

Swedish coastal water bodies on Wikidata

Combining WFD data with Wikidata

Josefina Algotsson, Frank Van Der Stelt and Diala Abdoush



Front:
The image depicts Swedish coastal water bodies on Wikidata.

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Summary

In accordance with the Water Framework Directive, the water district authorities report environmental information on Sweden's surface water bodies to the EU.

Under the government commission Smartare miljöinformation to the Swedish Environmental Protection Agency, Naturvårdsverket, the initiative was taken to adopt the reported environmental information on Sweden's coastal water bodies to Wikidata and Wikipedia. SMHI has led the initiative with support from Wikimedia Sweden, the South Baltic Sea Water District Authority, the county administrative board of Jönköping and Wikimedia volunteers.

The aim of this project has been to make the environmental information about Sweden's coastal water bodies more accessible to the public, to disseminate knowledge about status classification and create conditions for increasing environmental awareness among the public. The project has resulted in:

- 653 new coastal water bodies are described on Wikidata.
- Wikipedia articles on water management in Sweden, coastal water bodies and the SVAR database have been created.
- A template for infoboxes on Wikipedia has been developed and can automatically retrieve and display the status classification of coastal water bodies.
- The template for infoboxes on coastal water bodies is used in articles on coastal waters on Wikipedia.
- The license for the SVAR database is set to CC0, which facilitates the use of the information and opens the possibility of using it in more ways than before.

Sammanfattning

I enlighet med Vattendirektivet rapporterar Vattenmyndigheterna miljöinformation om Sveriges ytvattenförekomster till EU.

Under Naturvårdsverkets regeringsuppdrag Smartare miljöinformation togs initiativet upp att visualisera den till EU rapporterade miljöinformationen om Sveriges kustvattenförekomster på Wikidata och Wikipedia. SMHI har lett initiativet med stöd från Wikimedia Sverige, Vattenmyndigheten för Södra Östersjöns vattendistrikt, Jönköpings länsstyrelse och volontärer från Wikimedias gemenskap.

Syftet med arbetet var att göra miljöinformation om Sveriges kustvattenförekomster mer tillgänglig för allmänheten, sprida kunskap om statusklassning samt skapa förutsättningar att öka miljömedvetenheten hos allmänheten. Projektet har resulterat i att:

- 653 nya kustvattenförekomster beskrivs på Wikidata.
- Artiklar om vattenförvaltning i Sverige, kustvattenförekomster och databasen SVAR har skapats på Wikipedia.
- En mall för informationsrutor på Wikipedia har tagits fram och kan automatiskt hämta och visa information om kustvattenförekomsternas statusklassning från Wikidata.
- Mallen för informationsrutor om kustvattenförekomster används i artiklar om kustvatten på Wikipedia.
- Information på smhi.se om SMHIs datapolitik är uppdaterad.
- Licensen för databasen SVAR är fastställd till CC0 vilket förenklar användningen av informationen och öppnar möjligheten att använda den på fler sätt än tidigare.

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Introduction

1.1 Smartare miljöinformation

To contribute to the fulfillment of the national environmental quality objectives, the generation goal, tackling climate challenge, and to increase the use of environmental information through better accessibility, the Swedish Environmental Protection Agency (Naturvårdsverket) received the government commission Smarter environmental information (Smartare miljöinformation) in 2016 (Näringsdepartementet, 2016).

Smartare miljöinformation is conducted on several organizational levels. The Environmental data commission (Miljöinformationsrådet) guides the work conducted in three programs; Water and sea, Environmental protection and Nature. Each program has a steering committee and a forum. The forums are set up as think tanks and as a network of 14 different governmental agencies, amongst which are the Swedish Environmental Protection Agency (Naturvårdsverket), Swedish Agency for Marine and Water Management (Havs- och vattenmyndigheten, HaV), Swedish Meteorological and Hydrological Institute (SMHI), county administrative boards, Lantmäteriet, Swedish Association of Local Authorities and Regions (Sveriges kommuner och landsting), Geological Survey of Sweden (Sveriges geologiska undersökning), and Swedish University of Agricultural Sciences (Sveriges lantbruksuniversitet).

The core function of the program Water and sea is to set up initiatives where available environmental data are applied in new digital solutions, or existing digital solutions and tools are improved through corporation between the governmental agencies.

This report is the result of the initiative Kust-Wiki brought up in the program for Water and sea in spring of 2018.

1.2 Reporting for the Water Framework Directive

The Water Framework Directive (WFD) was adopted by the EU in year 2000 and aims to improve the water quality of the European water bodies. In this endeavor member states of EU manage the water quality (or status) of surface- and ground water based on river basin districts in six year water management cycles. This amounts to determining the division of surface water into subunits such as lake water bodies or coastal water bodies, classifying the water in terms of ecological and chemical status, setting up river basin management plans, and reporting the results to the European commission. The goal is for all surface- and ground water to reach a good status (Europaparlamentet, 2000). In Sweden, environmental and spatial data regarding the WFD status reporting is collected in the database Water Information System Sweden (WISS) and later made available at the European Environment Information and Observation Network (Eionet) website. Data is stored in structured files with XML or GML format and divided into files for each river basin district (EEA, Eionet Central Data Repository, 2019).

1.3 Wikimedia

Wikimedia is a collection of projects (such as Wikipedia and Wikidata), chapters (autonomous non-profit organizations supporting Wikimedia projects), the non-profit Wikimedia Foundation and hundreds of thousands of volunteers editing the Wikimedia projects with the mission of providing free educational content to the world. There are around 36 million Wikipedia accounts in the English Wikipedia amongst which around

120 thousand edit Wikipedia actively¹. WikiLeaks, despite its name, is not part of Wikimedia.

1.4 Lake water bodies on Wikidata

Wikimedia Sweden (WMSE) and the South Baltic Sea Water District Authority conducted the project *WFD data to Wikidata 2016* in 2016 and 2017. The structured files on Eionet were used to make the status classification about Sweden's lake water bodies more accessible to the public through Wikidata. Python scripts were created to read the structured files and write the information to Wikidata. The project aimed to create a template for a Wikipedia infobox which would utilize the new information in Wikidata. The template would be included in articles about Swedish lakes and automatically collect information from Wikidata keeping the environmental information more up to date. However, the infoboxes were never made due to time restrictions (Costa, 2017). Nevertheless, most of the principals for mapping the WFD data to Wikidata are used in this project.

2 Aim

The purpose of this project can be described by reviewing the goals set up by the overlying governmental commission *Smartare miljöinformation*, as well as the government's digital policy. The digital policy aims to streamline the government's activities and facilitate the contact with the general public. Open data is mentioned as one tool in this endeavor (Regeringen, 2019). One of the goals of *Smartare miljöinformation* is to increase the availability and use of environmental data. This project does this by introducing data produced by the European water management and creating articles about these concepts in Wikidata and Wikipedia respectively; platforms edited and viewed by millions of people every day. The overall purpose of this effort is to heighten the environmental awareness of the public, giving the tools to make conscious and sustainable decisions in their lives.

3 Methodology and tools

3.1 Wikidata

Wikidata is a data base of around 57 million items of structured data (Wikidata:Statistics, 2019). Much like Wikipedia has articles, Wikidata has items. Items typically describe objects and concepts. There are a few important principles to the items in Wikidata; one being that of notability. In short, this means that information included on Wikidata (this is also especially true for articles on Wikipedia) needs to "...have gained sufficiently significant attention by the world at large and over a period of time..." that it justifies its own page about it (Wikipedia:Notability, 2019). Another principal is that data included is explicitly under a Creative Commons CC0 license (Wikidata:Licensing, 2019).

Items on Wikidata have an identifying Q-number, a label and a description. The characteristics of that item are then further detailed using statements consisting of properties, values, qualifiers and references. The properties are identified using a P-number (Wikidata:Introduction, 2019). To facilitate the understanding of these concepts, this report will use italics when mentioning items and properties.

Figure 1 shows a schematic representation of the item *London*. The item has a statement about population. The property used to make the claim about the population is *population* (*P1082*). The value is set to the number 8173900. The property *population* (*P1082*) has

¹ <https://en.wikipedia.org/wiki/Wikipedia:Wikipedians>

its own Wikidata page where it's described as the number of people inhabiting the place. In addition, a statement can have qualifiers which in turn consist of properties and values. This gives extra description of the statement at hand and can be used to state sources for the claim. The value to a property could also be another Wikidata item. For example the real Wikidata item for *London* (Q84)² has the property value pair *capitol of* (P1376) *United Kingdom* (Q145), with *United Kingdom* (Q145) having its own Wikidata page detailing facts about it such as that it's an *instance of* (P31) a *country* (Q6256). This connection of items in a hierarchal structure makes it possible to subject the database to queries to find and visualize data based on tailored criteria.

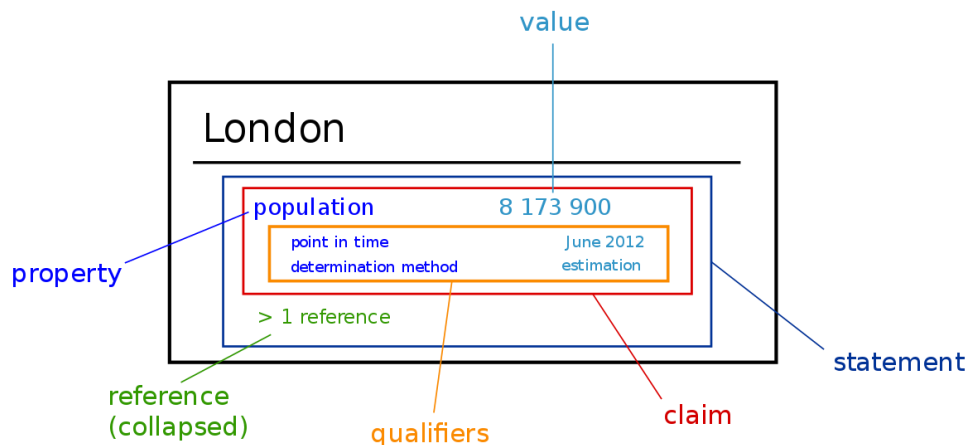


Figure 1. Principal sketch of a Wikidata statement - the building block of Wikidata Kaganer et al. (2013).

3.1.1 Editing Wikidata with QuickStatements

QuickStatements is a web based tool created to make large sets of changes to several Wikidata items in batches. The user inputs text commands which is read by the QuickStatements tool and changes are made to Wikidata items (Help:Quickstatements, 2019).

3.1.2 Visualizing with Wikidata query service

To access, select and visualize subsets of Wikidata, one can use the language SPARQL. Wikidata Query Service is a user interface allowing users to get this access without having to know the SPARQL language. The interface features drop down menus for filtering items and modifying an extraction of data. The structure of Wikidata makes it possible to create some quite complex requests. Examples of requests will follow and SPARQL code for the queries is available in the appendix.

3.2 Initiating the project in 2018

The project was initiated by the program for Water and sea under Smartare miljönformation in spring of 2018. The lead was briefly taken by Lisa Sundqvist (Ocean environmental division, SMHI) but passed over to Josefina Algotsson as project leader along with the seat in the program (HaV, 2019). The idea was to build on the results of the successful project WFD data to Wikidata 2016 which mapped environmental information about the Swedish lake water bodies to Wikidata.

² <https://www.wikidata.org/wiki/Q84>

During spring of 2018 research was conducted around similar, previous, projects. Such projects where the work conducted by Wikipedian Nasko³ when information about Sweden's lakes where collected from WISS, SMHI, Riksantikvarieämbetet and HaV and compiled in spreadsheets and used to automatically create more than 57 000 Wikipedia articles about lakes.

Furthermore the project WFD-data to Wikidata 2016 conducted by André Costa at Wikimedia Sweden (WMSE, a chapter of Wikimedia) and Niklas Holmgren (Kalmar county administrative board) was closely studied in terms of how the WFD reported data was mapped to items in Wikidata. Many of the Wikidata properties created during that project are utilized here.

In August, a meeting between Costa and Algotsson was held going through lessons learned from WFD-data to Wikidata 2016 as well as strategies going forward with the current project.

In October of 2018 the Wikipedia user Nasko was invited to SMHI for a workshop regarding automatic article creation and giving advice on structuring the project in a way that chronologically made sense. It was around this time that a discussion about the python scripts created by André Costa versus the tool QuickStatements began. It became more evident that focus would be put on creating the Wikidata items for the coastal water bodies first, followed by the creation of a template for an info box and articles about coastal water. Around this time it was concluded that due to the notability criteria, articles about coastal water bodies wouldn't hold up by themselves but would rather be included as environmental information about coastal waters already existing on Wikipedia.

Status reports to the program for Water and sea were made monthly.

3.3 Project plan

During autumn of 2018 resources and roles were appointed at SMHI and in the program for Water and sea. A specialist in WISS at the Jönköping county administrative board, a representative heavily involved in the WFD data to Wikidata 2016 project at Vattenmyndigheterna and representatives from HaV and SMHI were put together in a reference group. Representatives from the IT and the Information and statistics division at SMHI were put into a working team to handle the technical aspects of mapping WFD data to Wikidata and on mapping complementary data to the coastal water bodies respectively. A steering committee was put together with Bernth Samuelsson and Ola Pettersson of the Information and statistics division and Lisa Lind of the oceanographic forecast group. A dialogue was kept with Wikimedia Sweden about further involvement and a decision was made to hire two of their people as consultants during spring of 2019. The project plan was established in January of 2019.

3.4 Intense work in 2019

The two WMSE consultants, Alicia Fagerving and Axel Pettersson, joined the reference group to advise on the mapping of WFD data as well as guiding the project through the tools of the Wikimedia projects. Furthermore, Alicia was to create a template for an infobox utilizing Wikidata items of coastal water bodies.

Reference group meetings and steering committee meetings were both held once a month to discuss progress, direction and prioritizing. Frank van der Stelt began working on a Quick statements solution to mapping WFD data to Wikidata in January 2019 and matching this data to the datasets compiled by Diala Abdoush.

³ <https://sv.wikipedia.org/wiki/Anv%C3%A4ndare:Nasko>

3.4.1 Investigating data licenses

Due to Wikidata's principle of only hosting data under a CC0 license close attention was paid that the licenses regarding the relevant data was compatible with these restrictions. Eionet's legal notice regarding the data in their Central Data Repository states that reuse of data is permitted under the CC BY 2.5 DK license unless otherwise stated (EEA, Legal notice for CDR datasets, 2018). A CC BY license wouldn't be sufficient for inclusion on Wikidata. The data on which the Swedish reporting files are based is otherwise hosted at WISS which states that the environmental information (corresponding to the information in the XML-files) is available under a CC0 license. Regarding licenses for the spatial data presented in maps on the website (corresponding to the information in the GML-file) WISS refers to the respective copy right holders (Länsstyrelserna, 2014). In the case of the spatial data describing the coastal water body polygons, that holder is SMHI and the data in question is the SVAR (Svenskt vattenarkiv) database.

The data policy at SMHI states that data is made available for reuse and redistribution in accordance with the Creative Commons standard license. Exactly which one of the Creative Commons licenses this refers to isn't mentioned, but it is further clarified in the SMHI policy that the data can be used without restrictions and that a source should be specified if possible (Sandberg, 2015). This resembles a CC0 license (Creative Commons, 2019). However, to further assure that the data was used properly, the matter was discussed with the reference group, the steering committee, the open data group at SMHI as well as the legal affairs function at SMHI. It was then concluded by the management group at the department of core services in a meeting on March 19th that the license for the SVAR data would indeed be regarded as under a CC0 license.

3.5 Datasets

The current procedure for mapping information from the WFD reporting files to Wikidata involves a series of steps for accessing and compiling data using GIS, bash-scripts and QuickStatements. Data from Eionet, Lantmäteriet and SVAR have been used in this project. This section details the method of extracting data and transferal to Wikidata.

3.5.1 SVAR and Lantmäteriet

A dataset containing the EU_CD and municipalities for each coastal water body was created using GIS based on two layers:

- SVAR geodatabase version 2012_Rap
- Lantmäteriet database Geographical breakdown Direct v 1.0.0

In the resulting dataset the unique EU_CD number of each coastal water body is connected to the municipality which geographically overlaps with the coastal water body. In addition the URL leading to the coastal water body described on WISS was included in the dataset.

Furthermore a dataset detailing midpoints of the coastal water bodies in the SVAR version 2016 was used. This dataset is otherwise used in the routines surrounding deliveries of the water quality model Swedish Coastal zone Model to the website Vattenwebb. Although the dataset is based on a later SVAR version than that reported to Eionet in 2016 the dataset is proven useful since the coastal water bodies of the 2012 version are mostly unchanged in the 2016 version.

3.5.2 Eionet

XML- and GML files for water districts SE1, SE1TO, SE2, SE3, SE4 and SE5 from the Swedish WFD reporting files on Eionet was used. The XML-files contain data points such as ecological and chemical status and significant environmental impact. The GML-file contains spatial information such as the polygons describing the coastal water bodies,

surface area of the polygons and river basin district. This data is based on the SVAR 2012_Rap version.

3.6 Transformation of data

Since both Wikidata and the tools used for editing have developed markedly since 2016, the python scripts created by Costa (2017) can be replaced by the more efficient solution QuickStatements. The SVAR/Lantmäteriet dataset, the reporting files from Eionet along with the midpoint file were compiled and converted using bash scripts into a syntax readable for the QuickStatements tool. The disadvantage of QuickStatements is that it is not possible to ask for specific items. The assumption was made that each combination of coastal water body and its municipalities is to be regarded as a unique key that can be mapped to an item identifier. This mapping resulted in two supporting files:

- Mappings.cfg containing the mapping of status classes, water districts, significant impact type, counties (not used) and municipalities to their respective Wikidata item.
- Name_itemid_description_mapping.csv containing the coastal water body item identifiers along with their respective municipalities.

The source code is available in SMHI's SVN⁴.

The XML-files mentioned in the previous section were transformed using XSLT to .csv-files. The Excel-file containing the SVAR/Lantmäteriet dataset was saved as a .csv to ease paring of data. Furthermore, files mapping coastal water bodies, ecological and chemical status, district and municipalities to item identifiers were created. The following section is a summary of steps necessary to create and update the Wikidata items at hand. A more detailed instruction is available in the SMHI SVN repository.

3.6.1 Scripts

There are four bash scripts:

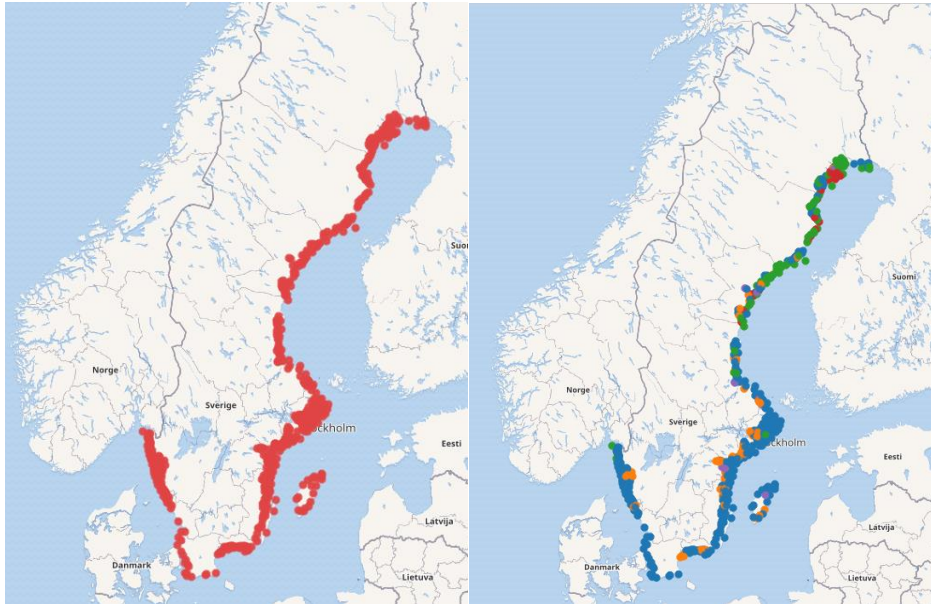
- prepare_metadata.sh which prepares the SVAR/Lantmäteriet input file and creates a row for each coastal water body and all its municipalities. Output is put in the outdata directory and is then used in the scripts that create and update Wikidata.
- fetch_files_and_extract_data.sh which retrieves data from Eionet and processes the XML files to collect the coastal water bodies and filter out relevant information. Output ends up in the outdata directory and is used in the scripts described next.
- create_wikidata.sh which combines data, metadata and the midpoints file and creates a .csv file with QuickStatements syntax that ensures that new items are created. The contents of the file is then copied and pasted into the QuickStatements tool to make the changes to the items.
- update_wikidata.sh which combines data, metadata, the item mapping file, and the midpoints file and creates a csv file with QuickStatements syntax that ensures that existing items are edited. The contents of the file is then copied and pasted into the QuickStatements tool to make the changes to the items.

The QuickStatements tool seems to have a limit on how many lines one can edit per run. A test of 20000 editions resulted in the program crashing. However, splitting up the CSV file into two runs of 10,000 editions worked out perfectly.

⁴ https://svn.smhi.se/repos/SCRAP/trunk/data_deliveries/smhi/kust_wiki/

4 Resulting items and their properties

The project has resulted in 653 new coastal water bodies on Wikidata. A Wikidata Query Service search shows a visual representation of the items presented in figure 2. Thanks to the structure on Wikidata these visualizations is possible. These maps are interactive and clickable, providing more information such as EU_CD number and a link to the Wikidata item.



Figur 2. Left: Visual representation of the Swedish coastal water bodies (red dots) added to Wikidata. Right: The ecological status classification the coastal water bodies on Wikidata. The status classes shown are High (red), Good (green), Moderate (blue), Poor (orange) and Bad (purple).

4.1 Label and description

The name stated in the SVAR/Lantmäteriet dataset was used as the Swedish label for the Wikidata item. These names are determined by SMHI usually based on the names in the relevant sea chart or Lantmäteriets Terrainmap (Terrängkartan). A description was put together by using the columns containing municipality in the SVAR/Lantmäteriet dataset.

A huge effort was put in by the Wikipedia user Esquilo⁵ to merge the items for coastal water bodies with other known bodies of water, such as *fjords* (Q45776), already on Wikidata. This rendered the coastal water bodies to be instances of both *coastal water body* (Q16615865) and *fjord* (Q45776), for example. However, a discussion between the project and Esquilo further detailed in the next subsection resulted in the items being separated. The efforts of Esquilo did have some favorable results amongst which were including the word “kustvattenförekomst” (coastal water body) into the labels. English labels were also added to the items including the words “coastal water body”.

4.2 Instance of

The coastal water bodies are defined using the property value pair *instance of* (P31) *coastal water body* (Q16615865). The main arguments for having the items only be instances of coastal water bodies is that the concept of a coastal water body is very different from the geographical concept. Its life cycle very much depends on the six-year water management cycle, and its properties are centered around status classification.

⁵ <https://www.wikidata.org/wiki/User:Esquilo>

For example, a coastal water body could in a sense cease to exist from one water management cycle to another due to it being split up into two new ones, merged with another one or changed into a lake water body due to isostatic uplift. Its definition is a combination of natural and administrative matters. The river basin districts and its division into the smaller units of surface water bodies are based on natural features dependent on catchment areas. The reason for defining these water bodies is on the other hand an administrative one; to oversee status and management planning. This makes them conceptually different from geographical items which are defined using other criteria. It is therefore impractical to contain the two concepts in the same item. Moreover, a similar structure is used for national parks and nature reserves on Wikidata since their properties differ from their geographical counterparts in a similar way.

Then again, there is inevitably a connection between the administrative and geographical entity since the definition partially overlap. This connection is important and suggestions to its implementation are handled in section 5.1.4.

4.3 Significant environmental impact and status

The significant impact type, ecological status, and chemical status contained in the Eionet XML-files were mapped to the properties *significant environmental impact* (P3643), *WFD ecological status* (P4002) and *WFD Chemical status* (P4202) respectively. These claims have a point in time qualifier set to 2016. The status classification is usually determined and set by the county administrative boards before the end of a water management cycle. Since the structured files on Eionet were reported, compiled, made available and marked 2016 this is used as the qualifier.

The references of these claims are set by using the *stated in* (P248) property and putting item *Water Framework Directive – 2016 Reporting Sweden* (Q29563137) as the value. This item contains a URL to Eionets page for Sweden's 2016 reporting⁶. This solution prevents dead links for these claims in the future, as only the link in the Wikidata item *Water Framework Directive – 2016 Reporting Sweden* (Q29563137) needs to be updated instead of one in each Wikidata item for all of the coastal water bodies. A *reference URL* (P854) is included in these claims and coupled with the address to the XML-file at hand to allow users to find the relevant structured files.

4.4 Spatial data

The property *country* (P17) is stated as *Sweden* (Q34) since all coastal water bodies used in this project belong to the Swedish reporting.

The district to which the coastal water body belongs was collected from the GML files and mapped to the property *located in administrative territorial entity* (P131). Items for the relevant water districts already existed due to the WFD data to Wikidata project in 2016 and could be mapped as values to this property. Mapping the water district using the property (P131) is different from how the water districts are currently mapped for lake water bodies. The lake water bodies use the property *part of* (P361).

Much discussion was held regarding whether to diverge from this way of mapping. It was concluded that since the coastal water bodies are administrative, and not geographical entities it's appropriate to map them using the *located in administrative territorial entity*.

The coastal water body midpoints were mapped to the *coordinate location* (P625). Only midpoints from coastal water bodies that were unchanged between the 2012_Rap version (represented in the GML-files) and the 2016 version of SVAR (represented in the midpoints file) were used in this regard. In this way, the midpoints calculated at SMHI and put into the Wikidata items are based on the same version of coastal water bodies

⁶ <http://cdr.eionet.europa.eu/se/eu/wfd2016>

present in the GML-files. The *area* (P2046) stated is collected from the GML-files and rounded to whole square meters. The references for these claims are structured in a similar manner as how the status classification and significant environmental impacts are handled. In this case the *reference URL* (P854) leads to the GML-file in question.

The municipalities to which the coastal water body belongs were also mapped using the property *located in the administrative territorial entity* (P131) and since this data is the result of combining the WFD reported division of coastal water bodies and the Lantmäteriet geographical Breakdown Direct v 1.0.0, both of these sources are stated.

In the work put in by user Esquilo the items were enriched since several claims where added about shared borders with other coastal water bodies.

4.5 Identifiers

The EU_CD number stated in the XML files where recorded as *EU Surface Water Body Code* (P2856). To facilitate navigation to the corresponding page on WISS, the property *described at url* (P973) was used along with the address stated in the SVAR/Lantmäteriet data set. In the efforts put in by Esquilo a statement was added with the property called *Lake ID* (P761). The EUCD number without the SE-prefix was added as the *Lake ID* making this a clickable link to WISS whilst the statement for *described at URL* (P973) was removed. This resulted in the pathway to the appropriate WISS still being available but embedded in the *Lake ID* statement. Considering the English description of *Lake ID* (focusing heavily on being a property describing lakes) this might confuse the reader since coastal water bodies don't have a lake ID in the same sense as lakes do according to the Sjöregister (SMHI, 2013). Instead they have a havsområdesnummer which along with the prefix "SE" is used for WFD reporting in Sweden (Lindkvist, Andersson, Björkert, & Gyllander, 2003).

4.6 Infobox

An infobox automatically collecting the environmental data for coastal water bodies from Wikidata was created (Fagerving, 2019). An example is visualized in figure 3. The infobox features a map powered by Open Street Map (a web based open-content map) which shows the approximate placement of the coastal water bodies. When clicked, the map opens up and shows in further detail where the coastal water bodies are situated. The infobox is then divided into sections for each coastal water body. The surface area and the municipalities to which the coastal water body belongs are listed.

Furthermore, the environmental information such as the ecological and chemical status along with the significant environmental impact is shown. By clicking the word "Kustvattenförekomster", the name of the coastal water body, the EU_CD number or the havsområdesnummer the user is sent to additional information on the concept of a coastal water body and the coastal water body itself. The links lead to the Wikipedia article explaining the concept of a coastal water body, the Wikidata item for the coastal water body, the coastal water body being detailed on the Eionet website and the corresponding object on WISS respectively.

This template has been implemented in the Wikipedia articles for Gullmarn⁷, Edsviken (havsvik)⁸, Kungsbackafjorden⁹ and Stora Värtan¹⁰.

⁷ <https://sv.wikipedia.org/wiki/Gullmarn>

⁸ [https://sv.wikipedia.org/wiki/Edsviken_\(havsvik\)](https://sv.wikipedia.org/wiki/Edsviken_(havsvik))

⁹ <https://sv.wikipedia.org/wiki/Kungsbackafjorden>

Gullmarn
 Kustvattenförekomster



Gullmarns centralbassäng kustvattenförekomst
 (SE581700-113000 [↗](#)), VISS: 581700-113000 [↗](#)

Kommun	Lysekils kommun ^{[5][6]} , Munkedals kommun ^{[5][6]} och Uddevalla kommun ^{[5][6]} (Sverige)
Areal	49 586 201 kvadratmeter ^[7]
Miljöpåverkan	kemisk förorening ^[8] och övergödning ^[8]
WFD status	WFD Ekologisk status: Måttlig ^[8] ; WFD Kemisk status: Otillfredsställande ^[8]

Färlevfjordens kustvattenförekomst (SE582630-113515 [↗](#)), VISS: 582630-113515 [↗](#)

Kommun	Lysekils kommun ^{[5][6]} och Munkedals kommun ^{[5][6]} (Sverige)
Areal	3 054 066 kvadratmeter ^[7]
Miljöpåverkan	kemisk förorening ^[8] och övergödning ^[8]
WFD status	WFD Ekologisk status: Måttlig ^[8] ; WFD Kemisk status: Otillfredsställande ^[8]

Saltkällefjordens kustvattenförekomst (SE582500-113890 [↗](#)), VISS: 582500-113890 [↗](#)

Kommun	Munkedals kommun ^{[5][6]} och Uddevalla kommun ^{[5][6]} (Sverige)
Areal	4 680 158 kvadratmeter ^[7]
Miljöpåverkan	kemisk förorening ^[8] och övergödning ^[8]
WFD status	WFD Ekologisk status: Måttlig ^[8] ; WFD Kemisk status: Otillfredsställande ^[8]

Figure 3. The infobox for coastal water bodies developed during this project implemented for Gullmarn centralbassäng coastal water body. The infobox features spatial information describing the coastal water bodies such as municipalities and surface area. The ecological and chemical status classification is listed along with significant environmental impacts according to the WFD Swedish

¹⁰ https://sv.wikipedia.org/wiki/Stora_V%C3%A4rtan

reporting files. All values are dynamically collected from the corresponding coastal water body.

5 Discussion and recommendations

As the landscape of Wikidata is ever changing thanks to its hard-working and passionate users, it's difficult to foresee the development and give accurate recommendations for future direction and management of the new data on Wikidata. But there are some conclusions about development of this material which are considered preferable.

5.1 Future mapping of WFD data

As has been reasoned in this project¹¹ and with regards to mapping analogous items such as nature reserves to Wikidata¹² the coastal water bodies should be (and are) defined as just that, coastal water bodies which are administrative entities. They are not defined as geographical objects. With the same reasoning, when referring to the river basin district at hand, the property *located in the administrative territorial entity* is used instead of the *part of* property. If this reasoning is accepted by the Wiki-community, so should the argument of moving the river basin district claim to the *located in administrative territorial entity* property in lake water body items.

5.1.1 Inception and dissolved date

To further clarify what coastal water bodies are currently being used in the water management cycles, a comparison of Eionet's reporting files should be made to single out ones which are continuously managed as opposed to ones which have been merged or divided into new ones during the course of the cycles so far. As of 2021 there should be 3 sets of reporting files (excluding the extension of cycle 2).

This process should also serve to find what new items need to be created for updating Wikidata with the next set of reporting files. One suggestion is to use the property *inception* (*P24574747*) to mirror in which water management cycle a coastal water body was active. The inception date should be set to the first year of the water management cycle for which it receives a status classification.

As an example, *Hertsöfjärden* (*Q62572260*) located in Luleå municipality, was first used as a coastal water body in the first water management cycle 2004-2009 and then used in the second cycle 2010-2016 as well as the extension of the second cycle. However, it was dissolved as a coastal water body after the extension of the second cycle which ended in 2018. The water body was now considered a lake water body and is called Inre Hertsöfjärden¹³ for the current cycle between 2017-2021. This means that *Hertsöfjärden* (*Q62572260*) should get an *inception* (*P571*) year of 2004 and a *dissolved, abolished or demolished* (*P576*) date of 2018. The lake water body Inre Hertsöfjärden should have an inception date of 2017 as this was the first year of the third water management cycle.

5.1.2 Tracking changes in a coastal water body

As a coastal water body can be changed in terms of its spatial extension between water management cycles without losing its identifying EU_CD or MS_CD number there is a question whether these changes need to be tracked on Wikidata. One could argue that this is the case; the size of a coastal water body is evidently a property that can change and should then be tracked by including time qualifiers to the claims. As a suggestion, *start*

¹¹ https://sv.wikipedia.org/wiki/Wikipedia:Projekt_Kustvatten/Mappings

¹² https://sv.wikipedia.org/wiki/Wikipedia:Bybrunnen/Arkiv_2019-04#Listor_%C3%B6ver_naturreservat_och_arbetslivsmuseer

¹³ <https://viss.lansstyrelsen.se/Waters.aspx?waterMSCD=WA37747720>

time (P580) and *end time* (P582) can be used as qualifiers to the statement about area. Moreover the same could be argued for the coordinate location. This value is created by finding the midpoint of each coastal water body using GIS. If the spatial extension changes so does the midpoint of the coastal water body most likely. However, the Wikidata property coordinate location isn't defined this way (with constraints that it describes the midpoint of something). Therefore to keep track of this property with *start time* (P580) and *end time* (P582) might not be necessary.

5.1.3 Describing the spatial extension of coastal water bodies

Thanks to a connection to Open Street Map (OSM), the *coordinate location* (P625) is showed in a map in the item. Furthermore, the points can be shown in the newly created info box.

Other WikiProjects have managed to include a polygon of an area in the same type of Open Street Map-powered map in certain items. For example, in *the coordinate location* (P625) of Berlin¹⁴ both a point and a line describing the spatial limits of the capital are represented in the map. This is due to Berlin also being an Open Street Map item and therefore its Open Street Map relation ID can be mapped to the *OSM relation ID* (P402) property and the line is automatically included in the map.

Implying the same type of mapping of the coastal water bodies would amount to transferring the polygons of the appropriate version of SVAR to OSM. The scope of this project couldn't possibly include such an effort. But contacts were made with the OSM mailing list to test the waters regarding whether a volunteer would be interested in conducting the necessary mapping to OSM. A person in the Kalmar county administrative board has participated actively in the mailing list discussions and processed the SVAR 2012_2 version in hopes it would better suit the Open street map needs. As of this day the coastal water bodies have not yet been included on OSM. The success depends on more OSM volunteers finding time and interest in helping with this endeavor.

5.1.4 Establishing the connection to geographical items

There is an undeniable connection of the coastal water bodies to geographical items on Wikidata. The spatial extension can be overlapping completely or in part. To further the understanding of the relationship between coastal water body items and geographical items there is a need for a solution that distinguishes yet connects the two.

One solution to this could be to use the property *located on terrain feature* (P706) or *located in or next to body of water* (P20). As an example the coastal water bodies *Loddbyviken* (Q61779448), *Pampusfjärden* (Q61779123), *Svensksundsviken* (Q61779689), *Inre Bråviken* (Q61779399), *Mellersta Bråviken* (Q61779409), *Allonöfjärden* (Q61779420) and *Yttre Bråviken* (Q61779821) could all have the property value pair *located on terrain feature* (P706) *Bråviken* (Q995658). This would make the connection from coastal water body item to geographical item but not the other way around. In this case the property *has part* (P527) could be used in the *Bråviken* item .

However, the appropriateness of these suggestions haven't been fully clarified, especially with regards to the overlap between administrative and geographical entity often times being partial. One solution could be to design a property that describes what coastal water body items that describe the WFD classification in that geographical area. Preferably the property should be made so that it can be used for all water bodies defined by WFD and regardless of whether the overlap is partial or complete.

¹⁴ <https://www.wikidata.org/wiki/Q64>

5.2 SVAR/Lantmäteriet dataset

For future compilations of SVAR and Lantmäteriet since all municipalities are already mapped to their respective counties on Wikidata, the extraction of only the municipality is sufficient in this regard.

5.3 Updating the items for the next water management cycle

As the current water management cycle ends in 2021 new reporting files will be made available on the Eionet portal. The following is a quick reference guide for when updates to Wikidata items are appropriate. For a complete guide to the bash and QuickStatements routines refer to the readme-file in the SMHI SVN repository.

- Create a new SVAR/Lantmäteriet outtake which lists the coastal water body names, EU_CD, municipalities and VISS url for the appropriate SVAR version.
- Run `fetch_files_and_extract_data.sh`. This re-structures the xml files into csv files containing EU_CD, ecological status, chemical status and significant environmental impacts.
- Compare the list of coastal water bodies in the SVAR/Lantmäteriet outtake and in the newly created data.csv file. If there are any discrepancies in number of coastal water bodies this could be due to the SVAR version represented in Eionet isn't the same as the SVAR/Lantmäteriet outtake is based on.
- Run `prepare_metadata.sh`. This converts the SVAR/Lantmäteriet outtake to a csv file.
- Compare the former data.csv file to the current data.csv file or compare an outtake of Swedish coastal water bodies from Wikidata query service to the current data.csv file and identify what EUCD has disappeared and what coastal water bodies have been created.
- For new coastal water bodies, run `create_wikidata.sh`. Some changes might have to be made to accommodate inserting the property inception date. This produces a file containing syntax which QuickStatements can read to create new items. Copy and paste the contents of this file into the QuickStatements tool¹⁵ to create new items.
- For discontinued coastal water bodies run `update_wikidata.sh` to create a *dissolved, abolished or demolished (P576)* claim with details that it was dissolved the last year of its water management cycle.
- For continued coastal water bodies run `update_wikidata.sh` to add claims of ecological and chemical status as well as significant environmental impacts. Make sure the point in time qualifier is set to the last year of the water management cycle of the reporting files.

6 Conclusion

The project can be considered a success. Although the process of investigating the licenses of the dataset took longer than expected, all goals set up by the project were delivered within budget with no significant delay.

¹⁵ <https://tools.wmflabs.org/quickstatements/#/batch>

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Figure 1: Wikidata statement Kaganer, Kolja21, Bjankuloski06en, Lydia Pintscher, Addshore. CC BY-SA 3.0

8 Appendix

The following code snippets can be copied and pasted into the [Wikidata Query Service](#) to visualize parts of the dataset introduced to Wikidata.

8.1 Wikidata query service code

8.1.1 Coastal water bodies

```
#defaultView:Map
SELECT ?item ?itemLabel ?eucd_id ?geografiska_koordinater
WHERE {
  ?item wdt:P31 wd:Q16615865.
  OPTIONAL { ?item wdt:P2856 ?eucd_id. }
  SERVICE wikibase:label { bd:serviceParam wikibase:language
"[AUTO_LANGUAGE],en". }
  OPTIONAL { }
  OPTIONAL { ?item wdt:P625 ?geografiska_koordinater. }
}
```

8.1.2 Ecological status classification of coastal water bodies

```
#All coastal water bodies colored after ecological status
#defaultView:Map
SELECT ?item ?itemLabel ?coords ?id ?layer WHERE {
  ?item wdt:P2856 ?id;
  wdt:P31 ?type;
  wdt:P4002 ?ecoStatus.
  BIND(
    IF(?ecoStatus = wd:Q30092136,"Moderate status",
    IF(?ecoStatus = wd:Q30092172,"Bad status",
    IF(?ecoStatus = wd:Q30092114,"High status",
    IF(?ecoStatus = wd:Q30092163,"Poor status",
    IF(?ecoStatus = wd:Q30092128,"Good status",
    "Other?"))))
  AS ?layer)
  OPTIONAL { ?item wdt:P625 ?coords. }
  SERVICE wikibase:label { bd:serviceParam wikibase:language
"en". }
  ?item wdt:P31 wd:Q16615865.
}
```


8.1.3 River basin district for coastal water bodies

```
#WFD-SWB
#defaultView:Map
SELECT ?item ?itemLabel ?coords ?id ?typeLabel ?layer
WHERE{
  ?item wdt:P2856 ?id .
  ?item wdt:P31 ?type .
  ?type wdt:P279 wd:Q30092755 .
  ?item wdt:P131 ?rbd .
  ?rbd wdt:P31 wd:Q132017 .
  BIND(?rbdLabel AS ?layer) .
  BIND(
    IF(?rbd = wd:Q25346184 , "Bottenvikens vattendistrikt",
    IF(?rbd = wd:Q26236784 , "Bottenhavets vattendistrikt",
    IF(?rbd = wd:Q26236793 , "Norra Östersjöns vattendistrikt",
    IF(?rbd = wd:Q26236798 , "Södra Östersjöns vattendistrikt",
    IF(?rbd = wd:Q26236808 , "Västerhavets vattendistrikt",
    IF(?rbd = wd:Q26492926 , "Bottenhavet (Int. avr. omr.
    Trøndelagsfylkene - Sverige)",
    "Other?")))))))
  AS ?layer)
  OPTIONAL { ?item wdt:P625 ?coords. }
  SERVICE wikibase:label { bd:serviceParam wikibase:language
  "sv". }
  ?item wdt:P31 wd:Q16615865.
}
```


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