

In total 93 projects with 1144 structures were collected, including structure parameters, physical conditions and the shoreline result measurements. Here are some explanations for these data sources.

### **1. Structure parameters**

The structure parameters data in this thesis was collected from a variety of cases in the different zones and countries. Three sources of information are used in the inquiry questionnaires, using data from project reports, and a selection of useful information from various articles, journals, and papers. First, we used the inquiry questionnaires as a source to collect data from the DELOS project. This project focussed on an inventory of detached breakwaters in Europe. The data bank was assembled from 150 completed survey series questions. Each full questionnaire contained information including location of the structure, main purpose of the scheme, type of breakwater, dimensional sketch, and other information. The collected data results are found in the “European experience of low crested structures for coastal management”. The second source consisted of data of exploitation from project reports. A database of detached breakwater projects in the United States and several other countries is maintained by the Coastal Engineering Research Center (CERC). The database includes detailed information such as detached breakwater types, construction dates, project dimensions, and other site data. A concise historical description of the project’s performance is also included. The third source for our database was collected from papers. Each of these, public papers, journals and articles focused on different aspects of detached breakwaters. However, these papers usually contained only part of the sketch of the structure parameters. The contribution of the collected data from the represented papers can be found in Mauricio González (2001), Bricio et al. (2008), José Ma Berenguer (1988), Rosen and Vajda (1982), Nir (1982) and Fried (1976). The three sources of data collection mentioned above were applied to review the detached breakwaters in Italy, Israel, Spain, the United Kingdom, and the United States.

### **2. Physical conditions: waves, currents, water level**

In general, detached breakwaters designed for shore protection along the coastline, are placed in the littoral zone. Within this zone, waves, oceanic currents, and water level are a major physical influence on the effectiveness of the structures. Data of waves and currents has been retrieved from online sources. The first wave source is the ERA-40, which is a re-analysis of the global atmosphere and surface conditions for over 45 years (September 1957 to August 2002) by the European Centre for Medium-Range Weather Forecasts (ECMWF) ([http://apps.ecmwf.int/datasets/data/era40\\_daily/](http://apps.ecmwf.int/datasets/data/era40_daily/)). The ECMWF used a database of meteorological collections from satellites, aircrafts, balloons, buoies, radiosondes, and scatterometers. This data was run through the ECMWF computer model and was stored in NetCDF format files. The second part of the wave source is the wave hindcast. Wave hindcast refers to the predictions of wind waves on the water surface in the past time. The Wave Information Studies (WIS) conducted by the US Army Corps of Engineering (USACE) has developed hindcast data for all ocean coasts of the United States and the coast of the Great Lakes in a period of 20 years (<http://wis.usace.army.mil/>). The next major physical aspect is the ocean current. The oceanic currents at all projects are the subject of observation in the Ocean Surface Current Analyses – Real time (OSCAR) project. Understanding ocean currents and their influence on structures is the basic information concerned with the existence of considerable currents or inconsiderable currents. The last physical aspect, discussed here, is the water level related to tidal range at the construction sites. The tidal range values were shown in the report of the projects or extracted from tidal charts. Thus, the physical conditions at structures in the littoral zone of waves and ocean currents were retrieved via reliable scientific organizations, while the physical conditions of the tides were gathered from project reports.

### **3. Sources of observation results**

Detached breakwaters interact with near-shore hydrodynamics in a very complicated way and are a consequence of coastal line changes. If the deposition forms a planform which connects a structure

to the coastline, this is called a tombolo. If there is no connection a salient is formed. Post-construction beach responses to detached breakwater structures are analysed using the aerial photos of time-series observations. The image data were obtained at the inequitable period between 1972 and 2013. The selected photos are mostly of good quality, with few cloud effects. In this study a technique is used to estimate shoreline responses, using a tool to measure distance between the objects.

You can see more details in the dissertation namely "*Shoreline response to detached breakwaters in prototype*". An electronic version of this dissertation is available at: <http://repository.tudelft.nl/>.