

INSTITUTE FOR SOCIAL AND ENVIRONMENTAL TRANSITION-INTERNATIONAL  
**CLIMATE RESILIENCE CASE STUDY**

## Quy Nhon, Vietnam

### PROGRAM OVERVIEW

**2009–2015 | Lead partners:** Binh Dinh Province People's Committee (DNPC), Binh Dinh Climate Change Coordination Office (CCCCO), Binh Dinh Department of Natural Resource and Environment (DONRE), Binh Dinh Storm and Flood Control Committee, Binh Dinh Department of Planning and Investment (DPI), Con Chim – Thi Nai lagoon Ecosystem Management Unit, Binh Dinh Hydrometeorology Center



Quy Nhon city



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### VULNERABILITY & RISK OVERVIEW



#### SYSTEMS

Rapid uncoordinated urbanization is already stressing drainage, flood management systems, and wetland eco-systems. Increased flooding and more extreme storms present risks to public works, industries, and assets such as homes, fishing equipment, fishery resources, agriculture, livestock and aquaculture. Loss of farmland to urbanization is increasing dependence on external food supply.



#### AGENTS

Farmers, fishermen, and poor residents living in coastal and low lying areas are highly exposed to storms and floods, particularly as surrounding land is raised and in-filled. Children and the elderly are particularly vulnerable. Traditional residents are losing their main livelihood sources in farming and aquaculture, with some but not all residents able to find new types of work. Migrants are excluded from certain social and political support and benefits.



#### INSTITUTIONS

Climate change is not integrated into current city planning processes. Plans are developed without strong public participation, transparency, or coordination among agencies. There has been a lack of adequate and accessible information on natural disaster risks, environmental impacts, urbanization trends, and climate change that would enable sound public planning or household and private sector investment decisions. There are no effective mechanisms for benefit sharing or joint management of natural resources.



#### EXPOSURE

Climate projections indicate a range of impacts, including higher temperature, higher variability in precipitation (unpredictable and intense wet seasons, and more frequent prolonged droughts), more severe storms and inundation, coastal and lagoon shoreline erosion, sand drifting, and sea level rise. Saline intrusion has been occurring along the lagoon and coast, exacerbated by drought. Low-lying riverside and coastal areas are at particular risk from typhoons and flooding.

For more information about our conceptual framework please visit: [www.i-s-e-t.org/crf](http://www.i-s-e-t.org/crf)

### Summary

This document describes how stakeholders in Quy Nhon city, located in Vietnam's Binh Dinh province, are taking action to build the resilience of physical systems, agents, and institutions in the face of rapid urban change and a changing climate. With support from the Asian Cities Climate Change Resilience Network (ACCCRN) program, stakeholders are working to:

- understand how vulnerabilities result from and may be exacerbated by climate change and urbanization, and plan for building resilience;
- establish a Climate Change Coordination Office (CCCCO) within the provincial government;
- identify the causes and impacts of a historical flood and develop a hydrological model to assess the potential impacts of urbanization and climate change;
- restore mangrove forest ecosystems and promote co-management and benefit sharing; and
- strengthen flood monitoring, early warning and response systems.

Quy Nhon is a long established city on the central coast of Vietnam. While its traditional economy was dominated by agriculture, aquaculture, and fisheries, the city is now recognized as one of the three key trade and tourism hubs in central Vietnam along with Da Nang and Nha Trang.

The city is physically dominated by a 5,000 hectare saltwater lagoon in the north, known as Thi Nai. Home to four major rivers, all with steep, narrow streams, Quy Nhon is highly exposed to flash floods. This risk has increased with rapidly expanding and uncoordinated urbanization in recent decades, during which low-lying areas that historically functioned as floodplains have been filled and replaced with buildings, elevated roads, and industrial zones. Natural mangrove ecosystems have been destroyed or degraded to make way for the development of aquaculture and urban infrastructure. Climate change exacerbates these risks, particularly in the face of changing precipitation patterns and sea level rise. This vulnerability was clearly demonstrated by the experience of a flood in 2009 during Typhoon Mirinae, which claimed seven lives and caused USD 21 million in damage to property across the city, especially in the Nhon Binh and Nhon Phu wards. Based only on this damage assessment, Typhoon Mirinae may have been the most costly storm to hit the city in living memory.

Quy Nhon is also becoming increasingly integrated into regional economies and will serve as a major transit hub in the Greater Mekong Sub-Region economic corridor, with new development and the upgrade of road infrastructure, sea ports, the cargo station, the airport and industrial zones. It remains unclear how deepening economic integration and interdependence will affect the city.

Through the ACCCRN program, ISET-Vietnam, the National Institute for Science and Technology Policy and Strategic Studies, and Challenge to Change have supported a diverse stakeholder group in Quy Nhon to understand the linked challenges of climate change and urbanization, evaluate priorities areas for action, and experiment with interventions to build resilience. This process has engaged local agents from the provincial to the community level, including the provincial, city ward and commune level People's Committees, government departments, mass organizations, non-government organizations, academic institutions, and individual community members.

In 2009, stakeholders embarked on a process of shared learning for resilience planning, which included:

- **participatory “shared learning dialogues” (SLDs)**, convening stakeholders and experts from a variety of backgrounds to understand more about climate risks, exchange research and experiences related to the city's vulnerability, and deliberate on next steps;
- **vulnerability assessments**, with a focus on climate impacts on poor and vulnerable households;

- **pilot projects** to engage local community members by testing their innovative ideas for building resilience;
- **sector studies** to provide in-depth analysis on priority issues;
- **development of a City Climate Resilience Action Plan**, led by a local Climate Change Working Group, to analyze and prioritize interventions for building urban resilience; and
- **ongoing implementation of priorities** identified in the City Climate Resilience Strategy, as described in the right.

## THE CITY CLIMATE RESILIENCE ACTION PLAN

The City Climate Resilience Action Plan is a broad local-level guidance document that provides the context, evidence, and analysis to justify and prioritize actions to strengthen urban resilience to climate change. It is a living document which functions as a platform for planners and other stakeholders to make revisions based on new learning and discussions. In Quy Nhon city, the ACCCRN-supported Action Plan was developed by the province's climate change working group, led by the Binh Dinh Department of Natural Resources and Environment and the Department of Investment and Planning. This action plan has informed the province's official Action Plan to Respond to Climate Change, which was approved by the Ministry of Environment and Natural Resources, and is in turn providing direction for Quy Nhon city's official Action Plan to Respond to Respond to Climate Change. The action plan prioritizes awareness and capacity building, integration of climate risk assessment into socio economic development and urbanization plan, support for sustainable livelihood development for vulnerable communities, research and assessment on climate change impacts, and reforestation of watershed protection areas and mangrove forests.

Through ACCCRN, the Rockefeller Foundation is supporting Quy Nhon and ISET-International to implement a number of priority actions. In this Climate Resilience Case Study, we explore how partners are:

- establishing new coordination and management mechanisms
- assessing the impacts of alternative flood and inundation scenarios on planned urban development in Nhon Binh ward, in the context of recent extreme storm events and potential climate change impacts;
- restoring the ecosystem of the mangrove forest in Thi Nai lagoon to reduce the climate vulnerability of poor people living on the edge of Quy Nhon city; and
- establishing effective mechanisms to collect and provide timely flood information and strengthen the community flood response capacity for vulnerable people living near the lower Ha Thanh and Kone rivers.

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## Quy Nhon, Vietnam

### BINH DINH CLIMATE CHANGE COORDINATION OFFICE

2011–2014 | Lead partner: Binh Dinh Department of Natural Resource and Environment (DONRE)



Binh Dinh team discussing  
in CCCO training workshop  
August, 2013



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## CONTRIBUTION TO URBAN CLIMATE RESILIENCE

### AGENTS

The Climate Change Coordination Office (CCCO) is helping raise the level of knowledge and awareness about climate change within city government and working to increase capacity of technical staff as members of an interdepartmental Climate Change Working Group. Ongoing Shared Learning Dialogues (SLDs) are helping facilitate learning and information sharing among city stakeholders.

### INSTITUTIONS

The CCCO is seeking to improve the quality, access, and application of information by coordinating a detailed sector study among government departments, establishing a climate change and urban planning database, and providing guidance for integrating climate change into socioeconomic development and sector plans. The office aims to make decision-making more transparent and accountable through participatory planning with communities in vulnerable wards, and to provide a mechanism for evaluating the city's overall achievements through "resilience indicators."

For more information about our conceptual framework please visit: [www.i-s-e-t.org/crf](http://www.i-s-e-t.org/crf)

## Summary

In Quy Nhon, Da Nang, and Can Tho, ACCCRN partners all arrived at a similar conclusion about institutional vulnerability in their cities: that the lack of effective mechanisms for coordination and harmonization of efforts across government departments, scales of government, and nongovernmental agents presented a major barrier to building resilience. This responds to a major theme from resilience thinking: the need for social learning, collaboration, and deliberation among stakeholders within the same system. Local partners determined that there is an ongoing need for local government to undertake informed, climate-responsive planning and decision-making and to implement the National Target Program to Respond to Climate Change (NTP-RCC). With support from ACCCRN and the Binh Dinh People's Committee, a CCCO was established in 2011. The CCCO is now fully operational, responsible for developing and coordinating all climate change adaptation and mitigation projects in collaboration with external agencies and local stakeholders. Under the authority of the provincial Climate Change Steering Committee (CCSC), it plays a variety of roles and uses various mechanisms for promoting better coordination and collaboration, and improving planning and investment for climate change.

Under its mandate from the CCSC and a grant from the Rockefeller Foundation, the CCCO is authorized to:

- support the development of the official Action Plan to Respond to Climate Change (CAP) for Binh Dinh province under NTP-RCC, develop the ACCCRN-supported CAP for Quy Nhon city, and oversee the implementation of the CAPs;
- coordinate climate change resilience analysis for relevant city and provincial departments;
- develop a database to facilitate relevant data access across city agencies;
- provide guidance to socio-economic development planning and urban master planning at the city level;
- strengthen capacities and participation of vulnerable communities in climate resilience planning and decision making;
- build awareness of climate challenge and responses among city government and enhance capacity of key departmental staff through the CCWG;
- engage relevant local departments in assessing climate vulnerabilities and responses through targeted studies;

- develop indicators in collaboration with relevant departments and agencies to monitor city resilience; and
- promote ongoing dialogues among city stakeholders through SLDs.

## Approach

Since its inception, the CCCO has coordinated and supported:

- **climate change awareness raising and capacity building** for key departmental staff in the CCWG and district level government officers, through workshops on climate information and vulnerabilities;
- **participatory climate change planning with local officials and community members** in Nhon Phu ward and Nhon Hai commune of Quy Nhon city;
- **development of the Binh Dinh Provincial CAP (2012)**, using analysis and priorities generated from ACCCRN's vulnerability assessments and plans developed in 2010. Based on this provincial CAP and community-level assessments, the CCCO is updating the ACCCRN CAP of Quy Nhon city;
- **project proposals for donor and government finance sources**, including a mangrove restoration project, and a project on flood risk reduction and early warning system, which are both being supported by the Rockefeller Foundation;
- **creation of a climate change and urban planning information database**, including research and vulnerability assessment reports and socioeconomic and hydrological data, which will be updated for sharing with other interested agencies and organizations;
- **development of city-wide resilience indicators** for three key city systems (aquaculture, tourism, and mangrove forest) in collaboration with the Binh Dinh Department of Culture, Sports and Tourism, and the Department of Agriculture and Rural Development (DARD);
- **research on integrating climate change into plans** for the Integrated Coastal Zone Natural Resources Management and Environment Protection Plan in Thi Nai Lagoon area, in collaboration with the Sub-division of Sea and Islands (Binh Dinh DONRE) and the DARD, with the first sharing workshop planned for April 2014;
- **activities, projects, and project development related to climate change in Binh Dinh province**, in collaboration with the Rockefeller Foundation, the Vietnamese Urban Development Agency (UDA), the Institute of Meteorology, Hydrology and Environment (IMHEN), United Nations Development Program (UNDP), Binh Dinh Association for Science and Technology, Catholic Relief Services (CRS), International Development Research Centre (IDRC), and German International Cooperation (GIZ).

## Next steps

As the CCCO project draws closer to completion in each ACCCRN city, the sustainability of this model has become a primary focus for all locations. For the Binh Dinh CCCO, which already has a permanent seat in the local government system, the discussion will focus more on

the challenge of maintaining and boosting its capacity and influence as a collaborative agent. While traditional institutional structures and incentives in Vietnam often encourage agencies to work, plan, and control resources independently, the CCCO's success depends on its ability to work actively to support other agencies. At the national level, ISET is working with various actors to ensure that the coming national plans and guidelines will emphasize the cross-cutting nature of climate change issues, and incentivize coordination and collaboration.

## LESSONS AND LEARNING: CCCO

- **The sustainability of the CCCO** – that is, its ability to continue to act as an agent of change and coordinating agency over the long-term – depends on its financial and institutional status. Initially, the CCCO relied on short-term project funding and faced inadequate and underdeveloped facilitating policies and mechanisms. However, in early 2013, the Binh Dinh CCCO was successful in becoming an agency under the direct management of the provincial People's Committee with a budget to support full-time staff.
- **Resilience indicators are a platform for visioning, deliberation, and discussion among key stakeholders, and a tool for monitoring city progress toward resilience.** By engaging these different stakeholders in iterative shared learning discussions to develop a set of indicators that best measure their sector's resilience to climate change, this process has transformed climate change from a broad and vague concept into an issue with practical implications for individual sectors. It has also helped to build technical capacity and collaborative relationships within and across city sectors.
- **“Soft skills” such as facilitation, networking, and partnership building are more important than technical skills** for organizations responsible for coordinating adaptation planning and supporting climate change work across scales and institutions. The ability to maintain close relationships and convene networks is critical for promoting climate change resilience, as is the ability to facilitate cooperation among key actors to accelerate procedures for initiating action and making decisions.
- **Meaningful public participation requires access to information and equitable opportunities to get involved and have influence.** Participatory planning is especially critical in urban areas, where changes in one area or system strongly impact others. But it also presents new challenges – for instance, the management of access to sensitive information about land use and new development projects, and a common lack of cohesiveness among urban “communities” as compared to traditional rural communities. For participatory planning to be effective, it must prioritize “access rights” as defined in the Rio Declaration on Environment and Development (1992), which has been adopted in Vietnamese national law but are often poorly applied in practice.

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INSTITUTE FOR SOCIAL AND ENVIRONMENTAL TRANSITION-INTERNATIONAL  
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## Quy Nhon, Vietnam

### HYDROLOGY AND URBAN DEVELOPMENT FLOOD MODELING

2011–2013 | **Lead partner:** Binh Dinh Department of Planning and Investment,  
 Binh Dinh Climate Change Coordination Office (CCCO)



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## CONTRIBUTION TO URBAN CLIMATE RESILIENCE



### SYSTEMS

The study highlights the interactions among a variety of physical systems—river flows, urban construction and urban drainage—with the aim of optimizing urban planning against future climate risks and strengthening ecological sustainability.



### AGENTS

Interviews with local residents created opportunities to improve awareness and knowledge of climate risks, as well as responsiveness to future extreme climate events. Dissemination of research results and shared learning dialogues (SLDs) helps to raise stakeholders' awareness of both the potential impact of climate change on urban development and the impact of urban development on flooding.



### INSTITUTIONS

The research provides new information and analysis of an extreme event, highlighting the urgent need for effective warning systems and better coordinated planning that accounts for drainage systems. It points to the weakness of the city's current institutions, i.e. lack of access to flood information and warnings for vulnerable communities, and provides a tool that allows planners to make better decisions, based on analysis of multiple possible futures and the best available data.

For more information about our conceptual framework please visit: [www.i-s-e-t.org/crf](http://www.i-s-e-t.org/crf)

## Summary

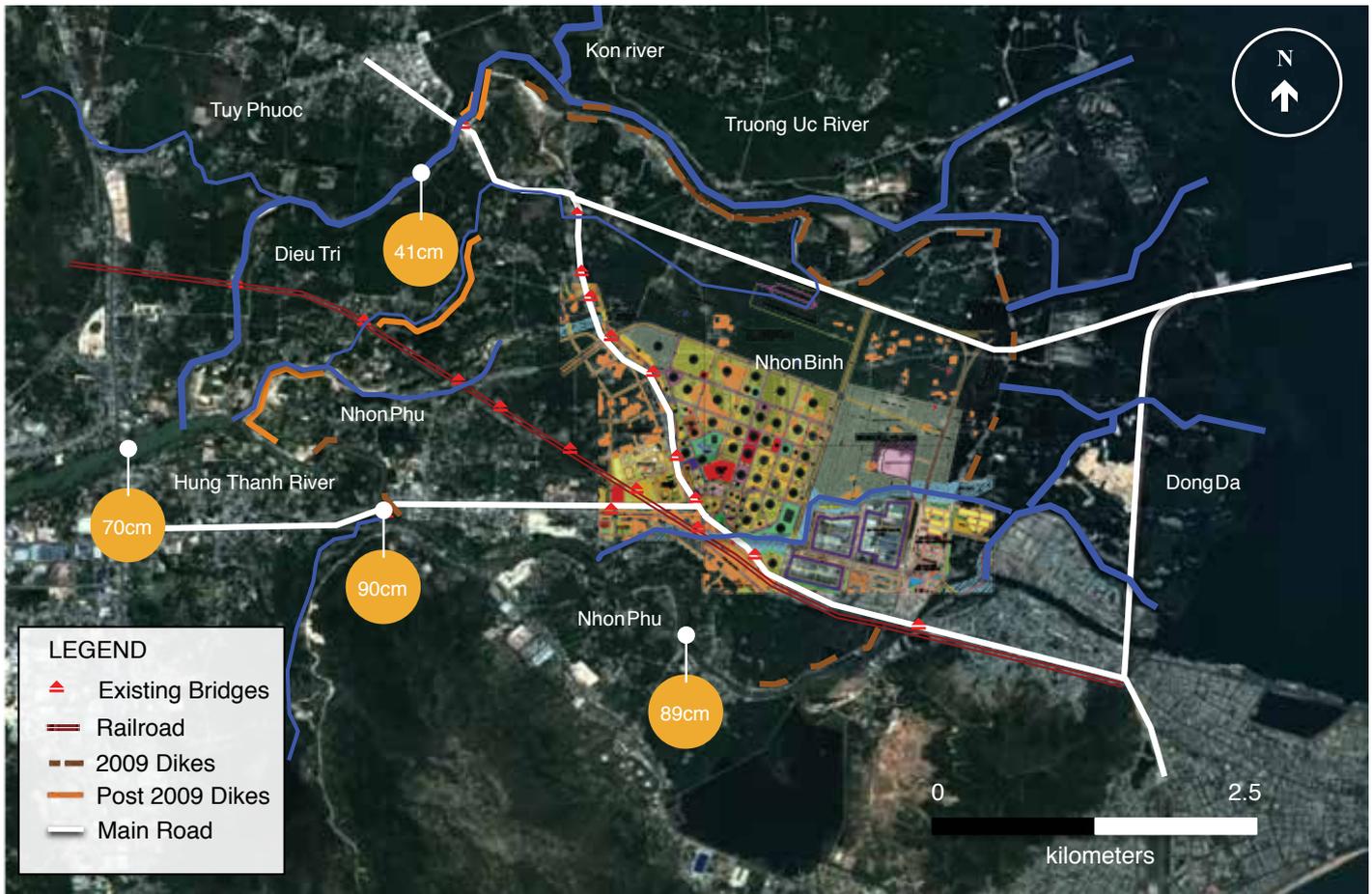
Located in the estuary of the Ha Thanh and Kone rivers in the floodplain that drains into Thi Nai lagoon, Nhon Binh ward is facing major change and uncertainty as a result of rapid urbanization and climate change impacts. People living here experience frequent floods and droughts, which damage their crops, livestock, home and equipment. However, before 2003, these events were often minor, and floods were much more predictable. More recently, as more buildings and elevated roads have been built, and larger areas in the floodplain have been raised and filled for industrial development, floodwater from heavy rain up-stream has been found trapped behind these barriers. This has created faster currents, longer flood duration, and higher human and economic costs than ever previously experienced. Despite its vulnerabilities, Nhon Binh has been the focus of urbanization in Quy Nhon over the last few decades, with the development of new and higher roads, houses, dykes and other structures. The current master plan for the area is introducing an

SOS village<sup>1</sup> for children with disabilities, an industrial zone, a wastewater treatment plant, a train station, and a new residential area.

In November 2009, Typhoon Mirinae landed on the coast of Central Vietnam, killing seven people and causing roughly USD 21 million (VND 374.5 billion<sup>2</sup>) in damage in Quy Nhon city alone, largely due to flooding in the Ha Thanh river. The severity of the flood – and the almost certain prospect of more frequent and more severe extreme events in the future – has put into question the current master plans for Nhon Binh ward and Quy Nhon city. Both of these master plans had not taken into account impacts from extreme climate events like Typhoon Mirinae.

<sup>1</sup> Children's home with family-based care for disadvantaged children, supported by the NGO SOS Children's Village.

<sup>2</sup> Deflated US dollars based on an exchange rate of 17,861 VND per 1 USD, 2 Nov 2009. [http://www.vietcombank.com.vn/en/\\_ScriptLib/ExRate\\_Brn.asp](http://www.vietcombank.com.vn/en/_ScriptLib/ExRate_Brn.asp).



Increased Flood Height due to build-out and Climate Change (26cm Sea Level Rise Scenario) under the medium climate scenario for 2050.

## Approach

A research team led by the Binh Dinh CCCO, the Southern Institute for Water Resource Research (SIWRR), and ISET pioneered a methodology to assess the potential impacts resulting from recent, current and planned urbanization, by combing interviews with local residents, satellite imagery, and hydrological modeling. They applied the approach to Nhon Binh and Nhon Phu wards through the following steps:

- understand how farmers, fishermen and salt makers have historically adapted to the flood-prone environment of the Ha Thanh River delta;
- map a chronology of the flood of November 2, 2009, based on detailed interviews, satellite imagery and site visits;
- assess landscape changes in Nhon Binh prior to Typhoon Mirinae;
- determine whether and how landscape change contributed to the flood's severity;
- compare and evaluate previous studies of flooding in the Ha Thanh River delta;
- construct a hydrological model of the delta, using available rainfall, elevation and stream flow data;
- apply the hydrological model to assess the impacts of a flood event similar to Typhoon Mirinae under current conditions; and
- assess potential impacts of flooding if the Nhon Binh Area Plan

is fully built, under various future climate change scenarios, by integrating the model with GIS.

Satellite maps and hydrological modeling confirmed observations made by people living in the floodplain: new construction and the lack of a flood early warning system severely exacerbated the level of flooding and the extent of damage. The more fundamental cause of the 2009 flood's severity was uncoordinated urbanization and infrastructure development in the low-lying floodplains of Nhon Phu and Nhon Binh.

In the future, any poorly considered construction (including that of protection dikes) will only shift flooding elsewhere and worsen the overall damage. In particular, if the current master plan for Binh Dinh is implemented without change, flood risks will rise dramatically both inside and outside planned urban areas.

As a result, the research recommends pursuing an approach to urban planning that preserves drainage, floodways and green spaces to minimize the level of damage to people, their homes and assets, and other high-value development during a flood. It proposes preserving green space that can function as parks, ecological zones or recreation areas; building more densely in elevated areas, rather than infilling large areas in the floodplain; scaling back urban developments such as An Phu Thinh that divert or slow drainage into Thi Nai

Lagoon; setting back urban developments from dikes to provide a greater buffer area for flooding; and constructing flood channels in appropriate areas to help drain water more quickly and relieve extreme pressure.

The process and results of this research have already been shared in a number of documents (listed at the end of this document) and discussed broadly in SLD events to advocate an alternative development strategy – first, through modifications of the current master plans and revision of construction standards for improved drainage capacity. During an SLD, lead researcher Michael DiGregorio estimated that the proposed approach to urban development would ultimately be less costly to the city because it requires fewer dikes and would reduce the level of damage during floods. An exchange event in May 2013, joined by partner cities, concerned agencies, and stakeholders in Vietnam and Thailand, was a major amplification effort where these same points were emphasized and compelling evidence was presented.

## Next steps

Immediately after the project ended in August 2013, there was a positive development which is expected to mark the start of a process for policy change and leadership support in Binh Dinh. On September 6, 2013, the Chairman of the Binh Dinh People's Committee sent an official letter of request to the Prime Minister for Binh Dinh to revise its urban master plan. Consistent with the project's recommendations, the proposed revisions include redirecting urban expansion to incorporate two communes of Canh Vinh and Canh Hien in the mountainous district of Van Canh to the west of the city, rather than towards six communes in Tuy Phuoc District to the north.

## Further resources

Michael DiGregorio and Huynh Cao Van (2013). *Living with Floods: A grassroots analysis of the causes and impacts of Typhoon Mirinae*.

Michael DiGregorio (2013). *Learning from Typhoon Mirinae. Institute for Social and Environmental Transition – Vietnam*. [http://accrn.org/sites/default/files/documents/ISET\\_LearningFromTyphoonMirinae\\_Final\\_130419.pdf](http://accrn.org/sites/default/files/documents/ISET_LearningFromTyphoonMirinae_Final_130419.pdf)

Online footage of Living with Flood:  
<https://www.youtube.com/watch?v=UF4DkZbAULw>

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## LESSONS AND LEARNING: Information and policy decisions

- In the context of great uncertainty due to climate change, extreme events can provide a better proxy for planning for future risk: Planning standards need to be based on a robust understanding of extreme events such as the 2009 flood, rather than probabilities based on historical experience. For example, the research shows that in 2009, water volume reached 3,360 m<sup>3</sup>/sec, which is almost three times higher than the volume at which water overtops the riverbanks and becomes a flood. Researchers therefore argue that 3,360 m<sup>3</sup>/sec should become the new minimum standard for urban planning.
- The knowledge of long-term local residents is critical to an understanding of why events become disasters and how impacts can be mitigated. Whereas much flood management planning relies primarily on satellite imagery and GIS alone, this project tested the theory that those closest to the problem have the most capacity to understand it and identify solutions. Indeed, local residents showed researchers how the 2009 flood was different from previous floods, how flood waters had built up behind certain barriers, overtopped structures, or flowed too rapidly through small openings. This information allowed researchers to develop a more representative flood map and model than had ever been previously constructed, and to make specific urban planning recommendations for reducing risk.
- Timely warning and information is a critical factor in building community responsiveness to potential disasters. People living in Quy Nhon learned this lesson the hard way in the 2009 flood, when lack of official information was the main cause of many personal tragedies. As described below, the CCCO and partners are working with local communities to fill this gap by developing an early flood warning system that will provide timely and accurate information and warnings to minimize damage from lack of preparation.
- Policy advocacy requires a multi-stakeholder approach and extensive care, especially when sensitive issues such as land use and planning are involved. Substantial time is invested in building policy makers' awareness and understanding, and for gaining support and consensus across different agencies, which by itself may or may not lead to the desired change in policy. Therefore, it is important to be constructive and realistic in suggestions, and to summon new avenues of influence whenever possible, such as backup from a well-respected voice, or the use of media channels. For example, support from the former leaders of Construction Department of Binh Dinh province in pointing out issues with the current master plans, and wide distribution of various publications such as accessible research reports, videos and documentaries have proved to be of great help to this process.
- How the research will influence the private sector is yet to be determined. There are still important questions about how the private sector—particularly land developers who play a crucial role in the changing nature of risk—will engage with this new analysis process. It is recommended in the project's final report that all new residential developments be approved only after an assessment impact using the tool.

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## Quy Nhon, Vietnam

### ECOSYSTEM SERVICES FOR CLIMATE RESILIENCE

2012–2015 | **Lead partner:** Con Chim – Thi Nai lagoon Ecosystem Management Unit (LEMU), Binh Dinh Hydrometeorology Center, Binh Dinh Climate Change Coordination Office (CCCO)



Mangrove seedlings © Diep Vu, Con Chim-Thi Nai LEMU 2013

### CONTRIBUTION TO URBAN CLIMATE RESILIENCE



#### SYSTEMS

Restore the damaged or destroyed mangrove ecosystem along the coast of Thi Nai lagoon, including mangrove forests and aquatic resources in the lagoon area.



#### AGENTS

Raise awareness of the local community and administrators about the importance of mangroves; improve and sustain livelihoods of impoverished local households vulnerable to flooding and storm damage by restoring the habitat for aquatic resources and supporting new livelihoods; and provide supplemental income for the local community through payment for mangrove plantation and protection in the short term.



#### INSTITUTIONS

Co-management is an institutional innovation, applied to foster collaboration and benefit sharing within communities and between the public and the state in mangrove planting, protection and benefits. This project will experiment with new platforms for planning, coordination, and regulation, and will develop new mechanisms for management and monitoring.

For more information about our conceptual framework please visit: [www.i-s-e-t.org/crf](http://www.i-s-e-t.org/crf)

## Summary

Thi Nai lagoon is a saltwater body of more than 5,000 hectares, stretching 10 kilometers north from the Northeast end of Quy Nhon city center. It not only possesses significant economic values, with abundant aquatic resources, soon-to-be three seaports, and high tourism potential, but is also the receiver and retainer of floodwater from Quy Nhon city before the water drains to the sea. During the last few decades, the lagoon has been shrinking rapidly due to urban encroachment and industrial and trade development. Large areas of mangrove forest along the shores of Thi Nai lagoon are continuing to disappear due to urban infrastructure development and conversion to aquaculture ponds – a process once supported by the government.

The flood in 2009 was a test of this area's vulnerability to extreme climate events and higher precipitation, which are both expected to increase in frequency and intensity as a result of climate change. In view of the heavy damage the flood left behind in Nhon Binh ward, after the rest of the lagoon west shore (part of Phuoc Son and

Phuoc Thuan districts) is annexed to the city and becomes urbanized in 2020, another typhoon like 2009's Typhoon Mirinae would be extremely problematic and costly, unless urban development recedes and the mangrove ecosystem along the lagoon coastline is restored.

Besides preventing urbanization expansion in this low-lying area and protecting communities from flood and storm impacts, mangrove forest restoration will also enhance community resilience in various other ways, such as: preventing erosion caused by sea level rise, strengthening local livelihoods and income, reducing local surface temperature in hot weather, improving food security, building awareness, and sequestering carbon (a mitigation benefit).

However, most past efforts for mangrove forest restoration in Vietnam and Quy Nhon have not been very successful. In most cases, overfishing and the destruction of mangroves could not be controlled and the chosen measures and mechanisms were ineffective.



## Approach

Based on the success of two ACCCRN pilot projects in this area from 2004 to 2010, Binh Dinh Climate Change Coordination Office (CCCCO) is working with the Con Chim – Thi Nai Lagoon Ecosystem Management Unit and many other technical partners in an effort to restore the ecosystem of the mangrove forest in Thi Nai lagoon and reduce the climate vulnerability of poor people living in this area. The project works around five major tasks:

- **Assessing the mangrove forests and their ecological conditions, current exploitation and environment quality for site selection and determination of ecosystem criteria**, led by the Nha Trang Institute of Oceanology. This involves detailed secondary research and field surveys of the mangrove forest species, location, structure, and conditions relevant to the growth of specific mangrove species, and an analysis of economic values of mangrove ecosystem services by a research team from Hue University. Importantly, the project includes consultative meetings with the community on the whole assessment process and its conclusions. These activities provide entry points to the other components of the project.
- **Community awareness raising and Community-Based Disaster Risk Management (CBDRM)**. Ms. Nguyen Phuc Hoa, a consultant from Challenge to Change, will provide support to develop a training manual, create a local trainers pool, conduct training and awareness raising to build the capacity of poor and vulnerable groups, prepare and implement community-proposed disaster reduction measures, and catalyze sharing, exchange and networking locally and regionally.
- **Resource planning and development of a co-management agreement**. This process, led by the Research Centre for Resources and Rural Development (RECERD), includes a large number of community consultations and negotiations. Co-management focuses both on the roles of the local community and government (represented by the Provincial Department of Agriculture and Rural Development) in sharing responsibilities

and rights. This is a long and challenging process that needs extra care to ensure it harmonizes the needs and concerns of the community, especially its most vulnerable members.

- **Support for alternative livelihoods** such as ecotourism, oyster/clam culture, and vocational training, which include RECERD-led trainings and regular consultations, plus equipment and materials aimed at incentivizing local people to move away from mangrove resource destruction. These are considered sustainable livelihoods, built on local interest and reasonable utilization of the available mangrove forest resources, while improving or at least not harming development or spoiling mangrove habitat. Vocational training helps to prepare people for urban life.
- **Mangrove reforestation**, organized by LEMU. Based on results of site selection and co-management agreement on allocation of forestland, households and communities will be contracted for collaborative restoration, protection and long-term rights for sustainably harvest the aquatic products of the mangrove forests. Plantation sites selected include the intertidal zone in Thi Nai lagoon in Phuoc Thuan, Phuoc Son, and Vinh Quang communes. Mangroves will be planted in phases to allow local people to adjust to this change of landscape. In early 2013, the first 11 hectares of mangrove forest were planted in Phuoc Thuan commune, out of about 68 hectares to be planted under the project.

## Next steps

Efforts under this project to date have revealed some important lessons for co-management approaches and mangrove ecosystem restoration; these are being applied as the project continues toward its scheduled conclusion in 2015, and could be considered instructive for similar projects in other locations beyond Quy Nhon. The project team will continue to monitor progress and reflect on lessons learned as the project progresses.

## LESSONS AND LEARNING: Co-management and mangrove forest restoration

Vietnam in general, and Quy Nhon city in particular, are unique urbanization and institutional contexts for the implementation of a co-management approach. Here, there are two levels of conflicts of interest to harmonize. At a lower level, communities, households and individuals are competing over a shared livelihood resource, and they risk sabotaging this resource in a typical case of a “tragedy of the commons.” At a higher level, these communities, households and individuals are together competing against a growing process that could put both their lives and their livelihoods at stake – that is, the urbanization process that is eating into their income supply and threatening their current shields against natural and climate hazards.

The project represents a complex effort to harmonize these conflicts. Many of these issues are exceptionally challenging to deal with, even though some are already anticipated or foreseen.

- Alternative livelihoods must be sustainable to promote successful co-management and mangrove restoration. The project has faced many challenges with the early oyster farming models in Phuoc Thuan commune. In the testing phase of the model, 10 of the 18 households lost their oysters, either because the oysters died as a result of an unusually lingering period of fresh water, or because they were stolen from demonstration ponds by people from outside their villages. This situation calls for more close consultation with local and vulnerable communities, especially at the planning phase, to identify more innovative measures that can minimize unexpected risks.
- There are also pressing problems with the mangrove plantation at Phuoc Son and Phuoc Thuan, where the current survival rates of new mangrove areas are much lower than required (68-70 per cent compared to the 90 per

cent standard). While there are many contributing factors, one major reason for the low survival rates is a failure in mangrove plantation protection and trespassing prevention. In addressing this, it has been suggested by participating households that responsibility should not be equally distributed to a large number of households to avoid another “tragedy of the commons.” Instead, the most active members should take charge and lead other households to participate in the model activities, and application of the model should be given to individual households to reduce pressure in protection.

- Community consultation is a tricky process that we hear a lot about, but rarely see done properly, partly because of the challenge of drawing inputs from the people with the most useful information – that is, the poorest and most vulnerable groups. These are the most reserved group, whose voices can be easily drowned out by other more dominant groups. This is the reason for this project’s strong emphasis on the community element and engagement with community experts who have experience and knowledge in the area. So far, the engagement has been successful in prompting challenges by the local community of some of the project’s original assumptions and plans. For example, participating households in Diem Van village (Phuoc Thuan commune) are unconvinced that the community regulations can be effectively enforced to deal with mangrove aquaculture ponds/plantation sites violations, especially when it involves people from other wards/communes, thus not bound by the community regulations. Therefore, in addition to these regulations, the villagers requested other protection mechanisms such as patrol teams and an increase in payment for plantation and protection activities.

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INSTITUTE FOR SOCIAL AND ENVIRONMENTAL TRANSITION-INTERNATIONAL  
**CLIMATE RESILIENCE CASE STUDY**

## Quy Nhon, Vietnam

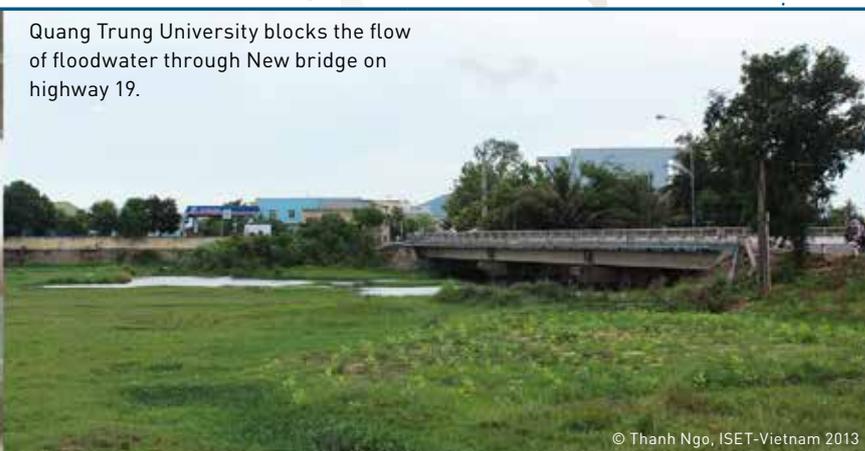
### REDUCING FLOOD RISK TO RESIDENTS IN THE LOWER HA THANH AND KONE RIVERS

2013–2015 | Implementing Partner: Binh Dinh Climate Change Coordination Office (CCCCO)



Woman in Nhon Phu pointing to upper limit of normal seasonal flooding.

© Van Huynh, Binh Dinh DPI 2012



Quang Trung University blocks the flow of floodwater through New bridge on highway 19.

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## CONTRIBUTION TO URBAN CLIMATE RESILIENCE



### SYSTEMS

Various “safe failure” measures for flood management will be implemented in the lower area of the Kone and Ha Thanh rivers of Quy Nhon city to address the prospect of increased flooding. These include improvements to the flood monitoring system, the early flood warning system, flood shelter infrastructure, and water supply in flood periods.



### AGENTS

By providing flood warning and protection to people living in Nhon Binh, Nhon Phu, and surrounding wards and communes, the project helps enhance flood preparedness and the response capacity of local vulnerable communities and governments.



### INSTITUTIONS

The project will not only generate and improve access to flood information in these wards and communes, but also add value to that process by making sure that the information is accurate, and arrives in time for the people who need it the most.

For more information about our conceptual framework please visit: [www.i-s-e-t.org/crf](http://www.i-s-e-t.org/crf)

## Summary

Like most areas on the central coast of Vietnam, Quy Nhon city is prone to flash floods because of its steep and narrow river system. Annual floods are therefore anticipated and accepted as part of people’s lives, expected to bring along some disruption as well as plenty of benefits to farmers’ crops when the sediments they carry spread out across paddy fields, fishponds, and marshes in a dense network of streams and canals.

In recent years, however, floods have become a more hostile influence on the people and their property, as water is found trapped inside flood cells by the high walls of bridges, roads, concrete dykes, buildings and structures – a result of an urbanization process that will be very challenging to rein in. The Nhon Binh and Nhon Phu wards – by the edge of Thi Nai lagoon, where urban development is most vigorous and historical drainage patterns are most disturbed – were the most severely hit areas in the last extreme flood, which was caused by Typhoon Mirinae in 2009.

According to results of the “Hydrology and Urban Development Flood Modeling” research project, much of the damage from the 2009 flood would have been avoidable if local governments and

communities had a stronger disaster warning system and flood response capacity. During the 2009 flood, no flood warnings were provided to communities. As a result, many people failed to prepare and protect themselves, their property and livestock from the rapidly rising water.

In November 2013, Binh Dinh experienced another severe flood which caused 17 deaths and extensive property loss, especially in Quy Nhon city, Tuy Phuoc district and An Nhon town.

The problems arising from increasing urbanization, worsened in the context of climate change, cannot be addressed overnight. According to scenarios developed by Vietnam’s National Institute for Meteorology, Hydrology and Environment (IMHEN), climate change is expected to increase both the frequency and intensity of seasonal storms. While advocating for the urban plan to be adjusted, we also need to protect people from the next extreme flood around the corner. For this purpose, it is crucial to provide timely and accurate information and warnings combined with organization and preparation to meet potential flood hazards.

## Approach

The key implementing partner for this project is the Binh Dinh CCCO, which is coordinating all other local partners including the Department of Hydrometeorology, the Committee for Flood and Storm Control (CFSCs) at different levels, the Center for Technology and Informatics of DONRE, the Southern Institute for Water Resource Research (SIWRR), the Nhon Binh and Nhon Phu ward People's Committees, and a telecom company. Challenge to Change (CtC) will provide technical support and ISET will provide oversight and technical guidance. All of these partners are involved in the following main processes:

- **Developing and installing an innovative, real-time river level and rainfall monitoring system** – a process supported by SIWRR, in consultation with the Tam Binh hydrological monitoring model in My Tho city. Five automatic stations (including four monitoring stations and one central station) have been installed in the existing hydrometeorological facilities to enable cross-checking and adjustments.
- **Creating an effective warning transmission network** that enables the people of Nhon Binh and Nhon Phu to receive timely information on flood status at the community level. The development of this network is based on lessons from models in Ho Chi Minh City and Tien Giang.
- With support from CtC, **organizing training and consultations** with the communities on flood warning responses, flood risk exposure mapping, and community-based climate change adaptation and CBDRM, to support them to develop their own flood preparedness, response and monitoring plans.
- **Providing the communities in two highly vulnerable areas of Nhon Phu and Nhon Binh wards with facilities to protect themselves and their property from floods.** This includes construction of community safe shelters and/or provision of other material/structural support.
- **Equipping community members with knowledge and equipment to access clean water during floods,** especially for poor households.
- **Establishing and building capacity for community responder groups** in the two most vulnerable areas of the Nhon Binh and Nhon Phu wards.

These processes will be delivered through the complementary combination of a technical approach (flood monitoring and SMS warning systems, flood mapping, safe shelter construction, expert consultation) with a community-based approach (community responder teams, community consultation meetings, community monitoring).

When the monitoring system collects timely and accurate information, the SMS messages are sent off at the time of threshold flood risk to the first responders, who in turn transfer the warnings to their communities. With this mechanism, local emergency

organizations can stand ready and households can have enough time to respond to increasing threats. When a flood actually happens, the flood map, warning signs and all training provided will inform people on what they should do, where they should head for shelter, how, and by which route. Through this, both the flood preparedness and the flood response capacity of these communities will be improved, with their flood vulnerability reduced. Meanwhile, the information base from the upgraded monitoring system and the increased awareness and preparation of local communities will build evidence on the reduction of risks through better urban development practices.

## Next steps

These initial experiences are encouraging signs that the project's emphasis on improving local systems and infrastructure and sustaining community participation are necessary and effective steps towards reducing local people's vulnerability to floods.

## LESSONS AND LEARNING: Flood-safer community

**The project is an effort to ensure safe failures of the drainage system.** It is an interim response to long-term needs that will only increase through climate change. In the long term, better planning and infrastructure responses are required, but it could take many years to change the existing structures and fully address the infrastructure and development problems. Therefore, in the meantime, local residents should be assisted to reduce their vulnerability to changing flood risks, and local government officials should be better informed of the changing flooding levels in these communities.

The initial period of this project provides clear evidence that participatory processes are essential companions to technical processes, and that the most feasible solutions to a problem can be found by engaging with those people who are most severely affected by it. In the project's multiple community consultation meetings and discussions to date, there were many ideas raised, some of which have significantly altered original plans for how processes would work and what some interventions would look like. For example, through consultation it became clearer that, for flood emergency response, large community safe shelters may not be as effective as simply helping people to build emergency lofts in their homes, or providing them with protective tools and materials like bunk beds, anchoring ropes, and sand bags.

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