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POLICY RECOMMENDATION

Integrated River Basin Management of Vu Gia - Thu Bon and Coastal Quang Nam - Da Nang, Viet Nam

FROM RIDGE TO REEF APPROACH

Nguyen Chu Hoi, Dao Trong Tu, Bui Thi Thu Hien

Hanns Seidel Foundation

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Nguyen Chu Hoi[1], Dao Trong Tu[2], Bui Thi Thu Hien[3]

[1] *Viet Nam National University – Hanoi University of Sciences (VNU - HUS)*

[2] *Center for Sustainable Development of Water Resources and Adaptation to Climate Change (CEWAREC)*

[3] *International Union for Conservation of Nature (IUCN)*

This publication is released by MFF with financial support from HSF, Danida, Norad and Sida.

Publishing organization: *IUCN, Gland (Switzerland) in cooperation with MFF, Bangkok, Thailand.*

Citation: *Nguyen Chu Hoi, Dao Trong Tu, Bui Thi Thu Hien (2016). Policy Recommendation: Integrated river basin management of Vu Gia – Thu Bon and coastal Quang Nam – Da Nang, Viet Nam – From Ridge to Reef Approach. Gland, Switzerland: IUCN. 32 pages.*

Cover-page image: *Vu Gia – Thu Bon coastal zone (Bui Kien Quoc)*

Publishing license: *282-2014/CXB/171-13/GTVT, issued by Transport and Communication Publishing House on 24/12/2014*

Layout: *Hoang Minh Comtech., JSC*

Contact: *National Coordinator Board Viet Nam*

MFF - Mangroves for the Future Innitiatives

IUCN Viet Nam

Address: 1st Floor, Building 2A, Diplomatic Compound, 298 Kim Ma, Ba Dinh

Hanoi, Viet Nam

Tel: +844 3726 1575

Fax: +844 3726 1561

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FOREWORD

Water is essential for human life, no creature can exist without water from the rivers and seas. In seeking life on other planets, the first thing man searches for is the presence of water.

On Earth, river basins and coastal zones that are linked to the sea/ocean are essential geographical zones for water resources and other resources fundamental to human life.

People who live and exploit resources from these geographical locations however, are often the drivers of rapid changes in ecological and environmental conditions, as well as the natural capital of river basins, coastal and oceanic zones. Negative anthropogenic impacts on the environment and eco-systems of river basins and coastal zones are becoming more obvious, especially when seen within the context of increasing population and the demand for natural resources.

Consequently water security, the environment, the ecosystems and the livelihood of communities living in the river basins and coastal zones have been seriously threatened. Conflicts of interest and disputes over space intended for use in sectoral/industrial development activities, and for use by local people are increasing.

Given such situations and the climate change, the Global Environment Fund (GEF)'s Facility on International Waters has recommended that countries and trans-boundary water regions should apply the *"From Ridge to Reef"* approach *(in short: R-R - "từ đầu nguồn xuống biển")*. The Mangroves for the Future *(MFF)* Program also identifies the R-R approach as a priority in its activities for a common goal toward a bright, prosperous and secure future for coastal communities [10]. This approach links Integrated Water Resources Management *(IWRM)* with Integrated Coastal Management *(ICM)* in order to strengthen the ability to distribute fresh water resources and other marine resources for future economic stability and long-term effectiveness through adaptation governance institutions [9].

In Viet Nam, water resource management has not been implemented at river basin level, leading to increasing disputes among water-using sectors *(domestic water,*

hydropower generation, irrigation, waterway transportation, etc.) and between water demand of the upstream and downstream.

In the development of river basins, from ridge to reef, the habitat function of a river should be viewed from a holistic and transparent approach. Water resources of a river are the assets and sources of life for the entire community who live on the river basin, water for domestic use should be given the ultimate priority and water distribution should comply with the principle of equitable and reasonable of water demand by different sectors, between upstream and downstream, among regions sharing a common basin

The dynamic and unsustainable economic development and the lack of appropriate water resource management for Vu Gia – Thu Bon river basin and coastal zone of Da Nang – Quang Nam have degraded the ability to sustain the life of the river basin and are the obstacles for the current and future socioeconomic development in of Da Nang City and Quang Nam Province.

River basins, coastal and marine areas exist in an inter-related relationship, whereby coastal zones are crucial as the transitional space between river basins and the ocean. However, these systems are often managed separately. Hence, there is a need for adequate knowledge and appropriate approach strategies to integrate the management of river basins with that of coastal zones based on ecological, meteorological and socioeconomic linkages factors.

This policy recomendation demonstrates the rapid assessment of the viability of the R-R approach in integrated management of river basins and coastal zones for the case of Vu Gia – Thu Bon river basins and coastal Quang Nam – Da Nang, in Central Viet Nam.

This study is conducted as part of IUCN MFF's program with financial support from HSF, Danida, Norad and Sida. The group of authors would like to express sincere thanks for the technical support by colleagues from IUCN: Jake Brunner, Venkat Iyer, Daniel Constable, Nguyen Thuy Anh, Nguyen Bich Hien; and from UN Habitat: Nguyen Quang, Le Thi Mai Huong.

Group of authors

LIST OF ABBREVIATIONS

BOD	Biological Oxygen Demand
CEWAREC	Center for Sustainable Development of Water Resources and Adaptation to Climate Change
COD	Chemical Oxygen Demand
DARD	Provincial Department of Agriculture and Rural Development
DOIT	Provincial Department of Industry and Trade
DONRE	Provincial Department of Natural Resources and Environment
GEF	Global Environment Facility
GIS	Geographic Information System
HUS	Hanoi University of Science
ICM	Integrated Coastal Management
IMER	Institute of Marine Environment and Resources
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resource Management
IWCM	Integrated Watershed and Coastal Management
JICA	Japanese International Cooperation Agency
MFF	Mangroves for the Future
MARD	Ministry of Agriculture and Rural Development
PEMSEA	Partnership in Environmental Management for the Seas of East Asia
R-R	From Ridge to Reef

MONRE	Ministry of Natural Resources and Environment
PPC	Provincial People's Committee
TSS	Total Suspended Solids
UNEP	United Nations Environmental Program
VASI	Viet Nam Administration of Seas and Islands
VNU	Viet Nam National University

SUMMARY

River basins, coastal zones, the sea and oceans are vital regions to human life and to the economic development of the areas around them. Human beings live in these geographical regions and exploit resources from them; aside from benefiting from these geographical regions, humans beings are also the drivers of many negative impacts on the ecological environment and the natural capital of these regions.

Changes due to hot anthropogenic activities on the river basins and coastal zones are becoming more extreme, especially in the context of rising population and increasing demand for resources.

This policy recommendation introduces the conception and solutions for application of R-R approach in the integrated management of river basins and coastal zones. This management approach links integrated water resource management *(IWRM)* to Integrated Coastal Management *(ICM)* in order to strengthen the distribution and mitigate the disputes in the use and exploitation of water and coastal resources, through adaptive governance institutions, for a future of stable and sustainable economy.

Vu Gia – Thu Bon river basin and coastal zone of Da Nang – Quang Nam was chosen for the case study.

For Viet Nam, this is a new approach which emphasises spatial connectedness in development to achieve long-term goals. Hence, the group of authors expect, with this policy recommendation, to enhance the awareness of stakeholders and analyse the viability of R-R to solve the obstacles which Da Nang city and Quang Nam Province are facing when using and exploiting the Vu Gia – Thu Bon river basin and coastal zone. Specifically:

Part I of this document re-emphasises the importance of river basins and coastal zones, the interdependence between them as well as the clarification related terminologies, including R-R approach. This part also provides basic information on Vu Gia – Thu Bon river basin and Da Nang – Quang Nam coastal zone, emphasizing that in these areas, water resource management is implemented using the traditional approach *(separation by sectors and provinces)* without a river basin approach nor a linkage between management of river basins and sea zones.

Consequences are the increasing conflicts of interest and spatial disputes in the use and exploitation of river basins and coastal zones, yet threatening the sustainable development of not only the river basin but also of the downstream and the coastal regions. Meanwhile, the institution and policy mechanism for the management of river basins and coastal zones are still revealing limitations.

Part II focuses on analysing the current state of development on Vu Gia – Thu Bon river basin and Da Nang – Quang Nam coastal zones. Part II continues confirming the crucial role of Vu Gia – Thu Bon river basin in providing water for both domestic use and economic development of Quang Nam Province and Da Nang City.

This is where natural values meet and combine, creating advantages to become a dynamic economic area within the economic centre for Central Viet Nam. Contributions of Vu Gia – Thu Bon river basin and Da Nang – Quang Nam coastal zones to the economic growth of these two respective regions are significant and have a spillover effect on the adjacent regions *(Thua Thien Hue to the north and Quang Ngai to the south).*

Nonetheless, the recent hot developments such as the construction of various small and large hydropower plants and the disorderly exploitation of minerals and timber on the Vu Gia – Thu Bon river basins have caused negative impacts on the environment, the ecosystem and the livelihoods of not only communities on the river basins but also on those in the coastal and sea area.

The rapid loss of natural capital of the river basin and coastal zone is significant; the transfer of alluvium downstream and to the sea are reduced in volume and quality, causing kinetic imbalance in the estuary, weakening the resilience of coastal regions and which exacerbates the impact of rainy season flooding and dry season drought. Other consequences are the degraded and exhaustive water resource, distorted current pattern, erosion along river banks and coast and extreme saline intrusion. The interdependence between Vu Gia – Thu Bon river basin and coastal Da Nang – Quang Nam must be integrated into development management, this requires early adoption of R-R approach.

Part III discusses the possibility and solutions for the implementation of R-R in the integrated management of Vu Gia – Thu Bon river basin and Da Nang – Quang Nam coastal zone. By means of adaptive governance institutions, awareness enhancement, establishment of cooperation for effective governance, strengthened inter-provincial and inter-sectoral coordination, sustainability in development should be ensured and conflicts in water use in river basins and water exploitation in coastal zones should be lessened. The adoption of R-R approach in management of Vu Gia – Thu Bon river basin and Da Nang – Quang Nam coastal zones will represent a national case study for Viet Nam and should be implemented with an appropriate roadmap.

1 Integrated Management of River Basins and Coastal Zones

1.1. INTEGRATED MANAGEMENT APPROACH FOR RIVER BASINS AND COASTAL ZONES

Geographically, river basin/watershed is the area of land from which all surface run-off flows into a sequence of streams, rivers and lakes, then into the sea through a single estuary, or an estuary or delta region [27]. When it comes to human life and the eco-system around the basin, the river basin is defined in a simpler way, i.e. River basin is a geographical area, within which water resources interact with other human-related resources.

Figure 1: Thu Bon River basin, in Quang Nam province (Source: Dao Trong Tu, 2014)

The coastal area is where the river basin meets the sea, and it is always influenced by the interactions between river basin processes *(mainly river)* and marine processes *(mainly wave, current, and tide)*, between geological dynamic movements *(submerges, erosion and sedimentation)*, and also directly by anthropogenic activities not only in the coastal area but also in river basins and in the ocean. The coastal zone includes two parts: the land-mass adjacent to the ocean *(hereinafter called coastal area)* and the near shore water area *(hereinafter called near shore area)*. The coastal area is where rivers join the ocean, where river basins link to the continental shelf [18].

Figure 2: Vu Gia – Thu Bon river basin, Quang Nam (Source: Dao Trong Tu, 2014)

Integrated Water Resources Management (IWRM) is a process which promotes the coordinated development and management of water, land and related resources in order to optimize economic and social benefits in an equitable manner without compromising the sustainability of vital ecosystems. The basis of IWRM originates from the interdependence of different consumption demands for limited water resources [28].

Integrated Coastal Management (ICM) is a dynamic and continuous process of reasonable decision making with regards to exploitation, usage, development of resources and environmental protection in the coastal area. The core of ICM is the development of an organisational institution and policy mechanism to regulate accepted solutions by sector and coastal area user [3]. ICM links the interests of the Government with those of communities, scientists and the management, sectoral agencies and authorities at all levels in the participatory development and implementation of a master plan for the development of resources and conservation of eco-systems in the coastal area [8].

Integrated Watershed and Coastal Management (IWCM) is a coordinated management across sectors, regions and organizations. This modality of management puts its emphasis on 2 key principles, i.e. the interdependence between the river basins system and the coastal area/the ocean and the integration *(holistic and comprehensive)* of institutional set up and policies in the management of river basins and coastal areas [6].

It should be noted that integrated management does not substitute sector-specific management, instead, it bridges and fine-tunes sectoral behaviors/treatments in the process of exploitation and usage of river basins and coastal areas [16].

1.2. VU GIA – THU BON RIVER BASINS AND DA NANG – QUANG NAM COASTAL ZONE

Vu Gia – Thu Bon river basin

Vu Gia - Thu Bon is one the 9 biggest river systems in Viet Nam, originating from the East side of Truong Son mountain range *(Ngoc Linh chain, Kon Tum province)*. The river is short with many slopes and consists of two main tributaries: (i) Vu Gia river, which is 204 km long until Da Nang, is composed of many tributaries including Dak Mi *(Cai river)*, Bung, A Vuong, Con, and (ii) Thu Bon river, originating from the common border of three provinces of Quang Nam, Kon Tum and Quang Ngai, at an elevation of over 2,000 m, running in the directions of North-south towards Phuoc Hoi, then South West – North East till Giao Thuy, then West – East till it reaches the ocean at Cua Dai, its length till Giao Thuy is 152km [5].

The total area of Vu Gia - Thu Bon river basin, starting from the upstream to the estuary is 10,350 km^2, the annual average amount of water supply is 20.22 billion m^3. The two rivers exchange water on the downstream at the confluences with Quang Hue river, which carries part of the water from Vu Gia river into Thu Bon river, and with Vinh Dien river, 16 km away from Quang Hue, which directs a part of water from Thu Bon river back into Vu Gia river. On the downstream, there is a high density of rivers; apart from the exchange of water currents between the afore-mentioned two rivers, additional currents are provided by other tributaries *(Tuy Loan tributary to Vu Gia river and Ly Ly tributary to Thu bon river)*. For years, the annual average water current has been 400m3/s, about 40-50 m^3/s in dry season, and up to 27,000m^3/s in flood season [5].

The river basin's topography varies widely. Upstream, there are high mountains, sharp ridges, and narrow valleys. As the water flows downstream, the river beds broaden, allowing water to spill over into the flood plain *(including paddy fields)* during the flood season.

Box 1: Some meteorological features of the river basin

Vu Gia - Thu Bon river basin is located in the tropical monsoon area. The average temperature is 25.4^{0}C, it is influenced by North-Eastern monsoon during October – March at the average wind speed of 6-10m/s. South, South-East and South-West monsoon blow in the area from May to August at the average speed of 4-6m/s. There is clear differentiation of rains across regions and seasons. Total annual rainfall varies from 2,000 mm in the delta to 4,000 mm in the mountain. Rainy season normally lasts for 4 months *(September- December)*. The rainfall during rainy season accounts for 65-80% of total annual rainfall, October and November are the most humid months of the year, providing 40-50% of total annual rainfall. Meanwhile, the dry season lasts from January to August, providing only 3-5% of total annual rainfall *(mainly from February to April)*.

Vu Gia – Thu Bon river basin is the most important water source for domestic and economic demand of Quang Nam province and Da Nang city. In addition to the advantage of slopy topography with lots of waterfalls and high precipitation levels, Vu Gia – Thu Bon river basin also has high potential for hydropower generation. Vu Gia – Thu Bon river basin is among four river basins with the highest potential for hydropower development, including Da river, Lo Gam, Se San and Vu Gia – Thu Bon.

In comparison with other river basins in Viet Nam, Vu Gia – Thu Bon has a generous water reserve. The water volume of this river basin in dry seasons can reach 4.280m^3 per capita per year, only after that of Se San river *(8.090m^3)* and of Mekong river *(6.292m^3)*, twice the level of Hong – Thai Binh, triple the level of Dong Nai and other river systems of the Southeast. Water stress in the dry season is low in Vu Gia – Thu Bon when compared with other river basins. The exploitation rate in the dry season is only 20% the total water level. Currently, water transportation is possible along 23km from the fork of Ai Nghia to Thuong Duc [5].

Da Nang – Quang Nam coastal zone

Da Nang – Quang Nam coastal zone – the lowest-lying area of Vu Gia - Thu Bon river basin - is more than 220km long and under two administrative bodies including Da Nang City *(with nearly 100km long coastline)* and Quang Nam province *(with 125km coastline)*. The landmass along the coast of Da Nang – Quang Nam is actually a sandy delta intersected with several bed-rocky promontories, such as Hai Van pass, Son Tra Peninsula *(which is composed of granite)*, Marble Mountain *(or Five-element Mountain or Ngu Hanh Son) (lime-stone mountain)*, and Nui Thanh Mountain, forming

3 beautiful sandy and curvy beaches *(Han bay beach, Son Tra – Cua Dai beach and Cua Dai – Nui Thanh beach).*

There are well-known bays along this coastal line, such as Han Bay *(Da Nang)*, An Hoa beach *(Quang Nam)*. These beaches are clean, beautiful and, in some places, wild and some are recognized internationally such as My Khe Beach *(Da Nang),* and Hoi An beach *(Quang Nam)*. Big rivers from Vu Gia - Thu Bon river basin join Han bay *(Vu Gia river)*, and Cua Dai *(Thu Bon river)*, especially Truong Giang river which runs along the coastal line of Quang Nam through to Cua Lo *(Nui Thanh Mountain)* in the South *(Figure 3)*. Scientists call Truong Giang river *(Long river)* a *"lagoon"* because of its sandy hurst framing the long and beautiful beach which is now solely used for aqua-cultural production.

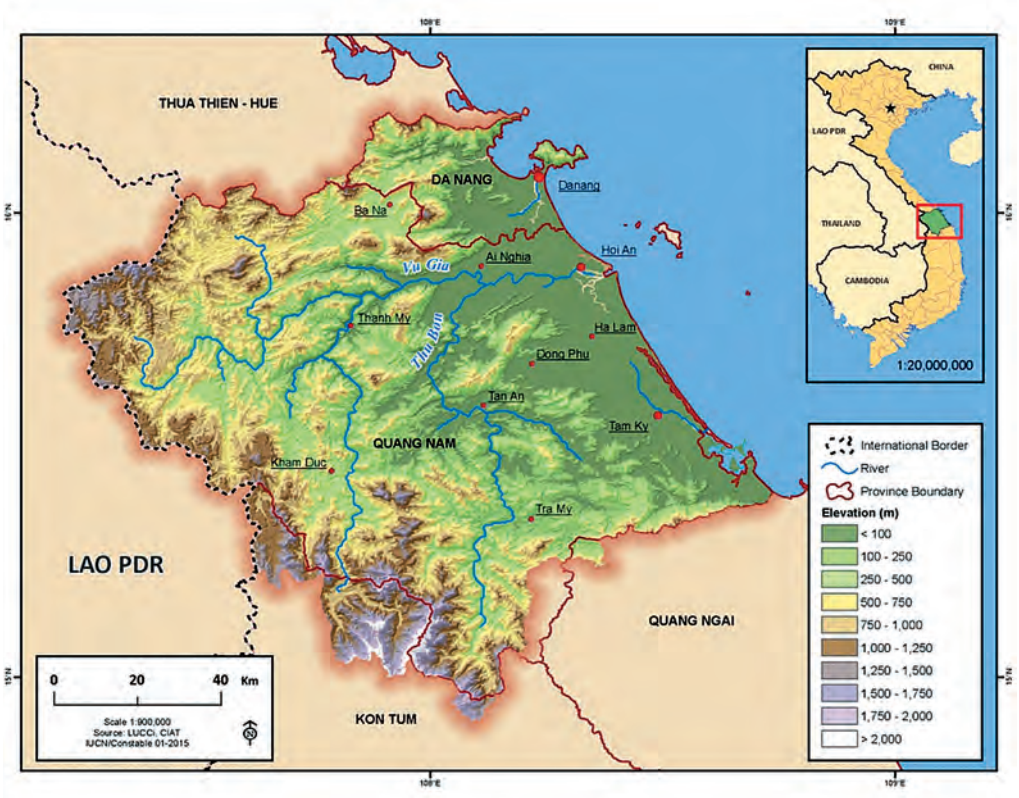

Figure 3: Map of Vu Gia - Thu Bon river basin and Da Nang – Quang Nam coastal zone [13]

Box 2: Typical features of Da Nang – Quang Nam coastal zone

Peripheral to estuaries and valleys are nype palms and mangrove ecosystems. In the near shore area, Coral reef *(Figure 4)* and beds of sea grass are found along the side of the island and in the sea bed around Cham archipelago isles, Nui Thanh Mountain *(in Quang Nam)* and along the coastal ridge of Son Tra Peninsula *(in Da Nang)*. The above mentioned eco-systems have high bio-productivity, high potential for conservation, rich fishery resources and are the valuable "natural infrastructure" for the protection of Quang Nam – Da Nang coastal zone against the impacts of climate change and sea level rise. They also provide *"in puts"* for the sustainable development of marine conservation-based economy, including marine island tourism, diving tourism, fishing and entertainment fishing services, etc. Various activities which exploit fisheries resources in this area bring about substantial benefits to the coastal resident communities *(approximately 60% of local population in these two localities reside in the coastal area and on the island).*

Vu Gia – Thu Bon river basin has a rich reserve of placer gold deposits and valuable timber from tropical forests in the vicinity. On the downstream, the climatic and environmental conditions are suitable for both freshwater and saltwater creatures as well as terrestrial animals. Vu Gia – Thu Bon estuary is a wetland area which is features hillocks, nype palms and beds of sea grass. Along Vu Gia –Thu Bon are lots of historical relics of the antique Cham Kingdom such as My Son Sanctuary *(Duy Xuyen)*, Tra Kieu *(ancient capital of Cham Kingdom)* and Hoi An's ancient port.

Given its relevance in terms of biodiversity and cultural value, the Thu Bon river basin, along with the antiquated city of Hoi An and the Cham archipelago marine protected area, has been recognized by UNESCO as a World's Biosphere Reserve. In addition are natural reserves such as Son Tra Special Use Forest, Ngu Hanh Son, Ba Na Hill ecotourism resort etc.

Intertwining natural values give Da Nang – Quang Nam advantages in multisectoral development *(static advantage)*, especially tourism, habour-marine economy, airline and fishery *(mostly exploitation)*. Thanks to policies enabling an open business environment *(dynamic advantage)*, this coastal zone has become a motivating economic zone with high growth in the economic corridor of Central Viet Nam. Da Nang City *(central city)*, Hoi An ancient town and Tam Ky city *(the administrative centre of Quang Nam Province)* which are situated on the estuaries, together with coastal

economic regions such as Lien Chieu *(Da Nang)* and Chu Lai *(Quang Nam)* are considered the locomotive of growth for Central Viet Nam.

The coastal zone has a significant contribution to the economic growth of these two provinces, with spillover effects on adjacent areas *(Thua Thien Hue in the north and Quang Ngai in the south).* The recent development of Da Nang and Hoi An, especially, has left a positive impression, both nationally and internationally and has become a model for future development of Central Viet Nam's city chains *(sea-view urban town).*

Figure 4: Coral reef in Cham Archipelago, Quang Nam
(Source: Cham Archipelago Marine Protected Area)

2 The current water resource management in Vu Gia – Thu Bon river basin and Da Nang – Quang Nam coastal zone

2.1. CURRENT DEVELOPMENT IN VU GIA – THU BON RIVER BASIN AND DA NANG – QUANG NAM COASTAL ZONE

a) Dense development of hydropower in the upstream has a significant impact on the environment and the entire river basin

Recent years have witnessed strong socio-economic development in the immediate region. In order to meet the increasingly higher demand for energy, the local provinces have planned and developed a series of small and large hydropower plants on Vu Gia – Thu Bon river basin. The *"heated"* and unsustainable development of the hydropower plants in high density on the upstream of Vu Gia - Thu Bon river basin has caused negative impacts on the environment, ecological systems and the livelihood of local communities, not only on the river basin area but also on the coastal and marine areas. This gives rise to conflicts between unsatisfactory conflict settlements in the allocation and consumption of water resources between the hydropower plants and water users in other sectors, specifically, agriculture, domestic users, and environmental protection purposes. Deforestation in the watershed forests, and illegal exploitation of placer gold deposits and gravel from river quarries are the causes to the degradation and exhaustion of water sources, the distortion of water currents and erosion of river banks.

Due to the high density of hydropower plants, rivers flows have been *"pierced off" (more than 30% of the flow which have been obstructed and transformed into "reservoirs" with diverted currents)*, the ecosystems, environment and living habitats of the river systems on the upstream and midstream have been badly damaged.

The volume and quality of alluvial that's brought to the downstream has reduced remarkably, causing the kinetic imbalance of river currents and estuary. Additional impacts are reduced plankton and food for fish; hindered fish migration, and increased risk of coastal erosion and mud obstruction in the estuary. Saline intrusion is especially problematic and has doubled; Vinh Dien river *(Quang Nam Province)*, for instance, has been salinized along 24 km instead of 12 km. Crop water, groundwater on the swallow level and domestic water has been salinized [5].

According to the authorities in both provinces *(Da Nang and Quang Nam),* coastal flooding is a troubling issue and intricately related to water resource management of Vu Gia – Thu Bon river basin. In rainy season in Da Nang, Hoa Vang Ward is the

Box 3: Hydropower development planning in the river basin

According to the master planning for hydropower development plan on the main river of Vu Gia – Thu Bon by 2020, it is expected that 10 hydropower plants will have been constructed *(specifically Đak Mi 1.4, Bung river 2,4,5 and 6, Tranh river 1,2, A Vuong, Con river)* with the total capacity of 1,200 MW. Up to now, 4 major hydropower plants have been constructed, specifically, Dak Mi 4, Tranh river 2, A Vuong and Con river 2 with the total general capacity of 637 MW, and annual power capacity of 1.7 billion kwh/year. According to the hydropower development plan of Quang Nam province, 42 projects have been approved with the total capacity of 1,583.36 MW, and average annual power volume of 6.254 billion kWh/year *(Source: Quang Nam Provincial People's Committee, 2013)* [25].

"After cautious consideration and consultation of 15 main social, economic and environmental issues regarding sustainable development in the river basin, the strategic environment assessment has concluded that the speed and scale of suggested hydropower development is not sustainable. When assessing 60 projects in the planning which have been approved and supplemented, the report points out that the master planning for hydropower development will have a net negative effect on the economy of both related provinces and a serious negative consequence on the natural systems, the life and welfare of some ethnic minority groups. Four relevant issues included in the assessment are: (i) water supply, (ii) economic development of Da Nang and Quang Nam, (iii) integrated ecosystem and (iv) ethnic minority".

(Source: Assessment of hydropower development in Vu Gia – Thu Bon river basin, by International Center for Environmental Management (ICEM), Australia, 2008) [1]

most severely affected whilst the inner city of Da Nang is less affected thanks to the maintenance of an effective drainage system.

The inefficient operation of hydropower plants has caused conflicts resulting from the allocation of water for hydropower generation and other purposes, such as domestic use and irrigation.

Box 4: The development and operation of terracial hydropower disregards planning

Song Bung 4 is located on Vu Gia river whereas Dak Mi regulates water from Vu Gia into Thu Bon; thus Song Bung 4 should be operated ahead of Dak Mi 4. The real operation, however, does not follow this procedure and the construction disregards the planning. The two plants have different investors and were constructed with different timing.

The plant only generates in peak time and shuts down during other hours. It does not operate continuously. The plant discharges water for 8 hours and ceases for 16 hours. Hydropower plants only serve electricity generation and neglects other purposes, leading to water shortages for irrigation. When the plant is generating power, the river is *"dead"*. When it works, water is suddenly discharged in high volume causing unstable currents.

(Source: Minute from the discussion of Consultation Workshop on 16.10.2014) [11]

b) Deforestation affects flood current and drought

Due to deforestation and forest degradation, the water flow is stronger in flood seasons, causing hydrologic changes, leading to conflicts within the ecosystem and disputes in water allocation, causing loss of rich ecosystems in the river basin. Aside from water-related disputes, there are livelihood-related disputes and difficulties in flood forecasting *(Box 5)*.

Box 5: Livelihood-related disputes and difficulty in flood forecasting

Serious disputes have arisen on the downstream between aquaculture producers and farmers. In the past, evidence of ineffective farming on paddy fields had to be provided as precondition for being offered a pond for shrimp breeding. A past common trick was that the local people directed sea water into their paddy field causing the rice to be killed.

It is difficult to forecast floods as the upstream is located in the mountains with high slopes; when it rains, there will be floods, especially in heavy rain. Thus, the flood operation process is just formality without a solid scientific foundation. Therefore, there is a need for more research into flood prediction, with the goal of achieving technical advances. Floods should be predicted before it rains, not after, as floods will come only two hours after the rain.

(Source: A comment at the Consultation Workshop in Da Nang on 16.10.2014) [11]

c) Pollution and environmental accident increases in Da Nang – Quang Nam coastal zone

In addition to the impact on the river basin, Da Nang City and Quang Nam Province also have to cope with several challenges concerning the sustainable development of coastal zone in the context of climate change and sea level rises.

Given the population scale and increasing economic growth on the river basin, the potential and progressive impacts from Vu Gia – Thu Bon river basin on the coastal area and near shore water of Da Nang – Quang Nam will be more severe, such as more frequent coastal flooding as well as mudslides and rockslides.

Increasing pollution of the sea and nearby coastal areas, caused by urban waste and domestic waste, are also a constant obstacle. In rainy season, floods cause severe pollution, affecting people's health as the expenditure for treatment of environmental consequences is too large for the national and local budget.

According to the inventory of waste discharge from the continent to the near shore water bodies of Quang Nam - Da Nang, which was conducted by VASI with support of UNEP-GPA *(2010)*, total annual pollutants dumped into the nearshore water bodies amounted to 92.6 thousand tons of COD, 22.4 thousand tons of BOD, 53.8 thousand tons of Nitrogen total *(N-T)*, 11.9 thousand tons of Phosphorus total *(P-T)*, 428.4 thousand tons of TSS, nearly 83 tons of Plant protection chemicals and approximately 430 tons of heavy metals.

Box 6: Some data on pollution in Da Nang – Quang Nam coastal zone

The proportion of source pollutants: apart from wash margins, source pollutants from Han river and Thu Bon river also are dumped into the nearshore area. However, total pollutants from these 2 rivers, consist of maximum 44% TSS, 12% organic substances, 28% N-T and nearly 3% P-T. Organic substances, nutrition and TSS mainly come from agricultural production *(counting for 42-87%)*, other pollutants are carried by the river itself, running from domestic and industrial activities *(Figure 5)*. Inventory results show that the near shore area of Quang Nam – Da Nang is the dump field of pollutants from the inland source *(just after Ba Ria – Vung Tau, Ho Chi Minh City, and before Hai Phong – Quang Ninh and Han bay (in Da Nang)* and is considered a hot spot for pollution [24].

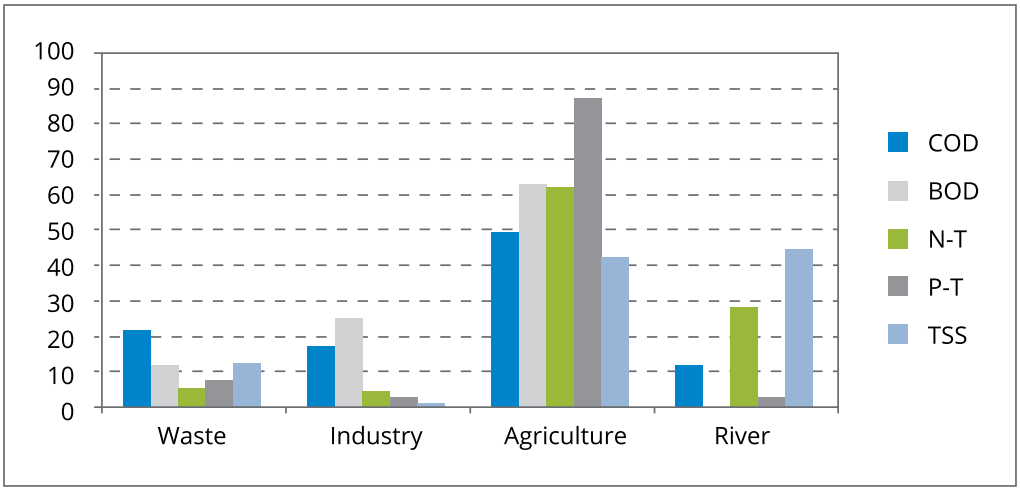

Figure 5: Some pollutants from different sources in the near shore water of Da Nang – Quang Nam (2010) [24]

Cham Islands, a marine protected area, *(Quang Nam)* is 16 km from the coastline, yet it has been heavily influenced by fresh water. During the rainy season, ocean water salinity *(S‰)* in the Protected Area has been reduced from 30‰ to 20‰, the salinity in estuaries at times is down to only 0-1‰. If freshwater continues flowing from rivers for a long time, it can cause impacts on the coral reefs - house of many species with high values for tourism and services.

Along with freshwater flows, alluvial and waste is carried away to the distance of 7-8km from the estuary, and recently, observations show waste and alluvial soil reached the Cham Islands, including all sorts of other things, such as: timber, fuel timber and azolla as well as the *"dumped"* pollutants from the continent. Eroded banks on the island have been embanked while strong waves hit beautiful and rare beaches such as Huong and Lang in the Cham Islands [12].

Additionally, improper use and exploitation of resources along the beach has caused the loss and degradation of relevant ecosystems – the natural capital of the area – such as nype palm, beds of flora peripheral to the river, sea grass and coral reefs in the nearshore, and exhaustion of aquacultural resources and tourism values. Erosion in the estuaries and along the river banks as well as sand blown-away are also troubling issues along this stretch of coast.

Figure 6: The coast is depressed 150m after 7 years in Hoi An (Source: Axel Neubert, HSF)

Recently, landslides have taken place along approximately 8km of the Cua Dai *(Thu Bon estuary)*, 4 resorts were impacted with 3 offshore resorts shut down before reopening *(Figure 7)*. On the side of Duy Nghia, passages are filled with alluvial deposits and it costs a lot for excavation. The waterfront, filled with alluvial deposits, becomes too shallow, allowing only small vessels, affecting transportation and tourism activities in Hoi An.

Landslides and erosion of islands in the Cham Islands, Cua Dai along with alluvial deposition may have connections to climate change and oceanic change, while human beings have a *"magnifying"* effect on the impacts *(sand exploitation in Cua Dai, illegal construction of embankments to prevent freshwater)* without consideration, calculations and integration of these impacts into the coastal estuary development

plans, hence, wasting a lot of investment capital - just like *"throwing money into the sea"* [14].

Figure 7: Hoi An beaches are being eroded - Fusion Alya is being sunk to the sea (Source: Axel Neubert)

In river estuaries and coastal areas near the bay, relevant eco-systems have been lost, i.e. coral reefs, and sea grass beds, while nepa palms have been reduced by 40-70% due to the forested land having been converted for industrial development purposes. Coral reefs in Tam Hai *(Nui Thanh)* have also vanished while breeding shrimps and fish that were previously common along the coastline have reduced severely, that is associated with the Open Economic Zone of Chu Lai and Truong Hai.

Box 7: A big gap in the awareness about development and conservation

Ms Tran Thi Hong Thuy, Director General of Cham Islands Marine Protected Area, Deputy Head of the Standing Committee of the Cham Islands – Hoi An biosphere reserve said: "the Province gives higher priority to development than environmental protection and nature conservation. For example, a forest plantation project to be supported by JICA *(Japan)* had to give way to the Chu Lai Open Economic Zone, despite the fact that the JICA project agreement was signed. Mangrove forests cannot develop, meanwhile, environment is polluted due to dis-assembly of used ships *(in Chu Lai Open Economic Zone)*. The factory of dis-assembling used ships has been suspended, yet, consequences caused are still heart-breaking!

"Hoi An desires to develop in connection with Quang Nam province and the river basin. Lessons from Oregon state (U.S.A) tell us how efforts have been made for the restoration of the "natural capital" of the river estuary, coastal area and planning of residential relocation to more elevated areas based on the scenarios of climate change and sea level rise. The implication is "it important to "recover" the lost properties in the region (lost sea, lost land, lost forests, lost sources of livelihood) for the province and the local people."

(Source: Field interview note on 27/8/2014)

d) Lack of coordination and cooperation among sectors and localities in integrated management of Vu Gia – Thu Bon river basin

While the State takes a passive view, the issues of Vu Gia – Thu Bon will not only affect Quang Nam Province and Da Nang City and they will never be the issues of only Da Nang City without affecting Quang Nam Province. These two localities often criticize each other; meanwhile, the coordination between localities and authorities has been ineffective [11].

2.2 CURRENT WATER RESOURCE MANAGEMENT IN VU GIA – THU BON RIVER BASIN

The management of water resources and other related resources in Vu Gia - Thu Bon river basin is currently a traditional approach – by administrative geographical boundary. The mechanism of administrative management over resources available in Da Nang City and Quang Nam province is a copy of central administration. Specifically, the Provincial Department of Natural Resources and Environment is responsible for the management of water resources, mineral resources and land; the Provincial Department of Agriculture and Rural Development *(DARD)* is responsible for the management of hydraulic works in service of agriculture, rural water supply, prevention and control of floods, storms and disaster reduction; the Provincial Department of Industry and Trade *(DOIT)* is in charge of the management and development of hydropower plants under the authorize mandate of the respective province *(Hydropower plants of less than 30 MW).*

Box 8: Shortcomings in coordination and cooperation

In the past, there used to be 2 management units in Vu Gia - Thu Bon river basin: one chaired by Vice Minister of MARD and one chaired by Chairman of PPC Quang Nam. Yet, in reality, the 2 Management Units were not operational due to the absence of an operational mechanism and budget. However, under the Decree 120, MONRE regulated to set up the committee. Furthermore, under the Law on Water Resources, a river basin organization is mentioned without referring to a committee. In nature, there has been a program proposed for the establishment of a river basin committee, which was never approved. MONRE is strongly committed for the program to be put in place within the current year.

(Source: Discussions at the consultation workshop in Da Nang on 16-10-2014)

Implementing the Law on Water Resources 1998, Ministry of Agriculture and Rural Development set up 8 River Basin Planning Management Boards for 8 major river basins in Viet Nam, one of which is Vu Gia - Thu Bon river basin. This Management

Board was established in accordance with the Decision Ref. No. 20/2005/QD-BNN dated April 13th, 2005 by the Minister of the Ministry of Agriculture and Rural Development. The Management Board is assigned with preparation, submission for approval and monitor the implementation of the Vu Gia - Thu Bon river basin plan, to ensure that the river basin management corresponds to the administrative location; to work with related agencies from ministries, sectoral agencies and local authorities in the basic surveys, inventory, assessment of water resources in Vu Gia - Thu Bon river basin, in the development, submission for approval of and monitoring the implementation of any other river basin plans of tributaries on Vu Gia - Thu Bon river; and to make recommendations on the settlement of disputes on water resources within Vu Gia - Thu Bon river basin.

The organizational structure of this Management Board consists of the Head *(Vice Minister of the Ministry of Agriculture and Rural Development)*, 3 deputy Heads, including the Division Head of Water Resources Management as Standing Deputy Head, Vice Chairperson of Quang Nam province People's Committee as one Deputy Head and the Vice Chairperson of the Da Nang City People's Committee as another Deputy Head. Nevertheless, the Management Board has not been effective for numerous reasons, specifically: unclear functions, overlaps in functions with other state administration bodies within the current structure; *"loose"* institutional structure of the Management Board where members do more than one job and hold high positions in relevant central ministries, and provincial people's committees; limited human and financial resources; Management Board's policies are unenforceable. As such, decisions on the management of water resources development are still in the hand of related Ministries, sectoral agencies *(Dao Trong Tu 2011)*. Since the issuance of the Law on Water Resources in 2012, the Vu Gia Thu Bon river basin Planning Management Board is no longer operational.

After changes from within the national level of water resources management, and the formation of the Ministry of Natural Resources and Environment *(2002)*, Decree 120/2008/NĐ-CP on the management of river basins with lots of innovations was issued in 2008 by the Government. The Decree Ref. No. 120/2008/ND-CP promulgates for the River basin Committees in charge of inter-provincial rivers. Yet, up until now, no such river basin committees have been established. Despite the fact that the Amendment Law on Water Resources was passed in 2012, inadequate sub-law documents have been issued. As a result, the water resources management in river basins is still facing many challenges, both in terms of regulatory policies and institutional arrangement. Vu Gia - Thu Bon river basin is not an exception.

2.3 CURRENT INTEGRATED MANAGEMENT OF DA NANG – QUANG NAM COASTAL ZONE

The two localities have made efforts in introducing integrated management of coastal areas, particularly the early implementation of Integrated Coastal Management *(ICM)* with technical assistance from Partnerships in Environmental Management for the Seas of East Asia *(PEMSEA)*. In general, activities conducted mainly focus on capacity building for the local levels in applying ICM, given the lack of a stable, strong institutional arrangement for cross-sectoral coordination of the compiled activities of ICM.

The proposal of ICM Da Nang was drafted by the former Oceanology Division in Hai Phong *(now Institute of Marine Environment and Resources - IMER)* in 2000 within the framework of the National Level Research on *"the development of ICM for Viet Nam to ensure eco-safety and sustainable development" – (Nghiên cứu xây dựng phương án ICM Việt Nam nhằm bảo đảm an toàn sinh thái và phát triển bền vững) (1996-2000)*. With the assistance from PEMSEA, in 2001, Da nang City People's Committee approved the Da Nang Coastal Strategy and, in 2005, the project of *"Quang Nam Province ICM Model"* was commenced. As of October 29th, 2008, the Quang Nam Province ICM Strategy to 2015 with vision to 2020 was approved by the Quang Nam Provincial People's Committee at their Decision Ref No. 43/2008/QD-UBND [23].

The common goal in ICM between the two provinces is to minimize the degradation of different forms of resources, to prevent environmental pollution, to facilitate sustainable economic development and to protect coastal resources. The 2 provinces can be considered to have pioneered in ICM application in Viet Nam. ICM strategy implementation of the two provinces has been built on their ICM Action Plans and functional zoning plans for the coastal areas.

The plan for spatial zoning of Da Nang City coastal area is implemented based on 15 coastal zoning principles and in line with the guidelines of PEMSEA. Especially component maps, coastal use status maps, GIS software application have been developed to plot the integrated coasting zoning map in Da Nang City coastal area *(Figure 8)*. According to this zoning map, Da Nang City places emphasis on conservation, development of tourism and marine-based economic sectors [20].

Inter-sectoral collaboration and coordination have been set up for effective ICM activities. Accordingly, each province establishes an ICM Steering Committee headed by a Vice Chair Person of the Provincial/City People's Committee, standing members of the committee are leaders of the provincial departments of Natural Resources and Environment (DONREs). Committee members are representatives

of related departments, agencies, including representatives from the Provincial Command of Viet Nam Border Defense Force. The Steering Committee and the standing office are assisted by the ICM Office. The functions, mandates and authority of different entities within the framework of ICM at local level are demonstrated in decisions on their establishments by the competent authority of the Provincial/City People's Committee.

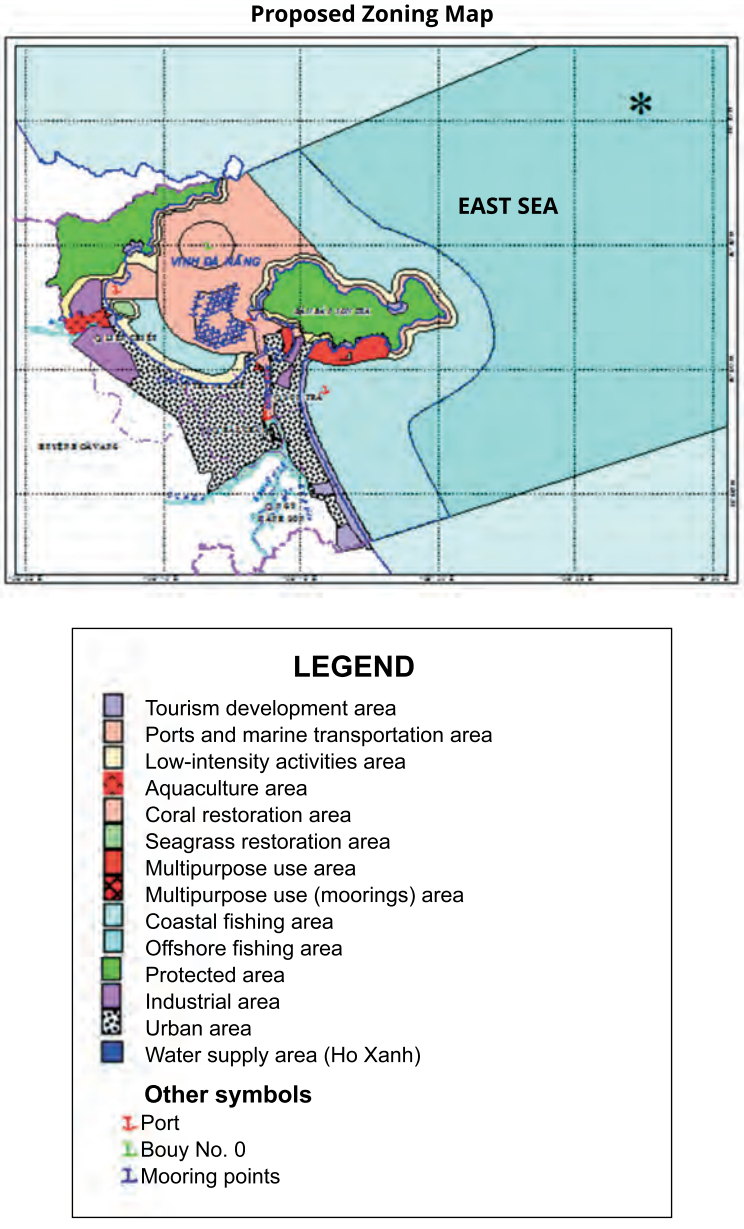

Figure 8: Functional zoning map of Da Nang coastal area

ICM has not been institutionalized in laws and national policies, it has been implemented in these 2 provinces on a project basis, since 2001 now mainly thanks to the financing from PEMSEA and local government budget, and contributions in kinds. ICM has, therefore, not been considered the routine and mandatory duties *(like other planning duties)* of these localities.

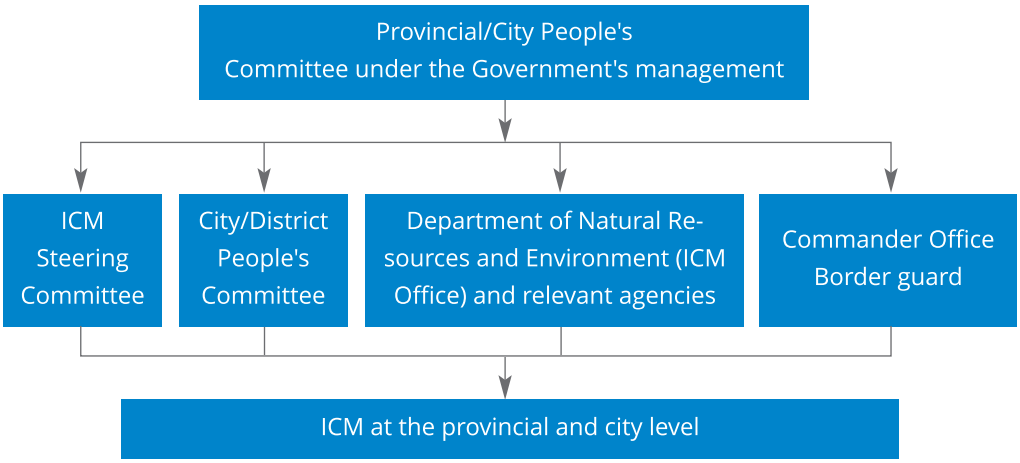

Figure 9: Relationship among functional authorities in a provincial ICM

As such, the institutional set up and inter-sectoral coordination have been established, including: Vu Gia - Thu Bon river basin planning management unit and ICM Steering Committees in Da Nang City and Quang Nam province. However, as *(physical, financial and human)* resources for implementation are still insufficient and inefficient, the results gained are more of formalities. There is a lack of political support from the local governments and necessary policies to maintain the new management modality. Furthermore, ICM plan implementation has encountered several difficulties, obstacles and not taken impacts from river basins into account. *(Box 9).*

At national level, a part from the Decision Ref. No. 158/2007/QD-TTg *(QD158)* dated October 9th, 2007 by the Prime Minister approving the ICM Program of the Central-North and Central Coastal lines to 201 and orientation towards 2020, the Government issued the Decree Ref. No. 25/2009/ND-CP dated March 06th 2009 regarding ICM of Marine and Island natural resource and environmental protection [2]. However, the implementation of these regulations has faced with lots of difficulties, not mentioning the ineffectiveness and validity on a national scale and in both of the 2 provinces. Nevertheless, the Decree 25/2009/ND-CP is still regarded as the historical benchmark of national policies for the first time regulating ICM.

Recently, the Government has approved the Integrated Coastal Zone Management Strategy *(2014)* and the National Assembly has passed the Law on Marine and Island Resources and Environment *(2015)*.

According to its mandate and authority, the City/ Provincial People's Committees regulated the Flow chart of reservoir operation, inter-reservoirs operation, and directives providing guidelines on the implementation thereof, which, yet, have achieved limited outcomes in reality.

Box 9: Shortcomings during the implementation of Quang Nam – Da Nang Integrate Coastal Management

Mrs. Nguyen Hoang Yen, Director of the Provincial Division of Sea and Island of Quang Nam said *"The province has invested in the development of ICM Strategy and Plan of Action, the coastal zoning solution, however, resources are not available for implementation thereof. PEMSEA only provided technical assistance, not implementation support and the province has had to make operational funds contribution (niêm liễn) annually. The coastal zoning plan is available but outdated, without updated amendments made to it. ICM Steering Committee has been set up, headed by former Vice Chairman of the Provincial People's Committee, who has retired, and the Committee has no operational funding. In short, very little of ICM has been done in the province".*

Mr. Truong Cong Hai, Deputy head of the Department of Sea and Island in Da Nang DONRE, said *"Existing ICM regulations in Da Nang City shall be updated, which the city does not care. Investment projects/ programs are not part of ICM yet. Neither is the Government's 158 on ICM for the Central-North and Central Coastal area, which covers 14 provines/central cities, including Da Nang. The Division of Sea and Islands, part of DONRE, is not coordinated for solving sea pollution caused by continental pollutants. The former ICM coordination mechanism has been transformed into the Integrated Steering Committee of Marine and Island Natural Resources and Environment of Da Nang City, which is headed by a Vice Chairperson of the City's People's Committee and comprises of ICM Project Coordination Unit".*

The afore-said information was also agreed to by Ms. Pham Thi Chin, Deputy Head of the Division of Sea and Island, who added *"Da Nang City has recently faced the shortage of fresh water from the upstream due to the emptied source, meanwhile the river has been intruded with salinity and can not supply sufficient water for fresh-water demand. Isn't it that Vu Gia and Thu Bon rivers are blocked!!! Yet, ICM has not immediately included the risks of impacts from the Vu Gia-Thu Bon river basin and climate change".*

(Source: Field interview notes dated 27/8/2014)

3 Towards integrated management of Vu Gia – Thu Bon river basin and Da Nang – Quang Nam coastal zone

For all river basins, there is an inseparable biological link between the general ecosystem and the water source of the river basin, the coastal zone and the sea. The scale of interaction, however, depends on the scale and morphologic characteristics of the river basin. From this analysis, it is necessary to have a new approach for integrated water resource management in river basins and coastal zone to ensure sustainable development. *"From Ridge to Reef"* or R-R approach is such an instrument.

The adoption of R-R to the case study of Vu Gia – Thu Bon river basin will clarify the crucial relationship between this river basin and Da Nang – Quang Nam coastal zone and near shore water. This will then enable the integration of policies, development plans, investment projects and adaptive solutions for river basins and coastal zones. R-R approach is still new in Viet Nam, where integrated water resource management and integrated coastal management have been separately and inefficiently implemented.

The R-R approach requires strengthened coordination across sectors, incentives and institutionalization of the participation of related stakeholders as well as the community in the field of river basins and coastal area. It is the basis for selecting and developing regional (inter-regional) linkages to tackle and mitigate the impacts of the river basin on the coastal area, as well as the impacts of coastal areas on the sea. The capacity of related stakeholders to coordinate in the management of natural resources and environment is a challenging issue [19].

The Government's development policies still tend to emphasize on exploitation of natural resources rather than on natural conservation and environmental protection as well as prioritize sectoral approaches of river and coastal management; inter-sectoral and inter-regional institutional framework is still lacking. This fact facilitates increasing conflicts of interests and spatial disputes in the exploitation of the river basin and coastal area.

The R-R approach requires the corresponding supporting instruments, for instance *"Integrated Spatial Planning - ISP"* to link development factors, and to solve the trans-boundary issues between river basins and coastal areas. However, the application of such tools is still in the experiment phase in some coastal areas [17]. Technical guidelines on the R-R approach and integrated Spatial Planning of the same type are still absent.

Human resource with technical knowledge and skills in the application of R-R is still lacking while supporting instruments for integrated management of river basins and coastal areas are still insufficient and inefficient. Thus the following research activities and policies are necessary for a successful application of R-R.

3.1 ESTABLISH APPROPRIATE POLICITES AND ACTION PLAN

(i) To conduct an assessment of impacts/threats and interrelationship between Vu Gia – Thu Bon river basin and Da Nang – Quang Nam coastal zone. Based on this assessment, the intergrated spatial planning should be conducted which connects the elements of river basins with those of coastal zones including the coastal land and water area. Spatial planning should be expanded beyond the limit of river basin or coastal zone by integrating land use planning in river basin into sea use planning/coastal spatial planning.

(ii) To develop community-based programs on conservation, restoration, and development of eco-systems in the river basin and coastal area for adaptation to climate change and sea water level rise. Specifically, plantation of neap palms in Cam Nam, Cam Thanh, which have been destroyed for shrimp farming *(but shrimps were killed by pollution)*, and bridge construction; restoration of coral reef in Tam Hai *(Nui Thanh)*, along the Son Tra Peninsula and the Cham Islands, in association with the market demand for diving tourism.

(iii) To establish partnership between the authority and the local community with related stakeholders, especially in the case of Vu Gia – Thu Bon river basin for identification of solutions to specific issues in the river basin and the coastal zone. To conduct surveys to search for additional ground water in deeper level to secure water for domestic use of the local residents while prioritizing major towns in the coastal zone.

(iv) To intensify *(the density of station network)* and modernize the network of meteorological and hydrological observation stations along the whole Vu Gia – Thu Bon river basin to ensure the provision of timely and accurate information for the operation of lake systems on the river basin *(in flood and drought season)*

3.2 ESTABLISH A RIVER BASIN COMMITTEE WITH THE FUNCTION OF INTEGRATED WATERSHED AND COASTAL MANAGEMENT

(i) To establish the river basin and coastal organization *(RBO)* in the light of setting up a *"Vu Gia – Thu Bon River Basin and Coastal Committee"*, who has sufficient authority to manage the planning, monitor and keep control of the development of Vu Gia - Thu Bon river basin and Quang Nam - Da Nang Coastal area, to settle all disputes regarding water use among the sectoral water users.

(ii) The River Basin Committee should seek to strengthen the inter-regional and inter-sectoral coordination in the management of Vu Gia - Thu Bon river basin, in connection with the management of Quang Nam - Da Nang Coastal zone. In the mean time, it is necessary to update and supplement with principles and guidelines on how to integrate river-basin factors and climate change in to local ICM Plans and Strategies of the 2 localities.

Box 10: What are expected by stakeholders?

There is a need for the coordination among numerous sectors, provinces, from central to local levels in the management of water resources of the river basin and coastal area. Related stakeholders should sit down together and reach consensus. For instance, resources tax reduction to be introduced to hydropower plants, who will pay for water at the basic level. Hence, fair, equitable and reasonable use of water resources can be ensured, for no harms to and the protection of eco-systems. In the absence of precedence on this practice, Quang Nam and Da Nang should be the very first case.

(Source: Quoted from the Minutes of Discussions at the consultation workshop on October 16th, 2014)

(iii) To organize periodical round-table and *"open"* dialogues among the 4 stakeholders of managers, scientists and entrepreneurs and the public from the 2 localities and to sign coordination agreements for implementation and compliance with compulsory and enacted requirements of issues related to the river basins and coastal area *(Figure 10)*.

3.3 SPECIFIC SOLUTIONS

(i) To stop the development of new hydropower plants to conduct assessment of effectiveness and impacts *(along the river, both from the upstream to the downstream, coastal zone and the sea)*. To conduct mitigation measures.

Figure 10: Open dialogue - A positive solution to problems in the river basin and coastal zone (Source: Internet)

To adjust the objectives of the escalated projects in permissible conditions to ensure the benefits of all water users and development entitlements.

(ii) Reservoir operational process among terracial hydropower plants: Along with the issuance of the regulation on inter-reservoir operation in the river basin of Vu Gia - Thu Bon during flood seasons *(The Decision Ref No. 909/QD-TTg, dated June 16th, 2014)*, it is necessary to develop the inter-reservoir operational process during dry seasons in Vu Gia - Thu Bon river basin, prioritizing supplementary water supply for the downstream water demand for production, domestic purposes of the local people on the downstream. For the sake of good inter-reservoirs operation, *(both during flood and drought seasons)*, an inter-provincial coordination mechanism engaging hydropower plants investors, so that timely and reasonable decisions can be made to deal with flood control *(during flood seasons)*, reasonable allocation of water sources among the different water demands/ sector users *(during drought seasons)*.

Figure 11: Sand exploitation from the river (Source: Dao Trong Tu, 2013)

(iii) To strictly ban sand exploitation along the river banks within the river basin, estuaries, meeting points between the sea and rivers *(Figure 11)* which cause kinetic changes, resulting in erosion of banks and sedimentation in passages. At the same time, it is recommended to amend the detailed planning of affected areas *(Cua Dai)* and to conduct excavations of river beds, estuaries, sea gates for rapid flood drainage and to maintain normal operation of ships, vessels and tourism.

(iv) To conduct inventory, zoning and deal with sources of inland wastes before they are discharged to the river, the sea. To issue regulations on controlling discharge of waste sourced from the continent to the sea, including sources of wastes from the river basin and to develop guidelines on waste treatment.

(v) To develop flood adaptation plans for the local towns, such as Da Nang, Hoi An, Tam Ky,..., to integrate flood impacts into planning process *(to develop public works, multi-functional cultural facilities, etc.).*

(vi) To continue conducting research and establishing hydraulic models to assess the impacts of floods and droughts *(identify the level/scale of impact on the river banks)*, in order to issue specific regulations to monitor the development of both river banks *(i.e.: areas where construction is prohibited, limited or allowed).*

(vii) To organize the national forum for high-ranking officials in the area of integrated management of Vu Gia - Thu Bon river basin and Quang Nam - Da Nang Coastal area to clear the problem of un-shared awareness during decision making.

(viii) To address the impacts caused by relocating and resettlement activities: it is necessary to issue post-resettlement policies, benefit-sharing policies in relation to the operation of the hydro-power plants in the localities, so that localities can generate revenues for financing repairs and maintenance of old, degraded resettlement facilities, facilitating production development and stable living conditions for the local people.

Box 11: What does the public say about solutions?

When asked about solutions, Ms. Nguyen Thi Ung *(74, at No. 310, Nguyen Duy Hieu street, Hoi An City)* happily responded as fluently as how a scientist or manager would respond. She recommended *"...it is important to check all reservoirs in the mountain, disqualified reservoirs should not be allowed to store water. Small hydropower plants should not be constructed: they are land-consuming, cash-consuming, and efforts-consuming to the State, and life-threatening to human beings, large-scale hydropower plants shall be developed by investors with "a conscience". It is necessary to excavate river estuary, sea estuary, river beds and even culverts and drains inside the city to ensure good drainage of water, otherwise, it would be disastrous..".*

(Source: Notes of field interview on August 26th, 2014)

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Mangroves for the Future
INVESTING IN COASTAL ECOSYSTEMS
www.mangrovesforthefuture.org

Mangroves for the Future (MFF)

The Mangroves for the Future Program *(MFF)* is an initiative based on cooperation for the promotion of investment in coastal ecosystems to support sustainable development. MFF provides a cooperation platform for many countries, sectors and organizations in response to challenges in the course of coastal ecosystem protection and sustainable livelihood, in contribution to a common goal.

MFF is operational based on the management efforts of the coastal zone before and after tsunami disaster in 2004 in the Indian Ocean, in special response to the call on cooperation and maintaining strong motivations after the tsunami disaster. Initially, it focused on most-severely affected countries of tsunami, - specifically India, Indonesia, Maldives, Seychelles, Sri Lanka and Thailand, MFF now expands membership to Pakistan and Viet Nam. MFF will engage other regional countries who face with similar difficulties, and pursue a long term goal to promote the global application of the integrated coastal management approach.

MFF expects to achieve positive outcomes through regional cooperation, national program support, private sector participation, and joint hands of the communities. This can be done through shared activities and projects to more effectively develop and share knowledge, better empowering organizations and communities, and promoting the management of coastal ecosystems.

Although MFF has selected mangrove forests to be the typical ecosystem, the initiative is also oriented towards other coastal ecosystems, including coral reefs, river estuaries, lagoons, wetland areas, beaches and sea grass beds. The MFF management strategy is based on the demands that are country-specific and region-specific, reaching forward sustainable and long-term management of coastal ecosystems. MFF regional steering committee regularly conducts reviews of these priorities together with emerging issues, to ensure that MFF continues to be an appropriate and adaptive initiative

For further details, please visit: *www.mangrovesforthefuture.org*

Hanns Seidel Foundation

Hanns Seidel Foundation, a German-based political foundation affiliated with the Christian Social Union promotes political education for *"Democracy, Peace and Development"* in Germany as well as in other counties. Hanns Seidel Foundation has more than 35 years of experience in development cooperation and is engaging in 90 projects in 60 countries.

With the ideology of a Christian society, its international activities strive for improvement of living standards and contribute to sustainable development by means of peace, democracy and social market economy. The Foundation cooperates with local partners in projects in politic consultation and education. The Foundation set high values in the independence and authorization of local partners.