



# VIETNAM COUNTRY REPORT

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## SUMMARY

This report discusses the diversity of problems between urban centres and surrounding ecosystems through an overview of water related disasters in the Vu Gia – Thu Bon basin, and impacts on urban resilience in Da Nang city, Vietnam.

Urbanization is accelerating in Vietnam, which had one of the highest growth rates in urban population in East Asia between 2000 and 2010 [1]. During this decade, the percentage of the country's population living in cities increased from 19% to 26%. The urban population growth rate of approximately 4.1% / yr. is expected to continue for the foreseeable future, as the country's economic structure continues to shift towards manufacturing and service industries. In 2013, there were 770 officially designated urban areas in Vietnam. By 2015, 70 new urban areas had been added for a total of 840 [2]. As populations grow in all these urban areas, and as new economic activities increasingly concentrate in cities, new infrastructure, housing, commercial facilities, industry and services such as schools and hospitals will be built in the process of urban development.

Climate change is also a growing risk for Vietnam's cities. Most of Vietnam's cities are in coastal or river delta sites at low elevation. They are vulnerable to sea level rise, high tides and storm surge, typhoons, and to extreme rainfall events either in the city itself or upstream. Climate models suggest that in central Vietnam extreme rainfall events are likely to increase in intensity and frequency. Sea level will slowly increase and tides will be higher. Typhoons may become stronger. The combined effects of these climate factors will lead to greater flood risk in growing urban areas, unless preventive measures are taken. Those all water related disasters have impacted widely with surrounding ecosystems where cities and towns are parts of the system.

Vietnam's cities already face significant flood risk. In the period 2012 - 2015, there have been major flooding events in Hanoi, Quang Ninh, Da Nang, Quang Nam, Quy Nhon, Can Tho and Ho Chi Minh City, among others. The hazards are especially serious in peri-urban areas – those areas that are undergoing rapid change and development on the edge of the built-up urban area. Many of these areas are not yet fully serviced with urban infrastructure, yet the density of residential, commercial and even industrial development in these areas is often increasing rapidly. These areas of rapid change move outwards as the urban population grows, and as infrastructure and urban construction fill in the city's development.

Yet there remain significant institutional challenges in integrating ecosystem services, and long-term planning in general, into urban planning. Political economy is always an issue in urban planning, because the enormous rents from land conversion create incentives to use power for personal or corporate benefit. City leaders do take master plans into

consideration in making development decisions. However, other factors often intervene to create a higher priority than flood prevention. Plans are often modified to accommodate the interests of large land owners or developers who are prepared to make major investments. This is partly because local governments are reliant on the income generated from land sales for a large share of their revenue. This puts them in an inherent conflict of interest: on one hand, they are responsible for public security, safety and flood prevention so they should avoid urban development that will increase flood risk. But on the other hand, they also should generate revenue for local government services and have few options to do this. Short term financial interests often prevail, leaving residents and businesses to bear the long-term costs of flooding.

Research from universities and related institutes is generally not used directly in decision-making. Evidence supporting decision-making is more regularly obtained from consulting company reports linked to fundable projects. Information from these sources are clear, quantitative and actionable. Where researchers have been found to have impact, this has resulted from trusted relationships between researchers who have been able to fund appropriate government bodies, who then take responsibility for disseminating information. Research can help through shared learning with local government, stakeholders and civil society groups, in short and visually accessible formats. For researchers to have influence and impact, their articles and research products need to be linked to fundable projects.

## URBANIZATION TRENDS

Urbanization is accelerating in Vietnam, which had one of the highest growth rates in urban population in East Asia between 2000 and 2010 [1]. During this decade, the percentage of the country's population living in cities increased from 19% to 26%. The urban population growth rate of approximately 4.1% / yr. is expected to continue for the foreseeable future, as the country's economic structure continues to shift towards manufacturing and service industries. In 2013, there were 770 officially designated urban areas in Vietnam. By 2015, 70 new urban areas had been added for a total of 840. As populations grow in all these urban areas, and as new economic activities increasingly concentrate in cities, new infrastructure, housing, commercial facilities, industry and services such as schools and hospitals will be built in the process of urban development.

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## THE VU GIA – THU BON RIVER BASIN ECOSYSTEM

The Vu Gia – Thu Bon River Basin is one of the largest river systems in Central Vietnam and covers most of Quang Nam Province, Da Nang City, and a small part of Kon Tum Province (Figure 1). Compared to many other river systems in Vietnam, the Vu Gia-Thu Bon basin has quite a large amount of water, with over 2,000 mm of rainfall on average in a year. However, the basin has one of the longest dry seasons in Vietnam with nine months of the year receiving only 30% of the rainfall, resulting in severe water shortages and problems with saline intrusion in coastal areas.

The Vu Gia River Basin has a total area of about 5,800 km<sup>2</sup> and is inhabited by 1,143,492 people. The average total annual flows (from the rainfall) are around  $W_0 = 3.91$  km<sup>3</sup> (corresponds to 3.91 billion m<sup>3</sup>). Analysis reveals that in the Vu Gia River Basin annual per capita water availability is more than three times the minimum requirement of 1,700 m<sup>3</sup>/capita (Table 1). Annual rainfall is abundant in Vu Gia (based on Thanh My station): average annual rainfall is 2,274 mm and relatively stable over the years: the coefficient of variation (Cv) is with 0.37 slightly above the threshold of 0.3. From these calculations, we can derive the results for resources stress as in the following table:

Table 1: Water resources stress of Vu Gia river basin

Available water resources (m <sup>3</sup> /capita)	Co efficient of variation in precipitation	RSs	RSv
3,419.35	0.37	0.0	1.0

The challenges for water resources management include the development of the Vu Gia – Thu Bon River Basin, the impacts on the environment, climate change, changes in rainfall, droughts and floods. Water resources in the basin are vitally important as they have a direct impact on daily life of people and the development of the area. In Vietnam, the systematic assessment of freshwater resources vulnerability is still in an early stage. As Da Nang city is in the downstream of the basin, it has a strong connection with the upstream where is in the neighbouring province – Quang Nam in context of ecosystem management. These include river system, rural, forest and coastal landscapes. However, each province and city has its own approach on water management strategy and economic development priorities, so there have been many gaps in coordination that could give rise to conflict between them.

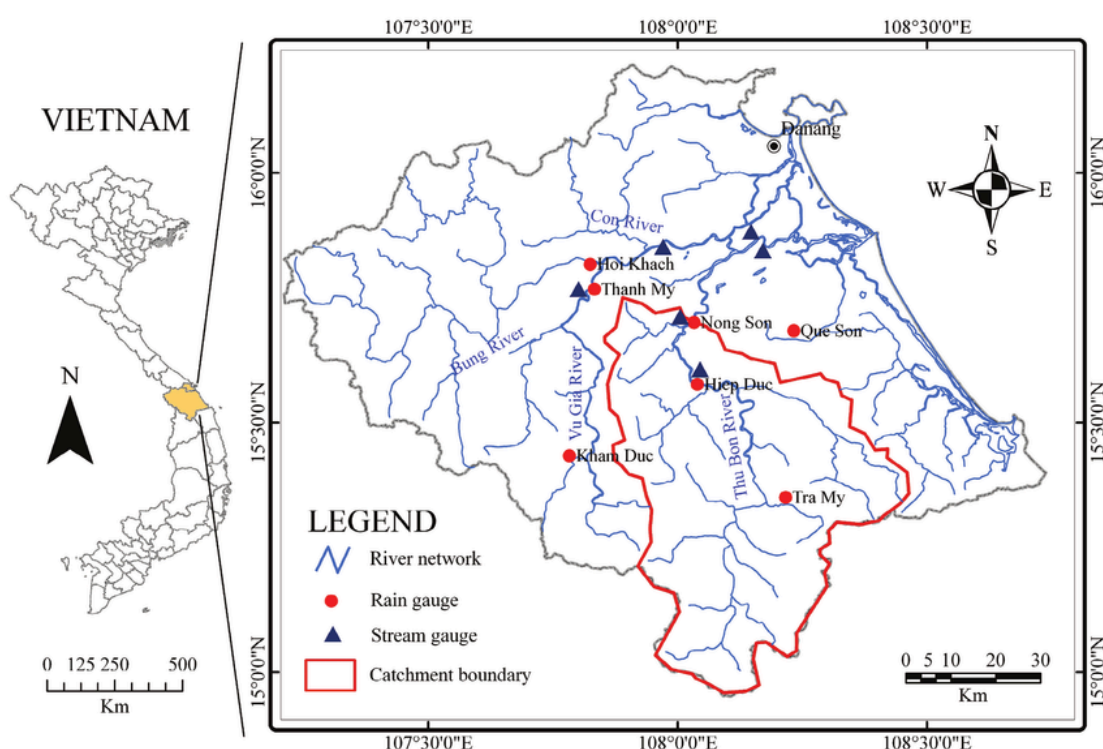


Figure 1: Map of Vu Gia - Thu Bon river basin

## Ecological Insecurities (ES)

According to the 2012 Statistical Yearbook of Quang Nam Province, the forested area in the Vu Gia River Basin is 2,997.59 km<sup>2</sup>, accounting for 51.7% of the basin. As the ecological deterioration parameter is represented by the ratio of the basin area without vegetation cover to the total river basin area, the value of the parameter equals 0.48.

The data of wastewater throughout the basin is very difficult to collect. Therefore, based on our experience we assume that 30% of the water used for agriculture and 80% of the

water used for domestic and industrial purposes will return as waste water in the basin. Hence, it is estimated that wastewater in the Vu Gia basin is  $364,042 \times 10^6 \text{m}^3$  in 2012

## URBAN HAZARD PROFILE – DA NANG CITY

Extreme weather events over the past few years have put pressure on the city. Typhoons, floods and droughts occur regularly, causing significant losses and presenting challenges to the government and citizens: housing, employment, and infrastructure revitalization after disasters; water supply for development demands; food hygiene; and livelihood improvement. These challenges are predicted to increase with development, climate change, and population growth. Failing to address them could lead to the decline of efficiency and productivity of some sectors and socio-economic fields in the city.

### Direct and indirect threat related to the Vu Gia – Thu Bon basin

The primary shocks and stresses of this period included typhoons and floods in 1998 and 1999, and inadequate basic living conditions including water shortages, infrastructure challenges, environment quality problems, and economic recession. Whereas, there is little data available, broad conclusions can be drawn about pre-2000 resilience including:

- The typhoons and floods in 1998 and 1999 caused 69 deaths.
- The 1998 flood inundated over 19,000 houses.
- Urban infrastructure and environmental quality were invested and improved
- Infrastructure and Environment were impacted by recurrent disasters.
- Typhoons and floods occurred regularly, leading to devastating damage to infrastructure and environment.
- Salinity intrusion during dry season in the last 5 years.

#### CLIMATE CHANGE IMPLICATIONS FOR URBAN AND SOCIO-ECONOMIC DEVELOPMENT

Shocks such as typhoons, floods, heat waves, droughts, saline intrusion are unpredictable, impact the city, and are likely to increase. Da Nang lies in the downstream of the Vu Gia Thu Bon basin and it is very dependent on upstream water management upstream. The weather is influenced by monsoon circulation and directly affected by tropical disturbances such as typhoons, tropical depressions, and the inter-tropical convergence zone.

Between 1998 and 2015, there were 26 typhoons, 13 tropical depressions and 46 floods directly affecting Da Nang City, resulting in 219 deaths/missing persons, 226 injured, loss of 156 ships, and destruction of 138,134 houses. Infrastructure and agriculture losses over these events totalled 9,401.6 billion VND (423 million USD). Typhoon Nari, in 2013,

resulted in 7,049 houses with detached roofs, 435 other homes inundated, 221 classrooms with detached roofs, 35 kindergartens severely damaged, 90m of fence collapsing and 1.539 m<sup>2</sup> of fence broken. Moreover, there were over 40,000 uprooted trees and 5,000 seriously damaged ones, resulting in huge ecosystem losses. The flood in November 14-16, 2013, due to heavy rain, resulted in inundation of and serious damage to 32,793 homes [4, 5].

*Table 2: Shocks and stresses related to water in the Vu Gia Thu Bon basin*

<b>Shocks &amp; Stresses</b>	<b>Associated Risks &amp; Impacts</b>
<b>Rising Intensity of Typhoons</b>	<ul style="list-style-type: none"> <li>• Houses of the poor are seriously damaged, hard to recover after typhoons.</li> <li>• Tourism, services and industrial production are disrupted.</li> <li>• Traffic network is interrupted, increasing risk for tourists and residents</li> </ul>
<b>Flooding Increase</b>	<ul style="list-style-type: none"> <li>• Housing and construction along rivers and in low-lying areas are damaged.</li> <li>• Flooding affects residents' lives including loss of life as well as financial and social impacts.</li> <li>• Property value within the city are reduced.</li> <li>• Constructions and infrastructure along rivers and in low-lying areas are damaged.</li> </ul>
<b>Drought</b>	<ul style="list-style-type: none"> <li>• Prices for water access, treatment and supply increase.</li> <li>• Conflicts arise between water users (irrigation, hydro-power generation, household use and agriculture).</li> <li>• Water quality decreases as flow volumes drop.</li> <li>• Saline intrusion increases due to reduced flow volume.</li> <li>• Agricultural productivity is reduced, leading to livelihood decline in rural areas.</li> </ul>

#### CLIMATE CHANGE AND URBAN DEVELOPMENT IMPACTING INFRASTRUCTURE AND THE ENVIRONMENT

Within Da Nang, urban expansion, infrastructure, and traffic investments have been prioritized, leading to risks of flooding and inundation in river basins near Quang Nam,



and in downstream areas in Da Nang. Urban development in low-lying areas and old flood drainage areas was promoted with no consideration for adaptation needs or solutions, creating a significant hazard-scape that will only increase in the future. According to the Hydrology and Urban development simulation model (HUDSIM – ACCCRN), causes of floods in Da Nang include: Large flows from the upstream areas pouring into the floodplain, while downstream, low-lying areas of Da Nang do not have adequate water storage or drainage capacity; levelling grounds for urban development in low-lying areas in ways that reduce floodwater storage and drainage and/or constrict flows; construction and improvement of traffic routes in ways that block water flows; and a lack of flood drainage and floodwater storage solutions.

According to scenarios of climate change impacts on the South-Central Coast, precipitation may increase by 1.5% in 2020 relative to 1990s, and by 4.0% in 2050 relative to 1990. In addition, sea level rise will slow floodwater drainage. As a result, Da Nang's flooding risk is projected to increase. Aside from water issues, climate change scenarios indicate that increases in temperatures will likely result in increased heat waves and prolonged droughts, which in turn will severely affect urban residents and infrastructure in the future.

## OVERVIEW OF LAND USE PLANNING INSTITUTIONS

Institutional arrangements for water management in Viet Nam are complex and involve several institutions across four administrative levels (national, provincial/city, district and commune levels). The basic institutional and organisational structure of water resource management in Viet Nam is illustrated in Figure 2.

In summary, ministries, ministerial-level agencies and other agencies attached to the Government are responsible for water resources management at national level and for the water management in large industrial zones and factories.

People's Committees at provincial and city level are responsible for water resource management within localities and water management in medium-size industrial zones and enterprises.

The problem is that, those stakeholders are still have a weak coordination. Each organization act follow their own functions and mandates. They also have their own strategies of development and management. Sharing information among agencies is still limited.

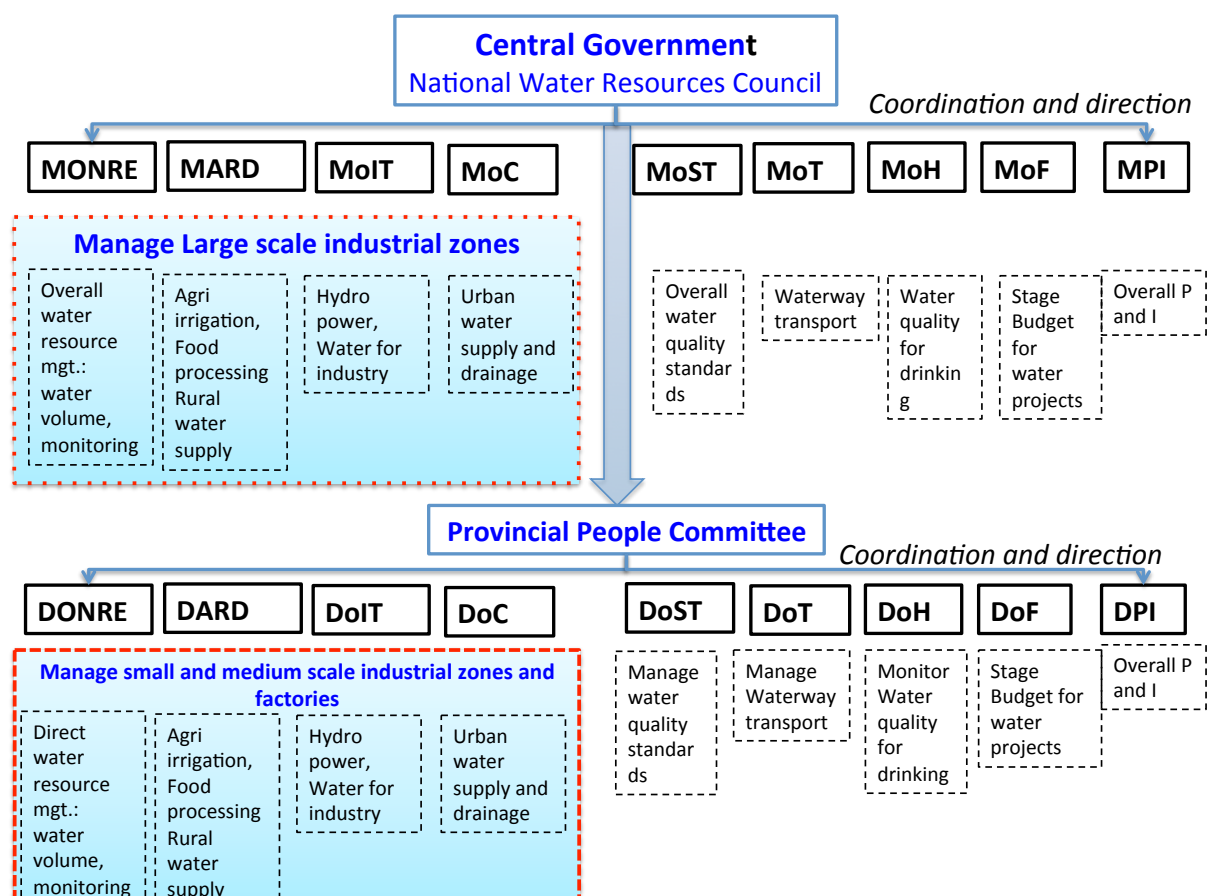


Figure 2: Agencies involved in water resources management

The briefs of key public sector organisations are shown in Table 3.

Table 3: Main functions of ministries

Ministries	Main functions and mandates
<b>Ministry of Natural Resources and Environment (MONRE)</b>	Responsible for state management in the fields of land, geology and mining, hydrology and meteorology, water resources, geodesy and mapping, climate changes, sea and islands. In terms of the water sector, MONRE is responsible for guiding and organising implementation of legal documents and policies related to water protection, water extraction, water resources monitoring and measuring, projections and licenses provisions.

<b>Ministry of Agriculture and Rural Development (MARD)</b>	Responsible for the state management of the fields of agriculture, forestry, salt production, fisheries, irrigation and water services and rural development nationwide. In the context of the water sector, MARD is responsible for guiding the implementation of strategies, projections on irrigation, strategies on prevention and mitigation of natural disasters (floods, storms, droughts), prevention and mitigation of negative impacts (water logging, failure of irrigation works), construction of dykes and irrigation planning, and rural water supply and sanitation.
<b>Ministry of Planning and Investment (MPI)</b>	Providing line ministries guidelines for formulation and implementation of sectoral social and economic development plan.
<b>Minister of Industry and Trade (MoIT)</b>	Development and management hydropower through Vietnam Electricity Corporation (EVN).
<b>Minister of Science and Technology (MoST)</b>	Appraising the water related standards drafted by MONRE, MoH and MoC.
<b>Minister of Construction (MoC)</b>	Governance of technical infrastructure, including water treatment works in urban areas.
<b>Minister of Health (MoH)</b>	Governance of drinking water quality; drafting drinking water standards and supervision of compliance with these standards.
<b>Minister of Finance (MoF)</b>	Preparation of water resources related environmental tax/fee/charges.
<b>Environmental Police</b>	Monitoring and investigation of the water pollution incidents.
<b>Minister of Transport (MoT)</b>	Management of waterways.

## Da Nang Urban resilience building strategies and action plans

In November 2015, Da Nang launched a Preliminary Resilience Assessment (PRA) which identified four areas in which the city needs to conduct in-depth studies and develop specific action plans, projects and initiatives to prepare adequate resources for city development. The result of these planning efforts is Da Nang's Resilience Strategy.

The Resilience Strategy [6] focuses on dealing with the major challenges of four focus areas of Da Nang's urban resilience planning. With this approach, Da Nang Resilience Strategy does not include or replace other existing strategies and plans of the city such as the Socio-economic Development Strategy, the Urban Development Planning, the Green Growth-led City Development Strategy and the Environmental City Plan. Under the view of urban resilience, the Resilience Strategy points out priority actions and initiatives that are needed to deal with future challenges. The Resilience Strategy is intended to be a living document that helps Da Nang become a city where residents can live in peace, have a dynamic economy with state-of-the-art infrastructure and resilient plans that address the city's shocks and stresses. It requires an engaged community of residents from all walks of life partnering to combat the many challenges that confront the city. The proposed strategy actions are expected to inspire greater collaboration between the Da Nang city government and Quang Nam province (upstream) to jointly enhance city resilience.

#### ACTION 1: RESEARCH ON QUANG NAM – DA NANG INTERREGIONAL RIVER BASIN PLAN

Many hydro power plants have been and are being built in the upstream of Vu Gia Thu Bon river basin. Da Nang is affected by these upstream activities due to its location; hydropower plant operations have the potential to significantly exacerbate or mitigate flood, water scarcity and saline intrusion issues. Unfortunately, the operation and management of the hydropower plants is currently not coordinated or executed well. Da Nang and Quang Nam have signed an MOU to mutually support and collaborate in resource management, environmental management, and climate change response. One of the key objectives is to request the Central Government to establish a River Basin Organization (RBO) for the Vu Gia Thu Bon basin. This is a supportive action and new initiative.

##### *Proposed activities*

- Conduct dialogues between Da Nang and Quang Nam to discuss policy, mechanisms, and a working model for a regional organization that executes and directs the water resource use and management in the Vu Gia Thu Bon river basin.
- Conduct research on financial mechanism to maintain the operation of the RBO.
- In first phase, conduct activities within the Global Resilience Partnership

#### ACTION 2: EXPAND FLOODWATER DRAINAGE CORRIDORS AND DEVELOP MECHANISMS TO MANAGE AND RESTORE THEM

There is no current planning around maintaining flood corridors along major rivers in Da Nang. Urbanization runs all the way to the river bank to maximize development area, leaving no space for floodwaters. New urban areas are developed on the floodplain without consideration of drainage impacts. Development and redevelopment plans need

to widen the flood corridor and increase the drainage capacity of the Vu Gia – Han river basin.

*Proposed activities*

- Research and design technical solutions for the flood corridor
- When developing new sites, clearly identify flood corridor borders
- Periodically dredge lakes and rivers
- Develop policy for river and drainage system management and protection

### ACTION 3: ASSESS FLOOD RISK IN NEW URBANIZED AREAS

There is currently no legal requirement for integrated flood risk assessment in urban planning.

*Proposed activities*

- Collect data, information on available assessment approaches
- Update the data on urban development; predict flood risk using existing hydrological simulation model.
- Develop policy mechanisms for disaster risk assessment, including flood risk assessment in new urbanized areas.
- Develop guidance for integrating risk assessment into urban planning
- Request People's Committee issue policies, regulations on risk assessment
- Enhance planning staff capacity for risk assessment
- Assess the flood risk in new urbanized area
- Propose relevant solutions

### ACTION 4: ADJUST PLANS WHICH POTENTIALLY IMPACT DRAINAGE CAPACITY

Urbanization, development on islands and construction of embankment has significantly obstructed river flows in Da Nang. This is exacerbated by floodplain transport infrastructure, which has been developed without consideration of drainage. Drainage systems in the old quarter are degraded with reduced capacity.

*Proposed activities*

- Research and develop a land use plan for drainage
- Designate ground level for new developed areas (i.e. depth of fill used for new construction)
- Redesign transport routes that impact drainage, incorporating overpasses and other design features to allow appropriate water passage
- Transform flood sensitive area into green spaces
- Develop and issue regulations and technical guidance on levelling and developing park and green buffer areas
- Identify development areas adjacent to flood corridors and issue regulations concerning flood risk remedies for these properties



**ACTION 5: RESETTLE RESIDENTIAL AREAS THAT ARE IN THE FLOOD PLAIN OR FREQUENTLY AFFECTED BY FLOOD** To ensure the safety of communities, it is necessary to relocate and resettle residential areas that are developed in the flood plain or frequently affected by flooding. This is a supportive and ongoing short-term adaptive action that needs to be promoted.

- Identify flood prone, frequently impacted areas
- Identify resettlement areas with low disaster risk
- Adjust the social housing strategy to take into consideration resettlement demand
- Provide support and incentives for households in high-risk areas to relocate and resettle

**ACTION 6: RESEARCH ON REGIONAL URBAN PLAN AND MANAGEMENT MECHANISM** Upstream activities can increase disaster risk in Da Nang due to its downstream location. Integrated management through bilateral cooperation mechanism between Da Nang and Quang Nam is needed for development and urban management.

*Proposed activities*

- Conduct survey, research on regional plan
- Develop the regional plan and management mechanism
- Conduct dialogue, and implementation

**ACTION 7: IMPLEMENT THE “GREEN UTILITY NETWORK” IN THE WATER SUPPLY SECTOR**

Water supply is one of the vulnerable sectors affected by climate change. Based on the report of “Water resource management project” (ACCCRN 2015), Da Nang need to strengthen the management and operation of water supply facilities, and adaptive capacity of water supply facilities to increasing climate change. Da Nang Water Supply Company (DAWACO), in collaboration with Vitens Evides International (VEI), conducts research to increase the resilience of water supply sector and reduce the GHG emission from operation. By this cooperation, DAWACO also take part in the Green Utility Network.

*Proposed activities*

- Conduct primary inventory to assess the energy and material efficiency
- Develop the Climate change action plan (CCAP) for water supply sector Share the results with international and national partners

## **INFORMATION DEMAND - CHALLENGES IN INTEGRATING ECOSYSTEMS WITH EVIDENCE-BASED URBAN PLANNING IN VIETNAM**

As illustrated by the case study, there are demands for information for specific action points arising from the resilience strategy. Yet there remain significant institutional challenges in integrating ecosystem services, and long-term planning in general, into urban planning.

In Vietnam, the influence of urban planning and development practices takes several forms. Where detailed construction plans are completed for entire neighbourhoods and construction is staged and approved in line with the plans, with careful attention to drainage system investments, flood risks in those neighbourhoods are generally low. However, because planning and construction are driven by standards rather than by functional linkages to the surrounding area, new construction frequently increases flood risks for existing, older urban areas within each city and among surrounding areas. Natural drainage and flood retention areas that previously served adjacent areas are filled, and new drainage systems are not designed to accommodate runoff from the adjacent urban area. The emphasis on ground elevation, instead of functional regional drainage, as a solution to flooding only serves to increase the problem, as new construction creates or worsens drainage problems for other surrounding areas.

The planning problems point to a lack of coordination of detailed plans with broader regional and city-level infrastructure plans. Major public developments, such as universities, hospitals, or government buildings, are not required to protect or replace natural drainage systems. Neither is there a long-term, city-wide drainage plan and sufficient financing to gradually introduce improvements over a period of decades. The drainage problems cannot be solved by piecemeal measures such as raising ground or road elevation. These provide temporary local relief by shifting the problem somewhere else.

At the same time, some areas are developing informally because they have had no plans at all, and because construction regulations are not enforced. In these areas, there is no planning, yet neither are they protected from development. There is no clear prohibition to construction, but neither is there any guidance for where and how to build, nor is there any public investment in services. Construction proceeds but it is quasi-legal. Infrastructure services are inadequate or non-existent.

Can Tho city is one example of these issues above. The city faces increasing flood pressure from rising sea level, heavier local rainfalls and unpredictable seasonal flows in the lower Mekong River system, all due to climate change. But current systems of land management and urban planning are incapable even of coping with existing flood problems. There is not yet a consistent, city-wide drainage plan that can sensibly be implemented over time. And the drainage problems are getting worse because the city does not protect valuable natural flood channels, retention areas, and low-lying land from development.

## Planning system

Government officials in Vietnam give little formal attention to the *process* of planning. Guidelines for urban planning emphasize the technical considerations that should be included, for example by specifying the ground elevation for future development, rather than the mechanisms for incorporating different kinds of knowledge and sectoral interests, or criteria for making trade-offs and determining priorities consistent with long-term socio-economic development goals. Most physical development plans are undertaken by technical consultants, who are often part of national or provincial planning institutes, rather than from scientists. All planning requires trade-offs and priority-setting, but in Vietnam this process is opaque, so the rationale and criteria for decision-making are generally not explicit. Until recently, most plans consisted mainly of maps at different scales, with land use and construction details indicated on the map. The rationale and criteria for planning choices were not generally explained as part of the plan document.

Projects and plans undertaken at a higher level of government are also not subject to the review of lower levels. So, a national project, such as a road planned and designed by the Ministry of Transportation, is not subject to local review. In Da Nang, researchers were told that the local government requested a review of the impacts of the ADB5 highway (which in principle is required anyway), but they were rebuffed by the national ministry, who said, in effect, "it's only a road."

Political economy is always an issue in urban planning, because the enormous rents from land conversion create incentives to use power for personal or corporate benefit. This is true anywhere, but it is especially problematic in Vietnam because the planning system is not transparent. Decisions about the choice of new urban development sites are made by a small number of people without clear rationale. There is broad scope for discretion in modifying detail plans so that they are no longer consistent with nationally approved master plans. Planning decisions always require choices and setting priorities, which is the responsibility of legitimate political leaders. But when the criteria and rationale for decisions are not clear to a public observer, there may be suspicion of undue influence or benefit. The case studies show examples of how detailed plans have been modified to suit development interests; but also of how planning decisions based on political

interests, such as the desire to meet criteria for a higher city rank, can over-rule the interests of private developers and lead to costly outcomes. Finally, the lack of resources for planning and the inconsistent enforcement of land use and planning regulations can lead to much higher future costs for urban development and servicing.

Many urban development companies in Vietnam are private corporations that are owned by the local government. This does not mean that their operations are intended to support public policy objectives. Rather, because government controls much of the financing and approvals process for urban development, these private companies were structured by local governments after land reforms in the early 1990's to take advantage of the enormous rents available from urban land development. They behave in most respects as profit-maximizing private entities, despite being government owned. But because developers influence the details of construction planning and detailed site planning, and because of the historical linkages between the executives of government-owned development corporations and local government officials, it is difficult to determine a clear distinction between the private interests of developers and the public interests of local government. Indeed, local governments (as in other countries) frequently see their political and fiscal interests as aligned with the profit-making interests of developers. Urban development generates direct revenue to local governments through land transactions, creates employment in the low skill construction industry and raises the status of the city, enabling it to make a case for a higher national rank and larger budget from the State. Local governments therefore have strong economic incentives to support development proposals.

### Contradictions in planning

Another problem discovered is that even when high quality master plans are prepared and approved, they are not always used to guide more detailed planning or to control investment. Even after master plans are approved, detailed implementation planning may be modified to serve the needs of developers in building large projects. There seems to be no requirement for detailed planning to be consistent with the approved master plans. Plans can be changed at the request of developers, or at the decision of local government leaders.

City leaders do take master plans into consideration in making development decisions. However, other factors often intervene to create a higher priority than flood prevention. Plans are often modified to accommodate the interests of large land owners or developers who are prepared to make major investments. This is partly because local governments are reliant on the income generated from land sales for a large share of their revenue. This puts them in an inherent conflict of interest: on one hand, they are responsible for public security, safety and flood prevention so they should avoid urban development that will increase flood risk. But on the other hand, they also should

generate revenue for local government services and have few options to do this. Short term financial interests often prevail, leaving residents and businesses to bear the long-term costs of flooding.

### Lack of coordination

One of the purposes of planning is to provide guidance to coordinate many kinds of investment by different sectors: transport, education, power supply, water supply and drainage. But urban plans do not seem to serve this purpose. The inconsistencies apply at all levels: national guidelines and standards for flood protection and ground elevation are routinely ignored, or exceptions are provided, in local plans. National level projects, such as highways, do not require local review and approval, and pay insufficient attention to local planning requirements, so they end up causing damage by disrupting local drainage patterns. Direction provided in master plans or detailed plans is not always followed in regulating detailed infrastructure investment. As a result, urban development can be fragmentary and inconsistent with construction activities. There are examples in three cities [7] of urban development being approved by local authorities in areas that were set aside for flood protection, or road construction that is not coordinated with drainage investments, resulting in prevention of drainage and increased inundation in urban communities. This lack of coordination is not only between technical units at the city / provincial level, but also between provincial and national authorities.

## CONCLUSION

Climate change will increase the threats that Vietnamese cities face from natural hazards. Extreme rainfall will likely be more intense. Sea level will rise, raising the level of estuaries and rivers. Dams and reservoirs will become more difficult to manage under extreme conditions. Cities must be prepared for more water. But the reality shows that mechanisms for planning and managing urban development are already inadequate even for current conditions. Development is directed to areas of high flood risk, planning and construction detail is driven by standards rather than by functionality or research results, there is no attention to regional context, ecosystems, and the impact of development on surrounding areas, drainage measures are typically included in plans but often neglected in construction. Some areas of cities are being built autonomously with no planning or services at all. These conditions will lead to increased flood risk and property damage, reducing the economic output of urban areas.

Research from universities and related institutes is generally not used directly in decision-making. Evidence supporting decision-making is more regularly obtained from consulting company reports linked to fundable projects. Information from these sources are clear, quantitative and actionable. Where researchers have been found to have impact, this has resulted from trusted relationships between researchers who have been able to fund



appropriate government bodies, who then take responsibility for disseminating information. Research can help through shared learning with local government, stakeholders and civil society groups, in short and visually accessible formats. For researchers to have influence and impact, their articles and research products need to be linked to fundable projects.

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