

Risky business

Expanding coastal cities need integrated solutions in the face of growing water risks

Hasty, business-as-usual solutions to managing disaster risks in expanding coastal cities can undermine sustainable development and actually put people, urban infrastructure and valuable land at greater risk.

Integrated Risk Management (IRM) is needed, based on an understanding of all dimensions of risk across space and time, and the full breadth of solutions, not only big infrastructure. Multi-sector approaches need to be applied. With IRM, sustainable development can be safeguarded and opportunities for growth can be unlocked.

The bottlenecks:

- Limited engagement of vulnerable communities in decision-making, resulting in policies and practices that ignore the risks facing the most vulnerable groups and that miss opportunities.
- Local information about risk (and about appropriate solutions) are disconnected from national, regional and global planning and financing.
- Environmental degradation is under-rated as an aggravating factor that contributes to increased risk.
- Single-discipline development approaches, resulting in lack of insight on effects on other sectors and across stakeholder groups.
- Focus on visible and short-term gains, at the expense of long-term resilience; ignoring trends in risk, including climate.
- Inadequate screening of large-scale development investments for potential risk and (indirect) effects on resilience across whole landscapes.

Figure 1: Design of effective approaches to increase coastal resilience depends on how heavily the coastal ecosystems are modified, on land use and the nature of inland and coastal processes, like water flows and erosion.

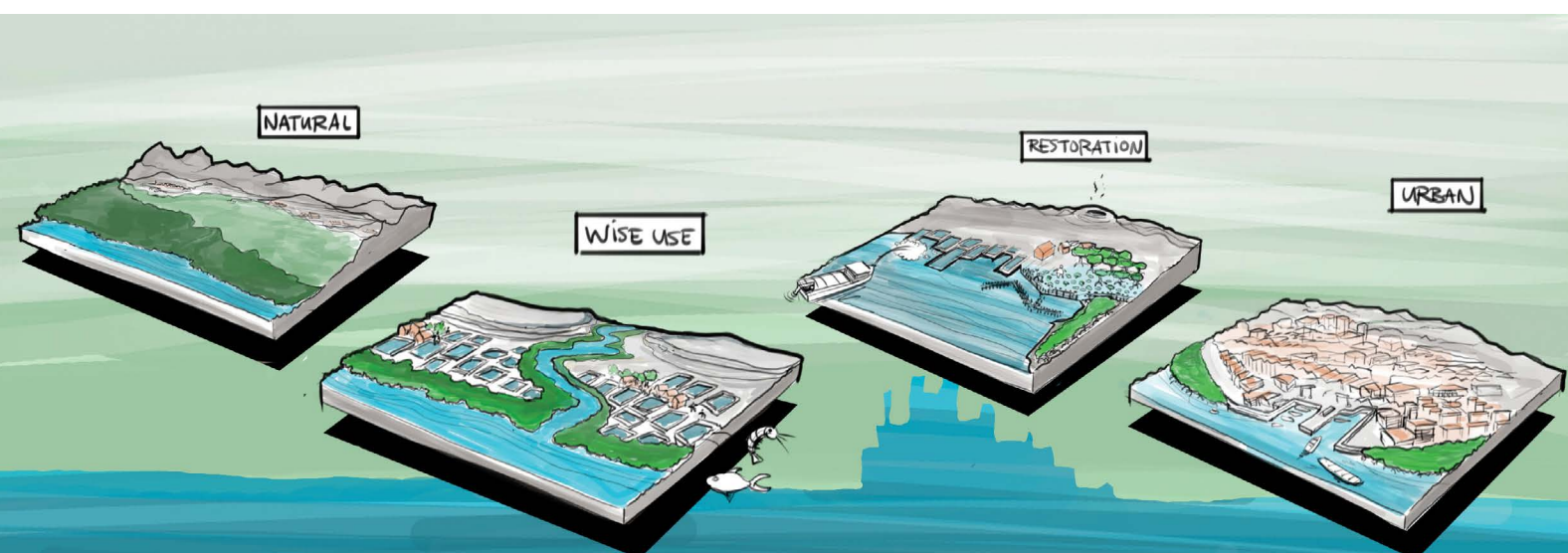
Integrated Risk Management integrates Disaster Risk Reduction, Ecosystem Management and Restoration and Climate Change Adaptation

With an Integrated Risk Management (IRM) approach, large water and coastal zone management schemes including related infrastructure developments will become more adaptive to climate change and they will be informed by environmental requirements and the needs and perspectives of all actors involved, including local communities.

Engineered solutions can best be implemented as part of a continuum of development interventions, which also include ecosystem management and local community-level action, that continue to adapt over time rather than being invested in as a one-off technical intervention.

The potential for ecosystem management and restoration to play a role in IRM in urban and peri-urban environments can vary greatly. Innovative design approaches such as [Building with Nature](#) take into account the exact conditions, including for example ecosystem condition, water flows, erosion and land subsidence processes. Experiences from major cities such as Rotterdam and New York demonstrate how green-grey solutions (or “hybrid-engineering”) are cost-effective and adaptive, while providing multiple benefits to society.

Wetlands International works with cities, water engineering companies, research institutions, local communities and humanitarian organisations to build knowledge and assist in the design of resilient solutions to tackle water risks. We also work as a member of the Ecoshape consortium to promote and enable Building with Nature solutions worldwide. In the following pages, we share some key cases from our experience and recommend Priority Actions to mobilise Integrated Risk Management.





What can save Saint-Louis from drowning?

The city of Saint-Louis has become the city most threatened by climate change in all of Africa. What once seemed to make sense - getting floodwaters off the landscape and away from Saint-Louis as quickly as possible - now needs revisiting. While Saint-Louis is still threatened by rising waters, this is an increasingly water-scarce and thirsty region buffering the Sahara Desert to the north.

In 2003, intense rains overwhelmed upstream dams, because man-made dykes limited the outflow of water into the surrounding wetlands and floodplains. Due to bottlenecks downstream the heavy flow could not reach the river mouth quickly enough and threatened the city. To save the city, a new channel was quickly excavated through the sand dunes, 10 km downstream of Saint-Louis, creating a shortcut to the ocean that immediately relieved the pressure and eased water levels. However, what initially was a four-metre emergency channel within weeks became a permanent bypass 400 metres wide. Exposed to the forces of nature from both sides. Today the breach is 5.2 km long and still growing (see Fig 2).

The breach and the loss of the flood pulse

To the north the ocean has swallowed two villages and is threatening more. The entire UNESCO World Heritage Site and bird sanctuary Barbarie National Park is in danger of disappearing due to erosion. But the negative impacts of the breach, combined with rising sea levels, are also being felt across the larger landscape. Saint-Louis is situated in the lower Senegal river delta, surrounded by several outstanding parks and reserves within the Senegal Delta UNESCO Man and Biosphere Reserve. Before the breach was created, these areas benefited from an annual flood pulse – a temporary inundation of the floodplains that brought freshwater to an otherwise parched landscape. Without the flood pulse, there is less freshwater, salt water is intruding upstream due to a larger tidal pulse, nature is turning into deserts and the food security of local farmers, fishers and pastoralists is at risk.

Looking for long-term solutions


In 2014 Senegal requested advice from the government of the Netherlands, and a special Dutch Risk Reduction Team was dispatched to assess the situation and provide advice. This cooperation is an opportunity to look at larger scale, long-term solutions to the region's coastal problems. With financing provided by the World Bank and European Union, the next step is an integrated study of the lower delta that seeks to understand how it functions, including the value of floodplains for nature and food production. Beyond the technical aspects, stakeholders – including local communities – will be consulted on their interests.



Making room for the river

In thinking about the floods and droughts to come, Wetlands International is asking, how can wetlands help protect Saint-Louis from flooding? And can storing water in the lower Senegal Delta wetlands contribute solutions to the region's water scarcity and food security challenges? Instead of sending the floodwaters directly out to sea, why not make more room for the river within the floodplains by restoring the flood pulse to water-starved areas?

Wetlands International conducted a study together with the Senegal River Basin Authority (OMVS), aimed at identifying and mapping ecosystem services along the entire river basin, with particular attention in the Delta. The findings advocate for "Building with Nature solutions" in order to achieve more effective control of water flow with nature-based solutions. We are proposing exploration of an approach that combines wetlands restoration and infrastructure to restore the flood pulse, and reduce flood and erosion risk to protect Saint-Louis and the wider coastal region, while benefitting biodiversity, livelihoods and rural development.



Natural infrastructure, the buffer for extreme rainfall in Buenos Aires province

The latest flooding incidence in the Buenos Aires province caused five deaths and affected 30,000 people of which 6,000 were forced to leave their homes. Urbanisation comes at the expense of the wetlands in the region that regulate the intense periodic flooding. With more extreme and less predictable weather events to come, more and more vulnerable people will be pushed below their coping levels.

The Parana Delta lies in the La Plata Basin in Argentina, the widest river on earth. The coasts of the La Plata River are the most densely populated areas of Argentina and Uruguay. The Parana Delta is surrounded by the agricultural and industrial core of Argentina and hosts several major ports. Its complex water cycle includes periodic flooding of the Paraná and Uruguay Rivers and tides of La Plata River, sometimes so intense that it has serious consequences for nature and local people, even in the conurbation of Buenos Aires.

The loss of buffers for intense flooding

The wetlands of the Parana delta region, which lie in the massive la Plata Basin in the province used to act as “buffers” for extreme rainfall. A large percentage of these wetlands have however been lost and can no longer regulate the intense periodic flooding and provide other services, such as coastal protection and provision of goods to people that rely on artisanal farming and fishing in the delta.

The wetlands and the integrity of the delta have been severely degraded or modified by forestry, large-scale agriculture and livestock farming involving big embankments and dikes, but also by infrastructure development such as ports, and mega-suburbs in the upland areas near the delta. Buenos Aires metropolitan area is certainly the conurbation that puts most pressure on the delta. The number of private developments in this megacity exceeds 400 today, largely at the expense of surrounding wetland areas.

The need for an integrated basin approach

The Luján river basin, which is a tributary of the Parana Delta and is under increasing pressure from urban expansion, shows the need for an integrated risk management approach to risk in the basin. The Luján river basin and its 1,000,000 inhabitants, suffer from increased floods with increasingly higher average annual rainfalls and more frequent heavy rainfall events. Urban expansion, driven mainly by the construction of private gated communities in wetland areas in the lower part of the basin is a key driver of changes, resulting in loss of wetland capacity for water regulation.

The current response to the problem is traditional flood risk management (such as dikes) at local level and without a basin approach. The increased floods risk indicates the urgent need for:

- Improved spatial planning at local and regional level that respects natural areas and the services they provide. The wetlands of the Parana Delta have thus far not been considered when making environmental impact assessments for infrastructure projects.
- Better engagement of vulnerable communities and civil society in decision-making;
- Ecosystem based approaches to adaptation that promote ‘natural infrastructure’ solutions, either alone or in combination with more traditional flood risk mitigation techniques.

Wetlands International has been supporting integrated risk management in the Parana Delta by developed a strong knowledge-base on the socio-economic valuation of local wetland resources, the extent of large-scale urbanisation and on the soy cultivation impacts on wetlands. We also build capacity of civil society organisations to help them to advocate for better land planning and policies that conserve wetlands in the region, such as with regard to mega-suburb expansion. We also support livestock farmers in improved environmental management. We also mainstreamed wetland conservation in the Roundtable on Responsible Soy (RTRS) and in other political processes at the national and regional level. The Minimum Standards Law for Wetlands Conservation is waiting to be approved by the National Congress of Argentina.



Reducing urban flood risks in Panama with Dutch expertise

The Juan Díaz sub-district of Panama City is the most flood-prone area of the country. Over the past years, urban flooding has increased due to urban developments and landfills in the Juan Díaz floodplains, riverbeds and mangroves. Urban neighbourhood groups have resisted more urban developments, demanding a stop and reversal of landfills. How can resilience be built in this densely populated part of the city?

The Juan Diaz sub-district is a low-lying area separated from the sea by a large strip of mangroves, currently protected by law. A larger river and many smaller ones as well as creeks run through it. Most of them have been encroached on and channelled. The floodplains, wetlands and surrounding mangroves have been used for landfill, to a height of 6 metres, due to a government regulation. When heavy rains fall, these landfills divert the water to lower lying earlier built neighbourhoods. Furthermore, upstream urban expansion causes sedimentation of the river and streams, and reduced rainwater infiltration, thereby increasing river flow and reducing capacity to drain rainwater coming into the lower part of the basin. Finally, the area suffers from a badly maintained urban drainage system and serious garbage problem, further putting its inhabitants at risk.

The last drop

In September 2015, after an extended dry period due to El Niño, the area was hit in the rainy season with an exceptionally heavy rainstorm, causing floods in parts of the sub-district that previously had never flooded. The inhabitants organised themselves in neighbourhood groups and demanded a stop to landfill projects, which are seen as the cause. The developers claimed to abide by official building codes and blamed the government, whose different entities pointed the finger at each other. Lastly, environmental NGOs joined the debate to defend the threatened wetlands. It became clear that an integrated and multi-stakeholder approach was needed to solve this multi-layer and multi-scaled problem.

Panama Dutch Water Dialogues

With the new decentralisation law in effect, the newly installed Municipal Government of Panama City has gained many responsibilities in urban planning. The Municipal Government has spearheaded efforts to resolve the urban flooding problems. In 2015, a Dutch Risk Reduction DRR Team mission was invited by the Mayor of Panama City to assist the City of Panama in analysing flood risks in the city in general and in the Juan Díaz, Tocumen and Pacora river basins in particular. The mission consists of experts of the Dutch Water Sector and is supported by Wetlands International. The team provides building blocks for the development of a Road-Map towards flood risk reduction and takes an interactive stakeholder approach. The implementation of the DRR Team's recommendations on Integrated Water Resource Management is done through the Panama Dutch Water Dialogues.

The first Dialogue delivered a Road Map for 2016 to:

1. analyse the actual situation, such as that of the actual drainage system, the evaluation of planned developments, and the coordination of the activities of the different authorities that have responsibilities related to water management
2. identify and bring together all relevant stakeholders varying from private sector to ministries and urban communities. Optimise their participation through the Water Dialogues on knowledge exchange, scenario planning, modelling and institutional capacity building
3. assess opportunities for application of water management approaches such as Building with Nature, Room for the River, retain-store-drain, and
4. develop a process of regulatory adjustment.

Wetlands International functions as the liaison between the Municipality, the Embassy and the Dutch water experts. We also provide technical input, facilitate planning and implementation actions and a knowledge and capacity building process.

We aim to replicate the approach taken in the Juan Díaz river basin for neighbouring Tocumen and Pacora basins and more widely in Panama.

Priority actions for Integrating Ecosystems in Risk Management

The integration of ecosystems and natural resource management in disaster risk reduction (DRR) is often overlooked. The cases in this brochure highlighted the need to integrate the management of ecosystems and natural resources in DRR work.

Our key messages for developing an ecosystem-smart approach in the design, implementation and evaluation of risk reduction programme:

1. Assess and understand the interrelationships between ecosystem functioning and disaster risk, and appreciate how improved land, water and natural resource management can increase community resilience;
2. Mobilise interdisciplinary teams capable of designing and implementing more inclusive risk reduction programmes, including vulnerability assessments that combine interventions from the humanitarian, development and environment sectors;
3. Understand how risk is expressed at different spatial scales, and how human interventions related to land, water and natural resource use may affect the vulnerability of communities elsewhere (within a river basin, along coastlines, etc.);
4. Establish policy dialogues with a broad range of stakeholders to advocate the wise use of ecosystem services and highlight the adverse consequences of unsustainable practices regarding disaster risk and community vulnerability;
5. Consider the environmental root causes of disaster risk, convening the right actors at the appropriate scales and clearly identifying institutional responsibilities and stakeholders' roles.

Step-by step guidance to develop an 'ecosystem-smart' approach in risk reduction programmes can be found in the document: [Integrating ecosystems in resilience practice: Criteria for Ecosystem-Smart Disaster Risk Reduction and Climate Change Adaptation](#), by Wetlands International. The criteria provide guidance on the required capacities, partnerships, institutional set-up and planning needs. It does not provide specific guidance on the technicalities behind selected ecosystem and natural resource management interventions as these are typically highly site-specific.

The criteria were developed in the context of the Partners for Resilience alliance; one of the first largescale efforts to bring together expertise from the humanitarian, development and environment sectors into a holistic risk reduction and climate change adaptation (CCA) programme (www.partnersforresilience.nl). Following the criteria will help to integrate these disciplines, which will substantially increase the sustainability and effectiveness of risk reduction interventions. While this document focuses on disaster risk reduction, the criteria are equally applicable to guide the integration of environmental considerations into climate change adaptation planning processes.

Bridge over the Sénégal River



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