NbS Examples Submitted by Belgium to the Intergovernmental Consultations on Nature-based Solutions

Good Practice

One of Belgium's flagship nature-based solutions project is the Sigma Plan, a large-scale nature restoration project that provide maximal safety against storm tides in the Scheldt estuary in the region of Flanders in the Northern part of the country (PPT-1). The plan protects approximately 20,000 hectares of land in Belgium bordering the Scheldt River and its tributaries such as the Rupel, the Nete and the Durme Rivers (PPT-2). In order to achieve adequate protection, the plan combines 'grey' infrastructure measures, mainly strengthened dike protection, and 'green' measures in the form of a network of controlled flood areas. The Sigmal plan allows the river and its tributaries to overflow in a controlled way, while letting the natural rhythms of the tides breathe new life into floodplains and tidal areas (PPT-3). As of 2015, the Sigma Plan consisted of 1200 hectares of designated natural flood zones. The plan also allows to maximize biodiversity and ecosystem services. The marshes and mudflats in the Scheldt Delta absorbing carbon (PPT-4). They are also boosting biodiversity, creating fertile conditions for viable populations of species such as bittern, corncrake, otter and beaver (PPT-5).

The Belgian Science Policy Office (BELSPO) supports research programmes on nature-based solutions through its financial contribution to BIODIVERSA+ projects and its Belgian Research Action through Interdisciplinary Networks's programme. The MixForChanges project assesses and promotes the potential of mixed tree plantations as nature-based solution to mitigate (C sequestration) and adapt (drought and herbivory resilience) to climate change by providing science-based recommendations and guidelines endorsed by forest owners, managers and policy-makers. The project includes an experiment in Belgium. NbS are also high on the agenda of several Federal, Flemish and local governmental authorities and departments. Because of its mandate to protect the coastline, the coastal division of the Flemish agency for Maritime Services and Coast (MDK) has been looking into the use of NbS mainly for climate adaptation. MDK was and is a partner in several coastal protection projects focussing on NbS: CREST project and the Interreg 2seas projects Building with Nature and SARCC. NbS have been incorporated into coastal protection projects and used along the coastline were possible (installing green dykes/dunes in front of the dyke, foreshore beach nourishment, managed realignment of Zwin). The principle of the Flemish coastal division is "soft where possible, hard where necessary" and therefore hybrid solutions are often used. Also, the Department of Maritime transport and in specific Flanders Hydraulic Research are studying the natural coastal processes for the use of NbS as coastal protection measures. De Vlaamse Waterweg nv. is responsible for the execution of the Sigmaplan in cooperation with the agency for Nature and Forest (ANB).

The University of Antwerp (UA) is cooperating in the implementation and evaluation of the Sigma plan and leads several research projects on nature-based solutions. The University of Antwerp's programme on NbS also focuses on the development of new techniques that can support natural ecosystems services, e.g. through the development of nature-based carbon sequestration techniques in both coastal and terrestrial ecosystems.

The OVAM, the Public Waste Agency in the region of Flanders (Belgium), coordinates two projects to develop nature-based solutions for soil remediation. In the Interreg Resanat project phytoremediation and biostimulation techniques for PAHs and other oil-derived contaminants are

experimented. In the LIFE Narmena project nature-based solutions for metal-contaminated river sediment and floodplains in nature reserves are developed with constructed wetlands and increasing inundation and water storage.

On the Belgian coast, the “Duin voor Dijk” (Dune for Dike) project uses the natural environment (sand dunes, grass and row wood hedges) to protect beaches from erosion and to prevent sea water from reaching the inhabited zones. Sea level rise and increasing risks of storms due to climate change are indeed a serious threat for the Belgian coast and a large part of Flanders region. In Oostende Oosteroever, six large plots of four hundred square meters each were planted with different patterns and densities of marram grass without rowwood. In Raversijde-Mariakerke, a seven hundred and fifty meter long coastal zone has been created with sections of one hundred square meters of marram grass. The great variation in density and pattern of the marram grass and osier provides a unique large-scale study area. In Westende, a so-called grass dike is being constructed. The KU Leuven (Catholic University in Leuven) monitors these pilot projects that all use different patterns and densities of plants so as to find out which planting retains the sand the best and thus stimulates the spontaneous formation of dunes the most. The results of the research will provide advice for a scientifically based and natural approach to seawalls.

The Coastbusters project, a public-private innovation partnership (funded by VLAIO) also uses an ecosystem-based flood defense solution for coastal zone management. Biogenic reefs with biobuilders can protect the coast and can counter coastal erosion by stabilising sediments around and under the reef. The project intitally screened the viability of three different naturally occurring sediment-stabilizing reef biobuilders off the Belgian coast: seagrass/seaweed, blue mussel and sand mason worm. In a follow-up project – Coastbusters – bivalve reef (VLAIO funded), the use of a mussel reef is further studied and pilot tests executed in front of the Flemish coastline.

A similar cooperation between industrial and research partners is the Bankbusters project. A VLAIO funded project studying the beneficial re-use of dredged material for the restoration of eroded tidal zones and help improve our local ecosystem services.

More information on NbS projects for coastal protection in Flanders can be found in the chapter on coastal flooding of the Compendium for Coast and Sea. A thorough overview of the potential of Flemish ecosystems as blue carbon sinks has recently been described in Dauwe et al. 2022. Mangroves, a very important blue carbon ecosystem is not naturally occurring in Flanders. However the VUB/ULB and UA are running multiple projects and have extensive expertise concerning research into the understanding, conservation and restoration of mangroves (UA – Prof. S. Temmerman, VUB/ULB- Prof. T. Van der stocken and Prof. F. Dahdouh-Guebas).

In the framework of the Horizon2020 MERLIN project The Province of East Flanders in collaboration with Ghent University is restoring the Zwalm Catchment. After degradation of the river due to straightening, bank enforcements, navigational use and intensive agricultural land use along its banks, the Zwalm river basin project aims at restoring the river to a healthy and functioning ecosystem while still allowing navigational use. More concretely, it consists in the installation waste water treatment plant (WWTP) and sewer systems, the removal of fish migration barriers, species reintroduction programs and habitat restoration (restoration of spawning beds, water buffer basins, buffer strips) and tailor-made agreements with farmers. The benefits are riparian and habitat restoration, flow connectivity, fish passes, biodiversity enhancement, reduction of erosion improvement of ecological and water quality.

In Brussels, as part of the European applied-research project COOLSCHOOLS, scientists of the Free University of Brussels (VUB) examine the implications of nature-based climate solutions in and around elementary schools in terms of accessibility and equity. They are looking at the Opération Ré-création project which transform schoolyards into recreational green, mixed-use, quality play and resourcing spaces that are shared with local residents outside school hours. This initiative is undertaken in response to Brussel's environmental strategies focusing on soil permeability, water management, reduction of heat island effect, reinforcement of the green network (creation of semi-natural habitats), nature awareness & education, well-being of citizens and children.

The Free Universities of Brussels (ULB and VUB)'s Co-Nature project has produced scenarios for inclusive nature-based urban design and regeneration in a participative manner. The project has three objectives: preparing an inventory, classification and suitability mapping of Nature-Based Solutions for urban regeneration; understanding of urban green space use and valuation from the perspective of cultural ecosystem services; co-producing alternative scenarios through participatory research-by-design workshops for developing Nature based Urban Design and policy guidelines. As highlight in this presentation, the project pays particular attention to ecological justice and how nature-based solutions can be better developed with and for poor urban population. The applied-research project focuses and analyzes two plans developed by the Government of the Brussels-Capital Region: Plan Nature that aims at reconciling the development of the city with nature, and Plan Canal that aims to stimulate city centre economic activity and local job creation, to create housing to keep up with population growth, and to build public space to serve as a platform for engagement and unification.

In Wallonia in the Southern part of Belgium, as part of the Walloon sustainable development program, agri-environmental and climatic methods (MAEC) are designed to encourage farmers to implement practices that conserve and improve the environment, over and above those required by law. These practices, which are subject to a voluntary 5-year commitment, give rise to remuneration to cover the loss of income and costs associated with their implementation. MAEC program includes a wide range of specific actions adapted to each situation (a catalog of more than 120 actions, which is not a closed list, is used). Examples of actions: flood meadow' located in runoff transfer zone, hedges and wooded strips, grassy headlands, environmentally-friendly crops, etc.

In Wallonia, the project "Yes We Plant" subsidizes citizens, farmers, associations, companies, schools and public organizations the planting of hedges, linear coppices and tree lines to conserve biodiversity and fight against climate change.

In the framework of the Natural Capital Financing Facility, the European Investment Bank and the European Commission fund nature-based solutions for wastewater treatment with the objective of achieving a very good status of water bodies and to promote the return of the pearl mussel and the thick mullet, as well as their host fish species on the Walloon territory. It also finances measures to protect the basins at the outlet of wastewater treatment plants and thus protect the water quality of rivers and associated ecosystems. It consists of measures such as, actions to protect water catchments in order to reduce the harmful contribution of nitrates, ecological management of the ecological management of pastures, the creation of meadows particularly rich in biodiversity or the development of basins or or the creation of natural basins or lagoons to reduce water overflows.

As part of its recovery plan, the Walloon region has launched Project 99 for Biodiversity and Climate Resilience to support and fund nature-based solutions for flood control that have, at the same time, a positive impact on the water cycle, the quality of surface and groundwater and the water supply (purification, run-off, infiltration). The solutions include the renaturation of riverbanks and

watercourses, re-maintenance, restoration of wetlands and the creation of temporary immersion areas, whether natural (also known as flood expansion areas) or engineered.

These examples can also be found with links in Belgium's Written Submission.

Bad Practice

We support the open nature of NBS but emphasize the importance of specifying which solutions qualify. Green roofs and walls can be developed in cities with a sole focus on mitigating and adapting to global warming, using few plant species without considering biodiversity. This approach has drawbacks such as low resistance and resilience to extreme events, higher management costs, and the risk of invasions. Additionally, a fragmented approach to green building design without coordination at the city level undermines sustainability goals and effectiveness. Similarly, rain gardens that disregard plant selection and other ecosystem services fall short of NBS. On the other hand, an urban planning approach that considers biogeography and functional traits of species for green roofs and walls can address multiple objectives like cooling, stormwater management, pollution abatement, human well-being, biodiversity enhancement, and resilience to future hazards. These approaches align with NBS, broadening the framework of ecosystem services by leveraging biodiversity to enhance resistance, resilience, and the delivery of various services.