BASMATI

Baltic Sea Maritime Spatial Planning for Sustainable Ecosystem Services

Database including spatial data on ecosystem services and (anthropogenic) pressures

Deliverable 3.2

BONUS

Science for a better future of the Baltic Sea region

BONUS BASMATI

Database including spatial data on ecosystem services and (anthropogenic) pressures

June 2019

Authors:

Wanda Holzhüter, Kerstin Schiele, Miriam von Thenen, Lotta Maack, Institute for Baltic Sea Research Warnemünde
Hanna Luhtala, University of Turku
Maija Viška, Solvita Strāķe, Latvian Institute of Aquatic Ecology

ISBN xxx-xxx-xxxxx-x-x

This report is a publicly accessible deliverable of the BONUS BASMATI project. The present work has been carried out within the project 'Baltic Sea Maritime Spatial Planning for Sustainable Ecosystem Services (BONUS BASMATI)', which has received funding from BONUS (art. 185), funded jointly by the EU, Innovation Fund Denmark, Swedish Research Council Formas, Academy of Finland, Latvian Ministry of Education and Science and Forschungszentrum Jülich GmbH (Germany).

This report may be downloaded from the internet and copied, provided that it is not changed and that it is properly referenced. It may be cited as:

Holzhüter, W.; Schiele, K; von Thenen, M.; Maack, L.; Luhtala, H.; Viška*, M.;* Strāķe*, S.: Database including spatial data on ecosystem services and (anthropogenic) pressures. BONUS BASMATI Deliverable 3.2, June 2019, www.bonusbasmati.eu*

Contents

BONUS BASMATI in Brief

BONUS call 2015:
Blue Baltic
Project coordinator:
Henning Sten Hansen, Aalborg University, Denmark
Project partners:
Aalborg University, Denmark (AAU)
Aarhus University, Denmark (AU)
Finnish Geospatial Research Institute, Finland (FGI)
Latvian Institute of Aquatic Ecology, Latvia (LIAE)
Leibniz Institute for Baltic Sea Research Warnemünde, Germany (IOW)
Nordregio, Sweden (Nordregio)
University of Turku, Finland (UTU)
Duration:
3 years, 7/2017 – 6/2020
Key theme addressed:
Theme 4.3 Maritime spatial planning from local to Baltic Sea region scale
Subthemes:
Theme 2.3 Integrated approaches to coastal management and Theme 4.1 Governance structures, policy performance and policy instruments
https://www.bonusportal.org/projects/blue_baltic_2017-2020

Project abstract:
Maritime Spatial Planning (MSP) requires a spatially explicit framework for decision-making, and on that background the overall objective of BONUS BASMATI is to develop integrated and innovative solutions for MSP from the local to the Baltic Sea Region scale. This is to be realised through multi-level governance structures and interactive information technology aiming at developing an ecologically and socio-economically sound network of protected marine areas covering the Baltic Sea. Based on the results of former MSP projects, the BONUS BASMATI project sets out to analyse governance systems and their information needs regarding MSP in the Baltic Sea region in order to develop an operational, transnational model for MSP, while maintaining compliance with existing governance systems. It also develops methods and tools for assessments of different plan-proposals, while including spatially explicit pressures and effects on maritime ecosystem services in order to create the Baltic Explorer, which is a spatial decision support system (SDSS) for the Baltic Sea region to facilitate broad access to information. During the project running until 2020, new data will be produced and tested in assessments corresponding to policy goals. The data will support the combined analysis of the three elements of the concept of ecosystem services: the capacity, flow and benefit of provisioning, regulating and cultural services. A central aim of the project is to facilitate cross-border collaboration, and the project is carried out in close cooperation with relevant stakeholders in the BSR. The impact of the project will be facilitated and assessed in transnational case studies, where integrated solutions are required. The local scale will consist of case study areas in the South-West Baltic, the Latvian territorial and EEZ waters including open part of the Baltic Sea and the Gulf of Riga, and across the region, a pan-Baltic case study will be performed.

Report Summary

The Baltic Sea Atlas (http://bio-50.io-warnemuende.de/iowbsa/index.php) was implemented to store and share marine spatial planning data and datasets from the BONUS BASMATI project. Data are used in the project's case studies. Additional datasets were included to provide examples on what kind of data can be used in marine spatial planning to account for ecosystem services. Data categories, data properties and metadata information follow the recommendations of Deliverable 3.1. The Baltic Sea Atlas is based on the open source webGIS framework kvwmap. The application is hosted at the Institute for Baltic Sea Research Warnemünde, Germany and connected to the metadata portal of the institute. The application provides simple visualisation including basic operation tools. The access via login and password allows data sharing with the project partners and other interested users, while ensuring basic licence agreements.

1 Introduction

1.1 Purpose and scope

The database Baltic Sea Atlas (BSA) was implemented to provide Marine Spatial Planning (MSP) data and datasets gathered and created within the BONUS BASMATI project. The aim was to create and store project data in a structured, harmonised and traceable way in order to facilitate usage within the project itself and possibly beyond. BSA datasets follow the projects recommendations on data categories, data properties and metadata (Deliverable 3.1, Schiele et al. 2018). In this way, project data are easily available to the Baltic Explorer as well as to the MSP community. Data are used in the project's case studies. Additional datasets were included to provide examples on what kind of data can be used in marine spatial planning to account for ecosystem services.
This report gives an overview on technical aspects regarding the database BSA. It lists agreements and procedures concerning data management within the database and provides examples on how data and datasets are created and administered in the BSA. A list of the BONUS BASMATI project data is included.

1.2 Interaction with other work packages

WP3 datasets stored in the BSA are used in the project's case studies (WP6). Additional data on ecosystem services are created and allocated to the categories provisioning services, regulating and maintenance services and cultural services as defined in WP4. All data are assessable for input to the Baltic Explorer (WP5).

2 Baltic Sea Atlas

Good data and metadata are the key for successful MSP. A sophisticated data management will guarantee the long-term availability of data and metadata and will allow easy data search and retrieval. To support data exchange and to provide data products for scientific, political, sectoral and public stakeholders the WebGIS application Baltic Sea Atlas (BSA, Figure 1) was implemented at the Institute for Baltic Sea Research in Warnemünde, Germany (IOW). The BSA was launched in 2014 under the patronage of the BMBF (Federal Ministry for Education and Science) project SECOS (Service of Sediments in German Coastal Seas). Within the BONUS BASMATI project WP3 major technical enhancements were conducted (e.g. user-friendly interface, download and WMS-function). Templates for data categorisation and metadata, including license agreements were developed, adapted and distributed to project partners before data acquisition (Attachment A and B).

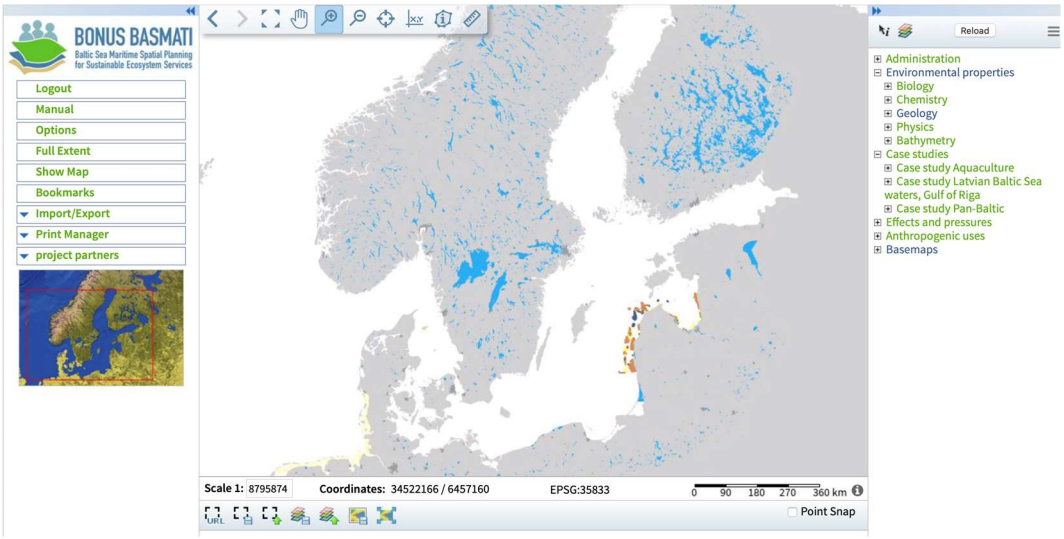


Figure 1: WebGIS application Baltic Sea Atlas (available at: http://bio-50.io-warnemuende.de/iowbsa/index.php)

The focus of the web application is the storage and the visualisation of geographical data gathered during the project. Therefore, the concept of the BSA is a simple and easy to operate user interface with a large map window and basic operation tools (left-hand side legend, Figure 1) to allow the access for GIS experts as well as non-experienced users. The BSA is not meant to be an analysing tool.
The BSA functions as a test bed for the implementation of data requirements (D 3.1, Schiele et al. 2018) for Marine Spatial Planning (MSP) in a database on a small scale. Therefore, the organisation and wording as well as categorisation (see also chapter 2.2) of data and datasets follow the classification of the ecosystem service framework after the Common International Classification of Ecosystem Services (CICES; D 4.1, von Thenen et al., 2018).
The BSA allows data exchange depending on a licence agreement.

Data assembled in the BSA are additionally linked to the IOWMeta database, a second database of the IOW organising metadata in general at the IOW. Data and metadata follow the requirements set by international data management agreements of the INSPIRE Directive (Infrastructure for spatial Information in Europe, 2007\2\EG, 2013).

The BSA can be accessed via the link: http://bio-50.io-warnemuende.de/iowbsa/index.php, via the host and homepage of the IOW: https://www.io-warnemuende.de/data-portal.html and via the website of the working group Marine Planning of the IOW: https://www.io-warnemuende.de/bio-ag-marine-planning.html.

2.1 Technical aspects of the Baltic Sea Atlas

The technology stack of the software follows modern web standards. The BSA is based on the open source webGIS framework kvwmap (Korduan & Christoph, 2005). The application is implemented in PHP5. The map source material is provided by an UMN-MapServer. An apache-webserver executes the PHP application and manages the communication with the client and the storage of raster data. Vector data are stored in a PostgreSQL-database with a postGIS extension. Additional information such as user-management is stored in a MySQL-database. The user interface is accessed by a modern web browser (Rahn & Korduan, 2008).

2.2 Data acquisition from case studies

Emphasis was put on a common procedure for data categorisation, data properties and metadata to ensure compatibility of project data. Therefore, all project participants received a step-by-step template and short instructions on how to create and prepare datasets and metadata for the Baltic Sea Atlas (see attachment A and B) using the ArcCatalog by ArcGIS®. The template and instructions include the request on which of the following categories is the most suitable for the dataset:

- Administration
- Environmental properties
    - Biology
    - Chemistry
    - Geology
    - Physics
    - Climate data
    - Bathymetry
- Ecosystem services
    - Provisioning services
    - Regulating and maintenance services
    - Cultural services
- Anthropogenic uses
    - Case study Aquaculture (Danish-German case study)
    - Case study Riga Bay (Latvian case Study)
    - Pan-Baltic case study
- Effects and Pressures
- Future scenarios

The categorisation reflects the right-hand legend of the Baltic Sea Atlas (Figure 1). In order to keep the legend clear, a theme will appear within the legend, when at least one dataset can be assigned to it.

2.3 Access and availability of data

All project partners have access to the Baltic Sea Atlas via personalised identification and password. Interested users and practitioners beyond the project community receive access upon request and will also receive a personalised identification and password after the project end. During the project phase, interested external users can get access upon request via lotta.maack@io-warnemuende.de.

Data of the database are available depending on the license agreement (Table 1). Data with the agreement *open* can be viewed and downloaded via the data export function of the database. Datasets with the agreement *restricted* contain contact information within the metadata, how this data can be received.

Table 1: License agreement

License agreement	*Description for Baltic Sea Atlas*
Open	View and download file
Restricted I	View file
Restricted II	View file, download only on enquiry at author
Restricted III	View file, download only on enquiry at author, with fee
Restricted IV	View file, download only on enquiry at author, data are open after three years from the day data was submitted to the Baltic Sea Atlas

3 Creation of data

In the following section the methodical creation of data is described for the three case studies. The different working approaches with data and information in each case study reflects the diversity of data handled in marine spatial planning processes. Further, examples of data that are suitable to derive ecosystem services are given. Each dataset can be assigned to one of the different categories of ecosystem services: provisioning services, regulating and maintenance services and cultural services.

3.1 Danish-German case study

The case study uses a GIS suitability analysis to identify potential mussel farm sites in the south-western Baltic Sea. Two different categories of data are used: environmental conditions and maritime activities. Both categories are essential for potential mussel farming sites: 1) mussels only strive when certain environmental conditions prevail 2) other maritime activities restrict the available area. Data layers for both categories were converted to raster files and a parameter-specific suitability function (PSSF) was identified (Longdill, Healy, & Black, 2008) that describes the parameter's suitability on a scale between 0 and 1 (unsuitable-suitable, see example Figure 2). Following this approach, the comparison of criteria from different data sources and with different units is possible.

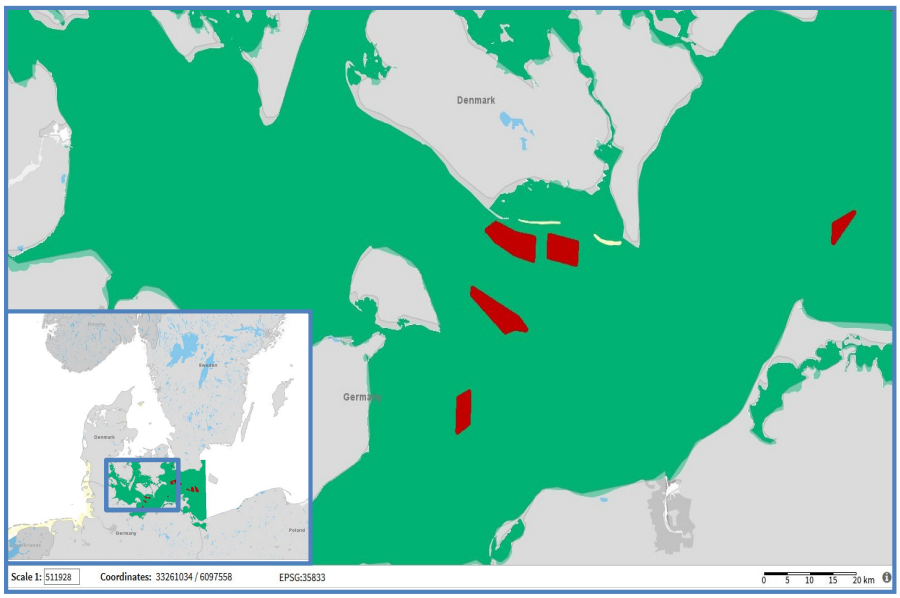


Figure 2: Results of suitability analysis "windparks" of the BSA from the southern Baltic Sea. Red areas are unsuitable for mussel farms, green areas are suitable for mussel farms regarding the parameter wind park.

Suitable environmental conditions for mussel growth can be found in the literature (Andersson, Eriksson, & Olofsson, 2013; Davaasuren, Brunel, Bolman, Jak, & Corso, 2013; Krost & Mühl, 2014; Lindahl, 2013; Lindahl et al., 2005; Schadach, 2013). For the suitability analysis, the criteria water depth, chlorophyll, dissolved oxygen and currents (both bottom and surface) were selected. The data for these criteria were derived from the ERGOM-GETM model. The NetCDF files were converted to raster files using a resolution of 50 m. The workflow in GIS included the reclassification of the raster layers and the rescaling using a linear function. All parameters were subsequently combined into one layer using the geometric mean with the raster calculator. Two combined layers were created to show

the less and more restrictive thresholds of the environmental parameters retrieved from the literature.

The case study furthermore includes data on maritime activities, i.e. wind parks, shipping, cables and pipelines, extraction and dumping sites, coastal recreation and Natura 2000 sites. Data sources include the HELCOM Map and Data Service, the environmental GIS ('Miljøgis') from the Danish Nature Agency and the GeoSeaPortal from the Federal Maritime and Hydrographic Agency. In the GIS analysis, the first step was the creation of buffer zones around some features to indicate official security zones that restrict other activities. The security zones were obtained from official documents or guidelines from other EU MSP projects. As a next step, the vector layers were converted to raster layers with values of 0 and 1 and a resolution of 50 m. The 0 values in the raster represent areas where maritime activities already occur and areas with a value of 1 are available options, in the sense that none of the selected maritime activities take place there. The different raster layers of the maritime activities were also overlain using raster calculator and two scenarios were created: the first one encompasses maritime activities currently in place and the second scenario shows the existing as well as the planned maritime activities and those with an unknown status or no longer in use. The combined layers of environmental parameters and maritime activities were overlain to show the overall suitability of the case study area for mussel farming.

3.2 Latvian case study

The Latvian case study addresses the need for the assessment and comparison of environmental impacts, costs, and benefits of alternative sea use options/scenarios in relation to the designation of Marine Protected Areas (MPA) to provide support for discussions with stakeholders and political decision-making for Maritime Spatial Planning (MSP). The Latvian case study utilizes environmental data from the Latvian Institute of Aquatic Ecology national monitoring program as well as HELCOM Map and Data Service, geological data from the Latvian Environment, Geology and Meteorology Centre and maritime activities data from Latvian Maritime Spatial Plan 2030 developed by the Ministry of Environmental Protection and Regional Development of the Republic of Latvia.

The available geological information of the Latvian coastal and off-shore waters shows that the seafloor is covered by mixed substrates of boulders, stones, sand and mud (Latvian Environment, Geology and Meteorology Centre, 1996). The hard, compact substrata on solid and soft bottoms, which arise from the Baltic sea floor are called reefs. Reefs may support a zonation of benthic communities of algae and animal species (HELCOM, 2013) and as biodiversity hot spots are to be protected under the Natura 2000 Habitats Directive. In the Latvian case study, reefs are areas where the proportion of seabed stone cover reaches 60%. The Latvian marine benthic habitats are classified according to the HELCOM Underwater Biotope and Habitat (HELCOM HUB) classification system (HELCOM, 2013) which defines the detailed Baltic habitats/biotopes and biotope complexes for the HELCOM area.
The data layers with geological information and underwater biotopes were processed using interpolation methods and combined to create underwater biotopes maps. Processing of the substrate data was done using the ArcGIS Inverse distance weighting (IDW) interpolation method to calculate the weighted average of point information that was obtained from video survey data and geological bottom sediment map. Interpolated data were portrayed in all surveyed areas in the Latvian Baltic Sea waters.

The produced information on spatial distribution of the benthic habitats (macroalgae and mussel stands on hard substrate) is used in the socio-economic assessment of their provided ecosystem services (ES). The map of benthic habitats provides spatial characterisation of the ecosystem's capacity to provide the ES. As part of the socio-economic assessment, types of socioeconomic benefits and values from these ES are specified. Indicators for each benefit and value are developed to provide quantitative and, where possible, monetary estimates on these benefits and values. Spatial distribution of the benefits and values will be assessed using various data and information with the aim to provide spatially-explicit assessment (including maps) of the benefits from the ES.

In addition to the above mentioned data sources, the case study also uses data from official, national level documents for long-term maritime spatial planning. These data layers provide information of potential oil extraction sites, modelled wind speed information in the Baltic Sea at the 100 m height and potentially suitable areas for wind park development in Latvian Baltic Sea waters. Areas of potential oil extraction sites and potentially suitable areas for wind parks are in vector data type – polygon data. The wind speed data are represented in raster data type.

3.3 Pan-Baltic case study

The Pan-Baltic case study produces information about stakeholder involvement practises in countries around the Baltic Sea. In addition, it aims to gather understanding about the perceptions and requirements of the business sector stakeholders concerning their involvement in the MSP process. The study is conducted by interviews and questionnaires. The data produced in the case study is information derived from the respondents and interviewees and is therefore based on expert knowledge. The results do not contain anything in spatial format. Moreover, the case study has not included any GIS analyses so far.

Expert knowledge in this case example represents non-spatial data. To be able to include such data in the Baltic Sea Atlas, a spatial shapefile was created. The shapefile was based on country borders derived from the HELCOM Map and Data Service. Here, in the spatial representation of countries, an attribute column was added to inform about the availability of interviews from the respective countries. Coding 0 was selected when no interviews were available, and coding 1 was selected when a planner from the country in question had given an interview for the case study purposes.

The availability of interviews can be illustrated on a map based on the attribute coding as proposed in Deliverable 3.1. The map should be interpreted as a visual means to provide the list of countries where interviews have been conducted. The metadata related to the shapefile includes basic information about the interviews. However, if further information about the content of the dataset is wanted, the Baltic Sea Atlas user needs to contact the data collector to discuss the possibilities to collaborate with the data. The direct outcomes of the interviews (i.e. audio recordings, written notes, etc.) are not publicly available due to confidentiality reasons. The shapefile itself can be freely downloaded by all users.

3.4 Ecosystem services data

The concept of ecosystem services (ES) can provide valuable input to marine planning and management. Still, data on ES are scarce and hardly used in MSP so far. The BSA includes additional datasets beyond the case studies of the project in order to show exemplarily which kind of data can be used to derive ecosystem services. One example for each type of ecosystem service is explained here in more detail.

3.4.1 Regulating and maintenance services

Regulating and maintenance services are provided by e.g. regulating the quality of water, air and soil or by providing flood and disease control.

Oxygen concentration is an indication on the regulative self-functioning of the Baltic Sea ecosystem. Information on the mean value of bottom water oxygen concentrations can be useful to derive regulating and maintenance services provided by the ecosystem (Figure 3). Oxygen levels can be an indicator for the bio-remediation potential of a marine area (amount of oxygen consumed to decompose organic material). Oxygen concentrations can therefore be uses as indication for water quality or reduction of eutrophication.

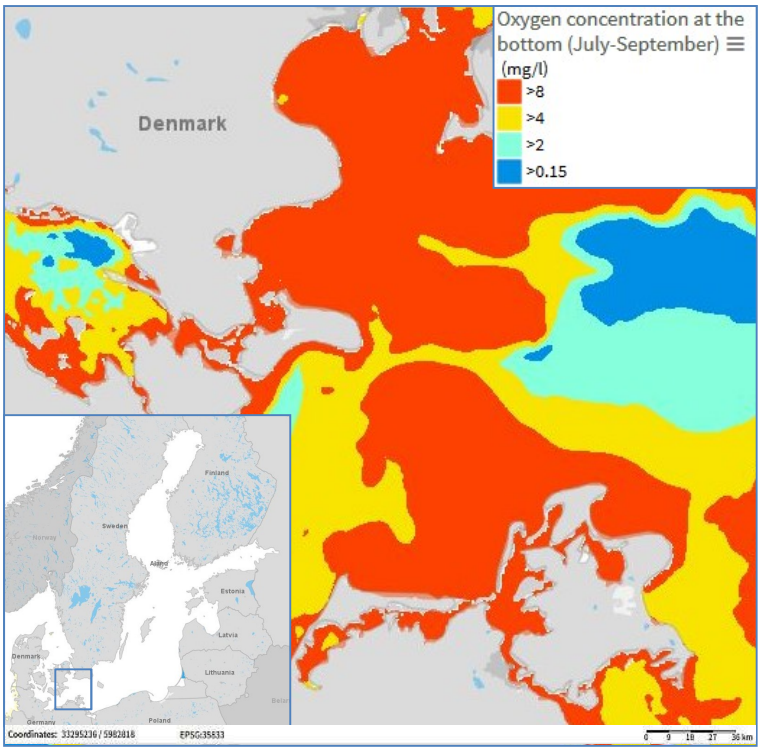


Figure 3: Mean bottom water oxygen concentrations in the southern Baltic Sea (June-September, modelling period 2006–2014).

Oxygen concentration was modelled with the ERGOM-GETM model for the period 2006-2014 (values are in mg/l). The dataset provides essential information for the suitability analysis of the Danish case study. The original NetCDF file was converted to raster format in ArcGIS and was subsequently resampled to a resolution of 50 m, using bilinear interpolation.

3.4.2 Provisioning services

Provisioning services describe the material or energy outputs from ecosystems. They include food, water and other resources.

The GIS data layer (Figure 4) shows buffers (red) of 400 metres around sand and gravel extraction sites (black) in the Baltic Sea Region. The dataset is based on HELCOM shapefile "Extraction gravel sand" (HELCOM HOLAS II Dataset: Extraction of sand and gravel (2017)) obtained from the HELCOM data portal.

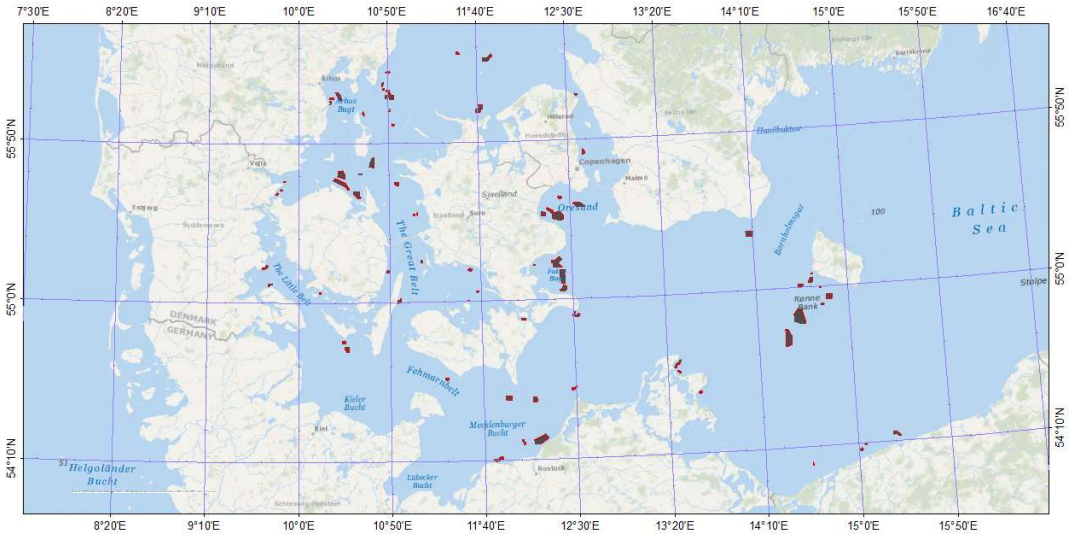


Figure 4: GIS data layer of extraction sites of gravel and sand (black) in the BSR with a 400 m buffer (red) where distribution of sediment plumes are likely to impact the surrounding marine environment.

Sand and extraction sites in the HELCOM shapefile are based on extraction activities during 2011–2015. The dataset contains sites of sand and gravel extraction in the Baltic Sea Region. Based on literature, buffers of 400 metres (Korpinen et al. 2017) were generated around the extraction sites representing an estimate of the extent of sediment in the water column that are likely to impact the surrounding marine environment.

3.4.3 Cultural services

Cultural services include the non-material benefits people obtain from ecosystems: aesthetic inspiration, cultural identity, sense of place, and spiritual experience related to the natural environment. Opportunities for tourism and for recreation are also considered within the cultural services.

The marine environment as aesthetic landscape and inspiration affects the intellectual and representative interaction of human well-beings with the sea. Within the CICES-framework a free horizon is valued and classified within the range of cultural services. Marine infrastructures such as wind turbines may have visual impact on people at the coastline (living at the coast or tourism) as well as at the sea (fishing, cargo transfer, ferries). Despite the advantage of orientation, it can impact the safety of ships (danger of collision) or it may impact the aesthetic value of a place. Illustrating the visibility range of wind turbines in a GIS-system is therefore important for MSP in order to evaluate the visual impact of such marine infrastructures. Figure 5 shows the area around a wind turbine (red) where one is likely to see a wind mill in the Baltic Sea. The wind turbine location map was obtained from the HELCOM data portal for the implementation process.

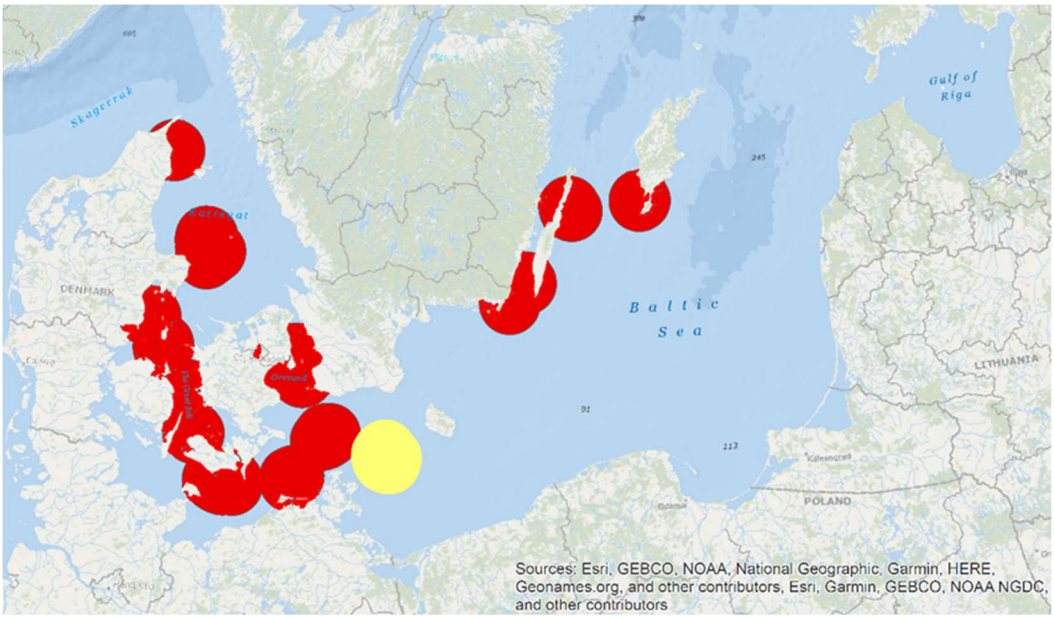


Figure 5: GIS-data layer of visibility field of wind turbines in the Baltic Sea with red areas for existing wind parks and yellow areas for wind parks which are still under construction.

The dataset contains the locations of wind turbines in the Baltic Sea Region, both existing (red) and under construction (yellow). The visual impact of a wind turbine varies with weather conditions, altitude above sea level (e.g. observer stands on steep coast or beach, on sailing boot or cruise liner) and the altitude of the wind turbine itself. Taking the variabilities into account, Bishop (2002) estimates a distance of 30 km where the visual impacts of wind turbines can be felt. Hence, a buffer of 30km was created around the wind turbines to determine areas of visual impacts as an estimation (elevation of the land is not considered here).

An intersect of the areas of visual impacts with the coastline of the Baltic Sea was done to determine the impacted coastline (Figure 6).

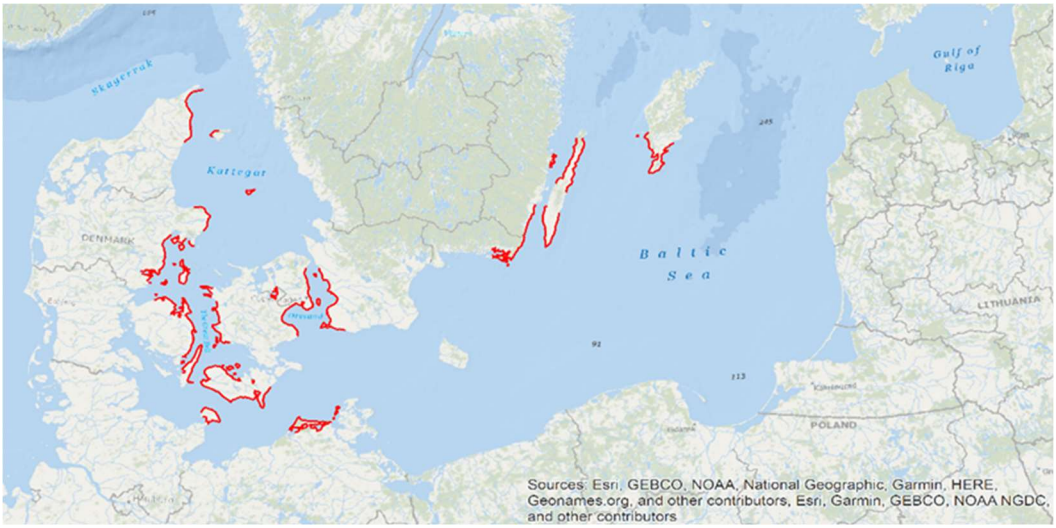


Figure 6: GIS data layer of impacted coastline (red) of the Baltic Sea and where one is likely to see wind turbines.

The red parts in Figure 6 illustrate the areas of the coastline, where wind turbines are most likely visible from the coastline (land elevation not considered).

4 Baltic Sea Atlas project data

The BSA hosts 61 datasets from the BONUS BASMATI project as of 30 June 2019.

Table 2: List of BONUS BASMATI datasets included in the Baltic Sea Atlas

No	Name of dataset	data category	2. data category	case study	data provider	License agreement
1	benthic biotopes	Environmental properties	biology		IOW	Restricted II
2	Chlorophyll-a levels (June-August)	Environmental properties	biology		IOW	Open
3	Important areas for marine mammals	Environmental properties	biology		IOW	Open
4	Important areas for avifouna	Environmental properties	biology		IOW	Open
5	Biotopes	Environmental properties	biology	Latvia	LIAE	Restricted II
6	Oxygen concentration at the bottom (Jul-Sep)	Environmental properties	chemistry	DK-GER	IOW	Open
7	Substrate (Latvia)	Environmental properties	geology	Latvia	LIAE	Restricted II
8	Wind speed at 100m hight	Environmental properties	physics	DK-GER	IOW	Restricted II
9	surface currents (Dec-Feb)	Environmental properties	physics	DK-GER	IOW	Open
10	bottom currents (June-Aug)	Environmental properties	physics	DK-GER	IOW	Open
11	Bathymetry	Environmental properties	bathymetry		IOW	Open
12	Exclusion criterion bottom nets	Case studies	Case study aquaculture	DK-GER	IOW	Open
13	Potential mussel farm location (DK)	Case studies	Case study aquaculture	DK-GER	IOW	Open
14	Exclusion criterion eider duc abundances	Case studies	Case study aquaculture	DK-GER	IOW	Open
15	Proposed fish farm locations (DK)	Case studies	Case study aquaculture	DK-GER	IOW	Open
16	Harbour 10 km radius	Case studies	Case study aquaculture	DK-GER	IOW	Open

No	Name of dataset	data category	2. data category	case study	data provider	License agreement
17	Suitability analysis scenario 4	Case studies	Case study aquaculture	DK-GER	IOW	Open
18	Suitability analysis scenario 3	Case studies	Case study aquaculture	DK-GER	IOW	Open
19	Suitability analysis scenario 2	Case studies	Case study aquaculture	DK-GER	IOW	Open
20	Suitability analysis scenario 1	Case studies	Case study aquaculture	DK-GER	IOW	Open
21	Suitability criterion environmental conditions I	Case studies	Case study aquaculture	DK-GER	IOW	Open
22	Suitability criterion environmental conditions II	Case studies	Case study aquaculture	DK-GER	IOW	Open
23	Suitability criterion oxygen levels (threshold: 4 mg/l)	Case studies	Case study aquaculture	DK-GER	IOW	Open
24	Suitability criterion chlorophyll-a levels (threshold: 3ug/l)	Case studies	Case study aquaculture	DK-GER	IOW	Open
25	Suitability criterion chlorophyll-a levels (threshold: 2ug/l)	Case studies	Case study aquaculture	DK-GER	IOW	Open
26	suitability criterion bottom currents (threshold:2 cm/s)	Case studies	Case study aquaculture	DK-GER	IOW	Open
27	suitability criterion surface currents (threshold:5-15 cm/s)	Case studies	Case study aquaculture	DK-GER	IOW	Open
28	suitability criterion surface currents (threshold:3-20 cm/s)	Case studies	Case study aquaculture	DK-GER	IOW	Open

No	Name of dataset	data category	2. data category	case study	data provider	License agreement
29	suitability criterion bathymetry	Case studies	Case study aquaculture	DK-GER	IOW	Open
30	exclusion criterion windparks (in use, under construction, planned, unkown status)	Case studies	Case study aquaculture	DK-GER	IOW	Open
31	exclusion criterion windparks (in use, under construction)	Case studies	Case study aquaculture	DK-GER	IOW	Open
32	Exclusion criterion shipping routes (in use)	Case studies	Case study aquaculture	DK-GER	IOW	Open
33	Exclusion criterion maritime uses (present, planned, past)	Case studies	Case study aquaculture	DK-GER	IOW	Open
34	Exclusion criterion maritime uses (present)	Case studies	Case study aquaculture	DK-GER	IOW	Open
35	Exclusion criterion restricted areas (DK)	Case studies	Case study aquaculture	DK-GER	IOW	Open
36	Exclusion criterion pipelines (in use, planned, unkown status)	Case studies	Case study aquaculture	DK-GER	IOW	Open
37	Exclusion criterion pipelines (in use)	Case studies	Case study aquaculture	DK-GER	IOW	Open
38	Exclusion criterion Natura 2000 areas	Case studies	Case study aquaculture	DK-GER	IOW	Open
39	Exclusion criterion extraction sites (in use, planned, out of use)	Case studies	Case study aquaculture	DK-GER	IOW	Open

No	Name of dataset	data category	2. data category	case study	data provider	License agreement
40	Exclusion criterion extraction sites (in use)	Case studies	Case study aquaculture	DK-GER	IOW	Open
41	Exclusion criterion dumping sites (in use, out of use)	Case studies	Case study aquaculture	DK-GER	IOW	Open
42	Exclusion criterion dumping sites (in use)	Case studies	Case study aquaculture	DK-GER	IOW	Open
43	Exclusion criterion coastal buffer (500m)	Case studies	Case study aquaculture	DK-GER	IOW	Open
44	Exclusion criterion cables (in use under construction)	Case studies	Case study aquaculture	DK-GER	IOW	Open
45	Potentially suitable areas for wind parks (Latvia)	Case studies	Case study Latvian Baltic Sea waters, Gulf of Riga	Latvia	LIAE	Restricted II
46	Potential oil extraction sites (Latvia)	Case studies	Case study Latvian Baltic Sea waters, Gulf of Riga	Latvia	LIAE	Restricted II
47	Pan Baltic interviews: stakeholder integration in MSP processes	Case studies	Case study Pan-Baltic	Pan-Baltic	UTU	Open
48	Visual impact on coastline by wind farms	Effects and pressures			IOW	Open
49	visual impact on areas by wind farms	Effects and pressures			IOW	Open
50	Extraction of gravel and sand with 400 m buffer	Effects and pressures			IOW	Open
51	Wreck dive sites	Anthropogenic uses			IOW	Open
52	Dive sites Fehmarn	Anthropogenic uses			IOW	Open

No	Name of dataset	data category	2. data category	case study	data provider	License agreement
53	fisheries Baltic Sea Data Average 2012-2018	Anthropogenic uses			IOW	Restricted II
54	Fisheries Baltic Sea Data 2018	Anthropogenic uses			IOW	Restricted II
55	Fisheries Baltic Sea Data 2017	Anthropogenic uses			IOW	Restricted II
56	Fisheries Baltic Sea Data 2016	Anthropogenic uses			IOW	Restricted II
57	Fisheries Baltic Sea Data 2015	Anthropogenic uses			IOW	Restricted II
58	Fisheries Baltic Sea Data 2014	Anthropogenic uses			IOW	Restricted II
59	Fisheries Baltic Sea Data 2013	Anthropogenic uses			IOW	Restricted II
60	Fisheries Baltic Sea Data 2012	Anthropogenic uses			IOW	Restricted II
61	Status of marine spatial plans	Anthropogenic uses			IOW	Restricted II

References

Andersson, J., Eriksson, A., & Olofsson, E. (2013). *GIS analysis of suitable localities for mussel farms along the county of Kalmar's coast. Reports of Aquabest project 9/2013*. Helsinki.

Bishop, I. D. (2002). Determination of Thresholds of Visual Impact: The Case of Wind Turbines. *Environment and Planning B: Planning and Design*, *29*(5), 707–718. https://doi.org/10.1068/b12854

Davaasuren, N., Brunel, T., Bolman, B., Jak, R., & Corso, S. (2013). *Maps of Europe showing coastal areas (marine ecosystems) with specific characteristics based on physical characteristics and suitability for different activities. COEXIST Deliverable D1.1*.

INSPIRE Directive. (2007). Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE).

HELCOM (2013): HELCOM HUB – Technical Report on the HELCOM Underwater Biotope and habitat classifi cation. Balt. Sea Environ. Proc. No. 139

Korduan, P., & Christoph, H. (2005). Internet-GIS-Initiative Mecklenburg-Vorpommern auf Basis freier Software. *Geoforum MV*.

Krost, P., & Mühl, M. (2014). *Aquakultur und Klimawandel in der Ostsee*. *RADOST-Berichstreihe*. Kiel.

Latvian Environment, Geology and Meteorology Centre (1996). Geological maps, Map of the bottom of the Gulf of Riga, 1: 200 000

Lindahl, O. (2013). Mussel cultivation. *Submariner Network*.

Lindahl, O., Hart, R., Hernroth, B., Kollberg, S., Loo, L. O., Olrog, L., … Syversen, U. (2005). Improving marine water quality by mussel farming: A profitable solution for Swedish society. *AMBIO: A Journal of the Human Environment*, *34*(2), 131–138. https://doi.org/10.1639/0044-

7447(2005)034[0131:imwqbm]2.0.co;2

Longdill, P. C., Healy, T. R., & Black, K. P. (2008). An integrated GIS approach for sustainable aquaculture management area site selection. *Ocean and Coastal Management*, *51*(8–9), 612–624. https://doi.org/10.1016/j.ocecoaman.2008.06.010

Rahn, S., & Korduan, P. (2008). Internet-GIS kvwmap im praktischen Einsatz für individuelle kommunale Anwendung. In *Environmental Informatics and Industrial Ecology: 22th international Conference on Informatics for Environmental Protection environinfo2018*.

Richtlinie 2007/2/EG. Richtlinie 2007/2/EG des Europäischen Parlamentes und des Rates zur Schaffung einer Geodateninfrastruktur in der Europäischen Gemeinschaft (INSPIRE), 2006 § (2007).

Schadach, M. (2013). *Muschelfarmen im Stettiner Haff - Eignungsgebiete vor dem Hintergrund eines integrierten Regionalmanagements*.

Schiele, K., Holzhüter, W., von Thenen, M., Luhtala, H., Strāķe, S., Viška, M., Pakalniete, K., Koski, C., Morf, A.: Requirements for data to be used in marine spatial planning. BONUS BASMATI Deliverable 3.1, August 2018, www.bonusbasmati.eu

von Thenen, M., Schiele, K., Fredericksen, P., Aigars, J., Pakalniete, K., Strake, S., … Schröder, L. (2018). Proposal for an ecosystem service framework for assessment of impacts of planning alternatives in a MSP perspective. *BONUS BASMATI Deliverable*, *4.1*, 1–30.

Attachments

A: Template for metadata information Baltic Sea Atlas web application

B: Checklist for Data delivery to the BSA

BASMATI

Baltic Sea Maritime Spatial Planning for Sustainable Ecosystem Services

Attachment A:

Template for metadata information Baltic Sea Atlas web application

Internal document

BONUS

SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION

Table of contents

1 Introduction

Metadata information is fundamentally important as it provides background information on the dataset such as copy rights. Data security, proof of source and scope of use of a dataset should always be given great attention.
Regarding the Baltic Sea Atlas, metadata is stored in IOWMeta. The Baltic Sea Atlas accesses the IOWMeta to retrieve metadata. IOWMeta links to WebGIS.

An example (see below “DK_KriegersFlak”) on how to fill in metadata in ArcCatalog is provided for vector data (e.g. shapefile of ESRI, the XML-based formats such as GML and KML). The same procedure as described in this template can be used for raster data formats (e.g. JPEG, GeoTIFF, PNG).
Please make sure you fill in as much information as you have and avoid to leave fields empty.
In case there is no licence for ArcCatalog, please use the template metadata which will be provided to you as a Word document upon request (contact lotta.maack@io-warnemuende.de).

Vector data format: Polygon shapefile “DK_KriegersFlak” (displayed with ArcGIS). Coordinate system: ETRS_1989_UTM_Zone_33N.

2 Get started

Option 1: I want to create new metadata information. Start on page 5.

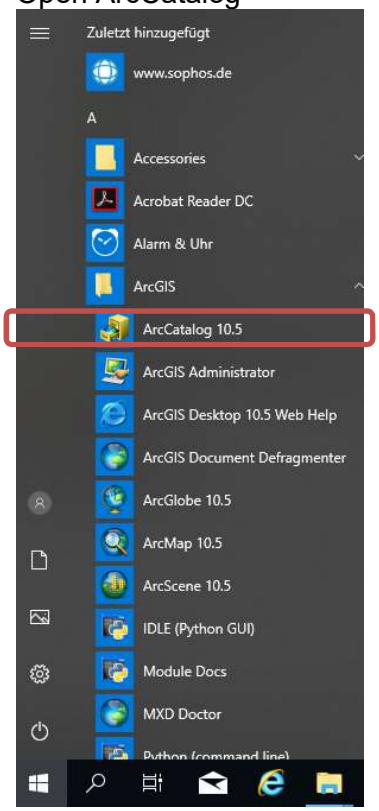
Option 2: I have a similar dataset of which I want to import the metadata information to the new dataset. Start on page 54.

In case of questions, further information or help needed please contact Lotta Maack (Institute for Baltic Research Warnemünde, Germany): lotta.maack@io-warnemuende.de

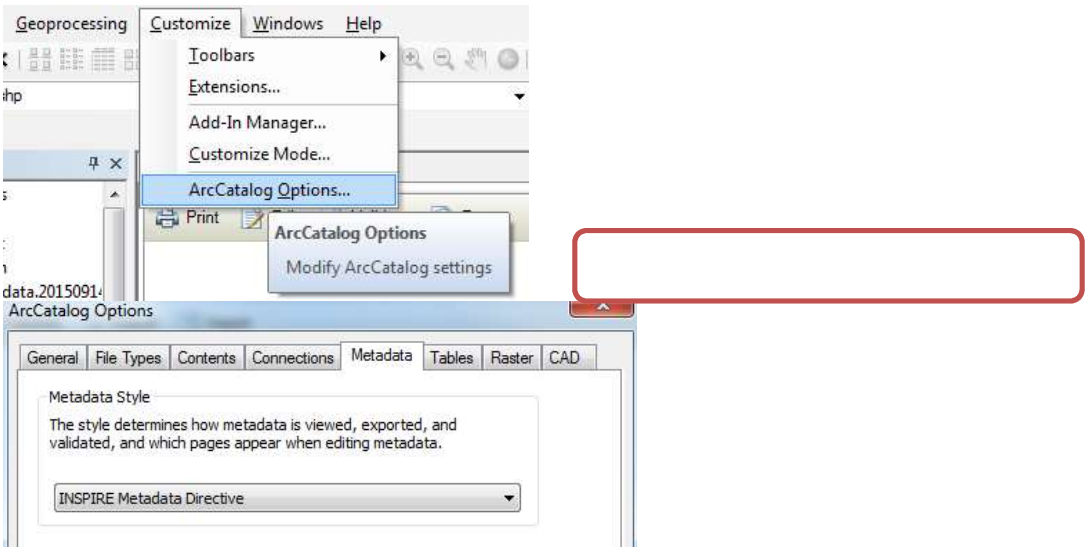
3 Option 1: I want to create new metadata information

3.1 Previous steps

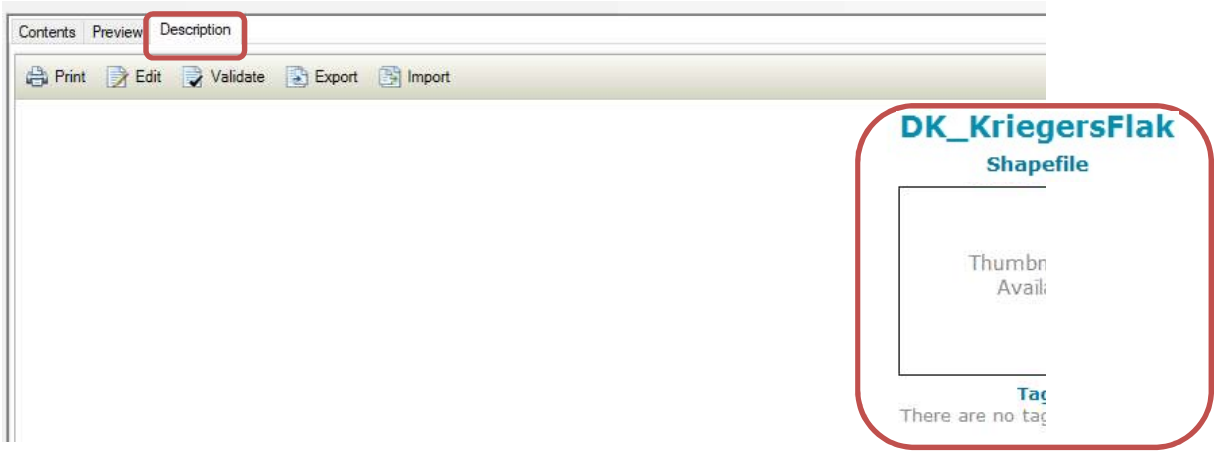
Open ArcCatalog



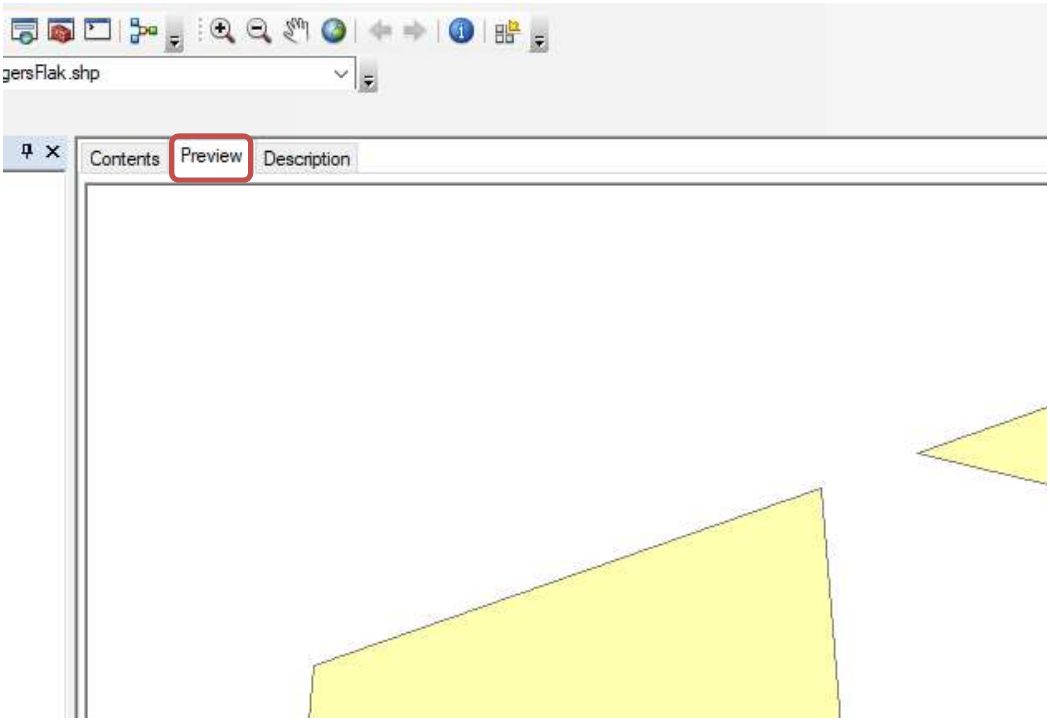
Choose “INSPIRE Metadata Directive”



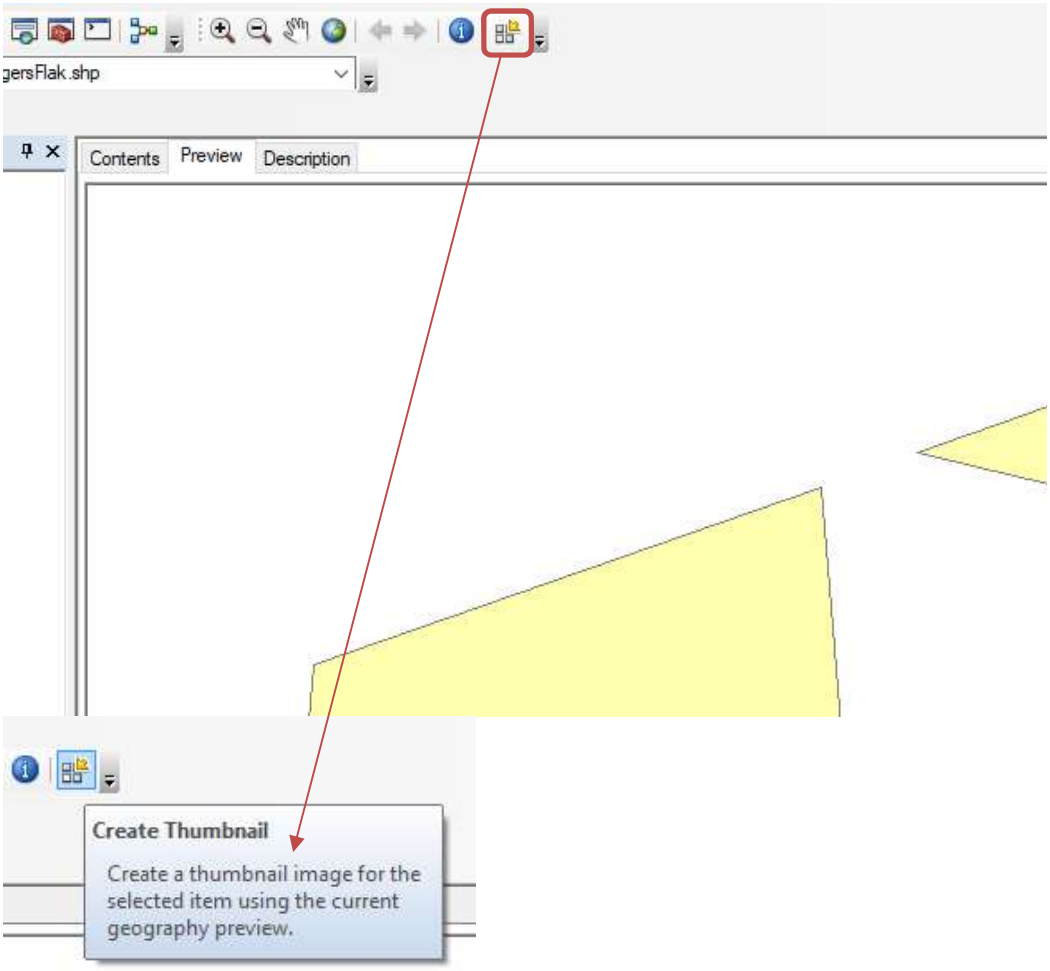
Go to “Description”. You will notice that no information is filled in so far and there is no thumbnail available.



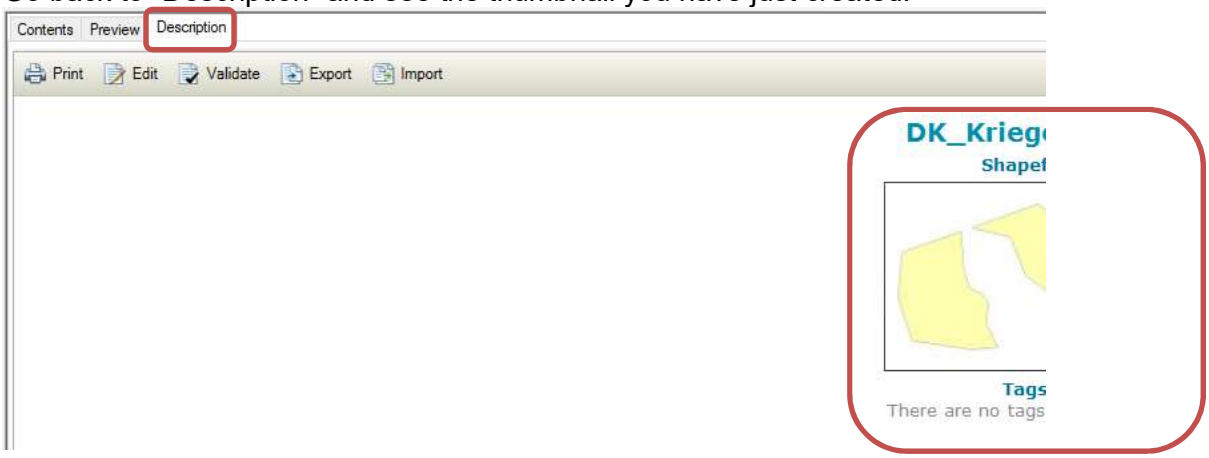
Create a thumbnail (the thumbnail will not appear in the WebGIS application but it still has to be created): Go to “Preview”



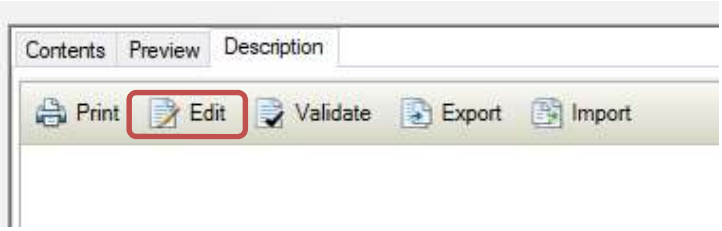
Click on the icon “Create Thumbnail”



Go back to “Description” and see the thumbnail you have just created.



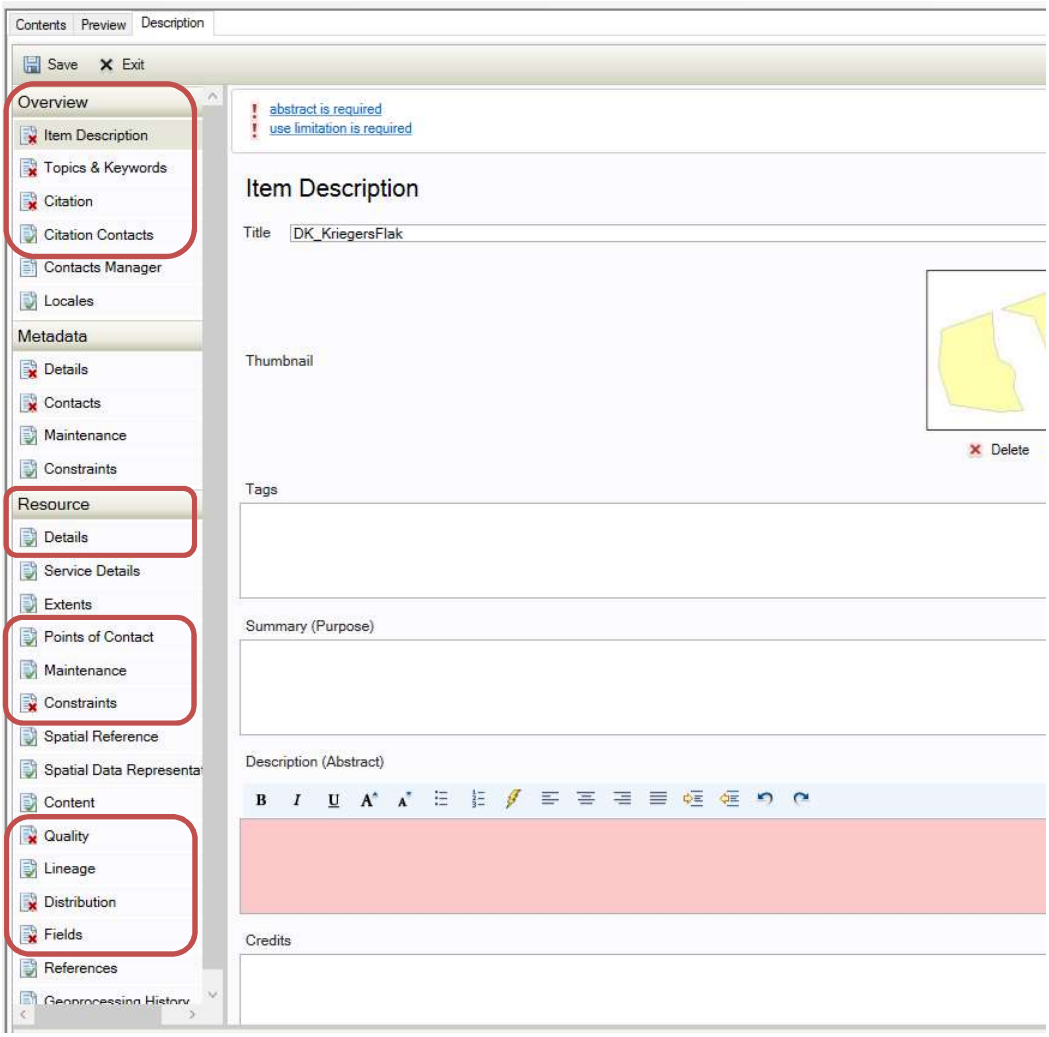
Edit metadata information. Go to “Description” and click on “Edit”.



You will see the classes which you can edit. The ones indicated in red circles will be of importance for the Baltic Sea Atlas. Please fill in as much information as you have about the dataset. Avoid empty spaces wherever possible.

3.2 Structure heading explained

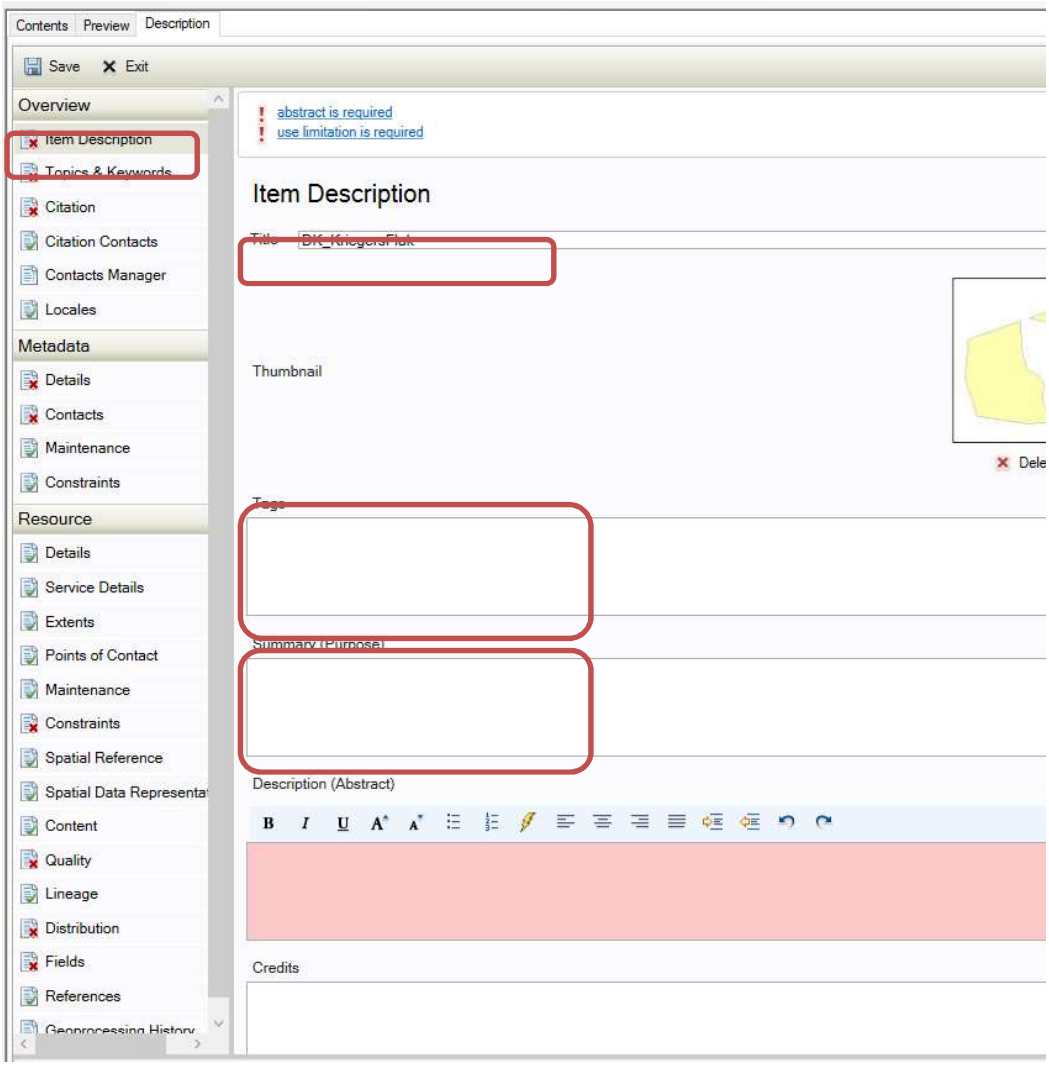
The categories of the structure heading which will be important for the Baltic Sea Atlas include **"Overview"** and **"Resource"**. Each contains further subcategories. The important subcategories that have to be filled in are indicated by red circles.



3.3 Structure heading "Overview"

In the structure heading **"Overview"** fill in all categories indicated with red circles. Start with **"Item Description"**.

3.3.1 Item description



Title (chose concise title)

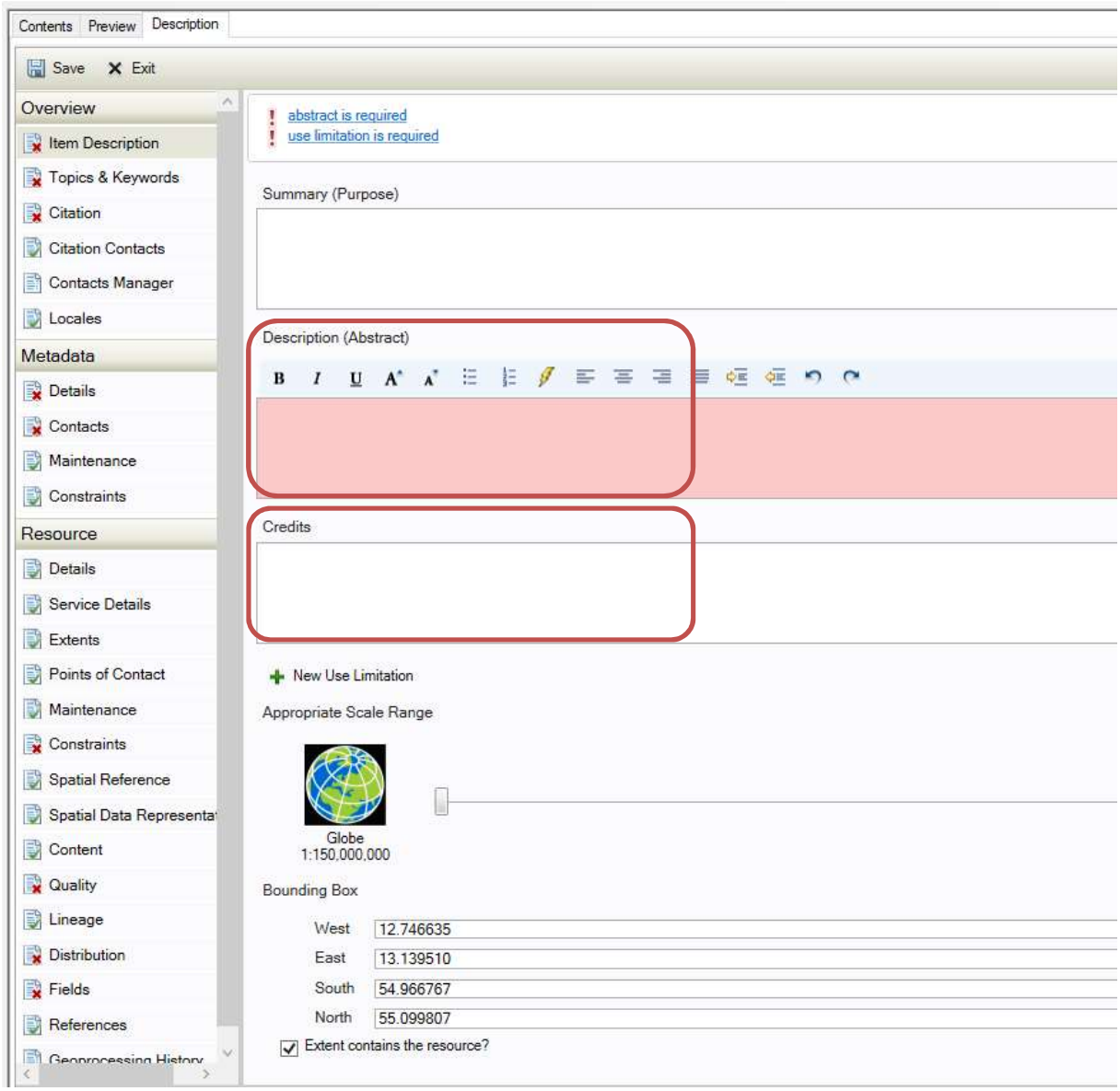
➔ DK_KriegersFlak

Tags/Keywords (search item, project, period, geographic area, ...)

➔ windpark, human activities, uses, Baltic Sea, MSP

Summary (short). Attention! Do not insert a "<" sign here.

➔ The dataset contains information on Kriegers Flak Offshore Wind Farm (under construction) in the Baltic Sea. The dataset was redrawn from https://ens.dk/sites/ens.dk/files/Vindenergi/kriegers_flak_offshore_wind_farm_offshore_technical_project_description_october_2015.pdf) for visualization and analysis purposes in ArcGIS. Background information is available at at Energinet.dk's webpage: www.energinet.dk.



"Description" *(The user sees this text first, so formulate meaningful).* Content, method of data collection, purpose.
Important: please fill in information on data properties as well. Data properties here include: spatial dimension, time frame and origin of data. *(For the spatial dimension include information on the vertical and horizontal dimension. For the time frame include frequency, temporal resolution and time line. For the origin of data choose only one class from the table below).*

category time frame	class	description
temporal occurrence		
	absent	applicable e.g. for species, which are not present anymore in a region or for lack of data
	one-time event	can be applied for disastrous events like a ships average or oil leak on an oil rick

	irregular	applicable for activities, which follow no pattern like dredging events, which depend on weather conditions, supply and demand and administrative authorizations
	regular	applicable e.g. cargo shipping or fishing routs
	static	permanent and ongoing status like residence opinions gathered via interview, maritime infrastructures
	not applicable	no characteristic temporal occurrence can be applied to the data in a meaningful way
	unknown	applicable, when the information is not available to the user
temporal frequency		frequently and regularly occurring events
	daily	event, that repeat approximately every day, like a daily ferry between two harbors
	monthly	event, that occurs approximately once a month, e.g. service trips to wind park
	seasonal	event, that occurs e.g. during spring season like an algae bloom or bird migration or the blockade of a shipping route with floating ice in
	annual	events, that occur during a specific time of the year e.g. the annual updates of socioeconomic statistics
	decadal	reoccuring events on a long, at times irregular frequency like fresh water inflows in the Gotland Basin of the Baltic Sea or extreme
	other period	can be chosen, to describe unique frequency patterns, which differ strongly from the listed classes above
	not applicable	no characteristic temporal frequency can be applied to the data in a meaningful way
	unknown	applicable, when the information is not available to the user
time line		
	past	e.g. historical data or data of outdated marine spatial plans like historic port facilities or historic coastlines

	recent	data, which are taken in the past but describe the most current situation, applicable for e.g. environmental data or model derived data
	present	data on existing uses or present state, e.g. activities taking place currently, existing (mariculture) facilities or legally adopted documents like the INSPIRE
	future	applicable for planned infrastructures or future scenarios, e.g. a planned wind park or sea level rise predictions
	not applicable	no characteristic time line can be applied to the data in a meaningful way

spatial dimension	class	description
vertical		
	air column	air column above the sea, e.g. bird migration routes
	surface water	no defined depth description available, describes the upper water column
	water column	whole water column e.g. aquacultures or wave energy infrastructures, wind energy infrastructures
	bottom water	no defined depth description available, describes the near water body above the seafloor
	seafloor	describes the solid ground and sediment of the marine environment, e.g. for pipelines and cable infrastructures or seagrass
	entire column	describes the seafloor, the water column and the air above, e.g. wind energy infrastructures, bridges
	coastal region	describes the near shore, coastline and coastal area, where maritime induced activity and infrastructures dominate like lighthouses, hotels, diving schools

	unknown	applicable, when the information is not available to the user
	not applicable	no characteristic vertical dimension can be applied to the data in a meaningful way
horizontal		
	point	coordinates available, e.g. ship wreck
	local	small spatial scale, a few km or km2 e.g. protected area or dredging plume
	regional	spatial scale reflecting e.g. ecological, historical, political, climate or morphological zone like an estuarine
	national	administrative boundary like state borders or exclusive economic zone
	basin wide	spatial scale follows morphological characteristics of sea basins e.g. Bornholm Basin
	Baltic wide	spatial scale reflects the whole geographic elongation of the Baltic Sea
	EU	e.g. applicable for policies and agreements of the European Union

origin of data	definition/description
measurements/observations	scientific based, independent measurements
official documents	e.g. national or regional reporting
expert knowledge	assumption by acknowledged experts in the topic
models	interpolations and calculations based on modelled or in-situ data
historical records	historical data and reports
reports by locals, individuals	historical or recent reports of locals or other individuals
assumptions by “source”	no solid data foundation, name data source
by authorities	data provided by authorities
user data by companies	data provided by companies, list sector (e.g.shipping industry)

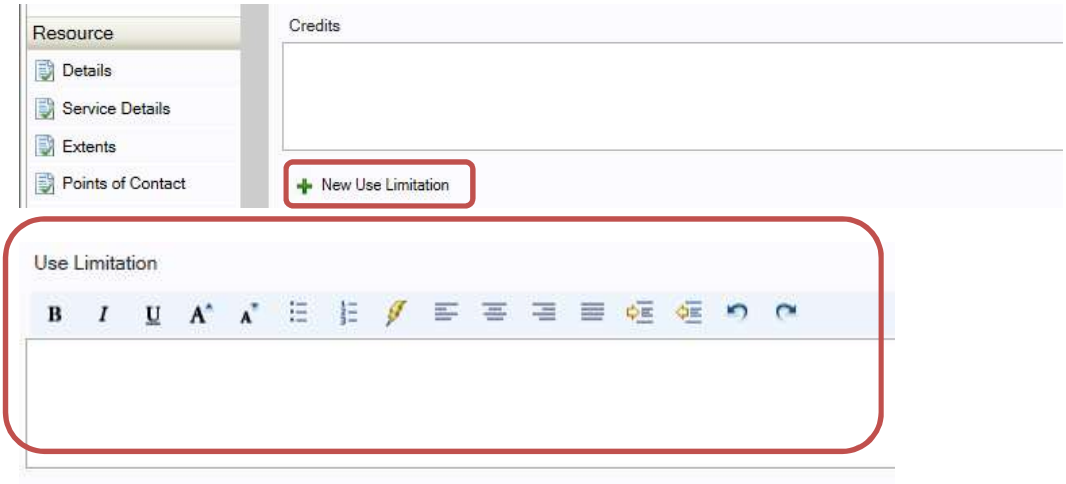
For the sample dataset:

- ➔ The windpark (under construction) at Kriegers Flak in Denmark. The dataset is based on available public sources (https://ens.dk/sites/ens.dk/files/Vindenergi/kriegers_flak_offshore_wind_farm_offshore_technical_project_description_october_2015.pdf).
- ➔ Spatial dimension (vertical): water column
- ➔ Spatial dimension (horizontal): point
- ➔ Time frame (frequency): irregular
- ➔ Time frame (temporal resolution): daily
- ➔ Time frame (time line): present
- ➔ Origin of data: official documents

"Credits" (Who collected the data? (Person(s), Institution(s), …)

- ➔ e.g. Miriam von Thenen, Leibniz Institute for Baltic Sea Research Warnemuende, Germany

Below "Credits" click on "+ New Use Limitation"

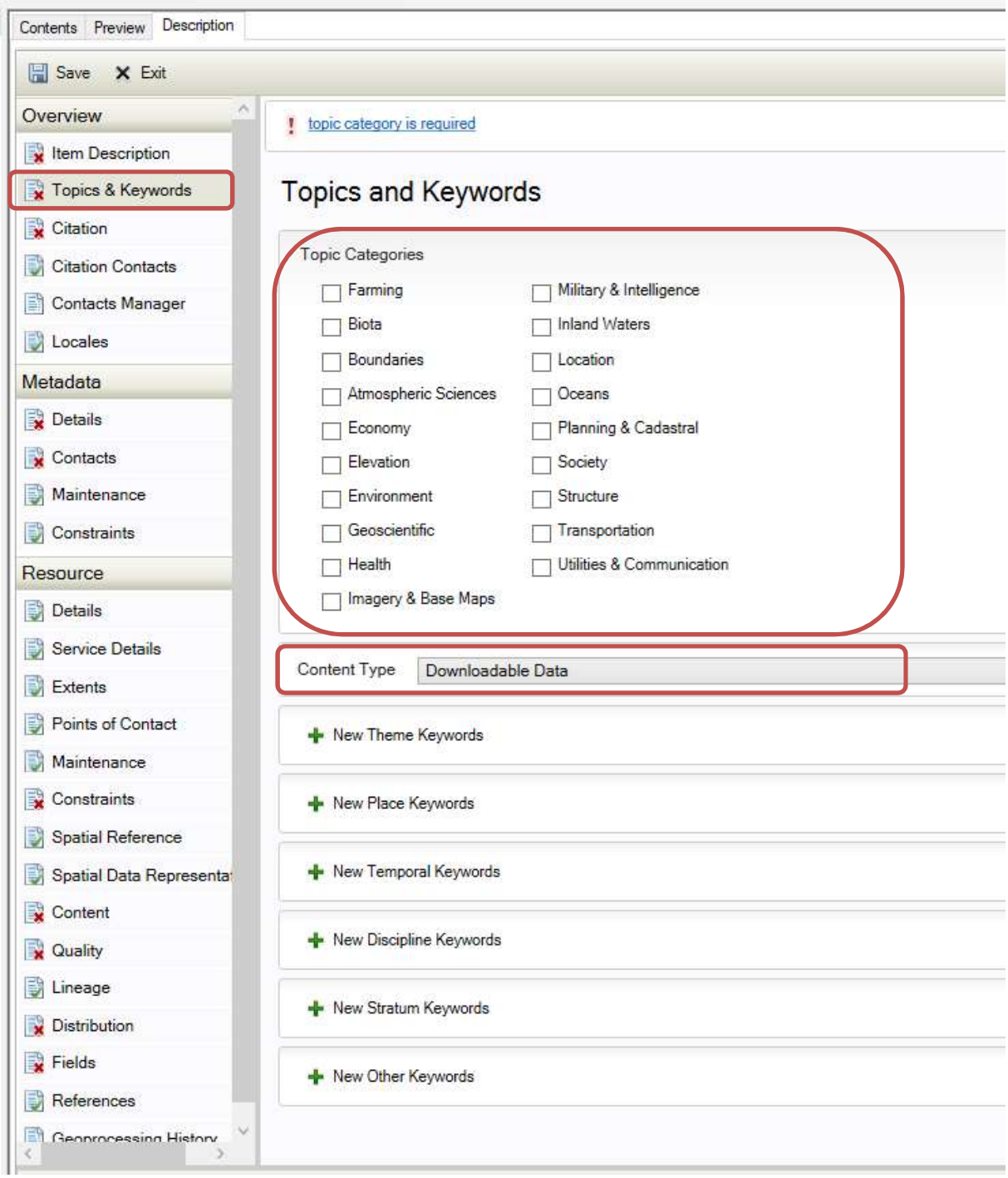


"Use Limitation" (how can the data be used? Always or just on request or by stating the copyright). Copyright.

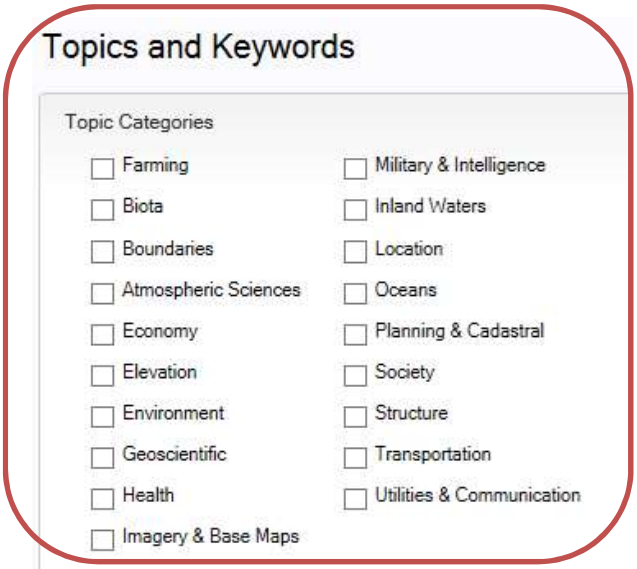
- ➔ Data was redrawn from https://ens.dk/sites/ens.dk/files/Vindenergi/kriegers_flak_offshore_wind_farm_offshore_technical_project_description_october_2015.pdf)
- ➔ Data can be used freely given that the source is cited. The source should be cited as: "(name)"
- ➔ (Data from IOW: "Data originator: Leibniz Institute for Baltic Sea Research Warnemuende, Germany")

In the structure heading **"Overview"** go to **"Topics and Keywords"** and fill in all categories indicated with red circles.

3.3.2 Topics and Keywords

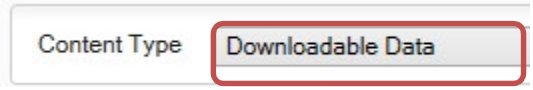


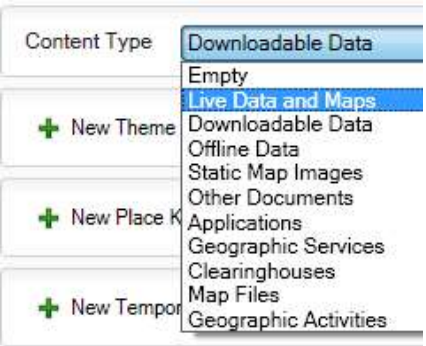
“Topics and Keywords” (*Multiple choice desired*)



➔ Oceans, Structure

“Content Type” (make only one selection, do not choose Empty if possible). Click on the drop-down list which currently says “Downloadable Data” and choose one option.

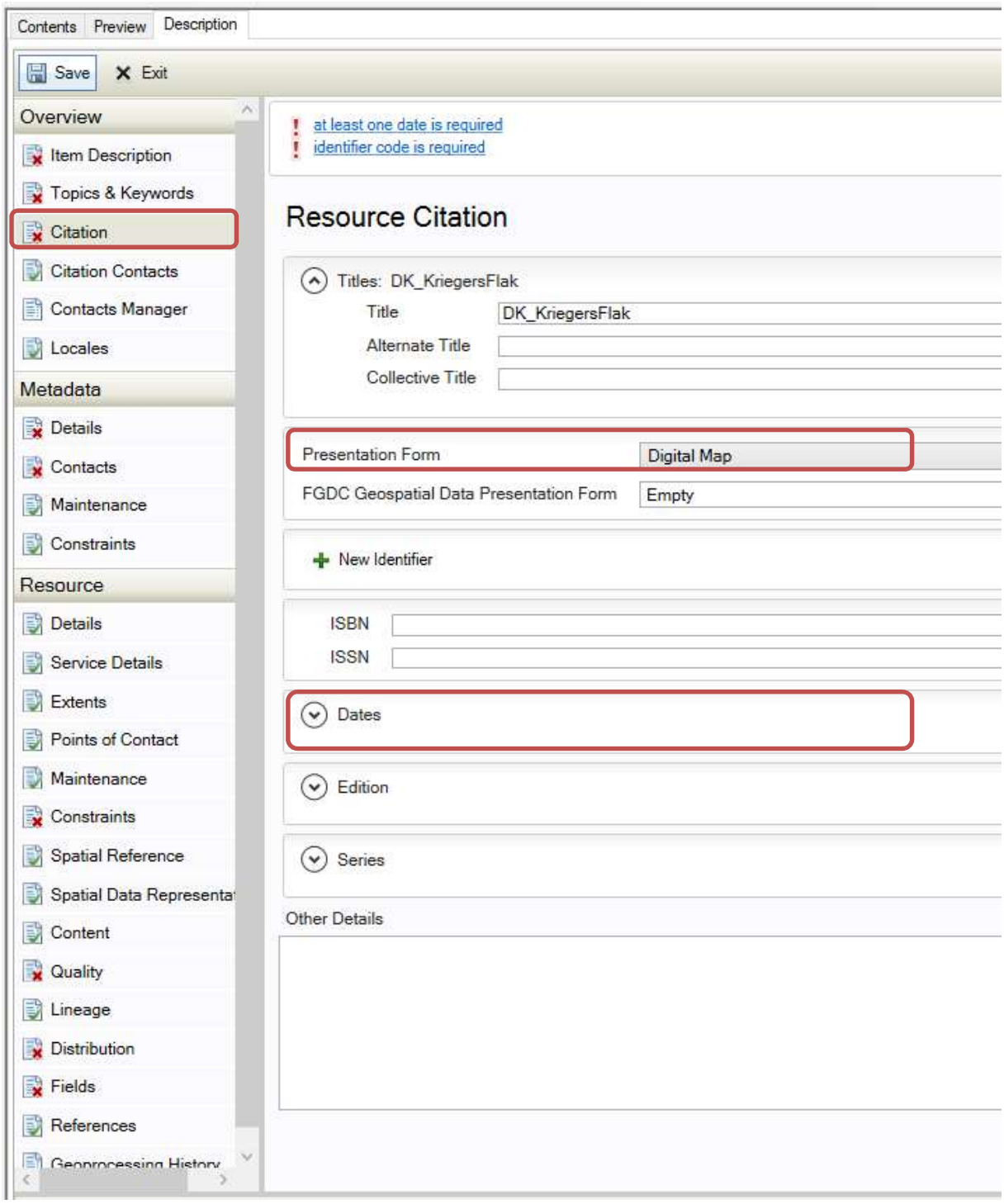




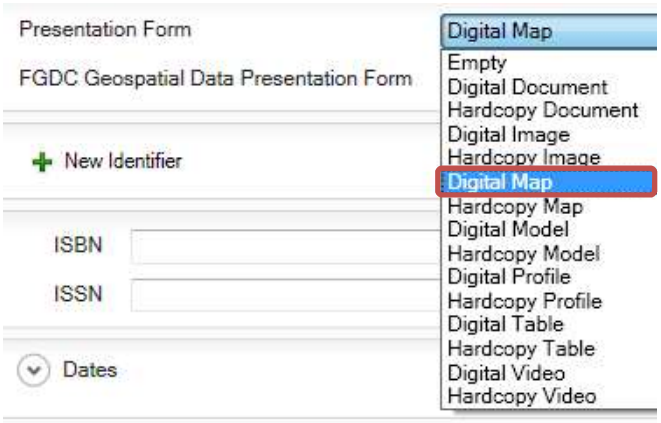
➔ Live Data and Maps

In the structure heading **“Overview”** go to **“Citation”** and fill in all categories indicated with red circles.

3.3.3 Citation



"Presentation Form" Click on the drop-down list which currently says "Digital Map" and choose one option.



➔ Digital Map

“Dates” (enter at least one date)
Click on the drop-down list of “Dates” and insert dates.

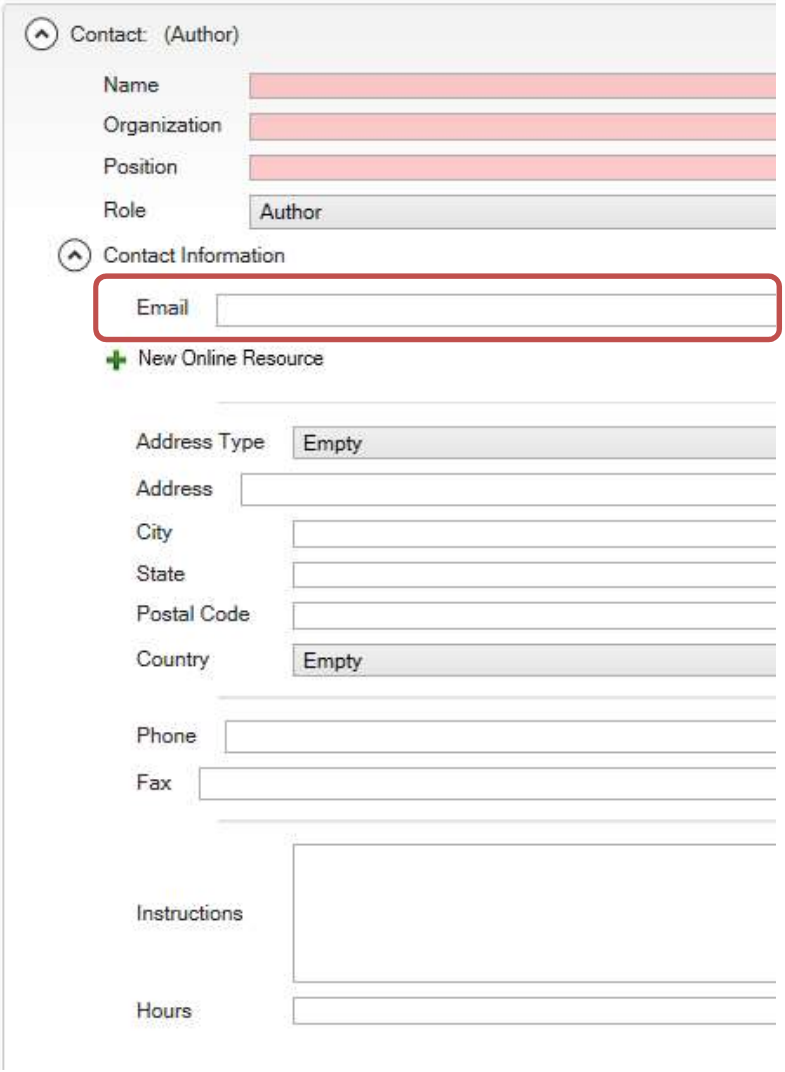
➔ Created 2018-06-01

In the structure heading **“Overview”** go to **“Citation Contacts”** and fill in all categories indicated with red circles.

3.3.4 Citation contacts

Contact(s), absolutely necessary. Click on "+ New Contact" and fill in information.
For the field "Role": make only one selection, do not choose Empty *if possible)*

Click on **“New Contact Information”** and fill in information.

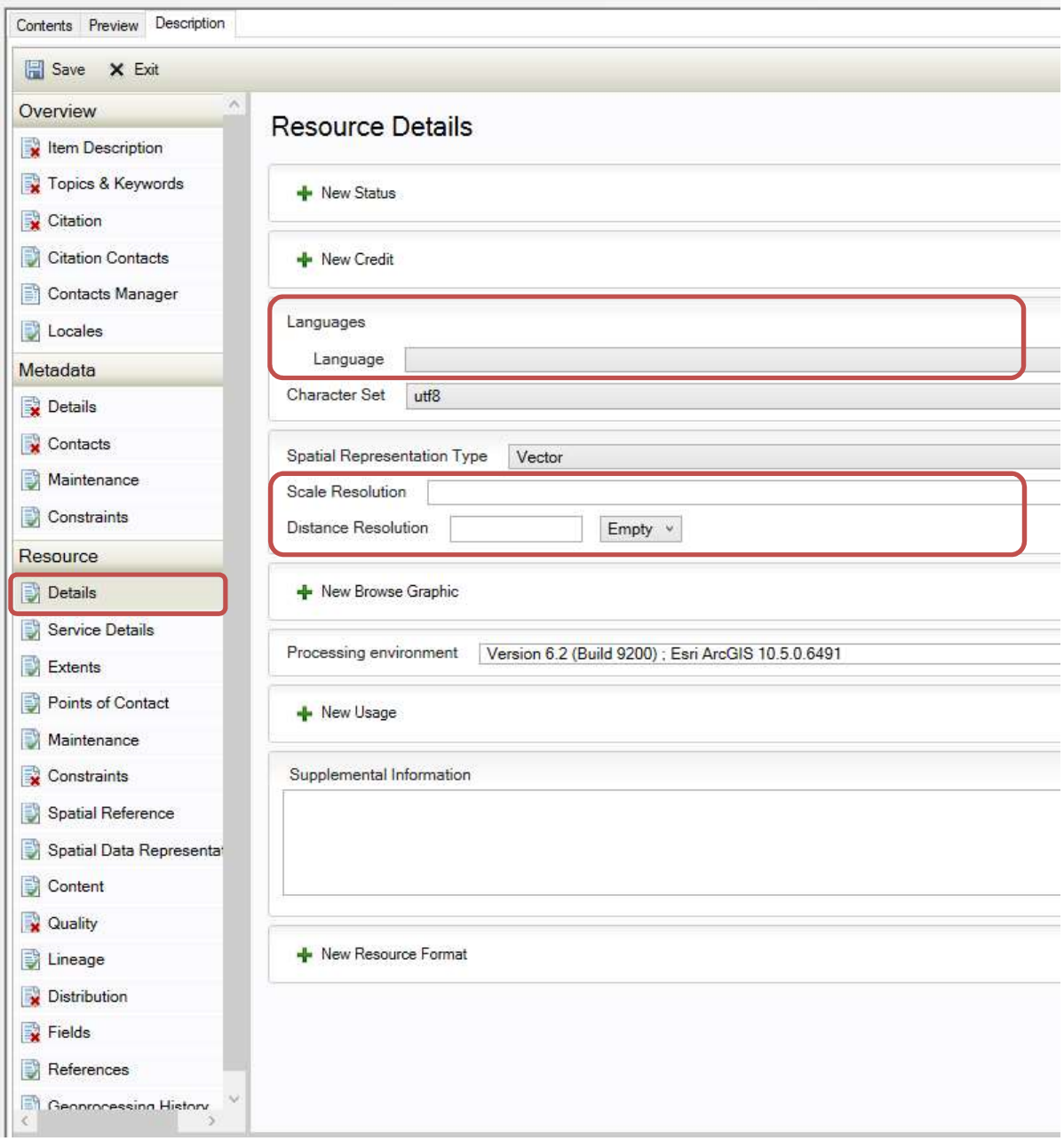


➔ Example: Miriam von Thenen, IOW, Email

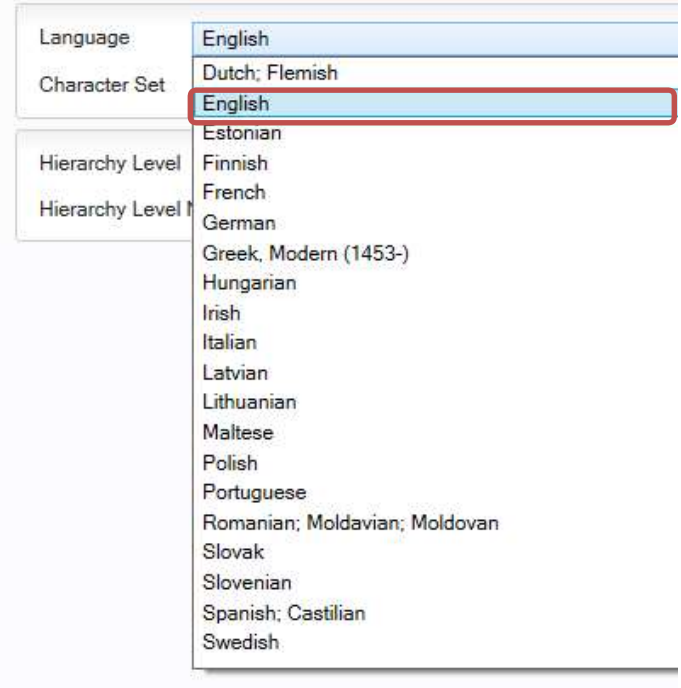
Go to the structure heading **“Resource”** and fill in all categories indicated with red circles.

3.4 Structure heading “Resource”

In the structure heading **“Resource”** fill in all categories indicated with red circles. Start with **“Details”**.


Contents
Preview
Description
Save
Exit
Overview
Item Description
Topics & Keywords
Citation
Citation Contacts
Contacts Manager
Locales
Metadata
Details
Contacts
Maintenance
Constraints
Resource
Details
Service Details
Extents
Points of Contact
Maintenance
Constraints
Spatial Reference
Content
Quality
Lineage
Distribution
Fields
References
Resource Details
New Status
New Credit
Languages
Language
Character Set
utf8
Spatial Representation Type
Vector
Scale Resolution
Distance Resolution
Empty
New Browse Graphic
Processing environment
Version 6.2 (Build 9200) ; Esri ArcGIS 10.5.0.6491
New Usage
Supplemental Information
New Resource Format

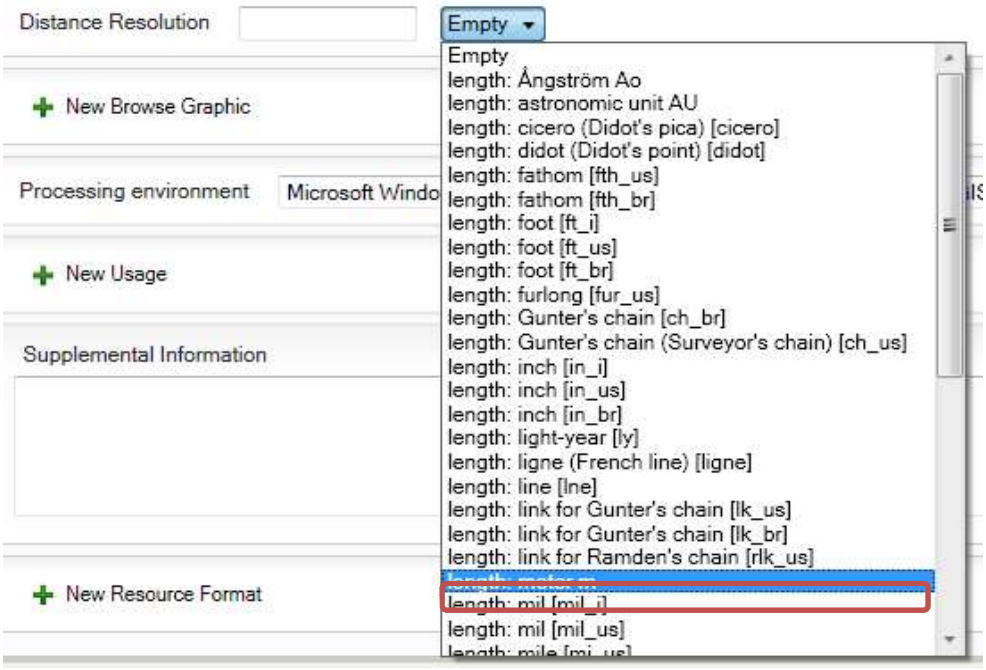
“Language”, choose the language.



➔ English

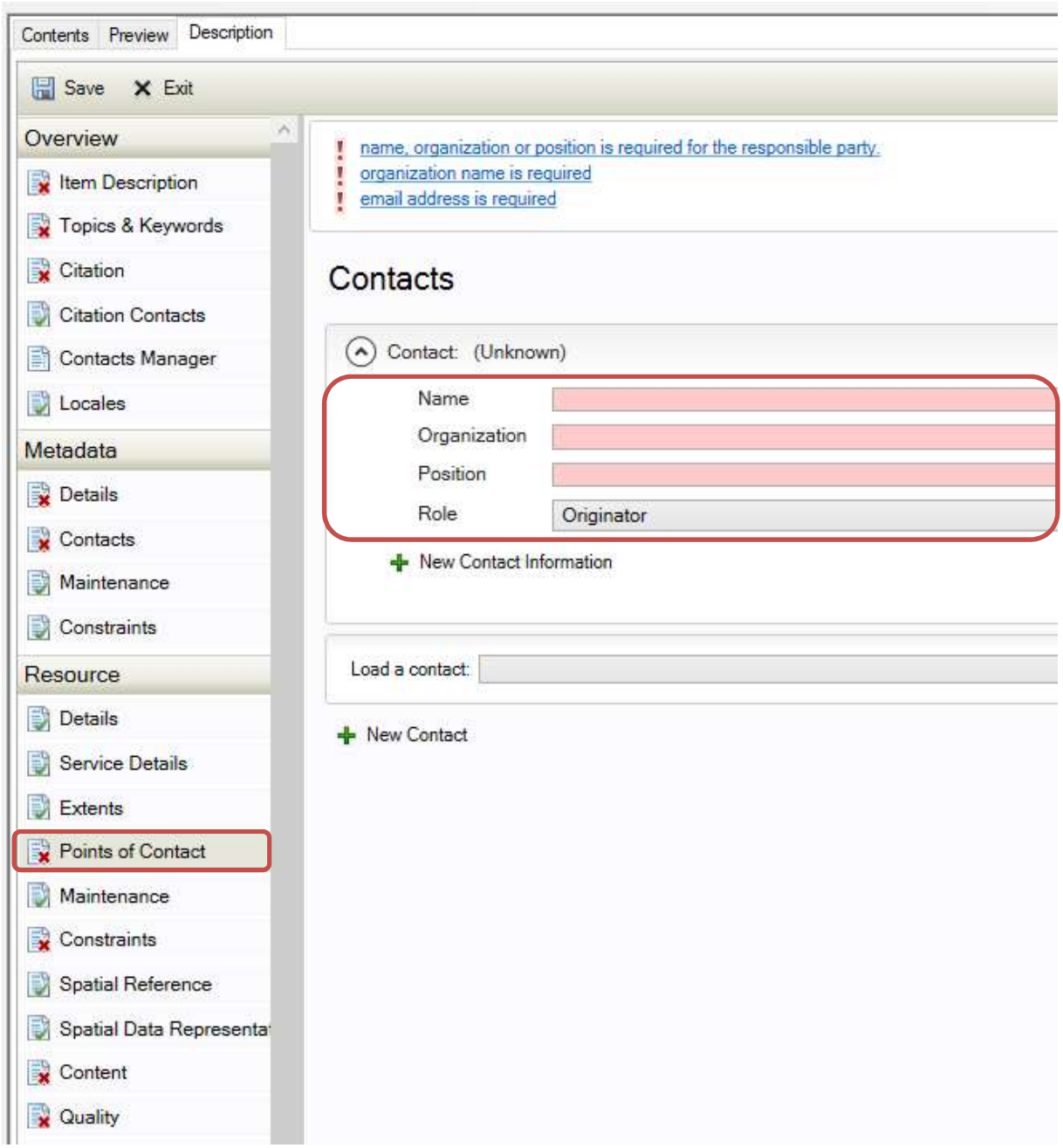
“Scale Resolution” (if available)

“Distance Resolution” (with unit)



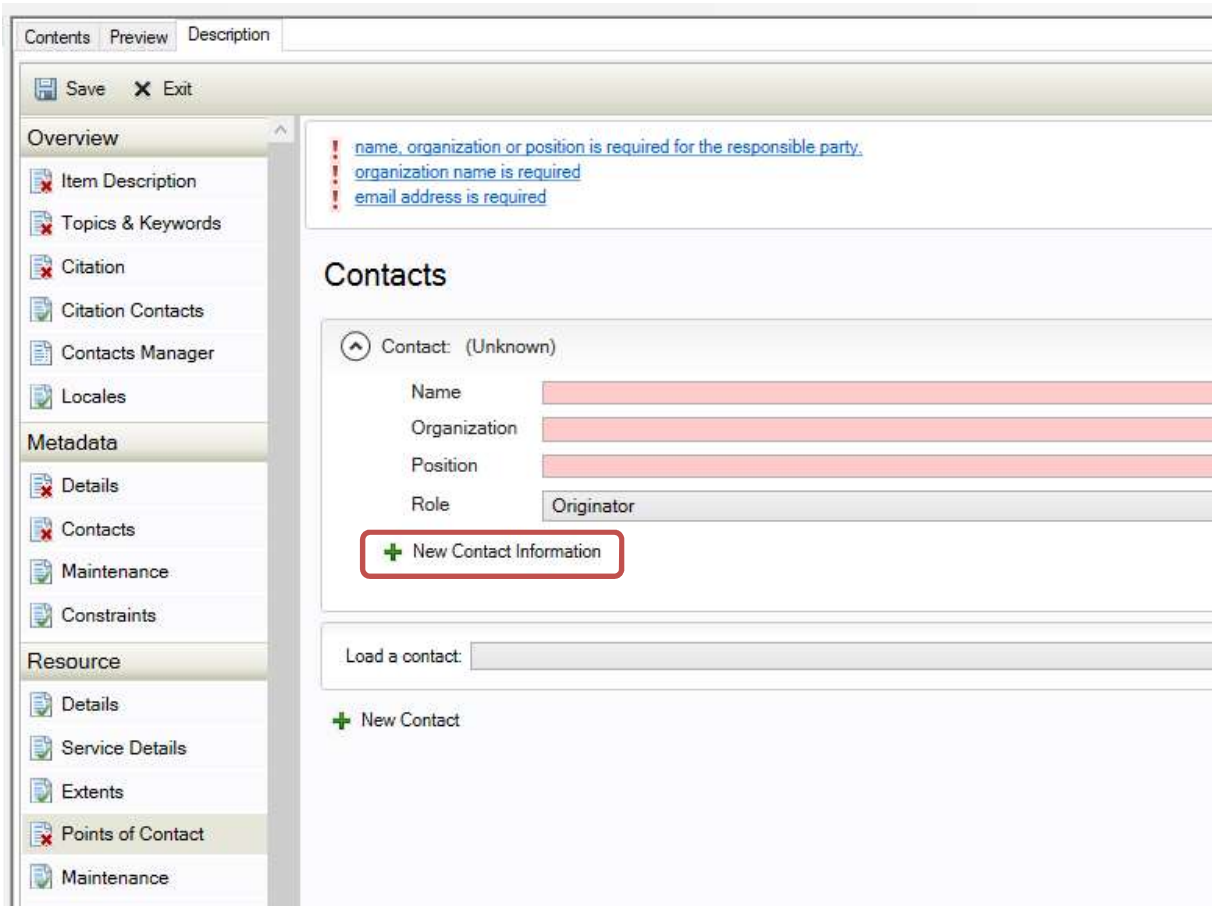
In the structure heading **“Resource”** go to **“Points of Contact”** and fill in all categories indicated with red circles.

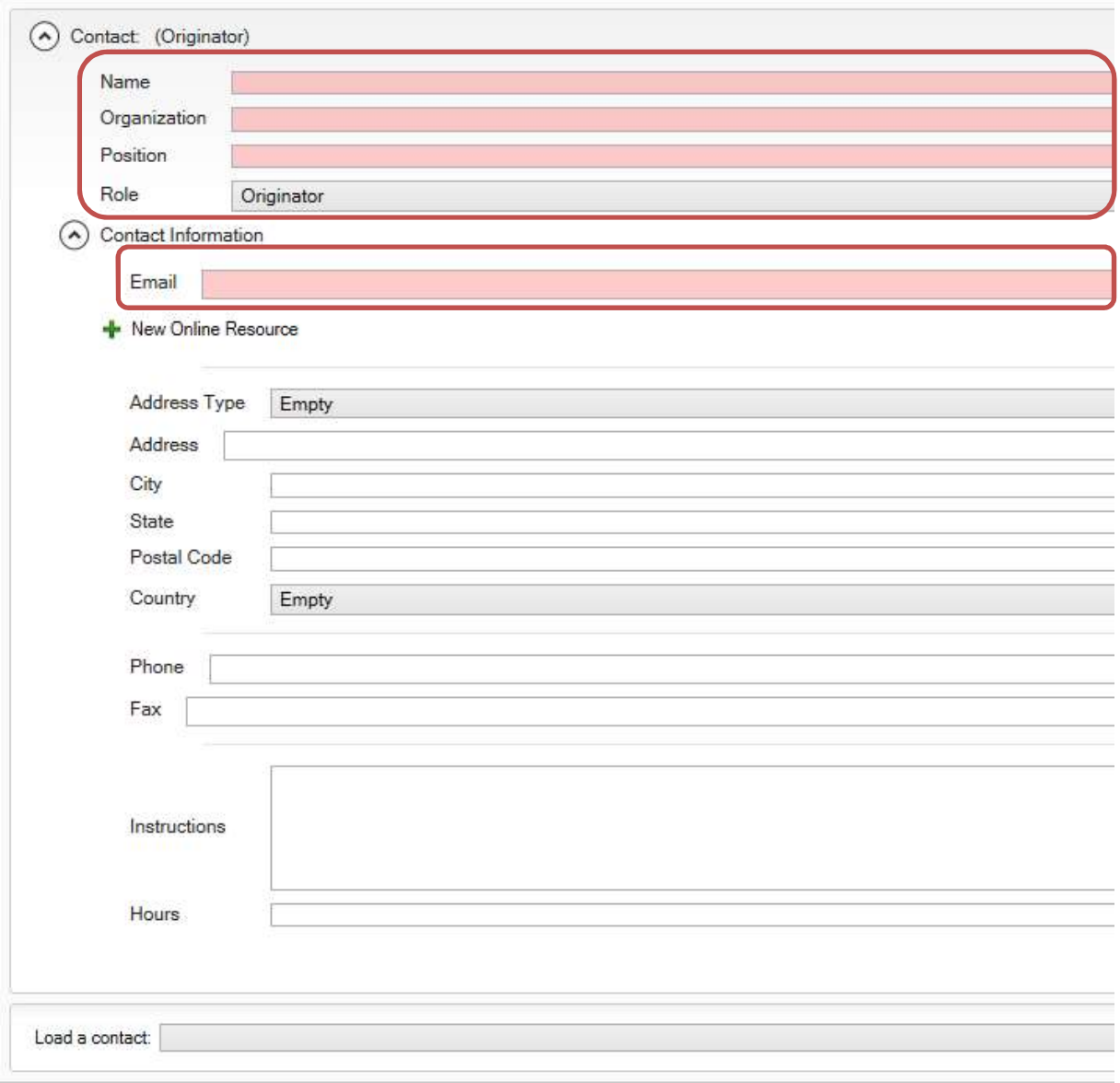
3.4.1 Points of Contact



Contact(s), can be copied from “Citation Contacts” (see below the structure heading “Overview”).

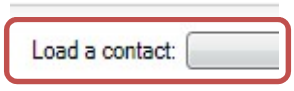
Click on “+ New Contact Information” and fill in information.





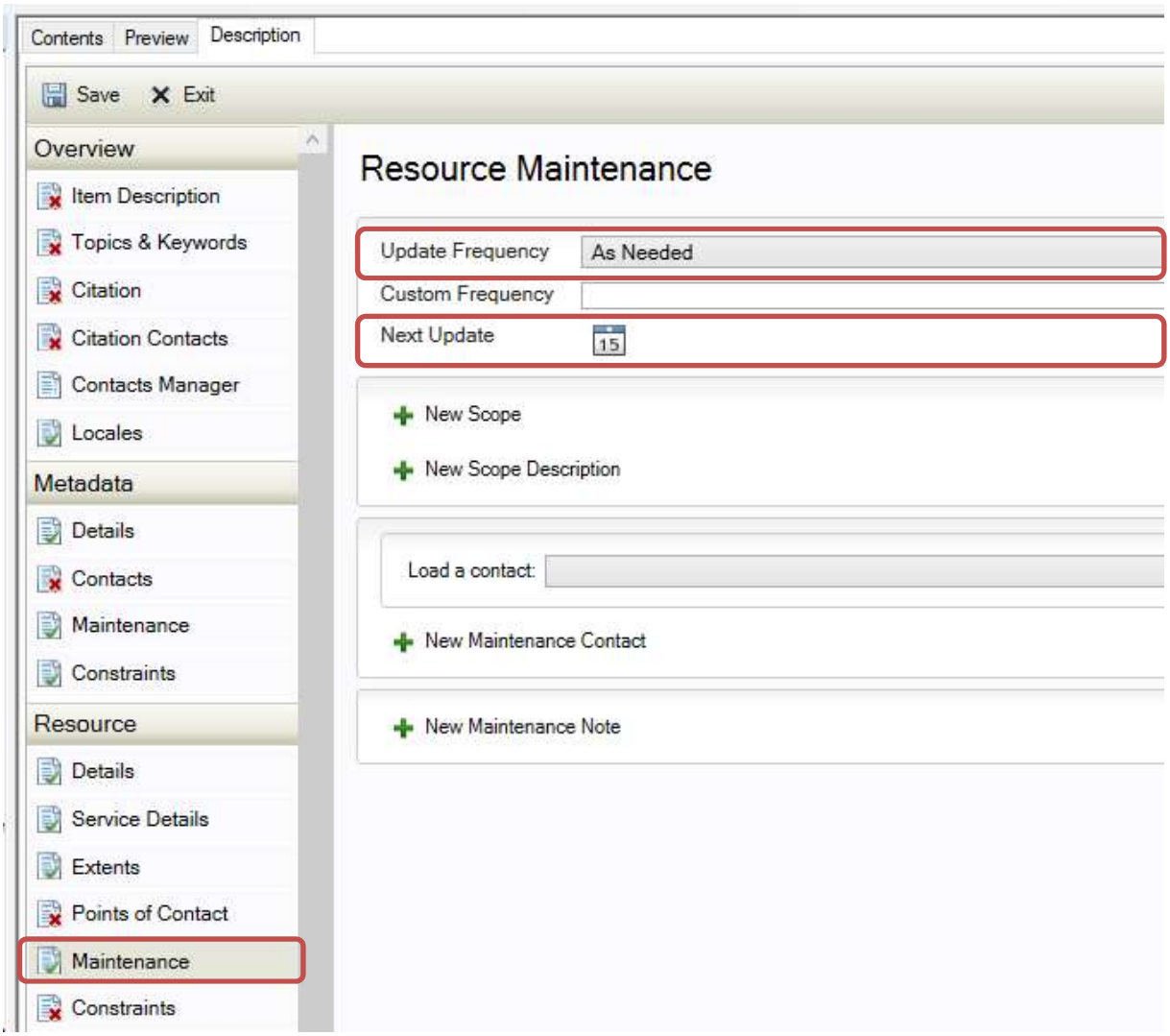
➔ Miriam von Thenen, IOW, Email

OR load a contact by clicking on “Load a contact”

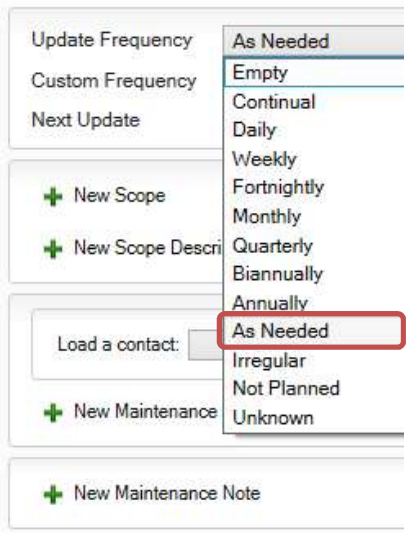


In the structure heading **“Resource”** go to **“Maintenance”** and fill in all categories indicated with red circles.

3.4.2 Maintenance



“Update frequency” (make only one selection, do not choose Empty if possible)

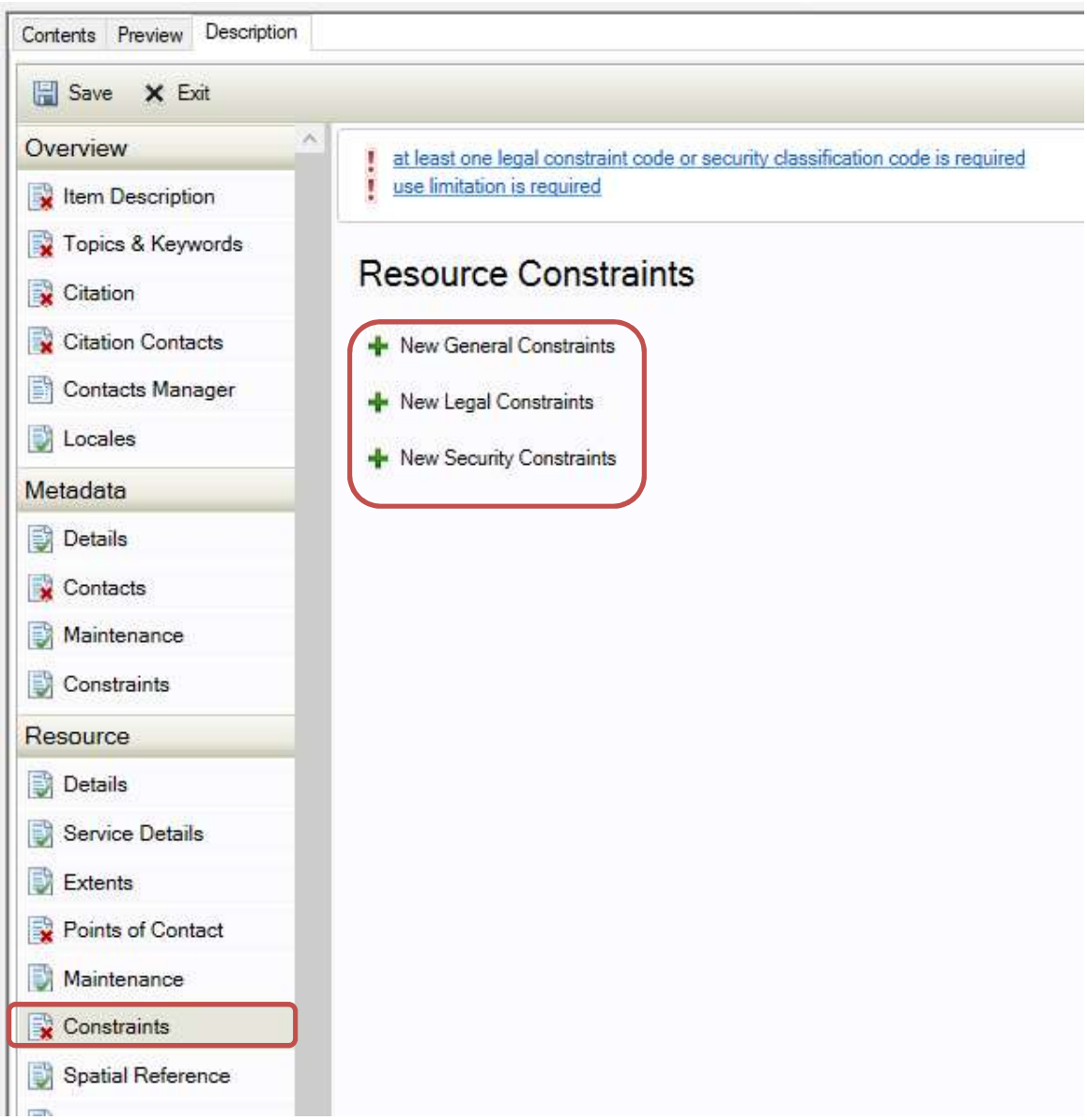


➔ As needed

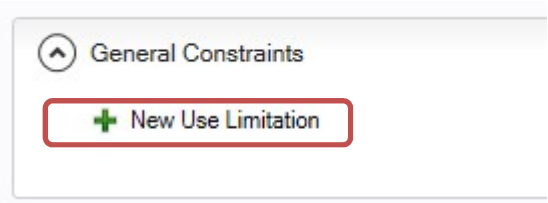
“Next update” *(if known)*

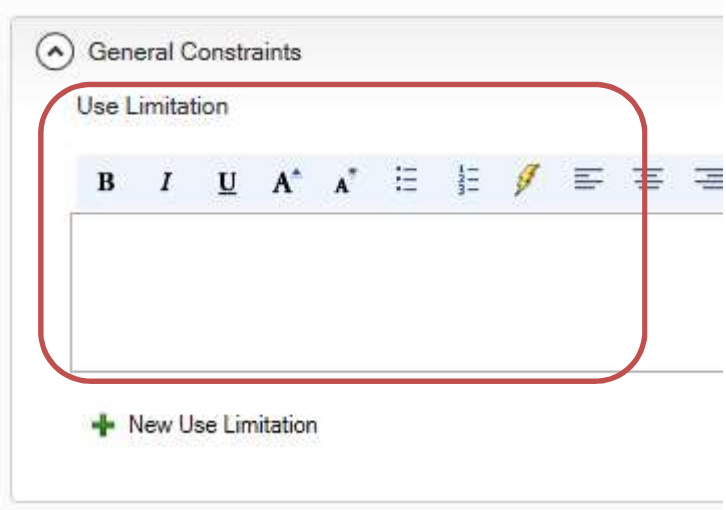
In the structure heading **“Resource”** go to **“Constraints”** and fill in all categories indicated with red circles.

3.4.3 Constraints



Click on "**+ New General Constraints**", then click on "+ New Use Limitation". Fill in information and choose one of the options from the table below.

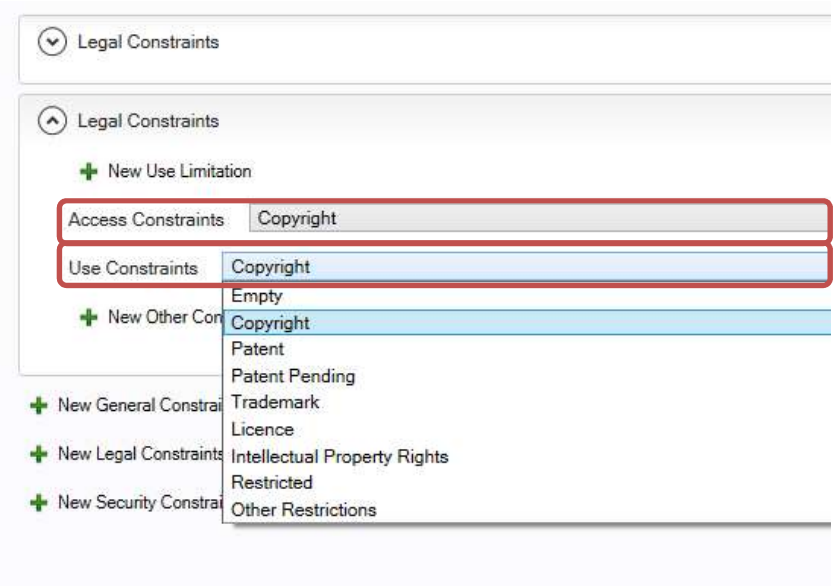




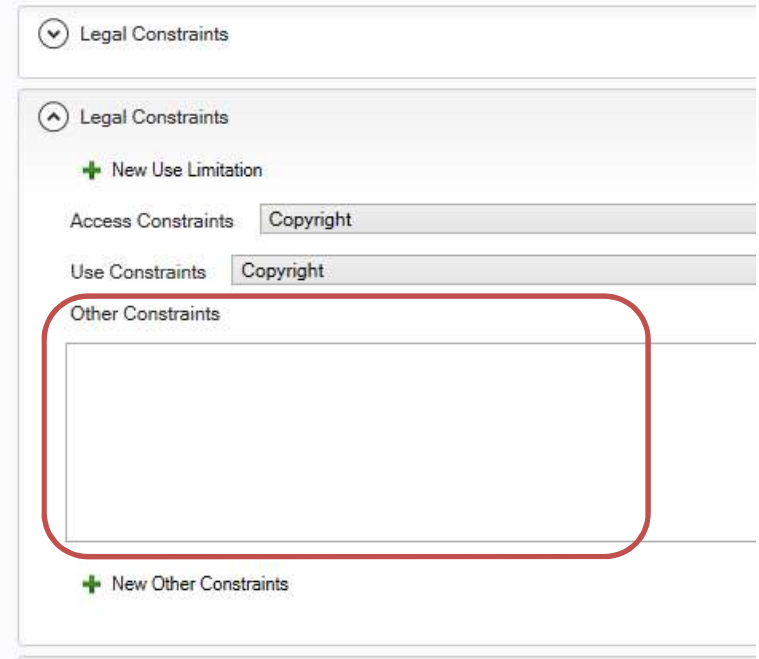
Choose one option to fill in manually:

License agreement	Description for Baltic Sea Atlas
Open	View and download file
Restricted I	View file
Restricted II	View file, download only on enquiry at author
Restricted III	View file, download only on enquiry at author, with fee
Restricted IV	View file, download only on enquiry at author, data are open after three years from the day data was submitted to the Baltic Sea Atlas

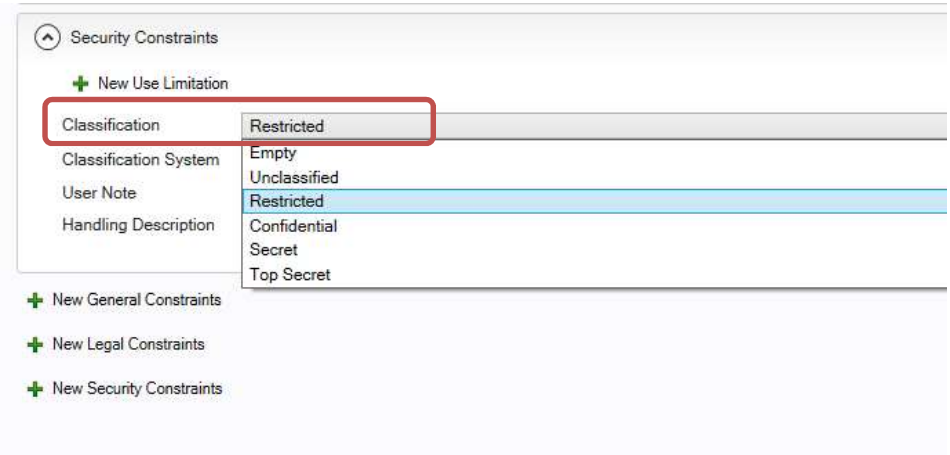
Click on "**+ New Legal Constraints**" and chose one option from the drop-down list *(choose 'copyright' unless data can be used freely).*



Click on "+ New Other Constraints". Fill in further information.

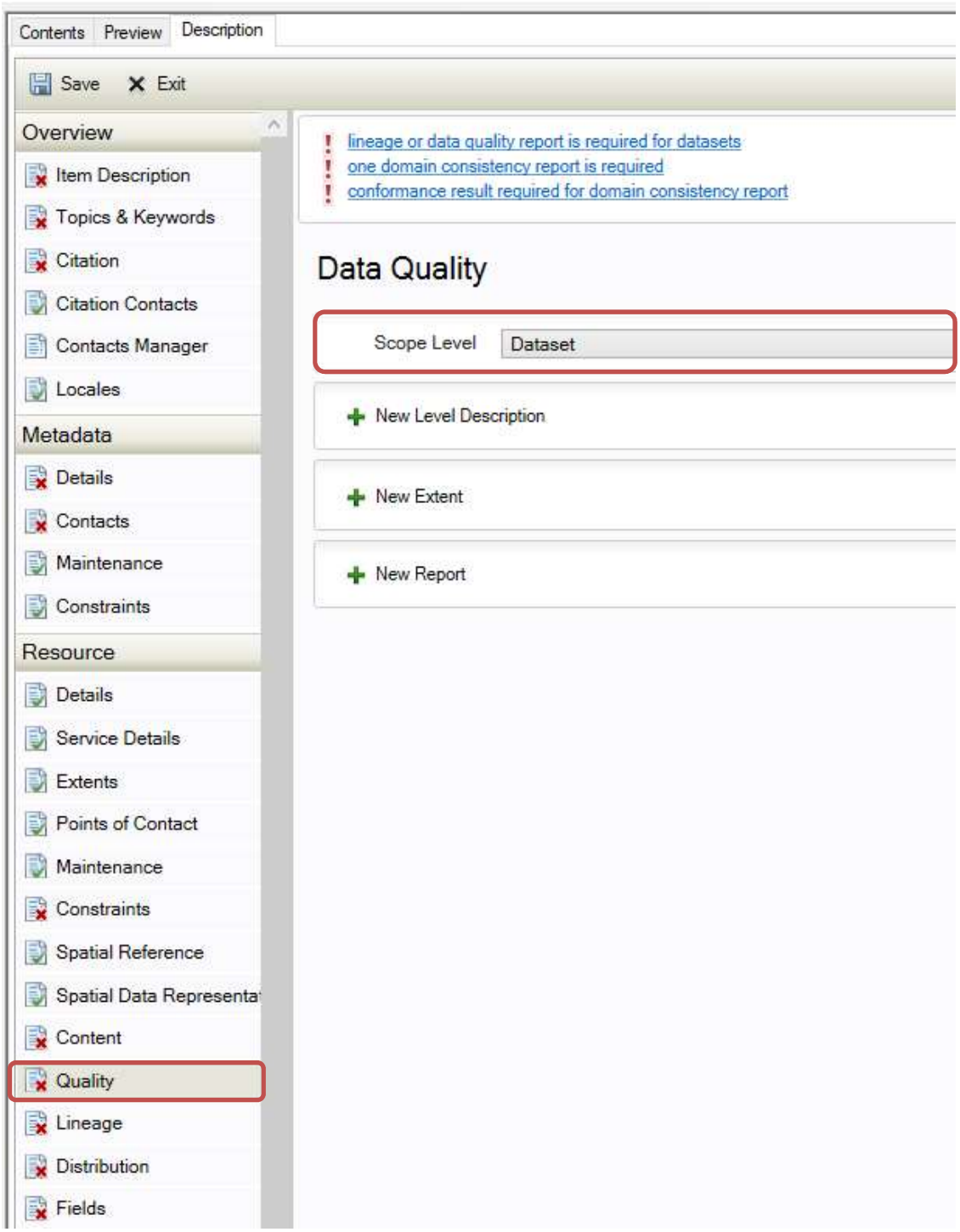


Click on "**+ New Security Constraints**" and chose one option from the drop-down list *(choose 'restricted' unless data can be used freely).*

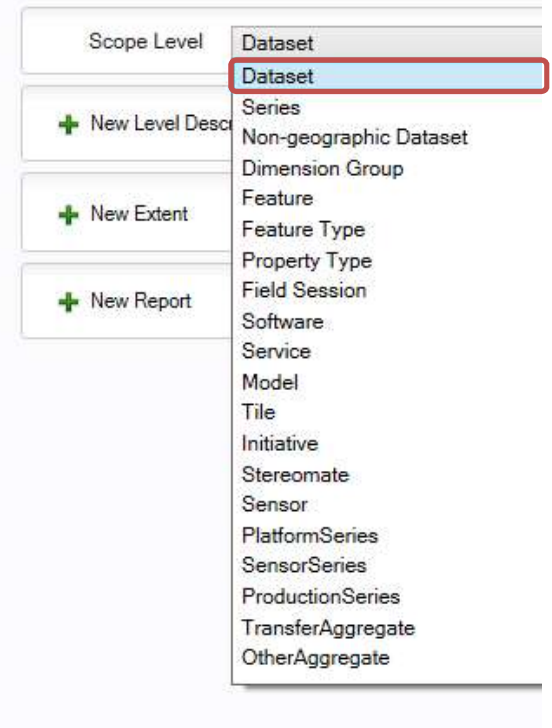


In the structure heading **"Resource"** go to **"Quality"** and fill in all categories indicated with red circles.

3.4.4 Quality


Contents
Preview
Description
Save
Exit
Overview
Item Description
Topics & Keywords
Citation
Citation Contacts
Contacts Manager
Locales
Metadata
Details
Contacts
Maintenance
Constraints
Resource
Details
Service Details
Extents
Points of Contact
Maintenance
Constraints
Spatial Reference
Spatial Data Representa
Content
Quality
Lineage
Distribution
Fields
lineage or data quality report is required for datasets
one domain consistency report is required
conformance result required for domain consistency report
Data Quality
Scope Level
Dataset
New Level Description
New Extent
New Report

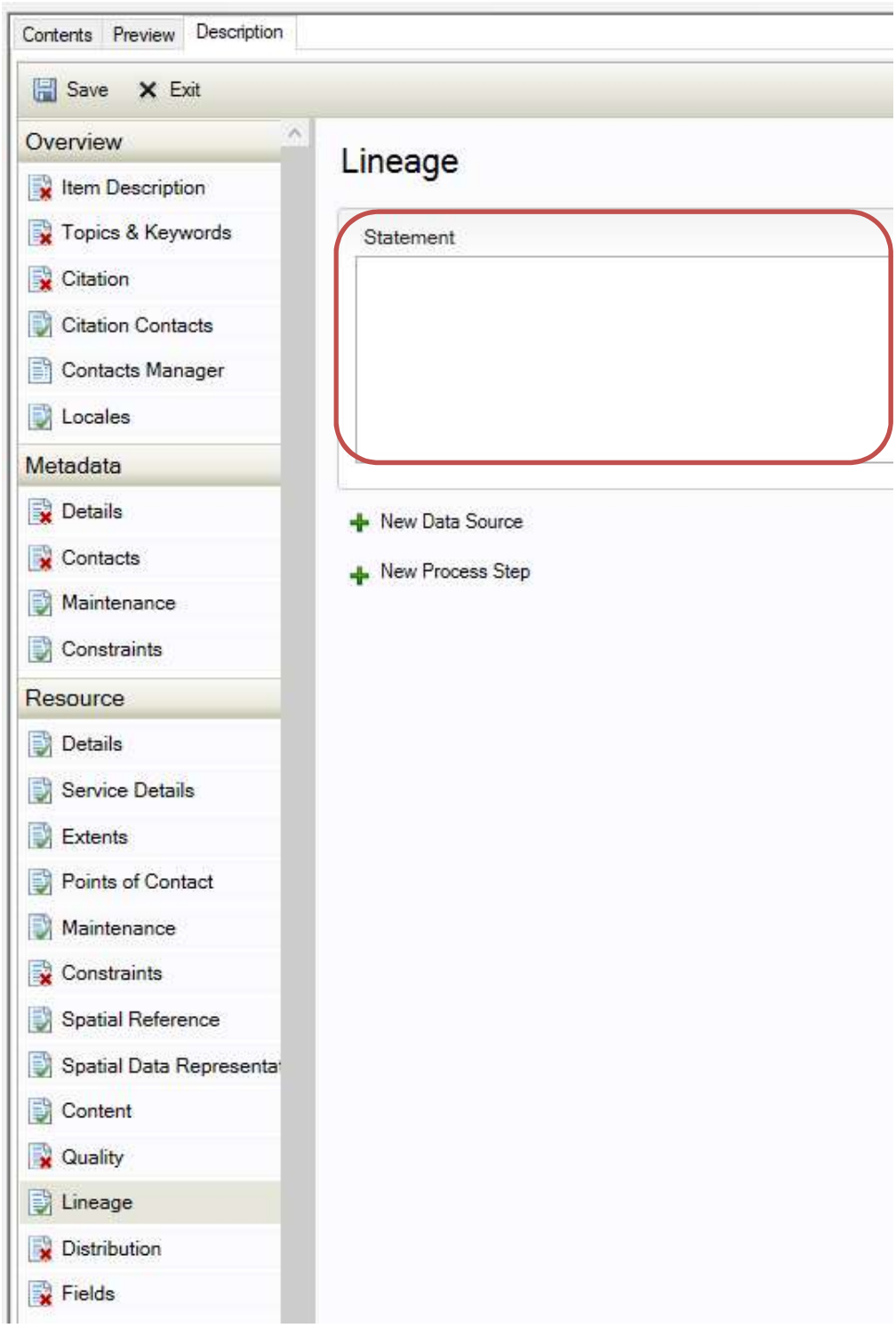
Click on the drop-down list of “**Scope Level**” and choose one option.



➔ Dataset

In the structure heading **“Resource”** go to **“Lineage”** and fill in all categories indicated with red circles.

3.4.5 Lineage

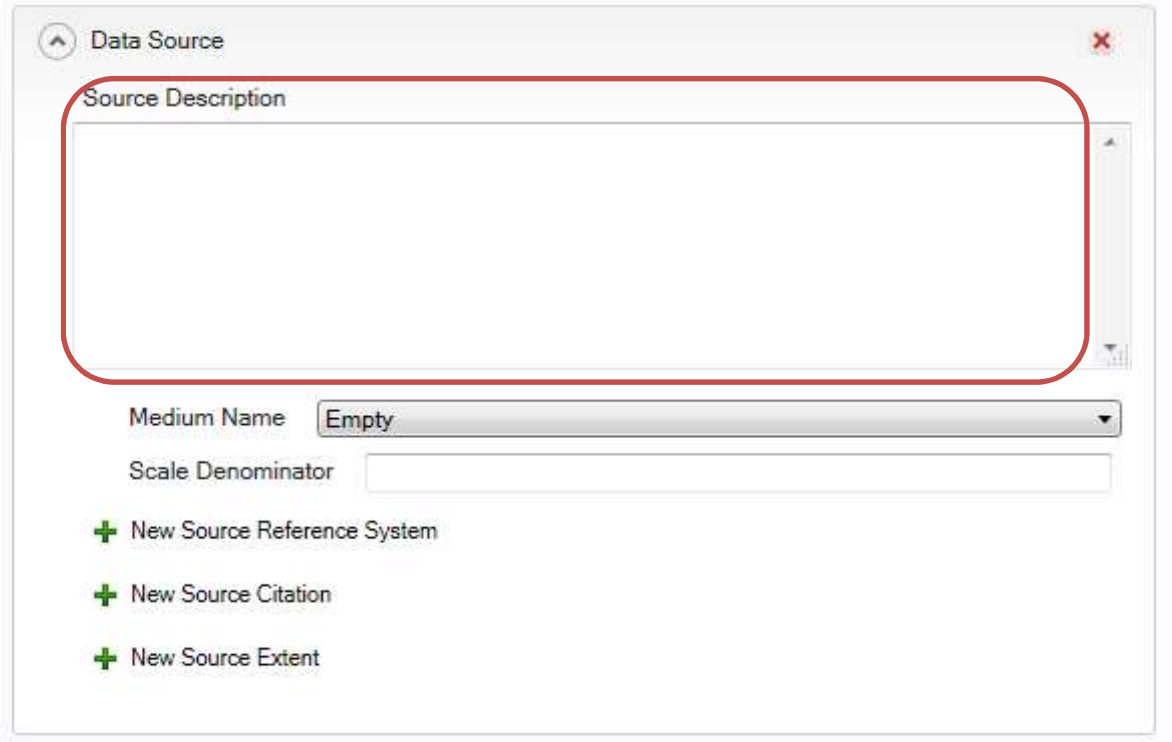


"Statement", here you can enter information about the origin of the data *(Methods, Description in detail, unit, ... You can enter process steps (What?, Who?, When?, Source?).* Shortly list the attribute fields of the dataset you can

find in the attribute table and give a short explanation what the field indicates (examples: “Time_f” = time frequency. “Spatial_h” = spatial dimension horizontal)

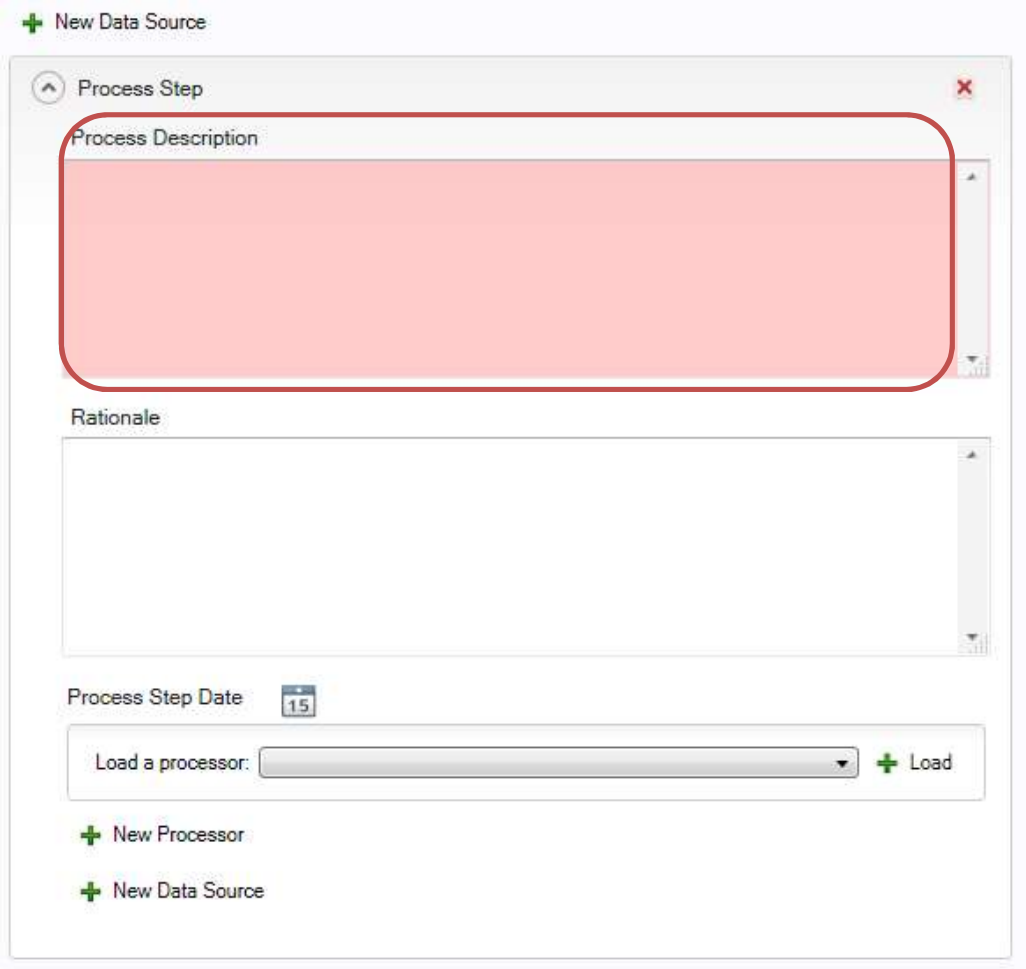
➔ The dataset was created based on digitization …

Click on **“New Data Source”** – if available. Data source can be described by text, as citation, with reference system and extent (for geodata).



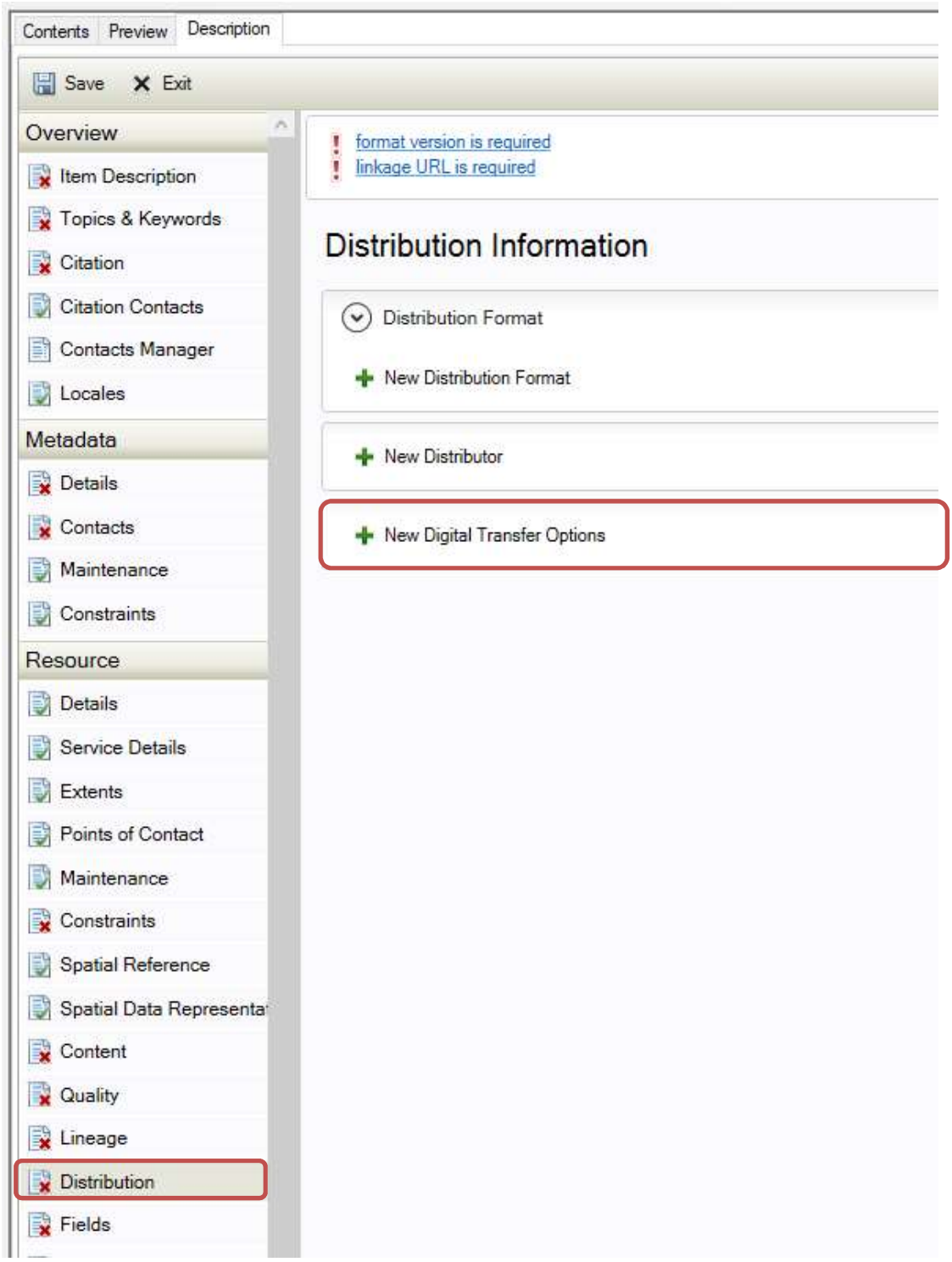
Process Step – if desired. Click on **“New Process Step”**, here work steps can be enumerated individually.

- What was done?
- When was the process step executed?
- Who executed the process step?
- Which data source belongs to the process step?

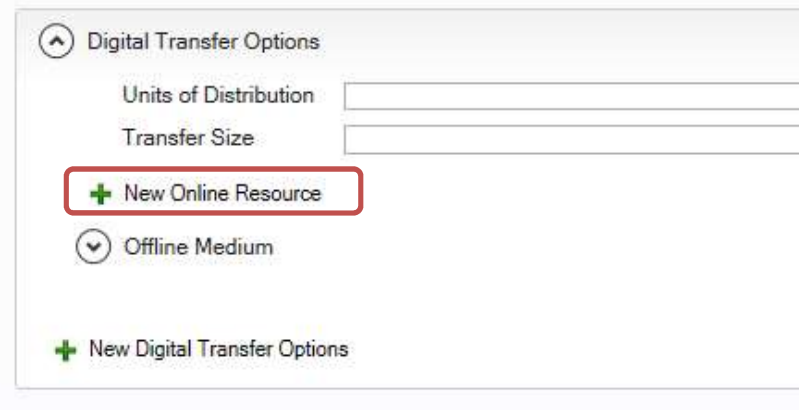


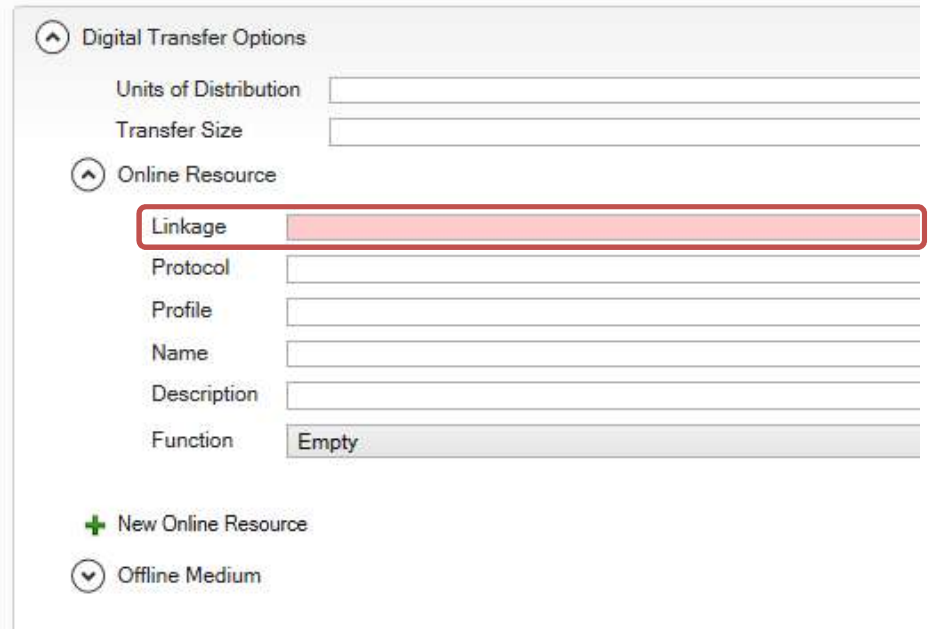
In the structure heading **"Resource"** go to **"Distribution"** and fill in all categories indicated with red circles.

3.4.6 Distribution

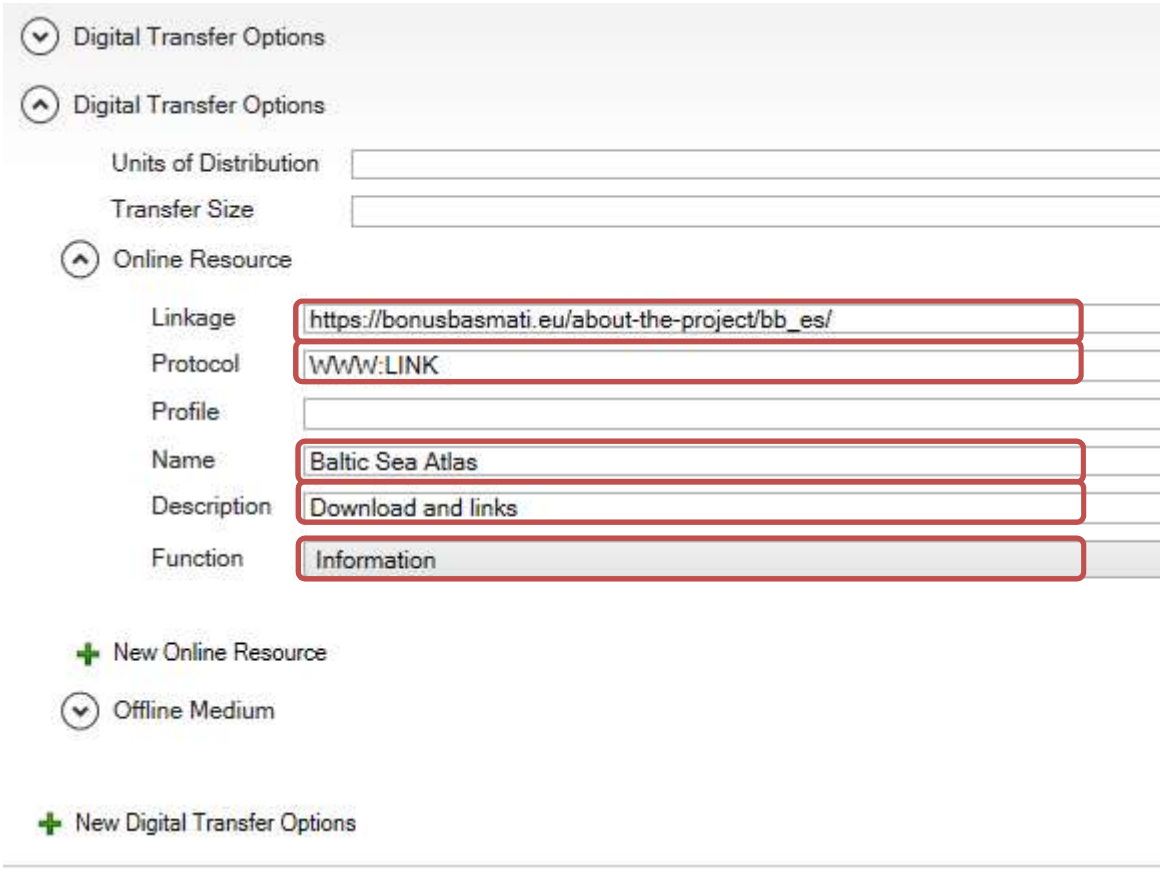


Click on “New Digital Transfer Options”, then click on “+ New Online Resource”.
Fill in “**Linkage**”


Digital Transfer Options
Units of Distribution
Transfer Size
New Online Resource
Offline Medium
New Digital Transfer Options

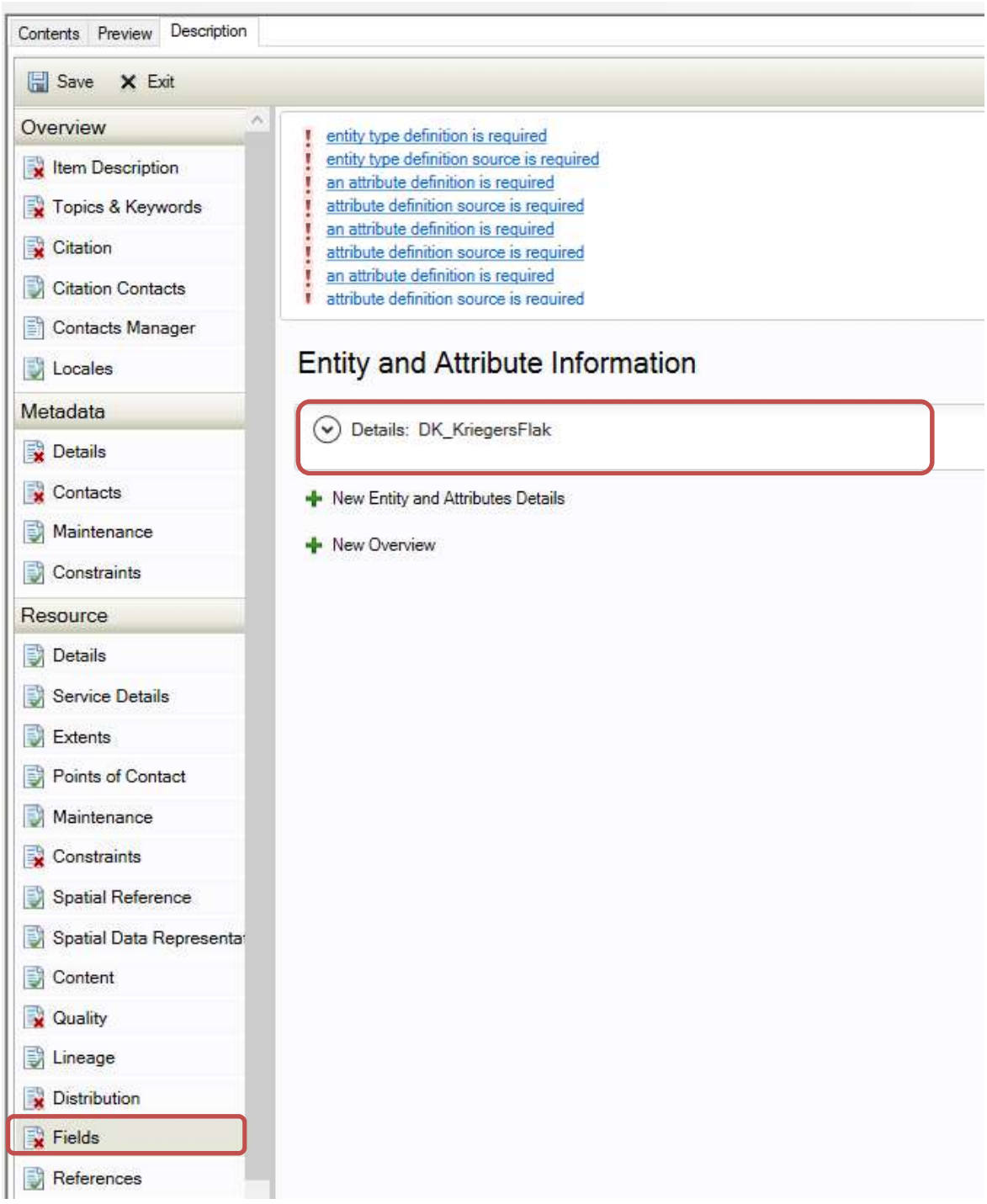

Digital Transfer Options
Units of Distribution
Transfer Size
Online Resource
Linkage
Protocol
Profile
Name
Description
Function
Empty
New Online Resource
Offline Medium

An example to fill in **“Linkage”** could be the following:



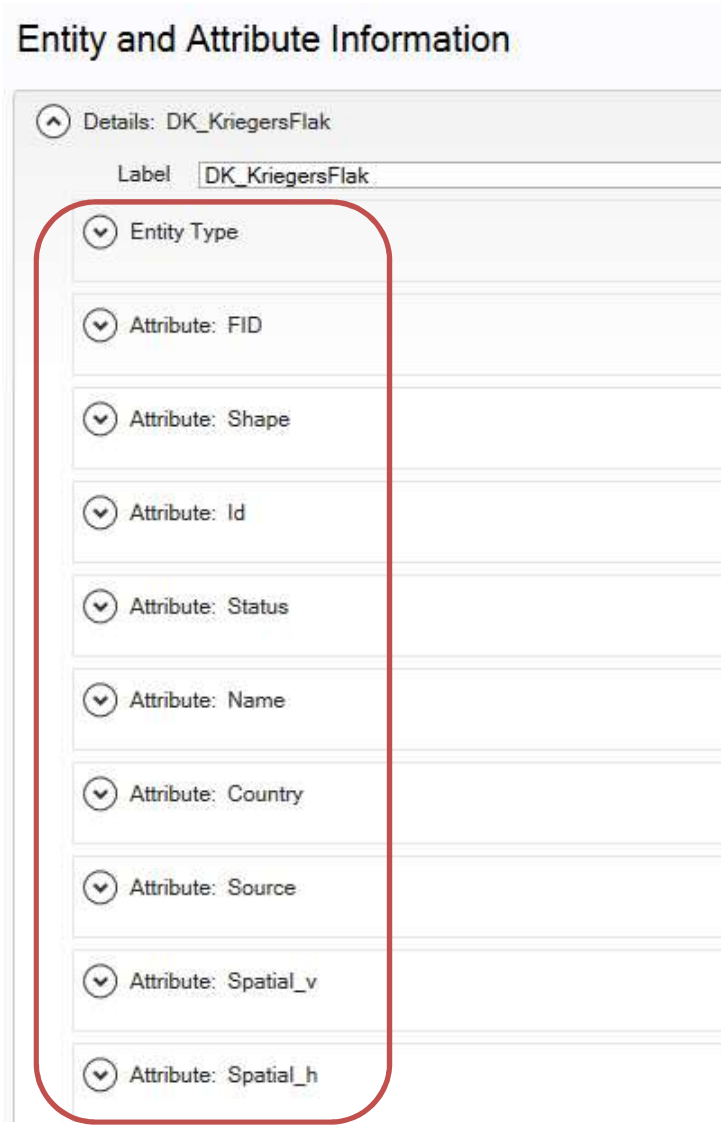
In the structure heading **“Resource”** go to **“Fields”** and fill in all categories indicated with red circles.

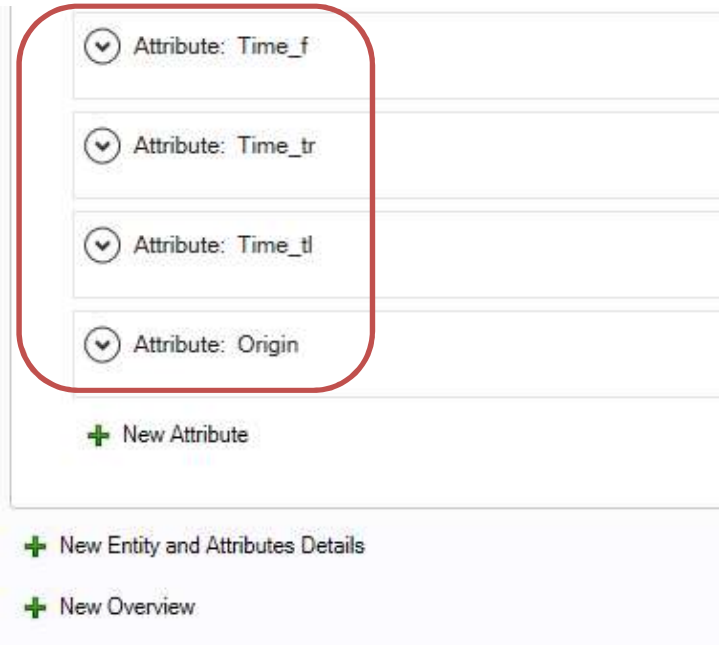
3.4.7 Fields

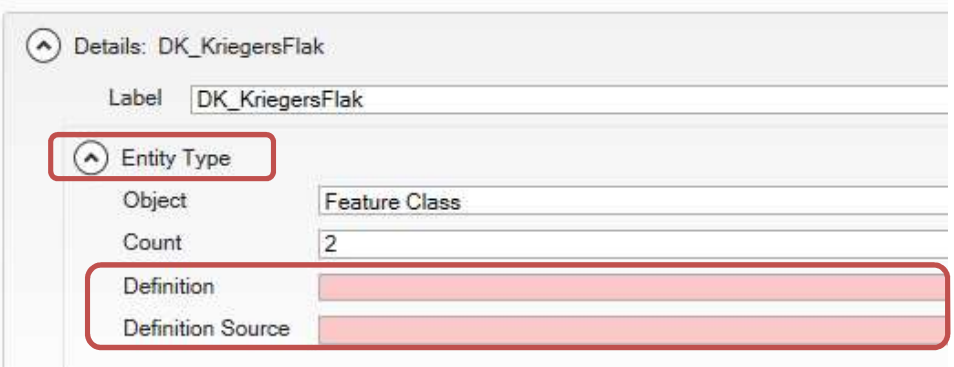


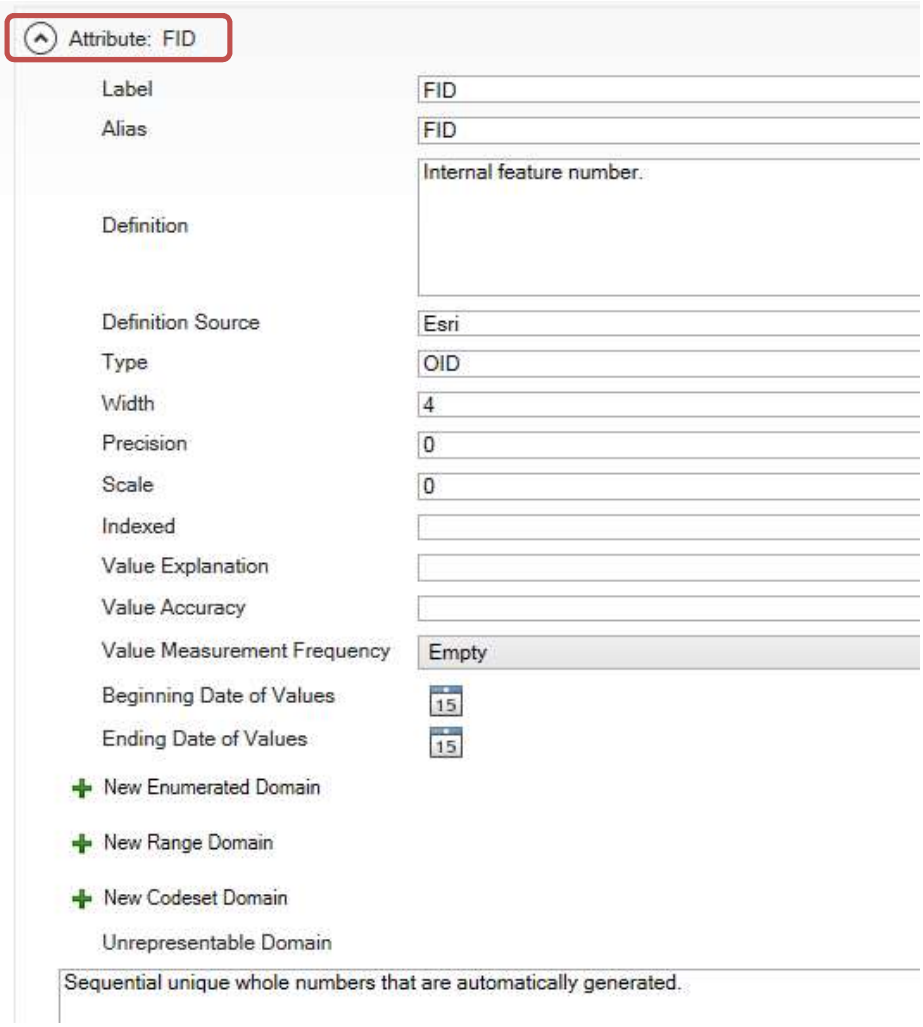
NOTE: Attribute fields – only necessary for vector data (for raster data, the units should be mentioned in the "Item Description" of the dataset and "Lineage".) Attribute name alias: *not absolutely necessary.* Definition: *short explanation of what is in the column, such as units of measure, abbreviations etc.*

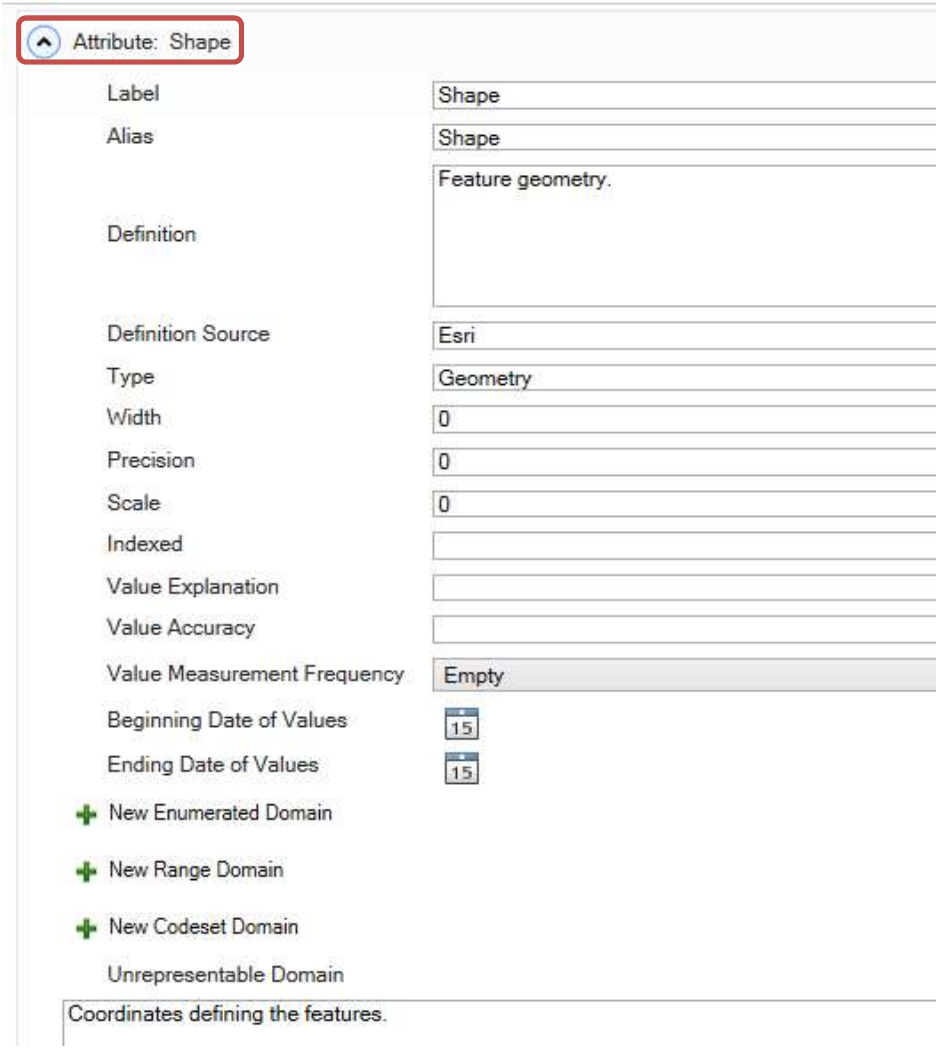
Click on “Details: DK_KriegersFlak” and you will see the different types of information you can edit. Click on each drop-down button and edit as much information as you have about the dataset.

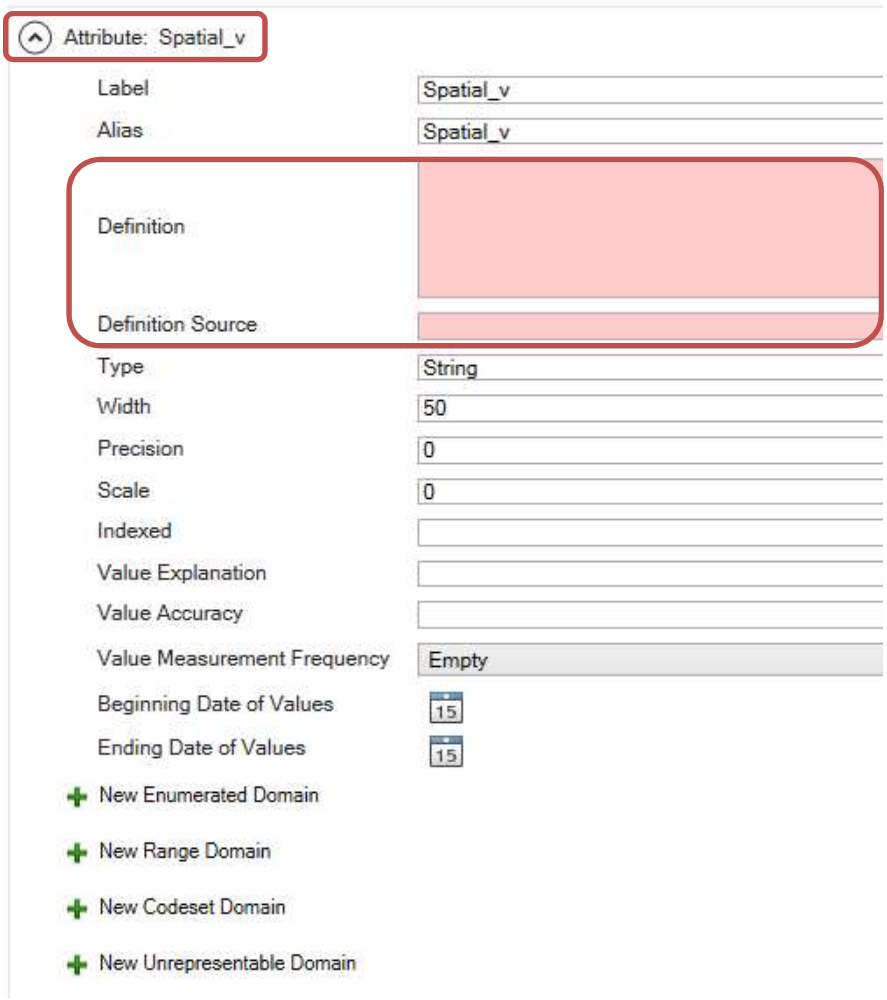



Attribute: Time_f
Attribute: Time_tr
Attribute: Time_tl
Attribute: Origin
New Attribute
New Entity and Attributes Details
New Overview

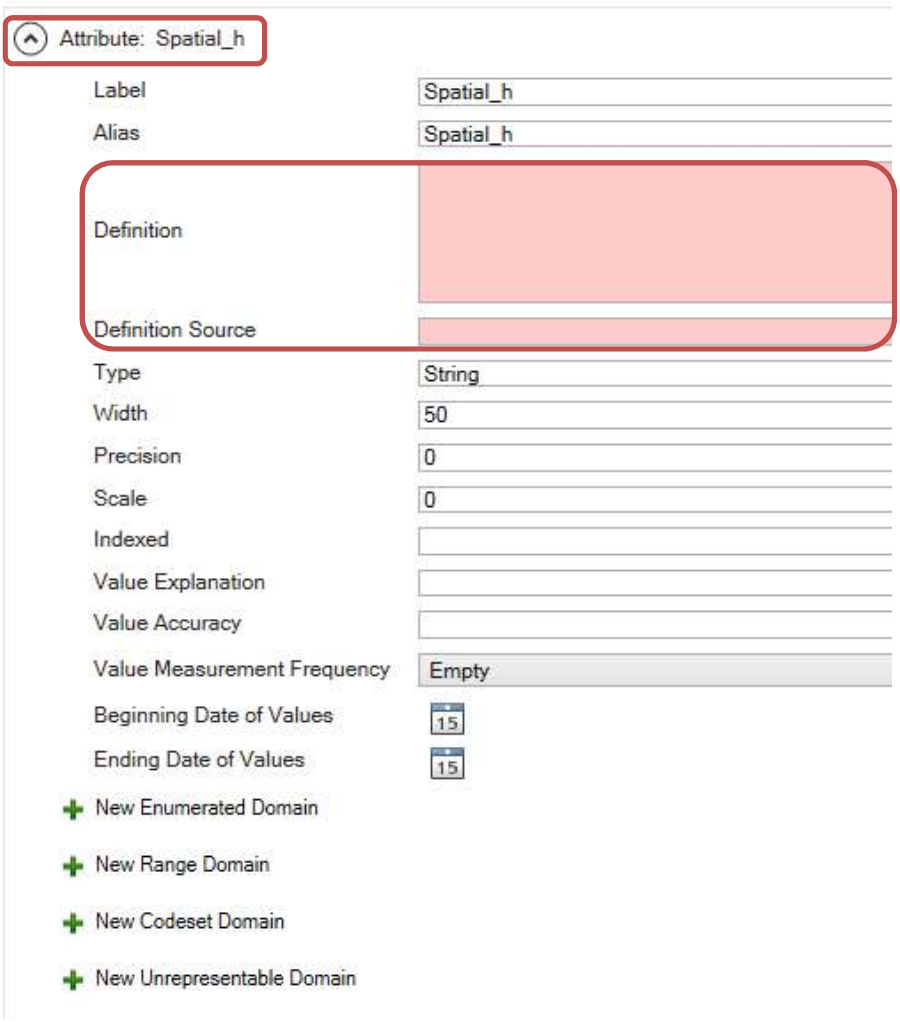

Details: DK_KriegersFlak
Label
DK_KriegersFlak
Entity Type
Object
Feature Class
Count
2
Definition
Definition Source


Attribute: FID
Label
FID
Alias
FID
Definition
Internal feature number.
Definition Source
Esri
Type
OID
Width
4
Precision
0
Scale
0
Indexed
Value Explanation
Value Accuracy
Value Measurement Frequency
Empty
Beginning Date of Values
Ending Date of Values
New Enumerated Domain
New Range Domain
New Codeset Domain
Unrepresentable Domain
Sequential unique whole numbers that are automatically generated.

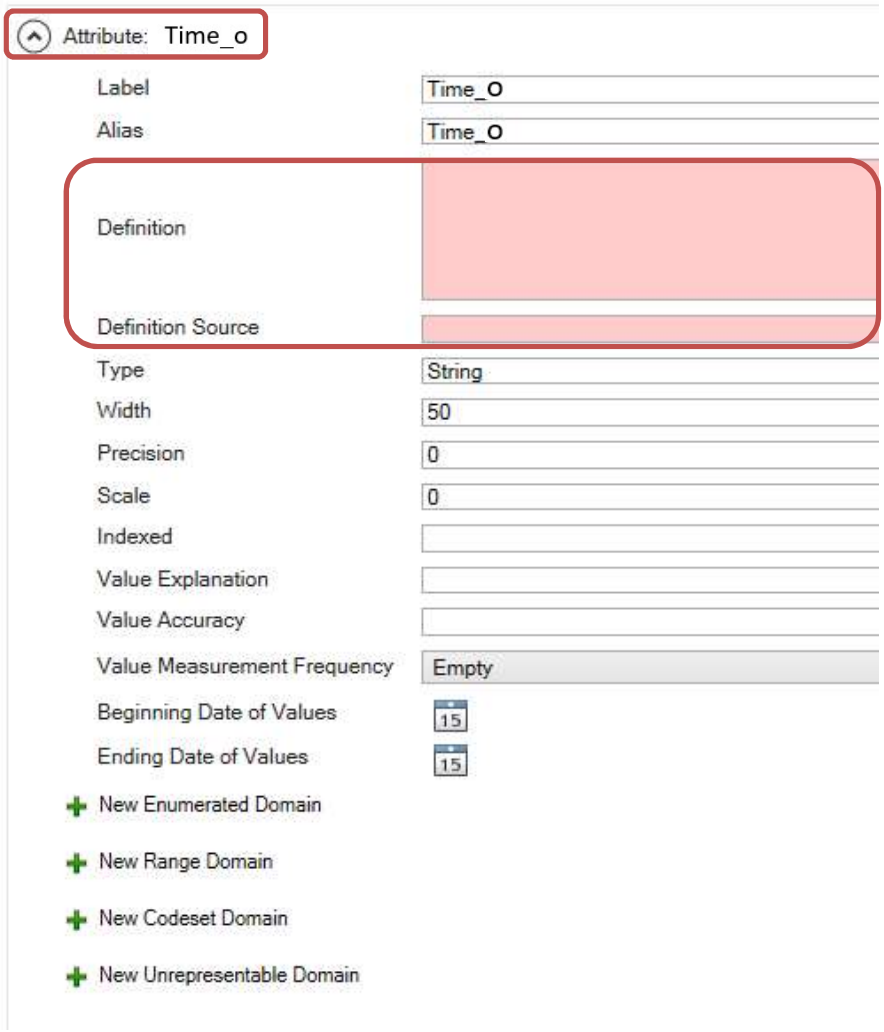

Attribute: Shape
Label
Shape
Alias
Shape
Definition
Feature geometry.
Definition Source
Esri
Type
Geometry
Width
0
Precision
0
Scale
0
Indexed
Value Explanation
Value Accuracy
Value Measurement Frequency
Empty
Beginning Date of Values
Ending Date of Values
New Enumerated Domain
New Range Domain
New Codeset Domain
Unrepresentable Domain
Coordinates defining the features.



➔ spatial dimension vertical; list all categories (incl. definitions if available)

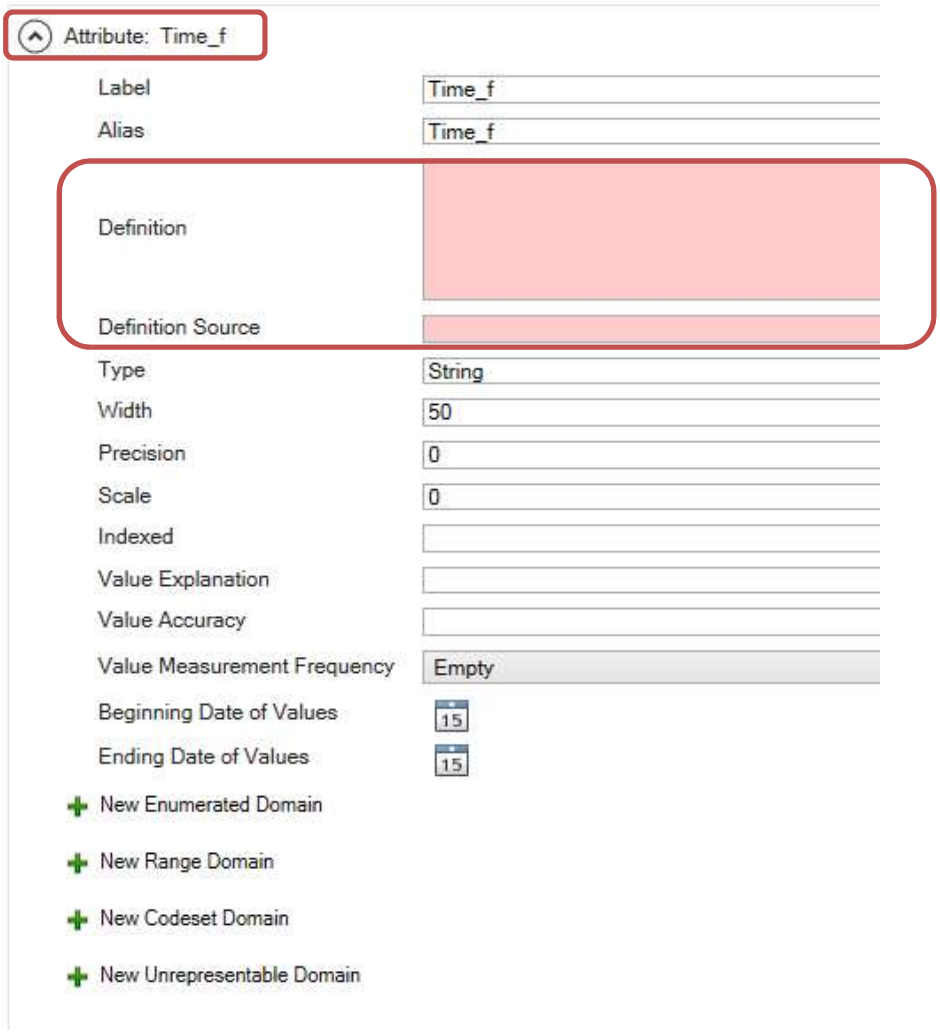


➔ spatial dimension horizontal; list all categories (incl. definitions if available)

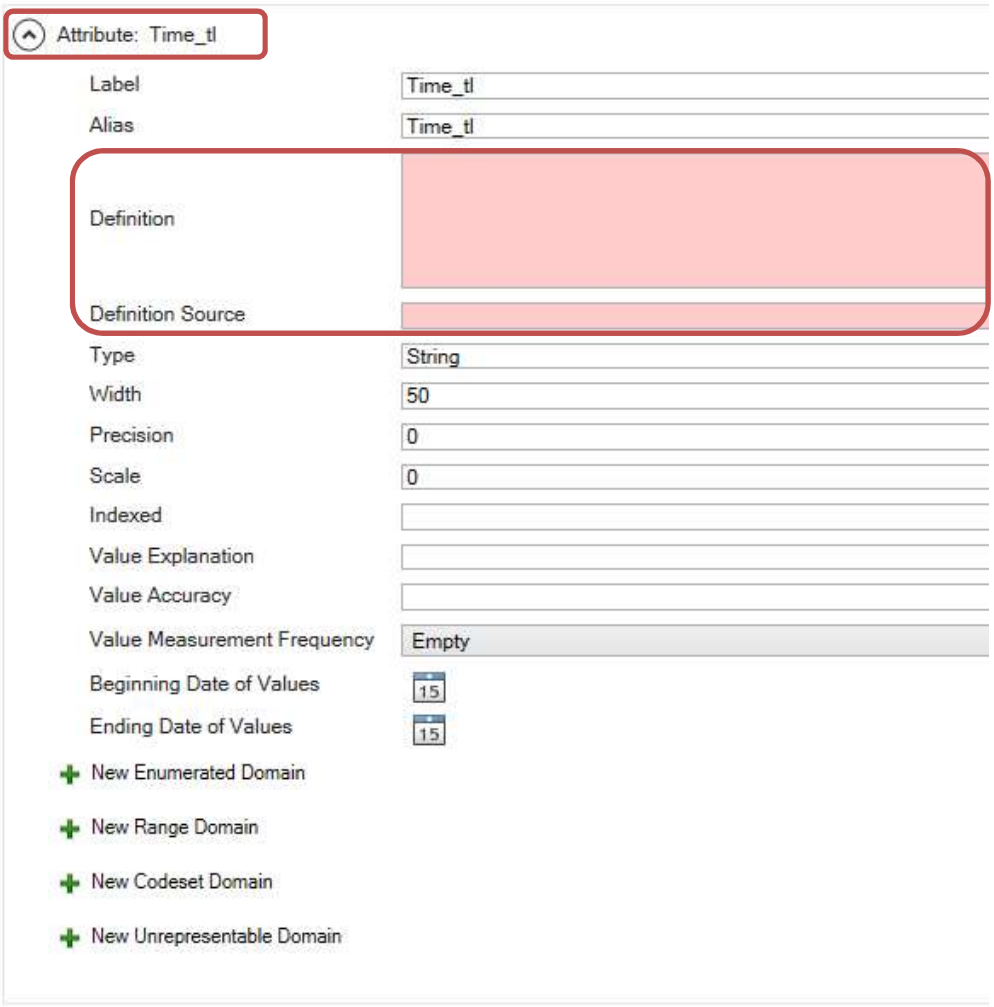


➔ time occurrence; list all categories (incl. definitions if available)

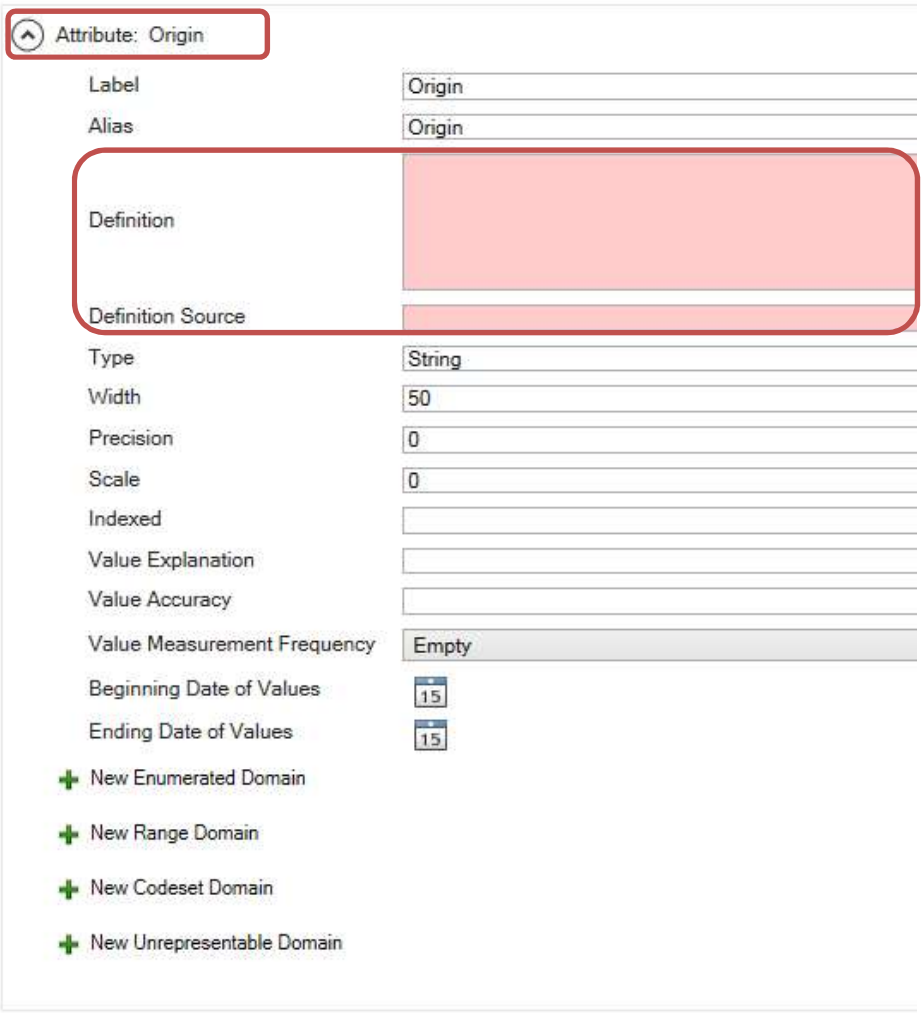
heat production



➔ time: temporal frequency; list all categories (incl. definitions if available)



➔ time: time line; list all categories (incl. definitions if available)



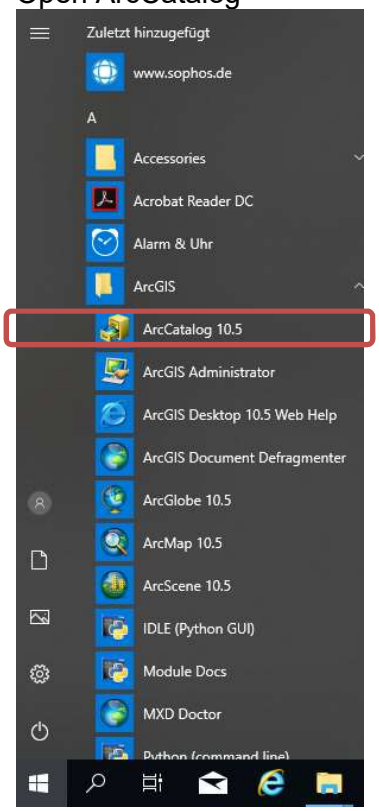
➔ origin: origin of data; list all categories (incl. definitions if available)

Save and Exit

4 Option 2: I have a similar dataset of which I want to import the metadata information to the new dataset

4.1 Procedure

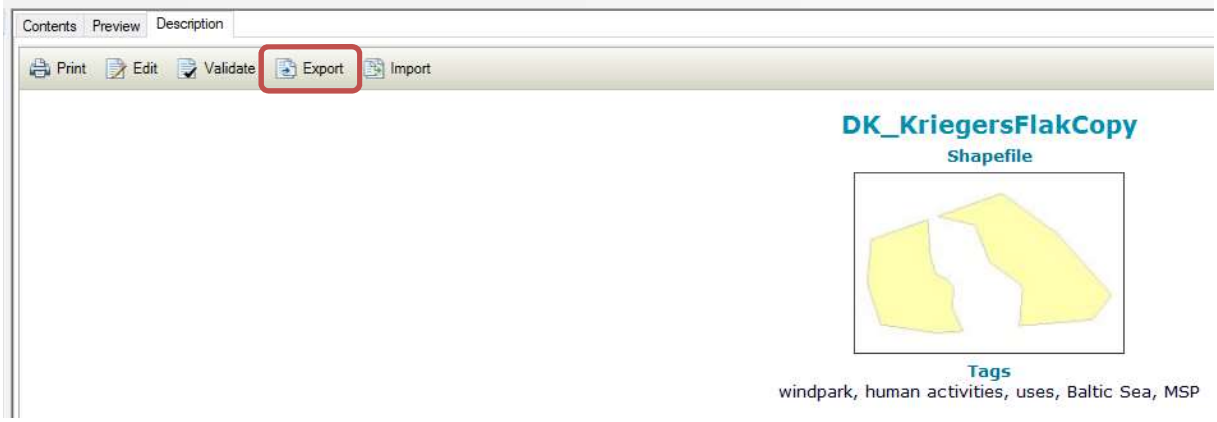
Open ArcCatalog



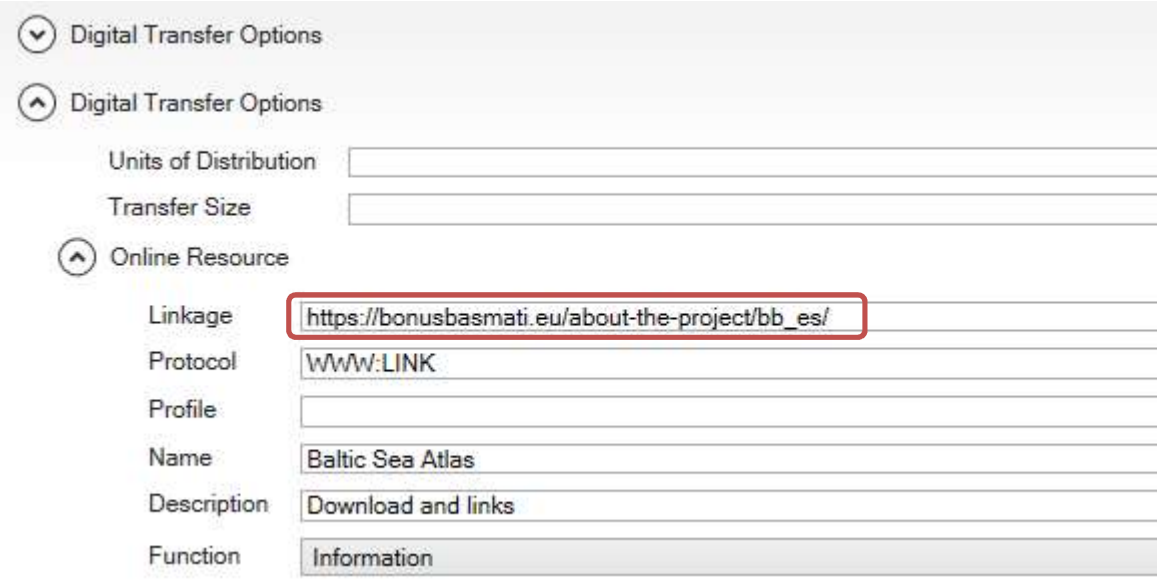
Search in your ArcCatalog Tree for the folder with the shapefile of which you want to use the metadata information and choose the respective shapefile.

Go to “Description”.

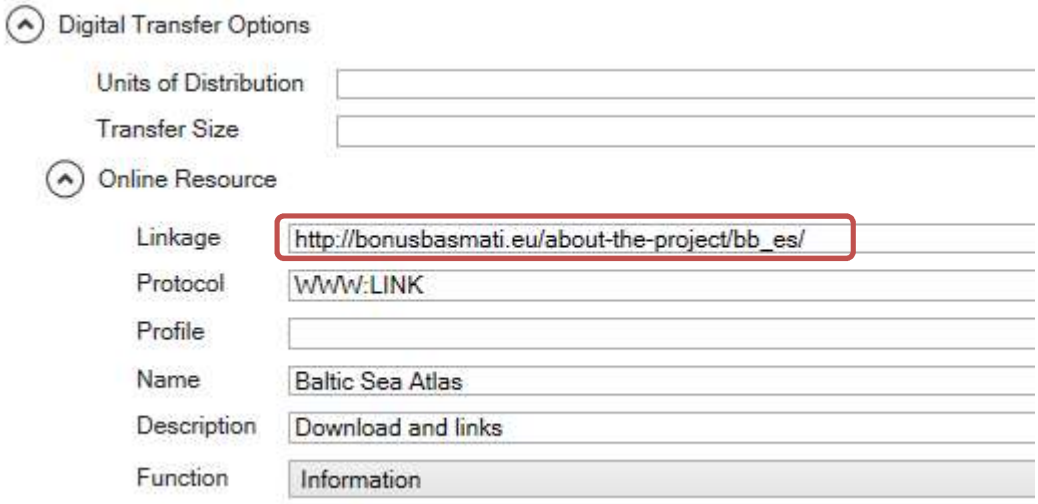
Go to “Export”. ***Attention**! Read the following before you continue with the export.



*Attention:
If you have an entry for an online resource (in the structure heading **“Resource”** go to **“Distribution”** and check for an entry) which is a weblink such as “https://bonusbasmati.eu/about-the-project/bb_es/” the link will not be saved properly in your .xml file. To avoid this, simply remove the “s” from “https” and then continue to export.

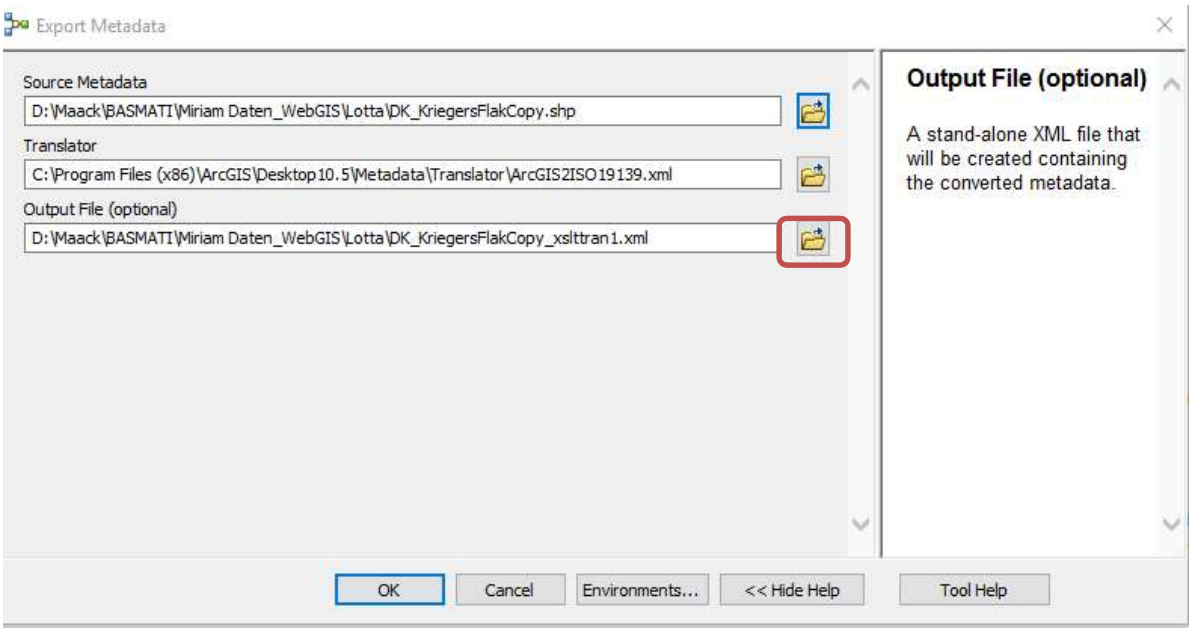


Change “https” into “http”.

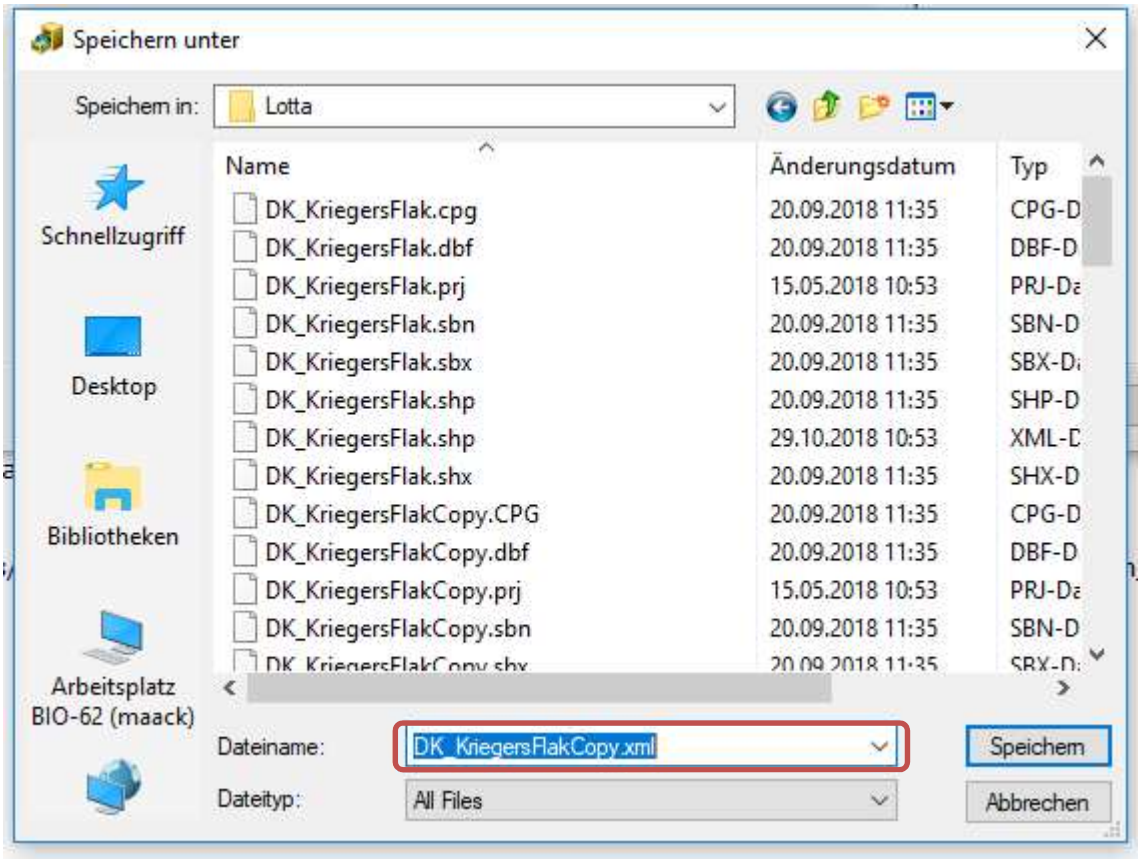


Now you can continue with the export. Go to “Export”.

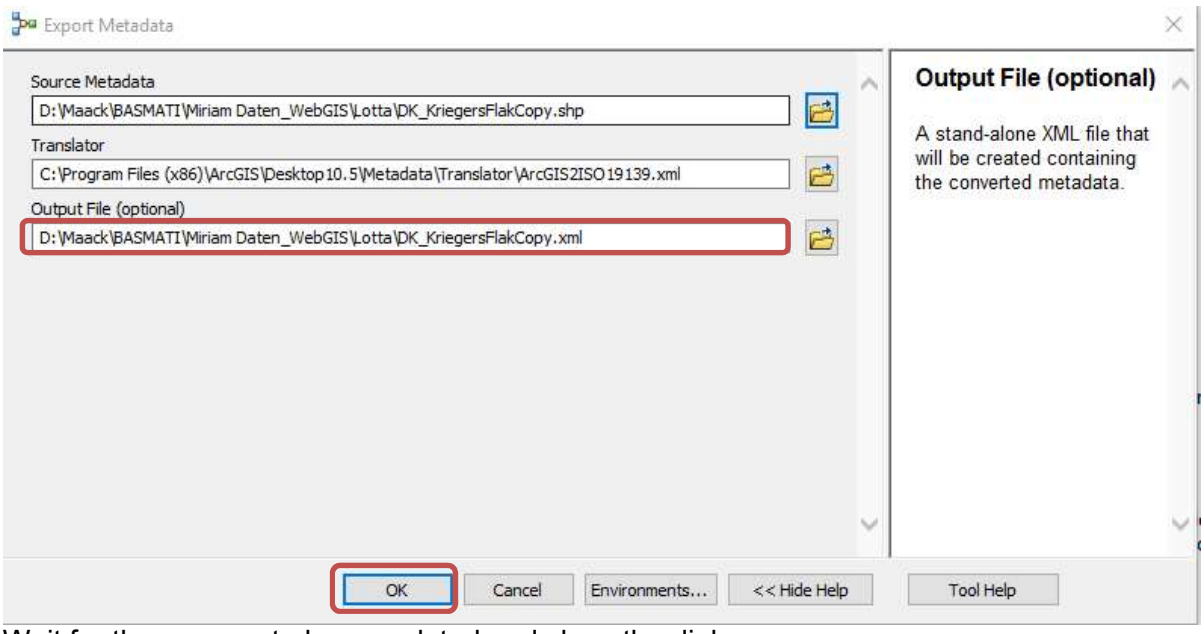
Choose the location of your output file by clicking on the folder icon.



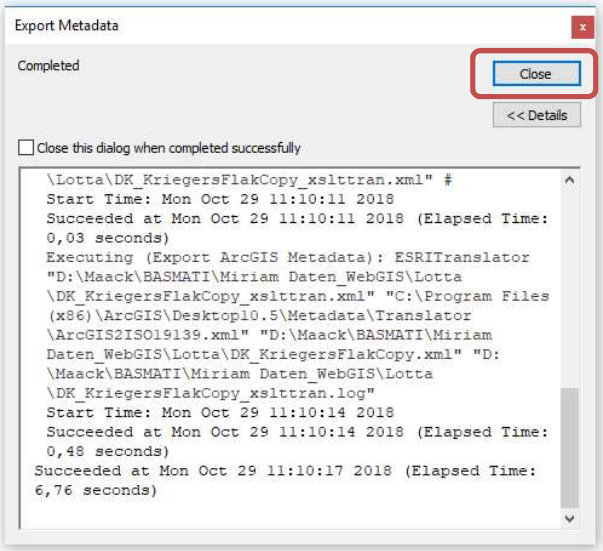
Save the file with as .xml file.



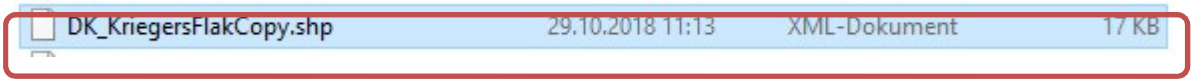
Check your entry and click “OK”.



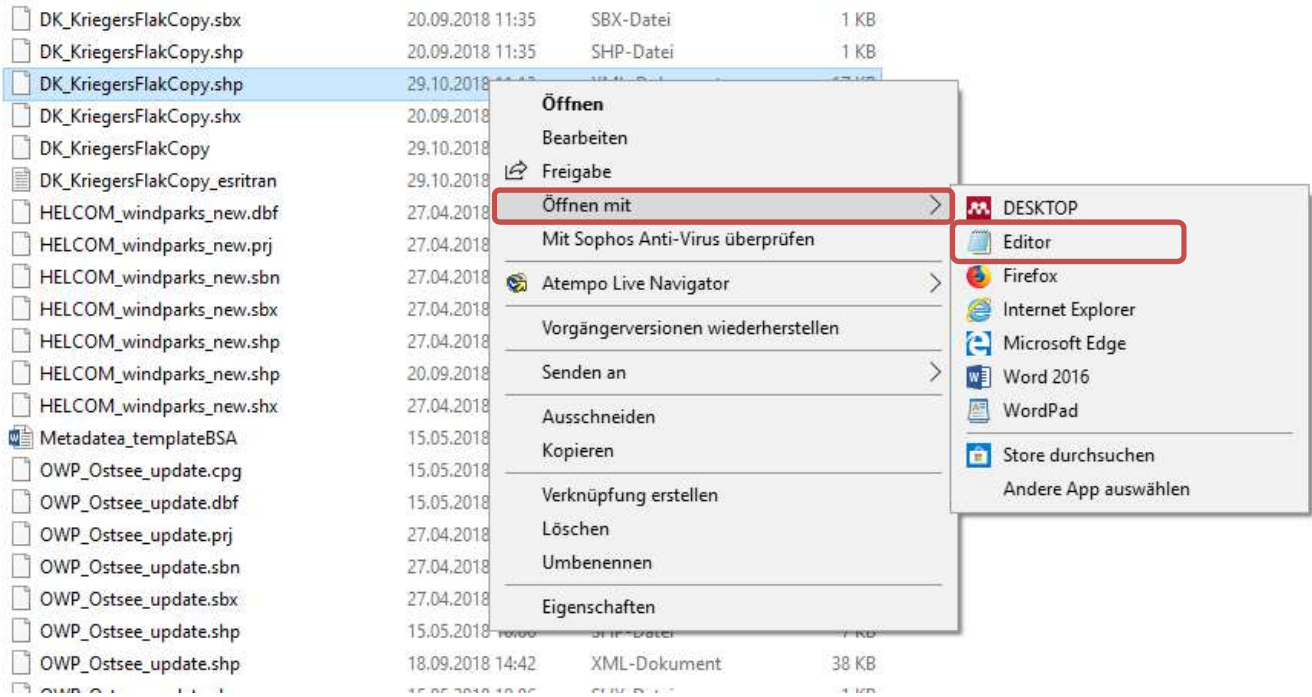
Wait for the process to be completed and close the dialog.



Search for the location you have saved the .xml file.



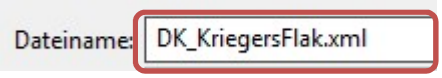
Open the file: Right click on the file and open with “Editor”.



The file will look similar to the following:

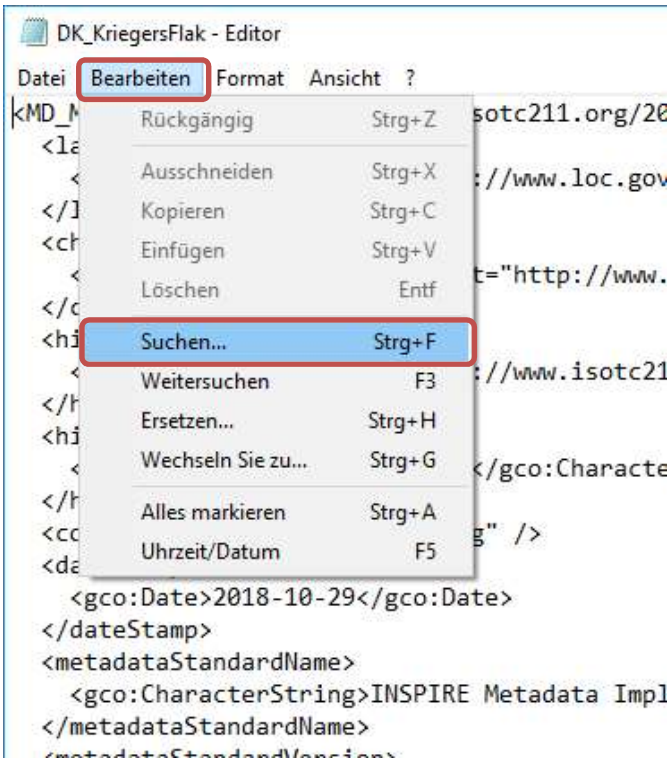
Click on the top left icon (“File/Option”). Click on “Save as” and search for the location you want to save the file.

Save the file under the name of the new shapefile. Attention: Write .xml behind the name.

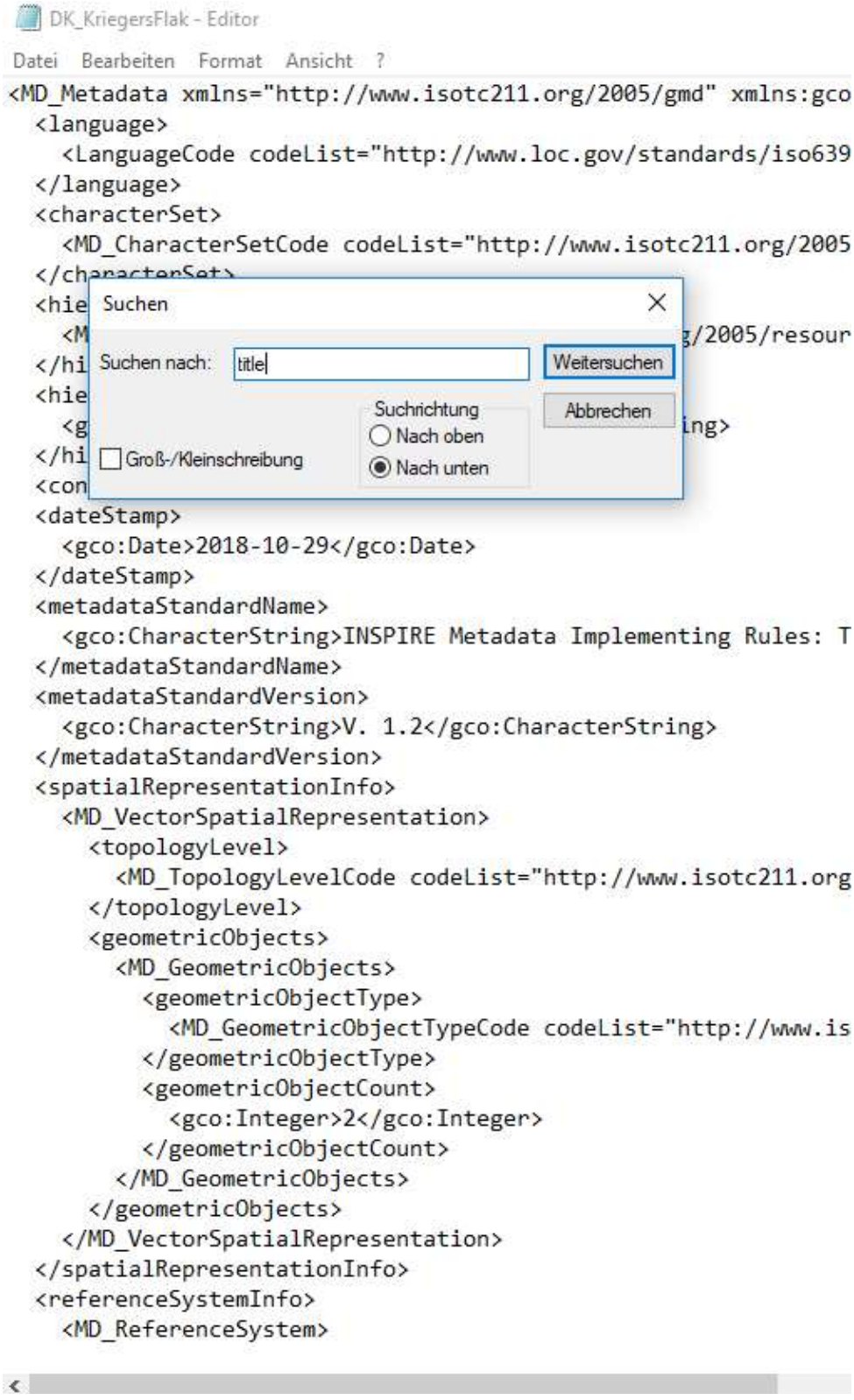


Now you can make small changes in the file directly. There is no need to import the .xml file again in the ArcCatalog. The most important file for metadata information is the .xml file as this will be used in IOWMeta.

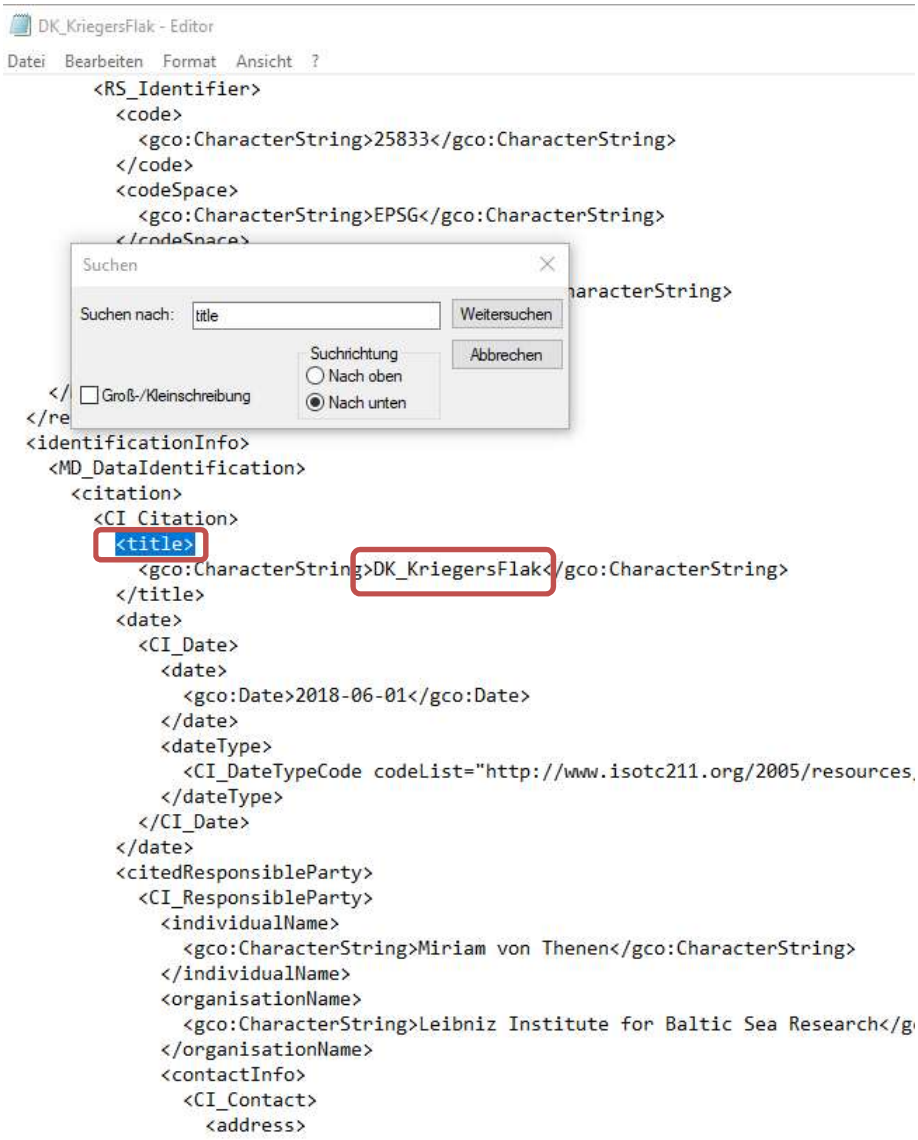
Go to “Edit” and click on “Search”.



You can now search for metadata information you want to change from the old file for the new one. Such information includes for example the title and keywords. Also if you have a weblink which you have previously changed from “https” into “http” you can now add the missing “s” again. Example: in the search field search for “title”.



You can now change the title. The previous title is written in between the brackets greater than and smaller than. >DK_KriegersFlak<
Make changes only within these brackets.



After you have completed the changes, you can save the file and make sure you send it together with the files of your dataset to the IOW so it can be included in the Baltic Sea Atlas.

BASMATI

Baltic Sea Maritime Spatial Planning for Sustainable Ecosystem Services

Attachment B:

Checklist data delivery to IOW

Internal document

BONUS

Science for a better future of the Baltic Sea region

<table>
<tr><th>Task</th><th>Description</th><th>Comments</th><th>Task check</th></tr>
<tr><td>1</td><td>I have filled out the required metadata information in the ArcCatalog as described in the template.</td><td></td><td></td></tr>
<tr><td>2</td><td>I have provided information about the use and license of the dataset. Choose from the options below.

<table><tr><th>check</th><th>License agreement</th><th>Description for Baltic Sea Atlas</th></tr><tr><td></td><td>Open</td><td>View and download file</td></tr><tr><td></td><td>Restricted I</td><td>View file</td></tr><tr><td></td><td>Restricted II</td><td>View file, download only on enquiry at author</td></tr><tr><td></td><td>Restricted III</td><td>View file, download only on enquiry at author, with fee</td></tr><tr><td></td><td>Restricted IV</td><td>View file, download only on enquiry at author, data are open after three years from the day data was submitted to the Baltic Sea Atlas</td></tr></table></td><td></td><td></td></tr>
<tr><td>3</td><td>I have provided information of where I want my dataset to be displayed in the existing database structure of the Baltic Sea Atlas. Choose from the structure heading below.

<table><tr><th>check</th><th>Database structure Baltic Sea Atlas</th></tr><tr><td></td><td>Administration</td></tr><tr><td></td><td>Environmental properties</td></tr><tr><td></td><td>- Biology</td></tr><tr><td></td><td>- Chemistry</td></tr><tr><td></td><td>- Geology</td></tr><tr><td></td><td>- Physics</td></tr><tr><td></td><td>- Climate data</td></tr><tr><td></td><td>- Bathymetry</td></tr><tr><td></td><td>Ecosystem services</td></tr><tr><td></td><td>- Provisioning services</td></tr><tr><td></td><td>- Regulating and maintenance services</td></tr><tr><td></td><td>- Cultural services</td></tr><tr><td></td><td>Anthropogenic uses</td></tr><tr><td></td><td>- Case study Aquaculture</td></tr><tr><td></td><td>- Case study Riga Bay</td></tr><tr><td></td><td>- Pan-Baltic case study</td></tr><tr><td></td><td>Effects and pressures</td></tr><tr><td></td><td>Future scenarios</td></tr></table></td><td></td><td></td></tr>
</table>

4	I have collected all files in a zip folder which has to be submitted to the Institute for Baltic Sea Research (IOW) in order to be implemented in the Baltic Sea Atlas. Files include all shapefile information and respective files, or raster data files and can include additional files such as excel files, text documents, pdf, png or others.		
5	I have submitted all required information and data files to the IOW.: lotta.maack@io-warnemuende.de		

In case of questions, further information or help needed please contact Lotta Maack (Institute for Baltic Research Warnemünde, Germany): lotta.maack@io-warnemuende.de


AALBORG UNIVERSITY
DENMARK


AARHUS
UNIVERSITY


NLS
FINNISH GEOSPATIAL
RESEARCH INSTITUTE
FGI


LATVIJAS
HIDROEKOLOĢIJAS
INSTITŪTS


Leibniz Institute for
Baltic Sea Research
Warnemünde
iow


Nordregio


Turun yliopisto
University of Turku