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Implementation of the Shared Environmental Information System principles and practices in the Eastern Partnership countries

(ENI SEIS II East)

Step-by-step implementation of an EcoPortal

Armenia

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# Summary

This document outlines steps to take to upgrade the existing Shared Environmental Information System for Lake Sevan to a national EcoPortal for Armenia. More specifically, the document describes detailed steps for the development of the water module of the EcoPortal based on the data needs to produce two selected water quality indicators (nutrients in freshwater and biological oxygen demands).

It also clarifies the division of tasks between the European Environment Agency (EEA), the Ministry of Nature Protection of the Republic of Armenia and the Statistical Committee of the Republic of Armenia.

The key deliverables are as follows:

* The development of the water component of the EcoPortal as precedent towards the advanced version of the EcoPortal of Armenia in the near future;
* The sharing of water quality data and publishing of water quality (UNECE indicators C10 and C11) and quantity indicators (C1-C5), including also the publishing of the indicator on Protected Areas (D1), on the EcoPortal.

Upon receiving a formal letter from the Ministry of Nature Protection of Armenia on the proposed steps herein, the EEA could initiate a process to outsource a contract with a software programming expert(s)/company for implementing step 5 and 6 as described in detail in this document.

The estimated in-kind resource contribution from the respective agencies of the Republic of Armenia is around 68 work-days for data harmonisation and digitisation, and the implementation of the respective data dictionaries. Roughly 90 work-days will be outsourced for programming the software. The SEIS National Assistant for the Republic of Armenia would also be instrumental for the overall coordination during the implementation of the work.

# Introduction

While public organisations are specialised compartments of living systems of a government, data is the life blood flowing through that very complex system to drive effective and efficient policy decisions. Institutions have to ensure timely flow of reliable and robust data and information to the policy makers. Otherwise, a high risk of large inconsistency would be between the reality of problem and the policy response to it. Data flows between systems, databases, processes, and departments, it carries with it the ability to make the organization smarter and more effective (UNESCO).

Among others, the water component of the project “Implementation of the Shared Environmental Information System principles and practices in the Eastern Partnership countries (ENI SEIS II East)” aims to help:

* Harmonise the water data via the implementation of the standard data dictionaries and align them with the State of the Environment Reporting of the Water Information System for Europe (WISE-SoE) and the EU Water Framework Directive (WFD);
* Develop a national portal for the water data and information by replicating the concept of the Water Information System for Europe (WISE);
* Publish the water indicators and underlying data on the national portal of water information system.

Based on the communication as well as outputs of a national workshop held on 6–7 December 2017, followed by a comprehensive hands-on training between 26 February - 2 March 2018 in Yerevan, the EEA (and its European Topic Centre on Inland, Coastal and Marine waters - ETC/ICM) developed a concept note on the implementation of water information system of Armenia. That concept note was used as basis for drafting a request for offer for the implementation of the WIS. Both documents have been circulated to the National Focal Points of Armenia to the ENI SEIS II East Project in order to obtain comments and further clarifications on the scope of the proposed system. In addition, the overall objective with the request for offer was to initiate the contractual preparations at the Statistical Committee of the Republic of Armenia (ARMSTAT). Further communication with Armenian NFPs (Ministry of Nature Protection and ARMSTAT) has revealed that the host institution should be the Ministry of Nature Protection (MNP) and the envisaged information system should be developed as an EcoPortal which would be an upgraded version of the existing SEIS for Lake Sevan. On the other hand, the Environmental Monitoring and Information Center has been chosen by the Ministry of Nature Protection as the exact location of the EcoPortal while roles and responsibilities of the respective institutions involved in the implementation of the EcoPortal still remains to be clarified by the Armenian authorities. It should be noted that this document has been developed under such conditions with the aim to further define the step-by-step implementation of the EcoPortal. In addition, the document outlines also the possible sharing of tasks and responsibilities between both the EEA and the Ministry of Nature Protection of Armenia in developing the water component of the EcoPortal of Armenia. It is expected that the EcoPortal will foster the SEIS principles in the area of water resources management not only at the national level but also contribute to its implementation at the regional level.

The initial report developed by the EEA on the implementation of the Water Information System of Armenia has identified two types of infrastructural challenges for application of the SEIS principles in Armenia:

* insufficient automation of data management and processing in the case of groundwater quality data;
* insufficient or limited sources for further modification, update and development of existing IT systems used for data processing and dissemination of the Shared Environmental Information System for Lake Sevan ([[1]](#footnote-2)).

This step-by-step document aims to outline how to develop the pilot project for developing the water component of the EcoPortal by upgrading the portal of Shared Environmental Information System for Lake Sevan to the national level and its contractual implementation. The pilot will also include the improvement of the data storage and processing of the groundwater quality data in the hydrogeological department of the Environmental Monitoring and Information Center (MNP). It is envisaged that the water component of the EcoPortal will be a precedent as the first step towards the advanced version of the EcoPortal of in Armenia in the near future.

In fact, Armenia has already made substantial progress in data collection, processing and partly in online data dissemination. The Ministry of Nature Protection (MNP) and Ministry of Emergency Situations (MES) are the key institutes in collecting and managing the data on water quality and quantity while the National Statistical Service (ARMSTAT) is disseminating the aggregated data and indicator at the national level. Data on surface water quality is collected and processed by the Monitoring Department of the Environmental Information and Monitoring Centre (EMIC) while groundwater quality data is managed by its Hydrogeological Department. Water quantity data is collected and managed by the Hydro-meteorological and monitoring service (Hydromet) of the Ministry of Emergency Situations.

Since a long time, the State Cadastre Information System has been developed with support from USAID to be the central database managing all water cadastre data in Armenia (inventory on permissions of water use, real water usage and discharges (emissions) of the pollutants to the river network). This information system is hosted in Water Resources Management Agency of the MNAP ([[2]](#footnote-3)). In addition, the EUWI+ project aims also to develop data management at the river basin district scale with possible linking to the centrally managed data management server at the national scale ([[3]](#footnote-4)). Improvement with the format, storage and processing of groundwater quality data which will be developed under the ENI SEIS II East Project will also be a complementary to the existing data management system of the MNP. In addition, the current Lake Sevan Information System will be upgraded to be the national EcoPortal of water data and information by providing the links to the source data on surface water quality hosted in Monitoring Department of the EMIC and groundwater quality data in Hydrogeological department of the EIMC, as well as to the water quality data in Hydromet Link to the Water Cadastre Information System database should be also added to the EcoPorta lwhen it will be available. .

As agreed with the Armenian authorities, the EcoPortal will be developed by using the UNECE regional indicators of C10 - BOD and concentration of ammonium in rivers and C11- Nutrients in freshwater ([[4]](#footnote-5)) as testing the online data sharing between hydrogeological department and monitoring department of the MENP. In addition, the selected water quantity indicators (C1-C5) and biodiversity indicator (D1) will also be published on the EcoPortal without linking to the underlying data sources.

The ENI SEIS II East project primarily aims to improve the capacity with the national staffs in managing the data and indicator assessment. Therefore, ***learning by doing*** is the overall approach of the project in the development and future maintenance of the portal. That will also ensure to upgrade the advanced version of the EcoPortal by the national experts in the near future.

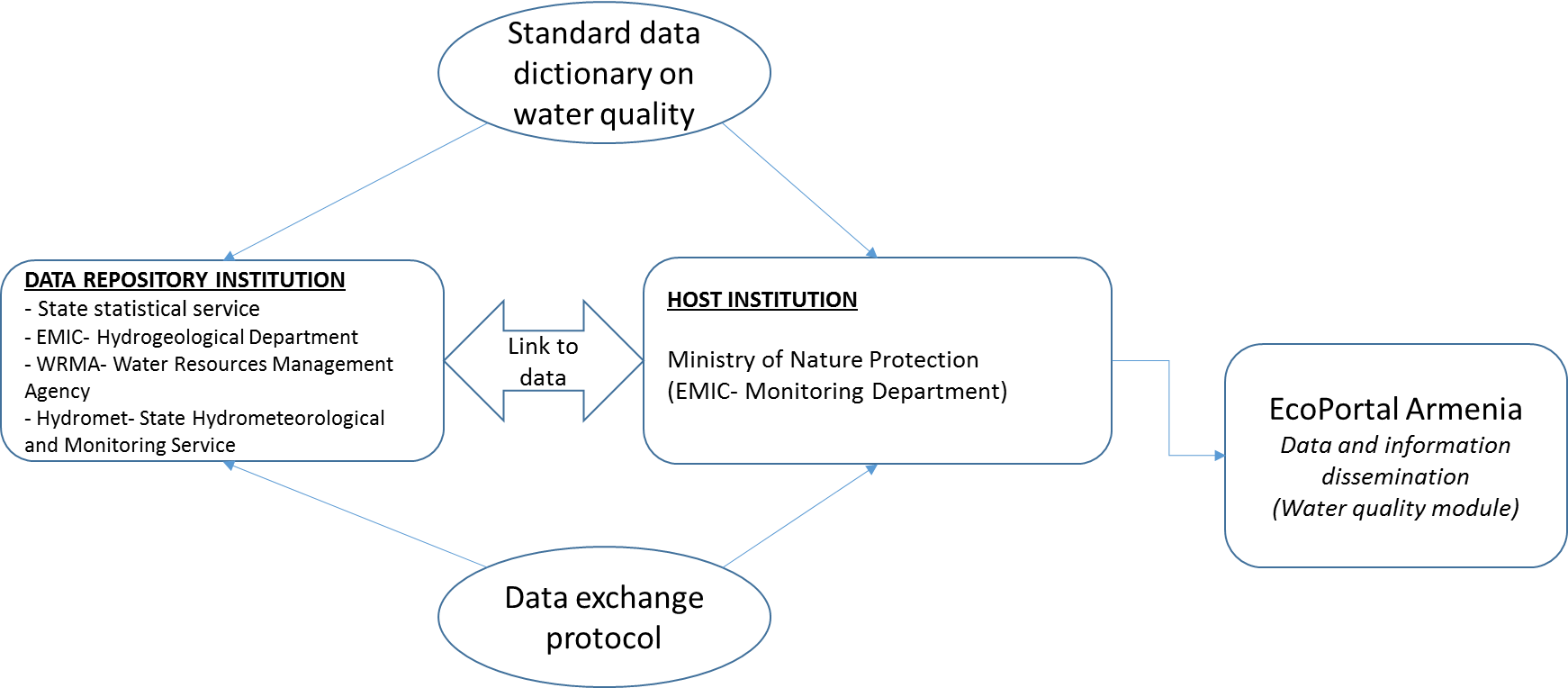
# Elements of the EcoPortal

The following elements of the EcoPortal are defined subject for the development:

* **Content:** the underlying datasets (raw and derived) of the indicators as well as the output/dissemination products
* **Cooperation:** work between the partners (e.g. Environmental Monitoring and Information Centre of the Ministry of Nature Protection, State Hydro-meteorological and Monitoring Service of the Ministry of Emergency Situations and National Statistical Service of the Republic of Armenia) that makes the data flowing and products available
* **Infrastructure:** technical part of the EcoPortal – software (database, files, web portal)

The three elements of the EcoPortal are shown in relationships in Figure 2.1. A strong cooperation should be constructed between Monitoring Department and Hydrogeological Department of the EIMC in order for the content (i.e. data) to flow through the complete diagram. An infrastructure (i.e. web portal and technical means of data storage, processes and sharing) is supporting this dataflow.

Figure 2.1 Simplified business model for the EcoPortal of Armenia



The content primarily covers the implementation of the standard Data Dictionary for the selected water quality indicators from the UNECE environmental indicators i.e. C10 and C11. The standard Data Dictionary of the WISE (Water Information System for Europe) water quality ([[5]](#footnote-6)) can be taken as example which can be adapted to the national settings of Armenia.

In addition, as the data storage of groundwater quality is not in an appropriate format (currently it is collected in a paper format) for the online data sharing, the content should also tackle digitizing the data on the GW quality.

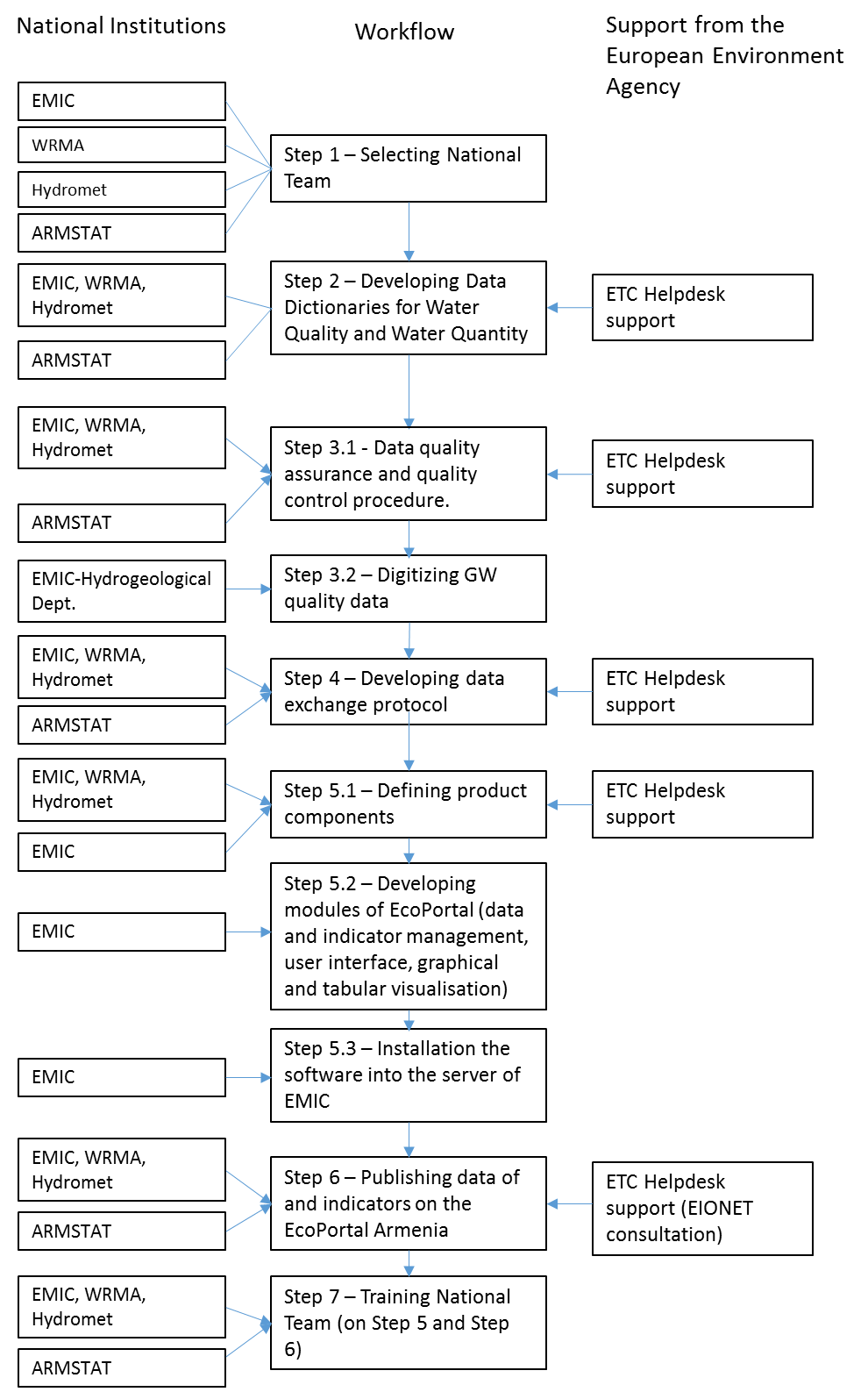
In line with the overall goals of the EcoPortal Armenia, data collection, storage and processing should be implemented on the EMIC and Hydromet side in a collaborative manner with the WRMA and ARMSTAT, while in line with the request of the Armenian NFPS, this document proposes EMIC will establish a functioning EcoPortal, and get familiar with its use and data dissemination and publishing the final products on the portal.

Since the creation of one common central database in which all water data should be stored together could be problematic due to handing over of the data between individual institutions, in further text it is recommended to store water quality, water quantity and water cadastre data in detached databases managed by the institutions responsible for given topic (EMIC, Hydromet and WRMA). These detached databases will be interlinked to EcoPortal hosted by EMIC.

# Implementation of the EcoPortal in Armenia

Implementation steps of the EcoPortal are presented in the Figure 3.

Figure 3 - Workflow on the implementation of the EcoPortal Armenia.



|  |  |
| --- | --- |
| EMIC | Ministry of Nature Protection- Environmental Monitoring and Information Center |
| WRMA | Ministry of Nature Protection – Water Resources Management Agency |
| Hydromet | Ministry of Emergency Situations - State Hydrometeorological and Monitoring Service |
| ARMSTAT | State Statistical Service of Republic of Armenia |
| ETC | European Environment Agency – European Topic Centre on Inland, Coastal and Marine waters |

## Step 1- Selecting the National team

As agreed during the workshop on 06-07 December 2017 in Yerevan, the UNECE indicators of C10- BOD and Concentration of ammonium in rivers and C11- Nutrients in freshwater will be used as testing the implementation of the EcoPortal Armenia. EMIC collects the underlying data on surface and groundwater quality on these selected indicators. Implementation of the standard Data Dictionary for data harmonization, data share, indicator development and publishing the indicators are the steps which will be tested between EMIC, WRMA, Hydromet and ARMSTAT. Hence, the National team should consist of the experts of water quality from Monitoring and Hydrogeological departments of the EMIC, experts from WRMA on data harmonization and integration and experts from HYDROMET particularly for the component of publishing the indicators. On the other hand, depending on the level of development with the Water Cadastre Information System, the decision should be made by the Armenian authorities whether the experts from the WRMA should be involved in the development of the EcoPortal if the Water Cadastre Information System is not operational yet. EMIC and ARMSTAT should be involved by content and IT experts in all steps of the implementation of the EcoPortal. The below table outlines the involvement of national experts in hands-on training on water quality indicators and IT from various institutions:

Table 1 – National experts involved in the training on data and indicator development of water quality and water quantity

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Group | Name | Institution | Department | Position | Responsibilities (a.o.) |
| Water quality | Gayane Hazutyunyan | MNP | EMIC | Chief analyst for water | Data analysis and reporting |
| Water quality | Ani Hambardzumyan | ARMSTAT | Environmental Statistics | Senior specialist | Processes, verifies and publishes data from EMIC, quality and quantity |
| Water quality | Ruben Grigoryan | Ministry of Health |  | Department head (?) |  |
| Water quality | Gayane Shahnazaryan | MNP | EMIC | Deputy Director |  |
| Water quality | Julieta Ghlichyana | MNP | EMIC | Director’s Advisor |  |
| Water quality | Silva Ayvazyan | MNP | Aarhus Centre | Coordinator |  |
| Water quantity | Yurik Poghosyan | ARMSTAT |  | Head | Coordination of work for C1-C5 indicators in Armenia |
| Water quantity | Victor Barseghyan | MNP |  | Head | Monitoring water quantity |
| Water quantity | Edgar Misakyan | ARMSTAT |  | Head of Hydrology Centre | Surface water resources monitoring |
| Water quantity | Nune Khachatryan | MES |  | Leading specialist of rescue service | Flood protection |
| Water quantity | Inga Nepap | MES |  | Instructor of rescue service | Flood protection |
| IT | Naira Mandalyan | ARMSTAT |  |  | Final processing and publication of water quality data |
| IT | Gohar Harutuynyan | MNP | EMIC |  | Management and processing of the water quality data |
| IT | Hrant Zaqaryan | MNP | WRMA | Head of the division | Manager of the State water resources cadastre |
| IT | Armine Danielyan | MES | Hydromet |  | Management and processing of surface water quantity data |

*Note: Roles of the content experts will be defined as one of those data provider, data owner, data steward based on the data exchange protocol which might be subject for the development between EMIC, WRMA, HYDROMET and ARMSTAT.*

*Suggestion: The SEIS National Assistant will organise the kick-off meeting to facilitate the development of the national team from EMIC, WRMA, Hydromet and ARMSTAT. It would be preferable to maintain the national experts trained on the water indicators as national team for developing the EcoPortal Armenia. It might be considered three experts per area (water quality, water quantity and IT) to be part of the National team*

*The working language with the EEA and its ETC/ICM will be conducted in English. The National assistant will document the outputs of the meeting while the National Focal Points to the ENI SEIS II East Project will formally inform the EEA on the final list of the national team.*

Estimated work-day for the National Team: 3 work-days

National assistant: 5 work-days (discussions with National Authorities e.g. Ministry of Nature Protection, Ministry of Emergency Situation, Water Resources Management Agency, ARMSTAT)

## Step 2 - Developing Data Dictionaries for water quality and water quantity

Having a harmonised data model and data structure is central to all data processing and indicator development. Data Dictionary is the basic definition and description of stored and exchanged data. It is a set of descriptions and definitions which establish the standardised set of data. It comes in a form of text and tables that can be shared with all parties involved in data delivery, storage, processing and publishing. It should contain:

* general and specific instructions;
* data model – table relations and structure;
* data model – table fields;
* enumeration lists (codelists, vocabularies) for predefined values.

Data Dictionary does not need interactive functionality and thus can be established in a document format, such as DOCX and XLSX. Different Data Dictionaries are needed for water quality and water quantity. For compliance with international reporting streams, it is recommended to use Data Dictionaries developed in line with WISE SoE Water Quality ([[6]](#footnote-7)) and WISE SoE Water Quantity([[7]](#footnote-8)) Data Dictionaries. However, content experts of Armenia can use the already existing simplified version of the water quality Data Dictionary provided by the EEA (its ETC/ICM) for the purposes of the ENI-SEIS East project, and further adapt it to the national setting which may contain the following elements;

* Parameters for which the data are collected to the selected indicators (C10 and C11)
* Data model
* Dataset tables
* Data elements
* Vocabularies
* Data format

Analogous components (data model, tables, elements) should be also available in Water quantity Data Dictionary.

*Suggestion: EMIC and ARMSTAT will adapt the simplified version of Data Dictionary for WISE Water quality data dataset ([[8]](#footnote-9)* ) *to the national setting. Hydromet and ARMSTAT will adapt the (simplified version of) the Data Dictionary for WISE Water quantity dataset* to *the national setting*

Estimated work-day for the National Team: 6 work-days

## Step 3.1- Defining and implementation of the data quality assurance and quality control procedure

The underlying data for the selected indicator require the implementation of quality assurance/quality control (QA/QC) process to ensure data quality. Monitoring department of the EMIC is responsible for undertaking the QA/QC of the surface quality water while Hydrogeological department of the EMIC should take the overall responsibility of QA/QC for the groundwater quality and Hydrometeorological department of MES for water quantity.

Defined QA/QC rules should be implemented to the data management process in the input organisations (checking of the input data by EMIC – Monitoring department, EMIC – Hydrogeological department and Hydromet), as well as at the moment of data inserting to the detached databases. ARMSTAT should also ensure sharing their experiences with EMIC on QA/QC procedures so that the quality controlled output data to be available to the end user in the EcoPortal.

Further explanations on the quality assurance and quality control of the data are provided in the document on “**Implementation of Water Information System – Armenia**”.

*Suggestion: Content experts from EMIC and ARMSTAT will define the steps of QA/QC procedure while the IT experts of the EMIC (and probably with the IT experts from ARMSTAT) will ensure appropriate programming of the software in accordance with defined QA/QC procedure. If such resource is not available in both institutions, then an external contract might be initiated by the EEA to fill the gap.*

Estimated work-day for the National Team:

Content experts 2 x3 work-days (specification of the QA/QC rules; 3 for water quality, 3 for water quantity)

IT experts 20 work-days (programming, implementation and testing of the rules)

## Step 3.2- Digitising groundwater quality data, transformation to the structure defined in Data Dictionary and transfer to the water quality database

Once the Data Dictionary has been implemented, the underlying data for selected indicators should also be available in electronic format for online data exchange. Despite Armenia has advanced infrastructure in data storage and processing, groundwater quality data managed by MNAP - Environmental Monitoring and Information Center - Hydrogeological Department are currently stored in paper format (written reports) or in Excel tables depending on the year in the time series. Thus, Hydrogeological department of the EMIC should digitize the data of which is only available in paper format, in order to make the GW quality data available for online data sharing.

The file format should be either that of Excel spreadsheet or in Access database for easy data transformation during the data processing for indicator development.

ETC/ICM will check the consistency of transformed data with the water quality Data Dictionary developed in the step 2.

After digitizing of the groundwater quality data and their transformation to the requested structure, this dataset will be checked by the QA/QC process and included into the water quality database.

*Suggestion: Water quality experts of the EMIC will digitize the groundwater quality data and cooperate with IT experts from EMIC and ARMSTAT*

Estimated work-day for the National Team: 15 work-days (it is a rough estimation as no information is available about the volume of data to be digitized).

## Step 4 - Developing data exchange protocol

In order to establish cooperation of institutions and subsequent dataflow in EcoPortal, the data exchange protocol among the institutions involved needs to be defined. EMIC should make the water quality data available online (via link) to all respective institutions in line with the agreed structure and content together with the implementation of the data manipulation on its side to serve the data to the end-user via front end user interface.

*Suggestion: Develop a data exchange protocol between EMIC, WRMA, HYDROMET and ARMSTAT, if it does not exist yet, in order to make the data exchange operational, systematic and coordinated. An example from Germany (Annex –I) can be adapted to Armenian setting.*

Estimated work-day for the National Team: 4 work-days

## Step 5.1- Defining product components

The current portal of the Lake Sevan displays indicators, news and resources as main products. However, the upgraded version of that portal should contain wider contemporary facilities i.e. downloading data from the sources (e.g. data on surface water quality from the EMIC website via the link provided on the EcoPortal of Armenia), dynamic generation of tables, interactive indicator visualisation, map viewer with dynamic maps etc. All such product components would entail designing the overall software of the EcoPortal and its possible modules. It should also be considered that the Ecoportal could be divided to the public part and to the outputs intended for experts only (restricted access).

*Suggestion: The product types will be lengthy discussed and defined by the National team (content experts and IT experts) in cooperation with EEA/ETC experts. National assistant (NA) to the ENI SEIS II East project will organize the meeting for the content and IT experts to have that discussion, while EEA/ETC experts will provide their views via e-mail or skype. NA will document the outputs of the discussion to the EEA.*

Estimated work-day for the National Team: 9 work-days

National assistant: 5 work-days

## Step 5.2 - Developing modules of EcoPortal

The software architecture of system would require development of different modules to handle with expected services and functions of the EcoPortal. The basic principle should be the use of open source software for programming as well as designing the whole system in accordance with the user needs of both expert staff from the institutions (in a restricted platform) and end-users. As Armenia is quite well-advanced in data storing and processing systems hosted in the EMIC and WRMA (see Water Cadastre Information System), it is expected that the EcoPortal will provide one single entry point to the information sources on water such as data, indicators, reports etc. together with facilities of self-querying by end-user.

The following modules need to be developed within the EcoPortal;

***Data storage and processing***

The EcoPortal will not store any tabular or spatial data on water (i.e. water quality) but provide the link from the front end to the Environmental Monitoring and Information Center- Monitoring department and Hydrogeological department, enabling the water quality data to be retrieved and downloaded by the end-user. Analogous solution should be implemented concerning the link to the water quantity database stored in Hydromet. And link to the water cadastre database in WRMA Therefore, apart from providing the front end interface on the EcoPortal, all the steps of storing and processing the data should be implemented on the source side (back end) which are lengthy defined in the document of Implementation of Water Information System – Armenia.

Estimated work-day for the National Team: 15 work-days

National assistant: 5 work-days (ensuring the communication amongst the national experts and with the EEA/ETC)

***Implementation and updating of the indicators***

The indicators are one of the main product types which should be displayed on the EcoPortal. The current portal of the Lake Sevan presents only statistics of the observation on selected parameters of the water quantity and quality and also provides graphical illustration of the time series of selected variables. The new update should contain the assessment of the indicators together with the statistics which will be published as “indicator” on the EcoPortal. However, development of the indicators and indicator based assessment require the involvement of the content experts from EMIC, WRMA, ARMSTAT and HYDROMET. For the selected water quality indicators primarily experts from EMIC should work closely with the IT experts from EMIC and ARMSTAT. It is envisaged that the indicators would be implemented and further updated by the content experts while the indicators would be published by EMIC on the EcoPortal of Armenia. Therefore, the EcoPortal should host a module only dedicated to the indicators (See example <https://www.eea.europa.eu/data-and-maps/indicators/#c0=10&c5=&b_start=0>).

Estimated work-day for the National Team: 20 work-days

National assistant: 5 work-days (ensuring the communication amongst the national experts and with the EEA/ETC)

***Visualisation of data and information***

Various tools and facilities are available for visualising data and information. The most important is to make such module available in the EcoPortal. The discussion on the product components by the national experts should also focus on the visualisation tools and provide proposals on data presentation, interactive maps, retrieving and downloading the data, publishing indicators, reports and other documents. Visualisation module is one of the most important components of the EcoPortal as it will be dynamic interface between data and information providers (e.g. EMIC and ARMSTAT) and the public at large.

*Suggestion: National assistant will organize the agenda item on the visualisation tools in the meeting on the product components. National experts will define most appropriate tools to be developed under the visualisation module of the EcoPortal. IT experts from EMIC and ARMSTAT will ensure the appropriate programming of that tools for the EcoPortal. As mentioned earlier, if resource gap is exist, then external contract might be subject to be initiated by the EEA to fill the gap in necessary resources in order to develop the EcoPortal. The scope of product components should be kept within the overall objective of the pilot.*

*EEA/ETC experts will provide their views via e-mail or skype. NA will document the outputs of the discussion to the EEA.*

Estimated work-day for the National Team: 20 work-days

National assistant: 5 work-days

## Step 5.3 - Installation the software of EcoPortal into the server of EMIC

Once the software has been developed, the IT experts of the EMIC (together with potentially external consultant) will install the software into their existing server system and provide the domain to the EcoPortal potentially under <http://www.mnp.am/>. This process should also cover testing operation of the system for data exchange, indicator publication as well as displaying the content related sources.

Content experts and IT experts of EMIC will closely work to ensure the interactive communication between front and back ends.

*Suggestion: This step should involve also an iterative testing based on the feedbacks from the endusers.*

Estimated work-day for the National Team: 10 work-days

## Step 6 - Publishing data and indicator on the EcoPortal

Only the link to the source of underlying data for indicators will be provided in the EcoPortal while indicators will be published on the EcoPortal after the public consultation with respective institutions has been completed([[9]](#footnote-10)).

*Suggestion: EMIC and ARMSTAT will collaboratively initiate the public consultation for the indicators C10 and C11 as well as test the functionality and the usage of the EcoPortal. IT experts will further fix or improve the procedure of data and information share in EcoPortal when any problem would be spotted during the public consultation.*

*EEA/ETC experts will provide their views via e-mail or skype and NA will ensure timely communication and consultation with the EEA/ETC experts.*

Estimated work-day for the National Team: 15 work-days

National assistant: 2 work-days

## Step 7- Training National team

Development and maintenance of the EcoPortal requires long-term resource allocation. Therefore, day-to-day involvement of national team (i.e., staff of the EMIC, WRMA, Hydromet and ARMSTAT) from the kick-off up to the implementation phase of developing the portal is crucially important. This will also underpin capacity building with the national water experts and IT experts for the further maintenance of the EcoPortal.

The involvement of the IT and content experts in the training is presented in Table – 1.

Table 1 – Training module and involvement of the National team per training topic

|  |  |  |
| --- | --- | --- |
| Training module | IT Experts  (EMIC and ARMSTAT) | Water quality experts  (EMIC, WRMA, Hydromet, ARMSTAT) |
| Steps 3.1-3.4 – Creation of the database, Defining and implementation of the QA/OC procedure, data transformation | X | X |
| Step 5.2 – Data and indicator management | X | X |
| Step 5.2 - Graphical and tabular visualisation | X |  |
| Step 5.2 - User interface |  |  |
| Step 6 – Publishing and updating data of and indicators | X | X |

*Suggestion: Ensure the involvement of the National team at every stage of the development of EcoPortal*

Estimated work-days for the National Team: 12 work-days (during the implementation of the EcoPortal)

|  |  |  |  |
| --- | --- | --- | --- |
| Step No. | Activity | Estimated work-days for the National team (work-days) | Estimated work-days for the National Assistant |
| Step 1 | Selecting the National team | 8 | 5 |
| Step 2 | Developing Data Dictionaries | 6 |  |
| Step 3.2 | Defining data quality assurance and quality control procedure | 26 |  |
| Step 3.2 | Digitizing Groundwater quality data, transformation to the structure defined in Data Dictionary and transfer to the water quality database | 15 |  |
| Step 4 | Developing data exchange protocol | 4 |  |
| Step 5.1 | Defining the product components | 9 | 5 |
| Step 5.2 | Developing modules of EcoPortal | 55 | 15 |
| Step 5.3 | Installation the software into the server of EMIC | 10 |  |
| Step 6 | Publishing data of and indicators on the EcoPortal Armenia | 15 | 2 |
| Step 7 | Training National Team (on Step 3, Step 5 and Step 6) | 12 |  |
| Total |  | 160 | 27 |

# Summary of estimated work-days

# Deliverables

* SEIS for Lake Sevan upgraded to the EcoPortal of Armenia (only water quality module for the time being, subject to further expansion in the future)
* Data and indicators published on the EcoPortal Armenia

# ANNEX I

**Example for a national Agreement regarding data exchange and assessment for an international reporting obligation (**unofficial translation to English, sensitive information removed**)**

**Agreement**

The following Agreement

between

[Party 1 name of administrative regional agency

Address]

and

[Party 2 name of national agency

Address]

is hereby concluded:

**§1**

**Nature of the Agreement**

An International Programme on Assessment and Monitoring of *Acidification of surface waters* exists under the *United Nations Economic Commission for Europe (UN-ECE) Convention on Long-range Transboundary Air Pollution*.

Within this programme, chemical and biological parameters are to be monitored at selected sampling sites in order to document the level and geographical distribution of acidification of surface water.

[Name of Country] participates in this monitoring programme. In [Name of Country], regions that are vulnerable to acidification are located in sparsely populated areas, in medium to high mountain ranges with poor calcareous soils covered by forest and in plains in northern [Name of Country](see Annex 1). Chemical, physical and biological parameters are monitored at approximately 30 monitoring sites (see Annex 2) within [Name of Country]. The frequency of monitoring, the selection of parameters and the analytical methods have been internationally agreed.

Respective governmental state offices and scientific institutes of the [Name of Country]administrative regions carry out the sampling, the sample analysis as well as the sample transport free of charge.

The [Party 2 name of national agency]sends the data collected in the [Name of Country]centrally to the laboratory of the *Norwegian Institute for Water Research (NIVA)*. *Norway is the lead country in the UN-ECE-monitoring programme.*

Within this agreement the [Party 1 name of administrative regional agency]is responsible for the coordination of the data collection throughout [Name of Country] and the data transfer to the [Party 2name of national agency] that arranges the transmission of the dataset to the Programme Centre of the “International Cooperation Programme on Assessment and Monitoring of Acidification of Rivers and Lakes”.

The activities performed by the[Party 1 name of administrative regional agency] include:

* Guidelines and methods for the monitoring and data collection under the UN-ECE-programme in accordance with the recommendations of NIVA, Norway and the [Party 2 name of national agency]
* Coordination of the biological and chemical analyses of all involved laboratories in the period [year x] to [year y]
* Coordination of quality assurance (biological and chemical ring tests in accordance with guidelines by the ‘Programme Centre’)
* Compilation of national monitoring data according to ‘Programme Centre’s’ reporting templates
* Quality assurance and quality control check of national data
* Update of descriptions of national monitoring sites
* Reporting of national data to the ‘Programme Centre’
* Further information provision as required by the ‘Programme Centre’
* Preparation of short assessments of the results from the monitoring data analysis
* Since a few years, biological parameters (macrozoobenthos and benthic diatoms) are no longer monitored in some [Name of Country] regions. In the years x and xx, for each parameter two monitoring campaigns have to be carried out at the appropriate point of time at the sampling sites.
* Additional assessments methods regarding biological acidity are to be proposed for better use of plankton data of lakes
* To predicted recovery trends for acidified waters (keyword “biological recovery”) regarding biological recolonization and recovery are to be specifically surveyed at selected monitoring sites
* Participating in programme-relevant national and international meetings (annual meeting of the [Name of Country] National Focus Centre and the annual international Task Force meeting)

A report on the activities performed is to be submitted twice per year to the [Party 2 name of national agency], for the first time on [date xx]. The final report due on[date yy]is to be prepared in detail.

**§2**

**Scope of Time/ Deadlines**

The agreed works shall be conducted in the period of [date xxx] to [date yy]. The [Party 1 name of administrative regional agency] executes independently the undertaken tasks and activities in consultation with the [Party 2 name of national agency]. In this respect it shall determine autonomously the implementation and the subcontracting of third parties. If third parties are subcontracted the [Party 2 name of national agency] shall not be under any obligation towards third parties.

**§3**

**Costs, Payment**

The [Party 2 name of national agency] contributes to the total costs of the UN-ECE-Programme:

XxxkEuro in the year aaaa

yyykEuro in the year bbbb

zzzkEuro in the year cccc

Payment will be done upon request of the [Party 1 name of administrative regional agency].

The [Party 1 name of administrative regional agency] contributes to this agreement by providing personnel capacities for the agreed coordination and by provision of infrastructure and existing knowledge that is essential for further analysis and assessment of the data. With the financial support from the [Party 2 name of national agency], the [Party 1 name of administrative regional agency]provides under this Agreement the means for the reporting obligations of [Name of Country]under the UN-ECE-monitoring programme for determining and assessing the acidification of surface waters.

This agreement is subject to the reservation that national budget is provided for the implementation of this programme for the financial year in question.

**§4**

**Rights of Use/ Publications**

1. The [Party 1 name of administrative regional agency]shall have the exclusive rights of use, especially the right of publication (including the right of informing beforehand under §12 of the Act on Copyright and Related Rights (UrhG)), the right of reproduction, distribution and dissemination of the service and individual assessment results as well as the right to present the results as far as it concerns the data owned by [Party 1 name of administrative regional agency].
2. [Party 2 name of national agency]shall receive an unlimited right to use the data of[Party 1 name of administrative regional agency]; especially the right to publish and edit the data as well as the right to communicate them in a analysed form to third parties.
3. Excluding the reservations under §37 of the Act on Copyright and Related Rights (UrhG), the[Party 2 name of national agency] shall receive the exclusive and unrestricted right to use the analysis and assessments of all other data. This right of use notably includes the types of use and transformation set out in§15 and§88 of the Act on Copyright and Related Rights (UrhG). The [Party 2 name of national agency] is entitled to grant third parties the right of use to all other data or to grant them a non-exclusive right of use, to publish results or parts of them, to forward them to third parties or to use it in any other way.

**§5**

**Miscellaneous**

Unless otherwise agreed herein, the provisions of the Civil Code apply.

Amendments thereto, have to be made in writing.

Signatures:

Date: Date:

Name of representative of Name of representative of

[Party 2 name of national agency] [Party 1 name of administrative regional agency]

**Annex 1:** Areas of acidification in [Name of Country]

**Annex 2:** List of monitoring sites in [Name of Country] of the UN-ECE monitoring programme on surface water acidification

1. http://www.seis-sevan.am [↑](#footnote-ref-2)
2. Provide reference to the USAID project [↑](#footnote-ref-3)
3. Provide reference to the EU WI+ data management component [↑](#footnote-ref-4)
4. <https://www.unece.org/env/indicators.html> [↑](#footnote-ref-5)
5. <http://cdr.eionet.europa.eu/help/WISE_SoE/wise4> [↑](#footnote-ref-6)
6. http://dd.eionet.europa.eu/datasets/3163 [↑](#footnote-ref-7)
7. http://dd.eionet.europa.eu/datasets/3223 [↑](#footnote-ref-8)
8. http://dd.eionet.europa.eu/datasets/3163 [↑](#footnote-ref-9)
9. Similar to the EIONET consultation which is conducted by the European Environment Agency when an indicator either is newly published or updated, EcoPortal can also be used by the EMIC and ARMSTAT for the consultation of indicator with respective public institutions.

   Public consultation is also an opportunity for EMIC and ARMSTAT to correct any kind of misinterpretation with data or assessment as well as eliminate errors in data processing. [↑](#footnote-ref-10)