

Sharing and dissemination of environmental information

Country maturity report | Roadmap: Republic of Moldova

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Roadmap

In general, it is recommended that the Republic of Moldova should focus on the following main 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, 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. In doing so, all available results 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 in place an interoperability framework or at least its foundation. This is especially required to further develop the MConnect system and ensure sustainable integration of other information resources including environmental information systems.
 - *Roadmap in the field of open data and environmental information:* this roadmap should contain key objectives for fostering sharing and dissemination of environmental information. During the implementation of ENI SEIS II East project the roadmap, introduced in the following section, was developed; it can serve as a basis or inspiration to practically implement suggested measures, create new ones and enhance open data and environmental information sharing initiatives.
- **Legal measures:**
 - *Enforcement mechanisms* for the regular collection, sharing and dissemination of environmental information and for the implementation.
- **Technical measures:**
 - *E-government, open data and geo-portals:* the country should have effective e-government, open data, 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 EU, the International Organization 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 standards 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 the Republic of Moldova (e.g. the Open Data Portal) and other portals containing environmental data and information. Nonetheless, it is



advised to look at these elements from an integrated perspective of environmental information sharing and dissemination and to update them where appropriate. These elements are under continuous development and hence a periodical 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 that to start, an interdisciplinary team should be established 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 taking into account 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 bodies 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 1. 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 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.



Colour	Type of measure	Description
	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 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 the Republic of Moldova to implement measures proposed in the roadmap after consideration of the latest policy, legal and technology changes happening in the country. The table below suggests a recommended timeframe to implement measures with different priorities assigned.

Table 2. The recommended timeframe for measures implementation

Priority	Recommended timeframe for the measure implementation
High	In next 1-3 years
Medium	In next 3-5 years
Low	Over 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 a Good Practices Report “Open data and e-government good practices for fostering environmental information sharing and dissemination” (the Good Practices Report). This report is an integral part of the present project and presents relevant examples from other countries and organisations on the practical implementation of the roadmap measures.

The Good Practices Report is organised in 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:



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- 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^{1, 2};
- Development of an assessment framework on environmental governance in the EU Member States³.

Roadmap measures: Content

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

Table 3. 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 (PSI)	High	<p>Adopt or amend as needed, the legal acts referring to data management and accessibility related to 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) and national legislation related to open data and e-governance. This can include:</p> <ul style="list-style-type: none"> • Improving environmental information system by defining themes, sources (lists, registers, databases, funds, etc.), formats, metadata, licensing and interoperability requirements; • Improving procedures for environmental data collection in machine-readable formats and its accessibility as open data; • Improving procedures for managing environmental data flows and regular updating, 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); considering ways to take on board citizen science and public engagement initiatives;

¹ https://www.europeandataportal.eu/sites/default/files/open_data_maturity_report_2019.pdf

² https://www.europeandataportal.eu/sites/default/files/european_data_portal_-_open_data_goldbook.pdf

³ “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
			<ul style="list-style-type: none"> • Streamlining the responsibilities of public authorities at all levels and across sectors to ensure clear competences and coordination; • Review periodically the application of the 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 clarify the practical rules to separate non-confidential information of public importance for its further disclosure). <p><i>For guidance, consult the section “Designing an open data legal framework and provision of enforcement mechanism” of the Good Practice Report.</i></p> <p><i>This measure is closely linked with “Establish a collaborative institutional framework for the implementation of open data” in the Cooperation (network) section.</i></p>
	2. Adopt guidelines defining the practical arrangements for environmental information management, sharing and dissemination	High	<p>Adopt technical guidelines setting out the practical arrangements for environmental information management, sharing and dissemination, specifying:</p> <ul style="list-style-type: none"> • The scope of environmental information system(s) 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 non-confidential information and datasets and publishing them online on the relevant portals (e.g. websites of public authorities, environmental portals (single web-access point for environmental information, geospatial portals, statistical, open data and other portals)); • Separation of non-confidential information as appropriate; • Gradually amendment of the data quality assurance procedures in line with EU rules. • Stakeholder communication, including public participation procedure in the design, use and update of the environmental information system(s).
	3. Develop and adopt an environmental data policy	High	<p>Adoption of an environmental data policy by the authorities in charge of environmental protection to include:</p>



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Measure	Priority	Description
		<ul style="list-style-type: none"> 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; Licensing terms and conditions; Contact point for access to environmental information. <p><i>Although it is stated that Moldova has had Open Data Policy since 2011, it could be further developed and improved in order to facilitate the accessibility of open data.</i></p> <p><i>For an example of data policy, consult the European Environment Agency's website: https://www.eea.europa.eu/legal/eea-data-policy/data-policy</i></p>
4. Develop/update licencing terms and conditions to promote open data access, use and reuse of environmental information using an open licence	High	<p>This measure will involve defining the licensing terms and conditions used on the different portals for publishing and accessing environment data.</p> <p><i>At present, there are no official and clear licensing mechanisms for reuse of the data available by public authorities.</i></p> <p><i>According to the PSI Directive, it is recommended to use open licences as they are available online and provide clear licensing conditions⁴.</i></p> <p><i>More information about licensing are available in the Good Practice Report in the section "Develop/update licensing terms and conditions to promote open data access, use and reuse of environmental information using an open licence".</i></p>
5. Regular collection and timely reporting of environmental data and information in accordance with national and	High	<p>This measure will:</p> <ul style="list-style-type: none"> Ensure the effective implementation of the Aarhus Convention and its decisions and recommendations from the Meeting of the Parties on promoting effective access to information and electronic information tools. Identify practical arrangements for establishing the Pollutant Release and Transfer Register within the

⁴ 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
international obligations		<p>integrated environmental information system(s) by using good international working practices.</p> <ul style="list-style-type: none"> • 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. Protocols related to the Convention on Long-range Transboundary Air Pollution). • Ensure the implementation of other international commitments related to the regular provision of environmental data and information.
6. Improve and make publicly available the quality assurance/quality control mechanisms behind the published environmental data and information	High	<p>This measure will aim to define metadata standards to facilitate the dissemination /exchange of environmental data and information (including dissemination of the available 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 the needed information.</p> <p>It is recommended that international standards be adopted, as the standard development requires both technical expertise and resources. The adaptation of the standard to the EU standard DCAT-AP would require capturing additional metadata, which would also enable integration with other open data portals in Europe.</p> <p>Refer to the Good Practices Report to get more information about metadata standards for open data.</p> <p>This measure is closely linked with the measure “Enhance interoperability of geospatial, statistical, health and environmental information systems” in the Infrastructure section.</p>
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	<p>This measure will:</p> <ul style="list-style-type: none"> • Assess the current quality control mechanisms from the collection of environmental data, to aggregation, manipulation, processing and publication across the whole MDIAR chain⁵; • Publish the 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); • Complement/amend the legal framework by adding provisions setting up obligations at different levels,

⁵ 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
			<p>regarding the quality control of environmental data, including penalties for non-compliance;</p> <ul style="list-style-type: none"> Fully implement the quality control mechanisms/procedures and set up an annual reporting process for the evaluation of the quality of environmental data provided. <p><i>At present, quality control is the responsibility of the institution that collects data, however, there are no common quality control processes that would ensure uniform quality control procedures⁶ (see Section 3.1.3.3 Quality control).</i></p> <p><i>An example of criteria for assessing quality control mechanisms are depicted in the document “Promotion of good practices for national environmental information systems and tools for data harvesting at EU level” page 165.</i></p> <p><i>Examples of standards, mechanisms and measures for quality control are also presented in the Good Practice Report, in the section “Develop and publish quality control mechanisms for environmental data”.</i></p>
	8. Expand collection, prepare and publish environmental data in a machine-readable format	Medium	<p>The Republic of Moldova currently publishes most of its data in a machine-readable format. Nonetheless, many data are kept in public authorities and it is important to ensure the publication of datasets in machine-readable formats so that they can be used.</p> <p>This measure aims to ensure the publication of environmental data in machine-readable format. 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 in such a format and requires processing beforehand.</p> <p><i>The Good Practice Report provides more details about machine-readable formats in “Transformation of data published to machine-readable format” section.</i></p> <p><i>This measure is closely linked with “Define/adopt and publish metadata description standards for all environmental data and information in accordance with international standards using a one-stop access point” measures outlined in the Content section.</i></p>
	9. Inventory, re-engineering and	Medium	<p>This measure will define metadata standards and ensure that environmental services are described and accessible</p>

⁶ As discussed in the national roundtable.



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	Measure	Priority	Description
	publication of public services as e-services		<p>through the electronic service portal, in accordance with national standards.</p> <p>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.</p> <p><i>For an example of implementation, consult the Good Practices Report's "Publishing e-services on a dedicated e-service portal" section.</i></p>
	10. Perform an open data impact analysis for the use/reuse of environment data	Continuous	<p>This measure will support raising awareness through regular assessment on the impact of the use/reuse of environmental data and information, as part of the open data impact assessment framework and consequently drive further developments. For instance, the performance could be evaluated against the following criteria:</p> <ul style="list-style-type: none"> • Number of environmental datasets downloaded and reused; • User feedback received/collected; • Number of applications developed using environmental data and having an impact on the environment (including reuse of environmental data by other sectors, such as transport). <p><i>More information about the general open data impact assessment can be found in the Good Practices Report in the "European Data Portal Impact maturity" section. The section provides an example of the European Open Data Portal relevant for this area.</i></p>

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);



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- Adopt an open data policy, and extend it to environmental data (example from the EU);
- 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 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).

Roadmap measures: Infrastructure

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

Table 4. Measures from the perspective of SEIS pillar: Infrastructure

Measure	Priority	Description
11. Establish a single and user-friendly web access point for environmental information	High	<p>The single access point can also be designed as an entry point for all environmental policy domains to support the implementation of decision VI/1 of the Meeting of the Parties to the Convention.</p> <p>The Republic of Moldova is currently developing the concept for Integrated Environmental Information System (SIIM). For its development, the country could follow these recommendations for the development of the environmental portal (single access point for environmental information):</p> <ul style="list-style-type: none"> • Design main technological solutions, which will be used as a single and user-friendly web-access point for environment information – technological solution should be based on the technological platform; • Agree upon a single access point by integrating various data sources of environmental information (e.g. a 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 existing portals so institutions can easily share their (structured) data and have the possibility to download



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	Measure	Priority	Description
			<p>datasets (e.g. EEA public map services⁷, provisions of the INSPIRE Directive);</p> <ul style="list-style-type: none"> • Implement a tool for checking the quality of metadata provided by data providers; • Publish environmental information and data in accordance with the rules described by international metadata standards, such as DCAT-AP metadata vocabulary (this measure will also provide 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 as well as from the public through public consultations launched by ministries and governmental bodies. <p><i>The current initiative in the Republic of Moldova, on the development of the Semantic Catalogue, should be coordinated with the development of a single access point for environmental information.</i></p> <p><i>More information about single access point can be found in the Good Practice Report in the section “Establish a single and user-friendly web-access point for environmental information” (examples from EU, EEA and Ireland).</i></p> <p><i>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”.</i></p> <p><i>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 (PSI)”, in the Content section, and measure “Establish a collaborative institutional framework for the implementation of open data”, in the Cooperation (network) section.</i></p>
	12. Enhance interoperability of geospatial, statistical, health and environmental information systems	High	<p>This measure will facilitate the implementation of the interoperability standards defined for environmental and other thematic data. This measure will:</p> <ul style="list-style-type: none"> • Assess the existing compatibility of various information systems with defined interoperability standards, in particular with the geoportal;

⁷ <https://www.eea.europa.eu/code/gis>



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	Measure	Priority	Description
			<ul style="list-style-type: none"> • 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. <p>These actions can also be included in the national interoperability framework.</p> <p><i>The Republic of Moldova has developed the Interoperability Governmental Platform MConnect to improve data exchange for the provision of e-services. Nonetheless, interoperability between information systems and data still requires further development⁸.</i></p> <p><i>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.</i></p> <p><i>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.</i></p>
	13. Establish an electronic registry of public environmental information	High	<p>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 will map the systems, databases, institutions, datasets and reports published.</p> <p>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.</p> <p><i>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</i></p>

⁸ As discussed during the national roundtable.



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Measure	Priority	Description
		<i>"Inventory of the environmental information system", page 25.</i>
14. Improve accessibility and usability of available environmental data and information by improving the multilingual aspect	Medium	<p>This measure will provide a full translation into Romanian/English of public authorities' websites, yearly reports and environmental information metadata.</p> <p><i>An example of the multilingual portal is the EEA GEMET⁹, which provides a thesaurus translated into 37 languages of environmental terms.</i></p>
15. Develop e-services for the environment	Medium	<p>This initiative will aim to develop environmental e-services according to the national standards (service passports), and according to service interoperability standards (e.g. e-signature, e-payment).</p> <p><i>More information about the description of public services can be found in the best practices report in the section "Building e-services and public information systems according to national and international standards".</i></p> <p><i>This measure is connected to the measure "Inventory, reengineering and publication of public services as e-services" from the present roadmap.</i></p>
16. Strengthen the technical capability for environmental monitoring	Continuous	<p>This measure aims to strengthen the technical capability for environmental monitoring to other thematic areas such as water.</p> <p>The gradual provision of modernised monitoring equipment should be planned and gradually ensured. To do so, the following is recommended:</p> <ul style="list-style-type: none"> • Define monitoring parameters at national and local level for each thematic area. These objectives should include: <ul style="list-style-type: none"> ○ 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. • Assess the current monitoring infrastructure for selected thematic areas (e.g. water as a start). This

⁹ <https://www.eionet.europa.eu/gemet/en/concept/4438>



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	Measure	Priority	Description
			<p>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 needs aligned with the objectives defined above.</p> <ul style="list-style-type: none"> • Develop an implementation plan to acquire and install new monitoring equipment, taking into consideration all financial possibilities and options. • Develop an implementation plan to gradually integrate the new equipment with existing, taking into consideration financial possibilities. 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 where to gradually complement the traditional environmental monitoring system with additional information coming from other sources (e.g. citizen science, earth observation). The acquisition of monitoring equipment requires consequent investments and should be well prioritised taking into consideration the local and national needs, and also with a long-time perspective and the approximation of the respective EU legislation in mind. <p><i>This measure is linked with the measures “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.</i></p>
	<p>17. 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</p>	<p>Medium</p>	<p>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:</p> <ul style="list-style-type: none"> • Make an inventory of all the systems used for the management of environmental information at the national level; • Define requirements for an integrated system for environmental information management. In particular, the system will provide functionalities such as: <ul style="list-style-type: none"> ○ Workflow (e.g. quality management); ○ Environmental data collection;



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Measure	Priority	Description
		<ul style="list-style-type: none"> ○ Automatic dissemination and update of open data; ○ Document management; ○ Integration with external systems (statistical, health, open data, transport, energy cadastral, etc. as needed); ○ Advanced visualisation tools and capabilities for integration with business intelligence tools. <ul style="list-style-type: none"> ● Gradually implement the system; ● Train the potential users and institutions on how to operate the system, benefits and functionalities; ● Assess regularly the performance and update the system when needed. <p>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 information systems.</p> <p>Note: the system should provide a standard API and a possibility to upload data manually so that compatibility with legacy and external systems can be maintained.</p> <p><i>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.</i></p> <p><i>This measure is linked to the measures “Enhance interoperability of geospatial, statistical, health and environmental information systems” from the present roadmap.</i></p>
18. Develop applications to engage the public in environmental monitoring and protection activities	Low	<p>This measure will aim to develop a series of software applications (e.g. mobile apps) that will expand the potential for e-government to create “environmental data ecosystem” and enable the public to access, consult and interact with environmental data.</p> <p>For instance, through the apps the public can:</p> <ul style="list-style-type: none"> ● 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.



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Measure	Priority	Description
		<i>This measure is linked with the measures proposed in the Cooperation (network) section in the present roadmap.</i>

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.

Roadmap measures: Cooperation (Network)

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

Table 5. Measures from the perspective of SEIS pillar: Cooperation

Measure	Priority	Description
19. Establish collaborative institutional framework for the implementation of open data	a High	<p>This measure will strengthen the necessary institutional framework for managing open data, especially taking into consideration the environmental component.</p> <p>This measure will focus on the need to create a strong cooperation between institutions in order to ensure the sharing, exchange, use, reuse and publication of public sector information (PSI).</p> <p>An example of an approach to establishing a collaborative institutional framework for open data involves:</p> <ul style="list-style-type: none"> • Amendments/completion of the existing legal framework to include the responsibilities of the various actors, and ensure the proper division of responsibilities of open data at national and thematic level (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 open data publishing process internally);



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	Measure	Priority	Description
			<ul style="list-style-type: none"> • Supporting institutions by providing guidelines to establish the responsibilities for open data governance inside each institution; • 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. <p><i>The Good Practice Report provides examples of initiatives undertaken in the EU to foster inter-institutional and international cooperation in the field of open data. In addition, 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” also provides good practices to establish an institutional framework for environmental governance.</i></p> <p><i>This measure is linked with the recommendations presented in the Content section of the present roadmap and the targeting of the revision of the legal framework.</i></p>
	20. Develop and ensure increased capacity for handling environmental and open data	Medium	<p>Components of this measure cover:</p> <ul style="list-style-type: none"> • 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 acquisition of necessary tools; • Development and integration of procedures and processes for preparing and disseminating environmental data and information; • Professional development/training plan 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 management and to recognise these trainings through certificates. <p><i>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 “2. Administrative capacity (environmental inspectorates, police, customs,</i></p>



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Measure	Priority	Description
		<p><i>prosecution services and audit bodies)” focuses strongly on the example of capacity-building in the EU.</i></p> <p><i>This measure is linked with the measures “Strengthen the technical capability for environmental monitoring” and “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” of the present roadmap.</i></p>
21. Promote international and regional cooperation to facilitate the implementation of the roadmap	High	<p>This measure aims to support the Republic of Moldova with international expertise and good practices to assist in the implementation of the present roadmap. To do so, it is recommended that:</p> <ul style="list-style-type: none"> • 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. <p><i>The Good Practices Report provides examples of initiatives that can be undertaken to implement this measure, in the section “Increasing public administration, public and business awareness over open data and environmental data”.</i></p>
22. Raise awareness of open government and open data for the environment among citizens and economic operators	Continuous	<p>This measure will increase the demand for open government and open data by raising awareness and conducting other promotion campaigns at national and local levels.</p> <p>This measure will focus on raising public awareness of the role and impact of environmental information, its accessibility, usability and other related aspects, by pursuing ongoing activities and strengthening and expanding them where and when appropriate.</p> <p>Additionally, a series of activities for promoting the use/reuse and sharing of environmental information could be undertaken, such as:</p> <ul style="list-style-type: none"> • Hackathons; • Fora; • Promotion campaigns; • Development of incubators; • Development of public-private partnerships; • Facilitating dialogue and cooperation between national bodies, NGOs and the academic community.



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	Measure	Priority	Description
			<p><i>The Republic of Moldova should focus on raising awareness in public authorities because currently the participation of data owners is one of the key reasons for slow open data development on the Open Data Portal.</i></p> <p><i>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”.</i></p>

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);
- 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).

