Learning experiences and recommendations for actions

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The previous parts of the CCC publication have illustrated a range of coastal problems that have become manifest in many coastal countries in the last decades. A variety of approaches and solutions have been developed to counteract the different problems. Although the specific problem setting in each country or region has to be considered unique, there is a lot of commonality in the types of problems encountered and the potential measures to be applied. Hence, there is great potential in developing a common understanding on promising ICZM strategies by sharing experiences and knowledge, to the mutual benefit of all coastal countries.

Based on the country examples described in this CCC publication, the following summarises a number of main, common learning experiences. These provide an important basis for the identification of recommendations for actions as specified in the second part of this chapter.

1-1 Main learning experiences

ICZM pays off
Considering the economic and environmental benefits of ICZM and coastal cooperation efforts, it follows that the benefits achieved may exceed costs many times over. This was clearly demonstrated by comparing the costs and benefits of a great many projects in the EU demonstration program (2000). The EUROSION project (2001-2004) concluded that the costs for society to counteract erosion problems would only amount to a small fraction of potential benefits. The Netherlands sand nourishment scheme ensures the protection of the natural coast in a sustainable way at relatively low cost. Investments in the Rotterdam harbour area development based on integrated spatial planning of the coastal area were proven to be very beneficial economically and ecologically. The Seychelles have been able to protect and maintain their valuable vegetation belts through effective coastal planning which basically saved the island state from tsunami disaster and provides in the mean time a large contribution to the GDP through tourism.

Considerable improvements of the flood protection situation have also been achieved in other Asian countries such as Bangladesh, Indonesia and India (through flood protection measures, polderisation, re-plantation of forest area and mangroves, early warning systems, evacuation schemes and cyclone shelters). Other important benefits are associated with the protection and restoration of natural production systems, related to e.g. water supply (restoration of the water supply system of the greater Shanghai area in China) and the co-management efforts directed at more balanced fishing practices, combating overfishing and destructive fishing in coastal waters of Thailand.
In addition, there are successful examples of ICZM applications at the grassroots level through direct involvement of local communities and NGOs, such as the enhancement of fish production by applying small scale artificial reef units in the State of Tamil Nadu (India) and the management of Tam Giang-Cau Hai Lagoon in cooperation with the people in Thuan An village in Vietnam.

Integrated spatial planning is a strong instrument for ICZM
Integrated spatial planning exercises provide a strong basis for addressing the complex problems and trade-offs involved in ICZM. In particular, this often legally- based instrument will have a stimulating effect on the implementation of ICZM programs by embedding ICZM in existing national and regional planning procedures. The beneficial effects of spatial planning supporting ICZM have been shown in projects in Romania, the Netherlands and several European regions in the Baltic and

Adriatic Sea and has also been demonstrated in the EU-PlanCoast project. Asian examples illustrating this need, include the experiences with devastating aquaculture developments and the importance of maintaining the protection from coastal natural systems, such as mangrove forests and coral reefs.

ICZM takes time and patience

Due to its complexity, its iterative cyclic nature, and its multi-actor setting ICZM is a slow process with many potential delays and obstacles. For instance, the time spent in preparing an ICZM phase e.g. searching for funding, partners, and office accommodation, can last as long as the actual execution of that ICZM phase.

But the learning experiences and commitments achieved in each step in the cycle, and in each cycle, will ultimately result in speeding up the process.

The integrated planning and sustainable development process for the Rotterdam harbour area took 17 years of cooperation. The process is now entering its second cycle. The results and consensus achieved in the first cycle, which are firmly anchored in regional laws for development, will considerably reduce the efforts required for the further planning and decision making process. The Sri Lanka example shows that after more than 30 years of ICZM practices, the powers and mandates of the coastal authorities and the underlying legislation need strengthening.

Balanced, vertical integration is essential

The participation of relevant actors on all levels is essential for successful implementation of ICZM. However to warrant sustainable long term development of a particular coastal area, the responsible national agencies must remain in control of the decision making process and the application of integrated spatial planning regulations.

An uneven distribution or representation of power, in the absence of clear, authorised development plans or planning procedures, may lead to non-sustainable, coastal development directed at short term profit. Any local or regional plan should fit the long term sustainable, legal frames that are set on national and sometimes international levels.

The benefits of balanced vertical integration is illustrated in Vietnam, where simultaneously at four levels ICZM is practised and efforts to increase awareness raising, communication and capacity building were successfully undertaken.

Monitoring plays an important role in ICZM

A fair amount of knowledge of the coastal system is a prerequisite for integrated planning and proper decision making on coastal zone management. This emphasizes the essential role of *monitoring in all phases* of ICZM. Monitoring data provide the basis for problem recognition. Monitoring data support the planning and implementation of the proper measures at the right place (what to do where?). And finally, the *evaluation of ICZM efforts* is based on monitoring results. This evaluation is to illustrate the effectiveness of the coastal measures applied and to identify the new or remaining problems observed, marking the beginning of a next cycle of adjusted planning, implementation and evaluation. The potential of Remote Sensing techniques in supporting the monitoring function was extensively demonstrated in the Vietnam cooperation projects in the period 1993-2006.

Innovative small scale adaptive measures

Various cases described in the CCC publication provide examples of promising, relatively small scale adaptation measures and activities, including e.g.:

- Local reforestation and afforestation projects;
- Small scale artificial reefs;
- Water quality improvement and waste management;
- Development of early warning systems;
- Cyclone shelters and safe havens for flood protection;
- Decentralised solar energy applications, e.g. for lighting of houses and desalinate sea water;
- Sustainable coastal fishing practices through co-management;
- Establishment and management of coastal, delta and marine reserves;
- Ecotourism developments;
- Subsistence agriculture development in the form of floating bed cultivation.

Proper introduction of these measures have been accompanied with training and awareness raising activities for, and with, the local coastal communities concerned.

Innovative adaptive measures at a larger scale

The need for space is felt in many coastal areas around the world and this urgency for more space will increase in time. 'The building with Nature' concept is being applied by many coastal nations. Large scale land reclamation, creating land in water, may reach more than 300 km^2 in Bohai Bay (China). Large scale soft, resilient and efficient coastal protection, e.g. sand nourishment up to 10 – 25 million m^3/year is being applied in some countries in Europe. Particularly promising is foreshore nourishment. Some examples of applying measures directed at sustainable development and adaptation in the Netherlands are:

- Creating water in land: combining river flood water emergency storage with dwelling and high technological horticulture - floating houses and greenhouses up to 5 ha are being constructed;
- Experimenting with sustainable energy generation at the border of the sea, by means of large scale fresh – salt water interactions which will soon begin;
- Pursuing win – win solutions , e.g. resulting in large, economic and ecological benefits of sustainable harbour development through effective cooperation between all stakeholders.

Knowledge and experiences have to be shared!

The ICZM practices in Europe and Asia have confirmed that ICZM is needed and do-able, and has produced successful results. More importantly, the experiences gained in the various countries provide a wealth of knowledge and insights to be deployed to the benefit of other countries. NGOs play a specific role to facilitate transferring of knowledge and exchanging experiences between the various participating stakeholders as illustrated for instance in the cases of the Baltic Sea, in Bangladesh, Thailand and Vietnam.

GIS based information regarding the annual movement of the Dutch coast-line is nowadays publically available on the web, an astonishing step forward in data dissemination. Geographic Information Infrastructure (GII) provides real time dissemination of information combating natural hazards, such as flooding, exercised in the Netherlands and recently applied during the extreme flooding in Pakistan. Among the coastal countries in Europe and Asia there is a general willingness to share these experiences and take part in coastal cooperation. The initiatives underlying the present publication illustrate this fact.

1-2 Recommendations for actions – the way forward

Required actions should focus on the identification and implementation of measures to prevent or to solve coastal problems. However, for effective ICZM application a number of essential management and implementation conditions need to be met.

Therefore firstly some main conditions are briefly discussed. Secondly attention is paid to the identification and implementation of promising measures in relation to country specific conditions and possibilities for expanding international cooperation.

Ways to improve the conditions for management and implementation

As described, an important part of getting ICZM into action deals with creating the necessary conditions. Based on the many examples and experiences considered in the CCC publication, the following provides an overview of the most important conditions to be achieved:

A long term look ahead

Develop a long-term vision on expected coastal management problems and required actions and developments to ensure continuity within a longer time perspective on a national level. Short and medium term coastal management plans and activities for designated regions or coastal areas are to be developed, merging concrete no-regret actions and nearby targets with long-term activities such as drawing up a strategy and action plan.

Adopt ICZM in spatial planning
Anchor coastal management planning in existing planning and decision-making procedures, using the underlying legal and institutional frameworks. In particular, investigate the possibilities to directly connect ICZM to the process of regional economic development and spatial planning. Water management and coastal development should be considered as leading or guiding principles in integrated spatial planning of low lying coastal and marine areas.

Full participation
Ensure the timely participation of the relevant actors on all levels, including local communities and stakeholders. Provide clarity on leadership and roles, especially in cases of shared competences and responsibilities. National agencies should be in control and provide institutional frames, legal arrangements, knowledge and funding to facilitate the management tasks of regional authorities. NGOs should be involved in assisting problem analyses, dissemination of knowledge to local stakeholders and in the daily management of coastal areas and ecosystems.

Proper monitoring and effective communication
Increase the role of monitoring, including data collection, data management and dissemination of information, and evaluation. Monitoring and data collection is required at all stages of the ICZM process to develop and improve the knowledge base. This knowledge is needed in order to understand the coastal system and the problems observed, to identify, plan, design and implement sustainable measures and to provide the basis for evaluation. This increased knowledge on the natural and socio-economic coastal processes and the analyses of impacts of developments and global changes should be communicated with the local stakeholders, in order to increase the awareness of the coastal problems and in finding local solutions. On the other hand, the coastal knowledge should also be made available in a form that the national and provincial/state policymakers can draw up long term planning and reserve the necessary funds for their coastal zone.

Increase international cooperation
Further develop and facilitate the possibilities to exchange and share knowledge and learning experiences in order to better address the main triggers for ICZM: population growth, unsustainable economic development and anticipated impacts of climate change. Increasing food, health and livelihood security and education will contribute to an early stabilisation of the world population. Integrated river basin and coastal zone management are important mechanisms for sound economic development and ecological and environmental security. Regional cooperation in flood and drought management is already essential and will become even more critical for dealing with the impacts of climate change effectively in the future.
Given the different ICZM development stages in different countries and the common nature of many of the coastal problems observed, there is a great need as well as potential for learning from each other. The exchange of knowledge and experience can be facilitated by improving and expanding already existing mechanisms, such as:

- Regional cooperation projects funded and initiated by the EU and international organisations;
- Bilateral arrangements for cooperation between countries;
- Development of information exchange networks.

In addition, new possibilities are to be investigated. These might include the establishment of broad international expert teams or the development of a global database of coastal management experiences (problems, solutions, successes, failures and determining factors). Another new possibility may be the establishment of internet based communication platforms for on-line ICZM consultation and support.

Identification and implementation of promising measures

This section starts with the description of four categories of ICZM measures. The feasibility of the measures however, will highly depend upon the prevailing country conditions. The key to the success of small scale adaptive measures, is the involvement and cooperation of local communities.

In addition, the emphasis should be on innovative technological developments which may substantially increase the potential for effective, locally operated measures.

Four categories of ICZM measures

Types of measures within ICZM fall into a number of different categories, as follows:

- *Prevention*. The first focus of ICZM should be on the prevention of coastal problems. This category of measures is involved with all aspects of spatial planning including decisions on resource use and exploitation on a national and regional level. Decisions and measures to be taken should be based on the knowledge of all relevant coastal mechanisms and the capabilities and limitations (e.g. carrying capacity) of the coastal system. Measures should aim at avoiding unsustainable use and overexploitation and preventing short term, irresponsible actions disrupting essential coastal functions.
- *Protection.* The category of protection includes all measures that will prevent or reduce the risks of flooding events and natural hazards, such as the building, adjusting and maintaining of man-made and natural flood protection systems. Preferred measures to counteract coastal erosion are to strengthen the natural protection of coastal vegetation belts or maintaining the protective dune systems. Ongoing coastal erosion may also be combated in a soft way by supplying sand to the coast. If absolutely needed many alternative hard coastal constructions can be applied such as to protect harbour entrances.
- *Adaptation.* Adaptation measures include a wide range of possible measures to be associated with human activity and living conditions on different scales, aiming to prevent or reduce the consequences of adverse effects. Examples are: the adaptation of houses and the creation of safe havens for flood protection; adjustments in agriculture, aquaculture and fisheries practices; waste water flow interception and treatment; development of ecotourism.
- *Restoration.* Restoration measures are involved with undoing the effects on the coastal system of undesirable and disruptive activities that have already taken place. These measures may include the restoration of natural systems such as coastal forests, mangroves and coral reefs; cleaning up water and soil pollution sources; limiting destructive coastal fishing and over-fishing in the high seas, and the rehabilitation of destroyed coastal systems such as abandoned aquaculture ponds.

Feasibility of measures depends on country conditions

The various parts of the CCC publication include a wide range of examples and experiences which hold important lessons on the failures and successes of the implementation of coastal measures. It is noted that the feasibility of measures, both from the viewpoint of implementation and functioning, very much depends on prevailing country conditions. In this respect, two more or less extreme country development situations could be considered: (1) a situation where a well developed institutional system is in place and sufficient resources and technical capabilities are available and (2) a situation where most or all of these conditions are basically lacking.

The first situation allows for the application of the whole range of options related to all the above measure categories. In particular, these options include the development of integrated approaches involving long-term planning and large-scale investment schemes. This situation applies to most of the coastal states in the EU and in particular the Netherlands, as described in part I of the CCC publication. However, examples of successful and promising coastal planning approaches can also be found in other countries.

The actual challenge is in the second situation, which unfortunately still applies to a large part of the coastal countries around the world. In this situation there are basically limited options for large investment schemes to prevent, protect or restore. Instead, there is a serious risk that ongoing coastal developments and short term profitability objectives will further disrupt coastal systems. Main threats include the cutting of coastal forests and mangroves; destruction of coral reefs; pollution of natural systems, overfishing of coastal waters; and the degradation of coastal areas by aquaculture development. Numerous examples of such problems have become manifest in the last decades.
The challenge is here to start at a small scale, to enlarge the ICZM efforts stepwise and to propose simple solutions to be executed and maintained by the local coastal inhabitants.

Emphasis on small scale adaptation measures
Obviously, the first priority is to stop and prevent devastating developments. This can only be achieved by developing sustainable coastal zone management practices, to be founded in appropriate governance and institutional structures. In identifying promising measures, the emphasis should be on relatively small scale adaptation measures aimed at immediate improvements at the grassroots level. In addition to direct costs and benefits, a number of other factors are particularly important in determining the potential success of such measures. These include a range of characteristics in relation to specific country or region conditions, such as:

- Extent and complexity of implementation requirements;
- Implementation time;
- Involvement and responsibilities of local stakeholders;
- Suitability with respect to local culture and customs;
- Maintenance requirements in relation to local maintenance capabilities;
- Opportunities for local implementation (production and construction);
- Simplicity and reliability;
- Proven success under comparable circumstances.

Good examples of such measures are the mangrove planting and the floating bed cultivation.

Need to widely apply innovative measures
The pressure on the coastal zone and its resources will increase strongly in the future.
Innovative, resilient, no-regret measures are needed in order to sustainably develop the coastal zone in the future and to respond to the impacts of anticipated climate change.
Examples of adaptive measure are found in Asia and in Europe. Large scale application of these multiple use measures should be pursued.

Involvement and cooperation of local parties required
Successful adaptation requires the involvement and cooperation of all relevant local parties.
The conditionality for implementation, operation and maintenance is to be provided by the national government. The local community, being the main beneficiary and mostly well aware of the local coastal problems should be involved in proposing solutions and during the execution of the measures.
Commitment of all relevant parties is essential in terms of the responsibilities, efforts made and benefits incurred. Strong vertical cooperation is key to the success of the planning and execution of local, adaptive measures.

Possibilities for expanding international cooperation

There is a great need for coastal countries to learn from each other, to increase communication and to exchange experiences. This need for improved communication was also recognised by Jens Sorensen in his 2002 survey of more than 700 ICZM projects throughout the world.

This CCC publication in the form of this Book and the extended Internet edition on the CCC website has been produced through the cooperation of 101 authors. All authors of Part I and II were involved in the execution of the projects described. The authors of planning tools were the developers of these tool, so are the authors of the innovative adaptive measures closely linked with the execution of these measures.

These 101 authors are listed in alphabetical order, with their e-mail addresses in the CCC Part V, this to facilitate communication between the authors and between the reader and the authors.
The cooperation with the 'CCC-dignitaries' was much appreciated, provided a insight in their commitment to the sustainable development of the coastal zone, and to mitigation and adaptation. Their details are public and also listed.
The interested reader can read the CCC Book and the extended version including the full chapters of the Part I and II cases on the CCC website, can download the demonstration version of the GIS based planning tools, can use four full Training Manuals, can scrutinise selected PDF reports and can contact an author.

These activities may be considered as a simple start of a community. We will see how this will evolve in the near future.

During the production of this CCC publication several ideas came up to strengthen the communication and exchange knowledge and transfer technology, such as:

- To establish some broad international expert teams regarding ICZM and coastal cooperation;
- To develop a global database of coastal management experiences (problems, solutions, successes, failures and determining factors);
- To establish an internet based communication platforms for on-line ICZM consultation and support;
- To safeguard very valuable websites loaded with coastal information gathered during many years of hard project work, which could be lost in a split second;
- To organise a second World Coast Conference preferably in Asia in 2013, twenty years after the first one in Noordwijk, Holland, to evaluate the worldwide progress made and how to address the future coastal challenges.

You are invited to communicate your ideas and initiatives related to strengthen international cooperation to for instance the Netherlands Water Partnership, Delta Alliance, UNESCO-IHE or the Coastal and Marine Union - EUCC.

Finally, the two following contributions by Luitzen Bijlsma and Pier Vellinga describe their interesting perspectives on coastal cooperation.