Boskalis

NATURE-BASED SOLUTIONS

CREATING SUSTAINABLE HORIZONS TOGETHER

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MOSES artificial reef units at the REEFolution project in Shimoni, Kenya

Cover photo: Construction of a sand motor in Benin

INTRODUCTION TO NATURE-BASED SOLUTIONS

Marker Wadden project in the Markermeer lake, the Netherlands

Human life is rooted in the world's natural systems. Prosperity and health suffer when nature is harmed. In our highly dynamic and unpredictable world, global population growth, biodiversity loss and climate change pose major challenges.

BENEFITS FOR ALL STAKEHOLDERS

Population growth is highest in coastal areas, which is precisely where coastal habitats and delta systems are most at risk. Coastal communities may suffer severely, with consequences for food supplies, land quality, erosion and flooding.

A holistic approach is needed to generate shared value for both human development and nature values by working with nature instead of against it: nature-based solutions are interventions that use nature to address global challenges and provide long-term benefits for people and nature.

RESILIENT SOLUTIONS TO COMPLEX CHALLENGES

Solutions that harness nature can provide answers to countless global sustainable development challenges, from the environment to the economy and health. The Global Biodiversity Framework adopted by the UN Biodiversity Conference in 2022 requires the restoration, and sustainable use of natural ecosystems. Nature-based solutions deliver the sustainable, cost-effective and resilient responses needed.

Nature-based solutions go one step beyond climate adaptation: they balance nature values and human development, which is essential to maintain biodiversity and public health, to generate economic opportunities, to improve water quality, and to provide coastal protection at landscape scale.

COMBINE KNOWLEDGE AND UNDERSTAND THE SYSTEM

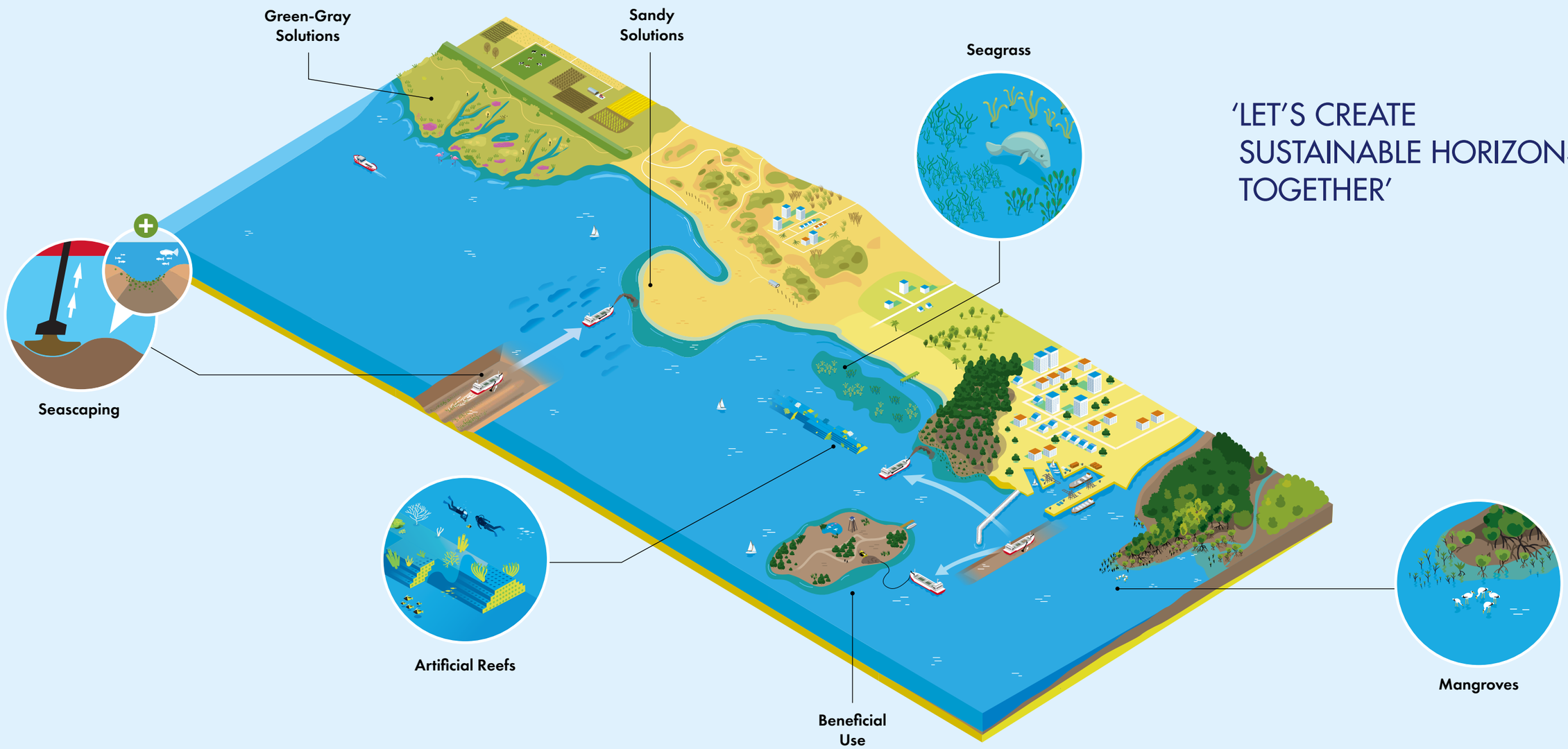
Nature-based solutions take inspiration from – and work with – nature. A thorough understanding of the local dynamics and natural processes is essential; each nature-based solution requires a context-specific innovative and dynamic design based on a holistic view of the broader landscape.

An evidence-based approach is paramount before, during and after the execution of a project. Throughout the project lifecycle, Boskalis studies the science and the data, collaborates with experts, engages local and indigenous knowledge where available and applies for permits.

DIFFERENT LANDSCAPES

Nature-based solutions can be used in many different landscapes. This brochure describes proven nature-based solutions implemented by Boskalis.

Our solutions are perfect for sandy and muddy coastlines, lakes, rivers and estuaries. But also for densely populated areas such as cities and ports. Nature-based solutions can be combined with traditional 'gray' infrastructure such as dikes and revetments to create green-gray solutions that match the landscape, delivering long-term resilience to changing conditions, and adding value for people and nature.



‘LET’S CREATE SUSTAINABLE HORIZONS TOGETHER’

TAPPING INTO FINANCING POTENTIAL

Scaling up nature-based solutions in the infrastructure market often presents project owners and developers with financing challenges. Private capital can play a critical role here: funds, investors and banks are increasingly looking to deploy their capital in sustainable and climate-adaptive infrastructure projects. In return, nature-based solutions provide long-lasting environmental, social and economic values that align with the objectives of the financial sector. We leverage our global network and we engage with industry partners and financial and development institutions to jointly explore ways to mobilize financing for nature-based solutions.

COLLABORATION

For Boskalis, alliances and collaborations are the core of our nature-based approach. Our long-standing relationships with engineers, knowledge institutes, NGOs and academic institutions provide us with access to the latest knowledge, add value to our work and allow us to manage the risks in complex project environments. Nature-based solutions perform best when they are actively supported by project owners and developers, and are co-designed with local experts, communities and stakeholders. The relationship with local communities is essential. From the earliest stages of a project, we engage proactively with the involved stakeholders. Even when we join projects later, after the design and permitting stages, we still look for ways to work together and include nature-based solutions in the development.

WHAT CAN WE OFFER?

At Boskalis, sustainability and the UN Sustainable Development Goals are a high priority. With over a hundred years of experience in river, delta and coastal engineering, we are keenly aware of the vital services provided by water-based ecosystems.

We are committed to being a sustainable business partner for nature-based solutions based on integrity, reliability and responsibility. We have the in-house knowledge needed for solutions that are uniquely tailored to local conditions and that meet our clients’ requirements.

We are convinced that – more than ever before – we need nature-based solutions to deliver the best possible projects and make a positive impact in our complex world. Our experts are eager to work with you on projects with the aim of adding value and going beyond traditional solutions.

SANDY SOLUTIONS

The Sand Motor at the Delfland Coast, the Netherlands

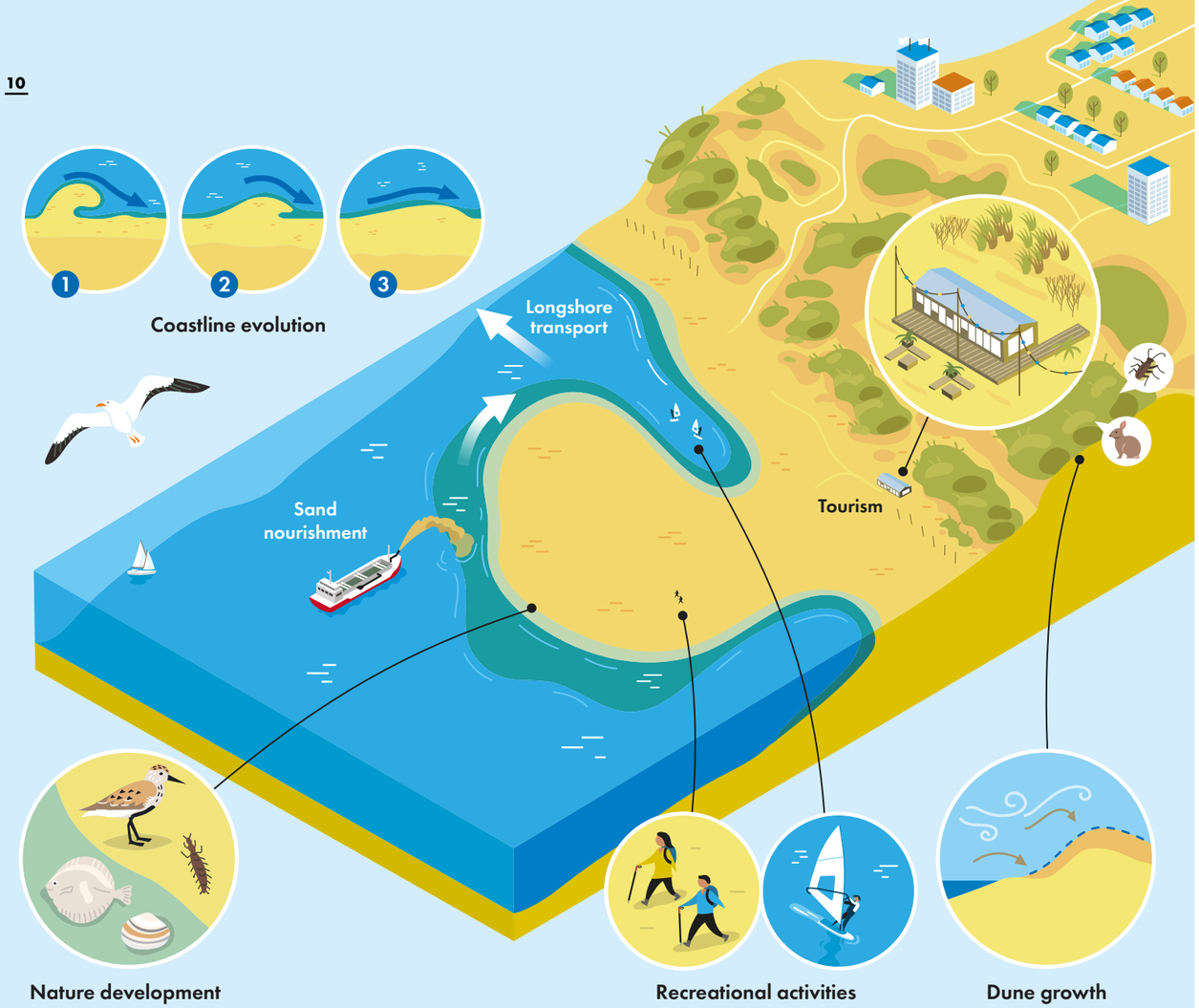
Traditional coastal nourishment involves frequent repeat operations that periodically disturb coastal environments. Sand motors – an example of a sandy solution – are a more sustainable option: they use natural coastal dynamics to gradually spread the sand over a long stretch of coast over time. The concept has been scientifically proven, accepted as best practice and widely implemented.

BENEFITS

Coastal protection
Sandy coastlines are the first line of defense against sea level rise. Sandy solutions consisting of large volumes of sand can protect coastlines for decades. The wind and currents gradually redistribute the sand along the coast, replenishing the beaches and dunes as needed.

Economy
These nourishments also generate opportunities for tourism, leisure and sports. The ecosystem-based approach means they are the focus of coastal research and innovative coastal management solutions. Local economies can also benefit directly from the creation of a freshwater reservoir.

Nature development
Depositing large volumes in a single operation reduces the required nourishment frequency, allowing more time for the development of large nature areas. The combination with local coastal dynamics results in diverse habitats with benthic gradients, dune vegetation and lagoon formation that attract macrobenthos, fish and birdlife.



‘SAND MOTORS ARE A MORE SUSTAINABLE OPTION THAN TRADITIONAL COASTAL NOURISHMENTS’

OUR APPROACH

Building with nature is at the heart of every sandy solution. Environmental awareness and a detailed system understanding of biotic and abiotic factors are crucial for succesfull development.

The design (shape, volume, frequency) typically depends on local conditions, the requirements and the local availability of sand of the right quality. Sand is increasingly becoming a scarcer and therefore valuable resource, so our approach focuses on its efficient use and smart interventions in the natural system for maximum effect with the least possible materials used.

OUR EXPERIENCE

Sandy solutions have been used successfully in multiple locations on coastlines and lakes.
In holistic designs co-developed by Boskalis, flood risk management, nature quality and leisure facilities have all benefited from improvements in the quality of shallow foreshores. The Sand Motor on the Dutch coast is a prime example. A ten-year program of intensive monitoring has shown that new dunes have formed, existing dunes have grown larger, and that new habitats have been created, boosting biodiversity in the sea, on land, and in the air.

We successfully strengthened a stretch of the Romanian coast, where a special focus was placed on marine ecosystem revival and development. As part of the West African Coastal Areas Management (WACA) program, we also restored the eroded Togo and Benin coastline with innovative nature-based sandy solutions.

COLLABORATION

Sandy solutions involve large-scale operations where collaboration is crucial. The successful implementation depends on stakeholder engagement: most parties involved are now firm supporters of these nature-based solutions.

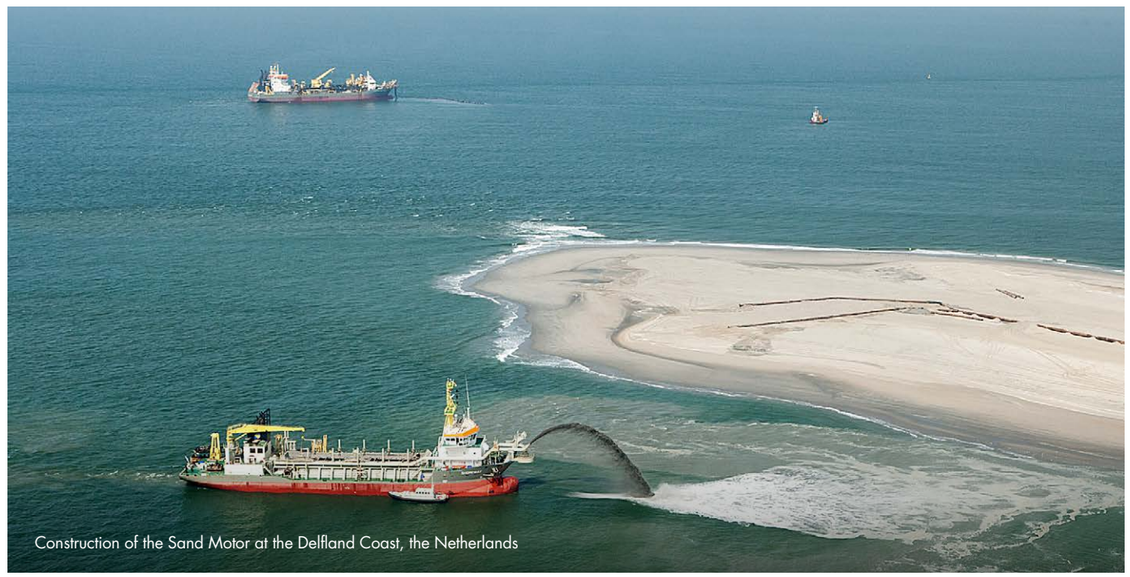
We have strategic partnerships with professionals all over the world, including knowledge institutes, engineering consultants, a number of universities and NGOs. We are also a leading partner of the EcoShape consortium, executing the Building with Nature program. With our partners, we create opportunities in research, pilot studies, tenders and projects. We share our insights, scientific knowledge, and technical expertise as input for project developments with our clients.


Beach nourishment Mamaia, Romania

WHAT CAN WE OFFER?

We can design and realize unique fit-for-purpose sandy solutions with our clients. These can be one-off projects but they can also be combined with projects such as the beneficial use of dredged sediments.

Work with us to protect the world’s coastlines and mitigate the causes and effects of coastal erosion.


Construction of the Sand Motor at the Delfland Coast, the Netherlands

BENEFICIAL USE OF SEDIMENT

The Marker Wadden project in the Markermeer lake, the Netherlands

The demand for marine sediment around the world is already enormous, and it is increasing, in particular for coastal protection and land reclamation. The recycling and use of that sediment – beneficial use – is a nature-based solution that can deliver economic, social, and environmental value on many projects.

Thinking about dredged material as a resource rather than a waste stream opens up a world of alternative and sustainable uses. This mindset fits in perfectly with the Boskalis sustainability strategy for coastal and marine developments. We seek to establish synergies in and between our projects to create sustainable win-win solutions for our clients and the environment.

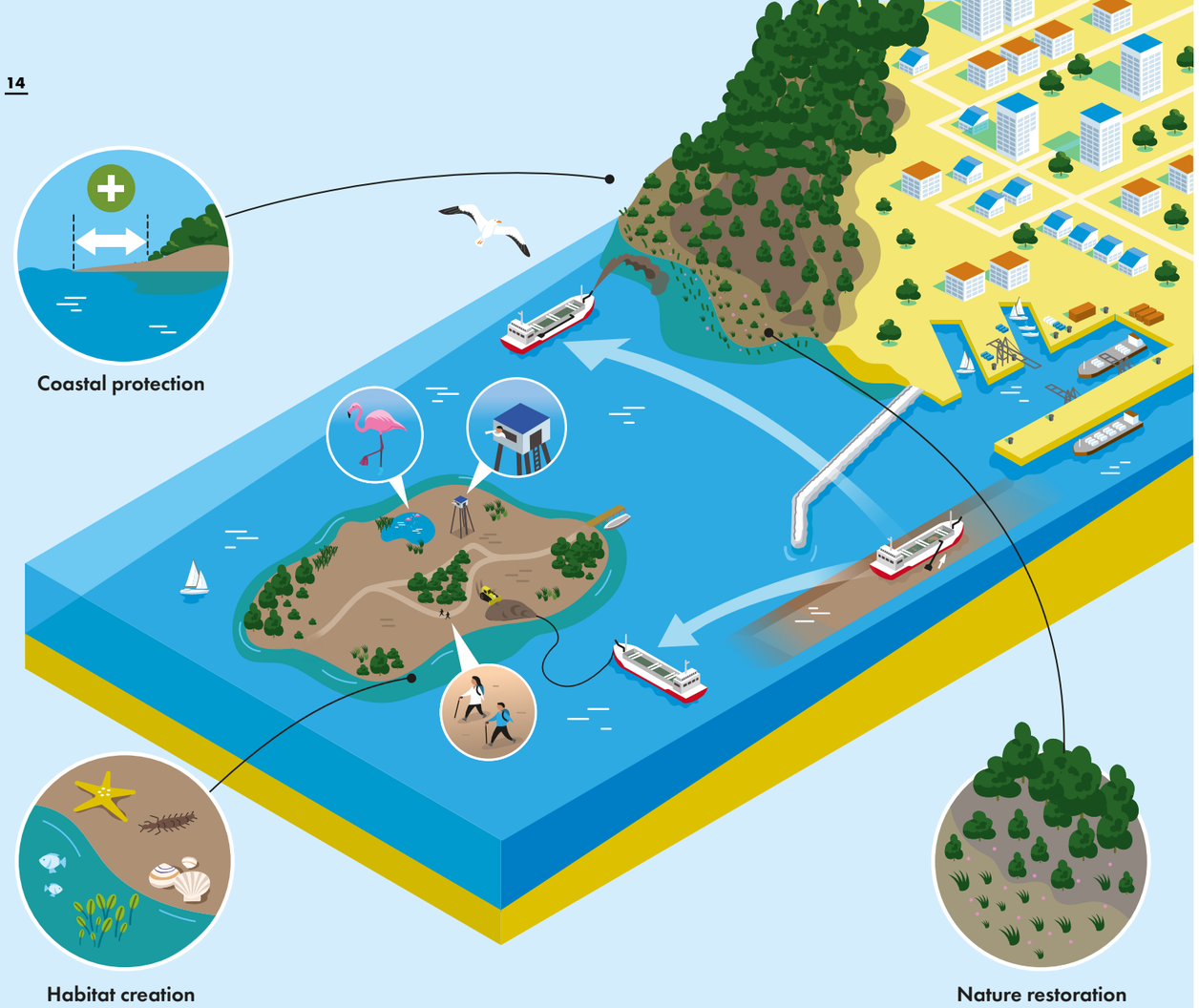
BENEFITS

Sustainable resource
Using sediment ensures economy of scale: larger volumes can be transported by sea. Linking up different projects through the sustainable relocation of dredged material advances the circular economy, saves money and reduces carbon emissions.

Reclamation
Dredged sediment can be reused for land reclamation and waterfront development. The creation of nature islands is a key example of beneficial use.

Remediation
Dredged sediment that would otherwise go to disposal sites can be re-purposed for the cleaning-up and redevelopment of industrialized, contaminated locations. Other activities include the capping of contaminated sediments, improving water quality, and the closure of landfills and mines.

Restoration
Dredged sediments can be positioned strategically in coastal ecosystems which already trap and manage sediments naturally, supporting mangrove or wetland restoration



‘SEDIMENT CAN BE USED TO CREATE A MOSAIC OF HABITATS, ULTIMATELY INCREASING OVERALL BIODIVERSITY’

projects. Beneficial use is highly valuable for habitat restoration on degraded coastlines.

Coastal Resilience
Dredged material can supply mudflats, sandy shores and riverbanks with much-needed sediment. These systems are often the first line of coastal defense. With this approach, we enhance the natural value of coastlines, while cost-effectively improving the coastal resilience to storms, flooding and sea level rise.

OUR APPROACH

We can deliver sustainable win-win solutions by combining multiple projects through the reuse of dredged material. Transport movements, costs and carbon emissions can be cut significantly by sharing resources and following mutually beneficial strategies.

OUR EXPERIENCE

In a holistic nature-based solution, matching supply and demand, we co-developed the Marker Wadden archipelago in the Netherlands. This is one of the largest nature-based engineering projects in Europe. To resolve the ecological problems in the Markermeer lake, we relocated the sediment to create a mosaic of thriving habitats. The archipelago allows the lake and new marshland ecosystems to interact, boosting natural processes and improving water quality. The new islands also provide excellent opportunities for leisure, education, and science.

We have also worked on upgrades of multiple primary defenses in the Netherlands using beneficial use principles. More recently, we have been widening a 750-meter section of sea dike with dredged material that was transformed into clay through a natural ripening process.

Ecological factors were taken into consideration in each project. Cost-effectiveness was significantly increased by using a smart, cross-project approach that included beneficial use.

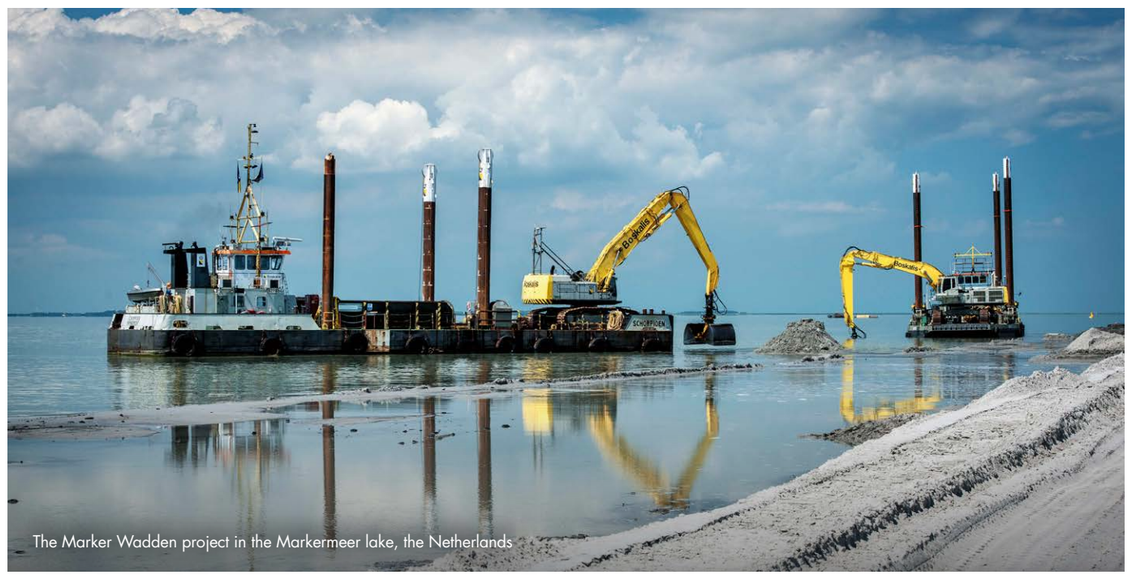
COLLABORATION

Restoration and coastal infrastructure projects almost always have major implications for local communities. Hence community engagement, good governance and proactive communications between stakeholders are key for beneficial use.

We have strategic partnerships with professionals all over the world, including knowledge institutes, engineering consultants, a number of universities and NGOs such as Wetlands International. Boskalis is also a leading partner of the EcoShape consortium, executing the Building with Nature program. We create opportunities for research, pilot studies and projects with our partners. We share our scientific knowledge and technical expertise as input for project development.

WHAT CAN WE OFFER?

We collaborate closely to tailor beneficial use to your project and manage the entire process for you, from inspection and design through to the implementation of potential remediation work, transportation and disposal of sediment at the final destination. We are also open to natural infrastructure opportunities to collaborate and innovate.


The Marker Wadden project in the Markermeer lake, the Netherlands

SEASCAPING

Photo: Dutch Maritime Productions/De Wilde Noordzee

The modern-day seascape combines natural ecosystems with the expanding footprint of activities such as shipping, fishing, dredging, and sand extraction. The impact of these activities on ecosystems has often not been fully appreciated. However, holistic planning is now needed to reduce the ecological pressures on our seascapes.

Ecosystem-based design of the seabed and shoreline – seascaping – provides an excellent nature-based solution to achieve better ecological outcomes. Seascaping mimics natural processes and morphological dynamics. It aims to transform 'ecological disruption' into sustainable opportunities for society, the economy and ecology.

Seascaping involves not only dredging to restore the natural shape of the seabed – sand dunes on the seabed, rock ridges around breakwaters and scour protection in renewable energy projects – but also multi-disciplinary engineering to defend and maintain coastlines in natural ways with rockpools, mangroves, and mussel and oyster beds.

BENEFITS

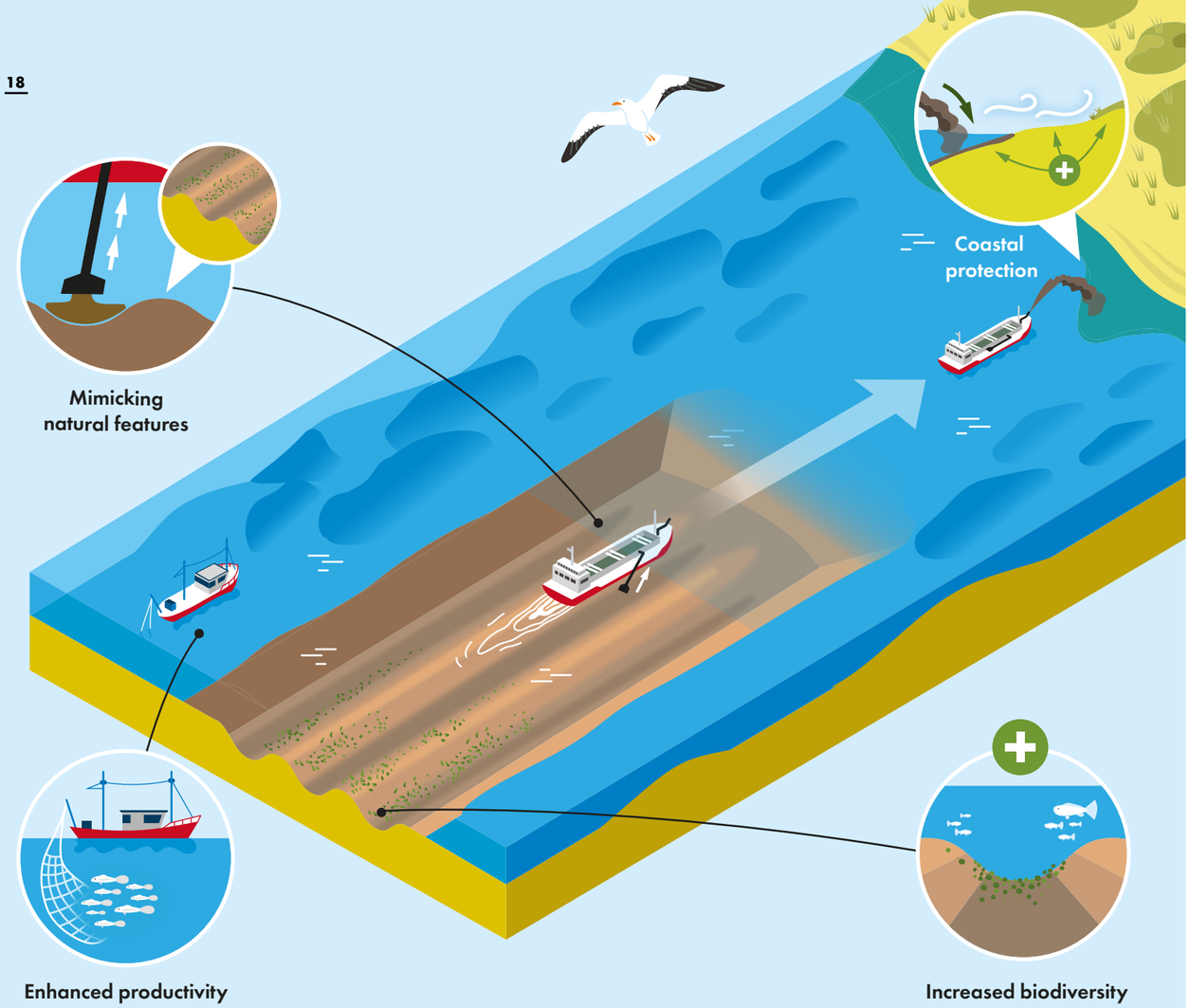
Habitat diversity
Seabed gradients make habitats more varied, with higher species richness, biomass and biodiversity as a result. Rockpools allow shrimp populations to thrive. Mussels and oysters bring back more biodiversity to our estuaries.

Project marketability
Upgrading biodiversity and overall sustainability significantly boosts social and political acceptance, streamlining not only permitting procedures but also the project scoping, execution and monitoring phases.

Higher productivity
Seascaping can enhance the biomass of economically valuable species such as fish, shellfish and lobsters, boosting fishing catches for the local community and improving their livelihoods. In man-made underwater landscapes, seascaping can provide crucial refuges for endangered species, while maximizing social benefits.

OUR APPROACH

Ecological seascaping focuses on the overall human and natural ecosystem. It starts with a study of the existing underwater landscape in order to produce an integrated design.



‘RELATIVELY SMALL CHANGES CAN CREATE BENEFITS FOR THE ENVIRONMENT, SOCIETY, AND THE ECONOMY’

Every underwater landscape is unique. So every project must be tailored to the local environment without losing sight of the overall picture.

Our network of partners and stakeholders means we have the capacity to combine seascaping with water infrastructure and deliver cost-effective, sustainable outcomes. We also work closely with local communities and stakeholders. In research, pilot studies, tenders and projects, we share our insights, scientific knowledge, and technical expertise as input for project development with our clients.

OUR EXPERIENCE

Ecological seascaping is a widely-used scientific concept. The first pilot study co-developed by Boskalis was executed near the port of Rotterdam. It involved designing and creating two ecosystem-based sand bars in a sand extraction site, in line with the natural

‘SEASCAPING TRANSFORMS ECOLOGICAL DISRUPTION INTO SUSTAINABLE OPPORTUNITIES’

sand ridges in the area. The project proved that the environmental impacts of marine infrastructure can be minimized. The sand bars were stable and allowed for the long-term sustainable development of the ecosystem, without additional equipment mobilization and with minimal impact on the overall sand extraction process.

We look forward to implementing the same success formula in infrastructure projects around the world, from sandy to rocky environments and from dredging works to the creation of revetments, rock pools, and complex crevice and ledge habitats.

WHAT CAN WE OFFER?

We have extensive knowledge and years of experience with seabed properties, vessel types, planning and dredging. We also have the wide range of experts – in nature conservation, morphology, marine ecology, and socio-economic studies – needed for any ecosystem-based scope.

Our seascaping approach can be used for almost any marine infrastructure project. With relatively small changes, project designs can deliver increased environmental, societal, and economic benefits.

We are on hand to help with your new projects, partnerships and pilot studies. We can advise you from the earliest design sketches through to the execution and monitoring phases of the project.

GREEN-GRAY SOLUTIONS

Green-gray coastal protection in North Java, Indonesia

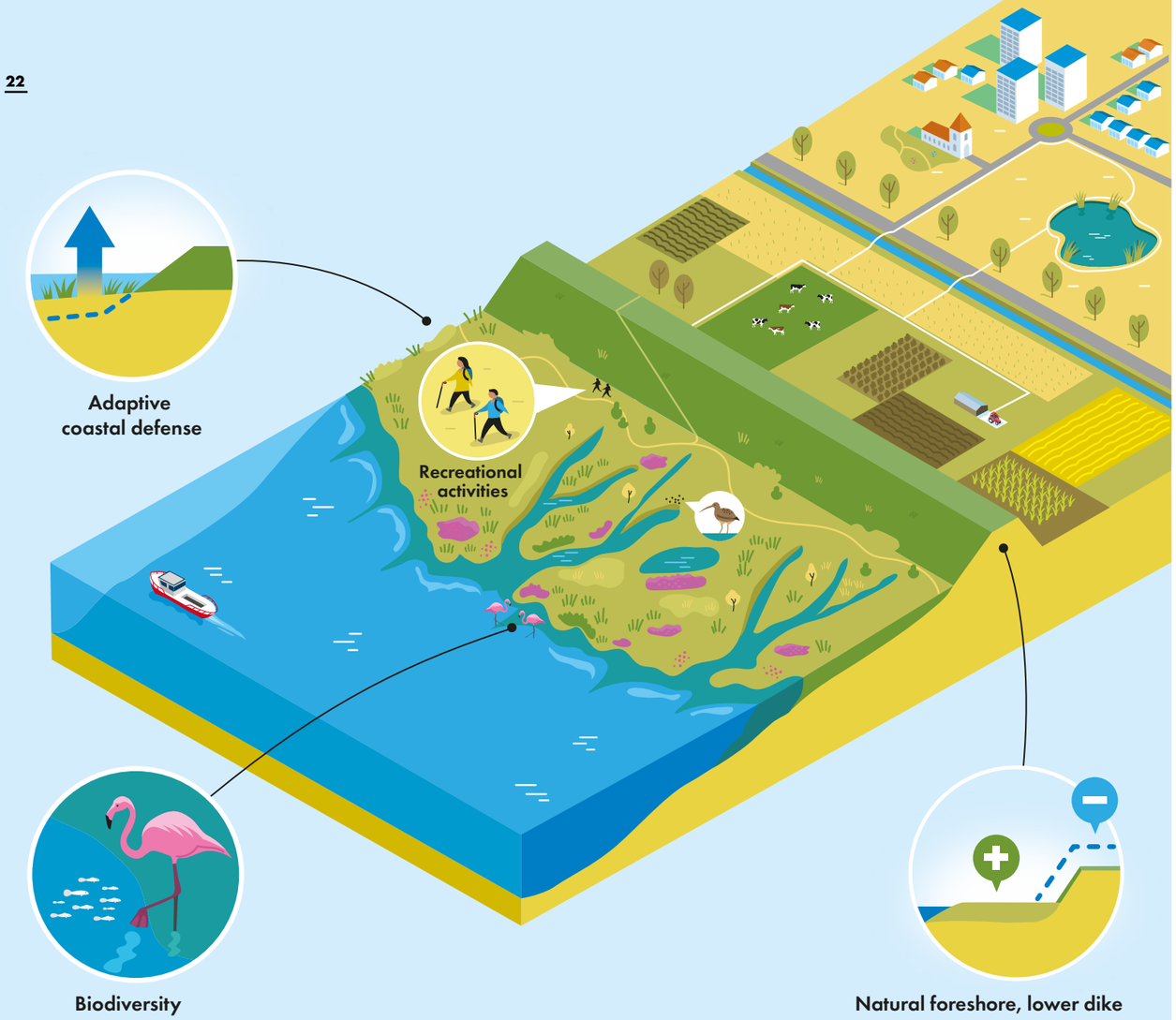
The effects of climate change are exacerbating the risks of coastal erosion and flooding. Green, nature-based solutions are emerging as cost-effective ways to mitigate those effects: natural ecosystems grow with their environment, and they provide dynamic solutions with long-term resilience. This contrasts with gray infrastructure, which is typically hard and static.

The optimal solutions for coastal adaptation are likely to combine green and gray and therefore deliver synergies between the two. Integrating natural green designs in traditional gray infrastructure not only improves long-term system resilience but also delivers numerous benefits for people and nature.

BENEFITS

Flood risk management
Green elements can cost-effectively protect coastlines and deltas from flooding and erosion. They are more resilient than traditional gray infrastructure and better at coping with future uncertainties such as sea level rise. Nature-based solutions are easily adaptable to changing environmental conditions, and maintenance and repairs therefore can be cost effective.

Nature and economy
Green-gray solutions provide critical habitats for numerous plant and animal species. In addition to the boost for biodiversity and productivity, a healthy ecosystem can also store carbon below the ground for centuries. Natural infrastructure can absorb pollutants and release oxygen, significantly improving air and water quality. Green-gray solutions also support economies and wellbeing by making the area more attractive for residents and visitors.



‘GREEN-GRAY SOLUTIONS BOOST BIODIVERSITY AND PRODUCTIVITY’

OUR APPROACH

The most effective green-gray solutions for coastal protection in urban areas are tailored to the specific local conditions and needs. This may involve factors like the local climate, topography, and hydrology, as well asthe social and economic context. We aim to prioritize solutions that serve multiple functions and therefore maximize the benefits.

It is vital to take long-term adaptive management and maintenance into consideration. A sound scientific approach and close collaboration with stakeholders are the keys to achieving results. Green solutions are often more dynamic due to their natural characteristics. Continuous monitoring during the design, construction and operational phases will help deliver effective adaptive management strategies.

OUR EXPERIENCE

We have completed a range of green-gray projects around the world: the construction of offshore ecological breakwaters, dikes with integrated foreshores, artificial reefs, sandy foreshores with integrated natural dune systems and wetland restoration.

In the Netherlands, we have worked on pioneering projects, such as the widened green dike in Delfzijl and a sandy reinforcement of the Houtrib dike between Lelystad and Enkhuizen. And in the Noordwaard, where a willow forest was planted in front of the dike to reduce wave impact.

COLLABORATION

The collaborative approach that Boskalis promotes is essential for the success of green-gray given the involvement of stakeholders with different interests and perspectives. With NGOs, knowledge institutes and engineering consultants, and public and private stakeholders, we test and research green-gray nature-based solutions for coastal and delta resilience, ecosystem restoration and sustainable port development. We also work with local communities and stakeholders to build the consensus that is vital for long-term success and sustainability. We collaborate with the World Bank and other financial institutions to identify opportunities and maximize the benefits of sustainable investments for people and nature.

‘DYNAMIC SOLUTIONS WITH LONG-TERM RESILIENCE’

WHAT CAN WE OFFER?

We have the skills and resources to design and implement effective and sustainable green-gray coastal infrastructure projects for your project. We can help you with your specific needs and goals by providing project management services, including the oversight of construction activities and close coordination with communities and stakeholders.

The Markermeer dikes coastal protection project, the Netherlands

ARTIFICIAL REEFS

3D printed reef units installed in Monaco

Artificial reefs mimic their natural counterparts. They can be used to deliver ecological and socio-economic benefits in marine infrastructure and coastal protection projects, as well as to restore the habitats of keystone species such as corals.

Boskalis has the expertise needed to build artificial reefs. We engage in focused research and knowledge alliances. We can offer you our unique knowledge, network and solutions for project development, permit application procedures and installation.

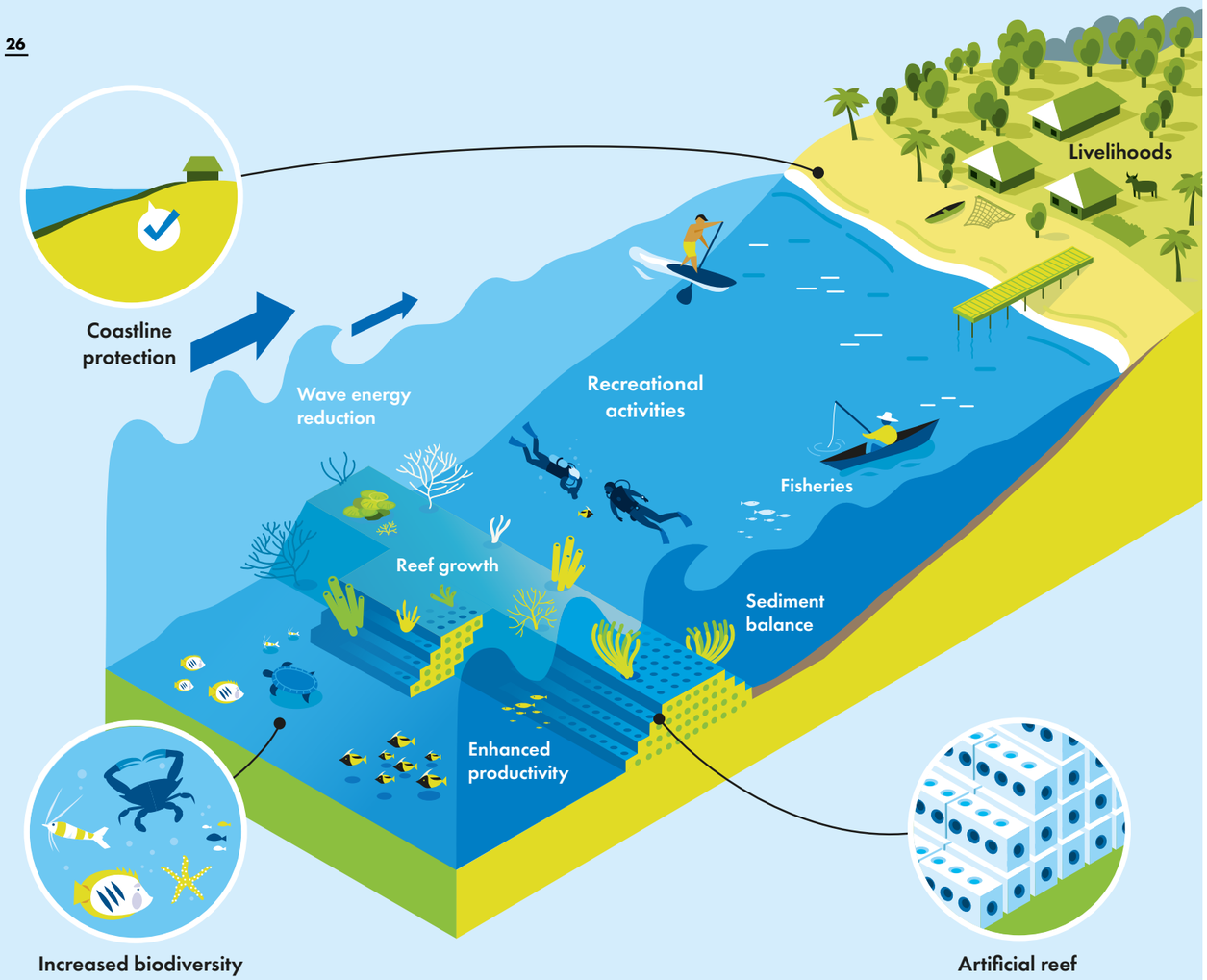
BENEFITS

Coastal protection
Artificial reefs reduce wave energy as effectively as traditional breakwaters or defenses, but at lower costs relative to the ecological value generated. They protect underwater vegetation and waterfront communities, and stabilize and retain sediment.

Ecosystem restoration
Artificial reefs restore ecosystems such as coral and oyster reefs. They instantly create complex habitats, supporting recovery and growth. They can also be used near marine infrastructure projects to reduce ecological recovery times and/or to enhance ecological and recreational value.

Enhanced productivity and the local economy
Artificial reefs boost fish production. With surfaces designed for the settlement of organisms like corals and oysters, they create countless feeding and habitat options for marine species such as fish, lobster and invertebrates, supporting local livelihoods through tourism and fishing.

Installation of the Rotterdam Reef, the Netherlands




MOSES units in Groningen, the Netherlands

ARTIFICIAL REEF DESIGNS

Mineral Accretion Technology (MAT)
MAT allows for modular designs which actively stimulate coral growth, thereby delivering highly complex habitats and climate resilience for corals. Local production, transport, and installation are straightforward and can be easily scaled.

Modular Sealife System
The Modular Sealife System (MOSES) focuses on enhancing fish biomass and supporting seabed communities. The limited size and weight of the MOSES units make them uniquely suited for production and construction in remote areas where resources are limited, but they are equally suitable for well-developed coastal regions.

Reef Enhancing Breakwater
The Reef Enhancing Breakwater is a modular design of heavy units that can be assembled to form exceptionally stable artficial reef structures. By creating habitat features at both large and small scales, they can host a complex reef ecosystem, whilst providing unique stability and coastal protection against currents and severe storm conditions.

3D Printed Reefs
3D printing technology provides the freedom of form needed for target species. The 3D-printed units can be made with different materials to suit local conditions and ecosystems using sustainable circular principles.

‘ARTIFICIAL REEFS INSTANTLY CREATE COMPLEX HABITATS WHERE MARINE LIFE CAN THRIVE’

COLLABORATION

We see the development of large-scale artificial reefs as an important innovation. Our thorough understanding of this technology means we can design reefs with multiple functions for use around the world. We have the expertise and strategic partnerships needed to create fit-for-purpose reef designs and the installation methods to facilitate upscaling.

We are on hand to help with your projects, partnerships and pilot studies. We can advise you from the earliest design sketches through to the installation and monitoring phases of a project.

WHAT CAN WE OFFER?
Our Artificial Reefs Program is unique in the industry. Contact us directly or visit our website boskalis.com/artificialreefs for more information.


MOSES units at the REEFolution project in Shimoni, Kenya

MANGROVES

Mangrove restoration project in North Java, Indonesia

Mangrove forests are unique ecosystems that thrive in the transition zone between land and sea. Frequent tidal flooding has driven evolution here: flora and fauna have adapted to cope with fluctuations in salinity, oxygen and nutrient concentrations.

Mangroves are crucial for the protection and biodiversity of tropical and subtropical coastlines. However, mangrove areas have been severely degraded over the past decades and their restoration is long overdue.

At Boskalis, we continuously explore opportunities to include mangroves in our projects and add ecological value, protect coastlines and boost local economies for all stakeholders.

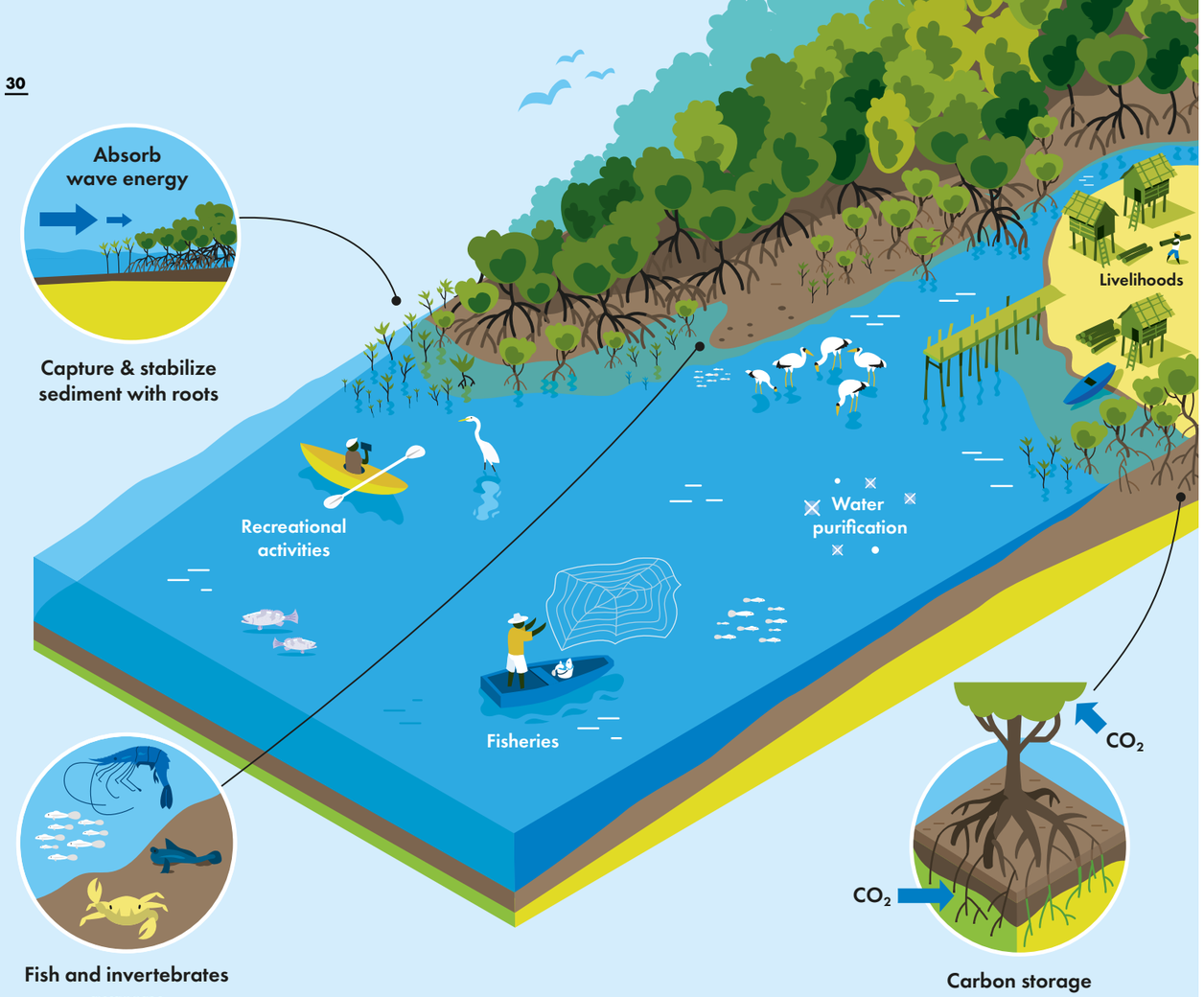
BENEFITS

Coastal protection
Mangroves are the first line of defense against flooding, hurricanes and storm surges. Their extensive root structures stabilize the underlying sediment, reduce erosion, and dissipate wave energy, preventing billions of dollars in flood damage every year. They can adapt to changing environmental conditions and provide a long-term, efficient mitigation to increasing storms.

Biodiversity
Mangroves support unique wetland communities by stabilizing the sediment and filtering pollutants from the water. They are also important nursery and feeding habitats for fish, birds, mammals and invertebrates.

Carbon storage
Mangroves are among the most effective carbon stores on the planet. The stored carbon in coastal ecosystems can remain stable for thousands of years. This ‘Blue Carbon’ highlights the unique potential of mangroves to protect the local and the global environment through carbon capture and storage.

Economy
Mangroves are not only natural fish factories, they also generate significant local revenue for local communities by providing valuable timber and non-timber resources, and by facilitating leisure activities such as eco-tourism, snorkeling and birdwatching.



‘MANGROVES PREVENT MORE THAN USD 65 BILLION IN PROPERTY DAMAGES AND REDUCE FLOOD RISK TO SOME 15 MILLION PEOPLE EVERY YEAR.’

GLOBAL MANGROVE ALLIANCE (2022)

OUR APPROACH

Mangroves can be restored by establishing the right environmental conditions and removing the barriers to natural regeneration. Suitable sites can be identified on the basis of the local ecology, hydrology and morphology, as well as the optimal growth parameters and the preferred species for the specific area.

We have a range of engineering solutions for establishing the right conditions. For example, in collaboration with local stakeholders, we can deposit additional sediment or place permeable protective structures on eroding coastlines to raise bed levels and restore the sediment balance.

OUR EXPERIENCE

Research & Development

We draw on data analysis, modelling studies and hydraulic experiments to learn more about mangrove ecosystems, including their potential to reduce flood risks. These results are then implemented directly in the design and execution of our projects.

Restoring mangroves

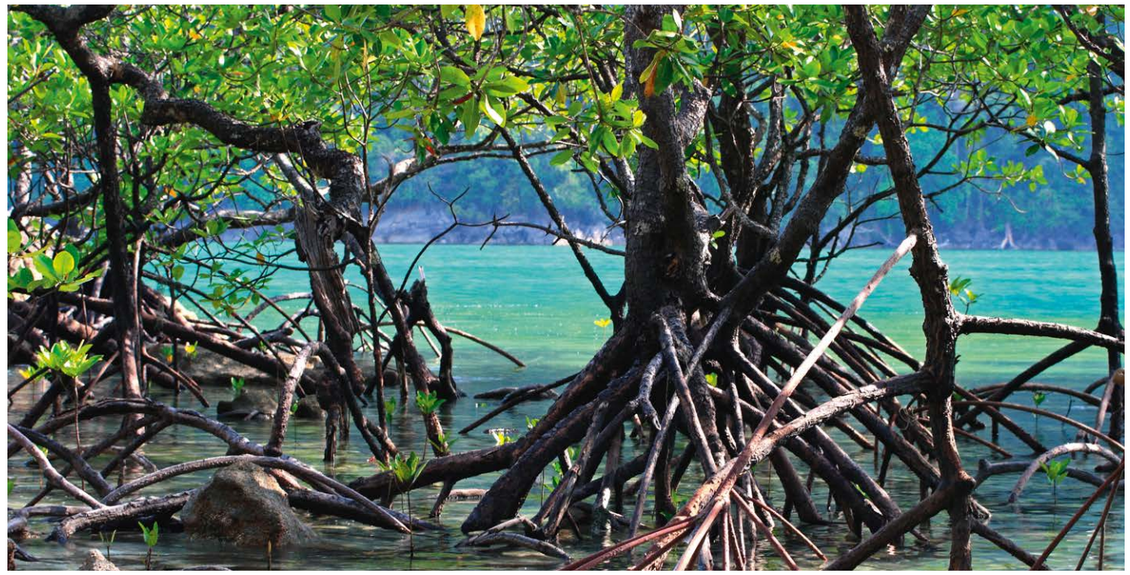
We work on several mangrove restoration projects across the world. On the north coast of Java, severe coastal erosion and land subsidence had led to the collapse of the ecosystem, causing the coastline to retreat several kilometers. With a sophisticated combination of mangrove restoration, small-scale engineering and sustainable land use, the shore bed level was restored, making mangrove restoration possible. The mangroves provide an extra source of income for the local community, whilst protecting the hinterland against further erosion, sea level rise and extreme weather. This approach could be used in countries with comparable coastlines and coastal threats. It forms a simple solution that requires advanced knowledge and expertise, thereby providing a cost-effective alternative, compared to applying only traditional hard infrastructure which does not adapt to higher sea levels as mangroves do.

COLLABORATION

We have a strategic partnership with Wetlands International and we are a leading partner of the EcoShape consortium, executing the Building with Nature program. With our partners, we work on research, pilot studies, tenders and projects. We share our insights, scientific knowledge, and technical expertise with our clients. Community involvement is essential for the long-term effectiveness of mangrove restoration projects. We engage in close relationships with local stakeholders, land-owners, and communities. For example, coastal field schools can be set up to train villagers to identify and develop successful aquaculture practices, and also care for the mangroves that are so important for coastal protection and water treatment.

WHAT CAN WE OFFER?

We can develop designs together based on beneficial reuse of material. Tap into our network, expertise and experience by contacting Boskalis today.



SEAGRASS

Seagrass is an aquatic plant that forms extensive meadows and thick root systems in marine environments. It is therefore considered a key ecosystem engineer because it shapes its environment.

There are approximately sixty seagrass species worldwide, creating unique biodiversity hotspots in every continent except Antarctica. Seagrass habitats vary enormously and communities can be found near coral reefs, sandy shores, estuaries, coastal lagoons, and even waters with depths of up to 70 meters. This means that nature-based solutions with seagrass are possible in a wide range of areas.

BENEFITS

Coastal protection

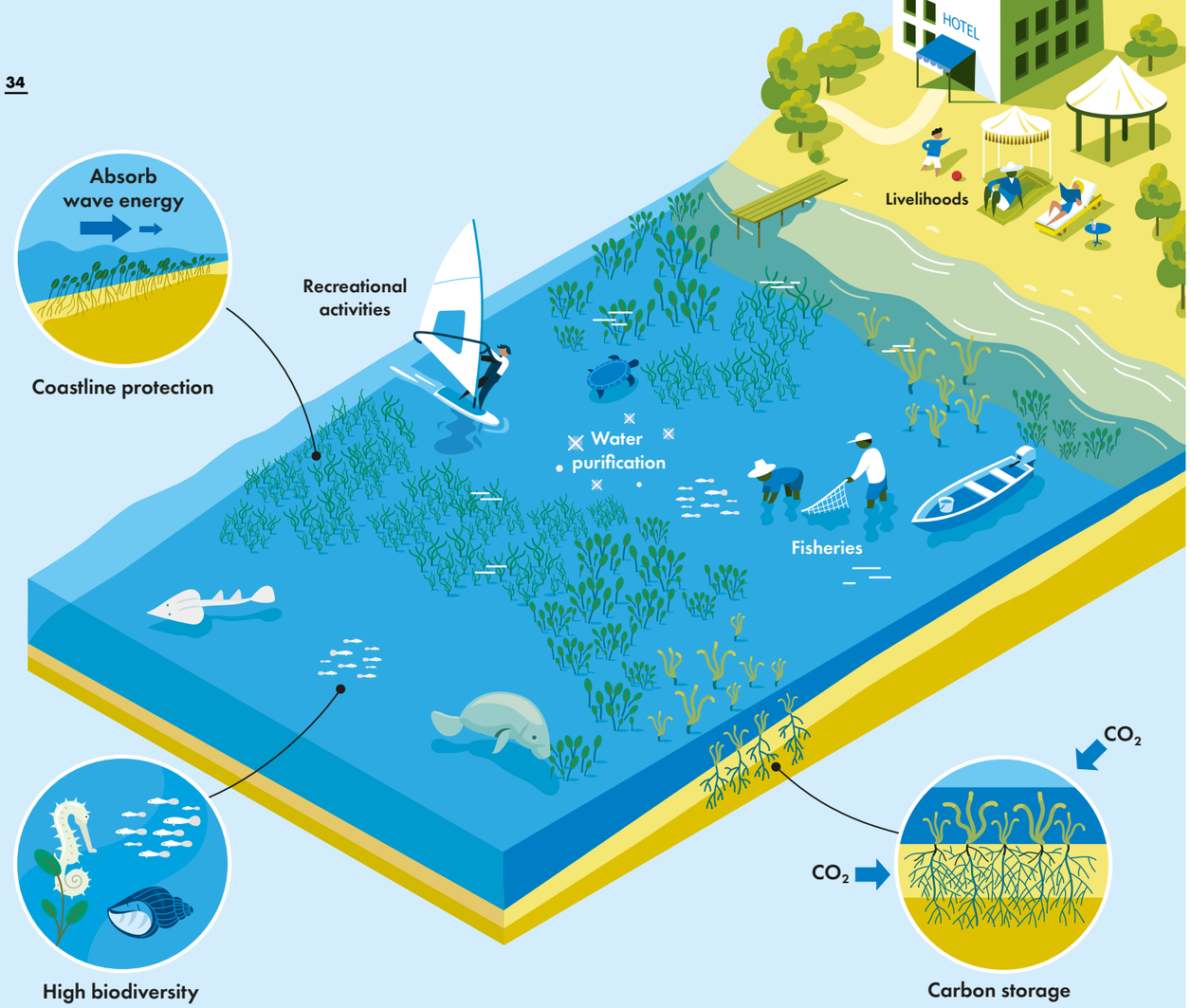
Seagrass is crucial for coastal protection. By stabilizing sediment and reducing wave energy, it provides direct protection from erosion, flooding and storm damage, as well as a sustainable alternative to traditional coastal engineering.

Biodiversity

Seagrass meadows are home to diverse wildlife communities that include many threatened species such as marine mammals, sea turtles and sea horses. Seagrass leaves and root systems improve water quality immediately by filtering, recycling and storing pollutants.

Carbon storage

Seagrass, and the sediments it traps, captures vast amounts of carbon that can be stored for centuries. Healthy seagrass meadows are therefore an essential natural ecosystem for stabilizing the climate.



‘SEAGRASS IS A KEY ECOSYSTEM ENGINEER’

Economy
Seagrass provides critical food, shelter and nursery opportunities for a wide range of commercially important species of fish and invertebrates (e.g. crab, lobster, shrimp, shellfish), whilst generating multiple ecotourism and leisure opportunities.

OUR APPROACH

The large-scale restoration of seagrass often includes planting seagrass and/or seedlings to kickstart seagrass growth. In some cases, restoring the natural conditions needed for seagrass growth is essential.

A variety of engineering techniques have been developed for restoration programs. These include aquaculture and stabilizing sediment to create a window of opportunity for seagrass to form dense, more resilient, meadows.

‘SEAGRASS RESTORATION PROVIDES DIRECT BENEFITS FOR COASTAL ECOLOGY AND LOCAL LIVELIHOODS’

Traditionally, seagrass transplantation is a manual, environmentally complex, and labor-intensive process. Costs are high and vegetation survival rates are low. We have upscaled and mechanized transplantation with the in-house design of the innovative seagrass TransPlanter by our own Research & Development department.

OUR EXPERIENCE

Seagrass revegetation
To reverse the degradation of seagrass habitats, we have teamed up with the Hampshire & Isle of Wight Wildlife Trust in the UK for an extensive, multi-year seagrass restoration project in the Solent. This project also raises awareness of the importance of seagrass ecosystems and adds to our knowledge base.

COLLABORATION

The long-term effectiveness of a seagrass restoration project depends on comprehensive community engagement from the outset. We therefore establish close relationships with knowledge institutes, local stakeholders, land-owners and communities. In local education projects, we create synergies that expand our knowledge and raise awareness of the vital role of seagrass for healthy coastlines.

WHAT CAN WE OFFER?

We believe that healthy seagrass ecosystems are crucial for coastal integrity. With our thorough understanding of coastal dynamics, we are in a position to facilitate natural seagrass regeneration for your project. We can lead this process from the earliest design sketches to the installation and monitoring phases. We have the scientific expertise and strategic partnerships needed for seagrass restoration projects that contribute to a sustainable future for people and nature.

Boskalis
Rosmolenweg 20
PO Box 43
3350 AA Papendrecht
The Netherlands

T +31 78 6969000
www.boskalis.com