

Building with Nature Indonesia - reaching scale for coastal resilience

Through "Building with Nature" we envision a safe delta coastline in Northern Java which enables vulnerable communities and economic sectors to prosper, be more self-reliant and resilient against hazards.

Java's coastline suffers from severe erosion. Millions of people at risk of flooding.

Northern Java's deltaic shorelines suffer from land subsidence and severe erosion, in some places more than three kilometers of land has already been taken by the sea. This is mainly caused by removal of mangrove belts, unsustainable coastal infrastructure and aquaculture and groundwater extraction. Catastrophic flooding occurs during high tides, storm surges and periods of excessive rainfall. In the long term, over 30 million people face the risk of losing their houses, roads, and valuable arable land.

Dams and sea walls as a single solution, are ineffective in muddy coasts.

Hard structures like dams and sea walls have proven to be ineffective as a single solution along rural mud-coasts and often exacerbate erosion. They also tend to be expensive and unstable as they are incapable of adapting to climate change. Furthermore, they fail to provide the vital economic, environmental and social services that healthy mangrove belts provide.

Building with Nature addresses the root causes of vulnerability, is cost-effective and sustainable over time. It boosts inclusive economic growth while improving living conditions. Our dream is to replicate this model in rural and urban coastlines in Indonesia and beyond.

Building with Nature in Northern Java: a sustainable solution for a safe and productive coastline.

Using the "Building with Nature" approach, we combine green (nature-based) solutions, such as mangrove restoration, with grey (hard-engineering) techniques such as dams and sea walls. In this way we make use of the power (services) of nature instead of fighting against it. With this innovative approach we will build stable (restored) mangrove coastlines that reduce flood risk, erosion and saline intrusion and can adapt to sea level rise. Simultaneously, we take a multi-stakeholder approach for the introduction of sustainable multifunctional land uses that enables inclusive economic growth once the coastline is stable.

Local women building permeable structures in Timbul Sloko, Northern Java, by Nanang Sujana



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Building with Nature

With the "**Building with Nature**" approach we will reverse the trend of continued coastal erosion and unsustainable economic development in Northern Java, starting with a Flagship project in Demak district. We envision a safe delta coastline which enables vulnerable communities and economic sectors to prosper and to be more self-reliant and resilient against hazards. We apply the following three-pronged approach:

Regaining the land, restoring the mangrove belt

In rural areas, we apply soft engineering measures such as the construction of grids of permeable dams (see cover photo), mud-nourishment and agitation dredging along with mangrove rehabilitation to regain the land and restore the fine sediment balance. We work with and along sea currents, river flows and waves rather than fighting against these natural processes. In urban areas where there is little space, hard engineering techniques are strengthened by mangroves belts thus diminishing costs of maintenance while increasing value for example recreation.

Climate smart and productive land-use

The restored coastline will enhance protection against natural hazards, protect arable land from erosion, revive fisheries and (non-timber) forest products, improve water purification, enhance carbon storage, as well as offer opportunities for recreation. But we will do more to boost the economic situation and to ensure a sustainable socio economic system. To avoid unsustainable practices from returning, we will introduce sustainable aquaculture which can co-exist with a healthy mangrove forest. This will

Building with Nature was initiated by Ecoshape, a consortium of private parties, government organisations and research institutes. The aim of Building with Nature is to utilise natural processes and provide opportunities for nature while realising hydraulic infrastructure, thereby developing sustainable and integral engineering solutions.

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substantially enhance shrimp production and near shore fisheries, two important engines of economic growth in the area.

Securing long-term maintenance of mangrove belts

To ensure the sustainability of our initiative, and to enable replication in other areas, training and embedding the approach in policy and planning are crucial elements from the first till final phase. We support integral solutions for improved coastal zone management by contributing to the development of a Master Plan, together with communities, government, private sector and civil society. This plan will address the root causes to coastal vulnerability, sustainable land use and finance options that together ensure the long-term maintenance of a stable coastline and its ecosystem services.

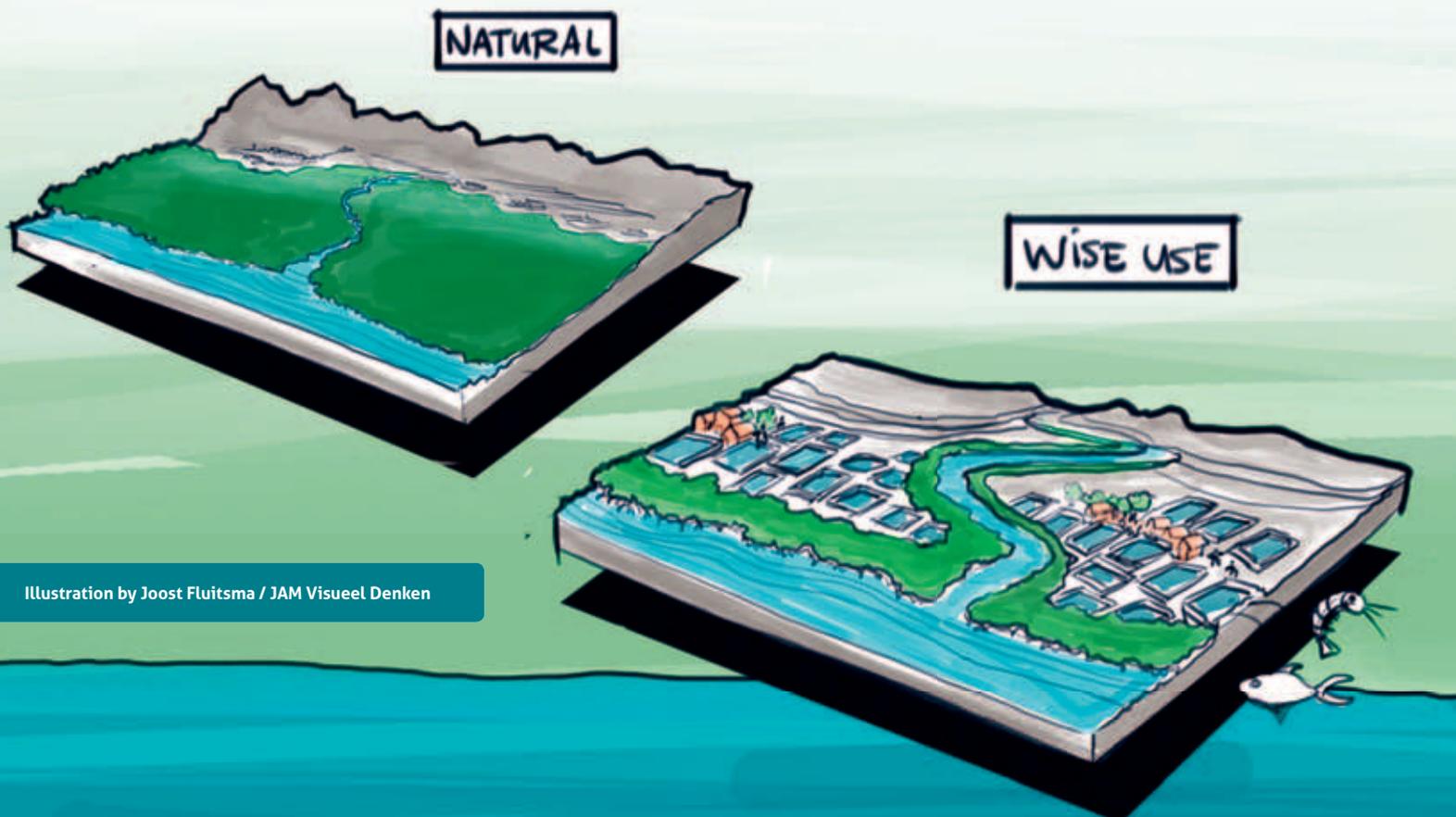
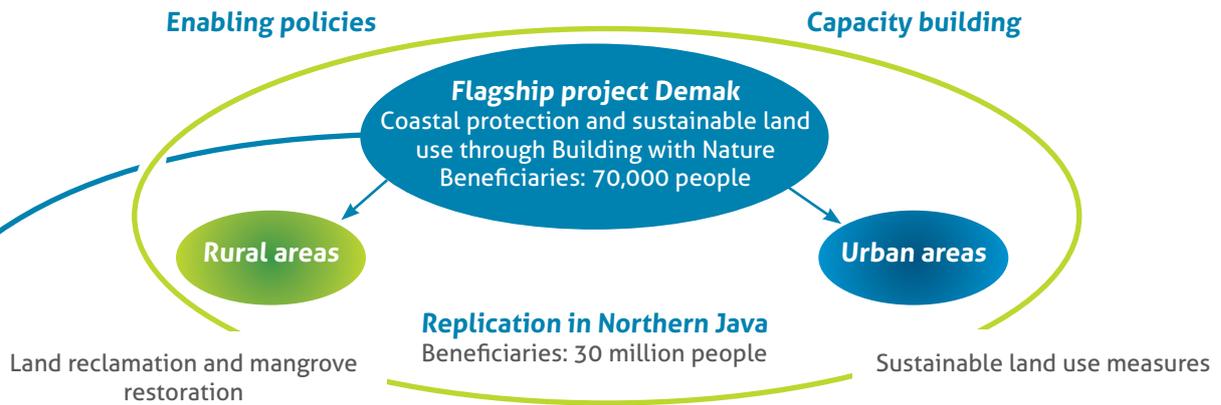


Illustration by Joost Fluitsma / JAM Visueel Denken

Our ambition:

Creating a Flagship that triggers change in rural and urban areas in Northern Java



Mangroves contribute to coastal safety in many settings

In **natural settings**, where the mangrove greenbelt is still very wide, mangroves are capable of lowering storm surge height by 5-50cm for every kilometer of mangrove and of fully dampening the waves on top of the surge within the first hundreds of meters of mangrove.

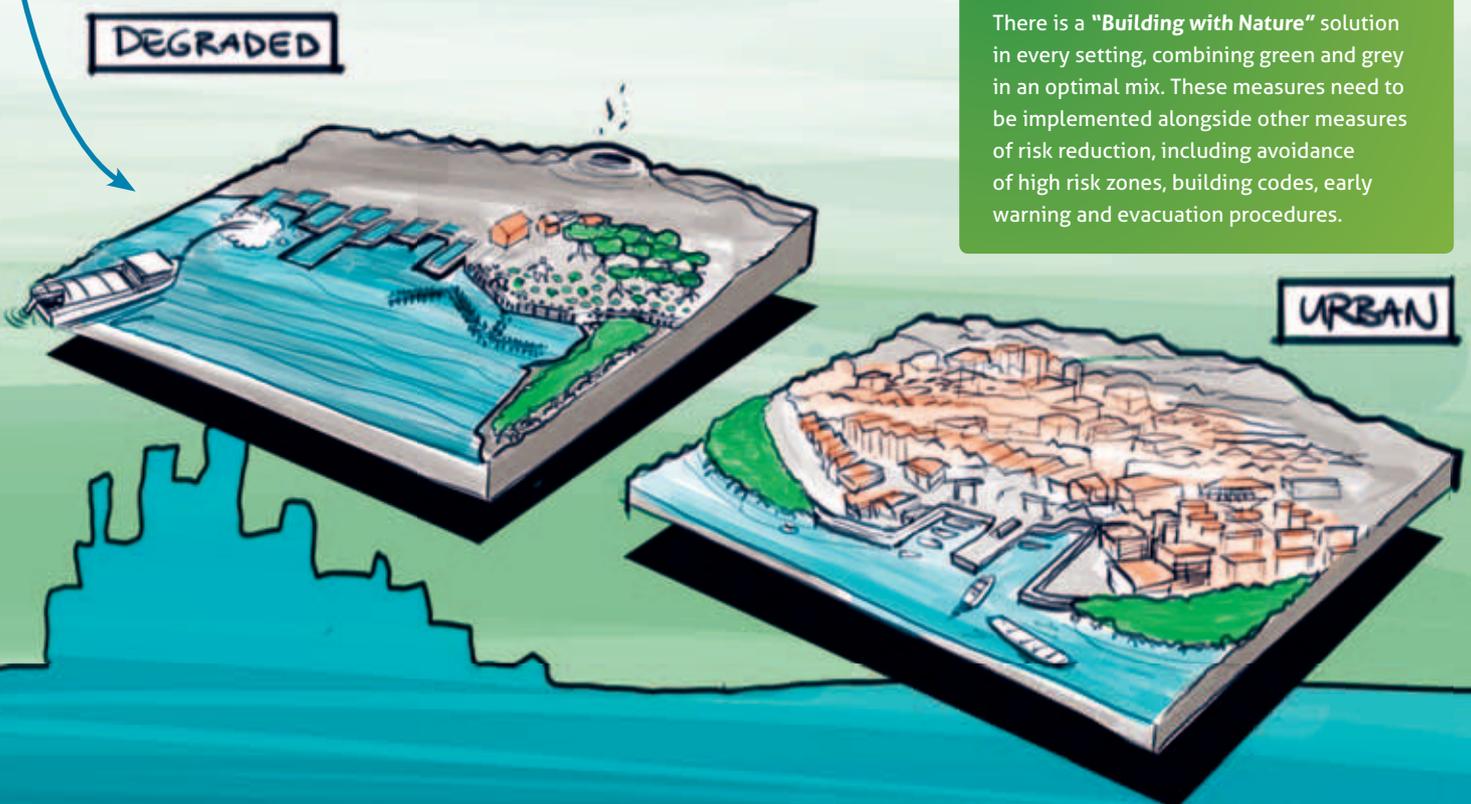
In **rural settings**, a mangrove greenbelt of hundreds of meters wide can reduce ordinary wind or swell waves by 50% in height over a distance of about 100m through the mangroves, thus reducing erosion.

When **wisely used**, such a mangrove belt can support aquaculture and fisheries while enhancing coastal safety. In **degraded settings**, mangroves can help regain eroded land using Building with Nature techniques, enabling a transition to wise use.

In both **natural and rural settings**, mangroves may be able to keep up with sea level rise, provided that the sediment and fresh water balance enable mangroves to thrive.

In **urban settings**, where little space is available, mangroves offer additional protection from waves, reducing construction and maintenance costs for hard infrastructure.

In **all these settings**, mangroves add additional value in the form of enhanced fisheries, carbon storage, (non-timber) forest products and recreation. Mangroves thus support food security, climate change mitigation and human wellbeing.



There is a "Building with Nature" solution in every setting, combining green and grey in an optimal mix. These measures need to be implemented alongside other measures of risk reduction, including avoidance of high risk zones, building codes, early warning and evacuation procedures.

New hope for the people of Demak

Timbul Sloko, Central Java, pilot site of the Mangrove Capital project.

There seemed to be no means of stopping the erosion and the floods. Major investments were made in seawalls and wave barriers, but all these efforts failed. Mangrove replanting was also not successful as the conditions were not right, such as the input of sufficient sediment. The floods kept on creeping further into the village and taking the land by 100 meters every year. People became desperate and made plans to move away, having witnessed neighbouring villages already being swallowed by the sea.

But then a new solution was introduced in the village, called "**Building with Nature**". This solution entails the placement of permeable dams (see picture) and was made possible by Wetlands International, Deltares and the Indonesian Ministry of Marine Affairs and Fisheries (MMAF). The permeable dams break the waves and trap sediment thus reclaiming land. Once the land is back, mangroves can recolonize the area and help protect the coastline against erosion.

Villagers had been waiting impatiently to see the evidence of success of this new '*permeable structures*' approach. And this day had come. The waves are clearly much lower inside the grid of permeable dams than outside. In some cases, pioneering mangrove trees are already testing the ground.

A major breakthrough came when the village signed a decree, demarcating 100 hectares of the currently lost land as protected area. This means that once the mangrove belt is restored, it will not suffer the same fate again. The potential and hope is created for a new landscape in which mangroves and aquaculture can be combined sustainably.

Mr. Eko Rudianto, Director of the Indonesian Ministry of Marine Affairs and Fisheries (MMAF):

"We are looking for alternative ways to solve coastal erosion problems in Indonesia and we are eager to collaborate with the Netherlands in Building with Nature approaches".

Hendrik Postma, Director of Boskalis Netherlands and Chairman of the Supervisory Board of Ecoshape (Building with Nature):
"There is a growing need for ecological knowledge to be integrated into engineering solutions. The business case for coastal resilience is that engineering solutions alone are often not enough. Sustainable, nature-based solutions are required to meet the needs of the growing numbers of people who are living in the world's deltas and along its coasts".



Collapsed house



Building permeable dams



Sediment and lower waves inside the grid of permeable dams



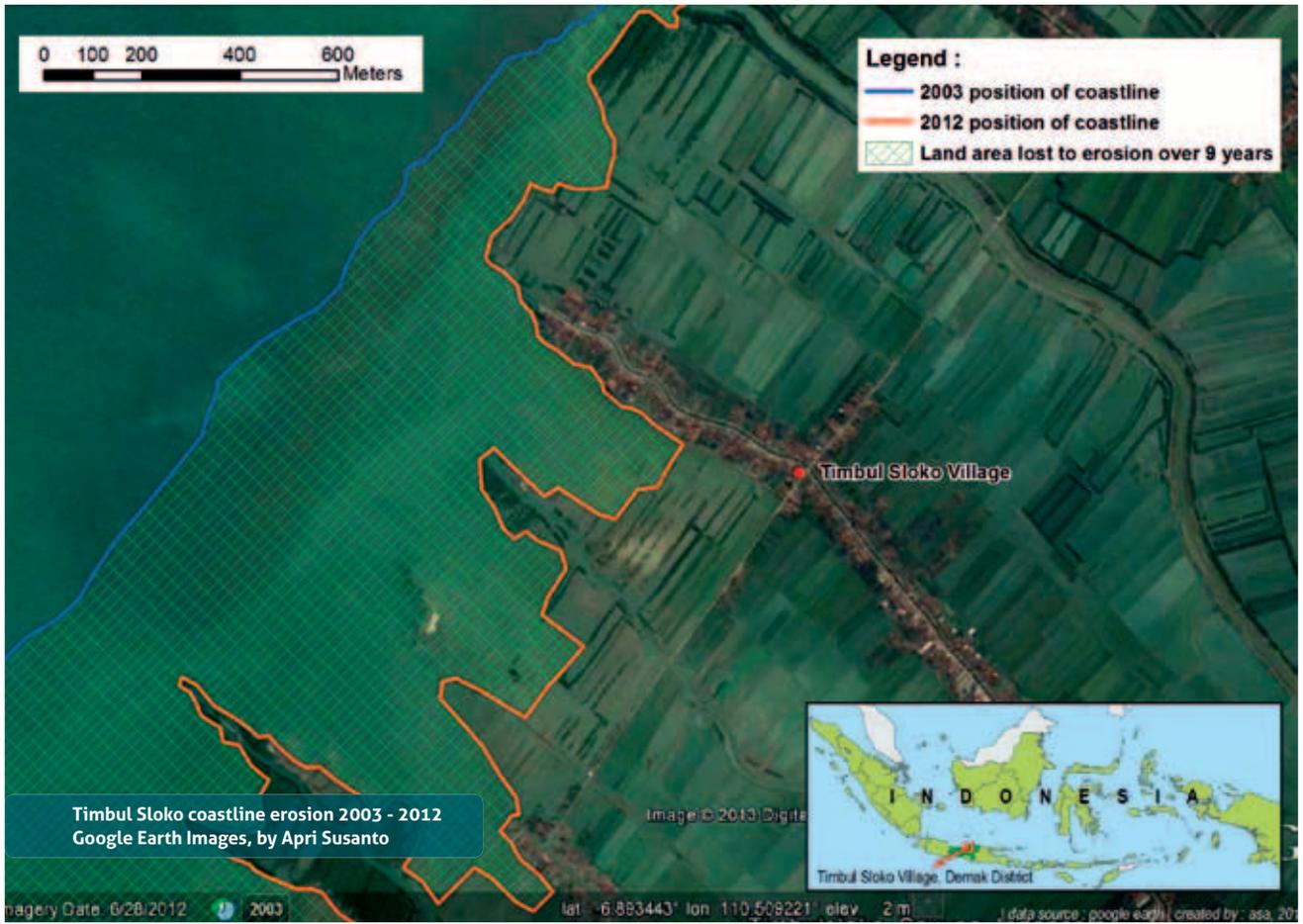
Villagers in Demak happy with demarcation protected mangrove zone

Quote village head of flagship village Timbul Sloko:

"We want to protect the reclaimed land, to avoid us from falling in the same trap of converting mangroves into aquaculture. We don't want this tragedy to happen to our village ever again".

Wim Kuijken, Deltacommissioner of the Netherlands:

"Soft Building with Nature solutions give more opportunity for planning with multifunctional benefits (such as for biodiversity and recreation) and also provide more flexibility for management adjustments, in line with what is needed to keep our feet dry in the future".



Aims for Demak district Flagship

- Restoring a 20km coastline through Building with Nature with communities, local government and engineers
- Decreasing coastal hazards: erosion, flooding and saline intrusion
- Enhancing production from sustainable aquaculture
- Demarcation of protected mangrove zone in Demak district
- Building with Nature embedded in Master Planning for sustainable coastal zone management and risk reduction in Northern Java

Join our efforts

Wetlands International, other Ecoshape members and our Indonesian partners are working together to improve the way in which government agencies, the private sector (including smallholders) and civil society manage their mangroves. We are pursuing this goal through collaboration and knowledge exchange and by encouraging innovative solutions such as Building with Nature. Join us and support our on-going initiatives by advocating sustainable coastal management, helping us with research, contributing to community-based conservation and restoration, and funding our activities on coastal resilience.

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