

Project Description

Project Mainport Development Rotterdam

Technical aspects of data management of the PMR-NCV project

Introduction

Port of Rotterdam is carrying out the Project Mainport Development Rotterdam, PMR, expanding the port with 1,000 hectares net of industrial ground, located directly on deep water, through a suppletion of sand in the Voordelta area in the North Sea. As the Voordelta has the status of protected nature reserve (Natura2000 area), European laws dictate that the expansion of the port must be compensated for loss of habitat. As part of the compensating measures, the Dutch national government established a series of protected areas in the Voordelta region. Rijkswaterstaat selected a consortium of Deltares, Imares, CSO, Bureau Waardenburg, Arcadis/Alkyon, INBO and NIOZ to conduct a long term monitoring of the nature compensation in the Voordelta (PMR-NCV).

The Monitoring data gathered are stored in an online geodatabase. The data can be disseminated via OGC standards and be viewed in for instance Google Earth or QuantumGIS.



www.beeldbank.rijkswaterstaat.nl

Keywords:

PostgreSQL, PostGIS, online, geodatabase, QGIS

The data are available for analysis to answer the questions raised within the project. The main question is whether the seabed protection area and resting areas adequately compensate for the loss of habitat and the increased difficulty of obtaining food for nesting terns and wintering common scoters.

Technical aspects of PMR-NCV

During start-up of the monitoring project OpenEarth (<http://openearth.eu>) methodology was chosen to store information of the monitoring and to disseminate information. OpenEarth is a philosophy which describes the use of open source products and generic tools to store and disseminate data. It is not a ready to use product, but the implementation is flexible and dependent on available techniques and demands.

The nature of the data collected by the consortium partners pointed towards the use of databases. PostgreSQL in combination with the module PostGIS was the obvious choice to store data. The use of PostGIS enhances the standard storing and querying of data with so-called spatial queries. This ensures spatial aggregations and also enables easy visualisation through commonly used OGC standards like WMS, WFS and KML.



At this moment several millions of data entries have been stored and are available for analysis to answer the questions within the project. The data is structured in a data model which is shown in figure 1.

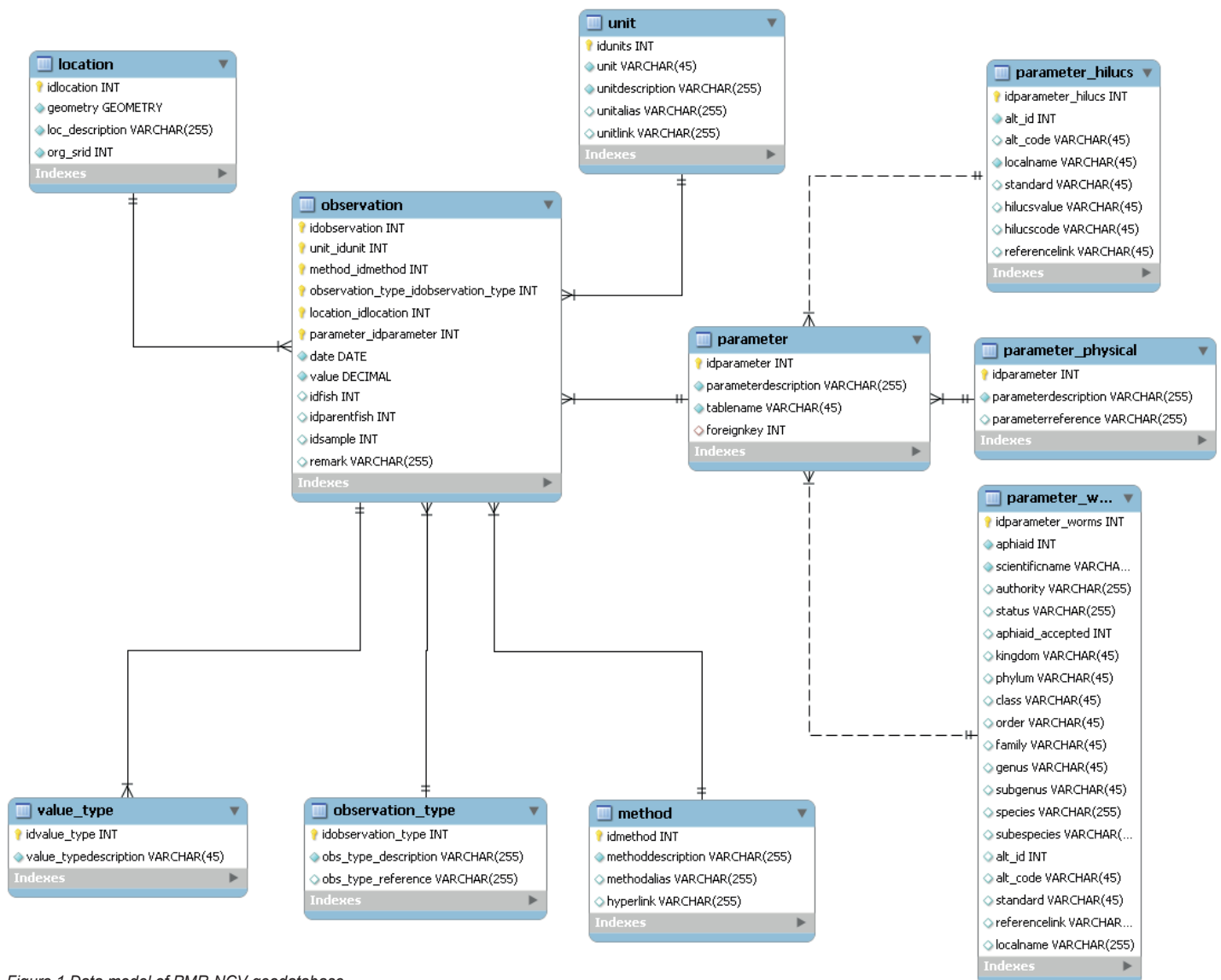


Figure 1 Data model of PMR-NCV geodatabase

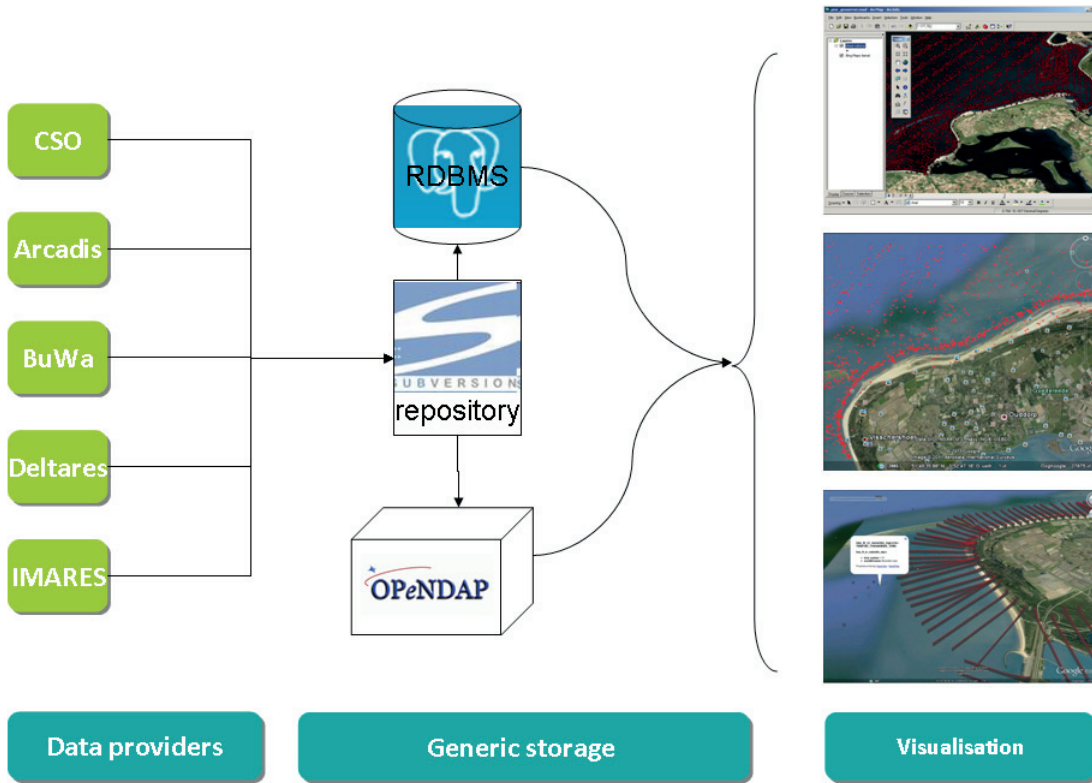


Figure 2 Data flows within the PMR-NCV project

Data can be uploaded through the internet. Various partners created their own solutions, mainly using Python as scripting environment.

Quality assurance is arranged within the internal processes defined by the partners of the consortium. They use commonly accepted standards.

The complete data stream is visualised in figure 2. The repository plays a crucial role in the total stream of data. This ensures version control on the data imported into the database. If necessary, data can also be converted into netCDF files. In practice this is only done in case large arrays of model output have to be available.



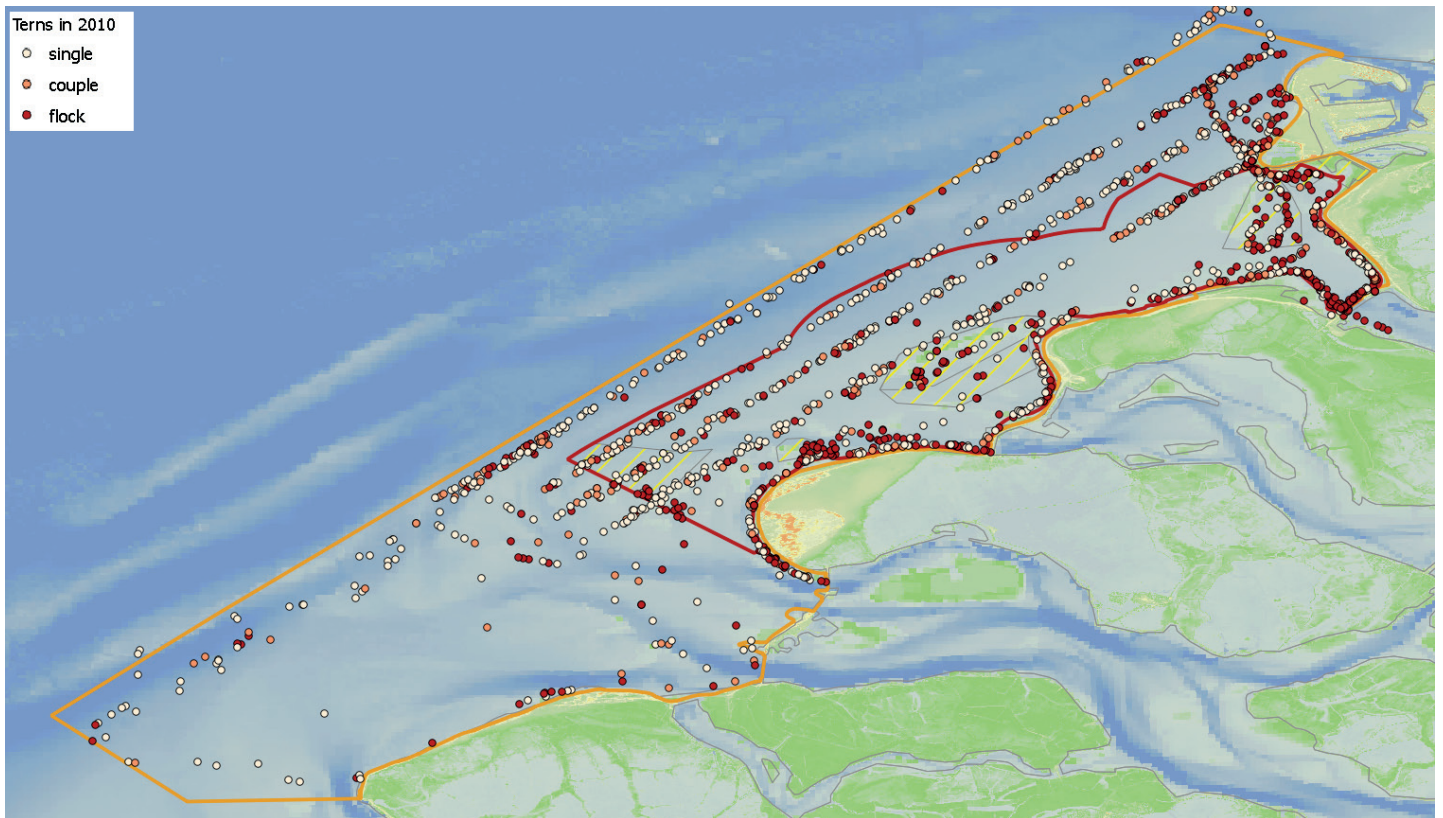


Figure 3 Terns in 2010 visualised in QuantumGIS. Due to the nature of the observation (airborne observations) the observations are arranged along lines.

Standards

Parameter tables of the database are built using European standards for Marine Species and Landuse, respectively WoRMS (<http://www.marinespecies.org>) and the HILUCS classification system (<http://inspire.jrc.ec.europa.eu/index.cfm/pageid/241/documentid/2627>) are used.

For geomorphological characteristics the CF-standard is used (<http://cf-pcmdi.llnl.gov/>).

Dissemination of the data can be arranged using OGC technical standards like WMS, WFS or KML. These standards are described on <http://www.opengeospatial.org/standards>. At the moment there are two ways to visualise data, that is either by using QuantumGIS (<http://qgis.org>) or disseminating via geoserver (<http://geoserver.org>).

Visualisation

Figure 3 gives an example of visualisation of data in the database of PMR-NCV using QuantumGIS. The advantage of QuantumGIS is that it is able to contact the PostgreSQL database directly. This combines true GIS functionality with the use of PostgreSQL. Other means of visualisation is arranged by Geoserver. Geoserver plays a crucial role in disseminating data through the internet. Geoserver is able to convert PostGIS data (module on PostgreSQL) to web services like WMS, WFS and KML. This enables (at least for the Web services WMS, WFS) use of data in other software like ArcGIS.

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