



Organizational development and institutionalizing of coastal protection in the southern Mekong-Delta, Vietnam

By Frank Thorenz, 2017

**Integrated Coastal Management Program
(GIZ- ICMP)**



Implemented by  Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

IMPRINT

Published by the

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH (2017)

Registered

Bonn and Eschborn, Germany
Integrated Coastal Management Programme (ICMP)
Room K1A, No.14 Thuy Khue Road, Tay Ho
Hanoi, Viet Nam
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As at

November 2017

Design and layout

Integrated Coastal Management Programme (ICMP)

Photo credits

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With support from

On behalf of the

Australian Department of Foreign Affairs and Trade (DFAT)
German Federal Ministry for Economic Cooperation and Development (BMZ)

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1 Introduction & objectives

In December 2016 the author has been assigned by the „Deutsche Gesellschaft für Internationale Zusammenarbeit“ (GIZ) to provide consultancy for the project „Integrated Coastal Management Program“. The general framework of this contract focusses on organizational development and institutionalizing of coastal protection focused on the southern Mekong Delta provinces of Kien Giang, Ca Mau, Soc Trang and Bac Lieu. The red river delta area was intended to be included on a more general level as well.

According to section two of the terms of reference, the assignment should address the following issues and tasks:

1. Workshop with the respective Ministry (MARD-DWR) on coastal protection policies and strategies as well as coastal flood risk management on national level.
2. Field trip to selected sites at the Northern East-sea coast (Red River Delta of Vietnam).
3. Workshop with representatives from the four southern Mekong Delta provinces, the Southern Institute for Water Resource Planning (SIWRP) and other knowledge institutions on coastal flood risk management, as well as planning, design and maintenance principles.
4. Meetings (arranged by GIZ ICMP) with relevant knowledge institutions in the Mekong Delta.
5. Field trip to selected sites at the West-sea coast or East-sea coast of the Mekong-Delta.
6. Further development and elaboration of a concept for a capacity building with special emphasis on organisational development, institutionalising and implementing of coastal protection and flood risk management strategies and plans, systems, planning and maintenance.
7. Recommendations on further development of a masterplan for coastal flood risk management
8. Report with findings and recommendations

Due to short-term developments beyond the responsibility of the author, tasks no. 2 and 5 were skipped by GIZ. In cooperation with the author extended emphasis was put on workshops and meetings with the relevant Vietnamese parties as well as GIZ.

The ICMP is supposed to improve the decision making on coastal protection and lead to proper non-regret measures. In order to strengthen the planning capacity of decision makers, four fields for capacity development have been identified:

- i. Improve the knowledge of natural processes along the coast and possible scenarios for the future in order to make use of those processes
- ii. Assess the current state of the coastal protection system, prioritize interventions and optimize trajectory and design of protection measures
- iii. Harmonize the coordination of interprovincial issues and strengthen the technical and organizational development of coastal protection
- iv. Strengthen the integrated, multi-sectoral planning approach in order to optimize the eco-system services of the mangrove protection forest and use the most effective technical measure to protect values of the land and coastal waters

2 Workshop with representatives from four southern Mekong Delta provinces

2.1 Overview and Methodology

The ICMP workshop hosted by ICMP-GIZ was held from Tue, 28th Feb until Mar, 1st 2017 in Can Tho. Besides representatives from the involved provinces Kien Giang, Ca Mau, Bac Lieu and Soc Trang, external experts and guests e. g. from MARD-DWR, the Southern Institutes of Water Resources Research (SWIRR) and Southern Institute of Water Resources Planning (SWIRP) joined the workshop.

The structure of the workshop consists of thematic inputs provided by key speakers, thematic interactive group work, brief group work presentations and discussion of the results. Each working groups consisted of representatives from a certain province.

The workshop was structured in six thematic blocks from which no. 3 and 5 were led by the author:

1. Intro, expectations & Provinces coastal profile: What has been done 2015-16? What are main problems? What will be done in the coming years? (ICMP-GIZ, Provinces)
2. Use of Webmap info + short exercises (group session) (ICMP-GIZ)
3. Coastal protection policy & strategy - Tasks of Provinces (group session) (Thorenz)
4. Decision Support Tools for Coastal protection - Task: Checklist provinces & feedback (group session) (ICMP-GIZ)
5. Planning & maintenance of coastal protection constructions - Tasks of provinces (group session) (Thorenz)
6. Group discussion, Questions, Answers & Feedback ICMP-GIZ (ICMP, Thorenz and others)

For the other topics the author acted as an external expert, who provided feedbacks and recommendations, which are summarized and extended in the following chapters. For the group work in sessions 3 and 5 the tasks for the working groups were addressed to the groups by the author in co-operation with SIWRP.

In combination especially with session 1 tasks for the working groups aimed mainly on reflection of the current state of strategic and operational planning, measure execution and maintenance in coastal protection in terms of flood protection and erosion protection as well as an outlook for the coming years on the provincial level. Whereas in session 3 strategic issues are addressed, in session 5 the technical questions are focused on the understanding of functional and constructive design and maintenance of coastal protection structures. The topics above mentioned also consequently follow up the workshops, fields trips and recommendations provided by the author in 2014 until to 2016 (Thorenz, 2014; Thorenz, 2015; Thorenz, 2016).

2.2 Workshop Topic 1: What has been done 2015-16? What are main problems? What will be done in the coming years?

Contents overview

Each province provided an overview concerning the coastal protection measures executed in the last two years, addressed main challenges and problems in implementation.

Kien Giang Province

A programme is developed by the province in order to provide flood protection and protect mangrove belts for the period 2015-2020 with the general objective of adaption to climate change.

Two dike sections of 63 km length and an elevation of 1.6 m and 67 km length and an elevation of 3.0 m are present. Main challenges consist of dike damages e. g. in the An Minh District and the Hon Dat district in several places.

Coastal erosion is considered to be a major problem for many coastal stretches which are introduced in detail in the presentation. E. g. in the Vàm Tiều Dừa and Vàm Kim Quy coastal erosion significantly affects residential areas as well as the sea dike. One major reason for erosion is supposed to be shrimp farming by means of shrimp ponds.

In order to extend the mangrove belts in front of the dike, several mangrove plantations were executed and are included in the plan. Dike toe protections in order to prevent erosion have been executed by means of melaleuca piles and stone gabions (Figure 1a and 1b). For wooden constructions melaleuca is preferred compared to bamboo due to price and local availability. Further needs for dike building and enhancement were presented.

In general the need for an extended budget in order to prevent coastal erosion and coastal flooding is stated.



Figure 1a and 1b: Mangrove plantation and gabions shore protection in Kien Giang (Source: Province of Kien Giang)

Ca Mau Province

Ca Mau province is bordered by the sea from three sides with a total length of the coastline of 254 km, containing 87 openings to the sea. A high vulnerability in terms of climate change is seen.

Sea level rise due to climate change and erosion are regarded as the main threats. Erosion rates of the mangrove belt are evaluated currently by 28/m per year at the west sea and 40 m/year at the east sea. Since 2009 3,982 ha of mangroves were lost. Several dike stretches are considered to be endangered.

Multiple influence factors are seen, mainly natural boundary conditions on one hand and human activities (e.g. agricultural use, living habits, shipping, and needs for water supply) on the other. Since they are interrelated in complex interactions further studies and longer term strategies are regarded to be necessary.

Since the year 2009 the efforts to enhance coastal protection were intensified. Several measures such as mangrove plantation, shoreline protection, groyne construction and dike strengthening were carried out. Especially different types of erosion protection systems were applied in order to stabilize the coastline. For groyne fields that should stabilize the tidal flats and the mangrove belt against erosion, several different constructions like double row bamboo pile groynes, double row concrete piles filled with rip-rap and hollow cubes build by precast concrete are constructed.

Also for the edge protection of the mangrove belts different construction like gabions, rows of wooden piles and combinations of these were applied.

The costs of all these measures differ significantly. Also the stability and effectiveness of the constructions varies.

A close cooperation with experts from abroad, scientists and the policy level is regarded to be needed in order to solve future challenges concerning flood-protection, erosion protection and integrated approaches with reforestation. A huge need for funding of these measures is stated.

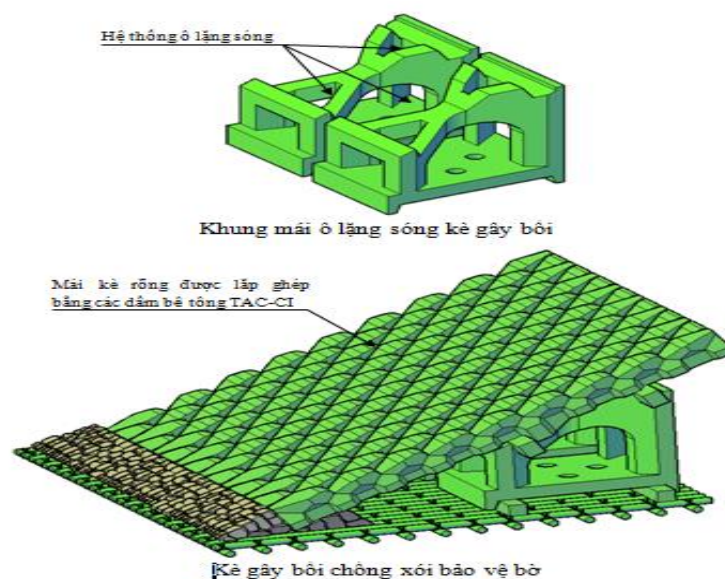


Figure 2: Precast concrete element considered for groyne elements in Ca Mau (Source: Province of Ca Mau)

A new idea concerning a groyne type made of precast concrete, consisting of an inclined plane, a framework structure and a bamboo mattress developed by companies, was discussed by request of of province with the author after the workshop (Figure 2). By asking targeted questions concerning to functions and the constructive design, the awareness and understanding of advantages and disadvantages were discussed. Initiated by this interactive discussion, the possible effects of this construction were intensively discussed and led to a deeper insight in the advantages and disadvantages. As a conclusion the construction was not preferred any longer by the province. In addition the advantages and disadvantages of hollow cubes as elements to construct groynes were discussed (Figure 3b).

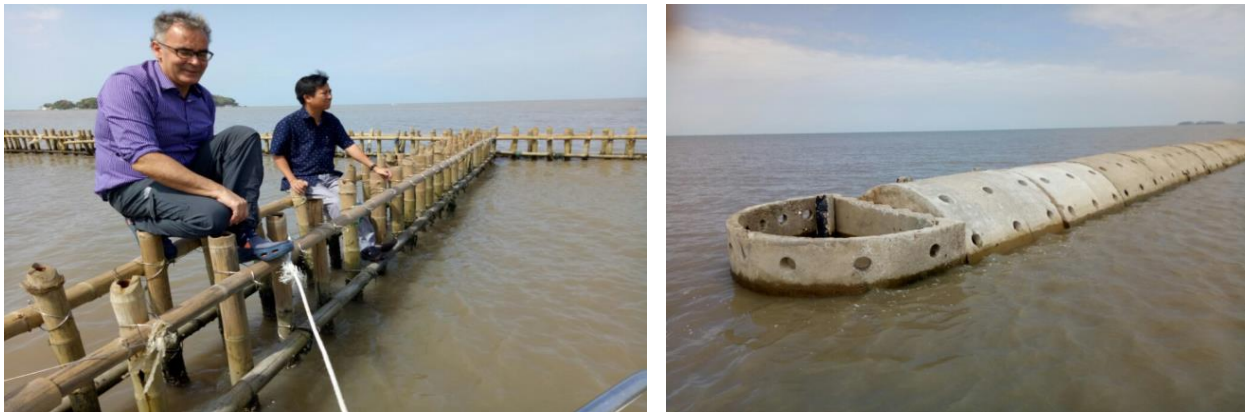


Figure 3a and 3b: Bamboo groynes and hollow cubes in Ca Mau (Source: Province of Ca Mau)

Bac Lieu province

One focus of the presentation was put on the severe damages happened to the erosion and flood protection system at the city on Ganh Hao. The 4,652 m long revetment and is combined with a return wall on top of the construction, partly an adjacent berm and a vertical flood wall and consists of six sections. Some sections have been reinforced during the last years, for further ones this is planned. The author has visited one stretch of the construction and provided recommendations on the planned section in the year 2015 (Thorenz, 2016).

Some sections of the revetment are directly located at the river mouth. One has been severely damaged by incident waves during storms between January and February 2017 (Figure 4). Strong north-eastern winds in combination with increased water levels caused ocean waves with heights between 2.4 and 4.0 m. On a total length of 835 m overtopping occurred, 74 meters underlay damages up to total collapse. The width of the collapsed parts amount to 6 meters in average. The concrete beam fixing the upper end of the construction broke or cracked over a length of 25 m in total. Overtopping waves led to flooding of parts of the city and damage of settlements in the direct vicinity of the failure. As emergency response officers and soldiers dropped precast concrete blocks type TSC-178 in the damaged parts of the revetment. As one idea in order to reduce wave energy is to construct a breakwater in front of the revetment close to the river mouth.

In the period 2015/2016 Erosion control measures piloted at Nha Mat covering stretch of one kilometer were severe damaged and not effective.

At Ganh Hao sea dike a mangrove protection project is running. From Muong So to Kenh Tu mangrove protection measures work effectively.

Many coastal protection projects executed in the recent years are regarded have not achieved satisfactory results (Thorenz 2015 and 2016). The need to integrate experts to survey Bac Lieu and develop a plan to protect the coastal area of Bac Lieu in a more practical and effective way is strongly stated. Furthermore the available budget is too limited in order to tackle the ongoing threats.



Figure 4: Severely damaged revetment in Ganh Hao (Source: Province of Bac Lieu)

Soc Trang Province

The province Soc Trang shows 72 km of open coastline. Three dykes systems containing dykes at the open coast as well as at the river mouth in the coastal stretches of Tran De, Cu Lao Dung and Vinh Chau with a total length of 93.76 km exist. 31 dike openings and 5 bridges are part of the dikes. General objectives are to prevent the protected area from salt water intrusion and to provide adequate flood protection.

Cu Lao Dung sea dike and Vinh Chau sea dike have to be strengthened. Main measures consist of revetment construction and the reinforcing of dike openings and dike bridges. Furthermore planting and protection of protection forests against coastal erosion are important measures.

In 2015 – 2016 the heightening and reinforcement of several stretches of the Vinh Chau sea dike are important measures. The construction of 0.362 km from needed 1.6 km of concrete block revetment for protection of the outer dike slope was executed. Protective forests at the seaside of the sea dikes shall be implemented

Until to 2020 dike strengthening with a need budget of VND 600 billion shall be completed. Furthermore the protection and extension of the mangrove belts all along the coastline is one major objective. From 2015 until 2020 more than 1,900 ha of protective forests shall be created



Figure 5a-c: Dike revetments and mangrove plantation in Soc Trang (Province of Soc Trang)

Conclusions

Due to ongoing erosion and severe damages at several the coastal protection structures all provinces see the urgent need to enhance their coastal protection system. Programs and measures have been started and are planned to be continued. One common challenge is a significant lack in available budgets.

The presentations also showed, that each province prefers different approaches for functional and constructive design of coastal protection structures based on own experiences. The author addressed during his consultancies from 2014 to 2016 several recommendations in order to improve the constructions in their functional and constructive design. This covers the construction of dikes, revetments, shoreline protection with gabions and T-fences as well. It is seen that each province still mainly relies on regional design philosophies. General rules for construction of coastal protection structures as addressed in the reports mentioned above, seem not or only partly be taken into account. This covers as well functional design as constructive design such as e.g. interaction of construction and the hydrodynamic boundary conditions as well as slopes, stability, roughness, filters, transition between elements as well as the connection between groynes and mangroves.

2.3 Workshop Topic 2: Use of Webmap info and short exercises

This part of the workshop was mainly operated by GIZ-ICMP. In general, the web-map application is regarded to be practical, intuitive tool which provides relevant basic information for understanding coastal processes and planning coastal protection measures. The provinces remarked, that the tool in general is regarded as very useful in order to facilitate their planning activities in coastal protection. An update concerning geographic names as well as the actual status of erosion and accretion areas is seen to be needed. The webmap recommendations concerning needed measures were discussed in the way that in general more hard measures are needed. For Bac Lieu T-fences are not seen as a sufficient measure.

The following aspects are recommended to take into account:

General recommendations

- Definition of a responsibility for assimilation of data and its implementation in the system.
- Acceptance and attractively to use the system at the provincial level is given in general and should be facilitated by focused workshops in order to extend the competence and the scope of users.
- Competence for utilization as well as data assimilation should be established on all integrated administrative and scientific levels.
- Major focus should be laid on the provincial level and the state institutes as the direct involved public bodies – databases live from direct implementation of users and data assimilation.
- The system should in the basic version be as simple as possible – when it is accepted and established by frequent use, extensions should be considered.
- Operability on the provincial level is a crucial point.
- Due to major responsibilities on the provincial and at the state institutes level, knowledge improvement should be facilitated.

Recommendations on contents

- The recommendations the system provides seem to be interpreted by the provinces as binding. It should be clarified that they gave important hints but cannot substitute of detailed investigations and planning.
- Morpho dynamic classification of coastal stretches should be understood as a first rough evaluation and are very coarse concerning the used categories. Uncertainties should be implemented in a proper way. Coastal processes are often complex and need detailed analysis taken several aspects and detailed knowledge of all relevant parameters into account.
- Recommendations on coastal protection measures therefore should be regarded as a first approach for developing suitable and sustainable technical solutions. The first impression was that not all recommendations might be appropriate.

2.4 Workshop Topic 3: Coastal protection policy & strategy

The undersigned provided a key speech concerning the addressed general topic. Examples concerning the detailed topics shown below from the German federal state Lower Saxony were introduced and put into a general context in order to sensitize the audience. These should be reflected by working groups at the provincial level by discussion of thematic tasks. Moderation was done jointly with the SWIRP. Outcomes of the group work were presented to all participants of the workshop and discussed.

In the presentation of the undersigned the following topics were addressed:

1. Introduction German North Sea coast
2. Coastal flood risk and erosion management
3. Climate change and adaption strategies
4. Interaction of spatial planning and coastal risk management
5. Funding and planning

6. Master plan coastal risk management and coastal protection act
7. Summary and conclusions

The following questions were asked by the provinces and answered by the author:

Ca Mau Province:

Which alignment is preferred: Near shoreline or further inland?

- Especially in case of eroding coasts a location of the dike further inland is mostly preferred if enough space is available. Main advantages are that this solution is expected to be cheaper in the long term and provides more flexible reaction on the effects of sea level rise. Furthermore foreland reclamation might be possible.
- Keeping the dike at the present location is expected often to be more costly due to the need of expensive dike protection like revetments or groynes.

Kien Giang Province:

Concerning spatial planning for Rach Gia, which governmental body should take the leading role?

- As an example, in Germany all public bodies contribute to spatial planning lead by the responsible special planning authority. By means of this procedure in integration of all relevant aspects as well as in general a high technical standard is guaranteed.

Which position of dikes for the Kien Giang situation of eroding coasts is preferred?

- The choice depends on the current local situation.
- If groins are not effective, mangrove reforestation due to morphology not possible and erosion of the mangrove belt is expected to thread the dike, a retreat could be the best choice if enough space is available.
- If no foreland is available expensive dike improvements will be necessary. A dike retreat might have advantages which should be considered well.

Soc Trang Province:

Which vegetation recommended to plant for sandy soils in front of the dike?

- A comparison with Germany is not possible due to different natural conditions.
- Indigenous Plants adapted to the natural boundary conditions should be taken into account and if applicable further investigated.

For the group work in session 3 the following tasks were addressed to the groups by the author and the following answers are given:

Which coastal protection strategy is sustainable taken climate change into account?

- Ca Mau: Adaptation
- Bac Lieu: Adaptation; pro-active strategies
- Soc Trang: Adaptation; Retreat based on a sustainable decision
Areas with important infrastructure require hard solutions
Rural areas allow retreat
- Kien Giang: Dependent on current situation, different solutions for each dike section are needed

Which protection level is needed for flood defense in your province?

- Ca Mau: 25 years (tidal regime changes ~18 years)
- Bac Lieu: 25 years
- Soc Trang: 20 and 25 years (earth dike: 20 years)
- Kien Giang: 100 years protection level (upgrade of the seadike by 2-3 m)

Which planning perspective should be taken into account?

- Ca Mau: 10 years planning
- Bac Lieu: 20 years planning
- Soc Trang: Mid term 5 years; long term 10 years planning

Which interactions/regulations between coastal protection/ risk management and spatial planning should be taken into account?

- Ca Mau: Foreland is regarded to be necessary
Space reservation for further extensions of the coastal protection system should cover 50-100 m
Space should be reserved in case of dike relocation to the inland
- Bac Lieu: A zone of 50 m should be reserved
- Soc Trang: 200 m of foreland and 50 m space behind dike should be reserved
- Kien Giang: priority of Mangrove forest protection
Space reservation should be implemented according to the dike law. The space reservation zones are recommended to be integrated in the webmap

Conclusions and recommendations

All provinces are in general aware of the need of space reservation for coastal protection. The adaption strategy is regarded as a very important one, especially in terms of eroding coasts and the consequences of climate change. The protection level all provinces consider as necessary, is comparatively low. No differentiation is made between settlement or infrastructure areas and rural areas.

The planning perspective especially taken for climate change and needed flexibilities for spatial adaptations into account is regarded as relatively short. In combination with the low safety standards and huge uncertainties in the consequences of climate change, the resilience of this strategy is estimated to be relatively low. The awareness for a need of longer term strategic spatial approaches, taken the considerations mentioned above into account, should be increased by direct discussions on the provincial level facilitated by external strategic coastal planning experts. A strong interrelation with planning of measures should be taken into account.

2.5 Workshop Topic 4: Decision Support Tools for Coastal protection

The participants were asked for a statement on how applicable each of the introduced tools facilitated by GIZ-ICMP is for their present work and will be in future. The question focused on the webmap, the sea dike tool, flycam, groynes and mangrove planting as well. The provinces regarded all tools as effective for present and future coastal protection planning, taking into account, that the planning process is not finished yet.

Currently all departments on the provincial level are asked for their giving recommendations if a planning is carried out by the responsible department. A cross-provincial planning and learning from each other in cooperation with experts is regarded to be a useful in order to enhance the skills by exchanging experiences and learning from each other.

It is strongly recommended by the author to sensitize the users especially of the web-map recommendation as well as the sea dike tool, to consider their recommendations as a hint. Main reason is that they only base on limited datasets and will not be able to take all relevant and especially integrated aspects into account. Hence it seems crucial to stress, that these recommendation will never substitute own considerations on design of structures. The latter aspect will integrate more aspects in the planning process and is able to consider new findings and data sets.



Figure 6: Workshop Impressions Can Tho Feb. 28th/Mar. 1st 2017 (Thorenz)

2.6 Workshop Topic 5: Planning & maintenance of coastal protection constructions

A key speech concerning the addressed general topic is provided by the undersigned. Examples concerning the detailed topics listed below from Lower Saxony are introduced.

A lot of general similarities according to coastal protection systems, forelands, shoreline erosion protection elements and demands for dike construction are given between Vietnam and the Lower Saxony situation. Hence examples of these elements were introduced and put into a general context in order to sensitize the audience. In order to facilitate main aspects of planning and construction, the working groups at the provincial level should discuss thematic tasks. Moderation was done jointly with the SWIRP. Outcomes of the group work was presented to all participants of the workshop and be discussed.

In the presentation of the undersigned the following topics were addressed:

1. Introduction
2. Coastal Protection System and Elements
3. Sea and Estuary Dikes
 - 3.1 Sea Dikes without foreland
 - 3.2 Sea Dikes with foreland
 - 3.3 Estuary Dikes

- 3.4 Design height and design water level
- 4 Dike Foreland
- 4.1 Groins and groin fields
- 4.2 Revetments
- 5. Maintenance and inspection
- 6. Summary and conclusions

For the group work in session 5 the following tasks were addressed to the groups by the author:

- What are the strengths and weaknesses of different construction types of groynes (including fences) and sea-dykes?
- What are the learning experiences in your province concerning suitable materials and construction designs for coastal protection (Aspects: functionality, stability, negative side effects, costs; use a table to summarize the results of the group discussion).

The questions to the author and the contribution of the provinces concentrate on technical planning concerning the constructions carried out in each province. These and the advices the author provided are summarized below:

Kien Giang Province:

Should canals exist next to dike foot?

- Small boats generate waves which lead to erosion of the channel banks and consequently to the dike foot as a negative impact.
- Dike foot damage must be avoided hence a toe protection is necessary.
- Canals can reduce bearing capacity and stability against slope sliding.
- In general no canals or canals with a certain distance to dike foot are recommended.

Should a road be placed on top of dike?

- Problems occur when dike needs to be heightened.
- A road placed on the landward berm could be used for material transport in case of dike strengthening.
- A homogeneous layer preferably of cohesive, erosion resistant material like clay on the dike recommended in order to avoid inhomogeneities.

Soc Trang Province:

In case of a dike directly exposed to sea hard measures like revetments are needed. How can these be constructed in an optimal way?

- Concrete block revetments show gaps between the blocks. Water intrusion due to wave attack might endanger the construction. Especially in case of breaking waves high pressure can occur which may lift the concrete blocks which are too light or not interconnected.
- Geotextiles below concrete blocks and if applicable a gravel layer in order to disseminate wave pressure and prevent wash out of inner material are substantial.
- The outer slope should be as rough as possible in case of wave attack in order to reduce wave-run-up. Hence rip-raps may have advantages compared to concrete blocks. In investigation in a wave flume is recommended.
- An adequate toe protection is important in order to avoid erosion of the revetment from the toe side.

Which outer slope of the dike should be taken into account? Currently used is 1:5.

- Damages due to wave attack happened at this existing constructions.
- For huge wave heights a slope of 1:6 is recommended especially for clay dikes.
- For moderate waves a slope 1:5 can be possible.
- For revetments a slope of 1:4 might or even 1:3 at the lower parts of the dike crest might be sufficient.
- A detailed investigation of the wave climate is needed. The slope depends very much on the selected material for slope construction. Especially concerning massive constructions like revetments model test can enhance the design.

Bac Lieu Province:

Which toe protection is recommended?

- The thickness of current concrete revetment for the case Ganh Hao might not be not sufficient due to high waves, which cause pressures and uplift of the concrete blocks.
- A milder outer slope is recommended in order to reduce wave run-up and overtopping.
- Since the blocks seen to be placed directly on a clay soil and a geotextile, high uplift pressures can be expected in case of breaking waves. A gravel layer between blocks and geotextile as well as a sandy subsoil in the vicinity of the revetment is recommended.
- Natural stones as a revetment are rougher than concrete blocks and are expected to reduce wave-run-up as well as overtopping significantly.
- An offshore breakwater at the river mouth was proposed by the SWIRR. Its recommended to investigate technical efforts and possible negative morphological side effects due to location at the river mouth particularly.

Ca Mau Province:

Which advices for dike revetments can be given?

- Revetments must be heavy enough.
- Gaps between concrete block elements have to be avoided. In curves depending on the block shape open problems occur. Hence rip-raps show advantages due to higher flexibility).
- The impermeability of clay layers directly below a massive revetment can cause uplift of the revetment.
- Sand layer under a revetment, a gravel layer and a geotextile as filter stable construction is recommended.



Figure 7a and 7b: Workshop Impressions Can Tho Feb. 28th/Mar. 1st 2017 (Thorenz)

Conclusions and recommendations

The questions addressed to the author mainly focus on specific issues of design of coastal protection structures. These mostly cover dikes, revetments and shoreline protection with gabions and T-fences as well. Main reasons are that construction do not fulfil the functional designs tasks or show lacks in stability up to severe damages. Similar situations have been visited by the author during his consultancies in 2013 to 2016 (Thorenz 2014, 2015 and 2016). Some improvements have been made, but in general the questions asked show the huge need for further improvement of the knowledge base. This covers the functional and constructive design of all relevant coastal protection structures. The deeper understanding of interaction of all relevant constructions with the hydrodynamic boundary conditions as well as adequate, sustainable design of the structures and their the main elements are regarded to be crucial. Also a harmonization of construction types should be achieved.

This deeper knowledge base is recommended to be facilitated on level of responsible public bodies such as the southern Mekong Delta provinces as well as the southern institutes mainly the SIWIRP as a planning institute but also as a scientific counterpart the SIWRR. As a result, costal protection measures will be carried out in a more sustainable way concerning interaction with nature, function and stability. This will contribute significantly to the implementation of an integrated coastal protection plan as well and supports the optimal investment of limited budgets.

As described in chapters 2.2 and 2.4 a strong interrelation between planning and design of constructions and strategic planning can is given.

3 Workshop with the respective Ministry (MARD-DWR) on coastal protection policies and strategies as well as coastal flood risk management on national level

On March, 3rd 2017 GIZ-ICMP representatives and the author visited the Ministry of Agriculture and Rural Development - Directorate of Water Resources (MARD-DWR) for a workshop on the addressed general topics. A key speech was given by the author followed by a comparison and discussion between the Lower Saxony and the Vietnamese situation with the representatives from MARD-DWR. The contents of the presentation are shown below. The planned field trip in the red river delta area, scheduled in the terms of references has been cancelled by GIZ-ICMP.

In the presentation of the author the following topics were addressed:

1. Introduction German North Sea coast
2. Coastal flood risk and erosion management
3. Coastal protection system and safety level
4. Climate change and adaption strategies
5. Interaction of spatial planning and coastal risk management
6. Sea dike construction
7. Foreland erosion protection
8. Maintenance and inspection
9. Master planning and funding
10. Summary and conclusions

From the MARD representatives a huge interest in the introduced strategic approaches was expressed. The need of further improvement of the Vietnamese coastal protections strategy was discussed referring to the topics above.

The challenges as well at the Mekong Delta as of the Red River Delta mouth were addressed. In the Red River area, severe erosion is ongoing at several stretches of the coastline. In combination with a steeper and deeper foreshore than in the Mekong Delta area, the need for appropriate sustainable strategies and measures have been expressed and discussed. Simple constructed resilient and easy adaptable dike constructions are found to be future-oriented needed. Additionally, the relevance of space reservation and implementation of coastal protection zones was addressed as an important topic.

The need for a further knowledge exchange with German experts working on the governmental strategic and planning level was expressed by MARD to be very useful. This will facilitate the development and implementation of Vietnamese strategic integrated coastal protection plans and also technical concepts for flood and erosion protection for the Red River Delta area. As a first further step, field visits and technical workshops are recommended to be executed.

4 Recommendations on further development of a masterplan for coastal flood risk management

4.1 ICMP Southern Mekong Delta – Focused Capacity Building

The workshop in Can Tho from Feb. 28th to March, 1st 2017 covered strategic as well as concrete planning aspects. It was shown that a general understanding for a need of enhancing the coastal protection system for the southern Mekong delta is given at the different institutional levels involved.

It also became clear that each province prefers different approaches for functional and constructive design of coastal protection structures, based on own experiences (Chapter 2.2.). Several damages and suboptimal functional as well as constructive planned structures were experienced on the provincial level. Expert recommendations for optimization of the constructions were strongly expressed as necessary several times by asking detailed questions (Chapter 2.2 and 2.4).

This shows the urgent need for further improvement of their design and of enhancing the technical knowledge base on the provincial as well as on the institute level.

During his consultancies from 2014 to 2016 the author addressed several recommendations concerning improvement of all relevant constructions (Thorenz 2014, 2015, 2016). These cover dikes, revetments, shoreline protection with gabions and T-fences as well. The recommendations seem to be considered in actual constructions only in a very limited way. Hence it is recommended to intensify and optimize the knowledge transfer.

Design of coastal protection structures also strongly interacts with the longer term planning perspective especially taken for climate change and needed flexibilities for spatial adaptations into account. Here relatively short planning periods as well as safety standards are taken into account on the province level. The approaches concerning strategies also differ from province to province. Hence also for this topic further expert recommendations are regarded to be needed by the provinces.

Since the provinces play a key role in planning and execution of plans and measures, it is strongly recommended to enlarge their knowledge base, building on the results of the activities in this field initiated by GIZ-ICMP and recommended in Thorenz (2014, 2015, 2016). This should be carried out in close cooperation with the specialized planning and research institutes SIWIRP in SIWRR.

It should be taken into account, that boundary conditions and knowledge base for each province are different. Hence tailor-made on site workshops

An improved technical knowledge base in coastal protection strategies and planning is recommended in order to enhance the capability to contribute regional and local experiences to the implementation of an integrated coastal management and a master plan for coastal risk management. On the other hand concrete planning tasks and challenges are considered to be very high on the provincial level, referring to workshop topic 1. Since the technical solutions planned and executed widely in the provinces, the understanding of functional and concrete design needs to be adapted.

Theoretical basis and raise of awareness in terms of Coastal protection policy and strategy as well as Planning and maintenance of coastal protection structures as building block for an organized development and institutionalizing of coastal protection in the Southern Mekong Delta. This also can contribute significantly to an optimization budget planning, since only strictly limited budgets for coastal protection are available.

Hence a focused capacity building is recommended. At a small scale this has been carried out very effectively with Ca Mau Province after the workshop (Chapter 2.2) This should cover the following main objectives, methodologies and contents:

Main objectives focused capacity building ICMP:

- Enhancing technical expertise on the planning level (provinces, SIWIRP, SIWRR) in order to optimize planning in a sustainable way
- Interactive learning by discussion and evaluation of current state with external experts in functional planning and construction of coastal defence systems and structures
 - Understanding the interaction of natural environment, hydraulic and morphodynamic boundary conditions with the construction
 - Fokus on relevant structures and coastal protection systems: dikes, revetments and groynes, shoreline protection
 - Understanding of a coastal protection systems and interrelation between elements
 - Crucial aspects for functional design - comparable solutions for comparable challenges
 - Implementation in constructional design
 - Advantages and disadvantages of certain construction materials
 - Awareness for no-regret measures
 - Sustainability, adaptability, prioritization
 - Spatial aspects of coastal protection planning
 - Resilience in terms of climate change
- Improvement of the current technical approaches
- Standardization up to an appropriate extent
- Adequate use of decision support tools (web-map, sea dike support tool)

Methodology and Contents focused capacity building ICMP

- Structuring of thematic fields relevant for decision making process in planning and technical constructions for each province
- Per Province: Field trips to all relevant structures – visualization and raising awareness by discussion in small technical groups on site
- Interactive discussion and pre-analysis on site
- Interactive detailed discussion of strategies and relevant construction types
- Examples of using decision support tools for planning issues

Duration

- 2 day per province in total
- Follow up workshop (1 or 2 Days) with all provinces

4.2 Coastal protection policies and strategies as well as coastal flood risk management on national level and Red River Delta

The workshop with representatives from MARD on March 1st 2017 showed the need for strategic approaches in coastal risk management and coastal protection.

The approach of ICMP for the southern Mekong Delta provides a sustainable example of implementing strategies and plans for certain regions. Here one should consider that the socio-economic as well natural boundary conditions for the regions taken into account can differ significantly. This demands regionally specified approaches under the umbrella of a national legal and technical framework.

For the Red River Delta area as one huge hydrological unit, the implementation of a regional integrated coastal flood protection and risk management plan comparable to the one for the southern Mekong Delta is recommended. As a second step based on the initial workshop mentioned above, a specific workshop in combination with a field trip to relevant spots with national experts and a consultant experienced in the governmental strategic as well as in the planning level is recommended. This approach can build the basis for a target orientated analysis of the actual and expected challenges for strategic and operational coastal protection and risk management planning. Proposed participants are MARD-DWR and the affected provinces.

Based on the challenges experienced by the author in the Southern Mekong Delta area, on the strategic level the legal and technical frameworks are recommended to be revised in terms of practicability and the consideration of resilience aspects. This mainly addresses the “Technical Standards for Sea Dike Design” (MARD, 2012) and the “Guideline on Dike Classification” (MARD, 2010). As first step a workshop with all relevant institutions is recommended.

Frank Thorenz, Head of NLWKL Norden, Germany, July 3rd 2017

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