforced in the existing framework.[89]

It further noted the need to establish working level standard operating procedures (SOP) for the use of geospatial information during emergency response on the basis of the National Strategy, Implementation Plan and Disaster Management law.

Facilitating open access by DMC/MARD to relevant geospatial datasets developed by MONRE (short-term arrangement until the national data policy/strategy is in place) and setting up a national data policy or strategy integrated to the NSDI (including remote sensing and geospatial data) for disaster management and socioeconomic development were also noted as concerns as was the need for more consistent and coherent capacity building of technical specialists within the Government of Viet Nam. The UN Spider mission also highlighted that an effective Disaster Management Information System (DMIS) in place would help precise damage assessment and plan recovery efforts. This should be linked with efforts being undertaken by PDC to implement VinAWARE at the request of DMC.

[89] Technical Assistance Mission Report for Viet Nam, UN-SPIDER; 2013/2104, www.un-spider.org

Damage and Needs Assessment (DANA) software built since 2006 has aimed to construct a unified database of all disaster related losses related to people, housing, education, health, transportation, agriculture, forestry, irrigation, fisheries, supplies, communications and industry. The database also logged the by the type of natural disasters such as hurricanes, Tornados, tropical cyclones, rain, flooding, flash floods, landslides, drought, salinity intrusion. This software (Designed to run on a single machine environment) was operated by support staff of the Department of Dyke Management and Flood Control in information management. DANA is synthetic data software, designed on a database on a SQL Server 2000 and active in the web environment to facilitate the sharing of information. The software has been installed and stored at the Computing Centre - Ministry of Agriculture and Rural Development, by the Department of Dyke Management and Flood and Storm Prevention and operational management.

Provinces and cities regularly use the report forms under Decision No. 31 - QD / PCLBTW date 24/02/2012 to report data damage and relief needs. However according to statistics collected the results from the dispatch date of 05/11/2013 number of centers 236/GNTT Prevention and Mitigation provinces these are still stored in the form of papers and/or excel spreadsheet software. Much of the central and southern provinces have never used DANA software or a software data collection and damage assessment after natural disasters other needs. [90]

In 2012 DANA was upgraded in Viet Nam and merged with a global DesInventar system through support from ISDR and UNDP. DesInventar is a conceptual and methodological tool for the generation of National Disaster Inventories and the construction of databases of damage, losses and in general the effects of disasters. The system aims to develop a sustainable disaster information management system within an institution for the systematic collection, documentation and analysis of data about losses caused by disasters associated with natural hazards. Global DesInventar databases are able to provide information on core indicators to global disaster reporting systems in a systematic manner, but can also be customized to meet government's local needs. Data is collected according to common standards, and time and geo-referenced. Data is usually collected at the lowest administrative level.

The Disaster Information Management System (DesInventar methodology) includes a software product with two main components. The Administration and Data Entry module is a relational and structural database through which the database is fed by filling in predefined fields (space and temporal data, types of events and causes, sources) and by both direct and indirect effects (deaths, houses, infrastructure, economic sectors). The Analysis module allows access to the database by queries that may include relations among the diverse variables of effects, types of events, causes, sites, dates, etc. This module allows at the same time to represent those queries with tables, graphics and thematic maps.

The software is built on the Microsoft Net Framework 2.0, system administrators use SQL server 2005 database. The statistical information DesInventar can be sorted to show (and then analyze) the impact of natural disasters at the local level. Statistics can then be analyzed in a number of existing methods and some new methods, starting with the preliminary analysis will help to understand the effects of the disaster. The ability to research, compare, and support for Decision Making action related to risk assessment, mitigate and manage the entire risk. All events can be analyzed and shown on maps and charts. 91

The graphical user interface of the software is complex, making it difficult for to update and use the information. Vietnam extent of software products is not high, some parts are still in not fully operational. The software update to be done by the experts in the project, no formal Decision management unit, to update the software. There have been some challenges in applying Desinventar in Viet Nam. For example, there are no specific guidelines for installing software, backup and data recovery. The interface is designed so that the data entry focal point needs to

[90] Hoang Thi Hien; Disaster Management Center (DMC) and ADPC Analytical Review Post-Disaster Damage, Loss and Needs Assessment Practices in Viet Nam (DaLNA); 2014

[91] Hoang Thi Hien; Disaster Management Center (DMC) and ADPC Analytical Review Post-Disaster Damage, Loss and Needs Assessment Practices in Viet Nam (DaLNA); 2014

know the programming language and is designed to direct them. The maintenance is very difficult often because a part of the program code mixed with html code. 92

A number of other international humanitarian actors also collect information on disasters, focusing primarily on needs and initial damage, rather than long term economic losses. This includes the Disaster Management Working Group; Vietnam Red Cross Society; and Non-Government Organizations: Oxfam, World Vision, Plan, CARE. 93

MARD and UNDP have been working together since 2012 to develop an integrated risk index for climate resilience in Viet Nam. This has been successfully applied in identifying high risk communes for inclusion in government programs. The model is now being further refined for provincial, commune and infrastructure level application as part of a joint Government, UNDP and ADB project focusing on climate resilient rural infrastructure in the northern mountainous regions of Viet Nam. These methodologies include tools for helping national and provincial planners to link risk assessments to budget allocations, and to better estimate costs for climate proofing rural infrastructure. The concept note developed to date proposes adapting and replicating these systems to cover all provinces, enabling national climate change risk assessment to be linked to the national budgeting process for the first time. This will be augmented by capacity development activities to enable MARD to update data annually. Improved longitudinal data and targeted research outlined above will then be integrated with existing data to develop the first integrated on-line climate change risk map for Viet Nam accessible to Government planners.

Figure 23: Example of integrated risk map at regional and district level developed by the ADB-UNDP Climate Resilience Project

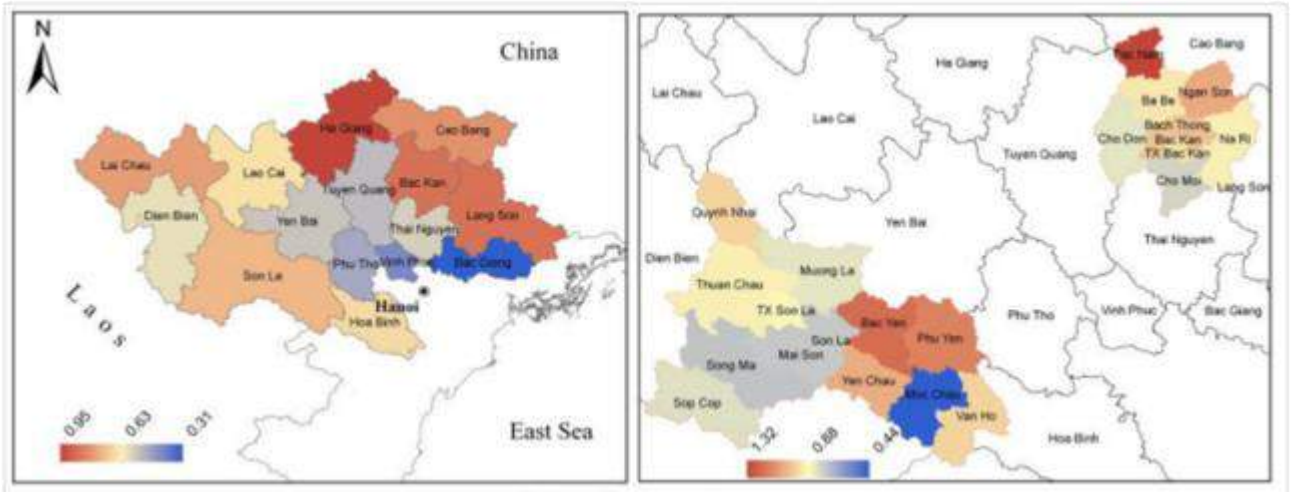
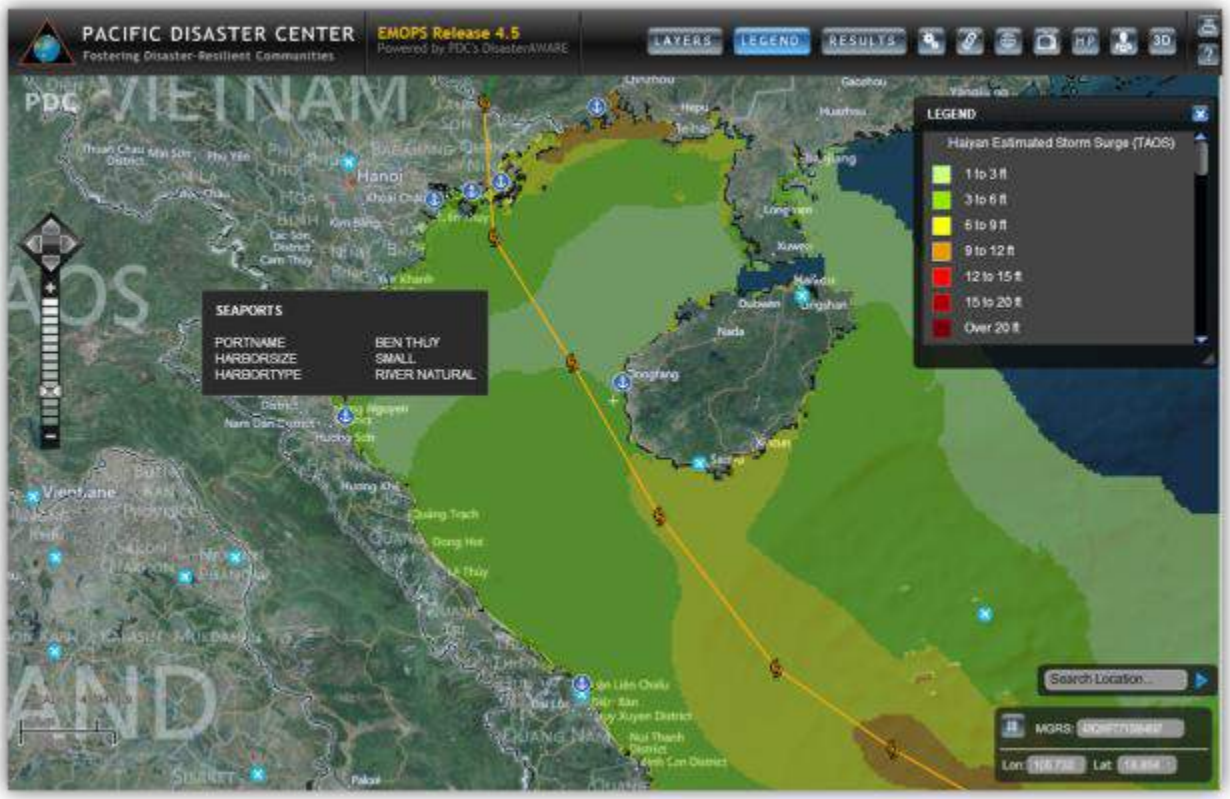


Figure 24: Example of VinAware Storm Track

[92] Hoang Thi Hien; Disaster Management Center (DMC) and ADPC Analytical Review Post-Disaster Damage, Loss and Needs Assessment Practices in Viet Nam (DaLNA); 2014

[93] Hoang Thi Hien; Disaster Management Center (DMC) and ADPC Analytical Review Post-Disaster Damage, Loss and Needs Assessment Practices in Viet Nam (DaLNA); 2014



To strengthen Vietnam's capacity for disaster management and flood monitoring and warning, PDC developed a web-based early warning decision support system for use by disaster managers in the most vulnerable provinces. The system, called VinAWARE, is a customized version of PDC's DisasterAWARE. It integrates map data, impact models, rain- and stream-gauge measurements, and meteorological forecasts to promote near real-time situational awareness and provide warnings based on criteria established by the Government of Vietnam. The interface is in Vietnamese, along with most of the information resources and data products. The project, funded by USTDA, included a training program for national and provincial level disaster professionals that incorporated scenario-based exercises.[94]

To help manage disaster data, Viet Nam also has a customized version of PDC's highly successful and widely used DisasterAWARE system called VinAWARE. This system provides disaster monitoring and hazard early warning decision support to disaster managers in Vietnam at both central and provincial levels. VinAWARE is the result of a long-standing relationship between the Pacific Disaster Center (PDC) and the Government of Vietnam. Over the past decade, PDC has provided technical assistance to MARD, DDMFSC, DMC, and other CCFSC agencies within MARD and MONRE across the central coastal provinces. In the case of dynamic data such as MONRE NHMS tropical cyclone, rainfall, and water level data, PDC worked with data providers to develop automated processes to routinely transfer these data to the MARD servers and process them for inclusion in VinAWARE.

[94] http://www.pdc.org/about/projects/VinAWARE/

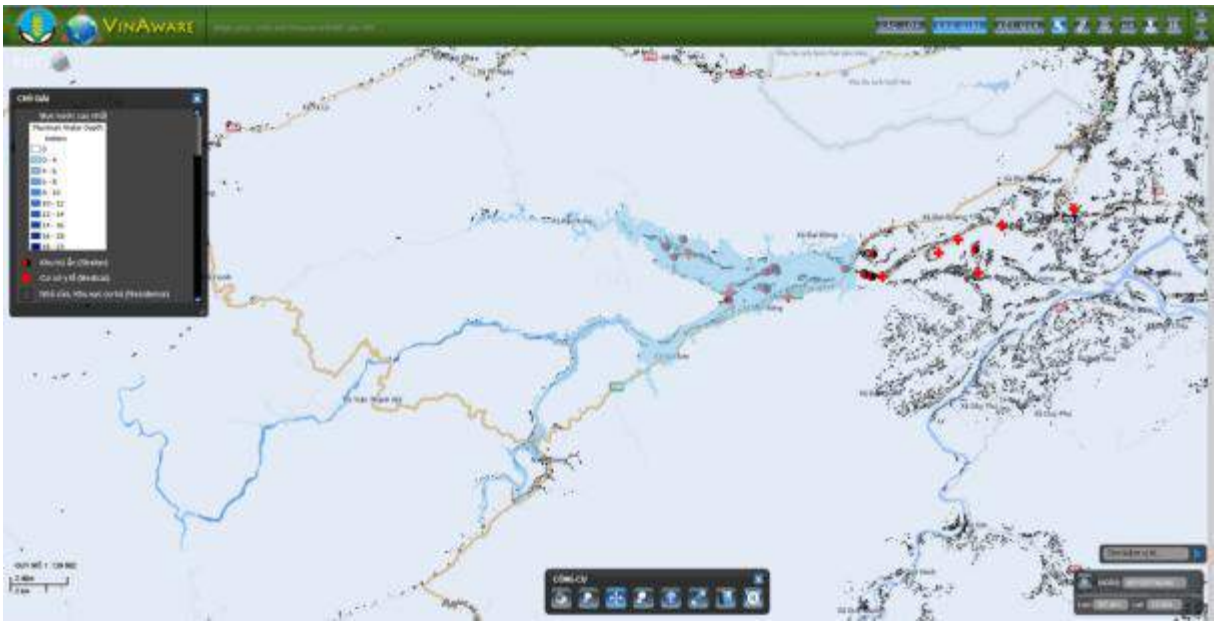


Figure 25: Improved risk maps can strengthen existing information systems such as VinAWARE which is able to layer hazard data over base maps with variables such as hospital locations and historic flood areas

The project has been able to undertake capacity development and training activities focused on running and using VinAWARE and related skill-building, including training in skills such as those required to run and apply flood models and to implement a dam safety program in Vietnam. Additionally, PDC has worked with DMC to begin the institutionalization of VinAWARE at national and provincial levels. This has included the execution of data-sharing agreements between MARD and key VinAWARE data providers. For VinAWARE to be successfully used by MARD DMC and DDMFSC—as well as other CCFSC agencies—some additional steps must be taken. Data sharing must be strengthened and outstanding data gaps that should be filled. In many cases, this data is available but not accessible.

A 2010 World Bank Study on options for risk sharing and transfer in Viet Nam highlighted that data availability an accuracy was a key issue in developing risk transfer products. It noted that official loss values may be under-estimated because the current post-disaster damage assessment and reporting system tends to under-report the financial value of the damages. The current damage assessment and needs assessment (DANA) system is mainly intended to record the direct costs of recovery and reconstruction of damaged property and infrastructure and does not report the value of secondary or business interruption losses: as such these estimates probably significantly under-estimate the true value of losses to the Vietnamese economy. It also highlighted the need for more standardized damage data, especially estimated financial values for each category of damage, to be collected through a comprehensive damage and needs assessment system. [95]

In addition, the National CBDRM program has also established a database to track progress towards achieving the 26 monitoring and evaluation indicators agreed to guide the project. The project is able to track which projects have begun implementation (see below) as well as to analyse progress towards achievement of key indicators of the project, including completion of CBDRM planning and SEDP integration processes. This database is managed by the DMC in MARD and is updated quarterly in line with regular government reporting schedules.

[95] Weathering the Storm: Options for Disaster Risk Financing in Vietnam; World Bank; 2010 Available at: http://reliefweb.int/sites/reliefweb.int/files/resources/61571C422DB58ADF49257712001D20C5-Full_Report.pdf

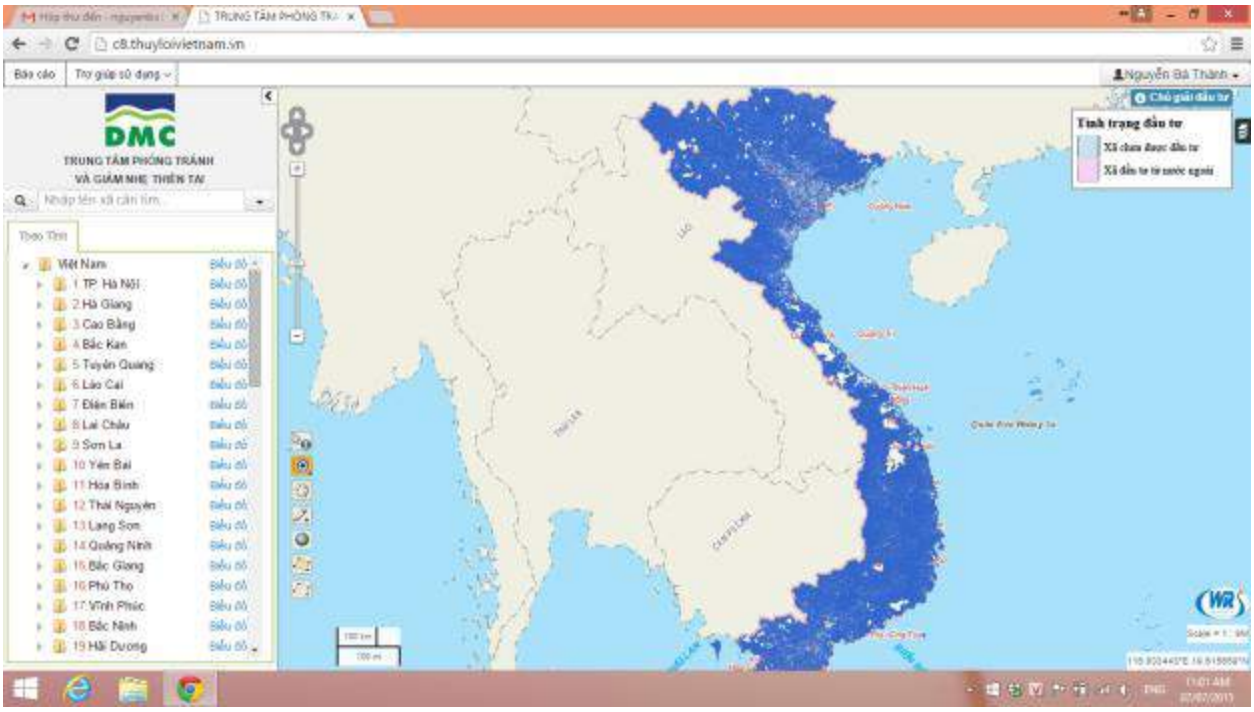


Figure 26: Screen from National CBDRM database in MARD that tracks progress towards implementation of the National CBDRM program.

It further noted that sovereign parametric disaster insurance could be further explored to protect against the fiscal impact of major events occurring every ten years or less frequently. Parametric insurance is an innovative form of insurance triggered by pre-defined parameters such as the wind speed or the excess rainfall level for tropical storms and typhoons. It provides immediate liquidity to the policyholder in the aftermath of a disaster.

In the medium term, the World Bank recommended that the Government of Vietnam could promote the development of the local property catastrophe insurance market, especially for private urban dwellings of middle and high-income households. The private residential property insurance market in Vietnam is still under-developed. As this market develops in the future, the Government could promote a private residential catastrophe insurance program through the establishment of a catastrophe insurance pool, like in Turkey. [96]

6.2 Applicable pilot projects

A number of recent projects are contributing to strengthen risk information and mapping in Viet Nam. This include:

- The "Strengthening institutional capacity for disaster risk management in Viet Nam, including climate change related disasters" Phase I and II (2009 to date) have helped develop the Damage and Needs Assessment database (DANA) and apply the global DesInventar methodology and software in Vietnam, as

[96] Weathering the Storm: Options for Disaster Risk Financing in Vietnam; World Bank; 2010 Available at: http://reliefweb.int/sites/reliefweb.int/files/resources/61571C422DB58ADF49257712001D20C5-Full_Report.pdf

well as providing significant support to development of Natational CBDRM programme. This project also developed integrated risk assessment tools and indices for disaster and climate change adaptation in Viet Nam.

- The ECHO funded Dip-echo partnerships have also provided support to numerous non-governmental projects to support implementation of the National CBDRM programme, including database development support, funding partners including CARE, Malteaser, Oxfam, Plan International and the Viet Nam Red Cross society and affiliates.
- Since 2006, the World Bank has been involved in the process of implementing the National Disaster Risk Management Project in Viet Nam with a concessional credit of US$160 million. The CBDRM activities of the program are executed by the Ministry of Agriculture and Rural Development and the Ministry of Natural Resources and Environment.
- The "Promoting Climate Resilient Infrastructure in Northern Mountain Provinces of Vietnam" Project (2012-2015) has developed vulnerability indices specifically for rural infrastructure in 15 provinces.
- VinAWARE: (2010-2015) has worked through DMC in MARD to operationalize an integrated disaster information system with USAID OFDA funding. This has included installing hardware, software and data (IT) components within the MARD IT Centre in Hanoi. Following that, PDC worked with DMC to identify needed data resources, and to the extent possible, obtained, processed, and configured these data into VinAWARE.
- SERVIR (2014), USAID and NASA announced SERVIR's expansion with SERVIR-Mekong, implemented by the Asian Disaster Preparedness Center (ADPC) and its consortium partners -- Spatial Informatics Group (SIG); Stockholm Environment Institute (SEI); and Deltares. This hub will promote the use of publicly available satellite imagery and related geospatial decision-support tools/products to help key stakeholders and decision makers in Burma (Myanmar), Cambodia, Lao PDR, Thailand, and Viet Nam better predict and manage floods and other natural disasters, improve agricultural risk management, manage land-use more sustainably, and help governments and communities increase resilience to the negative effects of climate change.
- The "High-resolution Climate Projections for Vietnam (HCPV)" project was funded by the Australian Government's Aid Agency (AusAID) under the Research for Development Alliance Program . The project aimed to further climate science research and capacity building between Australia and Vietnam. This project was delivered through close collaboration between Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO), Vietnam's Institute of Meteorology, Hydrology and Environment (IMHEN) and the University of Science - Vietnam National University from 2012 to 2013. This project has strengthen the existing understanding of future climate change in Vietnam, providing more detailed (high-resolution) projections for climate and sea-level rises throughout Vietnam and the seven climatic regions.
- In addition a number of Government bodies and research institutions have been active the creation of specific datasets for specific hazards, such as storm surge, landslides and some (not complete) watershed flood mapping.
- The Agricultural Community-Based Insurance Pilot, or "Agri CBI Pilot", funded by SNV, promotes innovative financing to build community resilience to climate change in coastal Vietnam. A community-based model implemented under local administration, the project was implemented in 81 villages in Nghi Loc district of Nghe An province. The target area is home to 9,500 households, and approximately 80% of these households are involved in rice farming on more than 18,000,000 sq. metres of land. The Agri CBI Pilot tested the provision of rice insurance through an area yield product which triggers a payment when the actual rice yield is less than 90% of the average yield for the last three crop seasons.[97] Other sector based agricultural schemes, including for shrimp production have also been piloted though have not yet been able to be successfully scaled up and replicated.
- Swiss-Re and MARD have piloted an agriculture insurance scheme starting with a pilot programme during the period 2011-2013. The programme provided cover for rice, livestock and aquaculture farming against storm, flood, drought, cold, frost, tsunami and other perils. It also provides cover against named pests and diseases and epidemics specific to rice, livestock and aquaculture. The Government provided premium subsidies for farmer households as follows: (i) poor households – 100% of total premium; (ii) near poor –

[97] http://www.microinsuranceacademy.org/project/nghe-an-vietnam/

80% of gross premium; (iii) other households outside these two categories – 60% of gross premium; and (iv) big farms and businesses – 20% of gross premium. The Vietnam National Reinsurance Corporation, Vina Re, and Vietnam's two largest insurers, Bao Viet and Bao Minh were appointed by the Ministry of Finance to participate in the design and implementation of the pilot programme.[98]

6.3 Key lessons learned

Key lessons learned for the CBDRM programme, as outlined in the five year review process can be summarised as follows:

- The programme has been beneficial and scaling up of implementation is essential 2016-2020. There is a need to further integrate the program with other relevant national priorities, to enlist sponsors and to more clearly define lead agency; advisory bodies; standing bodies at all levels to organize the implementation of the Scheme.
- With regard to finance, there is a need to be proactive in implementation using provincial resources in line with Decision No. 1002 / QD-TTg and 333 / QD-TTg of the Prime Minister; Document No. 7323 / OG-KTTH 03/9/2013 of the Government Office and Dispatch 3356 / BNN-TCTL date 18.09.2013 of the Ministry of Agriculture and Rural Development. This should be done in the context of the Decree Estimate 94/2014 / ND-TTg on establishing the fund provincial disaster prevention. Further central Government and ODA resources are also required.
- It is important to continue development and use of provincial trainers were trained in disaster risk management and community-based review application of the appropriate mode to maintain and develop this team for the purpose Castle. Directing the authorities on media training and continue disseminating the content of training, communications between ministries, sectors concerned is also required;
- Strengthening coordination with line ministries to integrate the contents of training, communication programs and projects by the ministries managing content related to the scheme, as well as development of collaboration guidelines, integration of programs to improve community awareness and forecasting programs, community-based early warning should be priorities
- Software support to monitor and evaluate implementation of the scheme at all levels should receive further support and updgrading as should the database on natural disasters, disaster risk and disaster prevention plans at the local level.
- Promoting scientific research, acquire technology, management model based disaster risk new and effective community is also critical to resilience building.
- Strengthening coordination with businesses, non-governmental organizations, international organizations and strengthening cooperation public - private between State agencies and businesses in the prevention of natural disasters is an important next step for the program.
- Strengthening international cooperation in bilateral and multilateral create favorable conditions for sharing experience, enlist the support of regional countries, international organizations and donors is also important.
- Consolidating and further strengthening partnerships to support implementation of the program in collaboration with development organizations, donors and the business community including for technical support is also important.
- The review also noted that MARD is in the process of consolidating the organizational apparatus of disaster prevention prescribed levels of Disaster Prevention Law, the authorities should give guidance on strengthening advisory bodies, assisting to implementation of the scheme.[99]
- A World Bank evaluation of their contribution to the programme specifically highlighted that the participation of all stakeholders, including villagers, relevant government agencies at all levels and

[98] http://cgd.swissre.com/features/Agricultural_reinsurance_in_Vietnam.html

[99] REPORT 5 YEARS ON THE IMPLEMENTATION PROJECT "COMMUNITY AWARENESS AND RISK MANAGEMENT COMMUNITY BASED DISASTER" - PERIOD 2009-2014, MARD Reference Number: / TCTL-NDM, May 2015.

international partners was crucial to the general success of the program; the use of new technology such as cell phone and web-based tools can be utilized in DRM projects to build an online participatory community-management system and linking physical investments with community DRM activities through geographic clustering provides for greater synergies and a more comprehensive approach.[100]

Additional recommendations highlighted in terms of strengthening risk data and land use planning include:

- There is a clear need to provide improved risk data to informed land use and municipal planning in high risk coastal and Mekong provinces.
- Risk data must however be in accessible formats for planners and work to upgrade key planning parameters to incorporate climate risk in annual budgeting processes.
- Wherever feasible, risk data should be made publically available in database form to facilitate its use by academia, the private sector and other actors.
- Raising the capacity of Government staff with regards to risk and probability assumptions in the context of climate change is key to increasing capacity within the Government to model and plan for risk. This should include identifying the impacts and enhanced approaches for risks where recovery/rehabilitation is possible and highlighting impacts for which recovery and rehabilitation is not possible and identify the different approaches for dealing with this.
- In addition to making improved climate extreme damage and loss data publically available, efforts to build on existing data platforms to increase access to the integrated risk mapping tools developed through a risk data repository should be considered. Providing training for national and provincial level decision makers on how to access and use improved data can also be a key entry point for action.

6.4 Financial and Economic Analysis

The costs CBDRM commune level implementation applying the Government methodology range from approximately 3,500-8,000 USD per commune depending on the accessibility and size of the commune. Costs for risk mapping and database development cost a fraction of potential losses.

Over the past 20 years, natural disasters have resulted in a total loss of life of 13,035 persons average of 652 lives per year), with major damage to residential housing and public-sector property, agriculture, and infrastructure (irrigation, transport, power and telecommunications) valued at VND 91 trillion (US$ 6.4 billion) or an average of VND 4,547 billion (US$ 322 million per year) in current prices. Over this period the annual costs of natural disasters have been equivalent to an average of about 1% of GDP with a peak loss of nearly 3% of GDP in 2006. In the aftermath of a disaster, Government of Vietnam, GoV, uses a combination of financial resources to respond to the financial needs. Despite the fact that the Government, the private sector and donors absorb some of these losses, there is still an estimated large resource gap between available financial resources and post-disaster expenditure requirements. An earlier study identified an overall funding gap for all natural disaster relief and reconstruction requirements and the available financial resources from central and local government, local voluntary donations and international aid donor funding of between US$130 million in 2000 which was a severe year for typhoon and flood losses and US$ 46 million in 2001 which was a low loss year.[101]

Ensuring all investment flows are disaster resilient presents a substantial opportunity to reduce rather than generate risk, an increase in which could slow development and economic progress.[102]

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[100] https://gfdrr.org/sites/gfdrr/files/publication/Pillar_2_Building_Resilient_Communities_in_Vietnam_0.pdf

[101] [101] Weathering the Storm: Options for Disaster Risk Financing in Vietnam; World Bank; 2010 Available at: http://reliefweb.int/sites/reliefweb.int/files/resources/61571C422DB58ADF49257712001D20C5-Full_Report.pdf

[102] Watson et al.; Finance for Reducing Disaster Risk: 10 things to know; March 2015; www.odi.org/sendai-2015-new-global-agreement-disaster-risk-reduction

Over the 1989-2008 period an average of nearly ten natural hazard events per year has been reported by CCFSC with an average value of estimated damage of VND 6,437 billion per event (US$ 40 million per event). The average size of loss per event for storm has been US$ 53 million and US$ 49 million for flood. The average value of damage per event associated with flash flooding/landslide and tornado has been much lower. Flood and storm have the potential to cause catastrophic losses in Vietnam as evidenced by the losses associated with Typhoon Xangsane 2006 which were estimated at US$ 649 million. Over the past 20 years 16 storm and flood events have had estimated damage of greater than US$ 100 million. See Figure 2.6. The largest recorded single storm was Storm No 6 of October 2006. Typhoon Xangsane was a category 13 Typhoon (sustained wind speeds > 133 Km/Hr) and affected 15 Provinces in central Vietnam with total assessed damage of VND 10,402 billion (US$ 649 million). The second largest recorded storm was Storm no. 5 of 2007 with estimated losses of US$ 619 million. The largest flood loss event occurred in the Red River Basin between 21 October and 3 November 2008 and caused major damages to property, infrastructure and agriculture in the Hanoi region, valued at US$ 522 million.

More research is required to further explain the major increase in average size of losses in recent years, but this is likely to be a combination of (i) major increases in the values of residential, commercial and industrial properties, public infrastructure and agricultural assets (including perennial crops) exposed to risk and (ii) in the case of storm damage the fact that Vietnam has experienced an increase in the number of severe typhoons of Category 13 wind speeds in the recent years, possibly related to climate change. In 2006, US$ 1.1 billion, or 95% of all reported damage in 2006, was associated with typhoons of which 3 typhoons, Durian, Xangsane and Cimaron were Category 13 typhoons.[103]

7. Findings and Recommendations

7.1 Key messages

Viet Nam has made considerable progress in developing a strong institutional base for effective climate change adaptation in recent years. The National Strategy on Climate Change and the recent Climate Change Law are key policy milestones. The Government has also been clear regarding the importance of both mitigation and adaptation action, and is committed implementing plans both to reduce emissions and protect development through adaptation. However, it is clear that any policy agenda for mitigation must include adaptation actions that have immediate benefits particularly to poorer households in exposed areas.

Viet Nam's policy framework is also beginning to be backed up by clear action to implement adaptation, but these efforts remain small scale and often fragmented. They are also under-funded, and funding constraints are reducing the effectiveness of technical solutions to promote adaptation. Successful pilots exist but these are not being scaled up and opportunities for complementarity to deepen impact are not yet being fully explored.

In terms of pressing adaptation needs, coastal resilience to storms, sea level rise and associated impacts is a clear priority both in policy and human terms. Efforts to manage coastal flood and storm risk in the context of Viet Nam must be core to any adaptation effort. Given the rapid pace of urbanization and demographic pressures in these areas, efforts should not be delayed, or Viet Nam risks being locked in to unsafe planning and housing patterns for the next generation.

It is also clear that the full potential of actions such as mangrove regeneration have co-benefits in both in term of mitigation, disaster risk reduction and livelihoods that should be fully explored. The issue of integration is however key- programs operate currently in 'siloes' and efforts to regenerate mangroves struggle to convince local populations of their worth. These should be embedded in wider development issues that show how forest

[103] Weathering the Storm: Options for Disaster Risk Financing in Vietnam; World Bank; 2010 Available at: http://reliefweb.int/sites/reliefweb.int/files/resources/61571C422DB58ADF49257712001D20C5-Full_Report.pdf

regeneration has community benefits not only in maintaining traditional livelihoods, but in protecting assets and development gains.

7.2 Recommendations

Based on this core analysis, the following recommendations are made for consideration in the development of future GCF adaptation proposals for coastal areas:

- Potential actions are closely aligned with National Strategies and with existing Government programs and plans.
- Improving access and understanding of climate change risk information is essential. Without improved access to data and analysis, current investments cannot fully reach their potential. The proposed research into topics including storm surge, salt water intrusion, sea level rise and typhoon impacts on communities and key sectors is important.
- Improving loss and damage accounting, both in terms of current and potential future climate actions should be a priority.
- Access to safe housing, as a key asset of poor families in rural areas can be an effective approach to create tangible and immediate adaptation benefits. Efforts to integrate green approaches, such as energy efficiency or solar power access may wish to be considered. This should be coupled with green municipal design elements that aim to maintain key resources like ground-water and to reduce the footprint of new housing developments.
- Mangrove regeneration projects have shown good results, but success rates can vary considerably based on the approaches employed, and actions considering replication must employ enhanced approaches. There will need to be careful consideration of the extent that GCF projects can engage in replanting, which can be cost in excess of $10,000 USD per hectare, compared to regeneration which can be achieved in easier locations at fraction of the cost. In addition, careful consideration will need to be paid to whether only mangrove regeneration or other techniques, such as grasses, can be deployed in some areas based on the ecological profile of the area.
- Maintaining or improving livelihoods should be considered in all planning.
- Clear indicators to ensure the participation of women and other vulnerable groups will also be key. Information work must enshrine the importance of gender and age disaggregated data collection. This should be complemented by strategies to actively require participation from a range of community constituencies in project design and decision making. Efforts to specifically strengthen two-way information flow in a context like Viet Nam which has benefitted from a strong history of centralized decision making should be encouraged.
- Government systems are still overly reliant on paper and phone communication, and are not effectively leveraging information technology particularly at sub-national level. The project should consider how information technology can be harnessed to both support information dissemination, collation and analysis. This capacity exists within Viet Nam's private sector but is not yet part of a regular government systems.

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