

Lessons from ACCCRN in Viet Nam Series

CO-MANAGEMENT MODEL FOR URBAN RIVERBANK EROSION MANAGEMENT IN CAN THO CITY, VIETNAM

August 2017



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ABSTRACT

Urban climate adaptation measures are frequently understood to require large-scale infrastructure investments. But these may not be feasible in low-income developing countries, where urban populations are growing most rapidly. Yet poor urban populations, especially in rapidly expanding peri-urban areas, may be most vulnerable to climate hazards such as flooding, sea level rise, and extreme storms because their population density is increasing more rapidly than infrastructure investment. This paper describes an experimental approach to riverbank erosion control in Can Tho, Vietnam, which involves an alternative mechanism for funding, building and maintaining infrastructure for riverbank stabilization and erosion control. Our paper describes the approaches for co-management model and discusses key lessons for replication in other cities.

Key words

Urban riverbank erosion

Community practices

Climate Change

Co-management model

INTRODUCTION

Riverbank erosion is a threat to the life and property of local people living by rivers (Tuhin, et. al 2014). It has become a common phenomenon in recent decades, restraining the economic development process of the important South-West economic region of Vietnam. It is evident that local communities are most directly affected and most vulnerable to disasters impacts (Cong, 2013). The worst sufferers of riverbank erosion impacts are not only communities and people in rural areas, but also people in urban areas where economic conditions seem better (Cong, 2013).

Local communities themselves have a huge hidden capacity that needs to be utilized, i.e. they include a large number of people, and have their own traditional knowledge and social connections and association, which would be a great social capital for disaster management (Nguyen, et al., 2009). Growing evidences prove that top-down approaches to disaster management fail to meet the needs of vulnerable communities, ignore the potential of local resources, and may even increase people's vulnerabilities. Vulnerable people themselves must be at the heart of decision-making when it comes to planning and implementing disaster risk management measures. Therefore, promoting the role of local communities is needed in the disaster management process (Shaw, 2006).

This paper describes a model of co-management between local communities and local governments for riverbank erosion control in Can Tho city, and community practices to manage riverbank erosion in the urban area. In addition, the paper discusses

the community-based approach as an opportunity to scale up individual actions into co-management arrangements between local governments and communities for riverbank erosion control.

RIVERBANK EROSION AND LOCAL PRACTICES IN CAN THO CITY

RIVERBANK EROSION IN CAN THO CITY

The process of urbanization in Can Tho has negatively affected the city's historical drainage system of rivers and drainage channels, and led to overdevelopment of riverbank areas with housing that may not have legal land rights. This has led to problems such as increased riverbank erosion, tidal floods, and poor drainage during storms, which are all expected to worsen as a result of climate change (Cong, 2013).

According to Can Tho City Flood and Storm Control Committee (2013), many riverbank erosion incidents in Can Tho city have occurred in the transition period between the rainy and dry seasons (from March to July annually), and caused loss in both human lives and property. In 2010, there were four riverbank erosion incidents, causing two deaths and about 2 billion VND of financial loss. In 2011, 12 serious incidents happened, leaving two people dead and five people injured, and causing a loss of over 3.5 billion VND. Five riverbank erosion incidents with total loss of more than 460 million VND were reported in 2012. At the end of March 2013, there was a dramatic riverbank erosion episode in hamlet 22, My Ai hamlet, My Khanh village, Phong Dien district, when five houses completely collapsed and eight other households had to evacuate immediately. Total loss of this event was over 1.3 trillion VND. Riverbank erosion frequently occurs in Binh Thuy,

FIGURE 1. COCONUT AND BAMBOO FENCES BUILT BY THE LOCAL PEOPLE



Cai Rang, Thot Not, O Mon, Ninh Kieu and Phong Dien districts.

The riverbank erosion problem is caused by the combination of a) changes in river and tidal currents as a result of a shifting Mekong hydrological regime and sea level rise; b) proliferation of high-risk construction by riverbanks by migrant households who lack residential permits and cannot afford to build elsewhere; and c) increased traffic by heavy riverboats. In the medium term, better regulation of boat traffic may be possible with improved siting of related facilities (e.g. construction material depots, docks, terminals) to concentrate traffic in protected canals and limit speeds. But both of the other causes of increased riverbank erosion are likely to intensify in the future.

To respond to these problems, Can Tho city plans to build concrete or part-concrete embankments along 22 of the 48 river channels within the city, according

to the city's plan for 2012-2015. It also has long-term plans to extend this program of embankment construction as the city grows. It is unclear whether sufficient funds can be mobilized for building concrete embankments for these 22 river channels, and it is beyond current or projected fiscal capacity of the city to build embankments for all the 48 channels. The cost of solid concrete embankments is roughly \$1.5 million/km, while even concrete-and-timber embankments cost about \$400,000/km. In both cases, this does not include the cost of resettling households living on the riverbank. Meanwhile, cost of biological bank stabilization methods is around 200-400 million VND/km. It is clearly infeasible to build concrete embankments for the whole waterway system of Can Tho city for the foreseeable future, and more cost-effective alternatives should be explored to reduce vulnerability of the affected households and related urban infrastructure.

An Binh ward, a densely populated middle- and low-income residential area in the central urban district of Ninh Kieu. The ward now has 10 local drainage channels, with total length of approximately 10 km. About 10-15 years ago, these channels played an important role in the community life, facilitating waterway transportation, providing water for domestic and agricultural use, and providing drainage for residential areas. The local community has their own experience in riverbank protection—some households built bamboo fences, grew water hyacinths, and planted mangrove apples to reduce erosion along Cai Son riverbank (Picture 1). However, there has been no official approval of these activities, no study of their comparative effectiveness, and no technical advice or support to local households to improve these practices. In addition, not all households can afford the cost of materials, so riverbank protection levels vary. The local situation is complex: property ownership and tenure patterns vary, different sections of the riverbank are at different degrees of risk as a result of soil and vegetation conditions. In some places, erosion threatens public infrastructure such as roadways or utility distribution systems, while in others, it affects only private properties.

In order to secure the riverbank, protective measures need to be applied consistently or erosion will intensify in the most exposed sections. This problem cannot be solved effectively either through public or private funded responses, and there is a need for new institutional mechanisms to facilitate both public and private investments in cost-effective solutions that are planned and managed locally to respond to local conditions, at the same time meeting minimum standards to assure results.

To solve these problems, new institutional mechanisms that enable community initiative technically and

financially supported by the government are required. The processes of community engagement, the structures and mechanisms for co-management, and the specific technical approaches may all be replicable to other contexts.

REVIEW OF CAN THO COMMUNITY PRACTICES FOR RIVERBANK EROSION MANAGEMENT

With years of experience coping with erosion, the local people have applied different methods for erosion control. These traditional practices to protect embankments include (i) planting trees and grass; (ii) setting up coconut and bamboo tree poles; and (iii) using tightly fastened sandbags to set up walls to reduce waves. Traditional measures only apply in cases of slow onset erosion, caused primarily by boat waves, and in places with a shallow depth, no swift-flowing water, and low landscape requirements. Local people also build semi-concrete structures, including (i) rock embankment, (ii) brick embankment, and (iii) concrete and concrete slab embankment. Many enterprises, factories or local households can afford to construct embankments, which tend to be long-lasting structures, depending mostly on their foundation stability and their designs. In some areas, constructed rock embankments create beautiful landscapes. However, semi-concrete embankments are not designed and constructed uniformly and according to standard construction procedures, hence they tend to break down after a short time of construction. Some structures did not have reinforced foundations. Also, the overloaded weight of buildings and roads by the riverbank was an important cause of embankment erosion. Besides, due to high construction cost, only some households with stable and high income could

construct these embankments. The construction of these embankments was spontaneous and unplanned, hence they do not have high aesthetic value. In some cases, these constructions also cause traffic difficulties (Southern Institute for Water Resources Research, 2010).

MODEL OF CO-MANAGEMENT

APPROACH AND PROCESS

Approach

At the request of the community in An Binh, ISET designed a project to build on their local knowledge while engaging the resources of the local government. The riverbank management process relies on a community-based approach to increase local awareness and capacity to implement local measures, and on support from local government units, technical experts from Can Tho University (CTU) and the Institute of Social and Environmental Transition (ISET). The approach involves five steps: (1) agreement between district level Urban Management Unit, Natural Resource and Environment Department, and Residential Quarter People's Service Board; (2) establishment of processes and mechanisms to promote community participation (Community Management Boards and self-managed groups); (3) design and consultation, to identify high erosion risk areas and other development issues in the areas, and work with local government staff and technical advisors to design solutions; (4) establishment of a community volunteer network (of households living along the riverbank) as core community groups (commitment by leaders of the Ninh Kieu district Urban Management Unit and An Binh ward People's Committee is a crucial factor to enable the

implementation of this work); and (5) implementation and maintenance. Another key success factor is the responsiveness of the project to community concerns and its ability to identify practical solutions to them. The community-based model strengthens the co-management capacity to help resolve conflicts and overcome existing challenges.

Process

After the community-based mechanisms for project planning and implementation were established, a participatory approach was applied consistently for all project activities. A key element of the project is shared financing for the infrastructure improvements in pilot activities, with the local government and local residents both making financial, material and labor contributions to the construction activities once the details of these contributions have been agreed. This requires negotiation and community coordination to ensure equitable treatment and inclusion of the poorest households. The key tool to facilitate these five steps is Share Learning and Dialogue (SLD) workshops, which were hosted by the Can Tho Climate Change Coordination Office (CCCCO).

This methodology is in line with national policies in support of grassroots democracy such as the mechanism of "government and people joining efforts" (Decree 24/1999/NC-CP), and "people know, people implement, people supervise, people benefit." The approach responds to key vulnerabilities identified in the city's climate vulnerability assessment and Resilience Strategy undertaken for the Asian Cities Climate Change Resilience Network (ACCCRN), especially for poor populations and recent migrants in

TABLE 1. SUMMARY OF STEPS AND ROLES OF STAKEHOLDERS

STEPS	ROLES OF STAKEHOLDERS		
	Scientists and technical experts (CTU, ISET)	Local community (people leaving near by the Cai Son river)	Local stakeholders (CCCO, district Departments, Ninh Kieu district, An Binh ward)
1. Agreement among local community and stakeholders	<ul style="list-style-type: none"> • Design assessment methodologies • Conduct impact assessments 	<ul style="list-style-type: none"> • Identify vulnerable groups 	<ul style="list-style-type: none"> • Host SLDs for stakeholders and local community
2. Establishment of processes and mechanisms to promote community participation	<ul style="list-style-type: none"> • Conduct community-base riverbank erosion impact assessment 	<ul style="list-style-type: none"> • Provide information on erosion impacts during the last 10 years (2003-2013) 	<ul style="list-style-type: none"> • Establish community groups for planning the construction of stabilized biological erosion protection measures along Cai Son riverbank
3. Design and consultation	<ul style="list-style-type: none"> • Design measures and consult with the local community 	<ul style="list-style-type: none"> • Participate in consultation meetings on measures of erosion control 	<ul style="list-style-type: none"> • Approve the measures for erosion control
4. Establishment of a community volunteer network		<ul style="list-style-type: none"> Establish the Community management board Work with all households in the area for resource mobilization based on their vulnerability level and economic capacity 	<ul style="list-style-type: none"> Approve the community regulations
5. Implementation and maintenance	<ul style="list-style-type: none"> • Documentation 	<ul style="list-style-type: none"> • Prepare for the construction and monitoring • Develop the community regulations 	<ul style="list-style-type: none"> • Support to organize SLDs

suburban and peri-urban areas. Table 1 describes the steps and roles of local stakeholders in the model.

In order to reduce riverbank erosion, it is necessary to plan routes for transportation on rivers and canals, and regulate appropriate speed limits for boats. In

Cai Son river, depending on the capacity of ships or boats, the speed limits are 8.27 km/h, 7.54 km/h, 6.16 km/h and 5.5 km/h for boats less than 5, 10, 15 and 20 tons, respectively. However, according to the Inland Water Transportation Port of Can Tho city (under Can Tho Department of Transportation), there are no

official regulations limiting the speed of boats or ships moving in the river system in Can Tho city. Therefore, it is difficult to set speed limits for boats and ships traveling in Cai Son River. In 2015, after many SLDs were organized for local community and stakeholders, Can Tho city issued a decision to install speed limit signs on the rivers. This is applied not only in Cai Son River but also many other river channels in Can Tho city.

Results

In an experimental effort in An Binh ward, the local government and the community have been collaborating to test low-cost riverbank stabilization measures. These measures include several innovations: they are based partly on community knowledge of bank vulnerability and stabilization measures; they involve the selection of appropriate biological materials for bank stabilization; and they involve the community in planning, decision-making, construction oversight, and contribution of labour and finance with the approval of government authorities. These measures together constitute a model for co-management of adaptive infrastructure measures. The most significant result of the model is the contribution of the local people who are living on both sites of the river. With the key message of **“my riverbank, my responsibility”** communicated in their community, the local people have contributed to the project 960 person-days and 170 million VND in cash to build and protect 3,086 m of riverbank using biological measures. The community also established a community board to maintain the riverbank after the project ends. Key issues that were resolved include clarification of roles and responsibilities of various stakeholders, such as riverbank area dwellers, community members

living farther from the river, the local government, and technical advisors. The community’s plan for riverbank stabilization was more ambitious than originally anticipated, and their financial and labour contributions enabled the project to be enlarged.

This result shows how low-income peri-urban communities can develop new financial and institutional mechanisms for adaptive infrastructure investments to build climate resilience.

Co-management of some kinds of urban infrastructure may be a practical solution to reduce climate risks.

DISCUSSION AND SUGGESTION

Co-management is not new in Vietnam. It has been applied for a long time since local people started to work together to build local roads and irrigation systems, as described in Decree no. 24/1999/ND-CP on mobilization, management and use of people’s voluntary contributions to the construction of infrastructures.

The challenge in applying Decree no. 24/1999/ND-CP in urban areas is that there are many differences between the urban and the rural contexts. However, there is a way to bring local people and local government together for sharing, learning and dialogues. It is necessary to clearly define the roles of different stakeholders and the local community in SLDs meetings. Roles of different stakeholders and the community in this project are listed in Table 3.

In Vietnam, the National Program on **“Community-based Disaster Risk Management”** (CBDRM) was approved by the Prime Minister under Decision no.

TABLE 2. SUMMARY OF STEPS AND ROLES OF STAKEHOLDERS

Local government	Local community	Scientists/Experts	NGO and Donor
<ul style="list-style-type: none"> • Co-funding • Policy guidance • Co-monitoring and co-management • Negotiating with households as needed • Organizing and monitoring construction • Managing materials, asset and investment • Ensuring progress 	<ul style="list-style-type: none"> • Co-management • Participating in group meetings to provide ideas on the construction plans and methods of contributions • Contributing materials and labor as possible • Participating in the construction • Discussing and proposing regulations or rules to operate and maintain the project works • Supporting operation and maintenance in accordance with the regulations 	<ul style="list-style-type: none"> • Conducting studies on condition of riverbank erosion and flooding • Conducting Cost and Benefit Analysis (CBA) • Working with local people to define solutions • Supporting local people to develop construction plan 	<ul style="list-style-type: none"> • Co-funding • Supporting the establishment of a model of co-management in the urban area • Providing technical assistant • Providing management

1002/QĐ-TTg dated 13/7/2009. The objective of this program is to raise awareness and efficiently organize CBDRM models at all levels and for all sectors to mitigate human and financial losses, and to ensure sustainable development. This program is being implemented in 6,000 rural communes in the whole country. It is recognized that “CBDRM” is new in terms of “terminology” in 2009 but in practice, this approach had been employed at different levels and in different areas of Vietnam. More in-depth research clearly showed that there are common factors between the goals and objectives of CBDRM and the goals and objectives of the Vietnamese Government’s policies

and principles, including “relying on the people and implemented by the people”, “grassroots democracy regulations”, “socializing flood and storm control and disaster mitigation”, “4 on-the-spot motto”, “sharing resources and collaborative implementation” (such as co-funding by Central and local governments in the construction of disaster management infrastructures), provision of the legal basis for local institutions to “participate in monitoring the construction of disaster management works”, and adoption of new technological measures. These principles can be applied directly to riverbank erosion management.

Communication and coordination of efforts between implementing units of the government is also key to the project's success. Disaster risk reduction in Vietnam is often managed by agencies in a hierarchical system, and the focus has been on disaster response rather than preparedness. In some circumstances, disaster management is considered the responsibility of the Flood and Storm Control agencies only. In many areas, it is believed that disaster risk reduction/management efforts are project-based only; therefore, they depend on external resources rather than local capacity (Nguyen & Shaw, 2009).

Co-management projects are expected to carry out assessments and draw lessons learned from each phase of implementation. However, this is not feasible in the current management system. It is difficult to replicate the project models in other areas because of limited human and financial resources for CBDRM at the national or city levels. Therefore, the commitment of local leaders and the interest of local people are critical to the replication the co-management model.

Moreover, co-management policies should be developed to support the implementation of local projects, which should also address practical concerns of beneficiaries. Because it is difficult for them to earn a living, the poor do not have much time to take part in project activities. The capacity of government staff at the community and ward levels are also limited and may not meet the requirements of project activities.

There are no operating volunteer groups in the community. Most of the officials assigned to work in the projects are local officers with their existing government duties, thus they could not spend much time on project activities. Therefore, the community

itself should be the key stakeholder in project implementation, consistent to the statement "***my riverbank, my responsibility***".

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Funded by the Rockefeller Foundation

