Deltares

Kuwait Guidelines for Integrated Coastal Zone Management and Planning

A stepwise approach for planners and stakeholders

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KISR
Kuwait Institute for Scientific Research

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Summary

The Government of Kuwait considers coastal resources as fundamental for the country's economic growth, environmental sustainability and for its citizen's wellbeing. There is a global acceptance that Integrated Coastal Zone Management (ICZM) constitutes an optimal approach to ensure the sustainable and resilient management of the coastal resources. The 2014 Environment Protection Law No. 42 mandated the Environment Public Authority (EPA) to prepare a national plan for marine environmental management. Based on this mandate, EPA is leading the development of the first ICZM planning guidelines for the State of Kuwait.

The ICZM Guidelines provide a comprehensive, integrated framework for integrated planning and management of the coastal zone in Kuwait. ICZM is a recurrent, integrated and holistic planning process aimed at addressing the complex management issues in a coastal area. These ICZM Guidelines have a dual purpose:

1. To provide general background and introduction to ICZM and its components. This objective targets participants unfamiliar with the concept and methodology of ICZM. It eventually aims at all participants having a basic common understanding.

2. To provide specific information and a step-wise approach to undertake an ICZM planning process and its subsequent implementation. This objective targets government representatives who are leading the process and all stakeholders who are actively involved in the initiation and implementation of the ICZM process. In these guidelines they will find more specific information that goes beyond the basic understanding of ICZM towards the concrete steps of implementation.

The ICZM Guidelines have been developed from March 2017 to February 2020 in close and interactive cooperation between EPA, the Kuwait Institute of Scientific Research (KISR) and Deltares.

About Deltares

Deltares is an independent institute for applied science in the field of water resources management. Throughout the world, we work on smart solutions, innovations and applications for people, environment and society. Our main focus is on deltas, coastal regions and river basins. Managing these densely populated and vulnerable areas is complex, which is why we work closely with governments, businesses, other research institutes and universities at home and abroad. Our motto is ‘Enabling Delta Life’.

As an applied research institute, the success of Deltares can be measured by how much our expert knowledge can be used in and for society. At Deltares, we aim to use our leading expertise to provide excellent advice and we carefully consider the impact of our work on people and planet.

All contracts and projects contribute to the consolidation of our knowledge base. We always apply a long-term perspective when developing solutions. We believe in openness and transparency. Many of our software, models and data are freely available and shared in global communities.

Deltares is based in Delft and Utrecht, the Netherlands. We employ over 800 people from 40 countries. We have branch and project offices in Australia, Indonesia, New Zealand, the Philippines, Singapore, the United Arab Emirates and Vietnam. Deltares also has an affiliated organisation in the USA.

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Abbreviations and acronyms

A5R	IPCC 5th Assessment Report
CBA	Cost Benefit Analysis
CEA	Cumulative Effect Assessment
CMP	Coastal Management Program
DPSIR	A framework for environmental assessments, considering: **D**riving forces, **P**ressures, **S**tate, **I**mpact and **R**esponses.
DSS	Decision Support System
EIA	Environmental Impact Assessment
eMISK	Environmental Monitoring Information System of Kuwait
EPA	Environment Public Authority
ESIA	Environmental and Social Impact Assessment
GDP	Gross Domestic Product
GIS	Geographical Information System
GMSL	Global Mean Sea Level Rise
ICZM	Integrated Coastal Zone Management
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
KISR	Kuwait Institute for Scientific Research
KNPC	Kuwait National Petroleum Company
KOC	Kuwait Oil Company
KOTC	Kuwait Oil Tanker Company
KPC	Kuwait Petroleum Corporation
MCDA	Multi-Criteria Decision Assessment
MCEM	Multi-Criteria Evaluation Methods
MEW	Ministry of Electricity and Water
MOC	Ministry of Communication
MPW	Ministry of Public Works
MSP	Multi-stakeholder Partnership
MSP	Marine (or Maritime) Spatial Planning
PAAET	Public Authority for Applied Education and Training
PAAFR	Public Authority for Agriculture Affairs and Fish Resources
ppt	parts per thousand
RCP	Representative Concentration Pathways (for greenhouse gases)
SA	Sustainability Appraisal
SDG	Sustainable Development Goals
SEA	Strategic Environmental Assessment
SLR	Sea Level Rise
SROCC	Special Report on the Ocean and Cryosphere in a Changing Climate
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change

Contents

1 Objectives, Scope and Audience

1.1 Objective

The objective of this document is to guide the State of Kuwait in leading an Integrated Coastal Zone Management (ICZM) planning process and its subsequent implementation. The Government of Kuwait considers coastal resources as fundamental for the country's economic growth, environmental sustainability and for its citizen's wellbeing. There is a global acceptance that ICZM constitutes an optimal approach to ensure the sustainable and resilient management of the coastal resources. The IPCC Fifth Assessment Report (Church et al., 2013) states that ICZM, with its emphasis on integration, is likely to remain a major framework for coastal climate-resilient and sustainable development.

This document, referred to as the ICZM Guidelines, provides a comprehensive, integrated framework and tools for integrated planning and management of the coastal zone in Kuwait. ICZM is a recurrent, integrated and holistic planning process aimed at addressing the complex management issues in a coastal area.

These ICZM Guidelines have a dual purpose:

3. To provide **general** background and introduction to ICZM and its components. This objective targets participants unfamiliar with the concept and methodology of ICZM. It eventually aims at all participants having a basic common understanding.

4. To provide **specific** information and a step-wise approach to undertake an ICZM planning process and its subsequent implementation. This objective targets government representatives who are leading the process and all stakeholders who are actively involved in the initiation and implementation of the ICZM process. In these guidelines they will find more specific information that goes beyond the basic understanding of ICZM towards the concrete steps of implementation.

The ICZM Guidelines are structured around this dual purpose through providing both general and specific information. Where available, a section with general background and introduction is followed by a description of the topic in the Kuwait context. Links and references for further reading are provided in the section or in the appendices.

The guidelines are set up as a living document, so that the document can be updated easily with additional or new information.

1.2 Scope

The ICZM Guidelines describe in detail the ICZM Planning Framework tailored to the context of Kuwait covering the natural, the socio-economic and the institutional systems that are inherently entwined in ICZM (see section 2.2). The ICZM Planning Framework presented in this document has been developed based on existing ICZM good practices, handbooks and tools developed by international agencies and NGO's and inputs of experts, practitioners and Kuwait stakeholders.

In 2014, the Environmental Protection Law No. (42) mandated the Environment Public Authority (EPA) to prepare a national plan for marine environmental management. Based on this mandate, EPA is leading the development of the first ICZM planning guidelines for the State of Kuwait. These ICZM Guidelines have been developed from March 2017 to February 2020 to prepare EPA and the State of Kuwait for undertaking the preparation of the first ICZM plan. The ICZM Guidelines describe how EPA intends to undertake the preparation of the ICZM plan with involvement of all stakeholders.

As an ICZM planning process is an interactive and adaptive process it is expected that these guidelines will be further developed to incorporate the learning and the emerging practice for future planning iterations. ICZM requires regular feedback on preceding steps which may lead to adaptation or new developments in following steps. The particularity of the ICZM Planning Framework is its circularity instead of being set in stone. In this document, a number of key components are identified that serve as primary building blocks to the making of the ICZM Implementation Plan. However, it remains a living document aimed at being revised and updated to incorporate the Government of Kuwait evolving planning experience as well as emerging challenges.

The scope with respect to the spatial coverage and the future time horizons of the ICZM Planning Framework are outlined in section 5.2.

1.3 Audience

The main audience of this report is the State of Kuwait, particularly the ICZM planners, technical experts, practitioners and decision makers actively involved in ICZM. The guidelines target an audience that is at the beginner level for ICZM.

However, and as mentioned in the introduction, the Guidelines are also meant to be useful for a broader audience. Each chapter gives a general description that can help for a common understanding and agreement on the methodology for stakeholders involved in planning and implementing ICZM on the ground, such as water users, national and local government agencies, communities, NGOs, civil society organizations, International Organizations and financers.

1.4 Reading guide

This report is divided in 11 chapters and two Appendices

- Chapter 1: Introduces the objective, scope and audience of these guidelines.
- Chapter 2: Provides general background and introduction into the ICZM tools, including drivers for success.
- Chapter 3: Describes the state of the Kuwait coast, including the state of the knowledge and the environmental, social, economic and institutional aspects. Section 3 also includes an indication of the main challenges and opportunities of the coast.
- Chapter 4: Presents the overall Kuwait ICZM Planning Framework.
- Chapters 5, 6, 7 and 8: Describe the detailed steps for each of the four phases of the Kuwait ICZM Planning Framework, i.e. the Inception phase (Chapter 5), the Situation Analysis phase (Chapter 6), the Planning phase (Chapter 7), and the Implementation phase (Chapter 8). Within each section, paragraphs are subdivided in a general part for background and introduction and, if available, a specific part tailored to the Kuwait context.
- Chapter 9: Includes the steps for the evaluation of a completed ICZM cycle and the preparation for the next ICZM cycle.
- Chapter 10 and 11: Includes definitions, abbreviations and references.
- Finally, the Appendices present a number of tools useful during the ICZM planning process as well as some good practices and examples to serve as a reference.

Figure 1.1 presents a roadmap for first-time users of the guidelines. Frequent or experienced users of the guidelines may go to a specific section directly, as each section is set up to be read independently assuming the reader has the appropriate context and background knowledge.

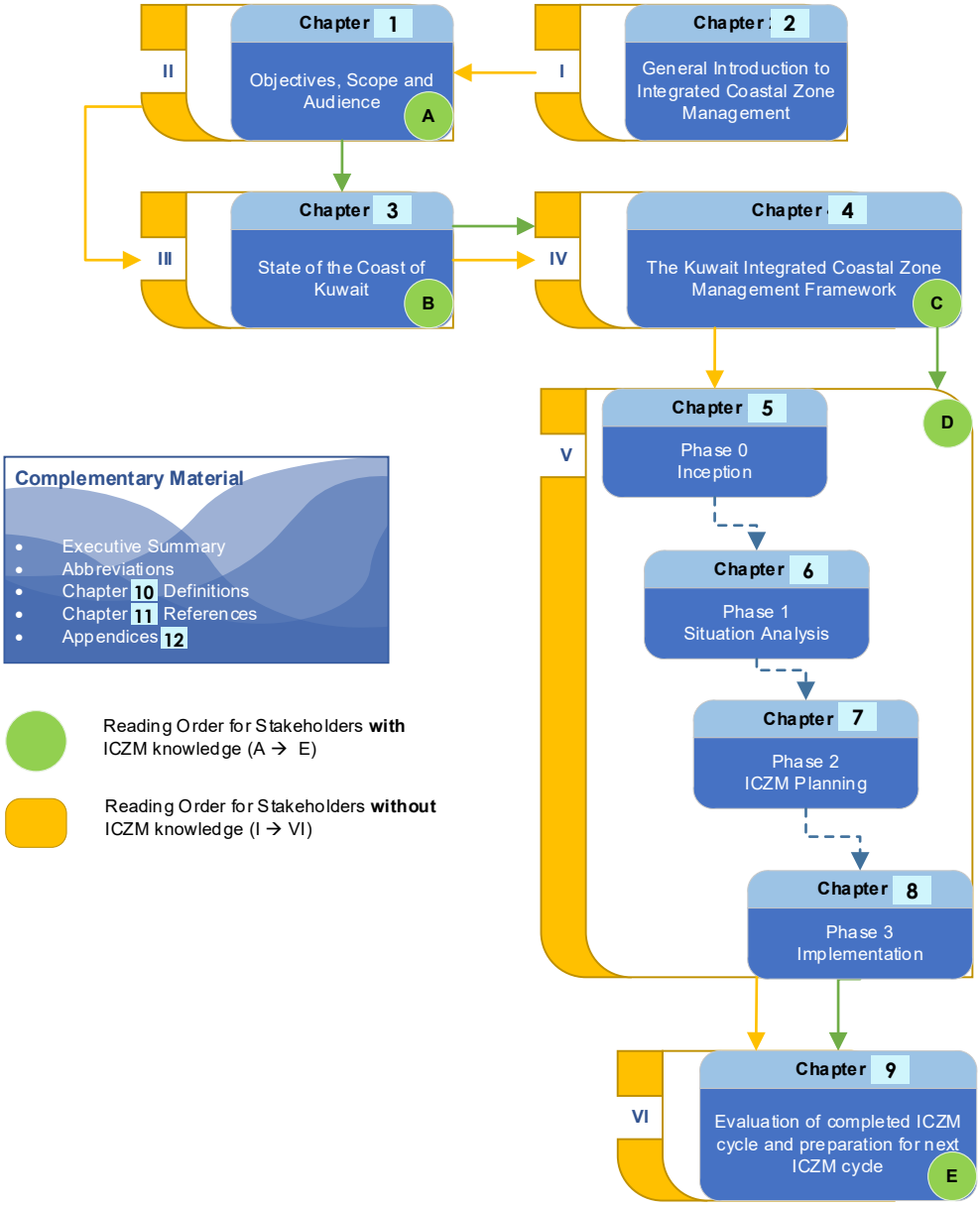

Figure 1.1 Structure of the ICZM Guidelines and reading suggestion

History to the ICZM Guidelines of Kuwait

In January 2009, researchers from the Coastal Management Program (CMP), KISR, held a meeting with the Coastal and Desertification Monitoring Department staff from the EPA to discuss the continuation of the ICZM plan for Kuwait, after completing Phase 1 in 2000. It was agreed that CMP and EPA prepare a pre-proposal and submit it to the Kuwaiti Government to request for funding. The initiative was approved in March 2010, and EPA officially requested CMP to provide a proposal for the implementation of the project. KISR submitted a tentative proposal to EPA in September 2012 and a contract was signed on March 29, 2016.

During the period between the submission of the tentative proposal and the signing of the contract, the EPA has highly advanced in areas related to air, water, and land pollution. The EPA declared the new Environmental Protection Law No. (42) of 2014 to raise awareness and bind the public to preserve Kuwait's ecosystem. The EPA also started a campaign to emphasize the importance of environmental issues to attract supporters and unify the awareness raising efforts. An environmental Monitoring Information System of Kuwait (eMISK) was established to build and maintain a comprehensive geo-environmental database of Kuwait, including the required infrastructure, and develop user-friendly interfaces for data entry, retrieval updating, browsing, and analysis. A new workplan was drafted to continue the work that has already been done instead of duplicating the work.

2 General introduction to Integrated Coastal Zone Management

This section introduces the concept of Integrated Coastal Zone Management (ICZM) and why it is beneficial for countries to manage their coastal zones proactively. Considering that Kuwait is relatively new to ICZM planning, this section intends to place all readers and users of the Guidelines on a common knowledge ground.

2.1 The coastal zone

Geographically, the coast is the area were the land meets the sea, as illustrated in Figure 2.1. The coastal zone includes the land subject to marine influence and the marine area that is subject to the influences of the land. In this regard, coastal zones are characterized by a high degree of land-sea interaction. Natural interactions include the challenges from natural hazards like storms and extreme weather events, the effect of rivers discharging fresh water, sediments, nutrients and other substances into the sea, and the typical coastal dynamics such as tides as well as ecological habitats such as salt marshes and mangrove forests.

Socio-economically, coastal zones are among the most densely populated areas where many economic activities take place and converge. Ports are the global connectors for goods and commodities both across the sea and to the hinterland. Fisheries provide a major food resource and contribute to GDP. Therefore, these coastal areas are typically characterized by economic growth, in which marine resources serve as a driver for prosperity. Finally, coastal zones provide for recreation and wellbeing for the local population and for visiting tourists.

Institutionally, because of the many activities going on in the coastal zone, many governments institutions ranging from the national and international (e.g. regional seas) level to the local level play a role and have a responsibility. These roles and responsibilities are sometimes aligning, sometimes conflicting and sometimes there is a gap. Cooperation of institutions is necessary to sustainably manage the coastal zone.

Figure 2.1 Coastal Zone Impression

Coastal zone systems are not static. They are typified by their dynamic and ever evolving nature. Growing populations and socio-economic developments have resulted in growing pressure on coastal resources as well as greater exposure and vulnerability to the impacts of Climate Change such as sea level rise (SLR). At the same time, new technologies and emerging management approaches create opportunities for improvements and human development.

One way of looking at the coastal zone is to distinguish the variety of functions that occur and that need to be accommodated now and into the future. Functions compete for space as typically space is limited in the coastal zone. Multiple use of space and resources is often highly beneficial. Tangible functions can be described quantitatively and may be assigned a monetary value. Examples are industrial water supply and fishing. Table 2.1 presents these and more examples.

Table 2.1 Functions of a coastal zone (Economic sectors and activities taking place)

Functions on land	Functions at the land-sea interface	Functions on sea
Human settlement (residential)	Coastal protection	Fisheries
Agriculture	Ports, harbours and marinas	Aquaculture
Industry	Industry requiring cooling water or process water (e.g. energy production, desalination)	Navigation and shipping
Trade and services	Outfalls (treated sewage effluent, storm water)	Offshore energy production
	Aquaculture	Offshore oil and gas production
	Recreation (beach)	Mining of resources (sand, shells)
	Coastal habitats supporting wild life and biodiversity (intertidal areas, salt marshes, mangroves)	Marine habitats supporting wild life and biodiversity (corals, seagrass, seabed)
	Cultural heritage	Cultural heritage

2.2 Three-systems approach to the coastal zone

Coastal zones are complex environments in which different systems exist and interact with another. In this regard, three systems are distinguished, namely the natural system, the socio-economic system, and the institutional system. This section describes the three systems and their characteristics.

2.2.1 Natural system

The natural system consists of the abiotic or physical, chemical and biological components both onshore and offshore. It includes the tide and currents, the river discharges, the salinity and temperature of the water, the movement of sand and silt, the nutrients, organic matter, dissolved oxygen and the pollutants in the water and the sediment, the bacteria and phytoplankton at the base of the food chain ranging from zooplankton to shellfish, birds, fish and mammals.

The natural system also includes the anthropogenic infrastructure in the coastal zone such as coastal protection, breakwaters, harbours, cables and pipelines. The infrastructure interacts with the natural processes, for example when a breakwater interrupts the sediment transport along the coast, or even controls the natural processes, for example when a sluice controls the water discharge to the sea.

The natural system of the coastal zone includes the onshore land, typically indicated by the hydrological catchment i.e. the area where rainwater eventually ends up in the sea and the associated infrastructure such as river embankments or dams. The coastal zone then includes the offshore sea area that is influenced by the onshore activities. It is essential to understand the connectivity between the catchment and the coast in order to manage coastal issues and landscapes.

Coastal zones are affected by complex processes that take place at the land and sea interface. Activities or infrastructure in the catchment (e.g. dam trapping sediments) can affect the water quality of river systems and wetland areas, which in turn impacts on the health of coastal and marine environments. This can have implications for natural values such as seagrass beds, fish stocks and biodiversity.

The physical characteristics of a coastal zone are not static but are rather dynamic and can change rapidly in response to natural processes such as seasonal weather patterns, or man-made infrastructure such as sea defences. Waves, winds, currents, tides and storms are the major natural forces on the coast. The effects and interactions of these natural forces on the shoreline and near-shore seabed are called coastal processes. These include erosion and deposition, movement of dunes, longshore drift, and the effects of storms on the coastline. In addition, the natural system is also affected by the consequences of climate change, like increase in global temperature, increasing number of extreme weather events, rising sea level and changing weather patterns. These are not easily mitigated or controlled and need long-term planning.

The natural system can be influenced by management and policy decisions. Measures can be taken by policy makers, like building sea defences or regulations on spatial planning. An example of a non-physical control measure is the enforcement of pollution regulations to reach a desired water quality. Contrary to these national or local measures, it is much more complicated to mitigate climate change, which also requires global measures.

2.2.2 Socio-economic system

The socio-economic system is composed of the human activities that take place in and make use of the coastal zone. This domain also includes the stakeholders, i.e. those who have an interest and those who are affected. Economic and social activities within a specific coastal zone area are connected to the wider world through the exchange of goods, people and services. Moreover, these activities are influenced by global trends and processes.

The socio-economic relevance of a coastal zone is defined by the uses and activities and the expected changes and developments. Examples of activities or economic sectors in the coastal zone are included in Table 2.1.

Some examples of important parameters of the socio-economic system are labour force and wage rates, price levels in relation to national and international markets, subsidies, efficiency of production and water use, and income distribution. When identifying and analysing activities, it is important to consider possible discrepancies between the opinions of individual actors or stakeholders and their representatives. For example, individual fishermen may have different interests from suggested by the official government organization.

The elements of the socio-economic system can, to a certain extent, be influenced by legislative and regulatory measures. For example, building regulations can have an impact on the development of the coast and can have a profound impact on the exposure and vulnerability of the population to sea level rise. However, global markets and economic trends are far more difficult, if not impossible, to control.

2.2.3 Institutional system

To allow government-driven management of the coastal areas and to enable integrated decision-making, coastal and marine management approaches are embedded in the institutional system to which also the legal and administrative framework of laws, policies and regulations belong. The institutional system considers who takes decisions, how decisions are made and how effective decisions are implemented and financed. Thus, it considers the institutions, their mandate and the cooperation between institutions (or the lack thereof).

Both the official setting laid down in laws and regulations and the actual setting in practice must be included in the analysis, as it is not uncommon that official and practical situation deviate.

Administrative and institutional settings vary with scale, and with the way governing institutions exist and operate. In many countries, the institutional system consists of:

- International agreements and commitments
- The central government, divided into sectors such as public works, agriculture, fisheries, environment, housing, industry, mining and transportation
- A coordinating body, for example a national water board, to coordinate actions by various sectors of the national government
- Regional bodies based upon the normal subdivisions of government, for example provinces, districts, cities and villages
- Regional bodies based on a division according to the physical characteristics of the area, such as river basin authorities (these can be local or international)

When initiating ICZM knowing the following information is useful:

- International agreements or regional sea commitments
- The ministries, coordinating bodies and other agencies having authority and responsibilities related to the coastal zone
- The existing legislation (laws and regulations) concerning the coastal zone including the policies and plans of various coastal-related sectors such as environment, fisheries, transportation and urban development
- The existing national and regional development plans and the authorities responsible for implementing these plans, establishing and enforcing regulations and overseeing infrastructure construction and operation
- An overview of power dynamics in the local communities, i.e. to be aware of the structure of local government/regional powers and coordinate at government level with local communities and NGOs and other stakeholders.
- To know about transparency (and its limitations in the country) with regards to the governance and communication on coastal management.
- To find local champions that can work with both local communities and government to deliver messages enabling effective and successful coastal zone planning.

Institutional arrangements with cross-sectoral institutional mechanisms are extremely important for coastal management in order to support short-term decision-making while adopting a long-term perspective and to address the complex issues and cumulative effects. For example, it uses the adaptive capacity of economic sectors to incorporate adaptive developments in coastal planning through policy measures; and it provides adaptive planning and a risk-informed decision-making on coastal hazards based on estimates of risk, as well as costs and benefits of coastal mitigation and coastal management.

2.3 Integrated Coastal Zone Management

In the previous section, the three systems present in the coastal zone were introduced: the natural system, the socio-economic system and the institutional system. The essence of Integrated Coastal Zone Management is that the three systems are considered at the same time. ICZM acknowledges that the three systems are inherently interlinked and cannot be considered separately. The three systems interact and influence each other as is shown in Figure 2.2.

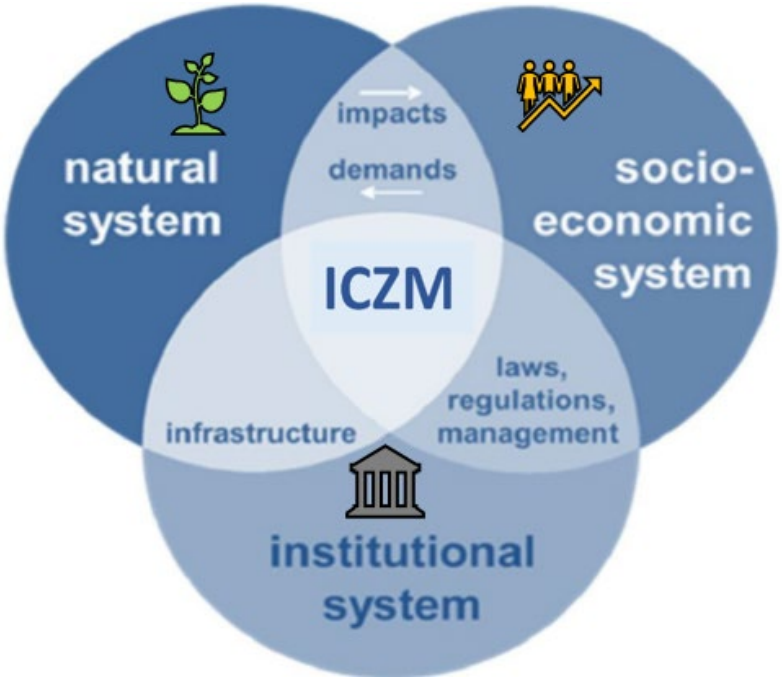

Figure 2.2 The three interacting systems in the coastal zone

The natural system serves as a source of resources and wealth of the socio-economic system. The socio-economic processes are guided and managed by the laws and regulations that are created by the institutional system. At the same time, the socio-economic processes impact the state of the natural system and can have negative effects if not managed in a sustainable way. In return, the natural system can impact the socio-economic system through extreme weather events and climate change. Within the institutional system decisions can be made to implement adaptation measures, like infrastructure or nature-based solutions, and mitigate risks from natural hazards.

ICZM is a highly participatory, science-based, principled and iterative planning approach. There are several definitions of ICZM available. These guidelines adopt the following definition developed by the World Bank in the 1996 Guidelines for Integrated Coastal Zone Management:

ICZM Definition
"Integrated Coastal Zone Management (ICZM) is a process lead by the government consisting of the legal and institutional framework necessary to ensure that development and management plans for coastal zones are integrated with environmental (including social) goals and are made with the participation of those affected. The purpose of ICZM is to maximize the benefits provided by the coastal zone and to minimize the conflicts and harmful effects of activities upon each other."

Leading ICZM are three overarching principles:

- Economic efficiency: The multitude of interests in and challenges to the coastal zone imply that choices need to be made: Not everything will be possible as both financial resources and spatial resources are limited.
- Equity: The basic right for all people to have access to and benefit from the coastal resources and opportunities for the sustenance of human well-being must be universally recognised.
- Environmental and ecological sustainability: The present use of the coastal resources should be managed in a way that does not undermine the life-support system, thereby compromising the use of the same resources by future generations.

ICZM should not be seen as a one-time activity: It is a process, which takes time and iterations. Therefore, ICZM should be designed as a step-by-step approach that is applied in a spiral way (Figure 2.3), which allows it to respond to changing social, economic and environmental needs. Moreover, it enables practitioners and policy makers to gradually improve their management system as they move up the spiral, progressively developing the coastal zone, building a more integrated institutional framework and improving environmental sustainability.

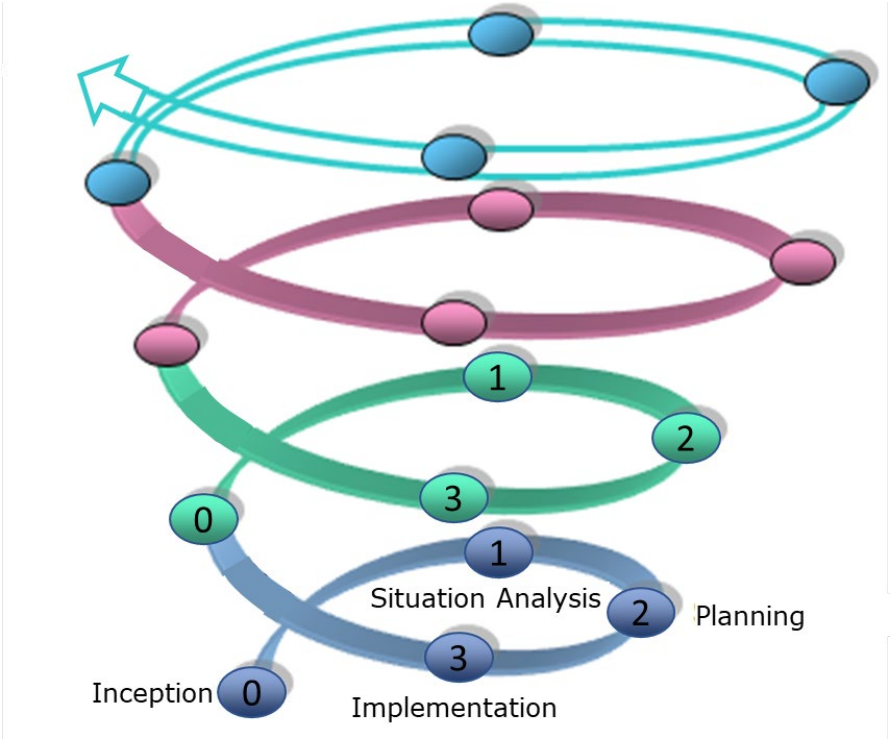

Figure 2.3 ICZM as a spiral process

Frameworks for integrated planning and management
In addition to ICZM, there are several other frameworks for integrated planning and management in the field of sustainable resource management. In river basins the process is referred to as Integrated Water Resources Management (IWRM). Maritime Spatial Planning (MSP) can be used as a tool for spatially managing marine areas. The principles and key components of these frameworks are the same as for ICZM, irrespective of the geographical application. These ICZM Guidelines use the Framework of Analysis for Water Resources Planning as a starting point (Louck and Van Beek, 2016; Deltares, 2019) supplemented with relevant components from other frameworks.

2.4 Drivers of success

For a comprehensive and successful ICZM plan, drivers of success can be identified. This section highlights these drivers of success, i.e. conditions to a successful ICZM planning process, and indicates where in the framework these are embedded.

2.4.1 Inclusiveness and participation

Participation is one of the main drivers of success of an ICZM planning process. Participation enriches the understanding of the natural, socio-economic and institutional context, helps create a common vision of development, enables ownership of the outcome and increases the effectiveness of the implementation of the plan.

One of the main challenges of participation is making sure that the process is socially inclusive, i.e. that all groups in society that are affected by ICZM are meaningfully included in the process. In this context, social inclusion is the process by which efforts are made to ensure equal opportunities to participate in the ICZM planning process for all regardless of background. People may be left out or be impacted in different ways for various reasons: because of personal characteristics (ethnicity, gender, age, religion, political orientation, disabilities) but also simply because they are not aware of the process, they do not realize their involvement, or they have not been identified as stakeholder.

How one is affected by (changes) in coastal zone risks and coastal zone management depends on a variety of factors. Although inclusiveness often seems associated with poor and marginalized communities, and within these, particularly women, children and elderly, inclusiveness needs to be considered at multiple scales. It is important to identify at the scale of a management issue under consideration, that different groups may have different dependencies on the coastal zone and can be affected differently as the combined results of various factors. The risk of an inadequate stakeholder engagement is to generate and implement plans that are irrelevant or even harmful to some stakeholders. In turn, an adequate stakeholder engagement broadens the scope of possible measures and increases both the sense of ownership of the ICZM plan and the likelihood of a satisfactory implementation.

Sections 5.3 and 6.1.1 provide the basis for the stakeholder engagement in the ICZM Framework.

2.4.2 Institutional framework and governance

Coordination between the different institutions with a mandate to manage an aspect of the coastal zone is fundamental to be able to manage a coast in a sustainable, climate-resilient manner. Often coastal resources are developed and managed “in silos”, whereas the consequences of one decision taken by a sector can affect are felt by others. Therefore, an enabling institutional framework is fundamental in the design and implementation of an ICZM plan. A strong ICZM institutional framework includes elements such as: i) clear mandate to carry out ICZM, ii) clear responsibilities in the ICZM planning and implementation process; iii) funding commitments for the planning and implementation process; and iv) capacity of the institutions to carry out their roles. In addition to an enabling environment, or in absence of a perfect one, an institutional champion or strong citizen demand, might also facilitate ICZM planning.

Sections 5.1 and 6.1.2 provide the basis for the institutional setting and the institutional analysis in the ICZM Framework.

2.4.3 Financing and Procurement

The ICZM planning process and the implementation of the ICZM plan require adequate funding. The main costs related to the ICZM planning process involve: i) staff time which consist mostly on the government staff as well as any additional technical assistance needed; ii) knowledge generation which could involve the implementation of additional surveys, or the acquisition of equipment for gathering, storing or analysing data; iii) utilization of facilities for working purposes or for hosting consultative processes.

The ICZM Implementation Plan culminates in an investment program, listing the measures, implementation arrangements and budgeting for the different measures agreed on in the plan. A sound and efficient investment program is fundamental for the actual implementation of the ICZM plan. A few general considerations might be useful when defining the investment program:

- Procurement Strategy: Adequately budgeting the time and resources it will take to procure the different measures. The time and resources necessary to procure will greatly depend on the different procurement processes. An efficient procurement strategy takes into consideration existing capacity and times procurement activities accordingly.

- Select financing resources strategically: Different financiers might be interested in financing particular measures. Public and private financing respond to different incentives and therefore measures should be presented in a manner that is attractive to financing. Depending on the effort required to follow different procurement processes and the urgency of particular measures, it might be more advantageous to obtain funding from particular financiers.

- Efficient grouping of measures: It might be advantageous for attracting funding or for facilitating procurement to group a set of measures together into investment packages. The amount of measures or investment packages might have a direct correlation with the complexity of the implementation of the plan, the amount of procurement, the amount of resources needed to implement the measures and ultimately how efficient and timely the ultimate implementation of the plan is.

The finances for the ICZM planning process are included in sections 5.1 and 5.4 of the ICZM Framework. The procurement and investment strategy is included in section 7.5.

2.4.4 Dealing with an uncertain future

Making long-term plans involves anticipating future changes. When these changes are characterized by a high degree of uncertainty (e.g. the impacts of sea level rise in the coast of Kuwait) the resulting situation is deeply uncertain. In this situation, policy makers need to make choices.

Dealing with uncertainties is included throughout the ICZM Framework. Section 6.3 provides the introduction to the decision support system in which uncertainty needs to be incorporated (semi)quantitatively.

2.4.5 Nature-based solutions

Societies have been using conventional engineering measures (often known as “hard” or “grey” infrastructure) for generations to reduce the impacts of coastal (flooding). Measures such as channels, levees, breakwaters, sea walls, etc. are often used because of their proven efficiency and because there is more experience with the design and construction of such infrastructure. Recently, the concept of “nature-based solutions” has gained strength as a good alternative or as a complement to the traditional “hard” solutions.

Nature-based solutions make use of natural processes for functional purposes such as mitigation of flood, drought, erosion and landslide risk or improving water quality (World Bank, 2017). They present the advantage against hard solutions in that they give added value to their function, can adapt to changing environments and are arguably cheaper and more sustainable solutions. Because they are based in nature, nature-based solutions are often considered as a no-regret measure. The added value of a nature-based solution varies but it can include more cost-effective solutions, co-benefits to the environment and local communities, recreation, opportunities for local communities, decrease of vulnerability to climate change, sequestering carbon, improving food security, etc. In the implementation of nature-based solutions, it is important to integrate the measure with existing ecosystems, native species and comply with basic principles of ecological restoration and conservation (World Bank, 2017).

Nature-based solutions are incorporated in sections 6.1.5, 6.4 and 7.1 of the ICZM Framework.

2.4.6 Designing understandable and communicative indicators

Indicators are quantitative/qualitative measured statements that can be used to describe existing situations and measure changes or trends over time. Indicators generally simplify complex phenomena for enhanced information communication to policy-makers and other interested parties, including the general public. Indicators are powerful tools in the feedback loop to an action plan, as an early warning signal about an emerging issue, or in providing concise message for engagement, education, and awareness (PEGASO 2011). Indicators have three objectives, namely informing, measuring and aiding decision making (PEGASO 2013):

1. Informing: Indicators help to inform the public, elected officials and all sectors of society in a comprehensible way about the state and progress of the strategy, where leaders are expected to act as catalysts in interpreting and promoting sustainable development.
2. Measuring: Progress is often measured in terms of objectives defined in a sustainable development plan or strategy. This facilitates periodic comparisons in time within the country and with other countries and makes possible to determine the principal trends as part of a long-term evolution.
3. Aiding decision making: A number of documents emphasize the importance of assisting national decision-making processes on sustainable development by providing a set of indicators to measure advances in critical sectors.

Indicators are incorporated in section 5.4 to monitor the progress of the ICZM process, in sections 6.2 and 6.3 to support assessment and decision making, and in section 7.6 to monitor the progress of the implementation of the ICZM plan.

2.5 Challenges of climate change

Extreme sea level events that are historically rare (once per century in the recent past) are projected to occur at least annually in many locations by 2050, especially in tropical regions (according to IPCC, 2019, Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC)), and such events can be very damaging for coastal areas, ecosystems and human settlements. Intensification of such phenomena under climate change may lead to ecosystem degradation and may further increase coastal ecosystems vulnerability to other impacts of climate change, pollution, and other human influences (Lovelock et al 2017). Climate-change attributable ocean heat waves have had severe impacts on coastal ecosystems all around the world and such warming events are projected to become more common in the future (SROCC). This is particularly concerning given the slow recovery rates of many coastal ecosystems.

Many coastal ecosystems can cope with highly variable environments, but the interactions of multiple stressors, e.g. various climate change impacts, pollution, overexploitation and degradation of coastal areas, can amplify negative impacts. Climate change impacts further relate to:

- redistribution of marine biodiversity, including the migration of fish stocks, which might impact food supply and fishing rights
- ocean acidification, i.e. impact of pH changes on the organism and ecosystem level potentially leading to irreversible shifts in ecosystem structure and functioning
- sea deoxygenation, i.e. impacts leading to shifts in the productivity of species, their interactions and the composition of ecosystems
- extreme weather events, including thermal stress events and their impacts on marine ecosystems and species
- harmful algal blooms (impacts for ecosystems, aquaculture and human health);

Long-term impacts of climate change and the adaptation capacity of ecosystems remain unknown. And so does the understanding of the cause and effect of the impacts and risks caused by climate change at ecosystem, economic and social levels. However, based on projections (IPCC), it is known that over the 21st century, changes in the ocean will continue and intensify: temperatures will increase, global mean sea level will rise and the ocean will continue to lose oxygen and to acidify. Increases in cyclonic winds and rainfall, extreme marine waves, combined with sea level rise, will exacerbate extreme sea level events, coastal hazards and disaster impacts. Projections show that climate change may cause changes at a pace such that marine ecosystems and species would not have sufficient time to adapt. Already today the findings of the World Ocean Assessment (United Nations, 2016) show that the oceans' carrying capacity is near or at its limit.

The blue economy and related ecosystem services of the marine and coastal areas are estimated at USD 3-6 trillion annually. With more than 10% of the world's population living in coastal areas that are less than 10 meters above sea level, this highlights the importance of protection of these areas for the economy. Coastal resources are particularly important for livelihoods of poor and vulnerable coastal communities. An increase in coastal populations and associated higher economic investments in the coastal areas leads to the increasing trend in damages in the coastal areas (Pielke Jr., et al., 2008). Estimates suggest that the global economic costs to cities, from rising seas and inland flooding, could amount to $1 trillion by mid-century.

National authorities and regional bodies have considered coastal and marine degradation, climate change impacts, and escalating socio-economic costs on coasts in coastal management plans with management and governance aspects, where climate adaptation is currently (and for the decades to come) taking the prominent role.

3 State of the coast of Kuwait

The onset of oil exploration in the early 1950s, lead to an intense development period along the coastline, due mostly to its simple geomorphic features. Kuwait's coastal area now hosts residential and business developments, port and harbor facilities, oil industries and recreational projects. Kuwait is mainly dependent on desalinated water for domestic, industrial, and irrigation use. The intensive utilization of the coast along with exceptional demands from various entities, has led to issues regarding coordination, consistency, and communication between authorities (Abou-Seida and Al-Sarawi, 1992).

The first national physical development plan was prepared in 1968, which included detailed proposals for the major developments of Kuwait's coastline. The heaviest industries in Kuwait are situated in the southern coastal area, which includes oil refineries, oil-loading terminals, and power and desalination plants. There are two major recreational developments along the coast. The first, "The Kuwait Waterfront Project" was developed in the 1980s and covers a 21 km coastal zone. It is a major unified recreational facility that includes famous landmarks of Kuwait, such as Green Island, which is the first artificial island in the Gulf region with a total area of 785,000 m2 and a diameter of 3.14 km long and is connected to the mainland by a 134 m long access way. The second, "Al-Sabah Sea city" is a flagship development that involved large-scale excavation and reclamation works to form lagoons and land for residential and commercial purposes.

Environmental law

The Environment Protection Law of Kuwait (2014) refers to an Integrated Environmental Management of Coastal Areas, defined as 'a style of management that depends on contribution of all concerned authorities through coordination among them in a manner that guarantees conservation of the environment in the coastal areas' (Kuwait Environment Protection Law, 2014).

Economic development and population increase have caused extensive pressure on the coastal zone. The lack of clear laws, direct penalty, and regular institutional monitoring altered the natural setup of the coast. Effective mitigation measures towards addressing these adverse environmental issues are therefore urgently needed to rehabilitate the coastal zone (Al-Sarawi et al, 1995).

3.1 Environmental State

Kuwait's coastline extends to 500 km. Its territorial waters are shallow with high temperatures, rising above 30ºC, and high salinity around 40 ppt. Kuwait Bay, the most prominent feature of Kuwait, is a shallow, semi-enclosed hypersaline water body that covers approximately 720 km2 (Pokavinich and Al-Osairi, 2014) and has a 130 km long coastline. Kuwait Bay is of immense biological importance as it has one of the most extensive intertidal mudflats in the entire Gulf. The Bay is located downstream to the Shatt Al-Arab river system, which is a vital source of nutrient and sediment as it provides feeding grounds for several types of birds and breeding grounds for various fish and shrimp species. Kuwait Bay supports the nation's thriving fish industry with an annual production of about 4,500 tonnes, representing only 16% of total demand. Most of the commercial important species are zobaidy (Pampus argenteus), hamoor (Epinephelus coioides), suboor (Tenualosa ilisha) and newaiby (Otolithes ruber).

Kuwait has always relied on the sea as a main source of living, as Kuwait depends on the sea for food, shipping, and recreation. Its rich marine ecosystem holds dynamic habitats and nursery grounds for fish, shrimp, and other ecologically important organisms such as sea birds. After the discovery of oil, natural resources did not represent the sea, marine wildlife, desert wildlife, vegetation, etc. anymore but rather oil and gas. Thus, the very definition of natural resources was altered to mean something different than it had before the discovery of oil.

As most of the industrial development occurred along the coastline of Kuwait, this expansion has led to a variety of contaminants being discharged directly to the marine environment such as trace metals, petroleum hydrocarbons, and contaminated brine water from the desalination plants, which is essential for freshwater production. Most of Kuwait's population resides along the coast, which led to the accumulation of high levels of contaminants from domestic sewage discharge. The impact of human activities provokes the natural sources of marine pollution such as particulate matter transported from the Shatt Al-Arab river or those deposited from dust storms. Massive fish kills were reported in 1999 and 2001 causing a loss of more than 2500 metric ton of wild mullet in the Bay. Annual incidents of large-scale algal blooms and small-scale fish kills have been reported in the Bay and marinas near-by. As Kuwait Bay is surrounded by arid lands, it experiences excessive evaporation which caused its hypersaline state, in addition to the brine water discharged from desalination plants in the area (Pokavinich and Al-Osairi, 2014). All aquaculture practices were banned in Kuwait Bay as a result.

The results of historical events, such as the Gulf war in 1991, increased marine pollution as more than 700 oil wells, storage tanks, and refineries were set to fire and damaged, releasing oil directly into the coastal waters. Another incident was the malfunction of the Mishref pumping station in 2009, which resulted in a discharge of around 150,000 m3 per day of untreated sewage into the sea through three main outfalls. As a result, the nearby beaches largely used by the public were affected and closed for a long period of time.

The decline of Kuwait Bays marine environment has become one of the main concerns for the government and society during the recent years. In addition, waste, thermal, and chemical discharges released from power and desalination stations may have an adverse impact on the marine environment. The whole Kuwaiti coastline is greatly affected by rapid, unplanned development which has caused environmental and geomorphic changes. Human activities around the coast interfered with the natural hydrodynamic processes. The combination of the previously mentioned impacts in addition to the extreme weather conditions of the region causes the marine ecosystem to reach its physiological limits.

3.2 Socio-Economic State

Kuwait has a total population of around 4.8 million, of which 30% are Kuwaitis. Population has grown over the past few years from 1.6 million in the early 1980s to 4.8 million at present. Most of this increase is a result of an increase in the number of foreign laborers, but the size of the Kuwaiti population itself also surpassed one million in those years. Illiteracy rate among the population is only 3 percent, holders of primary to secondary school certificates represent 45.4% of the population.

In terms of infrastructure and urbanization, Kuwait is homogeneous with 98% of the population living in urban areas with easy access to paved roads, clean water, electricity and power supply, and sewage facilities. Most of Kuwait’s urban areas lie within 20 km of the coast, as all of the population growth took place in Kuwait City, leaving nearly 90% of this small country uninhabited (Al-Tamimi, 2011).

Until present, the city continues to grow as additional neighbourhoods are being built on new areas north of Kuwait Bay, which were once considered a remote area far from the city center. Two of the most important plans of future development are: 1) Kuwait's Islands Project where five islands will be developed into economically feasible areas; and 2) Madinat Al-Hareer (Silk City): to be built in Subiya hosting a one kilometre skyscraper surrounded by buildings that are fit to house 700,000 people. Construction of new bridges, including Jaber Coastal Causeway, will be used to connect those areas to the main city.

Due to its strategic location at the head of the Arabian Gulf, international trading was one of the main sources of income in Kuwait prior to the discovery of oil, as well as the growth of pearl industry (Al-Jassar, 2009). Since the discovery of oil in the 1950s, Kuwait went through dramatic modernization as the country's economy shifted completely from one that depended largely on maritime commerce to one that is dependent on oil exports. By the 1970s, Kuwait was serving as a financial centre for the entire Arabian Gulf region, as it is one of the world's leading oil producers, hosting one of the world's largest crude oil reserves. Kuwait started relying on food imports as local agriculture cannot meet the growing population food demand. Crude oil and natural gas accounts for the majority of gross domestic product (GDP), almost 50% of the total country's GDP. Other major sources of income include social and financial services, transportation, and manufacturing. Only 5% of GDP comes from agriculture, utilities, and construction shares.

The government pursued aggressive economic policies designed to reshape and modernize all aspects of life in Kuwait City. As Kuwait's economy is based on fossil-fuel production, the biggest sector of the economy, which is focused on oil and gas production, is nationalized under the Kuwait Petroleum Company (KPC) and all its subsidiaries. KPC is owned by the Kuwaiti government, which helped create a substantial welfare system that includes free healthcare, housing, retirement plans, and marriage bonuses.

Kuwait is looking to diversify the economy in the future following the sustainability formula: sustainability practices of the past plus prosperity sources of the present equals a sustainable prosperous future. Kuwait has a vision for New Kuwait 2035:

Kuwait 2035 Vision
"[To] transform Kuwait into a financial and trade hub, attractive to investors, where the private sector leads the economy, creating competition and promoting production efficiency, under the umbrella of enabling government institutions, which accentuates values, safeguards social identify, and achieve human resource development as well as balanced development, providing adequate infrastructure, advanced legislation and inspiring business environment."

The Kuwait National Development Plan towards New Kuwait 35 is organized around 7 areas of focus for investment and improvement. One of the areas is economy with its strategic objective to develop a prosperous and diversified economy to reduce the country's dependency on oil export revenues.

3.3 Institutional State

The constitution of Kuwait was created by the Constitutional Assembly in 1962. It established Kuwait as a hereditary constitutional monarchy. It is based on democratic principles that combine both presidential and parliamentary systems. The parliament consists of fifty members chosen in direct election every four years. Either the Emir of Kuwait or the parliament can propose amendments to the constitution where two-thirds majority of the members of the National Assembly is required to adopt a change. The Emir can veto laws but the National Assembly can override his veto by a two-third vote as they are the main legislative power in Kuwait.

The State of Kuwait established the Council of Planning, during the early 1960s, to formulate general economic and social policy, prepare development plans, and supervise the implementation and follow-up of these plans. The Ministry of public Works (MPW) is there for design and implementation of infrastructure, the Ministry of Electricity and Water (MEW) for the development and management of water and power infrastructure, Kuwait Municipality for urban development, and finally the Ministry of Communication (MOC) for infrastructure related to transport and trade. Industries that are also involved in coastal activities include oil companies (Kuwait Petroleum Company (KPC), Kuwait National Petroleum Company (KNPC), Kuwait Oil Company (KOC), and Kuwait Oil Tankers Company (KOTC), as well as the Public Authority for Agriculture and Fisheries Resources (PAFFR).

Kuwait Environment Public Authority (EPA) was established following the Rio Earth Summit in 1992. Kuwait began discussions to establish EPA's structure and goals and in 1995 the parliament formally passed a law creating the agency. Its main goal is to protect human health and limit environmental pollution by collecting data, monitoring water and air quality, and enforcing rules and regulations related to the environment. Significant environmental challenges continue to threaten Kuwait's air, the water and the ecosystems in general. The Environmental Affairs Committee in the Parliament was established after the Gulf War to complement the EPA. The committee has helped to draft and pass a number of significant environmental laws, including the new Environmental Protection Law No. (42) of 2014 to raise awareness and bind the public to preserve Kuwait's ecosystem. In addition, the committee periodically investigates environmental problems, including whether the government has abided by health and environmental standards in carrying out development projects or addressing public health issues. It also showed that the committee as an institutional entity in government had meaningful powers to oversee government policies affecting the environment. Another example of the powers of the committee could be demonstrated by its work from 2009 to 2011 in trying to release the funds that the UN had frozen because of inaction by the Kuwaiti government.

Diwaniyas are part of the social fabric in Kuwait and play a role in the institutional state. A diwaniya is a gathering of people, traditionally men only, to meet and discuss political issues and other socio-political issues. The diwaniyas are the core of Kuwait's social, business and political life, the places where topics of interest are discussed, associates introduced, alliances formed, and similar networking activities undertaken. Formal diwaniyas may be convened to discuss particular topics, sometimes with invited guest speakers. They are also called for particular purposes, such as election campaigns. Formal diwaniyas are at the root of Kuwait's consensual political system. There are several types of diwaniya: family, private, public (sometimes political) and casual[1].

3.4 Challenges and Opportunities

Economic development and population increase have caused extensive pressure on the coastal zone. In addition, waste, thermal, and chemical discharges released from power and desalination stations may have an adverse impact on the marine environment. The whole Kuwaiti coastline is greatly affected by rapid, undirected development which has caused environmental and geomorphic changes.

Kuwait is one of the world's most water-stressed countries with the lowest per capita renewable freshwater availability of any country. More than 400 litres of water per person are consumed per day[2]. Water is supplied from desalinated seawater, groundwater, and treated wastewater. Desalination plants, located along the coast, provide 90% of Kuwait's potable water needs and co-produce electricity. Most of the available groundwater is brackish and saline, which is used for agriculture and domestic purposes.

[1] https://en.wikipedia.org/wiki/Dewaniya

[2] https://www.futuredirections.org.au/publication/kuwait-food-and-water-security/

Fresh groundwater is limited as it is formed under unique conditions that includes high intensity rainfall of short duration. In general, the quantity and quality of groundwater is deteriorating due to continuous pumping. Since a significant percentage of wastewater is being discharged to the sea and most of the population is connected to a central sewage system, there is a potential for reusing treated wastewater to contribute to high irrigation water demand for landscaping and agriculture. Kuwait is working on a strong campaign to reclaim and reuse all treated wastewater for different purposes.

The brine discharged from the desalination plants has a negative impact on the environment, which is another major challenge faced in Kuwait. The more desalination, the more brine is pumped back to the sea, causing the water to become saltier, and therefore making the process more expensive. As a result, seawater in the future will be too expensive to desalinate. Studies on desalination plants in Kuwait have shown that adding mineral precipitation plants to seawater desalination plants reduces the brine disposal problem. In terms of financial advantage, the economic return from mineral precipitation will benefit in reduction of overall water production cost. Therefore, this approach can be used to solve both environmental and economic issues.

As a result of coastal protected areas and banning of fishing activities, aquaculture practices in Kuwait are at a rise. The reduced access to fishing has been partly offset by fish farming projects, which provide fish and shrimp to local market throughout the year at reasonable prices. Aquaculture is relatively a new practice in Kuwait that could be a potential source of fish production which is currently being expanded to supplement local depleted landings from capture fisheries.

Kuwait has one of the highest per capita rates of municipal solid waste generation in the world, 1.32kg per capita per day. Kuwait produces more than 1.9 million tons of municipal solid waste annually, which is the responsibility of Kuwait Municipality. In the past, most of the industrial areas were not connected to the central sewer system, resulting in the industrial wastewater effluents discharged directly to the environment without treatment. In 2010, an industrial wastewater treatment plant was established with a capacity of 8,500 cubic meters per day and the possibility of increasing the capacity to about 15 thousand cubic meters per day. With the passing of Environment Law No. 42 in 2014, article 35 obliged all government agencies and the private sector to treat industrial wastewaters produced by their facilities before discharging them to the sea. The desalination plants fall under the responsibility of the Ministry of Electricity and Water and the Ministry of Health is responsible for the disposal of medical wastes, while the Ministry of Public Works should manage domestic wastewater. Even though the roles are supposed to be clearly distributed, waste management is still one of the major issues that needs to be addressed.

Kuwait has an opportunity to use eco-tourism as a way to conserve its islands and coastal natural reserves:

- Three southern islands (Qarouh, Kubbar, Um Al-Maradem)
- Sabah Al-Ahmad Natural Reserve
- Jahra Reserve
- Green Island (first artificial island in the Middle East, eco-friendly activities)

The issues and challenges of the coastal zone can be divided into two categories: technical and institutional. Technical issues include climate change due to temperature rise and sea level rise. Poor water quality is another main issue resulting from activities like oil spills, sewage discharge, and littering. Degradation of marine environment and fisheries with the subsequent impact on livelihoods and nutrition is also an issue. A fourth issue is shoreline management, mainly erosion of the shoreline due to anthropogenic pressures, which can cause loss of beach and deterioration of buildings. Institutional issues include conflict in responsibilities between ministries (ownership vs. monitoring), as well as lack of coordination and communication. With these challenges come opportunities but future success depends on adequately addressing the technical and institutional issues, proper planning, communication and cooperation between relevant organizations.

3.5 State of Knowledge

Hydrodynamics and associated coastal processes are a major concern for coastal-dependent countries such as Kuwait to understand the impacts caused by the fast-growing development in the area. Much of the scientific information of Kuwait's marine environment is not accessible and only known to those involved in research. Data is never continuous and is based on project funding. Therefore, researchers from the Kuwait Institute for Scientific Research (KISR) compiled data from 1977 on and published The Oceanographic Atlas of Kuwait's Waters in 2004. This Atlas was jointly funded by the Environment Public Authority (EPA)and provides valuable information on Kuwait's waters. It was created to guide decision makers and developers on the sustainable use of Kuwait's most valuable resources. The Atlas includes meteorological data, water circulation pattern, geomorphology, sediment characteristics, physical characteristics such as seawater temperature, salinity, turbidity, etc., fish resources, and coral reef distribution.

One of EPA's mandates is to ensure the quality of Kuwait's environment, in terms of level of pollution in the ecosystem, conform to international safety standards. In 2005, EPA launched a number of buoys along the coast to monitor the environmental status of Kuwaiti waters. The buoys measured biological and chemical parameters to monitor the level of pollutants such as oil pollution, industrial pollution and organic pollution. This system was upgraded in 2015 supporting the integration of the meteorological, oceanographic and water quality data from the data buoys to the geo-environmental database established by the environmental monitoring information system of Kuwait (eMisk). The purpose of eMISK is to build and maintain a comprehensive geo-environmental database of Kuwait along with an enterprise level GIS system for access, update and analysis of the environmental data. The real-time data as well as historical data from the buoys and/or early warnings are therefore available for helping decision makers in planning and management of marine activities in Kuwait.

Special attention was given to Kuwait Bay, as it hosts the majority of Kuwait's industrial and recreational development. The Coastal Management Program (CMP) at KISR launched its first real-time coastal assessment buoy "KISR-01" in December 2015, which is located at the heart of Kuwait Bay. The buoy provides valuable insight to the water conditions inside the Bay and measures parameters such as water current velocity and direction, wave height and period, seawater temperature, salinity, dissolved oxygen, and meteorological data. This helped in establishing a continuous database for a couple of years on Kuwait Bay. Data from the Buoy is also used to validate Numerical Models such as Delft 3D and MIKE to understand the water flushing characteristics of the Bay, which helps in studying the water pollutant concentrations and residence time.

Unfortunately, there are no continuous and comprehensive historical data on Kuwait's waters. There are gaps that need to be filled. For example, more data need to be collected in the southern part of Kuwait, such as sediment transport and nearshore waves to solve erosion issues. The more data collected, the better the understanding of the coastal system.

4 The Kuwait Integrated Coastal Zone Management Framework

This chapter introduces the general outline and principles of the Integrated Coastal Zone Management Framework for Kuwait.

4.1 Definitions: Development Objectives, Development Scenarios, Criteria and Measures

Before describing the ICZM Framework, the terms to be used must be clear. In planning and policy projects many different terms are used and that can be confusing. The main terms used in the ICZM Framework are: *Development objectives*, *development scenarios, indicators, measures, ICZM implementation plan.*

In this document, the terms are used and defined as follows:

- A *Development objective* defines what is to be achieved by the planning. The ICZM Plan will identify needs, prioritize issues and define targets and constraints on the actions to be taken to meet the Development Objectives.
    - Alternative terms sometimes used instead of the term *development objective*: goals, aim, purpose.
- A *Development scenario* is defined as a logical combination of individual measures or decisions that accomplishes the desired development objectives and satisfies the constraints imposed on the ICZM.
    - Alternative terms often used for a *development scenario* are strategy, master plan and policy. Note that “scenario” is also often used to describe an external situation beyond the control of the decision maker(s). In these guidelines, this is defined as external drivers, i.e. a combination of external factors
- A *Measure* is the implementation of a particular action. A distinction can be made between:
    - *Technical or structural measures:* modifications of elements of the coastal zone (green or grey) infrastructure such as shore protection, breakwaters, sewage treatment plants, and fish ladders. Technical or structural measures often include managerial measures such as better ways of using the infrastructure.
    - *Ecological (non-structural) measures* to improve the functioning of ecosystems, for example by introducing fish fry in spawning areas, or large herbivores.
    - *Economic measures* to induce coastal zone users to alter their use by changing the price of the resource use (through charges, taxes or subsidies).
    - *Regulatory measures* to alter the use of the coastal zone (through spatial zoning, permits, pollution control and other forms of restrictive legislation).
    - *Institutional measures* specifying which governmental agencies are responsible for which functions of the coastal zone and specifying the necessary interactions between the public and private sectors involved. Capacity building is also an institutional measure.
    - Further studies, research or observation and analysis

Box Definitions
Development objective: what do we want to accomplish?
Development scenario: how do we want to do it?
Measure: what are we going to do?
Indicator: how successful is what we choose to do?
External driver: the external economic, environmental or political situation affecting the impact of our strategy.

Alternative terms often used instead of *measure*: intervention, project, decision, action, etc.

- An *Indicator is* a quantifiable characteristic or variable which describes an existing situation or tracks changes or trends – i.e. progress – over time. They are used to indicate how to what extent the development objective is achieved. As such, they are the measuring rod that show how successful an individual measure, or a development scenario is in achieving the development objectives. In the context of ICZM, two types of Indicators can be distinguished:
    - *Assessment Indicator:* variables or parameters that can be directly related to the achievement of the development objectives (e.g. content of dissolved oxygen as an indicator of water quality)
    - *Monitoring Indicator:* variables or parameters that can be used to assess the progress of ICZM implementation plan. (e.g. sufficient allocation of human resources with a specific responsibility for ICZM placed at each administrative level from national government to coastal municipality)

  Alternative terms often used instead of *Indicator*: criteria.
- An *external driver* is defined as the environment exogenous to the coastal system under consideration that cannot be controlled by the decision maker involved. Examples of external driver variables include storm surge and other aspects of the climate, demographical trends and changes, land-use changes, production functions (such as aquaculture feed requirements), and most economic variables relating to benefits and costs. What should be considered as an external driver and what as a decision variable will depend on the system boundaries that have to be defined. Most used external drivers relate to climate change and socio-economic development.

4.2 The four phases of the Kuwait ICZM Framework

The Kuwait ICZM Framework consists of four phases as depicted in the scheme below. A phased approach facilitates in breaking up the process in manageable sections. Each phase has a certain duration and a specific objective.

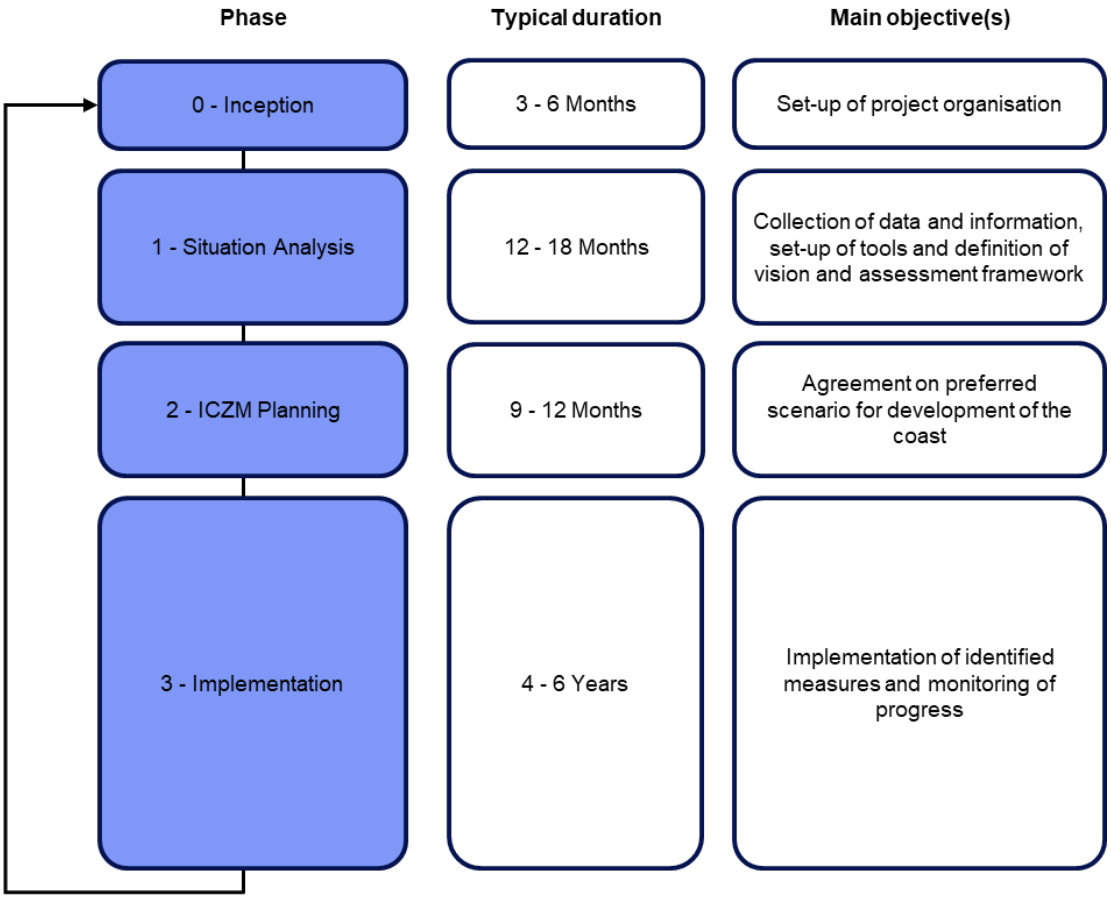

Figure 4.1 Four phases of the ICZM Framework

The objective of **Phase 0 Inception** is to prepare for the actual planning process. It is designated as 'zero' to indicate that is a preparatory phase. Phase 0 organises and sets up the project organisation and the project team, obtains the necessary technical and financing resources and develops a clear work program for the implementation of the ICZM planning process. A key activity in the Inception phase is the set-up of the stakeholder engagement and capacity building process. The end result of the Inception phase is the Inception Report.

The objective of **Phase 1 Situation Analysis** is to generate the knowledge base and the decision support system necessary to inform and to enable the decision making in the ICZM Planning phase. The Situation Analysis will focus on ascertaining and analysing the natural, socio-economic and institutional systems relevant to the coastal zone (see paragraph 2.2). Establishing vision, development objectives and assessment indicators for the future of the coastal zone in a participatory way is the key activity in this phase. The end result of the Situation Analysis phase is the Situation Analysis Report that compiles all activities and sets up the next phase.

During **Phase 2 ICZM Planning**, decision makers in cooperation with stakeholders agree in a participatory manner on a development path for the coastal zone grounded on development objectives and informed by scientific and analytical underpinnings. During the ICZM Planning phase both the environmental and the socio-economic benefits and impacts of the ongoing (autonomous) development trajectory, other possible development options, and external drivers such as climate change and population growth will be assessed and discussed. Decision makers will agree on a preferred development path and decide on a plan to implement it. This ICZM Implementation Plan consists of initiatives already envisioned by sectoral and spatial plans, as well as alternative or additional measures. The ICZM Implementation Plan typically includes elements such as an investment program, a financing strategy, institutional development plan, research agenda.

Phase 3 Implementation focuses on the actual implementation of the ICZM Plan. The implementation of the investment related elements of the plan will normally require a feasibility analysis and an environmental and social impact assessment. During implementation, continuous monitoring and evaluation is needed to follow the progress of the implementation and, if necessary, to adjust the ICZM Plan to emerging circumstances. Decision makers will inform key stakeholders on progress and achievements.

4.3 The Kuwait ICZM Framework in detail

Each of the four phases of the Kuwait ICZM Framework consists of a number of interlinked activities as shown in the diagram on the next page (Figure 4.2). The first three phases end with a key deliverable that sets up the following phase or phases:

- The Inception Report sets up the Situation Analysis phase and the (initial process of the) ICZM planning phase.
- The Situation Analysis phase sets up the (details) of the ICZM Planning phase.
- The ICZM Implementation Plan sets up the Implementation phase.

The numbers in the diagram correspond to the chapter in which each phase is described in detail and to the section in which each activity is described and explained in detail.

Although a framework should not be considered as rigid, distinct phases and activities are recognized and used to structure the ICZM planning process as a logical sequence of steps. However, a decision process is not a simple linear sequence of phases and activities as may be suggested in Figure 4.2, but involves feedbacks to earlier steps. Part of the process is thus iterative. Feedback loops are needed when:

- solutions fail to meet current objectives or conditions
- new insights change the perception of the challenges and its solutions
- essential system components and links have been overlooked
- objectives or the scope of study change (e.g., due to changing political, international, developments in society)

Communication and interaction between decision makers, and between decision makers and stakeholders are essential throughout the duration of a planning project and the implementation of the selected development. Regular reporting (inception and interim reports etc.) helps in effective communication, but a continuous dialogue is important throughout all phases and activities. Stakeholder involvement brings both knowledge and preferences to the planning process – a process that typically will need to find suitable compromises among all decision makers and stakeholders if a consensus is to be reached.

Figure 4.2 shows the sequence of steps to be followed in the Kuwait ICZM planning and implementation process. Figure 4.2 shows the main activities and the main links. Besides the above-mentioned feedback loops, there are more links between the various steps then what is now indicated by the arrows. Moreover, many of the arrows are two-directional while the figure only shows one direction. These details are omitted as it will make the main picture less clear.

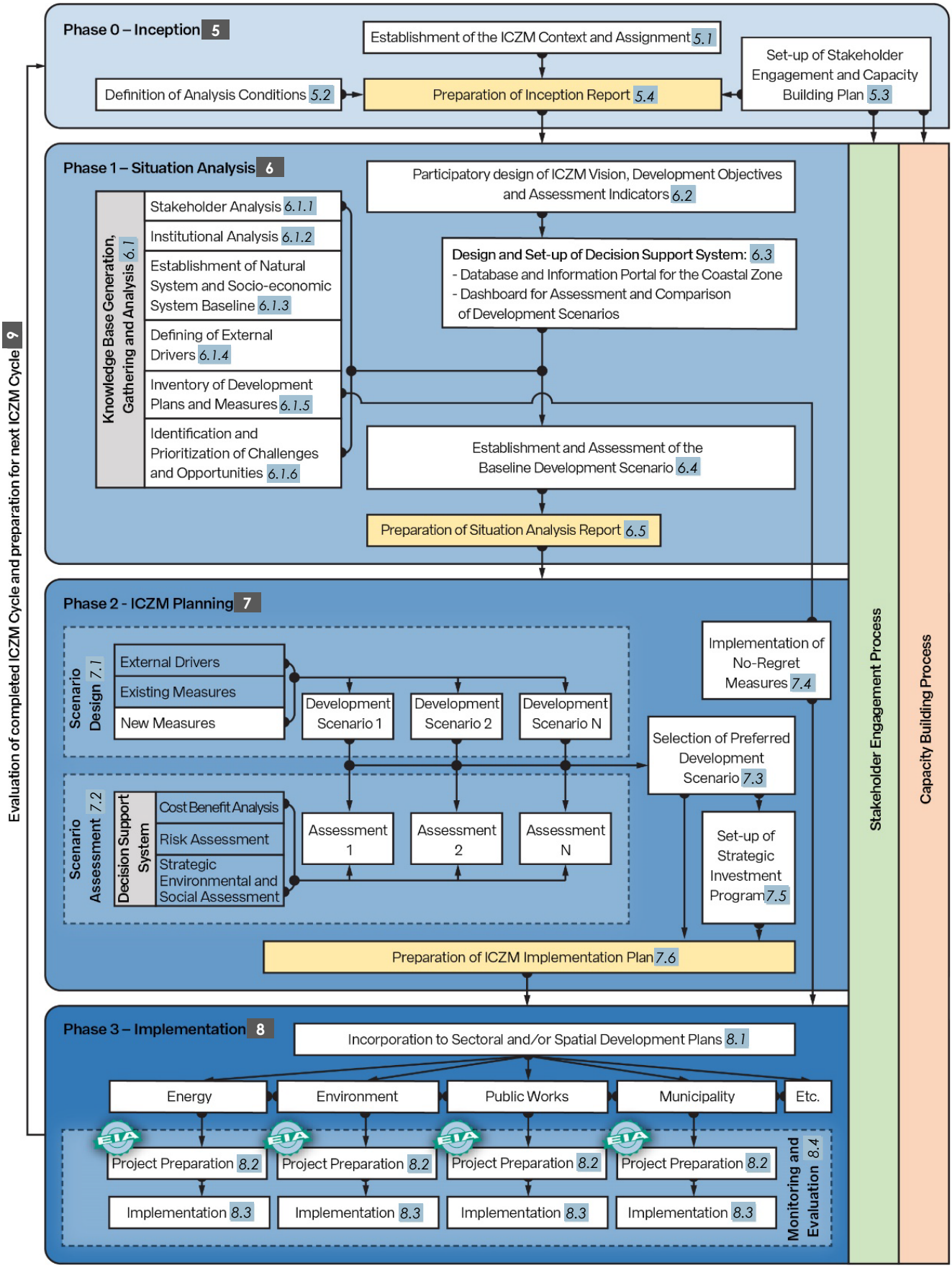

Figure 4.2 The Kuwait ICZM Framework in detail (numbers in the diagram refer to chapters in this report where more detail is provided)

The first three phases (0, 1 and 2) are the planning part of the framework. The ultimate result of these three phases is an integrated ICZM Implementation plan on the development and management of the coastal zone. It is a kind of master plan in which the various proposed measures/projects are tuned to each other and in which care is taken that a comprehensive development takes place. Integration is the key-word of this part of the framework.

The last phase (3) is about the implementation of the measures included in the preferred development scenario. This implementation is mostly done by individual projects as the agencies involved will be different. But also, during this phase it remains important that the overall integrated development as laid down in the ICZM Implementation Plan takes place. This requires a coordination of these developments at a higher level.

Each phase needs to provide the information desired by those institutions who decide on what is best to do, and when, and how. What those governing institutions need to know to be better informed before making their decisions varies among planning projects. But whatever that information is, the purpose of performing analyses is to generate and communicate it. The results of the analyses performed in the ICZM planning process should be of no surprise to those reading them in a final report or plan.

5 Phase 0: Inception

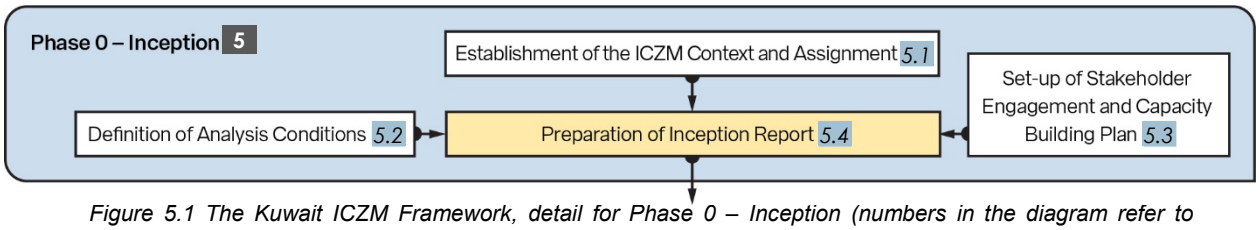

Figure 5.1 The Kuwait ICZM Framework, detail for Phase 0 – Inception (numbers in the diagram refer to chapters in this report where more detail is provided).

The purpose of **Phase 0 Inception** (Figure 5.1) is to lay the foundation for the entire ICZM planning process[3].

The final product of the Inception phase is an Inception Report which includes a work plan, establishes the timeline, organization and (basic) procedures of the planning process. Starting points are the current ICZM context and the conditions and scope of the analysis to be taken into account. Finally, a stakeholder engagement and capacity building plans are produced to guide and connect all stakeholders to the ICZM process.

During the Inception phase, the appropriate internal government procedures will need to be followed to obtain the necessary approvals, capacity, support and funding. In addition, if the State of Kuwait would need additional support from a 3rd party to accompany the planning process (analytical work, consultancy) the necessary procurement process will need to be followed.

The following four paragraphs provide the background and basic introduction to each of the four activities in the Inception phase. Also, where available, a brief introduction of and introduction into the current Kuwait situation is provided in each paragraph.

5.1 Establishment of the ICZM context and assignment

General background and introduction

The ICZM process, i.e. the design and implementation of the ICZM plan, is a recurrent process. The ICZM process is initiated by an authority with the mandate to carry out an ICZM plan – that mandate can be embedded in legislation or regulation. An ICZM plan does not happen in a vacuum and would need to build on and influence existing and ongoing sectoral and spatial plans.
The Planning authority will put together a multidisciplinary ICZM planning team that will accompany and support the planning process. The context and assignment for the ICZM plan are defined by the initiating authority. The *context* encompasses the general setting of the ICZM process. The *assignment* includes the specific conditions and instructions that the initiating authority requires to be taken into account by the ICZM planning team. Context and assignment give the ICZM process both mandate and direction.

[3] The Inception phase may be limited to the set-up of the Situation Analysis phase and the ICZM Planning phase only. It is common that the Implementation phase is carried out in a different organisational setting and hence a separate set up is needed. Still, it is good practice to look forward to the Implementation phase to ensure and enable maximum and optimal connection to and feasibility of implementation.

Elements of the context include:

- The motivation of the ICZM process, i.e. why does the government initiate the ICZM process?
- The goal(s) of the ICZM process, i.e. what does the government want to achieve?
- The policy, law or regulation in which the ICZM process is embedded
    - Note that sometimes ICZM is not (yet) embedded in (national) law or regulations. In that case, the initiating authority should specify the law or regulation that gives authority to the ICZM process. Sometimes the goal of a 1st ICZM process is to draft the law or regulation.
- The institutional arrangement to govern the ICZM planning process including the specific set of institutions, their roles and responsibilities

Elements of the assignment (may) include:

- Other previous or ongoing strategic planning, master planning or integrated planning processes that the ICZM process needs to align with. Often, there is an overarching (national, regional or local) vision document or strategic outline that the ICZM plan must align with.
- Specification of formal decision-making structure, if not prescribed in law or regulation, i.e. who and how will the ICZM plan be approved?
- Appointment of steering group and/or guidance group
- Timeline for the ICZM process, i.e. when must the ICZM plan be finished?
- Available resources, i.e. manpower and budget, for the ICZM process

Context and assignment are typically laid down in a brief or terms of reference. Iterations may be needed between the initiating authority and the ICZM planning team to resolve unclarities or uncertainties before adopting the final document.

5.2 Definition of analysis conditions

General background and introduction

In addition to the more legal and institutional oriented context and assignment as described in section 5.1, this step provides clarity on the analysis conditions for the ICZM process. Analysis conditions are the concrete and numerical conditions and assumptions to be applied throughout the ICZM planning process. Note that some analysis conditions may already have been included in the context and assignment as well. If not, they must be specified by the ICZM team and agreed upon by the decision makers.

Analysis conditions to define for the ICZM planning process include:

- System boundaries of the natural system, the socio-economic system and the institutional system - the components and the level of detail that will be included, e.g.:
    - How far offshore and how far onshore does the ICZM plan extend? Sometimes this is prescribed by the law or regulations and already included in the context.
    - What are the administrative boundaries (national, province, municipality, etc.) to be included?
    - What is the zone of influence that must be included in the ICZM process, but does not fall geographically in the ICZM plan? An example is the hydrological catchment from which water and substances such as nutrients and pollutants are transported to the coastal zone. An ICZM plan does not include the whole hydrological catchment, but measures and developments in the catchment are relevant if not essential for the coastal zone.

    - For the purposes of modelling, it has often proven useful to subdivide the coastal zone into units with similar characteristics and suitable boundaries. Examples are subdivisions into a coastal zone dominated by delta dynamics, the interactions between groundwater and a surface water system, a particularly relevant ecosystem (e.g. benthic habitats and fish resources), major coastal dynamic processes (e.g. currents, tides, shoreline erosion) etc. The definition of (sub)systems and their boundaries should be done early in the planning exercise in such a way that the natural systems across area boundaries can be reasonably determined, modelled and assessed.
- The base year for the study and the future time horizon(s) for the study:
    - Future time horizons may include short term (e.g. 5 years), medium term (e.g. 30 years) and long term (e.g. 50-100 years).
        - The short term refers to ongoing measures and to measures that can be implemented quickly and have a noticeable effect quickly.
        - The medium term refers to the life-time of economic investments and business plans.
        - The long term refers to the life-time of major infrastructure such as ports, roads and coastal protection. Currently, also climate change impacts are considered in the term of a century.
        - The time horizon used in the overarching (national) strategic vision is often applied as it ties the ICZM process to the national planning.
    - Future time horizons must be compared against a base year, also called a reference year. Usually, the most recent year for which basic data on the present situation is available is chosen as the base year.
- External driver assumptions concerning factors external to the ICZM study, such as climate change, the growth of population, food and energy consumption and prices. See also section 6.1.4.
- The discount rate to be applied in the economic analysis:
    - The discount rate is specified by (e.g.) the Ministry of Finance or Economic Affairs, or by the financier of the planned investments (e.g. Asian Development Bank, World Bank and Japan International Cooperation Agency).
- Data, time and budget constraints. Studies have to be executed within constraints of available data, time and budget.

The choice of the time horizons should be given sufficient attention. Official planning horizons (e.g. five, ten and twenty-five years) are typically used as time horizons for elements of the analysis. However, one should also consider the time scales of the natural and socio-economic systems and the processes and response times within it. Decision makers may tend to focus on short-range decisions even if they impose possible risks in the long term. System components will have characteristic time scales. For example:

- Economic activities have life cycles that are determined by the amortization period of the investments, typically 30 years.
- Social institutions have time horizons that depend on the pace of legal/institutional and political decision making.
- Physical-chemical systems have time scales that depend on the response or restoration times of the systems. Restoration of a polluted coastal, for example, may be achieved within a few months, while the restoration of a mangrove habitat may take many years.
- Ecosystems may have a time scale of a few weeks (algae blooms) or tens of years (degradation of mangrove forests), depending on the type of process or intervention.

Kuwait context

The ICZM planning process has to align to the Kuwait Vision 2035 and therefore 2035 is an important time horizon to be included. Other time horizons, for example related to climate change, are not yet defined.

The ICZM Planning Framework will look into all existing and planned activities along the 500 km long coastline, from the North (area around Khor Subiya) to the South (Nuwaiseeb) and all nine islands (Warba, Boubyan, Failaka, Auha, Miskan, Um Alnamil, Kubbar, Qarouh, and Um Almaradem). There is not an official definition of a coastal zone area for Kuwait.

5.3 Set-up of stakeholder engagement plan and capacity building plan

General background and introduction

In order to account for inclusiveness in the ICZM process, it is important to identify stakeholders and to ensure effective representation and input of these groups throughout the ICZM planning process.

Stakeholders *are persons or groups who are directly or indirectly affected by the ICZM plan, as well as those who may have interests in the ICZM plan and/or the ability to influence its implementation and outcome, either positively or negatively.*

In this step during the Inception phase, a stakeholder engagement plan is developed which outlines how and when stakeholders will be involved in each of the activities throughout the ICZM process. A first identification of stakeholders is included, most likely consisting of the stakeholders that are obvious and well-known. An in-depth and complete stakeholder analysis is carried out in the Situation Analysis phase (section 6.1.1). Special attention should be given to vulnerable and underrepresented communities to ensure that the ICZM planning process is social and gender inclusive.

Stakeholder engagement starts at an early stage in the planning process and continues throughout the life of the planning and the implementation phases. It requires a broad, inclusive, and continuous process as phases and activities change, relationships develop, and insight grows. Stakeholder engagement does not only generate overall acceptance and ownership of the planning process but also gathers knowledge and preferences.

Identifying stakeholders

A first necessity is the identification and involvement of the different societal groups and people that are involved and/or impacted differently by changes in coastal zone management and planning. In general, two categories of stakeholders that require attention, can be identified:

1. People and organizations needed to implement the plan, and
2. People and organizations that will be affected by the plan.

Relevant stakeholders may include government ministries, departments and agencies; private sector organisations; civil society organisations; non-governmental organisations (NGOs); universities and/or research institutions; and regional organisations. Special attention will be given to vulnerable and underrepresented communities to ensure that they participate in the ICZM planning in a meaningful way.

Every step of the development of the ICZM plan needs to make sure that trusted representatives of the identified groups effectively participate in the ICZM planning process and that they are given the information and tools to communicate with the groups they represent. Stakeholders' consultations should be social and gender equitable. Specific attention is required to the involvement of those that are most vulnerable to be left out: based on personal characteristics (ethnicities, genders, ages, religions, political orientations, disabilities) or because they are not aware of the process and potential impact.

Additional Information - Appendix B.4

Stakeholder Engagement Plan
A Stakeholder Engagement Plan is developed that includes key elements:

- Preliminary Stakeholder identification, including differentiation of groups and their interests
- Work program including the (i) objectives, methods and timeline for engaging each group of stakeholders, (ii) Resources and responsibilities and (iii) Monitoring and reporting.

The “stake” that each stakeholder or group has in the ICZM plan will vary. The intensity with which they are involved in the ICZM process should match with the differences in stakes and influence. It is likely that in the Inception phase not all stakeholders will be (appropriately) identified and not all elements of the stakeholder engagement plan can be written. A thorough stakeholder analysis will be done in the Situation Analysis phase (section 6.1.1). It is important, however, that the key stakeholders are involved as early as possible, so that the key stakeholders can already be involved in the process of the Situation Analysis phase.

A wealth of quantitative and qualitative methods is available to facilitate the participation, such as:

a. Surveys: structured on a series of questions to obtain a view of, or to appraise, a certain element in the ICZM plan. Surveys may be administered electronically, via phone or mail, as well as face to face. They are used to gather and compare information from a large number of people. They are not suitable for gaining a detailed understanding of a specific issue and should be combined with qualitative methods such as focus groups, interviews or workshops.
b. Interviews: undertaken individually or with more than one interviewee. One-on-one interviews have the advantage of allowing enough time to learn what key stakeholders think or know about a certain topic, as well as to develop a more detailed understanding of their opinions.
c. Focused Groups: specific issues are explored in depth through a structured but open-ended discussion, led by a trained facilitator. Structured to test the opinion of specific categories of stakeholders on a specific issue, focus groups can help reduce inhibition and promote open discussion by gathering similar types of people (e.g. women, ethnic minorities) in the group.
d. Workshops: different types of relevant stakeholders can be provided the opportunity to discuss and share knowledge, views and lessons learned on a specific issue.

During group discussions or workshops, some tools also exist to facilitate the participation and communication in a safe and trusted environment. One of those tools is for instance the collaborative modelling which seeks to engage stakeholders in joint analytical modelling activities to test and assess the performance of coastal systems under a variety of policy options. Other examples are the so-called serious games in which a serious (virtual) role play game helps to clarify the various actors, their interests, and interdependencies.

Capacity Building Plan
Different organizations have different roles and mandates regarding ICZM. Consequently, the officers of these organizations have specific tasks related to ICZM that they have to perform. On the first iterations of ICZM planning in Kuwait, roles and responsibilities of these government organizations will need to be clearly defined and might develop as ICZM planning evolves in time.

In the Situation Analysis phase, as part of the Institutional analysis (section 6.1.2) a further training needs assessment will be done: an inventory of the level of skills, knowledge and resources that is needed to perform these ICZM-related tasks, the actual level of these skills, knowledge and resources and the gap between these levels. From this gap analysis follows the training needs and from that the training/capacity building plan.

The Capacity Building Plan normally includes the following key elements:

- Roles and mandates of the different organizations
- Number and type of functionaries involved in ICZM
- Specific roles and tasks of the relevant functionaries
- Level of skills, knowledge and attitude needed for these roles and tasks
- Actual level of the functionaries' skills, knowledge and attitude
- Skills, knowledge, attitude that need to be trained and the different target groups
- Type of capacity building activities per target group
- Time schedule for the different capacity building activities

A specific skill that may need to be trained before or early in the Situation Analysis phase is the skill to effectively participate in socially and gender inclusive stakeholder engagement activities.

Kuwait context

Inclusive stakeholder engagement is developing in Kuwait. For example, the concept of Public Hearing is not common among governmental institutes and it is not required by law. Once a plan is drafted by the government, it is normally implemented regardless of the public participation. The State of Kuwait is in the process of including stakeholder engagement by requiring a public hearing section as part of the Environmental Impact Assessment (EIA), where an EIA report will not be approved without it.

The list below includes key government representatives that could be considered as stakeholder in the ICZM process.

1. Ministry of Finance
2. Ministry of Communication
3. Ministry of Public Works
4. Public Authority of Agriculture Affairs & Fish Resources (PAAFR)
5. Environment Public Authority
6. Port Authority
7. Municipality
8. Kuwait Institute for Scientific Research (KISR)

And possibly:

9. Public Authority for Applied Education and Training (PAAET), department Environmental Health
10. Kuwait University (Marine Centre)

The main stakeholders that oversee projects and activities along the coast are as follows:

- Government (EPA, Ministry of Finance, Kuwait Municipality, Ministry of Electricity and Water, PAFFR, Port Authority (Ministry of Communication), Ministry of Interior, Firefighting Department, Ministry of Public Works, and Coast Guards)
- Private (Touristic Enterprise Companies, K-Oil companies, and private investors)

Non-governmental key stakeholders could include community and women associations, religious groups, private sector, parent's associations, NGOs, etc. A stakeholder engagement plan can build on existing formal or informal mechanisms such as diwaniyas (representing the Kuwaiti male citizens) or the afternoon tea gatherings or women society events (representing Kuwait female citizens). The stakeholder engagement plan should look closely into how to involve representatives of the non-Kuwaiti residents, approximately 70% of the Kuwait population, into the ICZM planning process.

5.4 Preparation of Inception Report

General background and introduction

The final product of the Inception phase is the Inception Report. The Inception Report contains the findings of and decisions made during the Inception phase including the context and assignment (section 5.1) the analysis conditions (section 5.2) and the stakeholder engagement and capacity building plan (section 5.3.). It should make clear what will be studied, why, how and with who. In many cases, it will also specify what will *not* be studied and why.

In addition, the Inception Report describes in practical detail the different phases and steps of the ICZM process. The Situational Analysis phase and the ICZM Planning phase are described in detail. Often the Implementation phase is described in broad strokes only, as the Implementation phase depends on the ICZM plan that is only available at the end of the ICZM Planning phase (see section 4.3).

An essential part of the Inception Report is the work plan, in which time, budget and human resource allocations to various activities are specified. This work plan typically includes bar charts for activities and staffing, time schedules for deliverables, milestones, reporting procedures and similar features. The Inception Report should also include a communication plan that describes the interaction between the decision makers and the ICZM team. The interaction between stakeholders and the ICZM team is described in the stakeholder engagement plan (see section 5.3).

Elements of the work plan focusing on the practical and organisational elements are therefore:

- Team: The way in which the ICZM team is organised and who will be part of it.
  - Who is doing what?
  - What are roles and responsibilities, e.g. project manager, communication and outreach manager, scientific manager, office manager, etc.? Each activity should have a responsible person in the lead as well.
- Organisation of the ICZM process: Operational team vs Managerial oversight vs External feedback group.
- Activities. The different steps and activities that need to be taken in order to successfully implement ICZM, and with which stakeholders
- Resource allocation. The way in which the (financial and human) resources are distributed among the activities.
- Timeline. An overview of the ICZM planning that includes deliverables, milestones and reporting procedures.
- Reporting procedure and reporting schedule
- Procedures for adaptation of the work plan

Example table of contents of the Inception Report of the Manila Bay Sustainable Development Master Plan
Only the first (chapter) and second (paragraph) level of the table of content are shown.

Procurement

These guidelines assume that a team of governmental staff is leading and executing the ICZM process. One or more consultants may be contracted to undertake or contribute to certain activities of the planning process. As the procurement process may take up to several months, the procurement process must be planned accordingly to fit in the work plan.

Note that it is not uncommon that the government might source out support to the ICZM planning process to a third party, a consultant or consortium. In that case, the government will procure and become the client of a consultant/consortium and the consultant/consortium will support the government in the execution of the ICZM process. The government continues to be the ultimate owner of the plan as the mandate for planning remains within the government. The government might prescribe these guidelines as the framework for the ICZM process. The consultant will be drafting the Inception report to be approved and accepted by the client.

6 Phase 1: Situation Analysis

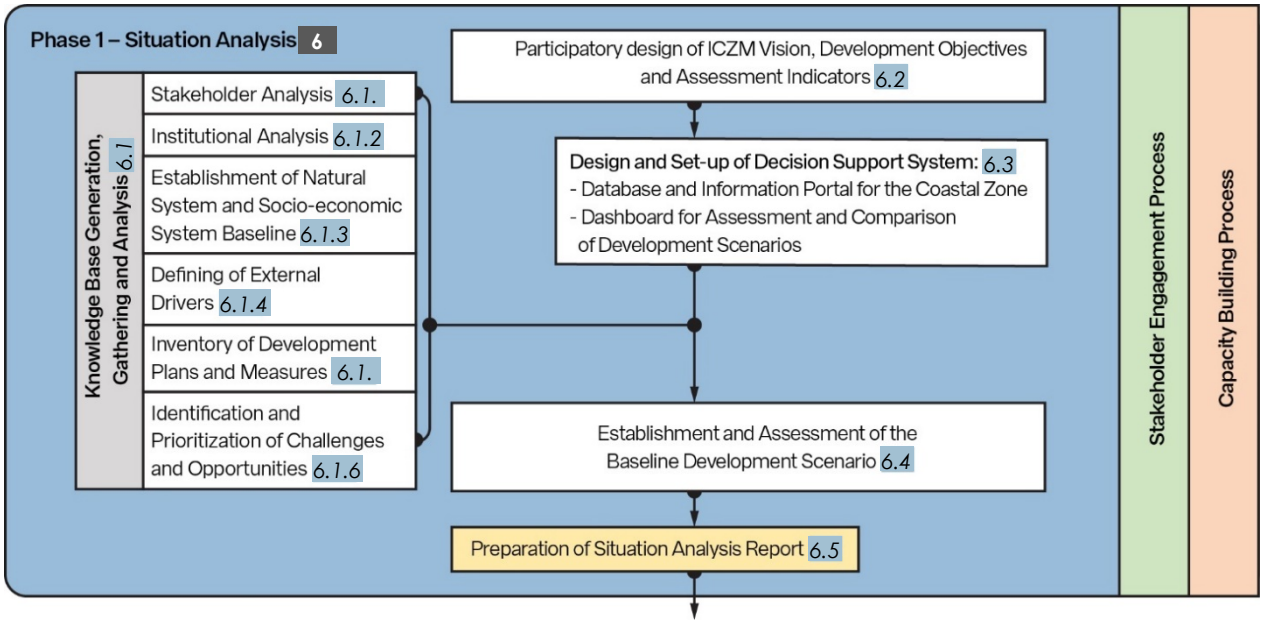

Figure 6.1 The Kuwait ICZM Framework, detail for Phase 1 – Inception (numbers in the diagram refer to chapters in this report where more detail is provided).

The objective of **Phase 1 Situation Analysis** (Figure 6.1) is to lay the foundation for the assessment and comparison of development scenarios (sets of measures) and the eventual selection of the preferred development scenario and specification in the ICZM Implementation plan. To make it possible that a development scenario can be selected, the Situation Analysis phase covers three basic activities:

1. The design and definition of a vision, the development objectives and the assessment indicators that allow intercomparing and scoring of development scenarios (section 6.2)

2. The set-up of a Decision Support System (DSS) that can quantify the indicators and can visualise the positive, neutral and negative effects of development scenarios to inform decision makers and stakeholders (section 6.3)
   - The DSS generates analysis and knowledge of the hydrological, environmental, social and economic implications of the ICZM plan. The DSS normally include a series of modelling tools as well as assessment methodologies such as:
     - A system to visualise, generate, store and share information
     - A suite of models to represent current and future situations and their impact on e.g. coastal morphology, water quality and ecology as well as social impacts
     - Economic assessment methodologies such as cost benefit analysis
     - Institutional assessment methodologies
     - Stakeholder engagement methodologies

3. The generation of the knowledge base that includes the compilation and generation of data and information for the natural system, the socio-economic system and the institutional system (section 6.1)
   - The objective is to compile or produce the necessary data and information on coastal resources, environmental, social, economic, and institutional data and information needed to guide the ICZM Planning process. Normally, a planning process requires the following sets of data and information:

- Status and trends of the physical, socio-economic and environmental aspects of the coastal zone
- Mapping of current infrastructure as well as planned sectoral and spatial developments
- Coastal management institutional framework

The Situation Analysis phase involves stakeholders in all three activities.

6.1 Knowledge base generation, data and information gathering and analysis

This step is split up in six sub-activities that ensure appropriate understanding of the natural, socio-economic and institutional systems. Both the current and potentially even historic situation and the future situation are included so that current and future challenges can be prioritised and addressed in the ICZM Plan.

6.1.1 Stakeholder analysis

General background and introduction

The prerequisite for the design of a participatory planning process is a good stakeholder analysis. In the Inception phase, a start was made with the identification of key stakeholders (section 5.3). In the Situation Analysis phase, a thorough stakeholder analysis is performed.

*The **stakeholder analysis** is a supporting planning tool that supports the identification of stakeholders and their engagement. Particularly, this analysis technique supports the task of identifying and in some occasions classifying the stakeholders according to their roles, capacities, interests, concerns and needs, as well as their dependencies.*

A stakeholder analysis helps to further develop the Stakeholder Engagement Plan. It also reduces the possibility of forgetting important risks. Besides that, it increases the chance that the various groups of stakeholders are willing to cooperate in solving the identified problems and issues. The stakeholder analysis contains the following steps (Deltares, 2019):

1) Situation analysis as point of departure
2) Inventory of the stakeholders involved (e.g. primary, secondary and tertiary stakeholders).
3) Mapping of formal relations according to their functions and responsibilities.
4) Inventory of interests, perceptions and needs
5) Mapping of interdependencies.

Theory and practice might differ, so a distinction must be made between the official/desired situation and the real situation. There are different ways to present and summarize the stakeholder analysis. Some tools are presented in Appendix B.3.

It is to note that the “stake” that each stakeholders or group has in the ICZM Implementation plan will vary, and so should the intensity with which they are involved in the process, according to the differences in stakes and influence. Stakeholders may also have different levels of involvement or different methods of participation. In general, the number of stakeholders in the various categories decreases with the intensity of involvement of the categories, as shown in Figure 6.2.

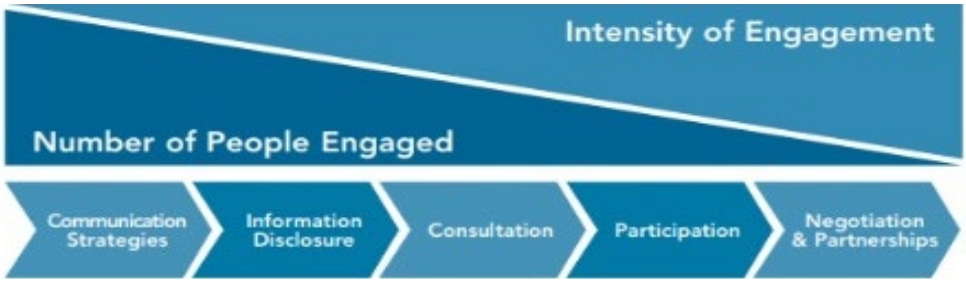

Figure 6.2 Spectrum of stakeholder engagement (IFC Stakeholder Engagement Guidelines)

Following the updated and completed results of the stakeholder analysis, the Stakeholder Engagement Plan may be updated.

Additional Information – Appendix B.3

6.1.2 Institutional analysis

General background and introduction

ICZM effectiveness and viability are limited by challenges in governance. In this activity, the institutional issues that may either facilitate or constrain the development and implementation of the ICZM plan are identified. Institutional issues include the legal and administrative aspects. Potentially constraining institutional issues are weak law enforcement, competing jurisdictions and decision-making, existence of fragmented policies affecting coastal areas, lack of integration of ICZM into different levels of the administration.

Traditional sectoral institutional arrangements have limitations in bringing together different governmental and non-governmental players to the ICZM process. Even if countries manage to develop the government-coordinated actions towards development of the ICZM approaches, many ICZM plans are not put into practice due to a number of obstacles for implementation due to shortcomings or deficiencies in the legal, institutional and administrative framework.

The objective of the institutional analysis is to identify the institutional arrangements for the preparation and implementation of the ICZM plan in Kuwait. The institutional analysis provides a clear description of the current institutional situation by 1) mapping the existing institutions with a mandate relevant to ICZM, 2) identifying possible gaps and overlaps in the different mandates, and 3) describing the institutions relative capacity and coordination mechanisms. The main elements of the institutional analysis are broadly defined as:

- Institutional Analysis: aimed at identifying the existing institutions with a mandate relevant to ICZM including but not limited to ministries, departments, multi-ministerial entities, agencies, committees, states/regions, etc. The policies, laws and/or regulations in which the mandate is designated are inventoried. The analysis also includes the roles, functions, responsibilities and main activities of these agencies and as well as an identification of the gaps and overlaps in mandates.
- Governance Analysis: aimed at identifying and examining the efficiency and efficacy of relationships between the different institutions with a mandate in coastal zone management. The objective is to ascertain whether the existing entities have an effective governance mechanism for ICZM planning. The relationship between the coastal management agencies and other stakeholder groups such as civil society, and the general public will be defined in order to get an indication on transparency and accountability.

An analysis on how gender and diversity are appropriately considered in governance structures might also be defined here.

- Management Analysis: aimed at examining the efficiency of existing institutions with a mandate on coastal zone management, including management structure, staffing, capacity, and budget. The management analysis can be further extended to focus on those agencies with a key role on the ICZM planning process to provide a higher level of detail in the support needed to perform ICZM-related tasks.

The methodology for the institutional analysis normally includes a combination of:

- Inventory and literature review of existing legislation, policies, strategies, spatial and sectoral development plans, coordination agreements, and any other documentation relevant to better understanding.
- Consultations and interviews with key personnel, decision makers and stakeholders both to fill in the gaps of information but also to test and validate the institutional arrangement for ICZM planning.
- Workshops to enhance the participatory approach in the process of institutional analysis for the participants to discuss the institutional arrangements, to identify constraints of current governance in the coastal units, to identify (potential) problems and opportunities.

The institutional analysis may provide advice on (adaptations to) the institutional arrangement for ICZM planning process and coordinate the implementation of ICZM Plan. In the ICZM process, it is recommended to consider the careful design of the institutional framework in the very early process of ICZM planning including handling institutional overlap in the respective mandates of institutions, and all interlinkages between institutional arrangements, administrative structure; policy, strategies, plans; legislation; participatory and financial mechanisms.

From this description it will be clear that there is an overlap between stakeholder analysis and institutional analysis. Many of the stakeholders are governmental institutions, hence the overlap with the institutional analysis.

Kuwait context

Further recommendations on consideration for developing the framework from the institutional point of view are presented in more detail in the report: “Policy and institutional settings for ICZM from around the world” (Enet, 2020) in which recommendations for Kuwait are presented.

6.1.3 Establishment of natural system and socio-economic system baseline

General background and introduction

In this step, a description and analysis of the two other integrated elements of the coastal zone are provided, i.e. the natural system and the socio-economic system. These descriptions and analysis may also be split in separate tasks. Note that the institutional system is described and analysed in section 6.1.2.

Most decision makers and stakeholders will be non-technical or only know about a (limited) part of the overall system. To be able to make balanced decisions they should understand how the overall system functions and how interventions in one part of the system will impact other systems’ elements. The objective of this activity is to provide the decision makers and stakeholders with the understanding that is relevant for them. This requires the reduction of a complex reality into a comprehensible description of system components and linkages. Choices have to be made about what should be included to what level of detail and what can be ignored.

Such choices require scientific and socio-economic judgment in combination with an understanding of the problems and possible measures that can be taken to improve system performance.

The description and analysis of the natural system and the socio-economic system are based on available data and information. The analysis may identify knowledge gaps. Only knowledge gaps that are deemed crucial for decision making, i.e. a decision cannot be made without this knowledge, should lead to additional research during the Situational Analysis phase. Knowledge gaps that are considered relevant but are not crucial, can be included as measures for further research in the ICZM Plan (section 7.6). Results will then be available either during the Implementation phase or at least for the next cycle of the ICZM process (section 9). For the ongoing ICZM process, the non-crucial knowledge gaps can be covered by, for example, expert judgements, work-arounds or sensitivity analysis.

Three steps are taken to describe and analyse:

1. Data and information collection and synthesis on selected natural and socio-economic topics
2. Building a conceptual framework of how the natural and socio-economic systems work and interact
3. Setting up a concise and comprehensible narrative to convey and communicate the key characteristics of the coastal zone that are relevant for decision making, to decision makers and stakeholders

In the first step, a number of key experts compile a synthesis of current knowledge. For the natural system, a synthesis is typically required for:

- The hydrodynamic system of water levels, currents, salinity, temperature and stratification patterns both in daily and seasonal variation and in extreme events
- The morphologic system of sediment composition, sediment movement and transport, coastline change, sedimentation and erosion patterns
- The water quality or (bio)chemical system of nutrients, dissolved oxygen, suspended sediments, pollutants such as heavy metals, organic micro-pollutants and oil spills; chlorophyll-a, algae composition and primary production
- The ecological system of habitats and species, biodiversity, food web from zooplankton and invertebrates and shellfish to fish, birds and mammals

The starting point for an analysis of the socio-economic system is an assessment of the present economic situation with respect to the coastal activities and the factors that determine these activities. Past trends can help provide information on factors that have been decisive in bringing about the present situation and that may give clues about the likely impacts of future developments. One's attention should be on the most important factors that determine relevant coastal activities rather than on analysis of the total economy. Thus, for the socio-economic system, a synthesis is required for:

- Economic activities in the coastal zone including their dependencies on the coastal zone, contribution to GDP, employment figures, etc.
- Population including spatial distribution and break down in gender, age, income distribution, etc.
- Land-use coverage and coastal and/or marine spatial zoning

In the second step, a conceptual framework is set up that shows the (key) interlinkages in the natural and socio-economic system and the (most relevant) cause-effect relationships. A useful method for a conceptual framework is the DPSIR method. The DPSIR framework is a widely used framework initially developed by the European Environment Agency linking socio-economic developments and human activities to (impacts on) the state of the environment and the ecosystem. DPSIR is an abbreviation of Driving forces, Pressures, State, Impact and Responses. A brief explanation and visualization of these terms and the linkages is shown in Figure 6.3.

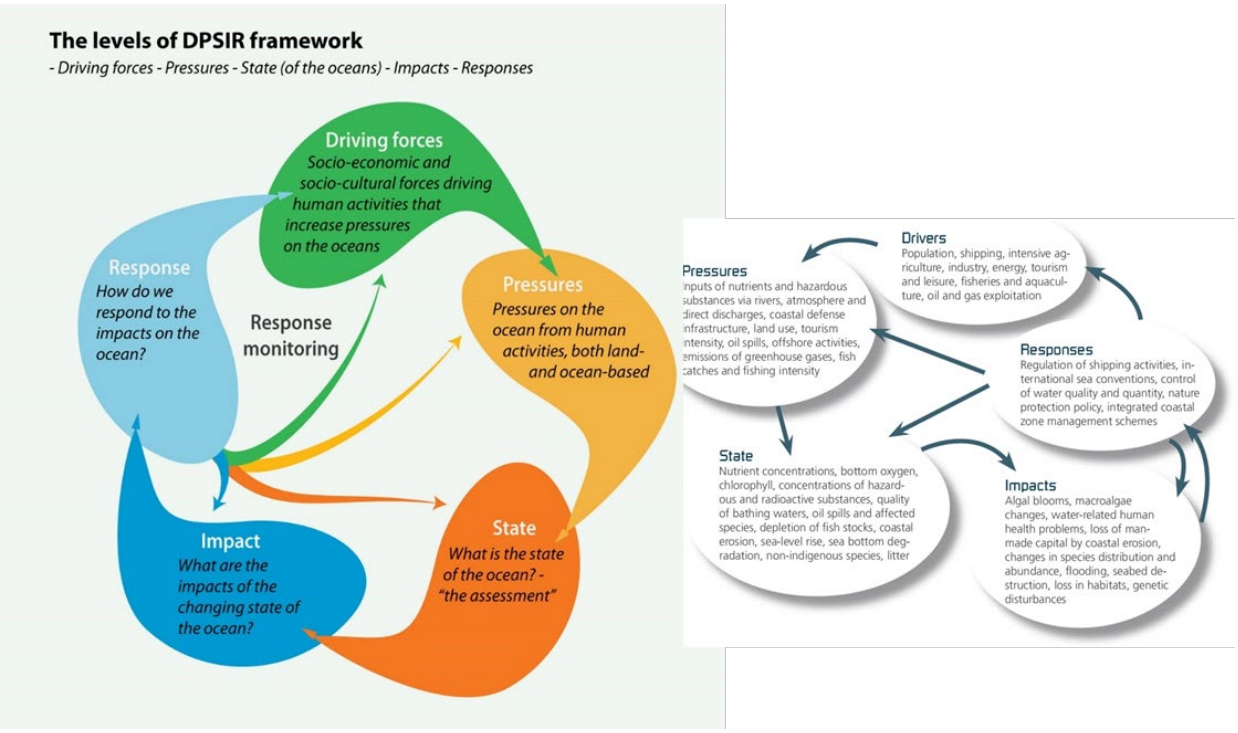

Figure 6.3 The DPSIR framework (left) and a simple example (right).

Societal developments drive human activities and these human activities create specific pressures on the natural system, which cause changes in the state of the natural system. These state changes impact our society, both socially and economically. Undesired societal impacts may demand changes at different levels in the DPSIR to overcome these impacts. Commonly, policies can be adapted, by changing e.g. specific land use (planning), or pressures can be adapted, e.g. by changing the human activities and the pressures they exert on the system.

The conceptual framework is usually set up collaboratively in a workshop setting with the experts, the ICZM team and key knowledgeable stakeholders. One or two iterations are generally required to compile all information, to discuss everything and – most importantly – to reduce the often complex and elaborate framework to the key components relevant for decision making in the ICZM Planning phase. In between the iterations, it might be necessary to return to step 1 to address certain questions, unknowns or uncertainties that came up during the workshop. The collaborative and participatory approach can be a key component of the stakeholder engagement plan (section 5.3).

Finally, in the third step, a concise and comprehensible narrative – "State of the Coast" – is set up to inform the decision makers, the stakeholders and possibly even a wider audience such as the general public. The narrative may have several forms simultaneously such as a website, a 2- or 4-page brochure and a report of no more than 50 pages.

Kuwait context

Please refer to chapter 3 for an overview of the state of the coast in Kuwait.

6.1.4 Defining of external drivers

General background and introduction

As defined in section 4.1, an external driver is an external development beyond the control of the decision maker. A good plan for development and management should not only address the present problems but should also prepare for problems that might arise in future. To predict the future, assumptions have to be made. External driver components for coastal zone studies are socio-economic developments (e.g. growth of population and economic activities) and climate change (e.g. sea-level rise, temperature rise). For the economic evaluation of the plan it might be needed to make assumptions about the future prices of energy and food. Changes in diet (e.g. the consumption of more fish) can also be important.

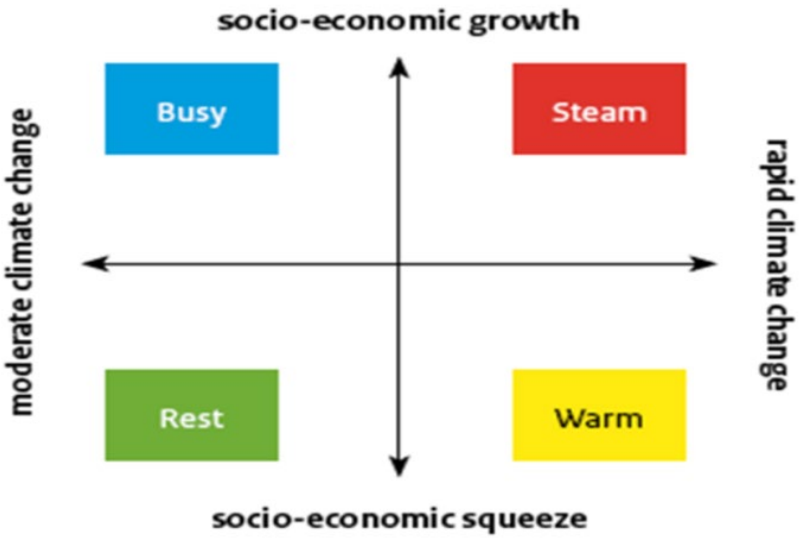

Figure 6.4 External drivers combinations of socio-economic growth and climate change

The most used combination of external drivers are presented in a quadrant of low and high economic growth versus slow and fast climate change (Figure 6.4). Ideally the whole analysis should be carried out for all kinds of external driver combinations and the selection of the best strategy should be based on the evaluation which strategy is able to cope with all these possible future developments. In reality, most analyses are carried out for the most likely combination of external drivers, based on a trend analysis or Business-As-Usual (BAU). The strategy that follows from this is then analysed in a 'scenario analysis', to test the strategy on robustness and flexibility for other possible futures.

External drivers for economic growth and for climate change are often available from national planning institutions. It is important that the ICZM process makes use of and/or aligns with these available future predictions. Note that external drivers may already be provided as part of the context and assignment (section 5.1).

An important activity in external driver development is a spatial planning analysis of expected developments. The expected socio-economic developments have to be translated into changed land-use, in particular spatial claims for urban settlements (requiring water supply, resulting in increased pollution loads, less food production, etc.). Road development plays an important role in expected changes in land use.

Kuwait context

An important external driver that has been already identified by Kuwait is climate change and its potential adverse consequences related to food security, water resources, public health, marine ecosystems and coastal zones. In 2019, the State of Kuwait submitted the Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) which summarized the presents the results of a series of studies that reveal how changes in variables such as local temperature and rainfall patterns, as well as rising seas, are expected to adversely affect vital sectors of the country.

Of the afore mentioned variables, rising seas (also referred to as SLR), is one of the direct consequences of climate change that has the greater impacts on coastal zones. Impacts can include: potential shoreline retreat on sandy coasts due to profile readjustment[4], increase on flooding frequency. (flood return period shortens as sea level rises), changes of tidal basins sediment budget and groundwater contamination. According to the Second National Communication (2019) document, there are a number of expected impacts due to SLR in Kuwait, as summarized in the textbox below

Expected impacts of Sea Level Rise in Kuwait (Second National Communication (2019) document)

" Rising sea levels pose threats such as wetland flooding, aquifer and agricultural soil contamination, destructive erosion and habitat loses for fish, birds, and plants. Sea level rise (SLR) also poses a threat to the built environment via the extension of Arabian Gulf waters farther inland, particularly under high tide conditions and especially in combination with storm surges associated with extreme storm events. Boubyan Island will be greatly impacted by SLR, with roughly half the island inundated in the highest SLR scenario (Figure 6.5). Only the relatively high land in the interior of the island will be visible above water by the end of this century. Coastal areas along Kuwait Bay are also projected to be adversely impacted by rising seas, especially the western coast near Doha Port and the densely populated neighbourhoods around Kuwait City. "

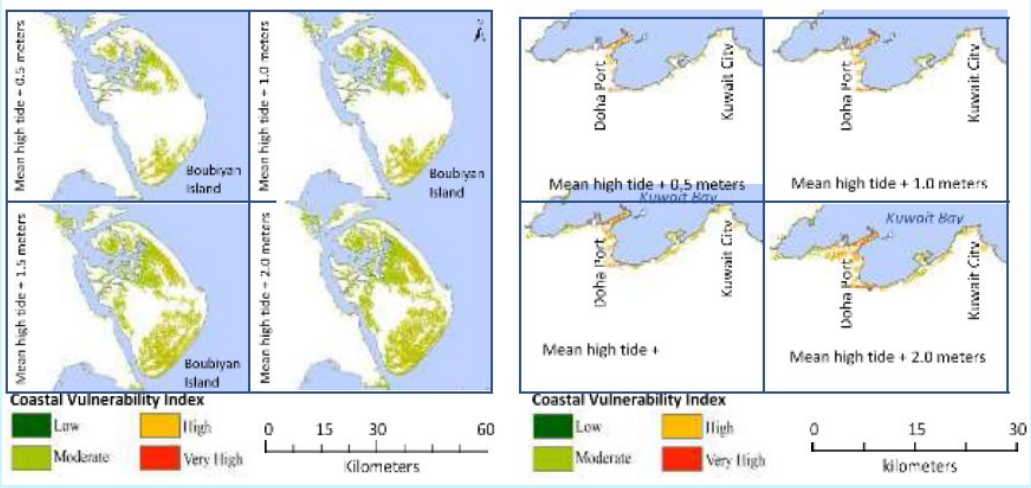

Figure 6.5. Innundated areas of Boubyan Island (left) and the southern area of Kuwait Bay (right). Source (Environment Public Authority, 2019)

[4] If there is enough sediment availability and at the right rate, shoreline progradation may also occur, but becomes less likely under conditions of sea level rise.

The previously identified impacts were based on four sea level rise scenarios above mean high tide: 0.5, 1.0, 1.5 and 2.0 meters. Looking in depth on how these SLR scenarios were defined for the State of Kuwait, it was found that only the lowest scenario had a relation with global mean sea level (GMSL) rise projections published by the IPPC AR5. The 0.5 meters of SLR for 2100 was justified as being a near mid-value between the lowest bound estimate for an optimistic greenhouse gas concentration scenario RCP[5] 2.6 (0.28 m SLR in 2100) and the upper bound of the most pessimistic greenhouse gas concentration scenario RCP 8.5 (0.9m SLR in 2100). The additional SLR values (1.0 , 1.5 and 2.0 meters), were just increases of 0.5m to the initial estimate for 2100 and they were used more as what-if[6] scenarios rather than a climate projection (which implicitly involves the definition of a time horizon (e.g. most likely Sea level risk estimate for 2050)).

The followed approach can be subjected to questionings such as:

- *Is it appropriate to use the SLR scenarios identified in the Second National Communication document as the most likely scenarios for Kuwait?*
    - Note that the 0.5m estimate was based on GMSL projections. GMSL estimates might differ significantly from regional or local estimates of SLR (on the regional scale, earth's gravitational field and ocean dynamics can become more relevant factors). Climate models can be used to obtain SLR estimates that are more applicable on Kuwait's context. In addition, factors such as anthropogenic land subsidence[7] can be a relevant driver for relative sea level rise in coastal environments, especially in places where groundwater or other ground resources (e.g. oil, natural gas) are heavily exploited.
- *Are what-if scenarios suitable for an Integrated Coastal Zone Management Planning exercise?*
    - Note that what-if scenarios are useful for identifying potential impacts and vulnerabilities of locations, such as the exercise developed by the State of Kuwait in the development of the Coastal Vulnerability Index which identifies hotspots vulnerable to possible increases in mean sea levels. Nonetheless, for a planning exercise, this information has to be complemented with most-likely projections attached to a future time horizon in order to guarantee that all planned development is able to withstand or adapt certain increased mean sea level. These projections can also give an indication on when an intervention in current coastal infrastructure might be required. The projections can be always compared to local observations and measurements to see if the rate of increase in SLR is accelerating or de/-accelerating to be able to correct the time available to intervene.

As mentioned before, the definition of the expected SLR scenarios for Kuwait is important for the implementation of an Integrated Coastal Zone Management Plan due the fact that expected trends in mean sea level need to be accounted for when regulations are made for example for the construction height and position from the shoreline of planned coastal properties or structures.

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[5] The Representative Concentration Pathways (RCP's) represent atmospheric concentrations of greenhouse gas according to possible future anthropogenic emission scenarios. RCP scenarios were named after a possible range of radioactive forcing values in the year 2100 (2.6, 4.5, 6 and 8.5 W/m2).

[6] What-if scenarios allow to test how impacts will evolve if the boundary conditions are changed (in this case SLR estimates)

[7] In order to do an assessment on anthropogenic land subsidence, a full study need to be carried out which involves the long-term measuring and monitoring of vertical land movement in Kuwait. To the best knowledge of the authors, this is not implemented for Kuwait's coastal zone. Estimates might be available from oil extraction site's, but locations are not near enough to the coastline to be able to use similar estimates to correct SLR projections.

It is noted that besides sea level rise, also other effects of climate change may be of importance for coastal zone management, such as changes in wind and waves patterns as well as changes in storm intensity and frequency. It will require further investigation by the State of Kuwait to identify the potential importance of these other external drivers in the country's coastline.

Other external drivers in the Kuwait context might be demographic projections made by the Central Statistical Bureau or similar institutions that make official estimates for the socio-economic development of the country.

6.1.5 Inventory of development plans and measures

General background and introduction

A *measure* is the implementation of a particular course of action. Measures can be divided into different categories: technical (investment), managerial, economic, ecological and institutional (see definition in section 4.1).

A *development plan* is an overarching plan that has either a geographical or sectoral focus typically with a longer-term view of 25 years or more. Other names for a development plan can be master plan, strategic plan or vision document. A development plan is characterized by providing an outlook to the future and a chosen direction for development of the geographical region (e.g. country, municipality, coastal zone, etc.) or for development of a certain sector or a public service (e.g. energy supply, fisheries, tourism, coastal protection, nature protection and restoration, etc.). Sometimes, but not always, the development plan contains a list of measures. The ICZM plan is an example of a development plan.

This activity follows a two-step approach: first an inventory of measures and second an initial screening of measures to select the measures to be included in the Strategy Building phase. The list of screened measures will be the starting point for the establishment of the baseline scenario and for the development scenarios (section 6.4 and 7.1 respectively).

The first step therefore is to make an *inventory of measures*. The inventory includes measures that occur either in the coastal zone or occur outside the coastal zone but influence the coastal zone. Development plans are an information source of measures. The inventory must include all the measures that the stakeholders are currently executing or executing in the near future. These are the firm measures, i.e. measures that will be definitely be implemented. The inventory must also include all the measures that the stakeholders are proposing or considering. These measures are not firm yet.

The inventory can be made in an Excel spreadsheet preferably integrated with a GIS system so that the location of the measures can be shown. For each measure, the following elements should be completed as much as possible:

- Name of the measure
- Owner of the measure, e.g. responsible government agency, private developer, etc.
- Type of measure, i.e. technical, managerial, economic, ecological and institutional
- Firm measure or not
- Location and/or spatial coverage
- Planning, i.e. when will the measure be implemented
- Indicative budget
- Source of budget, i.e. private or public
- Impact on or contribution to ICZM objectives, i.e. first level qualitative screening of impact on assessment indicators, e.g. big/moderate/small (section 6.2)

The second step is the *initial screening*. An inventory of all possible kinds of measures that can be taken, in general results in hundreds of discrete possibilities. In most cases, it is not practicable to analyse all of them in detail. A screening process is needed to select the most promising ones. An initial screening can be done by applying expert judgment as to effectiveness, efficiency, legitimacy and sustainability criteria. The textbox describes these criteria. Additional criteria can be identified, depending on the specific circumstances. The screening can easily be added to the Excel spreadsheet.

Criteria for initial screening of measures

***Effectiveness**. Measures to be taken are those which solve the most serious problems and have the highest impact on the ICZM objectives. Measures to prevent problems will be preferred to those that solve them. Similarly, measures that solve problems will be preferred to those that only control them.*

***Efficiency.** Measures to be taken should not meet the explicit objectives at the expense of other implicit objectives. The cost-benefit analysis is one indicator of efficiency. An example is to create a law that forces industrial firms to incur the full cost of end-of-pipe wastewater treatment. This would improve the water quality, and thus improve health and reduce environmental damage. On the other hand, it might impose high costs to the firms, possibly resulting in loss of employment. An efficient decision may be to opt only for cost sharing rather than full cost recovery.*

***Legitimacy**. Measures to be included in the ICZM development scenario should not rely on uncertain legal/institutional changes. Measures should also be as fair as possible, thus reducing public opposition so that they will be favoured by as many stakeholders as possible.*

***Sustainability**. Measures to be taken are those that improve (or at least do not degrade) the present environmental and socio-economic conditions for future generations.*

The aim of the screening process is to identify those measures that should be further analysed. The screening of measures can be a cyclic process, also in cooperation and consultation with stakeholders. Assessing the measures contributes to a better understanding of their effectiveness and new ones may be identified (comprehension loop). The result of the screening process is a set of promising measures that can be used for strategy design in the ICZM Planning phase.

6.1.6 Identification and prioritization of challenges and opportunities

General background and introduction

The final activity in the knowledge base generation is identify the problems and opportunities for the coastal zone. To do this, the results from the other five activities are used as input. Note that it is important not to look at challenges only, but at opportunities as well. These can be a powerful driver for action because of their positive nature. Opportunities that solve problems are the best.

The identification stage results in a long-list that could easily add up to several tens of problems and opportunities. Prioritization is needed as an effective ICZM Plan typically addresses the three to five most urgent and/or relevant topics. More topics lead to too complex decision making and splintering of implementing ability and budget. Therefore, the first step is to screen and aggregate where possible. The use of the conceptual framework derived in section 6.1.3 may be helpful here.

The prioritization can be done by voting in a meeting with stakeholders including decision makers. The ICZM team is the neutral facilitator of the meeting and does not cast a vote. The voting must be carefully designed to guarantee representativeness of the outcome. Thus, all relevant stakeholders must be present conform the outcome of stakeholder analysis in section 6.1.1.

Open voting is preferred over anonymous voting. The reason for a vote is extremely relevant, as it provides information not only on the perceived relevance of the problem/opportunity but also on the likely willingness to accept the outcome and cooperation in the Implementation phase. Alternatively, anonymous voting allows stakeholders a safe environment to express their wishes. A combination is also possible, when working in iterations.
The prioritization can be a political process when each stakeholder pushes their own stake. Although it might seem contradictory, it is a good and essential process to go through. In this Situation Analysis phase, no decisions are made and therefore it is very useful for the ICZM process to know and be aware of any issues or conflicts in this still early stage so that they can be incorporated or dealt with in the next phase. When avoided or overlooked, these issues and conflicts are likely to reappear in the acceptance of the ICZM Plan and at least hinder or even impede implementation of the plan.

Finally, note that the problem description should be carried out based on the results obtained from the baseline development case analyses (section 6.4) in combination with the problems and issues perceived by the decision makers and stakeholders (e.g. section 6.1.1). A problem analysis should be expressed as far as possible in terms of the socio-economic and environmental impacts that have a meaning to the decision makers and stakeholders. An integrated approach is crucial for a solid understanding of the system and its associated problems. The integrated approach can only be achieved if the plan defines the main problems and issues in the coastal zone and its inter-linkages. For this, it is important that the plan is aligned with other related plans such as Watershed Plans, Shoreline Management Plans (erosion), Flood Risk Management and Integrated Water Resources Management (IWRM), amongst others.

Kuwait context

Refer to section 3.4 for identified challenges and opportunities in the Kuwait coastal zone.

6.2 Participatory design of ICZM vision, development objectives and assessment indicators

General background and introduction

This activity involves the set-up of a systematic narrative and structure that links the vision for the coastal zone to quantifiable assessment indicators. The structure consists of a tiered approach as shown in Figure 6.6.

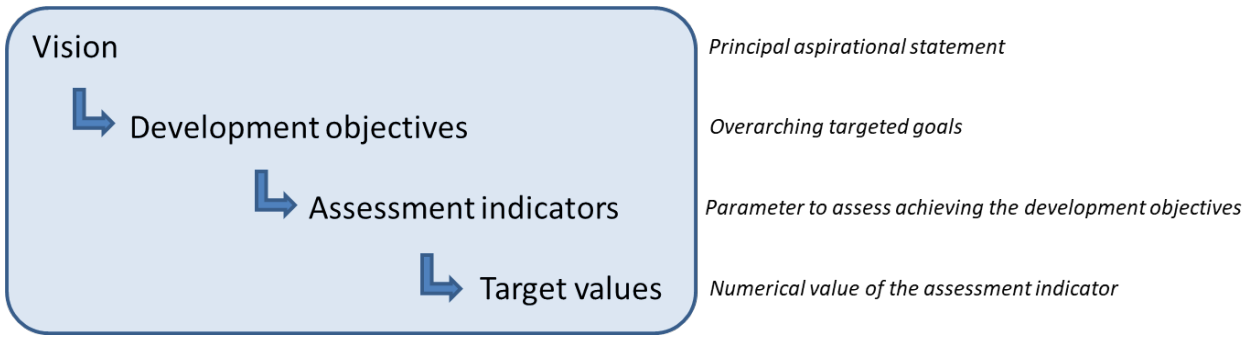

Figure 6.6 Schematic flow from vision to quantifiable indicators

The vision statement entails a clear, high-level aspirational statement about the future of the coastal zone based on policy commitments and societal goals. Usually, a vision contains a single clear statement that is easily understandable to a public audience, for example “A safe and sustainable coastal zone for all citizens”. If a vision is understandable, it is expected to receive wide agreement and support across all stakeholders (Le Quesne, 2016).

The high-level vision statement must be concretized in such a way that the impact and effect of both external drivers (section 6.1.4) and measures (section 6.1.5) can be assessed and that a choice can be made between different development scenarios. This is done through three subsequent tiers (Figure 6.6).

In the first tier, the ICZM vision is further defined by development objectives that must represent the prioritized problems and opportunities (section 6.1.6). If for example a deteriorating water quality is prioritized as a problem to be resolved by the ICZM Plan, the development objective can be defined as “Improved water quality”. For fisheries, a development objective can be “Sustainable fisheries”. Longer, one-sentence development objectives are also possible, but the description should be kept clear and concise. To keep the ICZM process manageable and easy to understand and follow for decision makers and stakeholders, the number of development objectives should preferably not exceed five.

Development objectives are formulated in qualitative terms. The next tier is to make these terms explicit in assessment indicators. What constitutes “improved water quality”? Typically, water quality objectives can provide assessment indicators. When is “sustainable fisheries” achieved? The Maximum Sustainable Yield is often used as an indicator for sustainable fisheries.

An assessment indicator is thus defined by:

- Parameter and Unit — e.g. dissolved total nitrogen concentration in mg-N/l
- Location (horizontal and vertical) — e.g. at monitoring station X at 1 m below the water surface
- Statistics — e.g. yearly maximum, or summer average

It is usually impossible to express all assessment indicators in a single measurement scale such as a monetary value. Assessment indicators related to environmental quality or ecosystem vitality or the beauty of a scenic view can often be expressed quantitatively but in non-monetary terms. This should however be done in such a way that a ranking is possible based on the chosen assessment indicators. Methodologies such as Cost Benefit Analysis, Risk Assessments and Strategic Environmental and Social Assessment could be instrumental in developing the understanding required to make decisions based on the assessment indicators.

Criteria to follow when developing indicators are:

- to measure performance and the results of policies and measures
- be both scientifically valid and politically defendable
- be practical (in the sense that they are measurable, and that data are available and can be captured, transformed and displayed in a relatively easy way)
- be capable of assessing conditions and trends into the future, i.e. possible to predict (model) for future situations
- be easy to understand and useful for both practitioners and policy-makers as well as the general public
- where appropriate, be capable of exchanging at super-national, national, regional and local levels
- be comparable from place to place.

Finally, for each assessment indicator, a target value must be specified. Typically, the target value is defined as “the value must be lower than …”, or “the value must be higher than …, or “the value must be between … and …”. Target values can often be derived from legislation or regulation.

Again, to keep the ICZM process manageable and easy to understand and follow for decision makers and stakeholders, the number of assessment indicators and their target values should preferably not exceed ten. Assessment indicators have to be comprehensive (sufficiently indicative of the degree to which the objective is met) and measurable, i.e. it should be possible to assign a value on a relevant measurement scale. Where possible, assessment indicators should be aggregated; for example, some financial criteria might be processed into a single value when distribution issues are not going to be important. The evaluation of the future scenarios and the included measures is done at pre-feasibility level. A more detailed evaluation at feasibility level will be done in the Implementation phase (section 8).

It must be considered that all assessment indicators must be predicted (modelled) for future situations. As it is likely that a set of models is required to cover the assessment indicators, a large number or assessment indicators requires a lot of work to set up the decision support system (6.3), another reason to restrict the number of assessment indicators.

The structure of vision, development objectives, assessment indicators and target values are ideally defined in a participatory manner and widely accepted by key stakeholders. The particulars of the participatory process should be defined in the Stakeholder Engagement Plan (section 5.3) including the identification of stakeholders and consultations methods (interviews, workshops, surveys).

Additional Information (Appendix A.2)

Kuwait context

Table 6.1 shows an example of a structured set of indicators set up during a capacity building event within the ICZM project.

Table 6.1 Example of Vision, development objectives and assessment indicators for Kuwait’s coastal zone (made by authors)

Vision: **An environmentally and socio-economically sustainable coast of Kuwait in 2035**		
Development objectives	Content indicators	Targets
1. Clean water and coasts	Water quality Tons of beach litter per km	Oxygen above 2 mg/l Salinity not exceeds 48 psc Less than 1 ton / km
2. Towards green industry & clean energy	Energy consumption (kW) Emissions (tons of CO2, NOx, SOx, PM) Solid waste entering coastal zone (tons) % Renewabes of the total mix	Less than ???? Less than ???? Less than ???? More than 50%
3. Sustainable coastal activities	% of slope coastline % change in sediment transport Change in satellite images Accessibility of ports and marina’s No. of tourist visits	Above 10% take action 20% of sediment budget Above 10% take action At least 2 meters of water column More than 100,000 – max ????
Approach	Progress indicators	Targets
Stakeholder engagement	No. of stakeholder workshops %of participants providing feedback % of positive feedback in surveys/emails etc % of returning participants in workshops % targeted organisation that participate Type of organisation that participated	Around each milestone (at least) 60% 50% 50% 80% Go, Priv, NGOs, Academia are present
Public awareness	No. of media items	10,000 retweets; 20,000 views on Instagram

6.3 Design and set-up of decision support system

General background and introduction

The objective of this activity is to design and/or update the decision support system (DSS) that will provide decision makers and other stakeholders with the analysis and knowledge needed to carry out the ICZM Planning phase. A proper ICZM process requires a number of quantitative tools that can be used to support the evaluation of different measures and plans. If these tools do not exists, they need to be developed.

In general, two functions can be distinguished in a DSS:

1. A structured database and information portal for the coastal zone
2. A dashboard for assessment and comparison of development scenarios and the underlying tools and models for computation

This section focuses on the second DSS function only, i.e. the models, tools, and methodologies that will be used to generate information and knowledge relevant for ICZM planning. The assessment indicators derived and defined in section 6.2 play a key role, as the dashboard shows at one glance the value of the assessment indicator and moreover if the assessment indicator meets the target. There are multiple ways to design a dashboard, but each dashboard has the same elements:

- It shows all assessment indicators.
- It shows the value of the assessment indicator.
- It shows the comparison of the value of the assessment indicator with the target value including whether the target value is met or not.
- It shows the assessment for different time horizons.
- It shows the comparison of different development scenarios against the baseline (autonomous) development

From the dashboard, it is possible to go at least one level deeper to underlying information and explanation and for example the underlying model results.

The underlying models have to be designed and set up to calculate the value of the assessment indicators. Each assessment indicator may have its own model, but multiple assessment indicators could also be derived from the same model. In any case, it is relevant that all models use the same assumptions and conditions for, for example, the external drivers, the time horizons and other analysis conditions (section 5.2).

The Assessment DSS normally includes the following elements:

- Multi-criteria Analysis/Scorecards → Dashboard
- Indicator Design and monitoring tools
- Environmental and Social Impact Assessment
- Economic Assessment: Cost-benefit analysis, cost-efficiency analysis
- Participatory and collaborative modelling tools

The format of the final DSS can vary from a set of DSS tools which workings and interactions are familiar to the specialists facilitating the planning process to interfaces and/or dashboard that make the results and workings of the models accessible to decision makers and a wider audience.

Additional Information – Appendix B.2

Kuwait context

Several components of the DSS can be identified:

- EPA's Environmental Monitoring and Information System for Kuwait (eMISK)
- KISR's Arabian Gulf model
- Coastal Vulnerability Index developed by KISR

6.4 Establishment and assessment of the baseline development scenario

General background and introduction

The baseline development scenario, also called the autonomous development, is the future coastal situation consisting of the existing coastal infrastructure and all firm measures planned for the coastal zone. Thus, only those measures that are being executed or have already been firmly decided and (financially) secured are included in the baseline development scenario.
These measures have been inventoried in section 6.1.5. Note that measures can be technical (infrastructure), ecological (non-structural), economical, regulatory or institutional (see section 4.1).

The baseline development scenario assumes that the present policies and regulations are continued and followed by the government and the users of the coastal zone. It is important to include the *actual* effectiveness of policies and regulations instead of the *intended* effectiveness. For example, when it is known that illegal fishing does occur despite being prohibited by regulation and overseen by enforcement, it must be included in the baseline development scenario. Foreseen and committed adaptation to policies and regulations and/or new policies and regulations that will come into effect in the (near) future, are considered firm measures and therefore must be included in the baseline development scenario.

No new measures are included. Any new measures will be part of one or more development scenarios in the ICZM Planning phase (section 7.1).

Once the baseline development scenario has been established, an assessment of the performance of the coastal zone is undertaken testing it against selected external drivers (section 6.1.4). The DSS (section 6.3) is used to calculate the assessment indicator values (section 6.2) for each time horizon for the baseline development scenario (considering the selected external drivers). The time horizons are specified in the Inception Report (section 5.4). By comparing the calculated baseline development scenario values against the target value, the gap to be resolved by new measures is known (Figure 6.7). This will be the starting point for the design and assessment of development scenarios in the ICZM Planning phase (sections 7.1 and 7.2).

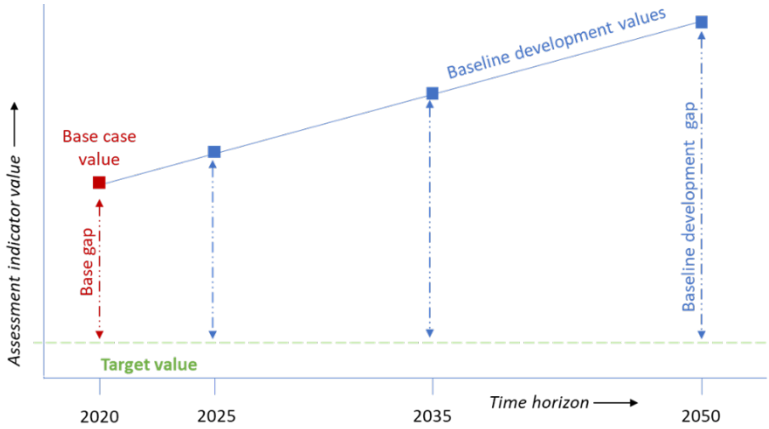

Figure 6.7 Illustration for the baseline development scenario of an assessment indicator at multiple time horizons and comparison with the target value. The difference between the actual value and the target value is called the baseline development gap.

As can be derived from the many references to other sections of the guidelines, this step of establishing and assessing the baseline development scenario is the first step that brings everything together. It is therefore not uncommon that a number of iterations are necessary. This should be seen as testing and solidifying both the understanding of the coastal system and the approach and tools (DSS) to be used in the ICZM Planning phase (section 7). Involvement and active participation in the iterations strongly connects and commits stakeholders to the ICZM process.

6.5 Preparation of Situation Analysis Report

General background and introduction

The Situation Analysis phase is concluded with the preparation of a Situation Analysis Report that captures the essentials of all activities carried out in this phase. Note that each activity should have a more detailed, technical report which can be used as the basis for the preparation of the Situation Analysis Report and can serve as background material.

The Situation Analysis Report gives a clear description of:

- the coastal zone system, i.e. the natural, socio-economic system and institutional system including an overview of the stakeholders involved (sections 6.1.1, 6.1.2 and 6.1.3)
- the external drivers that will be considered in the assessment (section 6.1.4)
- the present and expected future challenges and opportunities (section 6.1.5)
- the ICZM vision, development objectives and assessment indicators and the rationale behind the choice (section 6.2)
- the initial overview of development plans and measures that will be considered in the analysis (including no-regret measures) (section 6.1.6)
- the decision support system (section 6.3)
- the establishment and assessment of the baseline development scenario (section 6.4)

For the ICZM process, it is of utmost importance that all decision makers and stakeholders agree on the content of the Situation Analysis Report as this will be the base for the next phase. The Situation Analysis Report should target about 50 pages excluding appendices.

7 Phase 2: ICZM Planning

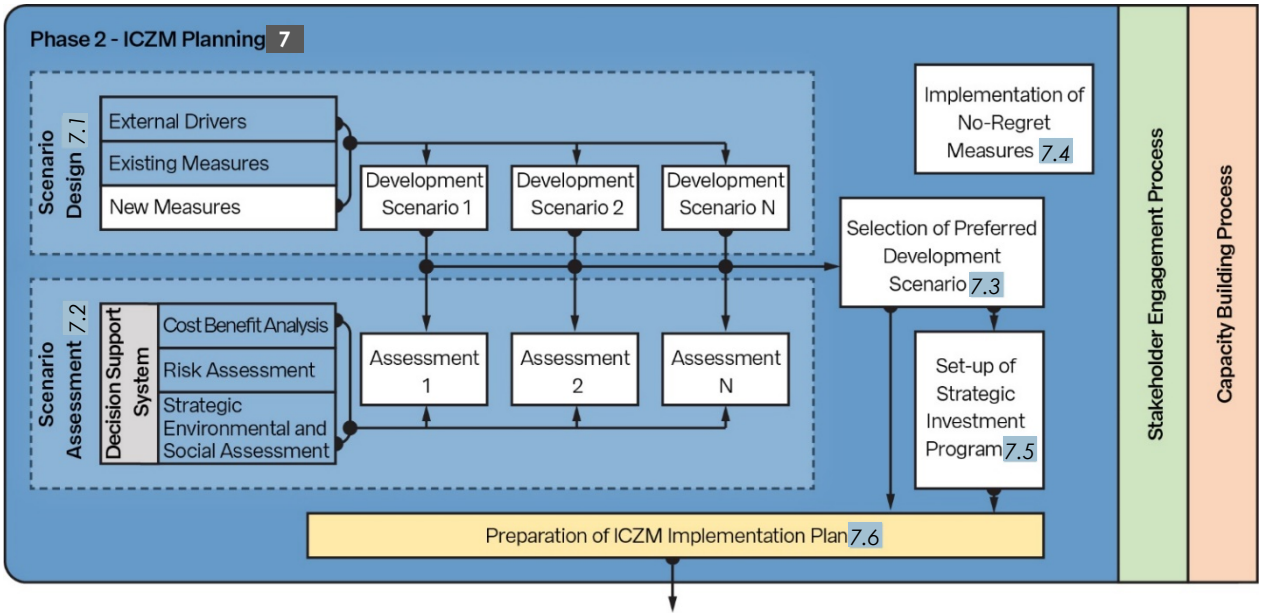

Figure 7.1 The Kuwait ICZM Framework, detail for Phase 2 – Inception (numbers in the diagram refer to chapters in this report where more detail is provided).

During **Phase 2 ICZM Planning** (Figure 7.1), decision makers agree in a participatory manner with stakeholders on a development path for the coastal zone grounded on vision and development objectives (section 6.2) and informed by scientific and analytical underpinnings. During the ICZM Planning phase, the environmental and socio-economic impacts of the ongoing development trajectory (section 6.4) and other possible development scenarios (section 7.1) taking into account the external drivers such as climate change, are discussed and assessed (section 7.2). Decision makers agree on a preferred development path (section 7.3) and decide on a plan to implement it (section 7.6). The ICZM plan could consist of initiatives already envisioned by sectoral and spatial plans, as well as alternative or additional measures. The implementation plan typically includes elements such as an investment program, a financing strategy, an institutional development plan, research agenda, etc. No regret measures potentially already derived from the Situation Analysis phase inventory (section 6.1.5) may follow a separate fast-track implementation (section 7.4).

7.1 Participatory design of development scenarios

General background and introduction

This step involves the design of coherent combinations of promising measures to satisfy the development objectives and to meet the assessment indicator target values. As there are generally many considerations related to these objectives, the design of development scenarios is not a simple process. Relations among combinations of measures and their scores on the assessment indicators are complex. The optimum combination may depend on who is asked. Trade-offs among the values of different assessment indicators, and disagreements among various stakeholders, are common.

The design of development scenarios is an iterative process. One can start by developing development scenarios on the basis of a single objective such as, for example, reliability of coastal protection or maximum net economic benefits. These development scenarios define the boundaries of the solution space. Comparison of the impacts of these development scenarios can lead to the construction of compromise development scenarios by changing elements in the development scenario. A resulting loss with respect to one criterion is then compared with gains to another.

Generally, there will not be a single development scenario that is superior to all other ones with respect to all assessment indicators used in the assessment. That means that an evaluation method is required for the ranking of alternative development scenarios.

7.2 Assessment of the development scenarios

General background and introduction

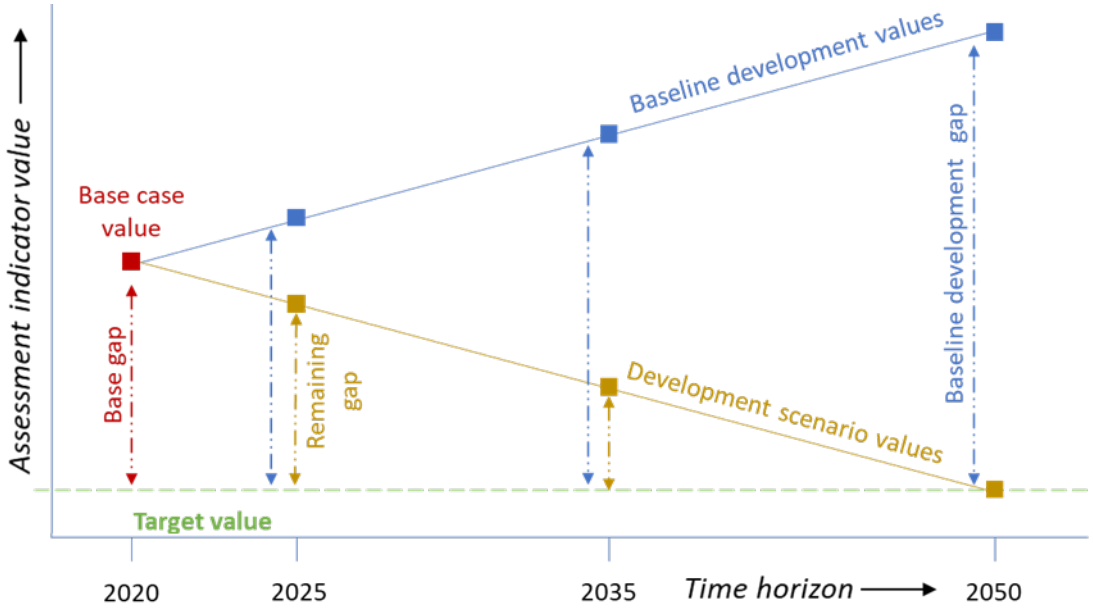

Figure 7.2 Illustration for a development scenario of an assessment indicator at multiple time horizons and comparison with the baseline development scenario and the target value. The difference between the actual value and the target value is called the remaining development gap.

To inform the comparison and ultimate selection of a development scenario, a number of assessments need to be carried out looking into the economic merits, the risk implications as well as the environmental and social benefits and impacts of the different development scenarios. Development scenarios are compared against a base case or baseline development scenario, typically a 'do-nothing' or 'business-as-usual' scenario. Assessment indicators for both baseline and development scenario are compared to a target value to show the (remaining) gap between actual and desired indicator value (Figure 7.2).

The assessment creates a comprehensive and in-depth picture of the development scenarios, and can be drawn upon in the need to further elaborate the merits of one development scenario over another. To further structure the comparison and selection of a development scenario, specific criteria can be designed for comparison purposes and the data can be retrieved from the assessments. Tools such as Score Cards are instrumental in presenting the assessment results to decision-makers and to frame and facilitate an informed discussion. Multi-criteria Analysis tools could also be instrumental in comparing and ranking the different development scenarios.

Presentation of the selected promising strategies to decision makers may be by means of briefings, presentations, and summary reports among other means. The level of detail and the way project results are presented should give an overview of the results at an appropriate level of detail for the audience involved. Visual aids such as interactive computer presentations of study results are often very helpful for promoting a discussion of the results of the assessments.

The results of the assessments vis a vis the different development scenarios can be presented in matrix form on 'scorecards'. The columns of the scorecard represent the different criteria while the rows represent the impact of different development scenarios with respect to a given criterion. An example is depicted in Table 7.1. Scorecards can contain numbers only, or the relative value of the criteria can be expressed by plusses and minuses, or a colour or shading. The purpose of scorecard presentations is to present a visual picture of the relative attractiveness of the alternatives based on various criteria. Scorecards can also help viewers detect clusters of criteria for which alternatives have a consistently better score. The presentation of the results in scorecards allows decision-makers to give each impact the weight they consider most appropriate.

Table 7.1 Example of a scorecard showing objective values associated with various strategies.

Objectives and criteria	unit	Base Year	Targets			Alternative (investment) strategies					
						Ref. case (no action)		Strategy 1		Strategy 2	
		2010	2020	2030	Perfect	2020	2030	2020	2030	2020	2030
Obj.1: Water and Sanitation											
% people access to safe drinking water	%	50%	63%	73%	100%	63%	73%	63%	73%	63%	73%
% people access to sanitation facilities	%	30%	50%	70%	100%	50%	70%	50%	70%	50%	70%
Obj.2: Food production											
Irrigation area	1000 ha	24	30	35	40	26	28	28	31	30	35
# animal water points	#	300	500	900	1000	400	700	500	900	500	900
Obj.3: Industry and Energy											
Water supplied to mining	%	30%	80%	90%	100%	40%	50%	50%	70%	80%	90%
Water supplied to industry	%	70%	80%	90%	100%	70%	70%	80%	90%	80%	90%
Hydropower generated	MWh	34	80	120	120	34	34	70	110	80	120
Obj.4: Environment											
Protected watershed area	km^2	1200	2500	3500	3500	2000	2500	2500	3000	2500	3500
Number of springs/sources protected	#	300	600	900	900	400	600	500	700	600	850
Average class water quality rivers	I - V	II	III	IV	V	II	III	III	III	III	IV
Obj.5: Vulnerability											
Vulnerability to floods - average damage	m€/yr	120	< 78	< 50	0	100	80	100	80	78	50
Vulnerability to droughts - average damage	m€/yr	200	< 50	< 30	0	160	120	80	40	50	30
Implementation information											
Required investments	m€		-	-	-			400	650	600	1200
B/C ratio economic categories (Obj.2, Obj.3)	-		> 1,3	> 1,2	-			1.3	1.2	1.2	1.1

7.3 Selection of preferred development scenario

General background and introduction

The scorecard (7.2) provides the information based upon which stakeholders can express their preference for a certain strategy and responsible officials can take their decision which one to implement. This is not a straightforward process as various stakeholders and decision makers often have different opinions about priorities. The ultimate decision is often political and is more intuitive than analytical. Still, the quantified information made available by means of the scorecard has its influence in such decision.

Tools are available that help to 'rank' the alternatives. These so-called Multi-Criteria Evaluation Methods (MCEM) use standardization methods and weighting to come up with an overall score for each development scenario. MCEM methodologies include the possibility to weight a particular indicator, for example, decision-makers might agree to weight social impact higher than economic costs. This is ultimately a management decision and would need to be facilitated and agreed by the decision-makers. MCEM is a participatory process and could be designed in detail to include different levels of participation in key moments. See Appendix B.1 for an example.

7.4 Implementation of no-regret measures

General background and introduction

No-regret, sometimes referred to as low-regrets, measures are actions that are necessary, likely urgent, and will perform well in a variety of future development scenarios. Low-regret measures should not have a negative impact on other measures or prevent other possible promising measures to be implemented. Low-regret measures can be identified at any point in the situation analysis and planning phases and be prepared accordingly. These are measures on which there is a very large agreement among the decision makers and stakeholders that these should absolutely be implemented, preferably as soon as possible. It should be ascertained that these measures will not have negative impacts on other measures or will prevent other possible promising measures to be implemented. The reason to define such no-regret measures is that in quite some situations there is a huge pressure to actually implement measures and not to wait till (another) big integrated study has been completed and accepted in its full extent. In particular in developing countries there is a big need for proposals for such measures. These measures can proceed immediately to the Implementation phase.

Examples of low-regret measures include establishing early warning systems, producing flood risk maps, restoring the functionality of natural flood retention areas or sea walls (mangroves, corals, etc), limiting inappropriate development in flood-prone areas or reallocating inappropriate land use activities into low risk areas.

7.5 Set-up of strategic investment program

General background and introduction

Financing

The actual implementation of the ICZM plan, especially those elements related to the construction and maintenance of infrastructure, will likely require large sums of financing. The main sources of funding for infrastructure investment include: i) public financing either through taxes, tariffs or transfers between governmental agencies, ii) international development agencies such as the World Bank, Global Environmental Facility, or Green Climate Funds through highly concessional loans or grants, iii) private funding including commercial finance, private companies and the insurance sector either as investors or as beneficiaries agreeing to pay for a service; iv) combined private-public financing such as Public-Private Partnerships (PPP), and v) philanthropic grants and funds which might be willing to contribute to particular aspects of the ICZM Implementation Plan like conservation or green infrastructure.

Such investment program provides an embedded system for the ICZM Implementation Plan to ensure inter-institutional coordination, inter-sectoral harmonization, compliance with the ICZM Plan (e.g. decisions), and coordination consistency between coastal adaptation strategies in the coastal units and national ICZM Plan. As such, it enables integrated decision-making for effective implementation of coastal planning and coastal adaptation along the coast. Furthermore, such framework ensures the highest level of political direction and oversight enabling ICZM implementation in a political accepted manner for the long run of coastal management.

7.6 Preparation of ICZM Implementation Plan

General background and introduction

This step finalizes the 'ICZM Planning' phase. The results of this and previous phases and the ultimate result, i.e. the preferred development scenario, are compiled in a formal document. Preferably the document should be authorized by the responsible organizations and act as a guidance document for all actors in the field of coastal zone management. The ICZM Implementation Plan will be the base document for the next Implementation phase. The ICZM Implementation plan gives a comprehensive picture of the integrated development and management of the coastal zone system, addressing all issues at the same time. This can be done at national level (a National ICZM Plan), at provincial/state level or at municipal level. The implementation of the plan in the next phase will often be done on a project-by-project basis. The plan has to take care that these individual developments are well tuned.

The ICZM Implementation plan should be a general accessible piece of documentation for the decision makers and stakeholders. It should preferably be limited to 100 pages and contain a lot of illustrative information (infographics). The content of the plan depends on the specific region but as a general structure the following is suggested:

1. Introduction (why, how, objectives, participatory approach followed)
2. Description of the coastal zone system (natural, socio-economic and institutional)
3. The policy context (institutional setting, general goals and policies, legal framework)
4. The analysis carried out (problems and challenges; vision, development objectives and assessment indicators used; external drivers, overview of measures)
5. Selected development scenario (alternatives, adaptive approach, sensitivity analysis)

All technical detail can be included in Annexes and separate reports.

Monitoring of progress

As the ICZM Implementation plan continues to be further developed in subsequent steps, a monitoring framework will also be defined to measure performance. The final ICZM plan should be accompanied by a set of monitoring indicators (section 8.4).

8 Phase 3: Implementation

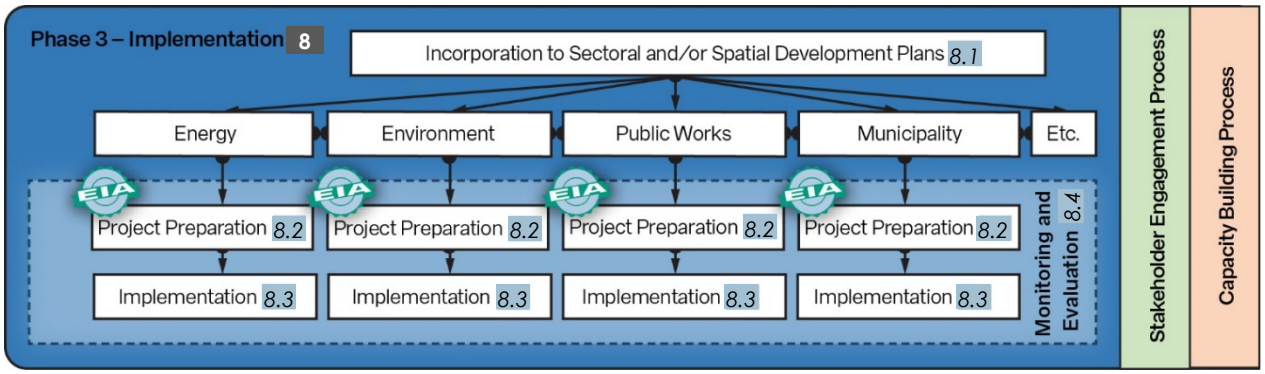

Figure 8.1 The Kuwait ICZM Framework, detail for Phase 3 – Inception (numbers in the diagram refer to chapters in this report where more detail is provided).

Phase 3 Implementation (Figure 8.1) focuses on the actual implementation of the ICZM plan. The ICZM plan might include a series of activities ranging from investment to legal development to further research. The implementation of the investment-related elements of the plan normally requires a feasibility analysis and an environmental and social impact assessment. During implementation, continuous monitoring and evaluation is needed to adjust the plan to emerging circumstances and report to key stakeholders on achievements.

8.1 Incorporation to sectoral and/or spatial development plans

General background and introduction

The ICZM Implementation plan (section 7.6) lists a set of measures and the agencies responsible for their implementation. The ICZM Implementation plan likely includes a number of measures that are implemented by spatial and sectoral authorities. Such activities could be mainstreamed into the existing or ongoing spatial and sectoral plans and budgets to ensure ownership, financing and performance monitoring. At this stage the activities included in the ICZM plan will become projects.

8.2 Project preparation including EIA and /or ESIA

General background and introduction

So far, the individual measures (projects) have been analysed at pre-feasibility level. Before a final decision can be taken about budgeting for these investments and a detailed implementation arrangement is agreed upon – which includes funding, financing and a procurement strategy per project – a process of further project preparation needs to take place. This process may include detailed feasibility and/or design studies. These studies enable a further analysis of the costs, benefits and impacts of the project in more detail. Commonly, a feasibility study includes 5 areas of feasibility:

- technical
- social / environmental
- political / legal
- financial / economic
- operational and scheduling

In many countries legal requirements exist that an Environmental Impact Assessment (EIA) study will be carried out. The most well-known legal requirements are: Environmental Impact Assessment (EIA, for infrastructure projects), Environmental and Social Impact Assessment (ESIA), Strategic Environmental Assessment (SEA, mainly used in policy development) and Sustainability Appraisal (SA). Which one to apply will depend on the type of measure and the specific legal requirement in the country.

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Additional Information – Appendix B.5

Kuwait context

The preparation of a particular project depends on its nature. If a project requires analytical work, its preparation might entail writing a research proposal and obtaining funds. If the Government of Kuwait is to outsource the implementation of the analytical work or requires of additional equipment, it will have to procure those contracts. If the Government of Kuwait is to implement the analytical work, a team and adequate resources need to be mobilized following the necessary internal procedures.

If a project requires legal or institutional development, funds will need to be allocated. Funding for legal or institutional development might include public and private funds (e.g. development finance or grants). If technical support is required, the Government of Kuwait will have to procure support.

If a project involves an investment, its preparation will normally entail feasibility studies and environmental and social impact assessment as well as securing financing. Depending on the source of financing, the feasibility study and the EIA might have to be carried out by independent third parties, which might entail different procurement processes and, therefore, additional time and resources. The EIA might need to be approved, which might entail following a concrete administrative process and, therefore, additional time and resources. Additional requirements such as consultations and compensation for environmental and social impacts should also be factored into project preparation.

Environmental Impact Assessment
This section focuses on how to comply with the EIA requirement. Based on the 2014 Environmental Protection Law, EPA has elaborated Environmental and Social Impact Assessment (ESIA) guidelines.

*The **Environmental Protection Law** defines Environmental Impact Assessment Studies as: comprehensive scientific studies to assess the overall impacts associated with the various projects and activities on environment before starting to implement such projects, or when any modifications or extensions to existing ones are applied, pursuant to the decisions issued by the competent authority. These include studies to determine the expected effects, predicting them, measuring and interpreting them, as well as identifying methods controlling them to reduce or minimize their negative impacts during the various phases of the project (*Kuwait Environmental Protection Law, 2014).

The main elements in the ESIA are: screening, scoping, impact assessment, participation and consultation, monitoring and follow-up. Project plans are assigned to different categories (screening), after which a scoping phase follows, which describes various properties of the project at hand. Public consultation follows, facilitating affected people and stakeholders to express opinions about the project's possible impacts. The next step entails the actual impact assessment. Again, these results will be subject to public consultation. The results undergo a review to check of the report meets the requirements, after which approval may be granted to the project plan. During and after project construction, monitoring and evaluation of the impacts is prescribed.

In practice, ESIA are carried out by KISR or external contractors. Reviewing of the EIA reports is currently conducted by EIA representatives. This typically contains two elements: a check on all reporting elements that are required according to the guidelines, and a check on completeness and accuracy of the cause-and-effect relationships between the foreseen project activities and the environment.

8.3 Project implementation

General background and introduction

Final implementation of an individual projects strongly depends on local laws and procedures of governmental spending. In case external financing is involved, the specific regulations of the financing institutions have to be followed. The strong involvement of the stakeholders in all previous phases of the ICZM Framework is expected to facilitate this final approval process.

Final approval will also benefit from taking the specific rules and regulations into account in the earlier phases of the development scenario preparation process; in particular in studying the institutional system during the Situation Analysis phase (section 6.1.2).

The actual implementation also follows local regulations. The implementation has to be monitored (see section 8.4) in particular if the implementation deviates from the agreed-upon implementation arrangement. If needed action has to be taken to ensure that the implementation stays in line with the overall (integrated) development scenario.

8.4 Monitoring and evaluation

General background and introduction

The progress and achievements of the ICZM Plan are subject to regular monitoring and evaluation as a way of continually improving the implementation process as well as reporting on key results indicators to decision makers and relevant stakeholders.

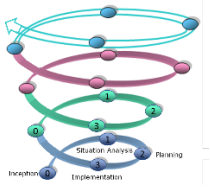
The objective of this activity is to communicate the implementation progress by reporting on key results indicators. The development objectives of the ICZM Plan and the goals and objectives of specific actions or projects should be specified as clearly and as quantitatively as possible through monitoring indicators.

There are many approaches to monitoring, but they all generally include the following elements: i) identification of expected performance, ii) assessment of the actual performance, iii) identification of performance variances (for example, shortcomings or excesses), and iv) the establishment of a procedure for communicating variances to the appropriate management or enforcing authorities so the implementation of the ICZM plan can be adapted to emerging realities.

In some instances, key aspects of the monitoring process are turned into communication products for relevant stakeholders such as policy makers or communities. Regular communication on the progress will help maintain stakeholders and decision makers engaged.

Stakeholders can be actively involved in the monitoring program through a participatory monitoring program or using technologies like phone applications.

9 Evaluation of completed ICZM cycle and preparation for next ICZM cycle



A complete ICZM cycle of the four phases may take 6 to 9 years (Figure 4.1). After finalising the last phase, the first phase can start again (see also Figure 2.3). Three main starting points for the next cycle are:

- The results of the previous cycle derived from the progress monitoring
- Progressing national or regional development plans and/or renewed strategies which require an update of the baseline development scenario (autonomous development)
- Updated information and progressed insight in the external drivers, for example updated projections of population growth or new climate change scenarios by the Intergovernmental Panel on Climate Change (IPPC) which compiles all scientific research on climate change once every six years.

Implementation of measures can take many years. Firstly, large infrastructural projects can easily take five years in preparation and five years in construction. Secondly, it may take many years to see the effect or impact of a measure. Successful nature restoration, such as restoration of a coral reef or a mangrove forest, can take twenty years or more for the ecosystem to have regained its natural balance. Thus, these long implementation timescales exceed beyond the timescale of an ICZM cycle. The way to deal with these long timescale projects and measures, is to include them in the baseline development scenario for the next ICZM cycle.

The start of a new ICZM cycle has the opportunity to continue the things that went well in the previous cycle and to improve the things that were less successful or less effective. Good practice is to start the new ICZM cycle with an open and transparent evaluation of the previous cycle.

10 Definitions

Adaptation: Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Assessment Indicator: variables or parameters that can be directly related to the achievement of the development objectives

Baseline / Baseline development scenario: The baseline is the state against which change is measured. It might be a 'current baseline,' in which case it represents observable, present-day conditions. It might also be a 'future baseline development scenario,' which in the context of ICZM is a projected future of the coastal zone which consists of the existing coastal infrastructure and all firm measures planned for the area.

Capacity building: The process in which individuals or organisations improve or learn the skills and tools that are required to do their job and perform their duties.

Civil Society: A wide array of organisations that include, community groups, non-governmental organizations, labour unions, indigenous groups, charitable organizations, faith-based organizations, professional associations, and foundations. Civil society has the power to influence the policy making process.

Climate change: A change in the state of the climate that can be identified (i.e. by statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change can be attributed to natural internal processes or external forcings, or to persistent anthropogenic (produced by human beings) changes in the composition of the atmosphere or in land use.

Criteria: A condition or fact used as a standard by which something can be judged or considered

Coastal Zone: An entity of land and water including the land subject to marine influence and the marine area that is subjected to the influences of the land. Interactions in this zone come from physical, biological and chemical processes and human interventions.

Cost-Benefit Analysis: systematic approach weighing all benefits – from an economic welfare perspective - of a project or policy alternatives against the investment costs.

Decision Support System (DSS): An integrated suite of tools and impact assessment methodologies designed to understand the physical, environmental, social and economic implications of the implementation of development scenarios. DSS normally include the following: i) a suite of linked numerical simulation models and databases covering flows, floods, water quality, sediments/morphology and saline intrusion; and iii) a set of environmental, social and economic impact assessment methodologies to facilitate the assessment of the wider positive and negative impacts of the implementation of development scenarios considering external drivers at different time horizons.

Development objective: Defines what is to be achieved by the planning process and describes and aspirational development vision of the coast. The Plan will identify needs, prioritize issues and define targets and constraints on the actions to be taken to meet the development objectives of the ICZM implementation plan.

Development scenario: A logical combination of individual measures or decisions that accomplishes the desired development objectives and satisfies the constraints imposed on the ICZM.

DPSIR: A widely used framework, initially developed by the European Environment Agency linking socio-economic developments and human activities to (impacts on) the state of the environment and the ecosystem. DPSIR is an abbreviation of Driving forces, Pressures, State, Impact and Responses.

Ecotourism: Responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education

Exposure: The presence of people, livelihoods; environmental services and resources; infrastructure; or economic, social, or cultural assets in places that could be adversely affected by hazards

External driver: The environment exogenous to the coastal system under consideration that cannot be controlled by the decision maker involved. Most used external drivers relate to climate change and socio-economic development.

Feasibility study/analysis: A preliminary study undertaken at the early stage of a project that helps to establish whether the project is viable and what are the feasible options.

Gender: Refers to how societies and specific cultures assign roles and ascribe characteristics to men and women on the basis of their sex. For example, many cultures share expectations that women are more nurturing than men, and that men should be soldiers during wars.

Gender equality: refers to equal rights, power, responsibilities and opportunities for women and men, as well as equal consideration of the interests, needs and priorities of women and men, as enshrined in international and other human rights agreements.

Governance: The way how society or groups within it, organize to make decisions. The concept of governance recognizes the contributions of various levels of government (global, international, regional, local) and the roles of the private sector, of nongovernmental actors, and of civil society on decision-making.

Green Infrastructure: Water management techniques that incorporate the natural and ecological system. These solutions can have social, economic and environmental benefits.

Hazard: The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources

Hydrodynamics: Is the study of the flow of water

ICZM Implementation Plan: Is the strategy that identifies the preferred development scenario for the coastal zone based on the approved development objectives, securing its materialization through concrete actions following a detailed work plan for its implementation and measuring its success by using a set of indicators.

Impacts: Harmful effects on natural and human systems of physical or human induced hazard.

Indicator: A measurable characteristic or variable which helps to describe an existing situation and to track changes or trends – i.e. progress – over time. Indicators generally simplify in order to quantify complex phenomena so that communication of information to policy-makers and other interested parties, including the general public, is enabled or enhanced.

Institutional system: This system is composed of the governmental institutions at various spatial scales that design policies. It includes regulations, laws and treaties.

Integrated Coastal Zone Management (ICZM): is a process lead by the government consisting of the legal and institutional framework necessary to ensure that development and management plans for coastal zones are integrated with environmental (including social) goals and are made with the participation of those affected. The purpose of ICZM is to maximize the benefits provided by the coastal zone and to minimize the conflicts and harmful effects of activities upon each other ...". Guidelines for Integrated Coastal Zone Management, 1996, World Bank

Land use: Refers to the function of an area. It is the way in which humans use a specific piece of land. Examples are farming and forestry.

Marine Spatial Zoning: Refers to the process of dividing a maritime area into various areas that each have a specific function.

Measure: The implementation of a particular action with a clear objective and concrete outcome and output that is narrowly defined in scope, space and time; and that is measurable, monitorable and verifiable. Measures can be classified as technical, ecological, economical, regulatory, or institutional interventions.

Mitigation: the lessening of the potential adverse impacts of physical hazards (including those that are human-induced) through actions that reduce hazard, exposure, and vulnerability.

Multi Criteria Decision Assessment Methodology (MCDA): a method to evaluate multiple criteria in a decision-making process with the objective to systematically grade and compare different development scenario against defined criteria.

Monitoring: The systematic and continuous collection of information that enables stakeholders / Decision-makers to check whether an intervention/ measure is on track or achieving a set of objectives.

Monitoring Indicator*:* variables or parameters that can be used to assess the progress of ICZM implementation plan.

Natural system: The natural system consists of the abiotic or physical, chemical and biological components both onshore and offshore.

Nature-based solutions: Solutions that make use of natural processes for functional purposes such as mitigation of flood, draught, erosion and landslide risk or improving water quality.

Participation: Refers to the possibility of stakeholders to provide informed, timely and meaningful input and to influence decision at various levels during the ICZM planning process.

Procurement: The purchase of goods or services by a public authority or other organisation. This process often involves public tenders.

Projection: A potential future evolution of a quantity or set of quantities, often computed with the aid of a model. Projections are distinguished from predictions in order to emphasize that projections involve assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realized, and are therefore subject to substantial uncertainty

Risk: The likelihood over a specified time period of severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects (impacts/losses)

Sensitivity analysis: is performed with assumptions that differ from those used in the primary analysis. Sensitivity analysis addresses the questions such as “will the results of the study change if we use other assumptions?” and “how sure are we of the assumptions?” Sensitivity analysis is typically performed to check the robustness of the results.

Social Inclusiveness: In this context, the practice or policy of including people that are affected by ICZM who might otherwise be excluded or marginalized, such as those who have physical or mental disabilities and members of minority groups.

Socio-economic system: A system that is composed of the human economic and social activities that take place in a society or specific area.

Stakeholders: Persons or groups who are directly or indirectly affected by the ICZM plan, as well as those who may have interests in the ICZM plan and/or the ability to influence its implementation and outcome, either positively or negatively.

Stakeholder analysis: A supporting planning tool that supports the identification of stakeholders and their engagement. Particularly, this analysis technique supports the task of identifying and in some occasions classifying the stakeholders according to their roles, capacities, interests, concerns and needs, as well as their dependencies

Sustainable development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Uncertainty: An expression of the degree to which a value or relationship is unknown. Uncertainty can result from lack of information or from disagreement about what is known or even knowable. Uncertainty may originate from many sources, such as quantifiable errors in the data, ambiguously defined concepts or terminology, or uncertain projections of human behavior. Uncertainty can therefore be represented by quantitative measures, for example, a range of values calculated by various models, or by qualitative statements, for example, reflecting the judgment of a team of experts.

Vision: A clear, high-level aspirational statement about the future based on policy commitments and societal goals. Usually, a vision contains a single clear statement that is easily understandable to a public audience, for example “A safe and sustainable coastal zone for all citizens”.

Vulnerability: Degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change including climate variability and extremes.

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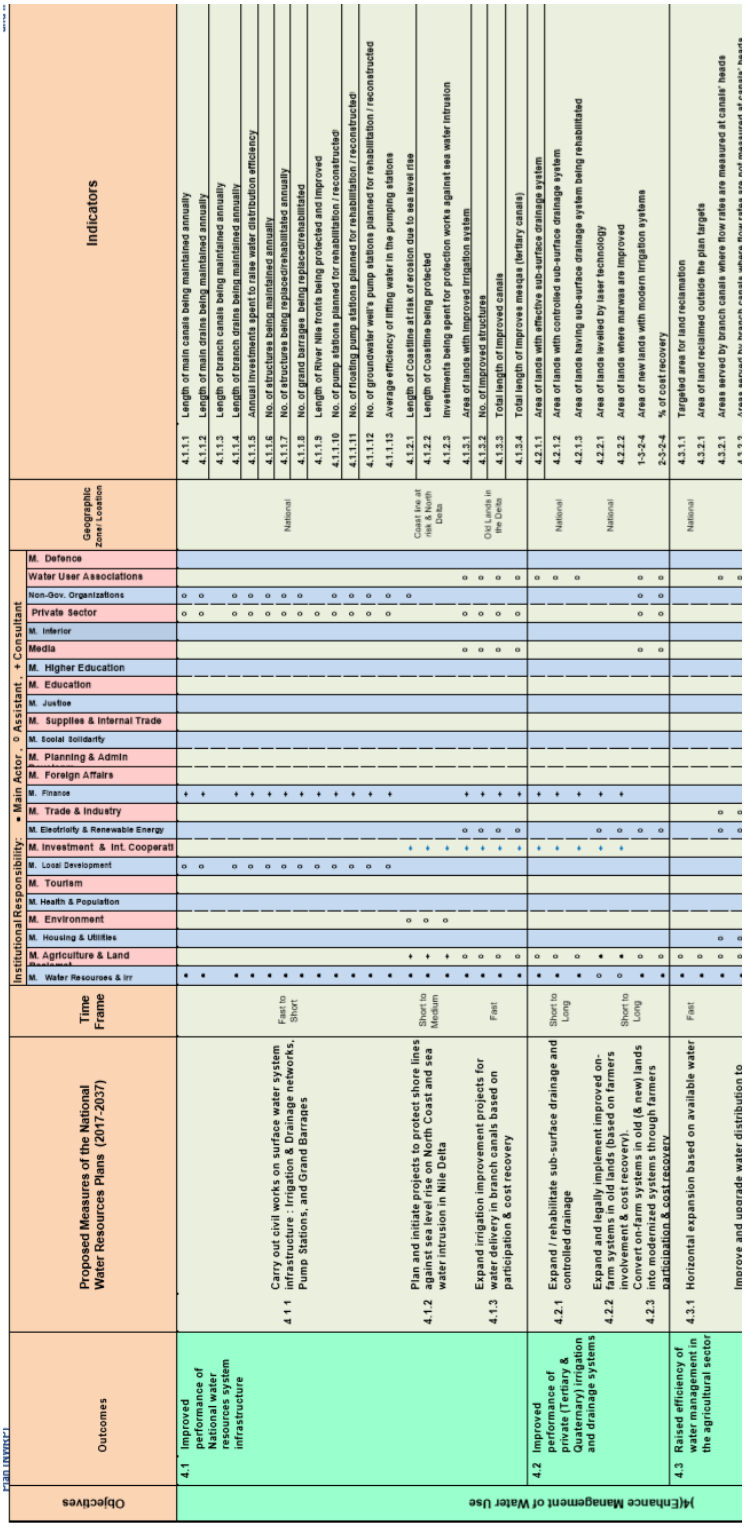
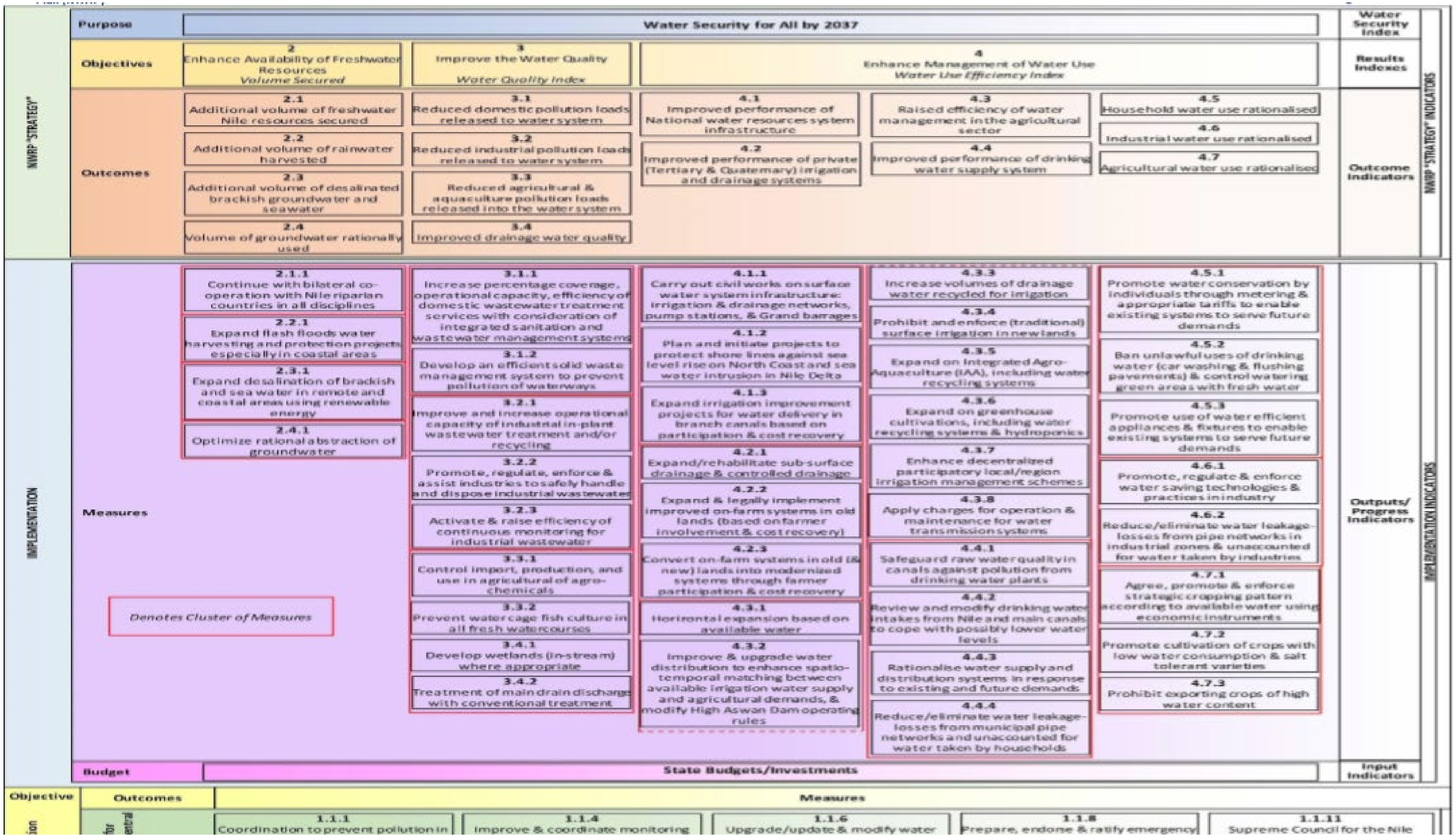
12 Appendices

A Appendix A – Examples of ICZM indicators and Action Plan

A.1 Example of Action Plan




Purpose
Water Security for All by 2037
Water Security Index
Objectives
2 Enhance Availability of Freshwater Resources
Volume Secured
3 Improve the Water Quality
Water Quality Index
4 Enhance Management of Water Use
Water Use Efficiency Index
Results Indexes
NWRP "STRATEGY"
Outcomes
2.1 Additional volume of freshwater Nile resources secured
2.2 Additional volume of rainwater harvested
2.3 Additional volume of desalinated brackish groundwater and seawater
2.4 Volume of groundwater rationally used
3.1 Reduced domestic pollution loads released to water system
3.2 Reduced industrial pollution loads released to water system
3.3 Reduced agricultural & aquaculture pollution loads released into the water system
3.4 Improved drainage water quality
4.1 Improved performance of National water resources system infrastructure
4.2 Improved performance of private (Tertiary & Quaternary) irrigation and drainage systems
4.3 Raised efficiency of water management in the agricultural sector
4.4 Improved performance of drinking water supply system
4.5 Household water use rationalised
4.6 Industrial water use rationalised
4.7 Agricultural water use rationalised
Outcome Indicators
NWRP "STRATEGY" INDICATORS
IMPLEMENTATION
Measures
2.1.1 Continue with bilateral co-operation with Nile riparian countries in all disciplines
2.2.1 Expand flash floods water harvesting and protection projects especially in coastal areas
2.3.1 Expand desalination of brackish and sea water in remote and coastal areas using renewable energy
2.4.1 Optimize rational abstraction of groundwater
Denotes Cluster of Measures
3.1.1 Increase percentage coverage, operational capacity, efficiency of domestic wastewater treatment services with consideration of integrated sanitation and wastewater management systems
3.1.2 Develop an efficient solid waste management system to prevent pollution of waterways
3.2.1 Improve and increase operational capacity of industrial in-plant wastewater treatment and/or recycling
3.2.2 Promote, regulate, enforce & assist industries to safely handle and dispose industrial wastewater
3.2.3 Activate & raise efficiency of continuous monitoring for industrial wastewater
3.3.1 Control import, production, and use in agricultural of agro-chemicals
3.3.2 Prevent water cage fish culture in all fresh watercourses
3.4.1 Develop wetlands (in-stream) where appropriate
3.4.2 Treatment of main drain discharge with conventional treatment
4.1.1 Carry out civil works on surface water system infrastructure: irrigation & drainage networks, pump stations, & Grand barrages
4.1.2 Plan and initiate projects to protect shore lines against sea level rise on North Coast and sea water intrusion in Nile Delta
4.1.3 Expand irrigation improvement projects for water delivery in branch canals based on participation & cost recovery
4.2.1 Expand/rehabilitate sub-surface drainage & controlled drainage
4.2.2 Expand & legally implement improved on-farm systems in old lands (based on farmer involvement & cost recovery)
4.2.3 Convert on-farm systems in old (& new) lands into modernized systems through farmer participation & cost recovery
4.3.1 Horizontal expansion based on available water
4.3.2 Improve & upgrade water distribution to enhance spatio-temporal matching between available irrigation water supply and agricultural demands, & modify High Aswan Dam operating rules
4.3.3 Increase volumes of drainage water recycled for irrigation
4.3.4 Prohibit and enforce (traditional) surface irrigation in new lands
4.3.5 Expand on Integrated Agro-Aquaculture (IAA), including water recycling systems
4.3.6 Expand on greenhouse cultivations, including water recycling systems & hydroponics
4.3.7 Enhance decentralized participatory local/region irrigation management schemes
4.3.8 Apply charges for operation & maintenance for water transmission systems
4.4.1 Safeguard raw water quality in canals against pollution from drinking water plants
4.4.2 Review and modify drinking water intakes from Nile and main canals to cope with possibly lower water levels
4.4.3 Rationalise water supply and distribution systems in response to existing and future demands
4.4.4 Reduce/eliminate water leakage-losses from municipal pipe networks and unaccounted for water taken by households
4.5.1 Promote water conservation by individuals through metering & appropriate tariffs to enable existing systems to serve future demands
4.5.2 Ban unlawful uses of drinking water (car washing & flushing pavements) & control watering green areas with fresh water
4.5.3 Promote use of water efficient appliances & fixtures to enable existing systems to serve future demands
4.6.1 Promote, regulate & enforce water saving technologies & practices in industry
4.6.2 Reduce/eliminate water leakage-losses from pipe networks in industrial zones & unaccounted for water taken by industries
4.7.1 Agree, promote & enforce strategic cropping pattern according to available water using economic instruments
4.7.2 Promote cultivation of crops with low water consumption & salt tolerant varieties
4.7.3 Prohibit exporting crops of high water content
Outputs/ Progress Indicators
IMPLEMENTATION INDICATORS
Budget
State Budgets/Investments
Input Indicators
Objective
Outcomes
Measures
1.1.1 Coordination to prevent pollution in
1.1.4 Improve & coordinate monitoring
1.1.6 Upgrade/update & modify water
1.1.8 Prepare, endorse & ratify emergency
1.1.11 Supreme Council for the Nile

Deltares

A.2 Assessment indicators example

An assessment indicator is defined by its:

- Parameter and Unit — e.g. dissolved total nitrogen concentration in mg-N/l
- Location (horizontal and vertical) — e.g. at monitoring station X at 1 m below the water surface
- Statistics — e.g. yearly maximum, or summer average

Assessment indicators have to be comprehensive (sufficiently indicative of the degree to which the objective is met) and measurable, i.e. it should be possible to assign a value on a relevant measurement scale. The table below provides an example of assessment indicators used to compare development scenarios in the Manila Bay ICZM Plan.

No.	Key Indicator	Coverage	Source of Data
1	Pollution load of BOD entering	Catchment area	DENR-EMB, MBCO, LLDA,
2	Percentage of Manila Bay monitoring stations that meet the Class SB water guideline values for fecal coliform	Manila Bay	DENR-EMB, MBCO, LLDA. PRRC
3	Pollution load of PO4 entering	Catchment area	DENR-EMB, MBCO, LLDA, DA-
4	Number of people exposed to coastal flooding	Plan area	DEM, NAMRIA, MGB, PSA
5	Area of Protected Critical Habitat (Intertidal and shallow soft bottom habitat, Mangrove, Coral) in hectares	Plan area	UNEP-TEEB; UPLB-AZRL; BFAR-NFRDI; DENR-NAMRIA
6	Solid waste diversion rate	Catchment area	NSWMC, MMDA, PDP (2017-2022)
7	Percentage informal settlements living in "cleared" hazard-prone areas	Plan area	DPWH (Region 3 and 4a) and MMDA (NCR) in coordination with LGUs/ Reports and Ground Validation. (Under Tar-
8	Fish stock biomass in metric tons/km2	Manila Bay	BFAR-NFRDI; PEMSEA
9	Poverty incidence	Plan area	PSA
10	Number of open dump sites	Catchment area	MBCO, NSWMC, MMDA

B Appendix B – Tool Box

B.1 Multi Criteria Decision Assessment Methodology

The Multi Criteria Decision Assessment Methodology (MCDA) is a method to evaluate multiple criteria in a decision-making process.

Objective
To systematically grade and compare different development scenario against defined criteria.

Methodology

- Decision-Makers decide on criteria. Some of the most common criteria include environmental impacts, social impact, cost (capital and operational), benefits. The criteria could incorporate elements to facilitate decision-making under deep uncertainty such as robustness or flexibility.
- Decision-Makers decide on weight depending on what criterion they consider a priority. Decision-Makers might choose weighting all criteria equally.
- Each scenario is scored by criterion based on an agreed on a maximum scale (e.g. 20 points). The higher the score, the more positive the impact. Key information (results of models, environmental and social impact assessment) should be presented to decision-makers to facilitate discussion and scoring.
- Calculate the score for each scenario and present back to Decision-makers

Example of MCDA Matrix

	Criterion 1 Environmental Impact	Criterion 2 Economic Impact	Criterion 3 Robustness(…)	Total
Weight	0.5	1	1	
Scenario 1: Definite Development Scenario	4	4	4	10
Scenario 2: Planned Development Scenario	4	4	5	11
Scenario 3: Alternative Scenario 1	2	1	2	4

Suggested References:

- Department of Communities and Local Government. (2009) Multicriteria Analysis: a manual. London. Hyperlink: http://eprints.lse.ac.uk/12761/1/Multi-criteria_Analysis.pdf
- Natural Resources Leadership Institute (2011) Multicriteria Decision Analysis. Hyperlink: https://projects.ncsu.edu/nrli/decision-making/MCDA.php

B.2 Cost-Benefit Analysis

A Cost-Benefit Analysis is a systematic approach weighing all benefits – from an economic welfare perspective - of a project or policy alternatives against the investment costs.

Objective

By monetizing all effects, the CBA can be used to calculate the (socio)economic rationale of an investment or a certain course of action.

Methodology

A Cost-Benefit Analysis follows several phases:

1. The approach starts by identifying the key problem or challenges at hand. It considers the most likely development in the future in case no new policy is adopted (reference alternative).
2. Policy or project alternatives are developed and described.
3. The effects of the alternatives on society/ the economy are identified, quantified and if possible monetized, in comparison to the reference alternative or base case.
4. Depending on the decision-making stage, a detailed or high-level cost assessment is used to estimate the projects lifecycle costs.
5. After a sensitivity analysis on key uncertainties and assumptions, all effects and costs are calculated to the same base-year, compared against each other, presented and interpreted for the decision maker.

	Scenario 1	Scenario 2	Scenario 3
Investment costs			
Construction	8,0	12,0	14,0
Land acquisition	1,0	2,0	20,0
Maintenance	0,8	1,2	1,4
Total	*9,8*	*15,2*	*35,4*
Effects			
Disaster risk reducion	9,0	12,0	12,0
Agriculture: fertility loss	-0,1		
Tourism/ recreation			25,0
Property value			2,5
Total	*8,9*	*12,0*	*39,5*
NPV (at discount rate 6%)	-0,9	-3,2	4,1
BCR	0,9	0,8	1,1

Example of a CBA (NPV = Net present value / BCR = Benefit cost ratio)

Suggested references

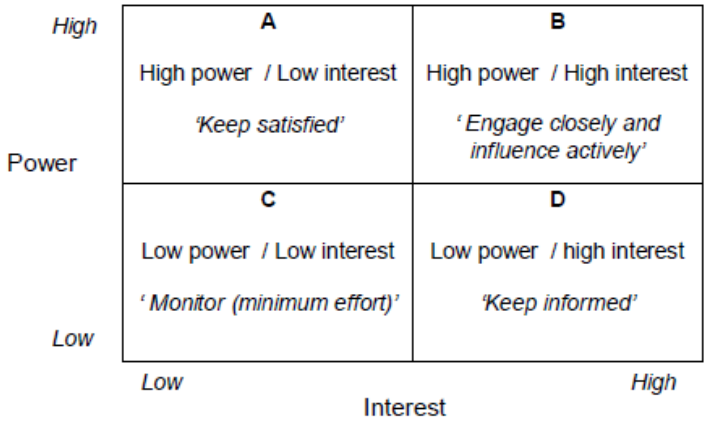
- World Bank (2010). Cost-Benefit Analysis in World Bank Projects
- Wise, R.M. and Capon, T.R. (2016) Assessing the costs and benefits of coastal climate adaptation, National Climate Change Adaptation Research Facility, Gold Coast.
- European Union (2014). Guide to cost-benefit analysis of investment projects

B.3 Stakeholders identification and participation

Several tools are presented here to facilitate stakeholder identification and the stakeholder participation. More tools can be found in the MSP Guide: How to design and facilitate multi-stakeholder partnerships published by the Centre for Development Innovation (2016).

- Power/Interest matrix

The aim of the tool is to capture the degree of influence and level of interest of each stakeholder over the relevant issues or possible objectives of the stakeholder partnership. With this information, it becomes possible to develop a specific approach and strategy for the identified stakeholders. It also helps to identify (potential) stakeholders who might not yet be on board.



Source: Centre for Development Innovation (2016). The MSP Guide: How to design and facilitate multi-stakeholder partnerships. Tools importance influence Matrix. Practical Action Publishing Ltd. http://www.mspguide.org/sites/default/files/tool/12msp_tools_importance_influence_matrix_12.pdf

- Stakeholder identification table

The aim of the tool is to analyse the most important stakeholders by focusing on their characteristics and roles. This requires a deeper analysis to foster a better understanding of the issue at stake.

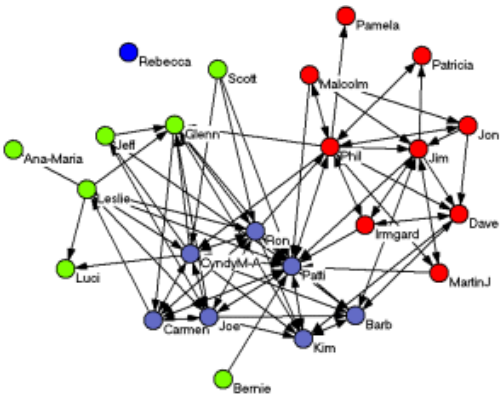
Stakeholders	Characteristics	Interests	Resources	Problems	Required actions
• National Government • Provincial	• High influence	• Improved economy • Country development			
• Rural council	• High influence	• agriculture			
• Municipality • Port authority	• Medium influence	• Business prosperity			
• Labour union	• Medium influence	• Improve employment			
• Mining company/ mining sector	• Regional • Size: 15k (people) #3 • Value: 100 mulc #1	• X • New port needed • New processing plant	• Financial support/ money/funding	• Shortage of power supply	• Provide power
• Dredging company • Leisure investor	• Medium influence	• Profit making			
• Friends of Bay (ngo)	• Low influence	• No growth at the expense of environmental degradation			
• Fisheries association/fisherm en	• Low influence • limited • (coral reefs) • 30 mulc – rural #3 • Size: 30k (people) #2	•	• historic/practical knowledge • labour	• pollution that causes fish kill (e-coli)	• strict environmental rules • public awareness

Example of a Stakeholder identification table

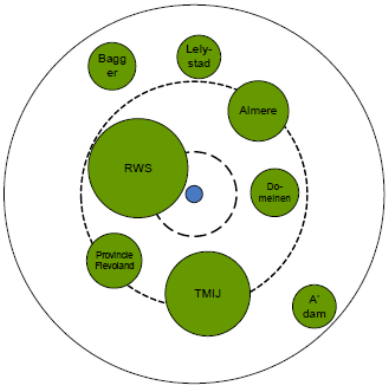
Source: Centre for Development Innovation (2016). The MSP Guide: How to design and facilitate multi-stakeholder partnerships. Tool Stakeholder characteristics and roles matrix. Practical Action Publishing Ltd. http://www.mspguide.org/tool/stakeholder-characteristics-and-roles-matrix

- Spider web or Venn Diagram

The tool helps to make an 'initial sweep' of stakeholders and their characteristics, and to identify roles of stakeholders. It allows to quickly visualise the most relevant stakeholders for the issue at hand, and their relationships.



Example of a Stakeholder's spider web



Example of a Venn Diagram

Source: Centre for Development Innovation (2016). The MSP Guide: How to design and facilitate multi-stakeholder partnerships. Tools Stakeholder identification. Practical Action Publishing Ltd. http://www.mspguide.org/sites/default/files/tool/5msp_tools_stakeholder_identification_5.pdf

- A Rich picture

A rich picture is a drawing of a situation that illustrates the main elements and relationships that need to be considered in trying to intervene in order to create some improvement. It consists of pictures, text, symbols and icons, which are all used to illustrate graphically the situation. It is called a rich picture because it illustrates the richness and complexity of a situation. The tool helps participants to understand the complexity of an entire situation.

Example of a Rich picture

Source: Centre for Development Innovation (2016). The MSP Guide: How to design and facilitate multi-stakeholder partnerships. Rich picture. Practical Action Publishing Ltd. http://www.mspguide.org/tool/rich-picture

- Serious games

Serious gaming is an essential tool for strategic planning, training for crisis situations and education. Serious games challenge players by simulating realistic problems. Players can try out a range of options and they can see the practical implications with no delay. This gives them the opportunity to train in a safe environment and avoid disastrous situations. The realism of serious games heightens the experience and helps to get the information across. The games encourage discussions between participants and the exchange of information, promote teamwork and allow players to understand better the processes they are involved in.

Source: https://www.deltares.nl/en/software-solutions/deltares-serious-game-portal/

Suggested reference for other tools:

- Centre for Development Innovation (2016). The MSP Guide: How to design and facilitate multi-stakeholder partnerships. Practical Action Publishing Ltd. Hyperlink: http://www.mspguide.org/sites/default/files/tool/dfid_toolsfordevelopment.pdf
- The Skimmer (n.a.) Serious Games for Coastal and Marine Conservation, Management, and Adaptation. Hyperlink: https://meam.openchannels.org/games
- Basco-Carrera, L., Warren, A., Van Beek, E., Jonoski, A. and Giardino, A. (2017) Collaborative Modelling or Participatory Modelling? A Framework for Water Resources Management. Environmental Modelling & Software 91 95–110.

B.4 Inclusiveness

Social inclusion is the process by which efforts are made to ensure equal opportunities to participate in the planning process for all regardless of background. This appendix presents some tools that facilitate the understanding, implementation and monitoring of inclusiveness in the planning process.

- Gender Indicators: What, Why and How?

This brief focuses on the use of gender indicators as a way of measuring change. It asks: what are indicators, and why should we develop gender indicators? It also addresses the often political issue of what we should be measuring, providing some broad principles that can be considered in making these decisions, as well as some questions donors can ask themselves when they are developing gender indicators. The brief also offers examples of existing indicators – noting that they always need to be adapted to specific contexts.

Source: Demetriades, J. (nd) Gender indicators: what, why and how? Brighton, UK: BRIDGE, Institute of Development Studies. http://www.oecd.org/dac/gender-development/43041409.pdf

- A guide to gender impact assessment

The gender impact assessment is one of the methods for gender mainstreaming. It should be used in the very early stage of any policymaking, i.e. when designing it. The gender impact assessment is an ex ante assessment and this implies the integration of a gender analysis at the 'define' stage of the policy cycle. The aim is to achieve a significant impact not only on the policy design but also on its planning, in order to ensure adequate equality outcomes. This document provides clear guidelines on how to conduct a gender impact assessment.

Source: European Commission (nd) A guide to gender impact assessment. Brussels: European Commission. https://eige.europa.eu/gender-mainstreaming/toolkits/gender-impact-assessment/guide-gender-impact-assessment

Suggested references:

- Oxfam (2014) 'Quick guide to gender-sensitive indicators'. Oxford: Oxfam. https://policy-practice.oxfam.org.uk/publications/quick-guide-to-gender-sensitive-indicators-312420

- IFC (2007). Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets. Washington, International Finance Corporation. https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_handbook_stakeholderengagement__wci__1319577185063

B.5 EIA Methodology

Here, the results of the possible improvement of the EIA in Kuwait and the integration of EIA in the ICZM planning framework are described based on the visits Deltares had in May and July 2019 to Kuwait. Two basic issues were discussed:

1. to better guide the environmental impact assessment of coastal projects in Kuwait for the EPA
2. to better fit the EIA in the framework of the ICZM

For improved guidance of EIA studies, one thing was noted especially: the EIA improvement for EPA coastal projects focused on the *better control of the quality of the EIA content*, not the procedural aspects. The latter have been addressed sufficiently in the existing EIA guidelines. Control over the content quality of the EIA in the guidelines currently consists of a set of 'tick boxes': issues that need to be addressed. These 'tick boxes' do not specifically focus on the quality of the assessment as such, but more on its completeness. The approach suggested focuses on this quality: how to understand whether the impact assessment has sufficient quality to be allowed for licence consideration?

There is no objective means to set the threshold for this; it is the subject of mutual agreement between regulators and scientific advisors involved in the EIA that the EIA study contains sufficient knowledge and that it is adequately discussed to appropriately understand the risks of environmental impacts related to the project's activities.

Important steps to address this are:

- describe cause-effect relationships in a DPSIR framework: how are activities/pressures causing changes in the state of the water quality, habitats and the species?
- Prioritize these effects: what will be the most likely and 'significant' effects, following e.g. legislation of protected and/or vulnerable habitats and species?
- Scales of impact: over what area and time will the impacts occur?
- Knowledge level and risk: what do we know about these effects, is there a large knowledge gap? What is the likelihood of an effect occurring within existing natural variability of the parameter of interest? What data are available to assess this?
- Thresholds: are there any legal thresholds of acceptable impact, or can these be set for the project?
- Alternatives and mitigation: what other ways of implementing the project are there that may have less environmental impacts? Are there any measures to prevent, mitigate or compensate the undesired environmental impact?
- Cumulative impact: are there any projects planned/licensed within the study area that may have interacting effects with those of the project under hand?
- Monitoring: do we need more/better data to evaluate the project impact? Will monitoring be part of the licensing requirements?
- Evaluate: will be project be evaluated regarding the actually occurring environmental impact. Is there learning by doing?

These 'steps' to check and improve the quality of an EIA can partly be addressed by 'tick boxes' as well; have they been mentioned at all is the first step to address. But whether they are sufficient for considering the EIA report for licensing requires an in-depth analysis and preferably discussion with colleagues and specialists. Specialists are required for review.

During the visit of Deltares to the EPA in Kuwait in July 2019, a DPSIR cross-table was set up to check the cause-effect relationships between some coastal activities as mentioned in the EIA guidelines and the pressures they exert on which components of the ecosystem.

Two groups were formed, which looked at the DPSIR for a new marina, and for a desalination/power plant: what activities occur in such projects, what pressures can be linked to these and how do these affect which ecosystem components. See the (incomplete) example below.

Sector/Activities/Pressures	State changes							
	Water quality		Habitats		Biodiversity			
	siltation	pollution	removal	damage	algae	fish	benthos	birds
Harbour								
Dredging	x	x	x		x		x	
Breakwater construction				x		x		
Disposal				x			x	

There was ample discussion about the question: what is exactly the difference between an activity, a pressure and a state (change)? It was explained that there is no golden rule for discriminating these. Important is to understand the chain of causes and effects and to organize the knowledge on this chain. For instance, fishing for demersal (bottom-dwelling) fish is an activity. The driver for (changes to this) activity may be increasing demands from the market through a growing population or investments for specific types of fishing. The pressures from this activity are taking out fish (removing a species' biomass directly), by-catch (removing biomass of untargeted fish species or even protected species such as turtles or dolphin) and disturbing the seabed with fishing gear. The state affected then is the habitat that may be destroyed (e.g. coral, or levelling morphological features), water quality through resuspension of mud particles, and a reduction of the biological diversity. Also, food-web effects may occur if e.g. birds and seals depend on the fish or seabed species that are removed/killed.

Use of Cumulative Effect Assessment in EIA

Another discussion point was the assessment of cumulative effects. In an EIA, the cumulative effect assessment (CEA) differs from the 'stand-alone' CEA: it usually only looks at the cumulative effect of the specific EIA project in relation to other projects that are (recently) licensed. As a metaphor: is the project the 'drop that makes the bucket of water overflow'? With 'overflow' as a metaphor for crossing the threshold of an unacceptable effect level. To follow through on the metaphor: the CEA looks at all the drops that go into the bucket, and how they contribute to the fullness of the bucket.

A next step is to create a generic cross-table for the major coastal projects (per sector) and how these can be deconstructed in a DPSIR: what are the main drivers, activities, pressures and states affected? This, and the steps mentioned above could be added as an Annex to the existing guidelines for EIA. Also, a future meeting could involve other EPA departments (e.g. the biodiversity department) to understand how an EIA that would cover impacts on water quality, habitats and species to improve co-operation and mutual discussion and understanding on EIA quality improvement (capacity building and training).

The second way of improving EIA studies is understanding their roles in the ICZM framework. As explained earlier, the role of the EIA in the ICZM planning may be 'bottom-up' or 'top-down', or, ideally: both. In reality, projects have already been implemented, either or not based on some idea, vision or strategy (not yet integrated), and evaluations from such projects can be used to inform, create, and adapt strategic decisions at the policy and management level. This is the bottom-up information flow where EIAs are essential: they form the ground work, the validation of the strategic decisions taken earlier, and perform an evaluation role for strategies. Or, if such decisions have not yet been taken, they may be crucial in understanding how a strategic decision may work out at the project level. The top-down role of EIAs is that they implement the strategic decisions taken earlier and checking that the project is abiding by the strategy chosen should form part of the EIA study.

In the case of a bottom-up role of an EIA, information from an EIA to the strategic level is likely to be used in a CEA first.

In many cases, a CEA will not be cumulating everything with everything, but focus on a choice of activities and a choice of habitats and/or species within a specific area. This area usually is much larger than that of the project-based EIA. This choice is often strategic, meaning that the reason for conducting a CEA will be based on expected or encountered conflicts between activities and the impact they have on habitats and/or species in a specific larger area. In many cases (and the preferred approach) is the so-called receptor-led CEA. This means that the cumulative impacts of various activities are assessed on specific habitats and/or species (the 'receptors' of the impacts). This in contrast to the so-called EIA-led or pressure-led CEAs that focus on the cumulative effect of specific stressors on various habitats and/or species. The reason for this is that the main goal of a CEA is to understand environmental impacts. When only one or a few activities/pressures are considered in a CEA and the effect is cumulated over various habitats/species, the resulting assessment falls short in understanding the impact these habitats/species suffer from the other not considered activities/pressures. Note that a CEA in general has a more qualitative outcome than and EIA. Due to the involvement of many cause-effect relationships, some will be well known but other will not. Some may be modelled with relative high accuracy and reliability, others will be guesstimates.

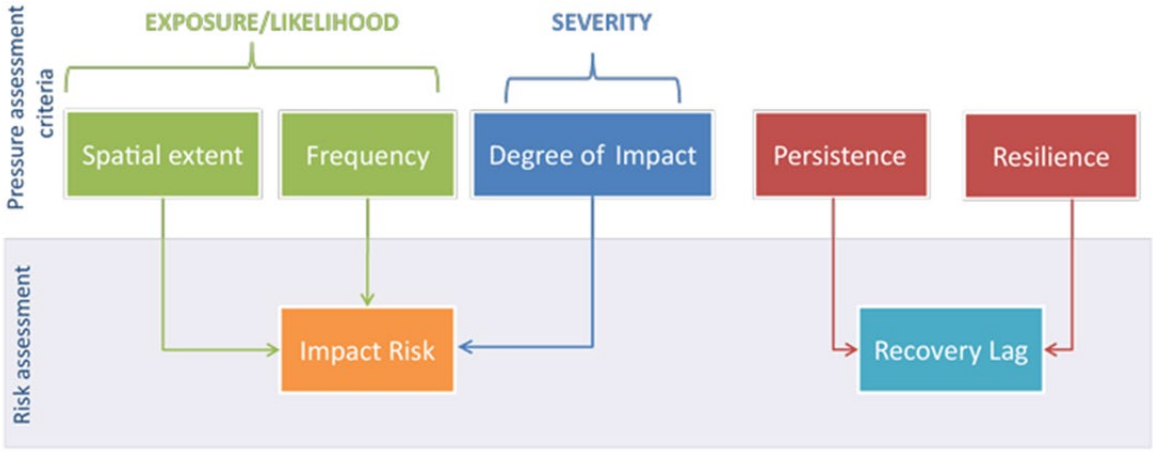
To conduct a CEA, three 'building blocks' are needed. The first building block is the collection of data on the spatial and temporal occurrence of the activities/pressures and the impacted habitats/species. Note that a good entry point for data selection is the cross-table mentioned in the previous section set up for the EIA guidance. This table organizes and prioritizes the knowledge on cause-effect relationships between activities/pressures and the impacted habitats/species. Prioritizing the cause-effect relationships helps in understanding data need: the most likely and largest impacts should be given priority in data collection. Existing EIAs can be very important in getting these data and understanding/prioritizing the impacts. Create spatial maps based on some temporal integration (e.g. aggregate data over a month, season or a year) to assess the 'chance of encounter' of an activity/pressure and the relevant habitat/species. Such maps give a first idea of how likely an impact may occur.

The second building block is indexing the data. Indexing is the creation of description classes. Quality of the data needs to be indexed to estimate the confidence of the assessment. If data are of high quality (e.g. monitoring studies with a high resolution in time and space) then the assessment outcome has a higher degree of confidence than if the data are based on e.g. expert judgement. How many index classes are chosen depends on the need for accuracy in the CEA. A common set of classes is high, medium or low (quality), but note there is no prescribed way of doing this. In many cases, the assignment of classes is a subjective action. Often, having an agreed and acceptable confidence in the assessment is more important than accuracy. Other indexes are needed for the sensitivity of the receptor to the activity/pressure, and of the magnitude (high-low), persistence (sometimes, only few locations – constant, many locations) of the activity/pressure.

The third building block is setting up a sensitivity matrix: how sensitive is the species to the activity/pressure, or: what is the expected degree of impact when activity/pressure and the habitat/species 'meet' in time and space.

The assessment (also called 'evaluation', see figure below) itself is based on these three building blocks:

- The exposure likelihood is the chance of an activity/pressure and habitats/species meeting: a function of their distribution over the area and how this plays out in time (including magnitude and persistence). Choosing temporal aggregations is important here (usually dictated by the quality of the data).
- Severity is the degree of impact (sensitivity) of the receptor to the activity/pressure: what happens when they 'meet'.
- Confidence of the assessment is quite important. A high confidence gives more reliability on the expected risk of the cumulative impact. In case of low confidence, even a low to medium expected cumulative impact may have a risk of having a high impact.
- Information on the recovery potential of a habitat/species in relation to the persistence of the activity/pressure gives additional information on the risk of the impact being repeated or sustaining for a longer period.



Building blocks of Cumulative Effects Assessment (CEA); ((Piet et al., 2017)

Although the CEA components and the principles are easy to understand, applying them in a case study requires much work in collecting data, discussing cause-effect relationships and their knowledge level, and in making assumptions (educated guesses) in case data and knowledge are limited or lacking. Also, indexing the data appeared to be difficult to do when confronted with such an activity for the first time. In Piet et al., (2017), conducting a pilot CEA in a Dutch case, a team of about ten scientists took over half a year to collect the data, organize them, index them and complete the assessment. Therefore, doing a CEA requires a methodology that needs to be tried and developed over time, and depending on the requirements, such a CEA can become a relatively complex and time-consuming exercise. The natural habit of (many) scientists to be accurate may conflict with the semi-quantitative set up of a CEA.

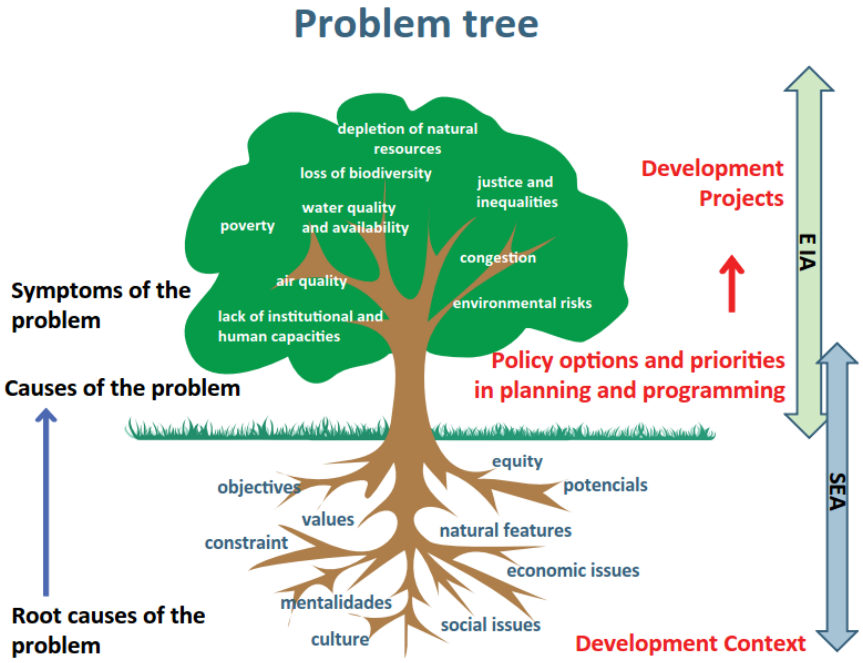
Box - Environmental Impact Assessment vs. Strategic Environmental Assessment

Environmental Impact Assessment has been described as part of the Implementation phase. In the context of ICZM some may encounter the concept of Strategic Environmental Assessment. Both assessments are complementary. For the sake of clarification, this section aims to provide some insight in the difference between both concepts. In Table 12.2 below, an overview is given of how Strategic Environmental Assessment and Environmental Impact Assessment compare on these elements.

Comparison of steps required in a SEA versus those in an EIA.

Properties	Strategic Environmental Assessment (SEA)	Environmental Impact Assessment (EIA)
Process	Iterative	Linear
Screening	Mostly case by case, from strategic point-of-view	Projects listed
Scoping	Political agenda, stakeholder discussions, expert judgement	Local issues and checklists
Public participation	Representative bodies	General public
Assessment	More qualitative	More quantitative
Quality review	Information quality and stakeholders	Information quality
Decision making	Comparison alternatives against policy objectives	Comparison against norms and standards
Monitoring	Focus on plan implementation	Focus on actual impacts

Another way of depicting the differences between how a Strategic Environmental Assessment and an Environmental Impact Assessment differ in scope when addressing environmental and social issues is in Figure 12.7. Generally speaking a Strategic Environmental Assessment looks at the root causes of an environmental issue while an Environmental Impact Assessment has a focus on the symptoms of the environmental problem.



'Problem tree' depicting the scope of a SEA versus that of an EIA (do Rosario Partidario, 2012).