

4 Decades of Belgian
Marine Monitoring
"uplifting historical data
to today's needs"

The implementation of a data management plan to uplift historical data: long-term change detection in the Belgian Continental Shelf

Ruth Lagring¹, Annelies Goffin², Yvan Stojanov¹, Francis Strobbe¹, Lennert Tyberghein², Thomas Vandenberghe¹

¹Royal Belgian Institute of Natural Sciences, Operational Directorate Natural Environment, Belgian Marine Data Centre (BMDC), Belgium (bmdc@naturalsciences.be)

²Flanders Marine Institute (VLIZ), Data Centre Division, Belgium

The amount of data collected during research and monitoring programs is increasing continuously. In the meanwhile know-how is constantly evolving. As data are very valuable it is important to ensure that they are managed efficiently during and after each project. More and more, funding agencies impose a data management plan (DMP) included in the proposal based on specific guidelines which are also used during the evaluation process. Such a DMP defines all aspects of data management, metadata generation, data preservation and analyses before the project begins. 4DEMON has the aim to centralize, integrate and valorize data on contamination, eutrophication and ocean acidification produced during expeditions in the Belgian Coastal Shelf (BCS) since 1970. It is a data-oriented project with two National Oceanographic Data Centres (NODC) as partners, BMDC and VLIZ. The data requirements of the funding agency (BELSPO) were implemented during the proposal by working out an efficient data workflow. As shown below, the intermediate results of the studies based on the resuscitated and valorized data are very promising.

Data guidelines

Project diagram

WP1 Coordination

OD Nature - all

NP3 Contamination

ILVO - OD Nature

WP4 Eutrophication

OD Nature - Ugent-VLIZ

WP5 Ocean Acidification

IDOD,

IMERS

MDA

The project is funded by the 'Belgian Research Action through Interdisciplinary Networks' (BRAIN-BE), thematic axis 'Cultural, Historical and Scientific Heritage'. The **data guidelines** within the first BRAIN call were rather limited, but were fine-tuned in later calls:

- For obtaining the data, use <u>existing databases</u> if possible, ensure that the data is accessible and schedule the cost and time.
- If new data has to be produced, justify the added value and estimate the budget.
- Guarantee the sustainable <u>availability of the data</u> to other users for other purposes; define the users and accessibility methods.

Based on these guidelines a dedicated **Data Management Work Package** was included with well described **tasks**. The **responsibilities** of the partners (who does what) were defined and included in a project **diagram** supporting efficient planning.

It's all about data

- Datatypes, collections & material
- Tools, formats & standards
- Roles and responsibilitiesDissemination methods of data & metadata
- Data policy & access
- Maintenance & sustainability afterwards

Tasks and tools

- Create general archive and integrated data inventory 1
- Define data **formats** and **procedures** for centralizing data for all datatypes 2
- Data integration: import into existing central databases 3
- Dissemination and distribution: data portal & link to international initiatives 4

www.4demon.be
www.bmdc.be
www.vliz.be/nl/imis

SDN, EMODnet,
ICES, WoRMS, GBIF,
EurOBIS, IODE

Data Management Plan

Guidelines

Tasks

Responsibilities

Diagram

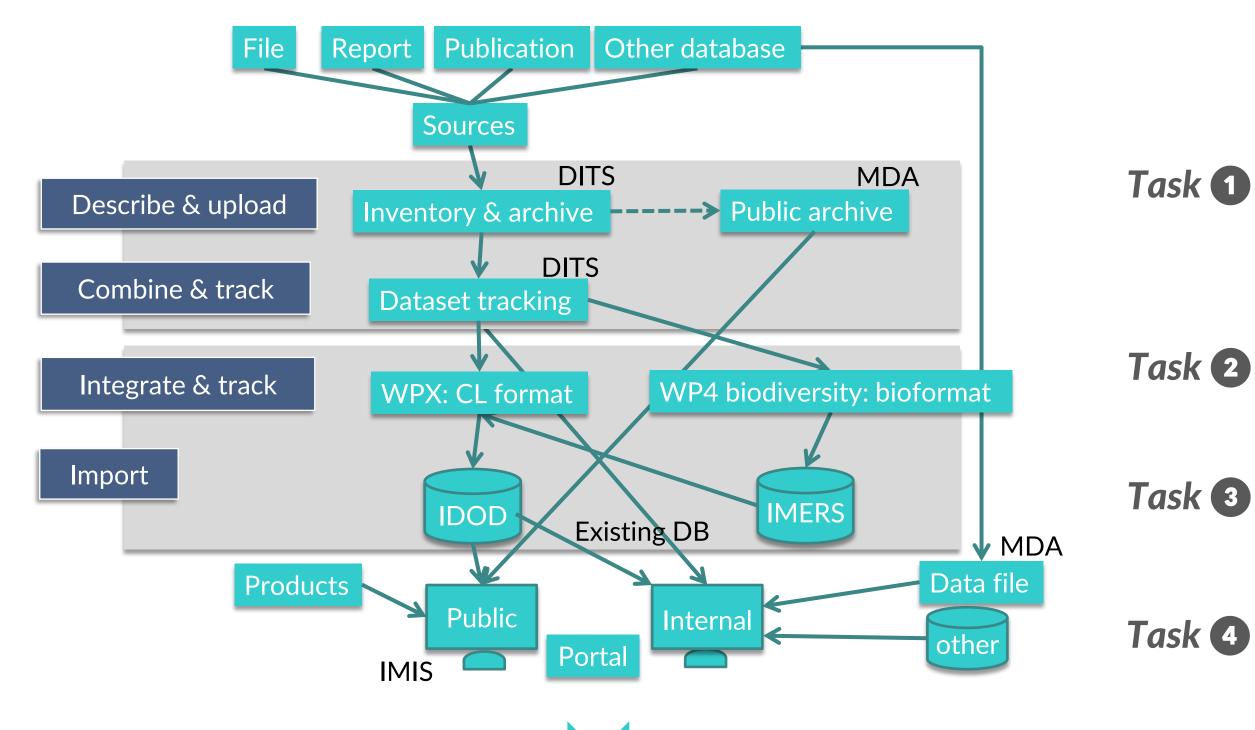
Workflow

Output

Maintenance

Data workflow

To ensure that all tasks are worked out efficiently, a **data workflow** was worked out, linking all the different processes, tools and responsibilities and taking into account all partners' needs.



ACTION, FEEDBACK & OUTPUT

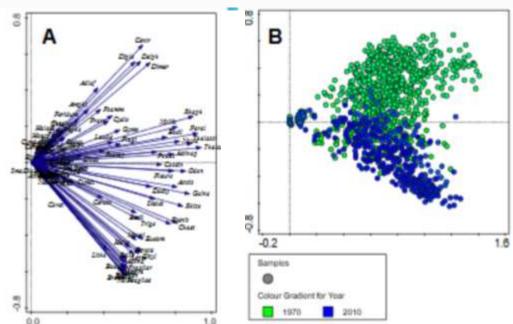
Once the projects started, the workflow was applied. Existing tools were adapted (MDA) and new tools developed (DITS), while formats for data exchange were fine-tuned. If partners' needs required adaptations, the datamanagers implemented their **feedback**. For example, for WP 3 and 4 intermediate databases were built to be able to centralise all original data before quality control and intercalibration was performed. Towards the end of the project, the **output** should be completely disseminated. The project website is being used for data products and a catalogue. Today, a data portal is being worked out.

MAINTENANCE

After the project ended all tools need to keep running and the data needs to remain accessible. As BMDC and VLIZ are both active NODCs with a long-term vision, the sustainability of the project results is ensured.

Shifts in species

WP4: Shifts in phytoplankton community composition

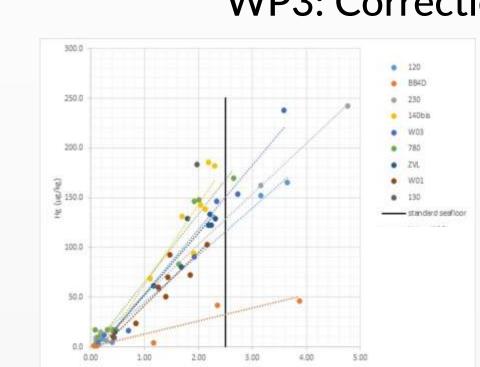


Partial Ordination Analysis (PCA) of genera abundance data with 'month' defined as a covariable. A. Genera ordination plot. B. Samples in the ordination space colored by sampling period.

By PCA the genera composition can be separated clearly between the 1970s and the 2000s. Eg, the species of the diatom genus *Pseudo-nitzschia* increased in the second period.

Ref: Anja Nohe et al. (2016)

Standard methods WP3: Correction for grain size effect

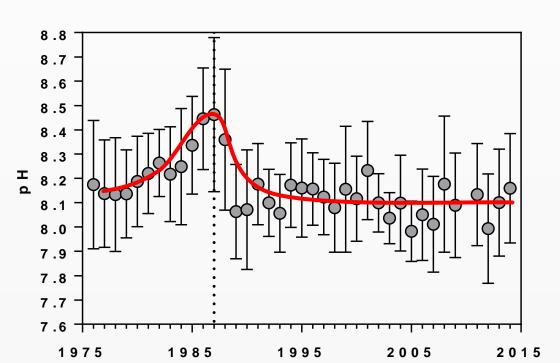


Relation between the concentration of the contaminant Hg and the normalizing parameter (TOC in this example) on different locations on the Belgian Part of the North Sea. For each location, different grain size compositions were analyzed for Hg concentration and for TOC. In this way, the concentration of Hg for each location can be standardized towards the standard seafloor (which contains 2.5% TOC) and results can be compared between each other.

Ref: Karen Bekaert et al. (2016)

Policy impact

WP5: Annual averages of pH in the BCS



The emerging pattern from the annual means is an increase of pH from the early 1970's to the mid 1980's, and then a decrease on-wards. This pattern could be related to changes in primary production related to eutrophication and nutrient reduction policies, in response to European legislation (reduction of phosphate emissions to rivers and coastal zones implemented from the mid 1980's onwards).

Ref: Alberto Borges et al. (2016)

Conclusions and Recommandations



- Clear guidelines and requirements on data should be provided by funding agencies to aid the project partners building an efficient and unambiguous data management plan.
- Including a work package on data management is an efficient way to support the dataflow throughout the project. The data management procedure of the 4DEMON project can be used as an example for other projects.
- Experienced data centres and data managers can provide adequate tools and databases, knowledge on data policy, standards, dissemination and ensure sustainability of the project outputs. It is therefore recommended to have them actively involved in each project.

References:

Karen <u>Bekaert</u> *et al.* (2016). Determination of the best normalizing parameter for heavy methods metals in sediments of the Belgian Part of the North Sea (BPNS).

Alberto <u>Borges</u> *et al.* (2016). Ocean acidification in the Belgian Coastal Zone.

Anja Nohe et al. (2016). Long-term phytoplankton monitoring data (1970-2010) from the Belgian North Sea reveal shifts in community composition and seasonal dynamics.





