

# Ecological Landscaping of Extraction Sites: Opportunities for a Second Life

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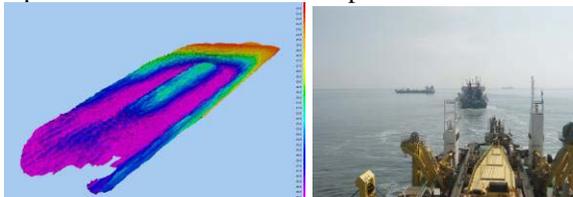
**Introduction:** After exploitation, marine extraction sites offer great potential for the creation of added value for various functions such as nature, recreation and fishing. The new physical lay-out provides deeper water, changed morphology, lower currents and different sediment characteristics, potentially creating suitable circumstances as a sanctuary for species.

The project investigates the possibilities for designing extraction sites in such a way that optimum combinations are found between the new physical situation and preferred (desired) ecological habitats. Ultimately, knowledge of these combinations can ensure that tailor-made circumstances can be designed and created that will attract more biodiversity and biomass in the area (i.e. nature, fishing, recreation).

This project searches for the relationship between the physical characteristics of a sand extraction site in the North Sea and the potential ecological benefits for habitats and biodiversity in the site. It determines which design parameters are important to take into account; both to achieve the end result and to keep the extraction works economically feasible.

**Methods:** The project investigates the potential of 'landscaping' the bottom of an extraction site in the North Sea via a pilot project. A first large sand wave was created parallel to the main current direction, a second one is being created perpendicular to the current. The sand waves have a volume of ca. 1.25Mm<sup>3</sup> and are realized at a depth of -30m to -40m. They are 8-10m high and 750m long with slopes of ca. 1:7-1:10. The design is based on a literature review, a morphological stability model and frequent discussions with a team of marine ecologists, contractors and responsible authorities.

The sand waves are constructed using several TSHDs that removed sand around the sand wave itself during a period of several months. See picture below:



**Fig. 1:** 3D picture of sand wave and dredging activity

**Results:** In July 2010, the first benthos measurements and fish surveys were carried out. The data analysis concentrated on the occurrence of biodiversity in relation to water depth, position on the sand wave, sediment size, -type and distribution and time. It appeared that several pioneer species of benthos and pelagic and demersal fish were already found to be present at the site.

The results of the monitoring and lessons learned from the design process including design parameters and -guidelines and the relationship between the physical characteristics and ecological habitats will be published in the final product of the Building with Nature programme; the EcoDynamic Development (EDD) Manual for a.o. the design of water-based infrastructure, land reclamations, flood protection works and related extraction sites.

**Discussion:** The project should demonstrate the beneficial environmental effect of landscaping whilst taking into account the economic feasibility of the sand mining and any legal- and permit-related requirements. It is important to make sure that this innovative design for a second life of the extraction site does not compromise the main function of the site itself i.e. the economical and unhindered extraction of sand needed for the construction or nourishment works.

In the near future, there will be a scale-increase of sand volumes needed to keep up with rising sea levels and increasing pressure on available coastal lands. This sand will be mined from offshore extraction sites. The scale-increase demands a sustainable management of these offshore resources and a combined effort to seek for mutual added value for nature and economy. Landscaping of the extraction sites can provide this added value.

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**References:** [1] Building with Nature programme <http://www.ecoshape.nl/ecoshape-english/home/> (2008)