Sharing and dissemination of environmental information

Country maturity report: Armenia

June 2020

Prepared by PricewaterhouseCoopers under contract with the European Environment Agency

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Legal notice

This report was produced by PricewaterhouseCoopers as part of the project for developing a roadmap and identifying feasible and practical means for integrating environmental information in national e-governance/open data processes and platforms. This action is done in the context of the ENI SEIS II East project 2016-2020. The report was built in 2018 and updated throughout 2019, including a review in March 2019 after the first regional meeting in Kyiv, and the second review after the roundtable in May 2019. The report was commented by the local authorities in Armenia in January 2020.

This report contains information obtained or derived from a variety of publicly available sources described within the report in more detail and does not intend to be a comprehensive analysis of environmental information, open data and e-government in the country but a collection of the main elements shaping the national environmental information landscape.

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CONTENTS

This project is funded by the European Union and is implemented by the European Environment Agency

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List of figures

List of tables

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List of abbreviations

Abbreviation	Definition
CEPA	Comprehensive and Enhanced Partnership Agreement
CIT	Communication and Information Technologies
EaP	Eastern Partnership
EEA	European Environment Agency
EGDI	E-Government Development Index
EIA	Environmental Impact Assessment
EMIC	Environment Monitoring and Information Centre
ENI	European Neighbourhood Instrument
EPI	Environmental Performance Index
FAO	Food and Agriculture Organisation
HCI	Human Capital Index
MEA	Multilateral environmental agreement
MOE	Ministry of Environment
NFP	National Focal Point
NGO	Non-government organisation
NIS	National Institute of Standards
ODIN	Open Data Inventory
OGP	Open Government Partnership
OSCE	Organisation for Security and Co-operation in Europe
OSI	Online Service Index
RA	Republic of Armenia
REC Caucasus	Regional Environmental Centre for the Caucasus
SEA	Strategic Environmental Assessment
SEIS	Shared Environment Information System
SNCO	State Non-Commercial Organisation
TII	Telecommunication Infrastructure Index
UNECE	United Nations Economic Commission for Europe
WRMA	Water Resources Management Agency

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1 Methodological approach and policy context

This report was produced by PricewaterhouseCoopers as part of the European Environment Agency (EEA) service contract No. 3437/R0-ENIE/EEA.57335 for developing a roadmap and identify feasible and practical means for integrating environmental information in national e-governance/open data processes and platforms. This action is done in the context of the EU-funded ENI SEIS II East project 2016-2020, which targets Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and, Ukraine – the Eastern Partnership countries (EaP).

The methodology followed to prepare the present report is based on the 2018 and 2019 European Union reports on open data maturity in Europe, with some adjustments made to accommodate the specific situation of Eastern Partnership countries as well as the focus on environmental information.

In all countries of the Eastern Partnership region, e-governance and open data initiatives are recognised as mainstream for making data and information easily accessible to the policymakers, public and other stakeholders. Sharing environmental information through national e-governance and open data frameworks based on the Shared Environmental Information System (SEIS) principles[1] has seen an important development in recent years. Nonetheless, it could be further underpinned with a clearly developed vision and comprehensive roadmap for this specific area. The benefits of sharing, disseminating and promoting the use and reuse of environmental information can support the governmental policies and actions in environment and related areas, the transition towards a green economy, innovation compliance with various reporting obligations as well as support to the implementation of various Sustainable Development Goals (SDGs). Furthermore, it can streamline efforts and reduce the reporting burden for the national authorities by working together in a more structured and connected way.

The present project aims to facilitate such exchanges and helping the EaP countries advance in developing an open data policy for the environment. The list of the main deliverables of the ENI SEIS II East project per components, including all related outcomes of the open data component is presented in the Annex A. The project is strongly embedded in the context of several international commitments and strategic documents related to the collection, update, sharing, dissemination and use of environmental information as follows:

- Article 5 of the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) and decision VI/1 of the Meeting of the Parties to the Aarhus Convention on promoting effective access to information;
- The Protocol on Pollutant Release and Transfer Registers (Protocol on PRTRs);

[1] https://www.eea.europa.eu/about-us/what/shared-environmental-information-system-1/shared-environmental-information-system

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- The Batumi Declaration "Greener, cleaner, smarter!" adopted by Ministers of the UNECE region calling to have SEIS in place in support of regular assessment in countries of UNECE region by 2021;
- The Declaration on cooperation on Environment and Climate Change in Eastern Partnership (Luxemburg 2016), and
- The 2030 Agenda for Sustainable Development;
- The European Green Deal[2] (2019);
- 'Eastern Partnership policy beyond 2020' Communication[3] adopted on 18 March 2020;

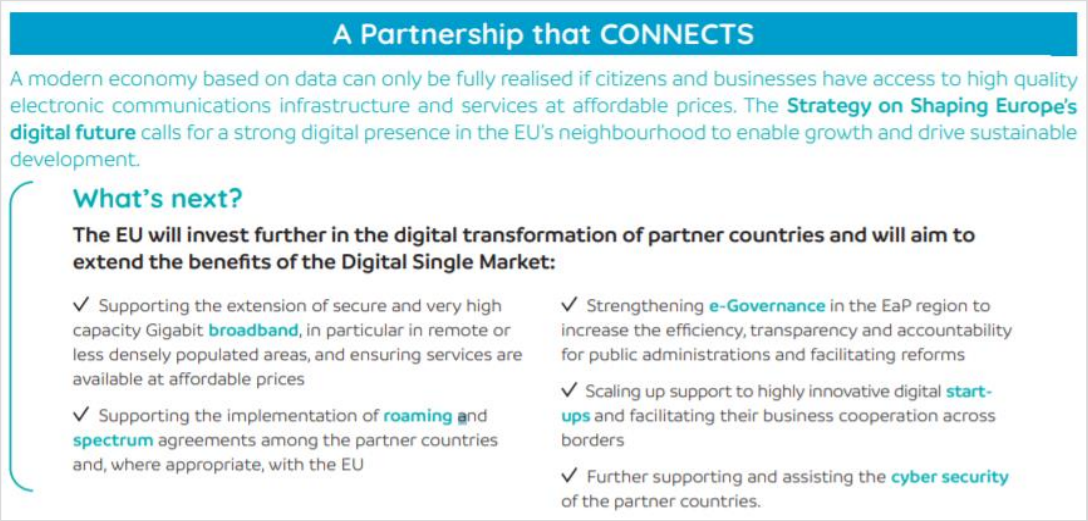

Figure 1. A digital future - one of the five objectives of Eastern Partnership policy initiative (2020, Factsheet: The Eastern Partnership beyond 2020: Reinforcing Resilience – a partnership that delivers for all[4])

- UN Secretary-General's Roadmap for Digital Cooperation, June 2020[5];
- Eastern Partnership leaders' video conference, 18 June 2020[6].

SEIS is also an integral part of the Good Environmental Governance flagship initiative of the EU. EEA is currently supporting this process in both the European Neighbourhood countries[7] East[8] and South[9] in the context of dedicated projects currently running until mid-2020.

As part of this project, the "Country maturity report on sharing and dissemination of environmental information" has been prepared. The report reflects on the national e-government and maturity level of open data. The report identifies synergies for fostering environmental information sharing and dissemination to support the implementation, among

[2] https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf
[3] https://data.consilium.europa.eu/doc/document/ST-6930-2020-ADD-1-REV-1/en/pdf
[4] https://eeas.europa.eu/sites/eeas/files/eap_joint_communication_factsheet_18.03.en_.pdf
[5] https://www.un.org/en/content/digital-cooperation-roadmap/
[6] https://www.consilium.europa.eu/en/meetings/international-summit/2020/06/18/
[7] https://euneighbours.eu/en
[8] EU Neighbours East: Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova, and Ukraine
9 EU Neighbours South: Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, and Tunisia

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others, of the SEIS principles, of the UNECE Aarhus Convention and Protocol on PRTRs. As such, the project is aiming to 1) gradually expand the open data maturity approach to the European Neighbourhood East countries and to the specific topic of environment, 2) assess the EaP countries' status of development in e-governance and open data for the environment, and 3) develop with and for each EaP country a roadmap for fostering the process and gradually align it to similar developments taking place in the European Union and other more advanced countries.

The report highlights the main challenges of the country in these areas and aims to serve as a tool to initiate the discussion about the strategic development and potential initiatives at the national level, bringing together stakeholders from e-government, open data, and the environment. It can serve both as a tool for further implementation as well as a possible replicable prototype for other countries.

The SEIS approach consists of three pillars: Content, Infrastructure and Cooperation[10], and this approach was followed for structuring the report and for gathering the necessary information. The report also leverages the work done in the European Union for measuring the maturity level of open data in the Member States. Consequently, the report adopts a similar structure as the "Open Data Maturity in Europe 2019"[11] published on the European Open Data Portal but adapted to the specificity of EaP countries and is focusing on the connection between e-government, open data and environmental information. As such, the report is built around three major blocks, namely 1) the assessment of environmental information readiness; 2) the assessment of technological enablers; and 3) the key challenges and their translation into a proposed roadmap. The structure of the report is similar for all EaP countries. This approach makes the analysis comparable across EaP countries and serves as a baseline for developing and exchanging initiatives across the region.

In this regard, all country reports are complemented by the Good Practices Report which supports the implementation of the proposed roadmaps by offering possible solutions and alternatives based on the example of other countries and international organisations.

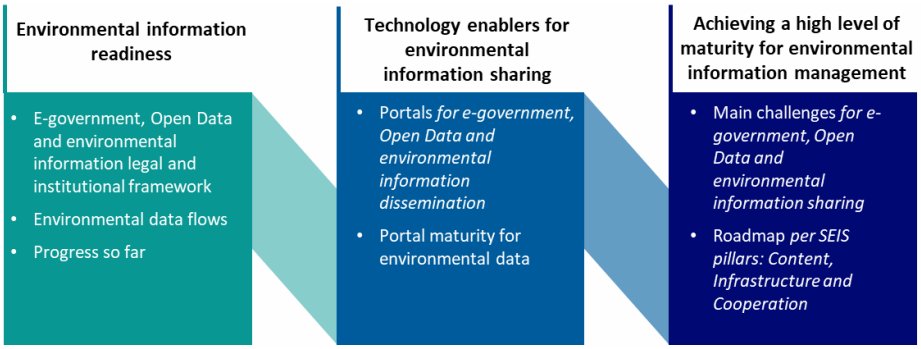

Figure 2. The country maturity report structure

[10] https://eni-seis.eionet.europa.eu/east/governance/what-is-seis

[11] The report structure was prepared according to Open Data Maturity in Europe 2018 and updated according to Open Data Maturity in Europe 2019
https://www.europeandataportal.eu/en/dashboard#2019

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The report was prepared in close cooperation with EEA project team, the National Focal Points (NFPs) for the ENI SEIS II project, the Aarhus Convention and the Protocol on PRTRs and the UNECE secretariat of these agreements respectively, and, with the support of the ENI SEIS national assistants. Furthermore, a broad consultation with national experts across a wide range of topics was ensured, ranging from environment, statistics, sectoral policies up to e-government and IT infrastructure.

The following sources of information were analysed to prepare the report:

- Legislation:
  - Legal acts related to public information;
  - Legal acts related to open data;
  - Legal acts related to e-government;
  - Legal acts related to environmental information.
- Environmental reporting:
  - Aarhus Convention national implementation reports[12];
  - Protocol on PRTRs national implementation reports, where available;
  - UNECE Environmental Performance Review, where available;
  - EU Analytical Report 7: Open Data in the European Union Neighbourhood[13];
  - UNECE Progress in the production and sharing of core environmental indicators[14];
  - Interim report On the Implementation of the Action Plan for Introduction of Open Government Partnership Initiative;
  - EEA – Armenia country report under ENPI-SEIS I project[15];
  - County Factsheets on the state of SEIS implementation in 2018[16];
  - World Bank Country Environmental Analysis, where available;
  - Country presentations made during the 4th ENI SEIS II East Project Steering Committee Meeting[17], 12 November 2019;
  - Other country-specific reports.
- Portals:
  - EU Open Data portal and national open data portals;
  - E-government services portals;
  - Environmental portals;
  - Statistical office website.

[12] 2017 National implementation reports by Parties : https://www.unece.org/env/pp/reports_trc_implementation_2017.html

[13] European Open Data Portal, Analytical Report 7, Open Data in the European Union Neighbourhood, June 2017, Capgemini, funded by the European Commission. https://www.europeandataportal.eu/sites/default/files/edp_analytical_report_n7.pdf

[14] Progress in the production and sharing of core environmental indicators in countries of South-Eastern and Eastern-Europe, Caucasus and Central Asia, May 2015 https://www.unece.org/fileadmin/DAM/env/europe/monitoring/Publications/Progress_in_the_production_and_sharing_of_core_indicators/images/Final_Publication_for_web_4_03_2015.pdf

[15] ENPI-SEIS East Region Synthesis Report, European Environment Agency, 2010-2014 https://www.eea.europa.eu/publications/enpi-seis-east-region-synthesis-report

[16] http://www.unece.org/environmental-policy/environmental-monitoring-and-assessment/areas-of-work/shared-environmental-information-system.html

[17] Presentations are available here: https://eni-seis.eionet.europa.eu/east/areas-of-work/communication/events/project-related-events/4th-eni-seis-ii-east-project-steering-committee-meeting

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- Other sources:
    - Country specific reports or/and analysis prepared by national and international bodies.

The challenges identified in each country, the related good practices, and the initiatives stemming from the roadmap were discussed initially during the regional event in Kyiv 4-6 March 2019. Furthermore, the country draft maturity report was updated based on the discussions and presentations made at the national event held in Yerevan on 10 September 2019 and further discussed during the national roundtable, with a focus on the roadmap (way forward). The roundtable gathered over 30 stakeholders from various sectors, including e-government, open data and environment as information providers and users (including NFPs from the ENI SEIS II project and the Aarhus Convention, few representatives from non-governmental organisations and from the Aarhus Centre). Comments, presentations and conclusions from the national discussions were integrated into the report.

Figure 3. Photo from the national roundtable in Yerevan. Credit: Ministry of Environment Armenia

Furthermore, the final draft version of the report was shared with the ENI countries, and the last consultation was organised in December 2019 before releasing the final version of the report.

All materials, including the summary of the discussions taking place in the events organised in the context of the project, are available at the links below:

- 1st Regional workshop on Open Data and e-Government for the Environment (Kyiv, 4-6 March 2019)

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- National roundtable on open data and e-government for the environment in Armenia (Yerevan, 10 September 2019)
- National roundtable on open data and e-government for the environment in Azerbaijan (Baku, 27 August 2019)
- National roundtable on open data and e-government for the environment in Belarus (Minsk, 24 June 2019)
- National roundtable on open data and e-government for the environment in Georgia (Tbilisi, 13 June 2019)
- National roundtable on open data and e-government for the environment in the Republic of Moldova (Chisinau, 23 May 2019)
- National roundtable on open data and e-government for the environment in Ukraine (Kyiv, 26 September 2019)
- Joint UNECE-EEA Workshop on Open Data for the Environment (Geneva, 2nd October 2019)

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2 Executive summary

The report was prepared and updated between 2018 and 2020 as part of the EU funded project implemented by EEA – 'Implementation of the Shared Environmental Information System principles and practices in the Eastern Partnership countries (ENI SEIS II East)'. National input in the preparation of the report was ensured through broad dialogue and consultation with various public authorities and other stakeholders in Armenia, particularly, those related to the environment and statistics. In addition, experts across various policy domains, including IT and e-government, have been involved through participation in national and regional events. These activities allowed an exchange of views on the future of e-government and open data in the cross-cutting domain of the environment. As a result, the document presents an overview of the national e-government framework, the maturity level of open data and dissemination of environmental information in Armenia. The analysis included the following:

- the policy framework was reviewed to identify existing strategic directions and available tools for the dissemination of environmental information by using open data and e-government solutions;
- the legal framework was analysed to determine the existing requirements related to e-government, open data and dissemination of environmental data and information;
- the technological solutions were assessed to determine the existing technical capabilities and improvements and/or adjustments needed in the future.

Based on the above, the document proposes a roadmap that includes measures focusing on the development of e-government and open data frameworks, which would greatly support the environmental domain and even beyond. The road map is designed to be a living document throughout the implementation process and to serve as a benchmark in assessing the progress at various stages of development.

The methodology followed to prepare the present report is based on the 2018 and 2019 European Union reports on open data maturity in Europe. Some adjustments were made to accommodate the specific situation of Eastern Partnership countries as well as the focus on environmental information.

E-government

Armenia has been on a journey to develop a digital transformation strategy since 2018, when a draft framework document "2030 Digital Transformation Agenda"[18] was prepared. In order to have a clear strategic direction for actions in the area of e-government, the country should prioritise the adoption of the "2030 Digital Transformation Agenda". This process has to be immediately followed by the preparation of an action plan containing clear measures on how to improve digital government services and e-governance.

Government Resolution No. 1093-N adopted in 2015 sets up basic security and interoperability requirements for the information systems managed by public authorities. It is necessary to

[18] The document was originally referred to as "2018-2030 Digital Transformation Agenda". As there is no public information available on the adoption of the document, "2030 Digital Transformation Agenda" title is used in this report.

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follow up on this process and develop secondary legislation to specify in detail the interoperability standards and the procedures which would ensure further development of e-government.

Armenian E-government Portal serves as a single access point for the e-governance tools and databases of the Armenian public authorities. For example, legal acts information system and electronic auction system are accessible via the portal. Also, the portal contains links to the various specific thematic e-service portals and descriptions of public e-services, as well as online service request forms. In addition, the portal provides information on Government's decisions, budget and expenditures. Currently, the portal does not have a functionality to process e-services workflow.

Open data

Open data in Armenia is emerging. Law on Freedom of Information (adopted in 2003) confirms the public right on access to information. The current legislation could be further enhanced to include also the concept of open data and to further support it through necessary governance and enforcement mechanisms.

Currently open data is disseminated by public authorities through their web portals, usually in non-machine-readable formats. To ensure a single-access point, an open data portal should be developed. This would allow to strengthen the open data initiative by providing the necessary tools for open data management and dissemination.

Environmental information sharing and dissemination

The existing legal framework (defining the general processes for environmental information and data management and dissemination as well as the responsibilities of the public authorities) requires updating and modernisation. Consequently, a new law on environmental information was drafted and submitted to the Armenian Parliament for consideration and adoption. Among others, the draft law is improving the procedures for environmental data and information management and effective dissemination.

A few technology-driven initiatives were undertaken over the last five years. Relevant examples in this respect include the establishment of the Shared Environmental Information System (SEIS) for Lake Sevan and the development of the Ecoportal. In 2015, the pilot project for Lake Sevan aimed at developing a model to allow the integration of data from a variety of sources. It is a step towards regular data sharing among key partners and it was made possible with EEA support under the first ENI SEIS project funded by the European Union. Another example is the development of Ecoportal - in 2020, the portal was developed with the technical and financial support of the ENI SEIS II East project. This development was building further on the experience already gained during the previous ENI SEIS project. The Ecoportal provides a single-access point for data and information dissemination on water. The Ecoportal allows to be further expanded to other thematic areas of the environmental domain and become a single access point for all environmental information.

Suggested recommendations

Following the analysis of the current situation, the proposed roadmap outlines key areas for future development in the field of e-government, open data and dissemination of environmental information, and provides concrete measures for improvement. Additionally, to facilitate the implementation of the roadmap, several examples and practical recommendations are provided in the report "Open data and e-government good practices for fostering environmental information sharing and dissemination".

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The success and rapid advancement of the country in this challenging domain remain strongly dependent on the clear priority-setting, multi-disciplinary teamwork and regular monitoring of progress. Furthermore, once progress is made in one or several areas proposed for consideration, amendments of the roadmap will be needed to keep it relevant and focused on the key priorities for the country.

The measures recommended for Armenia in the context of the roadmap have been grouped into the following categories: policy-related, legal and technical measures. They cover the following issues:

- Policy measures: focusing, among others, on the development and adoption of an e-government and open data strategy, followed by the adoption of a detailed action plan for the implementation of the digital initiatives;
- Legal measures: formalising, among others, the responsibilities of the public authorities in e-government and open data areas, as well as recommending the adoption and/or the use of available international standards for interoperability and metadata description;
- Technical measures: covering, among others, the development of an open data portal and of an integrated environmental information system which could be potentially used as a single web access point for environmental information; updating the licensing terms and conditions for access to information; preparation of metadata description and enhancement of the multilingual aspect of web portals and websites in the area of the environment.

All measures are to be seen as strongly interacting with and interdependent of each other. The impact of their gradual implementation has to be closely monitored, as it may bring systemic changes across the whole data and information chain.

It is also strongly recommended that a multidisciplinary team should be set up to address and oversee the implementation of all the above measures. Armenia has a good experience and practice in setting up cross-sectoral teams. A recent example was the development of the Ecoportal were experts from Ministry of Environment and subordinated institutions, Ministry of Emergency Situations and subordinate institutions, and Statistical Committee were closely working together. This good practice should be continued and strengthen and where possible applied in the broader context of the inter-institutional cooperation.

A specific recommendation to Armenia is to further enhance the Ecoportal by extending it to other thematic areas[19]. Furthermore, there is a need to gradually equip the public authorities dealing with environment and related data and information with the necessary technical tools for management (including exchange and sharing) and dissemination. In practice, this recommendation could be achieved by implementing relevant actions, presented in the roadmap and summarised below:

- Specific policy measures - setting a clear policy for the use of Ecoportal as the integrated environmental information system;

[19] Currently water thematic area is implemented in the portal

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- Specific legal measures - formalising procedures for data and information access and dissemination via the Ecoportal, including an obligation to provide user support services;
- Specific technical measures – (1) targeting maintenance and expansion to new thematic areas of the Ecoportal; (2) developing new interfaces and standard APIs for data exchange with other information systems; (3) providing training to civil servants in order to develop their technical skills in management and dissemination of environmental data and information.

The present report depicts the current status of e-government, open data and environmental information management and dissemination in Armenia. Given the exponential development of this area and its recognition as a top policy priority for the near future, a regular update of the report and roadmap proposed is strongly recommended. All the measures proposed need to be seen in strong interaction and interdependence with each other; the impact of their gradual implementation has to be closely monitored, as it might bring systemic changes across the whole data and information chain.

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3 Readiness of environmental information

3.1 E-government, open data and environmental information - legal and institutional framework

This section contains a summary of the legal framework, public policy and institutional framework in terms of e-government, open data and environmental information.

3.1.1 National policy and legal framework

3.1.1.1 E-government

This section presents the main legislation and policies shaping the e-government landscape in Armenia.

Government Resolution No. 1093-N of 31 August 2015 on the approval of technical requirements for public electronic services provided by national and local authorities and security of information systems[20]

This resolution defines the main concepts and principles for information system development. In addition, it sets security and interoperability requirements for the information systems managed by the national and local authorities. Technical standards for data exchange and information security are defined by applying relevant international standards in specific thematic area. The resolution does not provide details on the procedures to be applied for data management, dissemination and exchange.

The E-Governance Infrastructure Implementation Agency[21] appointed as the operator responsible for the technical support and coordination of the state information systems[22].

Draft Framework Document "2030 Digital Transformation Agenda"

A draft framework document, referred to as "2030 Digital Transformation Agenda", was developed and put for the public consultations in 2018. The draft document sets out six main directions in which further measures will be implemented to ensure Armenia's digital transformation. The draft framework document focuses on Armenia's digital conversion based on "SMART government", digital labour force, infrastructure, cybersecurity, private sector competitiveness, and institutional framework. The following strategic perspectives for the implementation of the digital transformation process in Armenia are proposed in the document:

- 2018 – 2020, Digital Jump (emphasis placed on large-scale infrastructure investments and updated assets);
- 2021 – 2025, Digital Acceleration (investment to maximise productivity);
- 2026 – 2030, Digitalised Development (strong emphasis on innovation growth).

[20] Direct translation from Armenian. https://www.arlis.am/documentview.aspx?docID=110384
[21] See chapter 3.1.4. for more information on the E-Government Infrastructure Implementation Agency
[22] Including administration of sub-registries

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The draft document has been put up for public consultation and circulated among the public authorities since 2018. In 2019, a consultative meeting was held with the Prime Minister on the digital agenda and the vision for its implementation. It was agreed that the strategy should be developed for the period 2020-2025[23]. There is no publicly available information on the status of the strategy in terms of finalisation and possible adoption.

3.1.1.2 Open data

This section presents the main legislation in the area of open data in Armenia.

Law on Freedom of Information[24]

The Law on Freedom of Information was adopted in September 2003. It was widely considered a progressive document, greatly appreciated by the international community.[25]

According to the law, the public can obtain information from public authorities (covering central and local governmental institutions, state institutions, organisations funded from central or local government budgets, organisations with public functions, i.e., organisations providing public services (such as universities, schools, hospitals, energy companies, etc.)). Each public authority has appointed a responsible person for overseeing the implementation of the "freedom of information" right and for monitoring the information requests submitted to the organisation.

Nonetheless, in practice, access to information remains unstructured and lacks standardisation. The Law on Freedom of Information does not identify any public authority for the coordination of public information sharing, neither it defines clear responsibilities. Currently, many governmental bodies and officials are still reluctant to grant the public access to information.

Since the adoption of the law, the civil society and the community of journalists have advocated the need to pass regulations that would further support and facilitate the implementation of the law. Such regulations were finally adopted through Governmental Decision N 1204-N from 15th October 2015. The decision refers to the process of data registration and management (registration, classification, maintenance and duplication) which is applied by national and local authorities.[26] As a result, the procedure for accessing public information was improved.[27]

[23] https://www.primeminister.am/en/press-release/item/2019/11/15/Digitization/
[24] https://www.arlis.am/DocumentView.aspx?docID=1372
[25] Report on the state of Media in Eastern Partnership Countries, Eastern Partnership Civil Society Forum, 2015
[26] https://www.arlis.am/documentview.aspx?docID=101115
[27] Country Report on Human Rights Practices for 2015 Armenia, Freedom of Information Centre for Armenia, 2016

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Law on State Statistics[28]

This law regulates the collection, processing, storage, as well as the analysis and exchange of statistical data as well as the presentation of statistical information related to the economic, demographic, social and environmental situation in the country.

3.1.1.3 Environmental information

This section presents the main legislation in the area of environmental data and information management and dissemination in Armenia.

Law on Environmental Control[29]

This law sets up the rules for the implementation of environmental legislation, including the division of responsibilities between various public authorities at different levels. It also establishes mechanisms for the adoption of the environmental legislation in Armenia. The law covers a wide range of topics subject to environmental monitoring and protection; this very broad coverage might hinder the update of the current provisions in all the areas covered by the law.

Law on Environmental Impact Assessment[30]

The Law on Environmental Impact Assessment (EIA) adopted in 2014, defines the procedures for EIA.

EIA activities are classified into three categories reflecting the different levels of EIA according to the severity of possible environmental impacts. The law presents the standard steps to be carried out as part of the EIA procedure for various projects and activities. It establishes general legal, economic, and organisational principles for conducting mandatory EIA for projects, and sectoral development initiatives. In particular, the law grants rights for public to access environmental information and to participate in the decision-making process. In addition, the law touches on aspects related to strategic environmental assessment (SEA) and human health impact. No environmental impact assessments, based on this law, were conducted yet.

By end of 2019, the law on Environmental Impact Assessment was revised by bringing the provisions of the Aarhus Convention into national legislation, since the law from year 2014 required further alignment. Revised draft simplifies the process of obtaining an expert opinion concerning the potential impact caused by the implementation of a proposed activity and the drafting of documentation, assessing the potential impact on environment and health. Also, amendments included in Article 4 of the draft law, change the definitions of the terms used in

[29] https://www.arlis.am/DocumentView.aspx?docid=120771
[30] https://www.arlis.am/DocumentView.aspx?DocID=93148

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the law. In particular, such terms as "environment", "fundamental documents", "proposed activity", "strategic environment assessment" and "assessment of the impact on the environment", "application", "expert", "initiator", "the public", "the public concern". The conditions for the public notification process were also revised. The draft law has been officially circulated.

Government Decision N 49-8 of 8 December 2016 on the approval of "The List of Measures to be implemented for the Fulfilment of Armenia's Obligations Emanating from Several International Environmental Conventions" to which the country is a party off

The scope of this Government Decision is to formalise Armenia's commitment to the implementation of the following international obligations:

- developing a roadmap for the implementation of the new obligations derived from five EU water directives included in the "EU-Armenia Comprehensive and Enhanced Partnership Agreement (CEPA)", signed in 2017;
- revising the water code, atmospheric air protection code, forestry code, land code and other key legislation, in light with the obligations listed and agreed in CEPA agreement;
- developing a new law on Environmental Information.

The current status of these commitments is not publicly available.

Government Decision N 3-16 of 25 January 2018 on the approval of "The State Environmental Monitoring Concept"[31]

The concept covers activities related to the collection, analysis, evaluation, maintenance and dissemination of state-related environmental information. It allows for the public and governmental organisations to better understand current environmental situation and the importance of environmental monitoring.

Other environmental legislation

The table below presents the list of key environmental legislative acts.

Table 1. List of key environmental legislation (as of May 2020)

No.	Law	Date
1.	Land Code[32]	2001
2.	Water Code[33]	2002
3.	Mining Code[34]	2002
4.	Forest Code[35]	2005
5.	Law on Environmental Impact Assessment[36]	2014
6.	Law on Protection Against Atmospheric Air Pollution[37]	1994, amended in 2008

[31] https://www.arlis.am/Annexes/4/QaxvackENX002.doc
[32] https://www.arlis.am/DocumentView.aspx?DocID=123518
[33] https://www.arlis.am/DocumentView.aspx?DocID=121550
[34] https://www.arlis.am/documentView.aspx?docid=31198
[35] https://www.arlis.am/DocumentView.aspx?docid=121312
[36] https://www.arlis.am/DocumentView.aspx?DocID=93148
[37] https://www.arlis.am/DocumentView.aspx?DocID=112454

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No.	Law	Date
7.	Law on Specially Protected Areas[38]	2006
8.	Law on the National Water Programme[39]	2006
9.	Law on the Payment Rates for Environmental Waste Storage[40]	2006
10.	Law on Compensation Tariffs for Damages Caused to Flora and Fauna due to Environmental Violations[41]	2005
11.	Law on National Water Policy[42]	2005
12.	Law on Waste[43]	2004
13.	Law on Energy Conservation and Renewable Energy	2004
14.	Law on the Lake Sevan[44]	2001
15.	Law on Flora	2000
16.	Law on Fauna[45]	1999
17.	Government Resolution on the approval of "The Strategy for Environmental Education and Development"	2018

3.1.2 Main international policies and agreements

Armenia has been gradually improving its international cooperation framework in the field of the environment since its independence in 1991. The country has already ratified several multilateral environmental agreements. There is a great interest in moving closer to the EU and the international community in general.[46] The main international policies and legal frameworks, in which the country is involved, are presented below.

3.1.2.1 Multilateral Environmental Agreements with public access to information and reporting obligations

Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention)[47]

Armenia was involved in the drafting of the Aarhus Convention, signed it in 1998 and ratified on 1 August 2001. The convention sets out obligations to provide effective public access to environmental information within its broad scope held by various public authorities, public participation in decision-making and access to justice in environmental matters. The progress of conventions' implementation in Armenia is reflected in the national reports to the convention.[48]

[38] https://www.arlis.am/DocumentView.aspx?DocID=29624
[39] https://www.arlis.am/DocumentView.aspx?DocID=113051
[40] https://www.arlis.am/DocumentView.aspx?DocID=118446
[41] https://www.arlis.am/DocumentView.aspx?docid=120773
[42] https://www.arlis.am/DocumentView.aspx?DocID=1784
[43] https://www.arlis.am/DocumentView.aspx?docid=122729
[44] https://www.arlis.am/DocumentView.aspx?DocID=77097
[45] https://www.arlis.am/DocumentView.aspx?DocID=120790
[46] Environmental Performance Reviews Armenia, UNECE, 2000
[47] https://www.unece.org/env/pp/welcome.html
[48] https://aarhusclearinghouse.unece.org/national-reports

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Protocol on Pollutant Release and Transfer Registers to the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Protocol on PRTRs)[49]

The Protocol sets out obligations to establish pollutant release and transfer registers, namely a national database or inventory of potentially hazardous chemical substances (released into the air, water and soil) and off-site transfers. As such, the inventory allows public authorities to consistently track each release and transfer of a hazardous chemical substance over time. Armenia signed the Protocol on Pollutant Release and Transfer Registers to the Aarhus Convention on 21 May 2003. However, the Protocol on PRTRs has not been ratified yet[50].

Other environmental conventions

This section analyses selected multilateral environmental agreements (MEAs) in terms of public access to information, reporting and monitoring requirements. The MEAs that are presented in the table below were chosen as examples to reflect on whether the country should carry out relevant monitoring, report data in thematic areas of water, air, biodiversity, climate change and the ozone layer and provide effective public access to information. For this report, the analysis focuses on the following:

- **public access to information.** In this respect**,** a review of the official Armenian public authorities' portals was performed. The analysis shows the extent to which publicly available information covers the requirements of the MEA (information is presented in the table below).
- **reporting.** In this case, a review of MEA related databases was performed to determine if the official national reports are provided by the Armenian public authorities. The analysis indicates whether the national report related to each specific MEA was submitted on time and as required by the MEA (information is presented in the table below).
- **monitoring activities.** For this aspect, a review of the monitoring activities as defined by the respective MEA and available in the official portals, as well as reports provided by public authorities, was performed. The analysis shows if the monitoring activity was performed on time and as required by the MEA (information is presented in the table below).

The table below presents the examples of the MEAs analysed in this section.

Table 2. Analysis of selected MEAs, in terms of public access to information, reporting, and monitoring requirements (as of May 2020)

Agreement	Obligations under the agreement		
	Public access to information	Reporting	Monitoring
UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention)	Not a party		

[49] https://www.unece.org/env/pp/prtr.html
[50] https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXVII-13-a&chapter=27&clang=_en

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Agreement	Obligations under the agreement		
	Public access to information	Reporting	Monitoring
UNECE Convention on Long-range Transboundary Air Pollution	Yes[51]	Yes[52]	Yes[53]
UNECE Protocol to the 1979 Convention on Long-range Transboundary Air Pollution on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30 per cent	Not a party		
UNECE Protocol to the 1979 Convention on Long-range Transboundary Air Pollution Concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes	Not a party		
UNECE Protocol to the 1979 Convention on Long-range Transboundary Air Pollution to Abate Acidification, Eutrophication and Ground-level Ozone	Not a party[54]		
UN Convention on Biological Diversity	Yes[55]	Yes[56]	Yes[57]
UN Framework Convention on Climate Change	Yes[58]	Yes[59]	Yes[60]
UN Vienna Convention for the Protection of the Ozone Layer	Yes[61]	Yes[62]	Yes[63]
UN Montreal Protocol on Substances that Deplete the Ozone Layer	Yes[64]	Yes[65]	Yes[66]

** Explanation of the markings in the table:*

- *Yes – the country provides publicly available information on official portals or official reports related to MEAs;*
- *No – the country does not provide information on official portals or official reports;*
- *Not a party – the country has not acceded to the respective MEA.*

[51]https://armstatbank.am/pxweb/en/ArmStatBank/ArmStatBank__8%20Environment__(A)%20Emissions%20of%20pollutants%20into%20the%20atmospheric%20air/EE-a1.px/?rxid=96d6add0-c1b9-43d5-880b-e72f8b2e5968
[52] https://www.ceip.at/ms/ceip_home1/ceip_home/status_reporting/2019_submissions/
[53] https://www.ceip.at/ms/ceip_home1/ceip_home/status_reporting/2019_submissions/
[54] Armenia has signed the Protocol on 1 December 1999 but has not ratified it.
[55] Source: Statistical Committee website
[56] https://www.cbd.int/doc/world/am/am-nbsap-v2-en.doc
[57] Source: Statistical Committee website
[58] Source: Statistical Committee website
[59] https://unfccc.int/sites/default/files/resource/armnc3.pdf
[60]http://www.armmonitoring.am/page/5
[61] Source: ozone.unep.org, Country data
[62] Source: https://ozone.unep.org/countries/profile/arm
[63] Source: ozone.unep.org, Country data
[64] Source: ozone.unep.org, Country data
[65] https://ozone.unep.org/countries/profile/arm
[66] Source: ozone.unep.org, Country data

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3.1.2.2 Other international fora promoting sharing and accessibility of environmental information

This section presents other international fora which promote sharing and accessibility of information.

"Environment for Europe" process

The first "Environment for Europe" ministerial conference took place in 1991 at Dobris Castle in the former Czechoslovakia. A set of basic guidelines for a pan-European cooperation strategy was laid down[67]. The Shared Environmental Information System (SEIS) in the pan-European region was launched at the "Environment for Europe" ministerial conference in 2011.

In 2016, the eighth "Environment for Europe" ministerial conference[68] took place in Batumi, Georgia. The ministers also signed the ministerial declaration[69] "Greener, cleaner and smarter!", calling for the continuation of efforts and the further development of national information systems to have SEIS in place in the countries of Europe and Central Asia by 2021[70].

The next "Environment for Europe" ministerial conference will review progress in the area of environment and celebrate 30 years of the "Environment for Europe" process.

Open Government Partnership Initiative[71]

The Open Government Partnership (OGP) is a multilateral initiative of national reformers, all determined to make their governments more responsive to the needs of the public. Armenia is a member of the Open Government Partnership initiative since 2011. It is a multilateral initiative, a platform for national reforms, aimed to make governments more responsive to the needs of the public.

According to the OGP, Armenia has 11 commitments for period 2018-2020 that focus on building government transparency and improving public services. The progress of the implementation of these commitments has yet to be evaluated.

EU-Armenia Comprehensive Enhanced Partnership Agreement (CEPA)[72]

The EU-Armenia Comprehensive Enhanced Partnership Agreement (CEPA) was signed on 24 November 2017 in the margins of the Eastern Partnership Summit. In the field of environment, the EU supports the adoption of EU environmental standards as well as its development of clean sources of energy.

The implementation report[73] indicates that Armenia increased its efforts to implement necessary reforms. However, the country still lacks structured approach towards fighting

[67] More information: https://www.unece.org/env/efe/historyofefe/history.en1991_01.html
[68] The Conference was organised based on the provisions of the Environment for Europe Reform Plan, adopted in 2009, and in accordance with the procedures for the Batumi Ministerial Conference, adopted in 2014.
[69] https://www.unece.org/fileadmin/DAM/env/documents/2016/ece/ece.batumi.conf.2016.2.add.1.e.pdf
[70] The main outcome of the conference is available here: https://www.unece.org/index.php?id=41721
[71] https://www.opengovpartnership.org/countries/armenia
[72] https://eeas.europa.eu/headquarters/headquarters-homepage/36141/new-agreement-signed-between-european-union-and-armenia-set-bring-tangible-benefits-citizens_en
[73] https://eeas.europa.eu/sites/eeas/files/partnership_implementation_report_armenia.pdf

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corruption, independent, accountable and efficient judiciary, and eradication of monopolies and creation of a competitive business environment. In the area of environment, in 2018, such progress was made:

- the first national Extractive Industries Transparency Initiative (EITI) report was published. The findings of the report should contribute to the improvement of the management, transparency and accountability of the mining sector in Armenia;
- the Ministry of Nature Protection (currently called Ministry of Environment) drafted the National Strategy and Action Plan for Environmental Protection and Use of Natural Resources. With EU support, the Ministry introduced a new policy and legislation on Integrated Pollution Prevention and Control, which includes the prohibition of some single-use plastics by 2020;
- Armenia has also developed solid waste projects and other projects focused on water in Yerevan and small municipalities, with support through the Neighbourhood Investment Platform (NIP)[74];
- Armenia has advanced on biodiversity conservation and management of natural resources, notably by improving legislative and institutional framework. It closely relates to the management and establishment of the new Specially Protected Natural Areas, the development of management plans for national parks and reserves, and the development and implementation of species conservation programmes for rare or endangered species.

3.1.2.3 Cooperation with the EU

This section provides an overview of the main agreements with the EU.

Declaration on Cooperation on Environment and Climate Change in the Eastern Partnership[75]

In 2016, the European Union (EU) and the countries of the Eastern Partnership (EaP) adopted the declaration on Cooperation on Environment and Climate Change (Luxembourg Declaration). The declaration aims to strengthen regional cooperation on environmental and climate action, and sustainable development in the Eastern Partnership region by implementing relevant international commitments such as the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change. It seeks to

(1) raise awareness among and enhance cooperation between relevant stakeholders,
(2) support the involvement of civil society in the decision-making process, strategic planning and implementation, and
(3) monitor the results of implementation of environmental policies, programmes and plans, and other commitments.

The second Eastern Partnership (EaP) ministerial meeting on the environment and climate change took place on 9 November 2018 in Luxembourg, co-organised by the European Commission and Austrian Presidency. The progress achieved by the countries was discussed

[74]https://ec.europa.eu/neighbourhood-enlargement/neighbourhood/neighbourhood-wide/neighbourhood-investment-platform_en

[75] Declaration on Cooperation on Environment and Climate Change in the Eastern Partnership, European Commission 2016.

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and assessed in view of further strengthening international cooperation[76]. The third Eastern Partnership high-level meeting is scheduled now for early 2021 (while only a virtual summit will take place on 18 June 2020 due to coronavirus restrictions).

EaP Connect Project[77]

The EaP Connect Project was launched in July 2015. It aims to link the national research and education networks in the partner countries to the pan-European research and education network GÉANT. It connects more than 2 million scientists, academics and students from 700 institutions across the region. The joint initiative of the EU, Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine is an example of the efforts undertaken to foster the creation of digital economies and promote open data in EaP countries[78].

3.1.3 National standards, interoperability and quality control

3.1.3.1 Metadata standards

The following table presents a brief description of metadata standards for open data, spatial data, environmental data and statistical data used in Armenia.

Table 3. Metadata standards overview (as of May 2020, developed by the Report authors)

Component	Metadata standards
Open data	Armenia does not have an open data portal nor a metadata standard for open data.
Spatial	The common standards for geospatial information are not publicly mentioned. No standards similar to those established by the EU directive INSPIRE[79] or European metadata standard such as GeoDCAT-AP are adopted.
Environmental information	Armenia does not have environmental metadata standards. The country still uses some methodologies from the USSR, for instance, the air pollution calculation methodology (from 1983). Although, according to the Constitution adopted in 1995 all the previous legislation in this regard are invalid. Therefore, it is necessary to set up additional requirements for environmental information standards and norms. The National Institute of Standards (NIS) is responsible for the standards of the environmental management system based on ISO 14001[80]. It is an internationally agreed standard that sets out the requirements for an environmental management system.
Statistical	Statistical Committee is publishing metadata on its website. The published information includes Special Data Dissemination Standard (SDDS), classifications, methodologies, glossaries and revision policy. However, none-specific metadata related to environment is described.

[76] Armenia progress factsheet: https://eeas.europa.eu/sites/eeas/files/eap_factsheet_armenia_en.pdf
[77] https://www.eapconnect.eu/
[78] EDP Analytical Report, Open Data in the European Union Neighbourhood, p. 9
[79] 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)
[80] http://www.sarm.am/en/standarts/browse/5/40/119

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3.1.3.2 Quality control/ quality assurance of environmental data and information

The quality control/ quality assurance procedures in the area of environment are established by the Statistical Committee. Quality management system of the Statistical Committee is based on the European Statistics Code of Practice. The following quality management documents are available. These documents are also applicable to the collection of environmental statistics:

1. **The quality policy of The Statistical Committee** [81]: The Statistical Committee Quality Policy is aimed at the systematic improvement of statistical products and processes through the development of relevant methodologies and tools, focus on high-quality services, and increasing the work efficiency and cost-effectiveness.
2. **The quality assurance framework of the European Statistical System**[82]: approved by the Resolution of the State Council on Statistics No 31 of 21st October 2016. This document confirms the will of Armenia to align its statistical system with the European standards in the field. To ensure good quality of the services, the Statistical Committee is implementing user satisfaction surveys and external reviews. In addition, the self-assessment questionnaire on the implementation of the indicators of the European Statistics Code of Practice has been developed by the Statistical Committee in order to get the feedback from different sectors and to reveal the gaps and possible improvements.
3. **The quality declarations**[83]: the quality declarations describe the regulatory background of the statistics, the purpose and the methodology of the statistics, dissemination and other important information for the users of the statistics. The quality declarations were developed during 2011 and 2012 for each of the Statistical Committee's products. Currently, the 138 statistical products are provided under 17 statistical domains. In regard to environment, the quality declarations define rules for reporting in the field of agriculture, forestry, fishery environment, energy and food security.

3.1.4 Institutional framework for environmental information management and involvement of stakeholder

The following diagram illustrates the main environmental information, open data and e-governance stakeholders operating in Armenia as of May 2020.

[81] The Resolution of the State Council on Statistics of Republic of Armenia No 17-A of 20 June 2016 https://www.armstat.am/file/doc/99497808.pdf
[82] https://www.armstat.am/file/doc/99499353.pdf
[83] https://www.armstat.am/en/?nid=26

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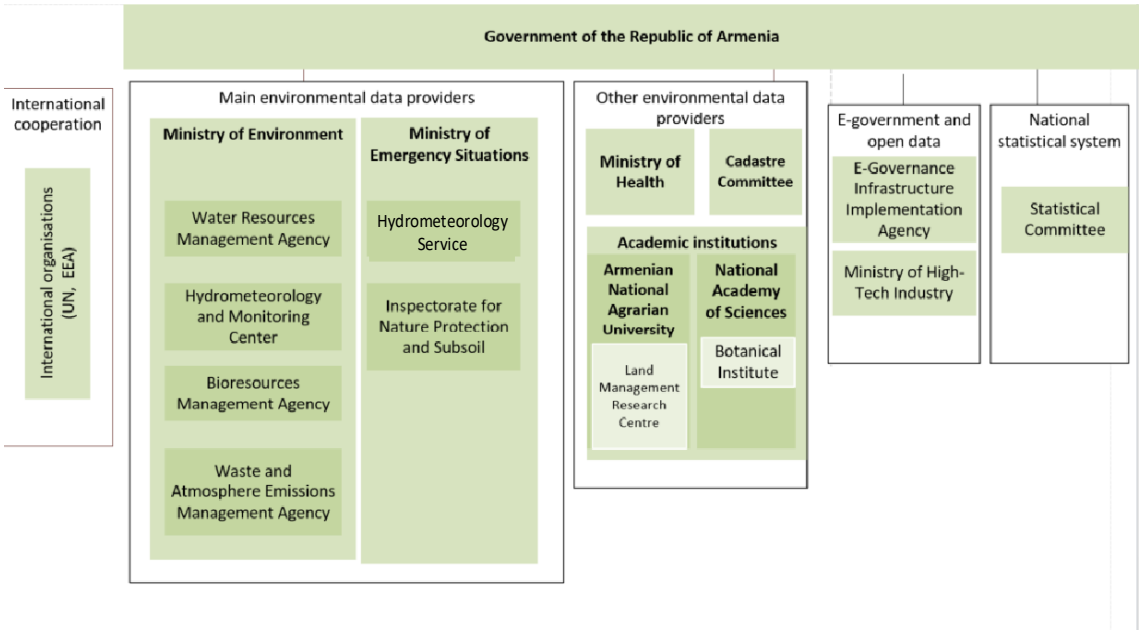

Figure 4. Institutional framework for environmental information, e-government and open data in Armenia (as of May 2020, developed by the Report authors)

Ministry of Environment[84]

The Ministry of Environment implements the national policies in the field of environmental protection and sustainable use of natural resources. In relation to environmental information, the Ministry of Environment is responsible for:

- development and review of the environment-related legislation, standards and technical regulations;
- identification and implementation of the main development directions of the environmental strategy, including education and awareness-raising campaigns;
- development of the environmental monitoring and assessment activities;
- management of environmental information systems;
- implementation and management of the obligations derived from environmental multilateral agreements the country is a party to.

The Ministry of Environment, and its subordinated structures, are responsible for the collection, analysis and dissemination of environmental information.

Subordinated structures under the Ministry of Environment include:

- **Water Resources Management Agency (WRMA)**[85]
  The Water Resources Management Agency manages the State Water Cadastre Information System. The agency is responsible for the collection and dissemination of

[84] http://www.mnp.am/
[85] http://www.wrma.am/

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data on the quantity of water resources managed through the State Water Cadastre Information System.

- **Hydrometeorology and Monitoring Centre**[86]
  As a result of the merger of "Environmental Monitoring and Information Centre", "Forest Monitoring Centre" and "Hydrometeorology and Atmospheric Impact Services" SNCOs, the Hydrometeorology and Monitoring Centre was established in 2020[87]. The centre is responsible for monitoring and dissemination in the areas such as surface water, groundwater, soil, waste, forestry, pollution of atmospheric air and others.

- **Bioresources Management Agency**
  Bioresources Management Agency is subordinated to the Ministry of Environment and does not have a dedicated website. There is no available public information related to the activities it performs**.**

- **Waste and Emissions into Atmosphere Management Agency**
  Waste and Emissions into Atmosphere Management Agency is subordinated to the Ministry of Environment and does not have a dedicated website. There is no publicly available information related to its activities.

Ministry of Emergency Situations[88]
The Ministry of Emergency Situations is the central executive authority that is responsible for emergency situation management, public safety and related activities. The ministry is responsible for the management of data and information related to hazardous objects.

Hydrometeorological Service [89]

This agency, subordinated to the Ministry of Emergency Situations, is responsible for monitoring and dissemination of data and information on the quality of surface water and air. Hydrometeorology Service produces weather forecasts, which are disseminated to the public.

Inspectorate for Nature Protection and Subsoil[90]
The Inspectorate for Nature Protection and Subsoil, subordinated to the Ministry of Emergency Situations, is responsible for supervising the implementation of norms and standards in the field of environment and protection of natural resources. It carries out state control over the fulfilment of the requirements for atmospheric air, entrails protection, use of water resources, lands, fauna, flora, hazardous materials, and waste management.

Other environmental data providers:

- **Ministry of Health**[91]
  The Ministry of Health of the Republic of Armenia is the central executive authority that guides and implements the policy in the field of health and healthcare services. In

[86] http://www.armmonitoring.am/
[87] http://www.armmonitoring.am/public/admin/ckfinder/userfiles/files/HMC_kanonadrutyun_01_06_2020.pdf
[88] http://www.mes.am/en/
[89] meteo.am
[90] https://www.ecoinspect.am/
[91] http://www.moh.am

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the context of environmental information, the ministry provides data and information related to emissions into atmospheric air and their impact on the human health.

- **Armenian National Agrarian University**[92]
  The Armenian National Agrarian University is the only higher education institution in the country that prepares specialists and implements scientific research activities in the areas of agribusiness, food technologies, agronomy, veterinary medicine and agrarian engineering. The university does not provide specific environmental data.

- **Land Management Research Centre**[93]
  Research centre, that operates under the Armenian National Agrarian University, conducts scientific research on the topics of land management, land planning, land cadastre, geographic informative systems, and effective utilization of agricultural land formations, consolidation and enlargement of land, as well as new methods of evaluating the land cadastre.

- **National Academy of Sciences**[94]
  The National Academy of Sciences is a governing body for coordinating the activities of the academic and scientific institutions. The Presidium of the Academy includes more than 34 scientific institutions and other organisations. The academy does not provide specific environmental data.

- **Botanical Institute**[95]
  Botanical Institute carries out scientific research on the following topics:
  - flora, vegetation and plant resources of Armenia;
  - forest habitats;
  - plant import and climate training;
  - the dynamics of vegetation change in Armenia for the purpose of identifying and researching ecosystems of world importance, particularly, endemic, rare relict plant species.

  The Institute also participates in the development of scientific bases for landscaping of settlements. However, the institute does not provide specific environmental data.

- **Cadastre Committee**[96]
  The Cadastre Committee is a public authority subordinated to the Government. It maintains the State Cadastre of Real Estate, develops information systems on property, geodesy and cartography, and determines the property rights and restrictions. The committee does not provide specific environmental data.

E-government and open data stakeholders:

- **Ministry of High-Tech Industry** [97]

[92] https://anau.am/en/
[93] https://anau.am/en/english-chair-of-land-management-and-land-cadastre/
[94] https://www.sci.am/about.php?langid=2
[95] http://www.botany.sci.am/
[96] https://www.e-cadastre.am/en/ and https://www.cadastre.am/
[97] https://hti.am/

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The Ministry of High-Tech Industry is an executive authority responsible for the development and implementation of the national policy in the spheres of communication, information, information technology and information security, postal services, licensing, granting of permits and military industry. The ministry does not manage or disseminate environmental data and information.

- **E-Governance Infrastructure Implementation Agency[98]**

  E-Governance Infrastructure Implementation Agency was established in 2009 by the Government of the Republic of Armenia. The agency is coordinating the overall implementation of e-Government initiatives in the Republic of Armenia.

  At this moment, the website of E-Governance Infrastructure Implementation Agency provides information and documentation related to e-signature solutions and usage.

- **Statistical Committee[99] of the Republic of Armenia[100]**

  The Statistical Committee of the Republic of Armenia collects and processes data and information from public authorities and business entities. It also receives data from administrative registers, organises its dissemination process, ensuring public access to statistical information.

- **Public authorities at sub-national and local levels - territorial units**

  Territorial units carry out their work with the support from the local structures of different ministries. This includes the regional inspectorates of the Ministry of Environment, state land inspectorates of the Ministry of Agriculture, sanitary-epidemiological and hygiene inspections of the Ministry of Health.

  The Inspectorate for Nature Protection and Subsoil supervises the implementation of environmental legislation in locally initiated /managed projects and cooperates with the regional administrations within the framework defined by the Law on Environmental Control.

  Many local governments do not have dedicated staff members responsible for environmental matters, despite several important responsibilities stipulated by the Law on Self-Governmental Authorities[101]. Local governments are partly involved in nature protection and nature conservation activities, as well as in environmental monitoring in the thematic areas of water, air, and soil. Local governments do not manage or disseminate environmental data and information.

- **Non-governmental organisations (NGOs)**

  A number of active programmes managed by the Government of the Republic of Armenia focus on NGO partnerships hence the cooperation with NGO has improved in the recent years. Although NGOs perform a wide range of activities related to

[98] https://www.ekeng.am/hy
[99] https://www.armstat.am/file/doc/99508113.pdf
[100] https://www.armstat.am/en/
[101] http://mes.am/en/the-lsg/

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sustainable development, a considerable number of them have limited human resources and heavily depend on grants. [102]

Since 1997, the Ministry of Justice has registered over 2000 NGOs. Nearly 70 are environmental related NGOs, however only around half of them are active.

- **Aarhus Centres**[103]

Since 2002, the OSCE has supported the implementation of UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (commonly referred to as the Aarhus Convention) across the OSCE region, by promoting the establishment and functioning of Aarhus Centres. Following the signature of the Aarhus Convention by the Republic of Armenia in 1998 and its ratification in 2001, the first Aarhus Centre in the OSCE region was established in Yerevan in 2002. With the support of the OSCE, 14 other Centres were inaugurated between 2005 and 2010 across the country and have been working on all three pillars of the Aarhus Convention. The Centres have played a major role in promoting access to information and dissemination of environmental information, as well as in engaging the public in environmental matters in the country, including in dealing with various environmental hotspots, disaster risk reduction, environmental legislation and other issues.

While the institutional framework related to their operation is currently undergoing revision, and a number of potential solutions in this area are currently being analysed, the Aarhus Centres continue to provide support to the implementation of the Aarhus Convention in the country, on a voluntary basis or in partnership with NGOs, to the extent possible.

Just recently, on 29 July 2020, within the Ministry of Environment of the Republic of Armenia, a Memorandum of Cooperation was signed between Hydrometeorology and Monitoring Centre SNCO, the Centre for Environmental Impact Assessment and the Yerevan Aarhus Centre. The memorandum aims to deepen cooperation on dissemination of environmental information in the process of environmental impact assessment and to support engagement between the state and the Aarhus Centres, building a constructive dialogue between the parties.

Considering the important role of Aarhus Centres in engaging the public in environmental matters, thus contributing to sustainable development that can only be achieved through the involvement of all stakeholders, it is important to identify viable solutions for their sustainable functioning.

[102] Civil Society Briefs: Armenia, Asian Development Bank, 2011

[103] https://aarhus.osce.org/armenia; As the situation is under development, this is the most recent information available from the OSCE.

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- **Regional Environmental Centre for Caucasus (REC Caucasus)**[104]

  Since its establishment in 1999, the REC Caucasus has implemented about 60 medium- and large-scale projects in the region which have contributed to policy development, capacity-building, facilitation of dialogue and networking, information exchange on environmental issues and supporting civil society in the South Caucasus states. The REC Caucasus provides numerous publications and video materials related to projects implemented in areas of land degradation, waste management, climate change, green economy, forests, biodiversity and water management.

3.2 Environmental data flows

The following diagram depicts the environmental data flows between various public authorities.

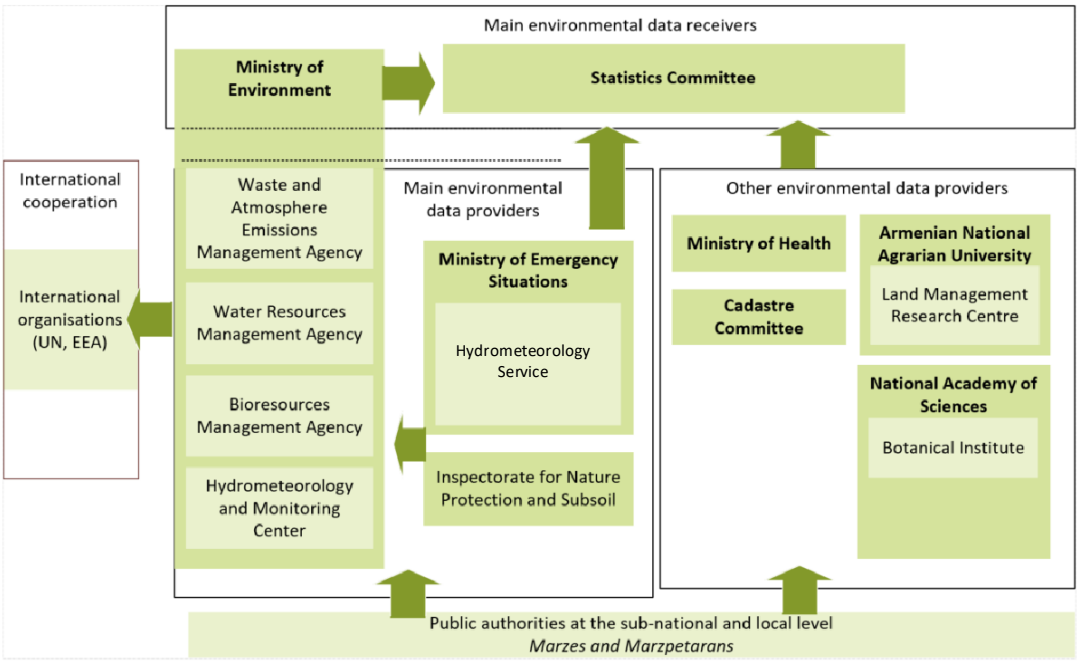

Figure 5. Environmental data flows in Armenia (as of May 2020, developed by the Report authors)

Institutional cooperation in the country is based on three types of data exchange agreements/arrangements namely inter-institutional protocols, inter-sectorial committee, and regular official and working meetings between contact persons of relevant institutions (see Figure 5).

[104] https://www.rec-caucasus.org/en

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The main organisations responsible for collecting, producing, managing and sharing environmental data and information in Armenia are the Ministry of Environment and the other public authorities presented in the previous section.

The Statistics Committee collects and disseminates certain types of environmental information. The collection, processing and dissemination of statistical information are conducted according to procedures and practices defined in the national legislation and further detailed through rules, guidelines and norms published on the website of the Statistics Committee[105].

Within the context of the ENI SEIS II project a letter of intent was signed on 30 August 2017 to support the sharing of environmental data and information between the Ministry of Environment, the Statistics Committee and the European Environment Agency (formalised through Regulation No. 122-A of 6 May 2018 of the Minister of Nature Protection of the Republic of Armenia)

3.2.1 Available environmental assessment reports, indicators and statistics

3.2.1.1 Environmental assessment reports

The ENI SEIS II East project website[106] summarises the main environmental assessment reports prepared and made currently available by Armenian public authorities. The main reports are presented in the table below reflecting the status of availability as of May 2020.

Table 4. List of main environmental reports by source in Armenia (as of May 2020, from ENI SEIS II East project website)

Report category	Report description
National environmental reports	Annual environment monitoring bulletin Data source: http://www.mnp.am/uploads/1/1521046228Annual-17.pdf Prepared by: Environmental Monitoring and Information Centre Last year published: 2019 Frequency: annual
Thematic reports - climate (national communications to UNFCCC)	Third National Communication of Armenia under the United Nations Framework Convention on Climate Change Data source: https://unfccc.int/resource/docs/natc/armnc3.pdf Prepared by: Ministry of Environment Last year published: 2015 Frequency: every 5 years
Thematic reports – land	Soil balance Data source: http://www.mnp.am/am/pages/209 Prepared by: Ministry of Environment Last year published: 2019 Frequency: annual
Thematic reports – air	Atmospheric Air Pollution in the Territory of the Republic of

[105] State of SEIS implementation in 2018 - Country Factsheet the Republic of Armenia, UNECE.
[106] https://eni-seis.eionet.europa.eu/east/countries/armenia

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Report category	Report description
	Armenia Data source: http://www.armmonitoring.am/public/admin/ckfinder/userfiles/files/ampopag/Odi%20Obzor%202019.pdf Prepared by: Environmental Monitoring and Information Centre Last year published: 2019 Frequency: annual
Thematic reports - water	Quality of Water in the Territory of the Republic of Armenia Data source: http://www.armmonitoring.am/public/admin/ckfinder/userfiles/files/ampopag/Water%20report%202019.pdf Prepared by: Environmental Monitoring and Information Centre Last year published: 2019 Frequency: annual
Thematic reports - biodiversity	Sixth National Report to the Convention on Biological Diversity Data source: http://www.mnp.am/uploads/1/15840212196-N.REPORT-ARMENIA-revised-eng-05.03.2019.pdf Prepared by: Ministry of Environment Last year published: 2019 Frequency: every four years
Thematic reports – waste	No data available
Indicator-based reports	Environment monitoring report Data source: http://www.mnp.am/uploads/1/1521046228Annual-17.pdf Prepared by: Environmental Monitoring and Information Centre Last year published: 2017 Frequency: inconsistent
National Statistical Yearbook	Statistical Yearbook of Armenia Data source: https://www.armstat.am/en/?nid=586&year=2019 Prepared by: Statistical Committee Last year published: 2019 Frequency: annual
Report on sustainable development	Report for the UN High-level Political Forum on Sustainable Development Data source: https://sustainabledevelopment.un.org/content/documents/19586Armenia_VNR_2018.pdf Prepared by the Government of Armenia Last year published: 2018 Frequency: inconsistent

3.2.1.2 UNECE environmental indicators produced by the Republic of Armenia

The website of the Statistical Committee of the Republic of Armenia publishes 49 UNECE indicators, as of May 2020. The following table provides detailed information about the UNECE indicators produced and available on the Statistical Committee website, organised by environmental thematic area.

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Table 5. List of UNECE indicators produced on a regular basis in Armenia (as of May 2020, armstatbank.am[107])

Thematic area	UNECE indicator	Status
A. Air pollution and ozone depletion	A1. Emissions of pollutants into the atmospheric air	Publicly available Frequency: annual
	A2. Ambient air quality in urban areas	Publicly available Frequency: annual
	A3. Consumption of ozone-depleting substances	Publicly available Frequency: annual
B. Climate change	B1. Air temperature	Publicly available Frequency: annual
	B2. Atmospheric precipitation	Publicly available Frequency: annual
	B3. Greenhouse gas emissions	Publicly available Frequency: annual
C. Water	C1. Renewable freshwater resources	Publicly available Frequency: annual
	C2. Freshwater abstraction	Publicly available Frequency: annual
	C3. Total water use	Publicly available Frequency: annual
	C4. Household water use per capita	Publicly available Frequency: annual
	C5. Water supply industry and population connected to the water supply industry and	Publicly available Frequency: annual
	C6. Connection of population to public water supply	Publicly available Frequency: annual
	C7. Water losses	Publicly available Frequency: annual
	C8. Reuse and recycling of freshwater	Not publicly available
	C9. Drinking water quality	Publicly available Frequency: annual
	C10. BOD and concentration of ammonium in rivers	Publicly available Frequency: annual
	C11. Nutrients in freshwater	Publicly available Frequency: annual
	C12. Nutrients in coastal seawaters	Not publicly available
	C13. Concentrations of pollutants in coastal seawater and sediments (except nutrients)	Not publicly available
	C14. Population connected to	Publicly available

[107] https://armstatbank.am/pxweb/en/ArmStatBank/ArmStatBank__8%20Environment/?rxid=96d6add0-c1b9-43d5-880b-e72f8b2e5968

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Thematic area	UNECE indicator	Status
	wastewater treatment	Frequency: annual
	C15. Wastewater treatment facilities	Publicly available Frequency: annual
	C16. Polluted (non-treated) wastewaters	Publicly available Frequency: annual
D. Biodiversity	D1. Protected areas	Publicly available Frequency: annual
	D2. Biosphere reserves and wetlands of international importance	Publicly available Frequency: annual
	D3. Forests and other wooded lands	Publicly available Frequency: annual
	D4. Threatened and protected species	Publicly available Frequency: annual
	D5. Trends in the number and distribution of selected species	Publicly available Frequency: annual
	D6. Invasive alien species	Publicly available Frequency: annual
E. Land and soil	E1. Land uptake	Publicly available Frequency: annual
	E2. The area affected by soil erosion	Publicly available Frequency: annual
F. Agriculture	F1. Irrigation	Publicly available Frequency: annual
	F2. Fertiliser consumption	Publicly available Frequency: annual
	F3. Gross nitrogen balance	Publicly available Frequency: annual
	F4. Pesticide consumption	Publicly available Frequency: annual
G. Energy	G1. Final energy consumption	Publicly available Frequency: annual
	G2. Total primary energy supply	Publicly available Frequency: annual
	G3. Energy intensity	Publicly available Frequency: annual
	G4. Renewable energy consumption	Publicly available Frequency: annual
	G5. Final electricity consumption	Publicly available Frequency: annual
	G6. Gross electricity production	Publicly available Frequency: annual
H. Transport	H1. Passenger transport demand	Publicly available Frequency: annual
	H2. Freight transport demand	Publicly available Frequency: annual
	H3. Composition of road motor vehicle fleet by fuel type	Not publicly available
	H4. Age of road motor vehicle	Not publicly available

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Thematic area	UNECE indicator	Status
	fleet	
I. Waste	I1. Waste generation	Publicly available Frequency: annual
	I2. Management of hazardous waste	Publicly available Frequency: annual
	I3. Waste reuse and recycling	Not publicly available
	I4. Final waste disposal	Publicly available Frequency: annual
J. Environmental financing	J1. Environmental protection expenditure	Publicly available Frequency: annual

The table below gives an indication of the country performance in producing and publishing the UNECE environmental indicators as presented on the ENI SEIS II East project website[108]. The current results indicate that in most categories Armenia is producing up to 100 per cent of the UNECE indicators, which represents a very good performance for this year.

Table 6. Assessment of performance in producing UNECE indicators (as of May 2020, based on the ENI SEIS II East project information)

Thematic area	Evaluation
A. Air pollution and ozone depletion	
B. Climate change	
C. Water	
D. Biodiversity	
E. Land and soil	
F. Agriculture	
G. Energy	
H. Transport	
I. Waste	
J. Environmental financing	

0/No data | 25% | 50% | 75% | 100%

3.2.1.3 Environmental statistics published

The Statistical Committee receives environmental data from public authorities responsible for environmental data management and based on this produces environmental statistics in accordance with the UNECE thematic areas. The environmental statistics are available for all thematic areas listed below and accessible for public use from the armstatbank.am website.

Table 7. Environment statistics published on Statistical Committee website armstatbank.am (as of May 2020, developed by the report's authors)

[108] https://eni-seis.eionet.europa.eu/east/countries/armenia

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Thematic areas of environmental statistics disseminated by State Statistical Committee	Environmental statistics
A. Air pollution and ozone depletion	Example of environmental statistics prepared and disseminated by Statistical Committee: • (A1) Emissions of pollutants into the atmospheric air • (A1-1) Emissions of pollutants into the atmospheric air (per capita and per square) • (A2) Ambient air quality in urban areas • (A3) Consumption of ozone-depleting substances
B. Climate change	All environmental statistics are available on the dedicated 'ArmStatBank' website of the Statistical Committee accessible at the following link: • https://armstatbank.am/
C. Water	
D. Biodiversity	
E. Land and soil	
F. Agriculture	
G. Energy	
H. Transport	
I. Waste	
J. Environmental finance	
Environmental economic accounts	

3.2.2 Environmental data sharing arrangements/agreements

This section describes the flow of environmental information and data between the main institutional stakeholders. When available, the main arrangement/agreements behind this regular exchange are also highlighted.

The environmental information at all stages is provided electronically via official communication channels. However, there is no central environmental system and no applied standard for information exchange. The following table provides facts on the existing inter-institutional cooperation agreements and information sharing mechanisms for exchange.

Table 8. Inter-institutional cooperation for environmental data exchange (as of May 2020)

Public authorities	Thematic area	Inter-institutional cooperation for data exchange
Ministry of Environment	B. Climate change C. Water D. Biodiversity E. Land and soil I. Waste J. Environmental financing	Ministry of Environment collaborates with other ministries and public institutions based on inter-sectoral commissions. They are convened when specific environmental issues arise and common measures have to be taken.
Water Resources Management Agency	C. Water	The agency is a subordinate authority to the Ministry of Environment. The agency supplies the collected data on water resources to the Ministry of Environment; which in turn processes, aggregates and makes the data available via its official website. There is no publicly available formal agreement on the information exchange with other public authorities than

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Public authorities	Thematic area	Inter-institutional cooperation for data exchange
		with the Ministry of Environment itself.
Environmental Monitoring and Information Centre	A. Air pollution and ozone depletion C. Water	The centre is a subordinate authority to the Ministry of Environment and provides the collected data on pollution of air and water resources to the Ministry. There is no publicly available formal agreement about information exchange with other public authorities.
Ministry of Emergency Situations	A. Air pollution and ozone depletion C. Water E. Land and soil I. Waste	The Ministry actively exchanges information with other governmental authorities such as the Ministry of Agriculture and Ministry of Environment. There is no publicly available formal agreement about information exchange with other public authorities.
Armenian State Hydrometeorological and Monitoring Service	A. Air pollution and ozone depletion C. Water E. Land and soil	The data collected are stored on an internal database, which is not publicly available. There is no information about cooperation with other public authorities.
National Academy of Sciences	E. Land and soil	There is no publicly available formal agreement about information exchange with other public authorities.
Ministry of Health	A. Air pollution and ozone depletion C. Water D. Biodiversity	There is no publicly available formal agreement for information exchange with other public authorities. The Ministry of Health aggregates and analyses the data received from these specialised units and reports them on a regular basis to the Statistical Committee.
Statistical Committee	A. Air pollution and ozone depletion C. Water E. Land and soil D. Biodiversity I. Waste	According to the law the Committee receives data from various public authorities and prepares statistical data and further develops statistical reports.

3.2.3 Licensing norms

Published resources that are available on public authorities' websites are accessible free of charge. No licence is referenced on any website, although copyrights are mentioned. The rules and conditions for the data published fall under the Law on Copyright and Related Rights[109], which stipulates the right of the owner/producer of the database on its own products.

The following table describes the licences available on the main portals.

Table 9. Licensing norms per portal

Portal	Licensing
Ministry of Environment	All information provided on the website of the Ministry of Environment is protected by copyright.
Statistical Committee	All information provided on the Statistical Committee website is copyright protected. A notice on the site indicates that "By using the website, please

[109] https://www.aipa.am/en/CopyrightLaw/

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Portal	Licensing
	refer to Statistical Committee" implying that the information could be used if reference to the source is made.

3.3 Progress so far

3.3.1 Main initiatives

Transactional e-Governance Development in Armenia[110]

The project was executed between 2012 and 2014 and was funded by the EU. The outcome of this activity strengthened the development of e-governance initiatives through the improvement of the legal framework and facilitated the deployment of different e-applications in the country. This project aimed to transform and improve the way public authorities interact with the public, as well as interinstitutional communication.

The main goal of this project was to introduce certain e-services for Armenia by:

- establishing a web-based environmental communication platform between the public and the government agencies "mail Armenia";
- establishing a digital Civil Status Registry and digitalise the civil registry records;
- piloting e-police services;
- providing policy advice to the government on the further development of Information Society and e-government;
- providing e-government support to the Statistical Committee.

The project allowed to accelerate e-government initiatives in the country, however, there is no evaluation done on the real impact of this activity in the longer term. No recent information is available on further progress achieved as a follow up of the project (the project web page is currently unavailable).

EU4Armenia: e-Gov Actions[111]

The project seeks to increase efficiency of the public services by establishing a common interoperability platform for enabling a "One Window" portal for all governmental services. This project targeted as a first step, the implementation of the One Stop Shop approach at border-crossing. "Single Electronic Window" will secure electronic exchange of data among all state agencies and economic agents in border crossing procedures. This will lead to simplified communication among all involved parties, elimination of administrative burden and acceleration of processes. The project was started at the end of 2017 and runs until 2020[112]. The budget of the project budget is 5.6M EUR. There is no publicly available information on the current status of the project implementation.

Shared Environmental Information System (SEIS) Lake Sevan[113]

[110] https://ega.ee/project/e-governance-development-in-armenia/
[111] https://eeas.europa.eu/delegations/armenia_en/41316/EU4Armenia:%20e-Gov%20Actions
[112] More about the projects and the progress: https://www.eu4armenia.am/
[113] http://seis-sevan.am/?p=about-us

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Under the ENI SEIS I project, EEA supported the Armenian authorities to develop a pilot project aiming to establish a Shared Environmental Information System (SEIS) for the Lake Sevan. This activity was conducted in 2014 and2015 and was a component of the regional project "Towards a Shared Environmental Information System in the European Neighbourhood" (ENPI-SEIS, 2010-2015) funded by EU.

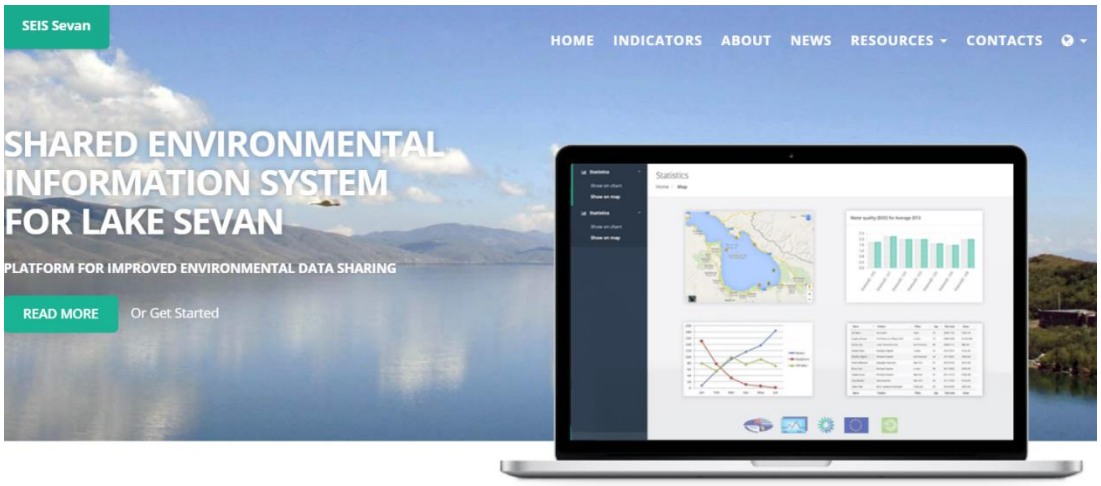

Figure 6. Shared Environmental Information System for Lake Sevan (as of May 2020, seis-sevan.am/)

The pilot project aimed at developing a model/mechanism to allow the integration of data from a variety of sources and providers, all related to the Lake Sevan protection, use and exploitation of resources. It was a step towards regular data sharing among key partners. It had been agreed that only data pertinent to the management of water resources should be included in the first phase (i.e. datasets underpinning a small set of essential water indicators) in order to limit the initial scope/range of data sets.

The Statistical Committee was leading the development of the Lake Sevan portal in cooperation with the Environmental Monitoring and Information Centre. Other ministries (existing at the time such as the Ministry of Territorial Administration and Emergency Situations, the Ministry of Energy Infrastructures and Natural Resources, the Ministry of Agriculture) were among key data providers during this pilot project.

The final report of the pilot project included conclusions and recommendations for further continuation and development of this system as well as the need for regular updating.

Currently, the latest data and statistics found on the SEIS Lake Sevan portal date from 2015.

Development and implementation of the national Ecoportal

Armenia has developed and implemented the Ecoportal with the technical and financial support of the ENI SEIS II East project under EU funding. The EEA support has focused primarily on the practical steps leading to the regular production of a limited number of key indicators related to water quality and water quantity at the national level (compliant with EEA core set and UNECE water related indicators). After development and testing, the portal is deployed and managed by the Environmental Monitoring and Information Centre. The following public authorities were involved in the implementation of “Ecoportal”:

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- Ministry of Environment and a number of subordinated institutions to the Ministry:
  - Inspectorate for Nature Protection and Subsoil;
  - Environmental Monitoring and Information Centre of the Ministry of Environment;
  - Water Resources Management Agency of the Ministry of Environment (WRMA).
- Hydrometeorology Service under the Ministry of Emergency Situations (HYDROMET);
- Statistical Committee.

Although currently the Ecoportal[114] contains only water information, it was designed to further expand to other thematic areas of the environment. Current content of the Ecoportal is presenting the indicators C1-C5, C10, C11 and D1 from the UNECE water indicators and the data behind. Other UNECE thematic area indicators are being developed (see section "Indicators" of this document). In addition, the Ecoportal hosts a number of publications, reports, maps and a database in the area of water. The portal will also function as a common working platform among the water agencies to exchange monitoring information and data.. Designed based on the Shared Environmental Information System principles, the portal provides comparable data, information and derived products to various users to implement effective water resource management, analytical work, water resource conservation and sustainable use,

The content management system of the Ecoportal has been developed in Armenian and English languages. Furthermore, the content of the Ecoportal was developed and populated by taking into account the results of other ongoing projects such as the EU Water Initiative (EU WI +) and United States Agency's for International Development (USAID) PUREwater and ASPIRED[115], which developed water databases.

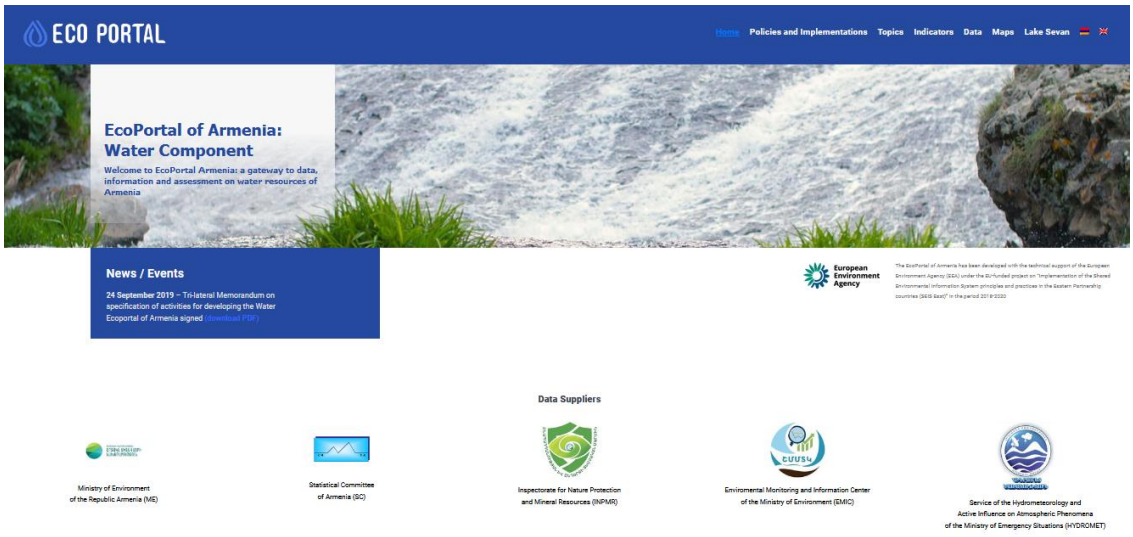

Figure 7. (accessible http://ecoportal.mnp.am:92/ as of May 2020)

[114] http://ecoportal.mnp.am:92/
[115] https://www.usaid.gov/armenia/our-work/economic-growth-and-trade

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3.3.2 International rankings

International rankings are important, as they assess progress made against other countries based on internationally acknowledged methodologies.

E-Government Development Index[116] (EGDI)

EGDI is a composite indicator, used to measure the readiness and the capacity of public authorities to use ICTs to deliver public services. Its components include Online Service Index (OSI), Telecommunication Infrastructure Index (TII) and Human Capital Index (HCI).

In 2018, Armenia scored 0.5944 and was ranked in #87 out of 193 countries. The figure below shows the change in EGDI in 2012-2018.

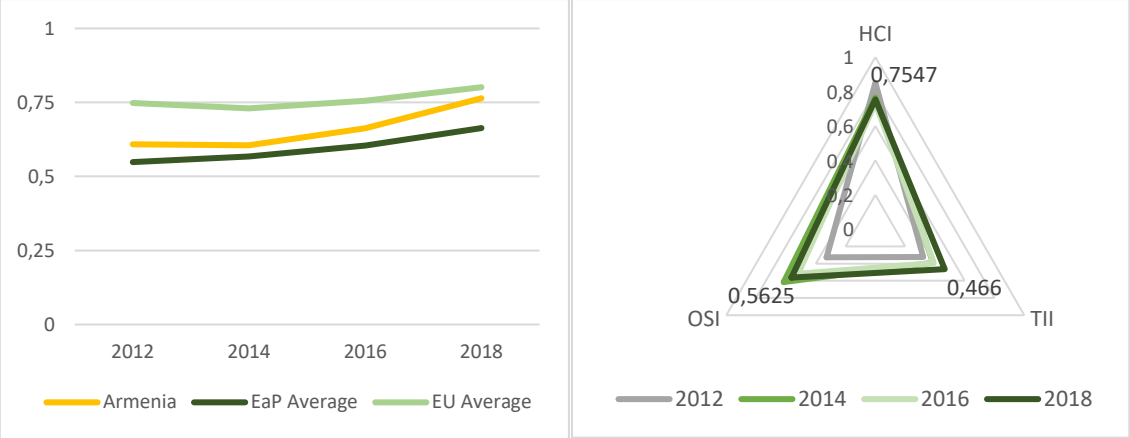

Figure 8. EGDI indicator for Armenia (2012-2018) (developed by the report's authors based on EGDI data)

These figures show the change in the value of EGDI components between 2012 and 2018 (value closer to 1 shows higher progress). OSI fluctuated in the last 6 years reaching the highest level in 2014 (0.6142). In 2018 the value of OSI was 0.5625. HCI decreased from the level of 0.8505 in 2012 to the level of 0.7547 in 2018. TII has the lowest score out of these 3 categories, but it has been experiencing steady growth in recent years and is currently at the level of 0.466.

In general, the score increase for e-services is due to the introduction of digital signature, and the development of e-services on various e-services platforms managed by public authorities.

Global Open Data Index[117]

The Global Open Data Index is the annual global benchmark for publication of open government data, run by the Open Knowledge Network. The survey is designed to assess the openness of specific government datasets according to the Open Definition in 16 different areas including government budget, spending and procurement, access to information about land ownership, election results at all levels and national statistics.

No data are available for the Republic of Armenia.

[116] https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/8-Armenia/dataYear/2018
[117] https://index.okfn.org/

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Open Data Inventory (ODIN) score[118]

The Open Data Inventory (ODIN) assesses data provided by national statistical offices (NSOs) through their principal websites for topical coverage and openness. The results are tabular to allow comparisons across different datasets within the country and between countries. ODIN unique methodology has been applied to 180 countries.

In 2018, Armenia had 50 points (out of 100) in terms of data coverage and 56 points (out of 100) when it comes to data openness. This translates into a combined result of 53 points. The overall ODIN score (which includes also social and economic statistics) was 53 points (#61 in the world versus #40 in 2017). When it comes to environmental statistics the situation is as follows:

Table 10. ODIN Score for Armenia between 2015-2018 (developed by the report's authors based on ODIN data)

	2015	2016	2017	2018	Avg. EU 2018	Avg. EaP 2018
Coverage	44	48	40	50	59	56
Openness	50	48	56	55	74	53
All elements	47	48	48	53	67	54

Armenia has a rather high score in the ODIN evaluation, closely aligned with the EU average. The evaluation of the ODIN score took into consideration the UNECE indicators published on the Statistical Committee website. In particular, the environmental coverage sub-score is 41% and the openness sub-score is 56%. This suggests a rather moderate focus on environmental data collection and therefore a moderate data availability for public use. More information is provided in the following figure.

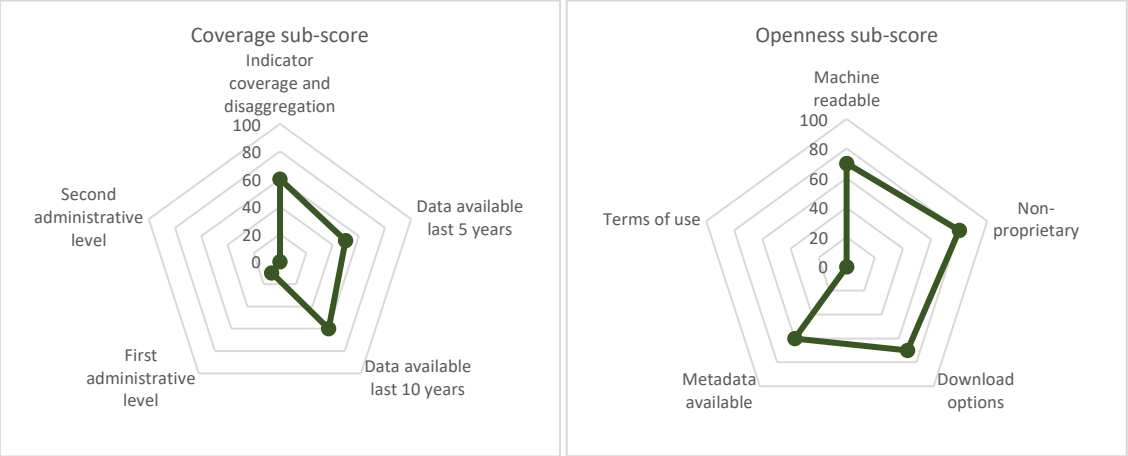

Figure 9. Coverage sub-score and openness sub-score of environment statistics in 2018 (developed by the report's authors based on ODIN data)

Open Data Barometer

[118] https://odin.opendatawatch.com/Report/countryProfile/ARM?appConfigId=5

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The Open Data Barometer is produced by the World Wide Web Foundation with the support of the Omidyar Network. It aims to uncover the readiness, implementation status and impact of open data initiatives around the world. The Open Data Barometer analyses global trends and provides comparative data on governments and regions using an in-depth methodology that combines contextual data, technical assessments and secondary indicators.

No data are available for the Republic of Armenia.

Environmental Performance Index[119]

The Environmental Performance Index (EPI) ranks 180 countries on 24 performance indicators across ten issue categories covering environmental health and ecosystem vitality. These metrics provide a gauge at a national scale on how close countries are to established environmental policy goals.

In 2018, Armenia ranked 63 out of 180 countries with the score 62.07, which is above the regional EaP average of 58 but still below the EU average of 74. The figure below shows the main indicators of the EPI.

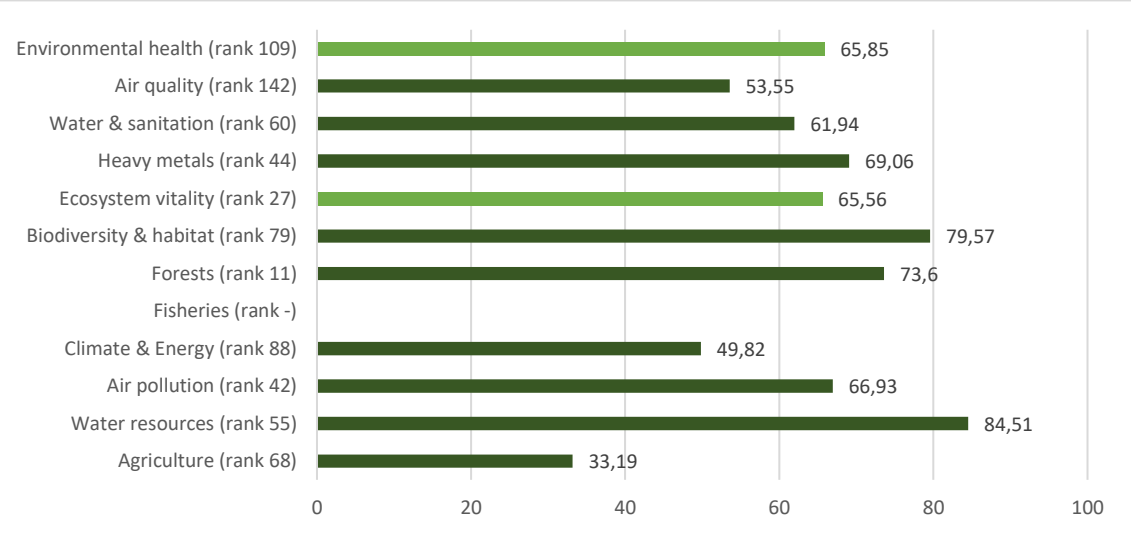

Figure 10. Indicators of EPI of Armenia in 2018 (epi.envirocenter.yale.edu/epi-country-report/ARM)

According to the report for the UN High-level Political Forum on Sustainable Development[120] (9-18 July 2018), the main challenges for the environment in Armenia are deforestation, use of solid fuel by householders, and deepening of the negative impacts caused by mining activities. The lowest ranking relates to agriculture[121].

[119] https://epi.envirocenter.yale.edu/epi-country-report/ARM

[120] Agriculture and Food Processing in Armenia – Limush Publishing House, Yerevan 2010, https://www.chamber.org.il/media/149433/%D7%A1%D7%A7%D7%99%D7%A8%D7%94-%D7%90%D7%A8%D7%9E%D7%A0%D7%99%D7%94.pdf

[121] Armenia, The challenges of Reform in the Agricultural Sector, 1995, WorldBank: http://documents.worldbank.org/curated/en/110001468740422505/pdf/multi-page.pdf

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Actions taken by the Republic of Armenia in response to deforestation issue

On 20-22 February 2019, more than 30 national forest experts came together to review and finalise the criteria and indicator set at a workshop organized by UNECE and FAO. Armenia is part of the project "Accountability Systems for Sustainable Forest Management for the Caucasus and Central Asia" which is funded through the United Nations Development Account and which supports several countries in developing national level criteria and indicator sets for sustainable forest management. "The results of this workshop can make a significant contribution to the positive changes that have taken place in Armenia, aiming to increase accountability and transparency in the forest sector" said, Deputy Chairperson of the Committee of Forest of the Ministry of Nature Protection.

In 2017, Armenia ratified the Paris Agreement (agreement within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with greenhouse gas emissions mitigation, adaptation and finance starting in the year 2020) committing to increase its forest cover to 20.1 % by 2050. "It is crucial to create a functioning forest monitoring system to allow an assessment of the progress and quality of restoration efforts" concluded the Deputy Head of the UNECE/FAO Forestry and Timber Section. For several years, remote sensing technologies have been applied for forest monitoring in Armenia. As a result, information on forests has become more accessible, is regularly updated and allows to draw conclusions on the historical forest situation in the country. This information is used, inter alia, to monitor and manage forest fires, the change of forest area and the ecosystem health.

By developing a national-level criteria and develop a dedicated indicator set, Armenia follows other 23 countries who are already using this approach, which promises to enhance discourse and communication on sustainable forest management.

Sustainable agriculture is a significant challenge in Armenia. The Armenian Development Strategy for 2014 – 2025 is the key document which sets up a framework and defines targets, priorities, thus a sustainable path, for the development of agriculture and rural policy. Accompanied by an action plan, this strategic document serves as a basis for enhancing continuity to the agrarian reform aiming to ensure sustainability of the production, alleviate poverty and reduce rural migration to urban areas. Armenia also closely collaborates with the Food and Agriculture Organisation (FAO). Here, the focus is on increased competitiveness and improved rural livelihoods to support the achievement of the Sustainable Development Goals. FAO's assistance in Armenia is shaped by the 2016-2020 FAO Country Programming Framework, focusing on three priority areas – (1)sustainable use of natural resources, (2) animal health, plant protection and food safety, and (3) food and nutrition security and poverty reduction.[122].

3.3.3 ICT related statistics

The ICT infrastructure in Armenia developed very fast. In 2009, only 15% of people had access to the internet, while in 2018 the number increased to 65%. Many international reports[123] are highlighting the monopoly in the sector as a blocking factor for the free market and open competition. Currently, three telecommunications operators in Armenia offer mobile internet services: ArmenTel, K-Telecom, and Ucom. In Armenia, they provide mobile connections based

[122] http://www.fao.org/3/a-az504e.pdf
[123] Harvard, READINESS FOR THE NETWORKED WORLD, https://cyber.harvard.edu/itg/libpubs/Armenia_eReadiness_Report.pdf
USAID, ICT Country profile, Armenia 2013: http://www.rciproject.com/itprofiles_files/ICT_Country_Profile_Armenia_2013_1.0.pdf

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on 3G, 4G, and 4G+ network technology. Though the 3G network is available in the capital and regions, the 4G network is available only in the capital and other large cities in the country.

According to the International Telecommunication Union[124], Armenia had at the end of 2018 (last official data available):

- Fixed-telephone subscriptions per 100 inhabitants: 16
- Mobile-cellular subscriptions per 100 inhabitants: 121
- Fixed (wired)-broadband subscriptions per 100 Inhabitants: 12
- Mobile-broadband subscriptions per 100 inhabitants: 76
- Households with a computer (%): 65
- Households with internet access (%): 65
- Persons using the internet (%): 69.7

[124] Link to Armenia country profile with the latest data : https://www.itu.int/net4/itu-d/icteye/CountryProfile.aspx

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4 Technology enablers for environmental information sharing

4.1 Portals

This section provides insights on the platforms available in Armenia for the publication of environmental data and information for national and international access and use.

4.1.1 Open data portal

Currently, the data provided by the public authorities are dispersed. As of May 2020, there are no official plans to pursue an open data portal. The public information is published on the websites of the various public authorities and are available upon request. Many public authorities publish PDF documents identifiable only through their administrative records (order number and date of issuing) making such documents difficult to search, use and reuse.

4.1.2 E-government portal

Armenian e-government portal brings together the electronic governance tools and the various databases managed by the public authorities and provides access for their use. It contains links to multiple e-service sectoral and horizontal portals (e.g., Unified portal for online requests https://e-request.am/en, State Electronic Payment System https://www.e-payments.am/en/). Currently, the website does not contain a catalogue of the public services provided by the national and local authorities. The portal itself does not contain e-services workflows, though online tools can be accessed through the portal – e.g. service request forms are available for some e-services, such as the possibility to track official letters submitted through the portal, the possibility to apply for licenses, etc..

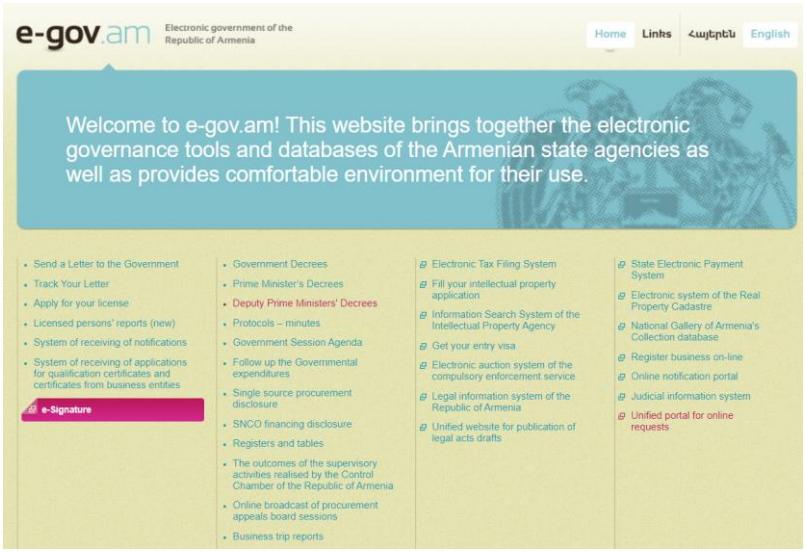

Figure 11. E-government portal of Republic of Armenia (as of May 2020,)

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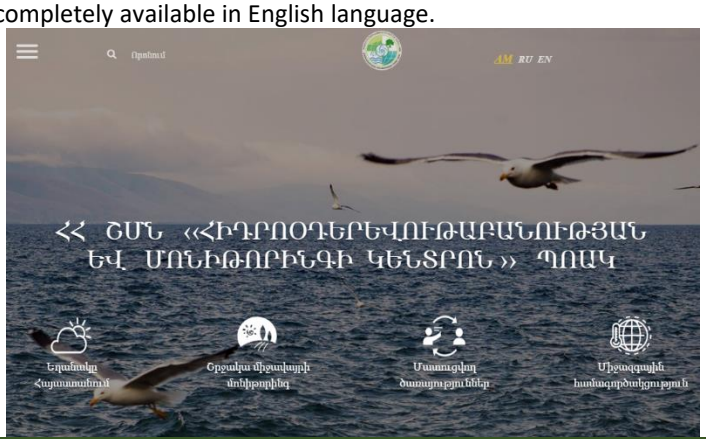
4.1.3 Environmental portals

There are multiple platforms in Armenia which are used to publish environmental data and information. In addition, often institutional changes taking place over the past years have hindered the improvements related to interoperability and public access. The following table summarises the main environmental national portals available currently in the country.

Table 11. Main environmental information platforms and portals managed by public authorities (as of May 2020)

Portal	Description
Website of the Ministry of Environment www.mnp.am	The website of the Ministry of Environment is available in Armenian, English and Russian. The website contains a summary of laws, resolutions and orders related to the environment. It also hosts reports on the environment organised by topics: “atmosphere”, “water”, “waste”, “biodiversity”, “soil” and “environmental monitoring”. Only a few reports are available under each topic. The English translation of the website does not provide access to all the content. The links to the Armenian and English versions are also different which leads to difficulties in navigating the portal and limits international access and usage. 
Hydrometeorology and Monitoring Centre armmonitoring.am	The website is hosting environmental data on atmospheric air, surface and, groundwater, waste, soil, land coverage. The website contains statistical data and presents a series of visuals (maps, graphs, etc.), but is not completely available in English language. 

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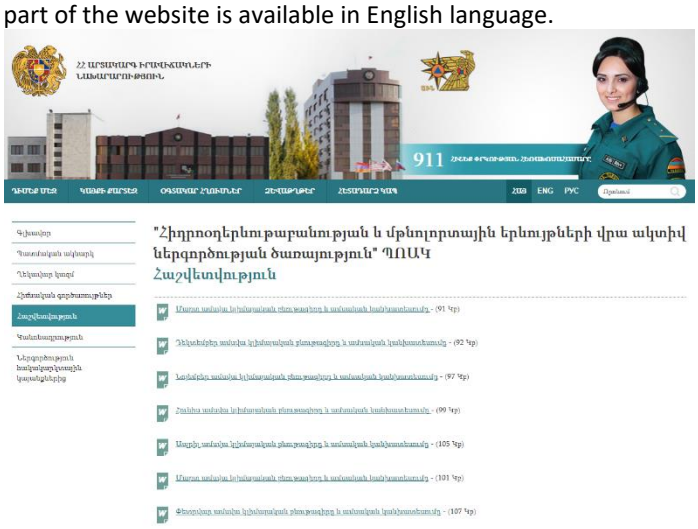
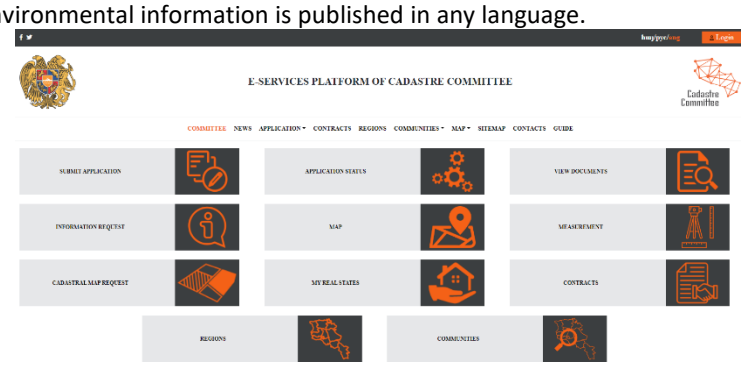
Portal	Description
Water Resources Management Agency of the Ministry of Environment www.wrma.am	The website provides access to activity reports, specific water resources reports, permits issued, State Water Cadastre Information System spatial data, maps and reports/publications. It also contains a section dedicated to "spatial data" which is currently under construction. The website is user-friendly, while the English version is yet to be completed. 
Hydrometeorological Service www.mes.am/en/meteo-management	The website provides access to monthly hydrometeorological reports. Only part of the website is available in English language. 
Cadastre Committee, RoA Maps www.e-cadastre.am/en/map	The website provides access to a map viewer of the Cadastre, where one can apply for different land management related services. No environmental information is published in any language. 
Statistical Committee www.armstat.am armstatbank.am/	The Statistical Committee of the Republic of Armenia publishes official statistics on various topics, mostly commercial/ economic related. Statistical information is published on two websites, available in Armenian and English.

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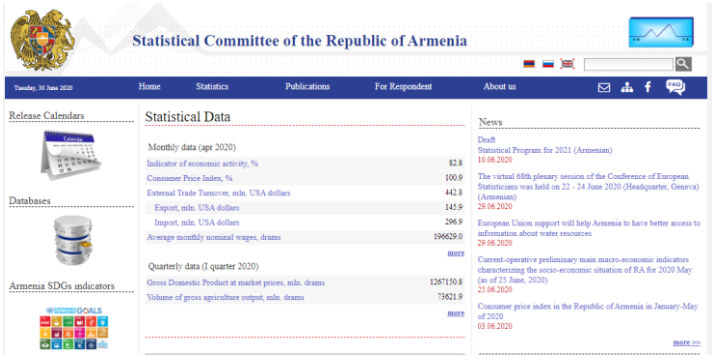
Portal	Description
	.The official website (www.armstat.am) lacks data visualisation and has few environmental statistics.  The data visualisation platform (armstatbank.am/) has a high degree of usability, the portal enables cross-sectoral and time series analysis. Here environmental data is used for the compilation of UNECE indicators. This portal is a good example for other EaP countries on how data can be visualised and made available and accessible for public use. 

4.2 Environment open data availability and reuse

Due to the substantial number of platforms available at national level, Armenia has a wide spread of environmental data and information on multiple websites. This situation often creates difficulties for the users in terms of finding the right information, in finding the most recent information or in finding the most reliable information. At the other side of the information chain, on the information provider side, this situation leads to duplication of work and resources, due to the lack of dialogue, coordination and agreement on who is publishing what in terms of environmental information. The consistent regular update of the information across so many websites is also affected by this fragmentation hence the difficulty in finding where to find the most recent information for potential use and re-use.

The table below presents an evaluation of the Statistical Committee website in terms of data availability and reusability.

Table 12. Statistical Committee website reusability (as of May 2020)

Portal	Website of the Statistical Committee
Statistics referring to the availability of	The website publishes environmental and environment-related statistical information organised per topics: emissions of pollutants into the

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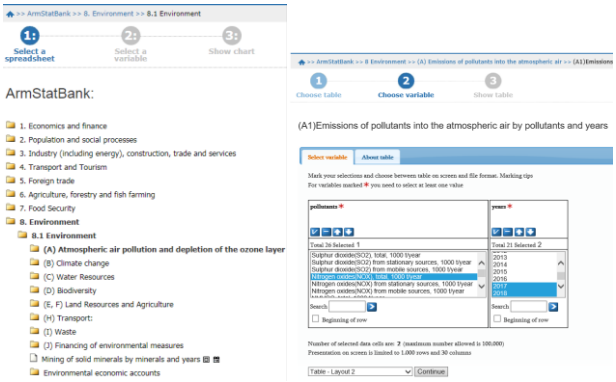
Portal	Website of the Statistical Committee
environmental data online	atmospheric air, climate change, water resources, biodiversity, land and agriculture, transport, waste, environmental financing. For each category, it is possible to select the indicators and the year. In total, the website provides access to 45 environmental datasets.  *Figure 12. Screenshots of the Statistics Committee website ArmStatBank (as of May 2020, http://armstatbank.am)*
Reusability of data	The website contains annual statistical indicators published in the form of tables and graphs or as various types of output files. Data can be downloaded in Excel and other machine-readable formats.

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5 Achieving a high level of maturity for environmental information management

5.1 Main challenges

5.1.1 E-government

The table below presents the main challenges, related to the e-government in Armenia. The information in the table is structured along the three SEIS pillars: content, infrastructure and cooperation (network).

Table 13. Main challenges related to e-governance

Content	• **Fragmented solutions for the e-services and the interactions with public authorities**. Armenia has an official e-government portal though it does not cover a full inventory of public services provided by the national and local authorities. Hence, the current display of the e-government portal can be misleading for the public, as in most cases it provides links to other systems and does not provide online services directly. Online service request forms are available for some e-services directly on the portal though with limited functionality. • **Lack of standards for the description of public services**. The description of public services on the e-government portal is not according to international standards and lacks key pieces of information such as price, reference requirements, service flow, etc.
Infrastructure	• **Weak technical interoperability**. Not all public authorities are at the same level in terms of e-governance and capacity[125]. It is necessary to develop technical interoperability and to ensure that common standards are applied by the different public authorities. This would increase the effectiveness of e-governance.
Cooperation	• **Low level of inter-institutional collaboration to facilitate the increase of digitalisation**. This situation leads to uncoordinated and fragmented development of digital solutions, that are difficult to integrate and to ensure interoperability. In this regard, Armenia needs to establish a cross-sectoral approach to digitalisation, which implies the involvement and contribution of all public authorities. • **The need for capacity building and skills development within public authorities for the digitalisation of the public services**. The lack of effective use of the public services may lead to difficulties during the implementation of digitalisation projects, i.e. staff may feel resentful and not motivated in learning new processes or acquiring new skills.

[125] https://www.ekeng.am/en/egovernance/

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5.1.2 Open data

The table below presents the major challenges, related to electronic access to public information with focus on the environmental domain in Armenia. The information in the table is structured along the three SEIS pillars.

Table 14. Major challenges related to open data

Content	• **Lack of dedicated legislation (legal provisions) concerning the access to open data**. Armenia needs to adopt regulations to: - Recognise and define the concept of open data by law; - Define processes of open data management and dissemination; - establish requirements for building a central and unique open data portal. The portal must be mandatorily populated with public information and comply with a set of legal requirements (e.g. metadata, main functions, request procedures, definition of responsibilities, etc.). • **Lack of an inventory of public information available for disclosure.** There is no inventory of the environmental data available (amount, quality, location); also, its location is fragmented. Thus, it is difficult for the public to reuse the data that is stored by the public authorities. • **Lack of published machine-readable data**. Formats of data published by public authorities differ from each other. Most environmental data and information are published in PDFs, which leads to difficulties in reusing the data. The procedures related to the formats of the data files and to the dissemination of data should be streamline/unified to improve re-usability and digital processing. • **Absence of metadata standard for the publication of public information**. Currently, the public information is published differently across websites and there are no metadata standards for the description of the data published (e.g. description, validity period, format(s), etc.). This leads to a difficult search of the needed data and information and limits the use and reuse of information and data.
Infrastructure	• **Lack of open data portal**. The absence of an open data portal undermines the access to public data.
Cooperation	• **The institutional framework for open data is not set up.** No public authority is responsible for the open data initiative in Armenia. In order to progress in this area, it is necessary to have a dedicated structure in place with clear responsibilities and competences for each public authority to engage in open data activities. • **Lack of awareness of open data.** As the open data initiative is not developed at the national level, public authorities are not aware of its potential benefits (e.g. new ways to exchange and disseminate data).

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5.1.3 Environmental information sharing

The table below presents the major challenges, related to environmental information management and dissemination. Information in the table is structured along the three SEIS pillars.

Table 15. Major challenges related to environmental information management

Content 	• **Lack of timely available environmental information**. The preparation of a coherent environmental policy has been challenged by the lack of timely, reliable and aggregated and analysed environmental information. A regular update is necessary to keep the information relevant and usable for both policy-makers and public as well as for both policy development and implementation. • **Regulatory gaps in terms of regular inter-institutional exchange and sharing of environmental data and information**. Currently, there are not many data sharing agreements in place between public authorities. When existing, they are not publicly available and possibly not harmonised in terms of content, frequency, quality and modalities.
Infrastructure 	• **Wide spread of environmental data**. Many platforms are publishing environmental data and information in Armenia; thus, it is difficult to know which platform holds which information. There is a lack of a single access point that would guide the user and integrate environmental information sources. This role could be potentially played by the Ecoportal which is still being developed. • **Lack of interoperability.** The systems do not have the required interfaces to ensure the effective exchange of data. This is especially the case in relation to the compilation of information of air pollutant emission and other environmental-economic accounts, as it will ensure comprehensive environmental monitoring. Registers for biodiversity, forests, and lands have to be completed and maintained.[126] • **Lack of technical equipment for environmental monitoring**. Gradual efforts should be made for upgrading the technical equipment of the Ministry of Environment and subordinate institutionsfor performing monitoring activities. For example, the Inspectorate for Nature Protection and Subsoil Inspection is not sufficiently equipped to conduct the regular monitoring of water quality. However, regular monitoring of water quality is prioritised as a main source of information and evaluated once a year. Non-prioritised sources are evaluated on a less frequent basis. As a result of the current situation , the Inspectorate for Nature Protection and Subsoil cannot provide to other public authorities and the public with complete and up-to-date data and information. • **Standardisation of information exchange with the Statistical Committee**

[126] Based on the presentations made during the 4th ENI SEIS II East Project Steering Committee Meeting,12 November, 2019. Presentations are available at: https://eni-seis.eionet.europa.eu/east/areas-of-work/communication/events/project-related-events/4th-eni-seis-ii-east-project-steering-committee-meeting

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	and between public authorities. Armenia needs to standardise the technical exchange channels of public information between the public authorities and with the Statistical Committee system to have a more efficient and coherent data exchange.
Cooperation 	• **Lack of a structured coordination of environmental programmes and projects**. The existing situation leads to scarce and fragmented development and implementation of various activities, including the ones related to improving environmental monitoring. Furthermore, it results in duplication of work and inefficient use of the financial resources granted. • **Unclear role of local public authorities in terms of environmental information exchange**. Armenia needs to implement and appropriately use the top-down and bottom-up approaches with a clear division of roles and responsibilities for data and information exchange among public authorities at national and local levels.

5.2 Roadmap[127]

In general, it is recommended that Armenia should focus on some key elements for ensuring coherent and effective open data and environmental information management and for addressing the common challenges presented above. In brief, the focus should be on the following:

- **Policy measures:**
  - *Long-term digital action plan*: an action plan for e-government and open data should be in place. It should ensure scoping, development, management and funding of the national e-government and open data portals, as well as digital awareness-raising activities for both public authorities and the public itself. In doing so, all available results and good practices acquired from previous activities and projects across the whole economy spectrum should be assessed and put in motion.
  - *General interoperability framework*: the country should have an interoperability framework in place or at least its foundation. This is especially required for building an integrated environmental information system(s) and ensuring the smooth exchange of environmental data.
  - *Roadmap in the field of open data and environmental information*: this roadmap should contain key objectives for fostering sharing and dissemination of environmental information.
- **Legal measures:**
  - *Enforcement mechanisms* for the regular collection, sharing and dissemination of environmental information and for monitoring implementation.
- **Technical measures:**

[127] The proposed roadmap has been updated taking into consideration the presentation made during the 4th ENI SEIS II East Project Steering Committee Meeting on November 12th, 2019 in Copenhagen. Presentations are available here : https://eni-seis.eionet.europa.eu/east/areas-of-work/communication/events/project-related-events/4th-eni-seis-ii-east-project-steering-committee-meeting

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- *E-government, open data and geo-portals*: the country should have effective e-government, open data and environmental portals on which environmental data and information can be shared/disseminated with spatial attributes, and where services can be built.
- *Implementation of international standards*: standards developed by the EU, the International Organisation for Standardisation (ISO), the World Meteorological Organisation, the Open Geospatial Consortium, the World Wide Web Consortium, the National Institute of Standards and Technology and other international organisations which are responsible for standard development could be adjusted and introduced in the areas of designing an information system, metadata standards and interoperability standards.

Some of these elements are already in place in Armenia. Nonetheless, it is advised to look at these aspects from an integrated perspective of environmental information sharing and dissemination and to update them where appropriate. These elements are under continuous development; hence a periodic review is necessary.

Guidance for the implementation of the roadmap

The roadmap provided in the following section outlines key areas for further development in the field of open data and environmental information. It also provides recommendations and suggested actions for improvement that are organised according to the following SEIS pillars: Content, Infrastructure and Cooperation.

The success and rapid advancement of the country in this challenging domain is strongly dependent on clear prioritisation, multi-disciplinary teamwork and regular monitoring and adjustment of results. Furthermore, as progress is gradually made in one or several areas proposed for consideration, improvements, readjustments or amendments to the roadmap will be needed to keep it relevant and focused on the key priorities of the country.

To support the implementation process of the proposed measures at the national level, it is recommended to start by establishing an interdisciplinary team that would be responsible for driving and overseeing the overall process. The measures should be prioritised and implemented to support and enhance the e-government, open data and environment strategies of the country. Furthermore, this process should not be carried out in isolation. On the contrary, it should also be undertaken by considering the extensive experience already gained in this area by other countries and organisations and in the context of broad regional exchange and international collaboration.

The proposed measures are to be implemented by specific authorities at various levels of decision-making and across disciplines. In this respect, the measures are grouped in three major categories, namely: policy, legal and technical measures. These categories are indicated by the colour scheme (provided in the table below). They aim to signal the leading expertise or decision-making level required for the implementation of each measure, while being considered in an interdisciplinary setting.

Table 16. Legend for the colour scheme of the roadmap measures

Colour	Type of measure	Description
	Policy	The measures in this category cover the development of specific

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Colour	Type of measure	Description
		strategies and policies and their integration into the overall policy framework at the national level. They include establishing clear and measurable targets as well as monitoring the implementation of the strategies and policies. Furthermore, they imply supervision, coordination and other practical arrangements in terms of interdisciplinary work on open data and e-governance across various areas, including the environment.
	Legal	The measures in this category cover the development and adoption of new or revision of existing legislation followed by the development of secondary legislation, guidelines and methodologies in the area of open data and e-governance across various domains, including the environment. Legal measures include governance set-up, ensuring clear division of responsibilities and proposing enforcement mechanisms for obligations provided in the legislation.
	Technical	The measures in this category cover the adoption and/or development of technical tools, methodologies and procedures, as well as the introduction and adoption of international standards, where appropriate, at the national level. These measures also embrace developing new competences and training specialists to ensure the successful implementation and sustainability of technology initiatives.

It is recommended for Armenia to implement measures proposed in the roadmap after considering the latest policy, legal and technology changes in the country. The table below suggests a recommended timeframe to implement measures with different priorities assigned. Considering that this domain is very dynamic, the suggested time perspectives could be shortened.

Table 17. The recommended timeframe for measures implementation

Priority	Recommended timeframe for the measure implementation
High	In the next 1-3 years
Medium	In the next 3-5 years
Low	Over the next 5 years

Priorities proposed in this roadmap were based on information received and aggregated from 2018 to 2020. Depending on the measure implementation, changes in the policy, legislation or technology the suggested priorities might change. To ensure effective implementation of proposed measures and their relevance regular measure monitoring is essential.

"Open data and e-government good practices for fostering environmental information sharing and dissemination" report

The implementation of the proposed measures in the roadmap is assisted by the Good Practices Report "Open data and e-government good practices for fostering environmental information sharing and dissemination" (in brief, the Good Practices Report). This report is an integral part of the present project and provides relevant examples from other countries and organisations on the practical implementation of the roadmap measures.

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The Good Practices Report is organised into two sections – e-government and open data – each part following the SEIS pillars "content", "infrastructure", and "cooperation (network)". In addition to this, the following resources can also be used to support the implementation of the measures proposed in this roadmap:

- Report on the "Promotion of good practices for national environment information systems and tools for data harvesting at EU level";
- Streamlining Environmental Reporting – Action Plan;
- Open Data Maturity in Europe 2019[128][129];
- Development of an assessment framework on environmental governance in the EU Member States[130].

5.2.1 Roadmap measures: Content

The measures proposed to Armenia from the perspective of SEIS pillar: Content are presented in the table below.

Table 18. Measures from the perspective of SEIS pillar: Content

	Measure	Priority	Description
	1. Revision of the legal framework to promote and regulate the online accessibility and reuse of public sector information	High	Adopt or amend, as needed, the legal acts referring to data management and accessibility related to the environmental domain (monitoring, assessment and reporting, management and control of natural resources, ecosystems and pollution) in accordance with the Aarhus Convention and the Protocol on PRTRs (as appropriate). This can include: • Improving the environmental information system(s) by defining themes, sources (lists, registers, databases, funds, etc.), formats, metadata, licencing and interoperability requirements; • Improving procedures for environmental data collection and exchange in electronic format, and its accessibility as open data; • Improving procedures for managing environmental data flows and regular updates, quality assurance and control, reporting, inter-institutional sharing and exchange, online dissemination and other means of dissemination; • Setting up the public participation procedures for involving the public at large in the design, use and update of the environmental information system(s);

[128] https://www.europeandataportal.eu/sites/default/files/open_data_maturity_report_2019.pdf
[129] https://www.europeandataportal.eu/sites/default/files/european_data_portal_-_open_data_goldbook.pdf
[130] "Development of an assessment framework on environmental governance in the EU Member States" under the contract No 07.0203/2017/764990/SER/ENV.E.4 funded by the European Commission, Final report May 2019.

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	Measure	Priority	Description
			considering ways to take on board citizen science and public engagement initiatives; • Streamlining the responsibilities of public authorities at all levels and across sectors to ensure clear competences and coordination; • Reviewing periodically the application of exceptions in the disclosure of environmental information; • Monitoring the legitimate application of these exceptions and the disclosure of information on emissions in accordance with the Aarhus Convention – (in particular define the practical rules to differentiate the non-confidential information of public importance for its further disclosure[131]). *For Armenia it is recommended to adopt a new law on environmental information dissemination as soon as possible to ensure the coordinated and up to date approach for environmental information dissemination and standardised responsibilities and processes in the area of environment.* *As well secondary legislation should be developed including usage of standards.* *For guidance, consult the section "Designing an open data legal framework and provision of enforcement mechanism" of the Good Practices Report.* *This measure is closely linked with "Establish a collaborative institutional framework for the implementation of open data" in the Cooperation (network) section.*
	2. Adopt guidelines defining the practical arrangements for environmental information management, sharing and dissemination	High	Adopt technical guidelines setting out the practical arrangements for environmental information management, sharing and dissemination specifying: • The scope of the environmental information system with metadata description and registry; • The environmental data management structure (including data architecture, data stewardship, system administration, data privacy, data security and data quality); • Decision-making procedures for sharing of non-confidential information and datasets (e.g. websites of public authorities, environmental portals – one web access point for environmental information, geospatial portals, statistical, open data and other portals) and also making them available online on

[131] Requested during the national roundtable

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	Measure	Priority	Description
			relevant portals; • Separation of non-confidential information, as appropriate; • Gradual amendment of the data quality assurance procedures in line with EU rules.
	3. Develop and adopt an environmental data policy	High	Adoption of an environmental data policy by the authorities in charge of environmental protection to include: • List of varied environmental information available and the scope thereof; • Basic terms of availability and accessibility, including open access and data sharing aspects; • Data holder support for availability and accessibility by third parties; • Rights and obligations of data and information holders/providers in terms of maintenance, update, quality assurance and reliability of data and information about their responsibility; • Licencing terms and conditions; • Contact point for access to environmental information. *For an example of data policy, consult the European* Environment Agency's website*: https://www.eea.europa.eu/legal/eea-data-policy/data-policy*
	4. Develop/update licencing terms and conditions to promote open data access, use and reuse of environmental information using an open licence	High	This measure will involve defining the licencing terms and conditions used on the different portals for publishing and accessing environment data. *At present, there are no official and clear licencing mechanisms for reuse of the data made available by the public authorities.* *According to the Public Sector Information Directive, it is recommended to use open licences as they are available online and provide clear licencing conditions[132].* *More information about licencing is available in the Good Practices Report in the section "Harmonise licencing terms and conditions of environmental data to promote its public use and reuse".*
	5. Regular collection and timely reporting of environmental data	High	This measure will: • Ensure the effective implementation of the Aarhus Convention and its decisions and recommendations

[132] Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the reuse of public sector information https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L1024&from=EN

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	Measure	Priority	Description
	and information in accordance with national and international obligations		by the Meeting of the Parties on promoting effective access to information and electronic information tools[133]. • Consider the possibility of ratifying the Protocol on PRTRs; • Identify the practical arrangements for establishing the Pollutant Release and Transfer Register and for its incorporation within the integrated environmental information system(s) by using good international working practices; • Ensure traceability of assessments and indicators by linking them with the available data sources used; • Consider becoming a Party to other UNECE MEAs (e.g. Water Convention and Protocols to the Air Convention) to improve environmental governance, monitoring and data management; • Ensure the implementation of other international commitments related to the regular provision of environmental data and information. *This measure is closely linked with the measures "Enhance interoperability of geospatial, statistical, health and environment information systems" and "Establish an electronic registry of public environmental information" in the Infrastructure section.*
	6. Improve and make publicly available the quality control/ quality assurance mechanisms behind the published environmental data and information	High	The results and methodology used for quality control/ quality assurance of environmental data are to be published in a detailed manner in order to enable public and other stakeholders to assess the reliability of the data. This measure will: • Assess the current quality control/ quality assurance mechanisms from the collection of environmental data, to aggregation, manipulation, processing and publication across the whole MDIAR chain[134]; • Publish current procedures in place and set minimum standards to respect all stages of the data flow (data collection, data preparation and control, aggregation and data dissemination); • Further develop/amend the legal framework by adding provisions setting up obligations at different levels, regarding the quality control/ quality assurance of environmental data, including penalties

[133] http://www.unece.org/environmental-policy/conventions/public-participation/aarhus-convention/tfwg/task-force-on-access-to-information/consultations-on-the-recommendation-on-electronic-information-tools.html

[134] The monitoring/data/information/assessment/reporting (MDIAR) chain is the flow of data and information from national monitoring to European reporting.

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	Measure	Priority	Description
			for non-compliance; • Monitor the implementation of the quality control/ quality assurance measures and set up an annual reporting process for the evaluation of the quality of environmental data provided. *The examples of criteria for assessing quality control/* quality assurance *mechanisms are depicted in the document "Promotion of good practices for national environmental information systems and tools for data harvesting at EU level", p. 165.* *Examples of standards, mechanisms and measures for quality control/* quality assurance *are also presented in the Good Practices Report, in the section "Develop and publish quality control mechanisms for environmental data".*
	7. Define/adopt and publish metadata description standards for all environmental data and information in accordance with international standards using a one-stop access point	High	This measure will aim to define metadata standards to facilitate the dissemination/exchange of environmental data and information (including dissemination of environmental reports). As a result, it will be easier for institutions to manage and exchange environmental data, while also making it easier for the public to find information. *An example could be the implementation of the EU DCAT-AP standard, which would also enable integration with other open data portals in Europe.* *Refer to the Good Practices Report and forthcoming Aarhus Convention Recommendations on Electronic Information Tools to get more information about metadata standards for environmental data and information.* *This measure is closely linked with the measures "Enhance interoperability of geospatial, statistical, health and environment information systems" in the section Infrastructure.*
	8. Expand collection, prepare and publish environmental data in a machine-readable format	Medium	As Armenia does not have an open data portal, this measure is set as a medium priority. Nonetheless, it is important to stress that the real potential of environmental data lies in its usability, hence the need for setting clear rules to publish the data in a machine-readable format. This measure aims to ensure the publication of environmental data in machine-readable format. Additional aspect of the measure focusses on historical data digitalisation. Such a measure can be driven by the establishment of the open data legal framework, setting up the obligation to publish, as a rule, all datasets in machine-readable formats, unless data are not available

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	Measure	Priority	Description
			in such a format and requires processing beforehand. Regularly produce the state of environment report in accordance with the Aarhus Convention provisions and make the report available online. Furthermore, aim towards an assessment-based and interactive report, preferably indicator-based. *The Good Practices Report provides more details about machine-readable formats in the section "Transformation of data published to machine-readable format".* *This measure is closely linked with the measures "Define/adopt and publish metadata description standards for all environmental data and information in accordance with the international standards using a one-stop access point" in the Content section.*
	9. Inventory, re-engineering and publication of public services as e-services	Medium	The current portal in Armenia for e-services is a mixture of services, access points to other portals and documentation over a range of e-government topics. Few e-services are available compare to the number of public services, and their description is not comprehensive. This measure will define metadata standards and ensure that environmental services are described and accessible through the electronic service portal, in accordance with national standards. For the description of public services, it is recommended that the European Core Vocabularies, such as Core Public Service, Core Person, Core Location and Core Public Organisation, be adapted. This would allow a coherent and standardised description of e-services and improved interoperability to be ensured. *For an example of implementation, consult the Good Practices Report's "Publishing e-services on a dedicated e-service portal" section.*

In order to facilitate the implementation of the provided measures, the Good Practices Report provides the following examples and recommendations:

- Building a digital strategy which includes the environment (example from Lithuania);
- Building e-services and public information systems according to national and international standards (examples from Estonia and the EU);
- Publishing e-services on a dedicated e-service portal (examples from the Lithuania, Romania and the UK);
- Develop a national strategy for open data and a measure plan to implement it for specific types of information (example from Ireland);
- Adopt an action plan based on the open data strategy and the digital strategy (example from the OGP);
- Adopt an open data policy, and extend it to environmental data (example from the EU);

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- Designing an open data legal framework and provision of enforcement mechanisms (example from the EU);
- Definition of metadata description standard for all environmental information (examples from the EU and the UK);
- Transformation of data published to machine-readable format;
- Develop and publish quality control/ quality assurance mechanisms for environmental data (example from the European Open Data Portal);
- Adopt/update licencing terms and conditions of environmental data to promote its public use and reuse (example from the European Open Data Portal);
- Evaluate the impact of open data (examples from the European Open Data Portal);
- Improve accessibility and use of available environmental data and information by improving the multilingual aspect of portals (example from the EEA).

5.2.2 Roadmap measures: Infrastructure

The measures proposed to Armenia from the perspective of SEIS pillar: Infrastructure are presented in the table below.

Table 19. Measures from the perspective of SEIS pillar: Infrastructure

	Measure	Priority	Description
	10. Establish a single and user-friendly web access point for environmental information	High	Environmental information and data are spread on multiple portals, as shown in this report. Particularly, it is not clear which website must have the latest and correct information published. The portals are also built according to different designs, which hinders user experience. To support the implementation of the Decision VI/1 of the Meeting of the Parties of the Aarhus Convention, it is recommended to establish a single web access point to environmental information. Single access implementation is not subjected to the adoption of only one software solution. The principle may be implemented through enabling access to various solutions in a single place. In this regard, Armenia is currently developing a water Ecoportal covering few UNECE environmental indicators for water and biodiversity. The launch of Ecoportal provides a possibility to further test and develop one single platform for key environmental data monitoring. Timely addition of relevant thematic areas (e.g., land, air, waste) would expand the use and benefits of the tool. The following suggestions could assist in the development of an environmental portal (single web access point for environmental information): • Design main technological solutions, which will be used as a single and user-friendly web-access point for environmental information – technological solution should be based on the technological

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	Measure	Priority	Description
			platform; • Agree upon a single access point by integrating various data sources of environmental information (e.g. the single access point should provide access to environmental datasets, indicators, links to environmental reports and various applications); • Provide web-services and commonly agreed external application programming interfaces (APIs) to the existing portals so the institutions can easily share their (structured) data and have the possibility to download datasets (e.g. EEA public map services [135] , INSPIRE Directive); • Implement a uniform tool for checking the quality of metadata provided by data providers; • Publish environmental data in accordance with the rules described in international metadata standards, such as DCAT-AP metadata vocabulary (this measure will also allow automatic synchronisation with other EU open data portals); • Develop search functionality to allow the user to apply multiple field search and filter options (e.g. file format) to refine a search; combining keywords with classifiers; • Maintain and enhance the portal by including feedback gathering from the public through public consultation organised by ministries and governmental authorities. *More information about single access points can be found in the Good Practices Report in the "Establish a single and user-friendly web access point for environmental information" section (examples from the EU, EEA and Ireland).* *The design of the environmental information system is also widely described in the document "Promotion of good practices for national environmental information systems and tools for data harvesting at EU level".* *This measure is closely linked with the measure "Revision of the legal framework to promote and regulate the online accessibility and reuse of public sector information ", in the Content section, and measure "Establish a collaborative institutional framework for the implementation of open data", in the Cooperation (network) section.*
	11. Enhance interoperability of	High	This measure will facilitate the implementation of the interoperability standards defined for environmental and

[135] https://www.eea.europa.eu/code/gis

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	Measure	Priority	Description
	geospatial, statistical, health and environmental information systems		other thematic data. This measure will: • Assess the existing compatibility of various information systems with defined interoperability standards, in particular with the geoportal; • Adopt/update and implement standards for metadata and data interoperability in accordance with international standards and good practices; • Develop APIs for external users; • Provide automated mechanisms for sharing time-series data. These actions could be also considered within an overarching national interoperability framework. *Refer to the Good Practices Report for more details about the development of interoperability in Lithuania and the EU in the "Establishing an interoperability framework" section.* *This measure is linked with the measure "Develop and/or continue to enhance an integrated system for the management of environmental information in accordance with the Aarhus Convention and the Protocol on PRTRs" from the present roadmap.*
	12. Establish an electronic registry of public environmental information	High	This measure will aim to establish a registry of environmental information and data available in each institution and system (i.e. the metadata management system), as well as data that is publishable, taking into consideration the legal framework in place. The registry will be used by public servants to support the continuous development of environmental information systems and the dissemination of environmental information. Particularly, the registry should map the systems, databases, institutions, datasets and reports published. This measure could be coupled with the standardisation of metadata for environmental information and with the development of a single web access point for environmental information, which would be automatically refreshed based on the registry of environmental information. *The inventory of environmental information systems is widely described in the document "Promotion of good practices for national environmental information systems and tools for data harvesting at EU level", in the section "Inventory of the environmental information system".*
	13. Improve accessibility and	Medium	This measure will provide a full translation of public institutions websites, yearly reports and environmental

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	Measure	Priority	Description
	usability of available environmental data and information by improving the multilingual aspect		information metadata to Armenian and English. *An example of a multilingual portal is the EEA GEMET,[136] which provides a thesaurus of environmental terms, currently translated in 37 languages.*
	14. Develop e-services for the environment	Medium	This initiative will aim to develop environmental e-services according to the national standards (service passports) service interoperability standards (e.g. e-signature, e-payment). *More information about the description of public services can be found in the Good Practices Report in the section "Building e-services and public information systems according to national and international standards".* *This measure is connected to the measure "Inventory, re-engineering and publication of public services as e-services" from the present roadmap.*

	15. Strengthen the technical capability for environmental monitoring	Continuous	This measure aims to strengthen the technical capacity for environmental monitoring for other thematic areas, such as water and forestry. To do so, it is recommended to:
			
			• Define monitoring parameters at national and local levels for each thematic area. These objectives should include:
			  ○ Frequency of observations (e.g. hourly, daily, monthly or yearly);
			  ○ Granularity of data gathered (accuracy);
			  ○ Space coverage (taking into consideration the spatial requirements – urban vs rural areas, industrial areas);
			  ○ Quality of data;
			  ○ Compatibility with existing equipment and information systems and, where possible, compliance with EU requirements as part of the approximation process.
			• Conduct critical assessment in relation to the needs of the status and performance capabilities of the current monitoring infrastructure (for each thematic area, starting with priority areas such as, for example, water). This can be achieved through the establishment of a cross-sectional team of experts that could reflect on the existing equipment and provide a complete assessment of the needs aligned with the objectives defined above.

[136] https://www.eionet.europa.eu/gemet/en/concept/4438

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	Measure	Priority	Description
			• Develop a long-term and realistic national plan for gradual modernisation, taking into consideration all financial possibilities and options; • Follow this process by developing a coherent and stepwise implementation plan to gradually integrate new equipment into the existing system. This point is crucial as a lack of integration of the monitoring process in information systems: 1) renders the exchange of data cumbersome, 2) increases the need for human resources and 3) undermines the quality and availability of data. • Identify potential environmental areas to gradually complement the traditional environmental monitoring system with additional information coming from other sources (e.g. citizen science[137], earth observation[138],[139]). The acquisition of monitoring equipment requires consequent investments. It should be well prioritised, with a long-time perspective. Also, it should take into consideration the local and national needs. It is recommended to prioritise the buying and implementation process, and to make sure that the equipment is well integrated into the existing (or new) information systems in order to facilitate the data flows. *This measure is linked with the measure "Develop and/or continue to enhance an integrated system for the management of environmental information in accordance with the Aarhus Convention and the Protocol on PRTRs" from the present roadmap.*
	16. Develop and/or continue to enhance an integrated system for the management of environmental information in accordance with the Aarhus Convention and the Protocol on PRTRs	Medium	This measure recommends the development of an integrated environmental management system, which will ensure the coordinated management and exchange of environmental data and information. To do so, this measure recommends: • Making an inventory of all systems used for the management of environmental data and information, especially that is not publicly available, at the national level; • Defining the requirements for an integrated system for environmental information management. In particular, the system should provide functionalities such as: ○ Workflow (e.g. quality management);

[137] Commission Staff Working Document "Best Practices in Citizen Science for Environmental Monitoring"
[138] https://ec-jrc.github.io/citsci-explorer/
[139] https://www.copernicus.eu/en/services

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	Measure	Priority	Description
			○ Environmental data collection; ○ Automatic dissemination and update of open data; ○ Document management; ○ Integration with external systems (statistical, health, open data, transport, energy and land cadastral, etc., as needed); ○ Advanced visualisation tools and capabilities for integration with business intelligence tools; • Gradual implementation of the system; • Training of potential users and institutions involved on the benefits, functionalities and usability of the integrated system; • Regular assessment of the performance and update of the system when needed. This measure will foresee the development of an efficient system for integrating various types of environmental data and information at different levels (sub-national, national) by connecting various existing systems. Note: 1) as highlighted during the roundtable in Yerevan, this measure does not recommend centralising or decentralising all environmental functions in a single information system, but instead to provide mechanisms for integrating them. Hence the system should provide a standard API and the possibility to upload data manually so that compatibility with legacy and external systems could be maintained, and 2) this measure should be executed even though Armenia has not yet ratified the Protocol on PRTRs. *The document "Promotion of good practices for national environmental information systems and tools for data harvesting at EU level" presents guidelines for the development of environmental information systems.* *This measure is linked to the measure "Enhance Interoperability of geospatial, statistical, health and environmental information systems" from the present roadmap.* *The Good Practices Report also presents a few examples of initiatives undertaken for building an integrated information system in the section "Infrastructure".*
	17. Develop applications to engage the public in environmental monitoring and protection activities	Low	Armenia currently does not have an open data portal, thus civil society initiatives for building software applications (e.g. mobile apps) using public sector information are rare. Consequently, this measure will aim to stimulate the development of a series of software applications (e.g. mobile apps) for the public. Firstly, this action will stimulate the role of e-government to interact with the

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	Measure	Priority	Description
			public and lead to the creation of "environmental data ecosystem". Secondly, this action will also encourage the public to access, consult and interact with the environmental data. For instance, through the apps the public can: • access and consult environmental information in real-time according to their location; • report poaching, and mark and signal polluted areas, etc.; • participate in environmentally friendly events in their neighbourhood; • integrate environmental data they have collected with government apps, where possible. *This measure is linked with the measures proposed under the pillar "Cooperation" in the present roadmap.*

In order to facilitate the implementation of the provided measures, the Good Practices Report provides the following examples and recommendations:

- Establishing an interoperability framework (examples from the EU and Lithuania);
- Building an integrated environmental monitoring system at national level (example from Ukraine);
- Building an open data portal and foster publication of public sector information (examples from Ireland, the Netherlands and Spain);
- Establishing a single and user-friendly web access point for environmental information (examples from Ireland and the EEA);
- Developing infrastructure on the most advanced platforms based on geospatial data and GIS technologies (examples from the EU and Lithuania);
- Providing technological support for sharing environmental data at the regional level.

5.2.3 Roadmap measures: Cooperation (Network)

The measures proposed to Armenia from the perspective of SEIS pillar: Cooperation are presented in the table below.

Table 20. Measures from the perspective of SEIS pillar: Cooperation

	Measure	Priority	Description
	18. Establish a collaborative institutional framework for the implementation of open data	High	Armenia currently does not have a national open data concept or an open data policy and strategy. It is crucial to establish a collaborative institutional framework for open data and to foster open data across institutions, e.g.it is suggested to establish a working group under the Prime Minister of the Republic of Armenia for collaboration in the field of environment. In addition it is recommended to provide information on the Ministry structure and links to subordinate institutions.

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	Measure	Priority	Description
			This measure will strengthen the necessary institutional framework for managing open data, especially taking into consideration the environmental component. This measure will also focus on the need to create strong cooperation links between institutions to ensure the sharing, (re)using and publication of the environmental data and information. An example of an approach to establishing a collaborative institutional framework for open data involves: • Amendment to the existing legal framework or adoption of additional secondary regulations to foresee clear responsibilities of the various actors and ensure the clear division of responsibilities on open data at national and thematic levels (e.g. there should be general rules for governing the open data framework and specific rules for individual environmental data providers on how to organise an open data publishing process internally); • Establishment of a cross-sectoral working group which will assist/support and facilitate in the establishment of the operational mechanisms of collaboration (i.e. processes, procedures and good practices); • Organisation of events/fora/regular dialogues to foster collaboration between national stakeholders and various data users. Also, it is recommended to ensure the operation of the Aarhus centres. *The Good Practices Report provides examples of initiatives undertaken in the EU to foster inter-institutional and international cooperation in the field of open data. The open data maturity report 2019 provides criteria to assess the maturity of the institutional framework in a country. The document "Development of an assessment framework on environmental governance in the EU Member States"[140] also provides good practices to establish an institutional framework for environmental governance.* *This measure is linked with the recommendations presented in the section "Content" of the present roadmap and targeting the revision of the legal*

140 https://ec.europa.eu/environment/environmental_governance/pdf/development_assessment_framework_environmental_governance.pdf

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	Measure	Priority	Description
			framework.
	19. Develop and ensure increased capacity for handling environmental and open data	Medium	Components of this measure cover: • Assessment of the capacities needed (human resources and tools) for managing and making available environmental data and information at national and local levels; • Recruitment of specialised staff and gradual acquisition of necessary tools for open data and environmental data management; • Development and integration of procedures and processes for preparing and disseminating environmental data and information; • Professional development/training plans for civil servants and/or data stewards or data officers working with data. In this regard, it is possible to foresee official training programmes (mandatory) for staff in charge of data handling and to recognise these trainings through certificates. *The document "*Development of an assessment framework on environmental governance in the EU Member States*" provides multiple examples of initiatives undertaken to build capacity in this area. The section "3.5.2. Administrative capacity (environmental inspectorates, police, customs, prosecution services and audit bodies)" focuses strongly on the example of capacity-building in the EU.* *This measure is linked with the measures "Strengthening of technical capacity for environmental monitoring" and "Develop and/or continue to enhance an integrated system for environmental information management in accordance with the Aarhus Convention and the Protocol on PRTRs" of the present roadmap.*
	20. Promote international and regional cooperation to facilitate the implementation of the roadmap	High	Armenia currently has little cooperation with other countries for open data. This measure aims to support Armenia with international expertise and good practices to assist in the implementation of the present roadmap. To do so, it is recommended that: • Fora and other platforms where experience can be shared be identified; • Contacts with key stakeholders at the regional and international level be established to share experience and good practices; • An inventory of international and regional initiatives be built, and their potential assessed. *The Good Practices Report provides examples of initiatives that can be undertaken to implement this*

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	Measure	Priority	Description
			measure, in the section "Increasing public administration, public and business awareness over open data and environmental data".
	21. Raise awareness of open government and open data for the environment among citizens and economic operators	Continuous	Armenia does not have currently an open data portal, and in general, the open data concept is not well developed in the country. The roundtable in Armenia highlighted that multiple requests for environmental information are received. This aspect indicated that the public need awareness campaigns to be regularly informed about environmental information and open data. Under these circumstances, this measure is extremely important and will stimulate the demand for open government and open data by showcasing its benefits and usefulness at all levels and across various categories of potential users. This measure will focus on raising public awareness on the role of environmental information, its accessibility, usability and other related aspects, by pursuing ongoing activities, strengthening and expanding them where and when appropriate. The focus of above-mentioned activities could be directed to promotion of environmental applications and enhancement of their usage. Additionally, the measure will focus on undertaking a series of activities to promote the use/re-use and sharing of environmental information, such as: • Hackathons; • Fora; • Promotion campaigns; • Development of incubators; • Development of public-private partnerships; • Facilitating dialogue and cooperation between national authorities, NGOs and the academic community. *The Good Practices Report provides examples of initiatives that can be undertaken to implement this measure, in the section "Increasing public administration, citizens and business awareness over open data and environmental data".*

In order to facilitate the implementation of the provided measures, the Good Practices Report provides examples and recommendations on the following topics:

- Increasing awareness and motivation among public institutions over e-government and digital solutions (example from the EU);
- Increasing awareness of e-government among the public and businesses (example from the EU);

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- Coordinating open data initiative(s) (example from Ireland);
- Establishing processes and procedures for managing open data (example from Lithuania);
- Increasing public administration, public and business awareness of open data and environmental data (example from Belgium, Cyprus, the EU, Italy and Luxembourg);
- Promoting open data to organisations;
- Collecting user feedback and providing new means of communication between open data providers and users (example from Spain).

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