



Netherlands Commission for  
Environmental Assessment

May 2018



Figure 1: NCEA, 2017: delta planning in Myanmar

# Strategic Environmental Assessment for River Basin and Delta Planning

Since 2005, the NCEA has been involved in the development of several river basin and delta plans. Based upon our experiences in 11 countries (see Box 2) this key sheet gives some examples of the added value of strategic environmental assessment (SEA) in achieving a more sustainable management and use of river basins and deltas.

We provide information on our experiences in the use of Strategic Environmental Assessment (SEA) as an instrument to enhance strategic decision making on management plans for river basins and delta systems. We do this in order to contribute to poverty reduction, good governance and sustainable use of land and water resources in river basins and deltas.

## Issues in river basins and delta systems

The world can be divided into hundreds of river basins ranging in size from the largest, the Amazon basin, to many small ones. The lower part of these basins, the deltas, are home to over half a billion people and locate both productive ecosystems and economic hotspots.

## Box 1: Definitions

A **river basin** or river catchment is an area of land where all water that falls on that land, flows into one river. It can flow directly into the river or go through smaller rivers that flow into the bigger river. A river basin can be divided in sub-basins.

A **delta** or delta system is part of a river basin. Deltas are geographically well-defined flat sediment plains subject to frequent inundation by river and sea.

Many of these river basins and deltas have serious problems of water shortage, flooding and pollution presenting serious risks to people and ecosystems (see Table 1). Technical solutions to water management are often difficult to implement cost-effectively for many reasons. These include the scale and interjurisdictional complexity of water systems, their multiple uses of which many conflict, impeding cooperation and cost-sharing. In some cases, there is also skewed interdependency, for example where upstream jurisdictions control the water on which downstream jurisdictions depend, or where upstream

jurisdictions undertake major developments that have adverse downstream impacts.

The development and sustainable use of water resources in the basins and deltas requires allocation of water among competing human activities. This implies decision-

making in complex situations, often with conflicting interests. Careful planning and analysis are required to support such decisions, taking into account technical, economic and environmental aspects in a specific social, cultural and institutional context. Intensive and timely consultation of all stakeholders is of utmost importance.

**Table 1: Common problems in river basins and delta systems**

River basins	Delta systems
<ul style="list-style-type: none"> <li>• Soil erosion and runoff due to intensified and unsustainable land use practices (deforestation and soil degradation).</li> <li>• Increased sediment load and subsequent siltation of river beds and reservoirs.</li> <li>• Water pollution through diffuse (e.g. agrochemicals) and point source discharges (waste water).</li> <li>• Water diversion and over-extraction (e.g. for irrigation, industry, water transport or public use).</li> <li>• Interventions in natural river dynamics by dams, weirs, embankments, river training works, dredging, etc.</li> <li>• Climate change may aggravate these problems by creating greater variation in quantity and seasonality of rainfall, affecting river hydrology and land use patterns in the entire catchment.</li> <li>• Lack of governance mechanisms and institutional capacity to address up- and downstream issues in a coordinated manner, often complicated by the transboundary nature of many river basins.</li> </ul>	<ul style="list-style-type: none"> <li>• River floods and storm surges / cyclones, potentially increased by climate change.</li> <li>• Rapid urbanization and the impracticality to undo historic developments in a delta.</li> <li>• Agricultural overuse and pollution.</li> <li>• Natural and man-made subsidence due to land reclamation and groundwater exploitation.</li> <li>• Coastal and river bank erosion, often associated with sediment starvation, usually caused by upstream dams.</li> <li>• Salinization, a combined effect of some of the above issues and sea level rise leading to an increase of surface and underground influx of seawater.</li> <li>• Lack of a governance mechanism to address the above issues in a coordinated manner through inter-sectoral collaboration.</li> <li>• Degeneration and loss of natural vegetation such as mangrove forests.</li> </ul>

Adequate management of water resources by the government requires strategic planning of river basins and deltas. Effective use of SEA can enhance the quality of river basin and delta planning, by assessing its contribution to sustainable and inclusive development and by reducing negative consequences for underprivileged groups in society and for the natural environment. The positive role of SEA in developing river basin and delta plans is becoming visible in a growing number of SEAs that have been applied. The same applies to the proactive role of SEA in integrating such planning in the broader context of transboundary and regional development planning and in aligning these activities with existing national sector policies. In sum, SEA can contribute to the development of river basin and delta planning and plans. In the next section we present the NCEA's vision on how this may be applied in practice.



**Figure 2: NCEA, 2015: river basin planning in Rwanda**

## View on SEA support to river basin and delta planning

In the view of the NCEA, SEA can add quality to river basin and delta planning by building upon and reinforcing Integrated Water Resources Management (IWRM), the main concept that is used in these processes. IWRM has been the accepted management paradigm for efficient, equitable and sustainable management of water resources since the early 1990s. It is defined as a process which promotes the coordinated development and management of water, land and related resources in the river basin in order to maximize the resultant economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems.

IWRM aims to choose from a series of possible water management objectives those that will best contribute to a range of competing economic, social and ecological goals. Achieving these goals typically involves the participation of a range of government bodies and other stakeholders, beyond those directly involved with water management<sup>1</sup>.

These processes result in river basin plans and delta plans that provide the basis to steer future investments. The IWRM approach has been applied in countries such as Vietnam, Bangladesh, Mozambique, Indonesia, Mali, Kenya and Myanmar. In the latter four countries the NCEA was also involved in the execution of an SEA to support the delta planning process.

How SEA can contribute to river basin planning that makes use of IWRM is shown in Table 2. At their request, the NCEA has guided authorities in Rwanda in doing an SEA for a river basin planning process that was based upon the IWRM concept. IWRM is required by law for catchment planning and management in Rwanda. The NCEA developed an approach to integrate SEA into a participative catchment planning process by aligning the IWRM and SEA process steps. The Table shows that SEA and IWRM have much in common. SEA adds the following components to the process: stakeholder analysis, development of alternatives, comparative assessment of the impacts of the alternatives, quality review of the process and report.

**Table 2: Process steps to integrate SEA into catchment planning in Rwanda**

General steps in IWRM <sup>2</sup>	General SEA steps <sup>3</sup>	Integrated catchment planning in Rwanda
	<b>Screening</b> 1. Reach consensus on the need for SEA and its link to planning. 2. Find stakeholders and announce start of the plan process.	<b>1. Start plan process</b> <ul style="list-style-type: none"> <li>Identify stakeholders.</li> <li>Agree on roles, responsibilities and process structure.</li> </ul>
<b>Situation analysis</b> Analysis of the water system, including stakeholder priorities and perspectives. (Participatory; technical, economic, gender and sustainability issues).	<b>Scoping</b> 3. Develop a shared vision on problems & opportunities, define plan objectives and draft alternative ways to reach these objectives.	<b>2. Situation analysis</b> <ul style="list-style-type: none"> <li>Characterization of land &amp; water system (technical, social, economic, gender and sustainability aspects).</li> </ul>
<b>Vision development</b> Creating a vision for the medium to longer term future.		<b>3. Stakeholder priorities</b> <ul style="list-style-type: none"> <li>Identify stakeholder concerns (participatory).</li> </ul>
		<b>4. Vision development</b> <ul style="list-style-type: none"> <li>Develop catchment vision and plan objectives (address both problems &amp; opportunities).</li> <li>Define alternative ways to reach objectives.</li> </ul>

<sup>1</sup> G. Pegram, Y. Li, T. Le. Quesne, R. Speed, J. Li, and F. Shen. 2013. River basin planning: Principles, procedures and approaches for strategic basin planning. Paris, UNESCO

**Table 2 (continued)**

General steps in IWRM <sup>2</sup>	General SEA steps <sup>3</sup>	Integrated catchment planning in Rwanda
	<p><b>Scoping (continued)</b></p> <p>4. Do a consistency analysis for relevant (national) policies that have consequences for each catchment.</p> <p>5. Set ToR for the technical assessment, based on scoping.</p>	<p><b>5. Consistency analysis</b></p> <ul style="list-style-type: none"> <li>• What other policies have consequences for the catchment?</li> </ul> <p><b>6. Terms of Reference</b></p> <ul style="list-style-type: none"> <li>• Set ToR for detailed planning and assessment, including assessment criteria.</li> </ul>
<p><b>Integrated planning</b> (Sub-) catchment plan considering competing water interests. When choices must be made between competing interests these are made explicit. The stakeholders participate in the process.</p>	<p><b>Assessment</b></p> <p>6. Assess the impacts of alternatives and document this.</p> <p>7. Review: organise (independent) quality assurance of documentation (preferably involving stakeholders).</p>	<p><b>7. Planning and assessment</b></p> <ul style="list-style-type: none"> <li>• Detailed studies for catchment planning.</li> <li>• Assessment of social and environmental impacts; compare alternatives on their positive and negative impacts.</li> <li>• Iteration: design alternative with maximum benefits.</li> <li>• Mitigation/compensation measures for remaining negative impacts.</li> <li>• Provide plan in accessible language with technical annexes.</li> </ul> <p><b>8. Review</b></p> <ul style="list-style-type: none"> <li>• Quality assurance of documentation (preferably involving stakeholders).</li> </ul>
	<p><b>Formal decision making</b></p> <p>8. Discuss with all stakeholders the alternative to prefer.</p> <p>9. Motivate the (political) decision in writing.</p>	<p><b>9. Formal decision making</b></p> <ul style="list-style-type: none"> <li>• (see left)</li> </ul>
<p><b>Sector and agency planning</b> Planned activities are assigned to implementing entities.</p>		<p><b>10. Sector and agency planning</b></p> <ul style="list-style-type: none"> <li>• Assign tasks to implementing district administrations or sector agencies.</li> </ul>
<p><b>Coordinated implementation</b> Implementation of sector and agency plans.</p>		<p><b>11. Coordinated implementation</b></p> <ul style="list-style-type: none"> <li>• Implementation within boundaries set by catchment plan.</li> </ul>
<p><b>Joint monitoring</b> Monitoring assured by stakeholders, together with monitoring procedures of the implementing organizations.</p>	<p><b>Monitoring</b></p> <p>10. Monitor the implementation and discuss the results.</p>	<p><b>12. Joint monitoring</b></p> <ul style="list-style-type: none"> <li>• By stakeholders in catchment and regular monitoring organizations.</li> </ul>

<sup>2</sup> Source: Integrated Water Resources Management Programme Rwanda 2015 – 2019. Project document 15 October 2014

<sup>3</sup> Source: Netherlands Commission for Environmental Assessment

Based upon our experiences, we have identified the main decisions that are taken in river basin and delta planning and the main issues that are addressed by SEA, see Table 3. In an SEA for a river stabilization plan in Bangladesh, alternatives ranging from a natural to a completely

regulated river system have been described and compared enriching the debate and contributing to well informed decision-making by weighing the pros and cons of all alternatives.

**Table 3: Examples of main decisions in river basin and delta planning, and issues to be addressed in related SEA or ESIA (not exhaustive)**

Main decisions	Main issues for decision making
Water (and land) management	To be addressed in SEA
<ul style="list-style-type: none"> <li>Governance of water management</li> </ul>	<ul style="list-style-type: none"> <li>Alternative governance models: public, public-private, level of decentralization, funding mechanisms, decision power</li> </ul>
<ul style="list-style-type: none"> <li>Water distribution agreement between up- and downstream countries or regions</li> </ul>	<ul style="list-style-type: none"> <li>Water distribution alternatives</li> </ul>
<ul style="list-style-type: none"> <li>River stabilization (flood protection dikes, channelization, groins, dredging, training works, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Alternatives ranging from a natural to a completely regulated river system</li> </ul>
<ul style="list-style-type: none"> <li>Water allocation to different uses and users, such as maintenance of ecosystems and ecosystem services, agriculture, hydropower, public water supply, process water, navigation, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Alternative combinations of water allocation for different uses and users</li> </ul>
<ul style="list-style-type: none"> <li>Land use management and planning (combat salinization, soil subsidence, soil erosion and soil degradation)</li> </ul>	<ul style="list-style-type: none"> <li>Land use planning alternatives</li> </ul>
<ul style="list-style-type: none"> <li>Flood risk management and early warning</li> </ul>	<ul style="list-style-type: none"> <li>Flood adaptation measures (including early warning) versus maximum flood protection;</li> <li>Zoning and differentiated safety levels based on magnitude of flood damage;</li> </ul>
<ul style="list-style-type: none"> <li>Restoration of water related ecosystems to rehabilitate ecosystem services, e.g. for nature conservation, enhanced resilience against climate change, land and water productivity, water quality, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Site alternatives; connectivity and quality of water related ecosystem; type and magnitude of restoration interventions; alternative management and exploitation regimes.</li> </ul>
Water quality	To be addressed in SEA
<ul style="list-style-type: none"> <li>Use of agro-chemicals (diffuse pollution)</li> </ul>	<ul style="list-style-type: none"> <li>Alternatives to avoid and reduce the use of agro-chemicals</li> </ul>
<ul style="list-style-type: none"> <li>Discharge of polluted water (point source pollution)</li> </ul>	<ul style="list-style-type: none"> <li>Alternatives to avoid, reduce and re-use water discharges</li> </ul>
<ul style="list-style-type: none"> <li>Surface and groundwater salinity intrusion</li> </ul>	<ul style="list-style-type: none"> <li>Alternatives to reduce or adapt to salinity</li> </ul>
Major projects	To be addressed in ESIA
<ul style="list-style-type: none"> <li>River training or channelization works</li> <li>Coastal defence works</li> <li>Dredging works</li> <li>Dams and reservoirs (single or multi-purpose)</li> <li>Hydropower projects</li> <li>Irrigation schemes</li> <li>Ground water extraction</li> <li>Water diversion (inter-basin transfer)</li> <li>Ports and harbours</li> </ul>	<ul style="list-style-type: none"> <li>Alternatives (siting, size, design, applied technologies, timing of construction, operational regime, etc.)</li> <li>Mitigation, compensation and off set measures</li> <li>Environmental and social management plan</li> </ul>



Figure 3: NCEA, 2017: river basin planning in Bangladesh

## Advantages of applying SEA

SEA and IWRM have much in common. Both include the integration of environmental and social considerations into multisector decisions; both emphasize the importance of participatory and consultative approaches to decision-making; both incorporate monitoring and evaluation of outcomes; both seek to broaden the perspectives of planners beyond immediate sectoral issues; and both stress that the outcome is a product (a policy, strategy or plan) as well as a process. A further look at the strengths and weaknesses of SEA approaches and IWRM reveals major differences, where IWRM and SEA can complement each other:

**SEA is a legally established vehicle to convey the messages of IWRM.** SEA is legally adopted in an increasing number of countries for plans and programmes, including river basin and delta plans. Moreover, virtually all countries have ESIA requirements for projects resulting from such plans (see the last row in Table 3). The SEA for the Hidrovia river stabilization plan in South America showed the importance of SEA for site selection of large investments such as dredging and river training. IWRM usually does not have a legal basis, even though some countries have developed IWRM-based policies. A legal obligation in combination with a government willing to learn from experiences does provide good opportunities to use SEA as a vehicle to convey the messages of IWRM.

**SEA assesses the consistency of existing policies with the basin or delta planning process.** A so-called consistency analysis in SEA depicts the potential for conflict or mutual strengthening between the existing policies, plans and regulations, and the basin or delta plan under preparation. If conflicting interests are identified the planning process can address these.

**SEA is well equipped for the practical implementation of the principles it shares with IWRM (stakeholder participation and informed, transparent decision-making).** Stakeholders have to make certain that their interests are taken into account in government decision-making. SEA aims at bringing forward these interests in the planning and decision-making cycle, at the right moments, providing the type of information that decision-makers need. This practice of impact assessment is sometimes complex, as stakeholders have different influence and powers, each trying to influence the process. The experiences with SEA for the Tana Delta land use plan in Kenya (see Box 3) show that SEA has in-built guarantees that interests of all stakeholders are taken into account, that decision-making takes place in the most transparent manner, and that the provided information is scientifically valid. This resulted in credibility of the outcome of this planning process.

*(continued on next page)*

**SEA enhances credibility and legitimacy of information.** SEA can contribute significantly to the credibility of the information generated by the planning process, by requiring a review of the outcomes. During review, a plan is opened to the public at large for comments; in most countries also a formalized review exists by panels of experts. Often the review phase leads to additional research questions which, by law, have to be treated in the final SEA report and/or plan, thus adding to the credibility of the plan. Where stakeholders and the public at large have had the opportunity to express their concerns during the scoping stage, the review stage gives these parties the opportunity to decide whether their views and concerns have been adequately addressed in the document(s). This public review ensures that all information has been taken into consideration.

**As a sector-neutral, broadly applied instrument, SEA can insert IWRM principles beyond water sector boundaries.** IWRM is strongly rooted in the water sector. This sectoral basis can be a point of weakness when issues beyond the sectoral boundaries have to be addressed. It becomes even more complex when other sectors, potentially ignorant of IWRM principles, are in the lead in a plan process (e.g. forestry sector or regional development planning authority). At sectoral level, climate change considerations within an SEA might be used to identify where adaptation interventions will be required to enhance the resilience of the sector in the face of climate change, or to identify which strategies are – and which are not, – resilient under different climate change scenarios. Responsibility of such plans does not necessarily lie in the hands of the water sector. There are limited possibilities to apply IWRM principles if the ‘owners’ of the plan are not familiar with it or have no affinity with it. The SEA for the Tana Delta LUP showed that the use of the delta by the cattle holders is crucial for their livelihood as the Delta provides food and water at the end of the dry season. The interest of all groups of cattle holders have been taken into consideration although some groups are most of the year living far away from the delta.



**Figure 4: NCEA, 2012: public consultation in Rwanda**

## Box 2: NCEA experiences, since 2005

### SEA for river basin plans:

- SEA Hidrovia river stabilization plan – by five South American countries of the La Plata Basin, 2006
- SEA Madeira river basin plan, Bolivia, 2007
- SEA Prespa watershed management plan, Macedonia, 2010
- SEA Regional development plan in lower Beni, Bolivia, 2011
- SEA Lower Zambezi catchment plan, Mozambique, 2011
- SESA for River stabilization plan, Bangladesh, 2016 & 2018
- SEA for four integrated catchment plans, Rwanda 2018

### SEA for delta plans:

- SEA National Water plan, Netherlands, 2010
- SEA Inner Delta development plan, Mali, 2012
- SEA Tana delta Land use plan, Kenya, 2014
- SEA Integrated Ayeyarwady Delta Strategy, Myanmar, 2018
- SEA Benin Delta plan, (under preparation)
- SEA Turkana–Omo basin, Ethiopia/Kenya (planned)

### Box 3: SEA for the Tana River Delta Land Use Plan, Kenya

In 2011 the NCEA was asked by the National Environmental Management Authority of Kenya (NEMA) to review a draft scoping report for the Spatial Planning & Strategic Environmental Assessment for the Tana River Delta (TRD) and Tana River Basin, and to advise on the development of an SEA and a LUP (Land Use Plan) for the TRD.

The Tana River is the longest river of Kenya, flowing from the highlands near Mount Kenya to the Tana River Delta near Lamu and Kipini on the east coast. The target area for the SEA/LUP, the Tana River Delta, is an area of complexity both from an ecosystem protection and “wise use” based management perspective as well as because of the complex rural socio-economic conditions and population dynamics.

In line with the redefined roles on national and county level in the new constitution, a new approach was followed for this SEA and LUP. The initiative for the SEA was taken on county level, with the results eventually submitted for approval to the County Cabinet and Assembly. The responsibility for this process is with the County Planning Departments. Both a Strategic Environmental Assessment and a Land Use Plan (LUP) have to be submitted to NEMA for final approval on the national level.

The NCEA was intensively involved in the SEA/LUP process, including a field visit by a multidisciplinary expert working group in April 2012. The group worked in close cooperation with the representatives of the SEA and LUP teams and with the Technical Advisory Committee for the SEA/LUP process. The NCEA advised to implement the SEA and LUP in a parallel process, as both instruments are required under the new regulations.

A 2016 evaluation mission concluded that the participatory approach in both processes has greatly contributed to the current engagement of the local population. This conclusion was confirmed on national and county level and during meetings with communities. The process generated high quality baseline data, produced a preferred development scenario based on sound data analysis, and has widely communicated the results among stakeholders. The SEA/LUP process is very positively valued, saved both time and resources, and has contributed much to local awareness building. Combining the two processes has enabled, for instance, the use of largely the same baseline data and interactions with target groups. In addition, the use of the same scenarios, leading to shared (SEA and LUP) conclusions on preferred strategies, has saved time and effort and contributes to the synchronization of the approval procedures on national and county level.



The key issue for future development of the delta is water availability, which needs to be safeguarded through an IWRM process on basin level, balancing water and land requirements between agriculture development and livestock and nature protection for a large part of the delta which is a Ramsar site. A water balance for the Tana River and Delta should be developed with highest priority and include the plans and ideas for dam construction upstream, irrigated agriculture development and cattle raising downstream and the water, space and energy consequences of the development of the Lamu Port–South Sudan–Ethiopia Transport (LAPSSET) corridor.

Figure 5: NCEA, 2011: delta planning in Kenya

#### The NCEA

The Netherlands Commission for Environmental Assessment is an independent body of experts. It advises national and international governments on the quality of environmental assessment reports in order to contribute to sound decision-making. In addition, the NCEA supports the strengthening of EA systems in low and middle income countries, and makes its extensive knowledge of environmental assessment available to all.

#### Contact

Dr Arend Kolhoff, Technical Secretary  
[akolhoff@eia.nl](mailto:akolhoff@eia.nl) / +31 302347604