HYDR⊙4U

Sustainable Small-Scale Hydropower in Central Asia

Deliverable 7.2: Data Management Plan WP7

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Abbreviations and Acronyms

Acronym	Description
CA	Consortium Agreement
DMP	Data Management Plan
DoA	Description of Action
DX.Y	Deliverable Number Y of the Xth Work-Package
D&C	Dissemination & Communication
EC	European Commission
EU	European Union
GA	Grant Agreement
H2020	Horizon 2020 (8th Framework Programme for Research of the EU)
ICT	Information Communication Technology
IP	Intellectual Property
IPR	Intellectual Property Rights
MOOC	Massive Online Open Course
OA	Open Access
PP	Project Partner
RTD	Research Technology and Development
S&S	Sync&Share
SHP	Small Hydropower
TRL	Technology Readiness Level
WP	Work Package

0. Publishable Summary

The Data Management Plan describes data handling considering the FAIR principles during the Hydro4U project. It is supposed to provide guidelines and to report about the progress during the project lifetime. The version presented here gives an overview on existing data sets to be used, planned new data generation, including methodology and the standards applied. It also contains an approach for data preservation and continuation after the project.

1. Introduction

Hydro4U is a Horizon2020 (H2020) Innovation Action (IA) project that aims to exploit the existing but unused hydropower potential in Central Asia in a sustainable way. Hereby, data is one key element to tackle this potential. The consortium identified lack of data as one limitation for investors in order to realize hydropower plants. In order to overcome this limitation and to reach Hydro4Us objectives different data are collected and processed.

This document is the data management plan (DMP) for Hydro4U. The DMP provides descriptions of the data used in Hydro4U and an outline of how the data is managed, shared and preserved. Datasets are procured for Hydro4U from online or public sources as well as private or commercial sources.

This DMP describes the steps undertaken by the consortium to make the data generated by Hydro4U findable, accessible, interoperable and re-usable (FAIR), if they are meant for the public. The DMP is framed in accordance to the "Guidelines on FAIR Data Management in Horizon 2020", which lists the following points that are to be addressed by a DMP that promotes FAIR data:

- the handling of research data during and after the project
- what data will be collected, processed and /or generated
- which methodology and standards will be applied
- whether data will be shared/made open access, and
- how data will be curated and preserved (including after the project).

2. Data Summary

In order to reach the objectives of Hydro4U data has to be collected and processed. However, not all data needed are freely available. Hydro4U has the ambition to use open source data as much as possible and to share results (open access). If it is unavoidable, non-open access data will be used e.g. from commercial or state-owned sources, if they are accessible for the consortium. Moreover, due to the experience, know-how and previous work of the consortium members and the demonstration character of this innovation action, different datasets exist already at Hydro4U beneficiaries and are potentially re-used. For such data Hydro4U considers the IP and ownership rights, when it comes to publication and data sharing. Due to the high Technology Readiness Levels (TRLs) of the demonstrators (6/7 to 7/8 respectively), which are very close to a fully commercial product, IP rights are of particular interest in Hydro4U.

2.1. Purpose of data collection and generation

The overall motivation for data collection in Hydro4U is to reach the objectives mentioned in the Grant Agreement, which can be shortly summarized:

- to exploit the unused small hydropower potential in Central Asia and make it accessible,
- to build two demonstrators,
- to quantify the overall sustainability (environmental and socioeconomic) of SHP in a transboundary WFEC nexus context and
- to collect data for D&C purposes, to stay connected with the target groups and finally for executing exploitation actions.

Thus, Hydro4U empowers hydropower operators, investors and governments to include small hydropower for the green energy transition in Central Asia. This goal is reached with the construction of two innovative SHP demonstrators in Central Asia, including innovative planning approaches and the involvement of all water users at the site. These demonstrators shall have a lighthouse character and attract attention in the whole region. Moreover, the proposed hydropower solutions are evaluated extensively to measure their socioeconomic benefit as well as their impact on the ecology. Furthermore, one element for the replication and various geodata (Hydrology, topography, land use, etc.) must be collected and processed for the potential analysis (see Deliverable D.1.1 and Annex 7.2 of this document).

Some of the data the project will collect and generate is classified as personal data, such as names, e.g. during surveys and workshops, and stakeholder consultations. This data must be irreversibly rendered anonymous before being made public. If such data cannot be irreversibly rendered anonymous, it will remain confidential. Non-anonymous data, although not openly shared in the project or beyond, can still provide input to Deliverables and other scientific output (e.g. publications, conference presentations), but only the analysis of the aggregated data, which cannot be linked to individual participants, will be made public. This will be in particular important for the activities related to Dissemination and Communication (D&C). Here names, email-address and organization type will be collected

- for the newsletter subscription: by an app of word-press (newsletter app of the website program). This data will be stored in Europe and only be used to communicate news and newsletters to the subscribers.
- for the organization of events: Name, Email, organization type and Position will be collected to enable the organization of events, the networking during the project period and to exchange information between events. Participants have to opt-in.

Only data that is needed to perform project activities will be collected. For D&C activities only personnel data to stay connected will be collected (Name, Email address and organisation type); each participant/subscriber needs to actively accept the temporary storage of their data.

2.2. Data types, formats and size

Hydro4U will only use widely accepted formats for data generation, such as:

- Documents / Reports / Other Publications: PDF, txt, doc/docx, ppt/pptx
- Geodata: GeoTIFF, XYZ-files, shp
- Technical drawings: dxf, dwg
- Spreadsheets: xls, xslx
- Databases: csv
- Audio files: mp3, wav, wma
- Pictures: jpg, png
- Video: avi, flv, mov, mp4, wmv

The size of all data cannot be estimated in the current state of the project.

Moreover, a particularity of Hydro4U are the demonstrators, the two different SHP plants, which will be built within Hydro4U and cannot be categorized as conventional data.

2.3. Origin of data

Hydro4U uses different existing data sources: A large proportion of the needed geodata, e.g. for the potential analysis and the decision support system, are freely accessible (at least for

the main thematic fields and on the global scale). Additional information exists already at the partners from previous works in Central Asia, other projects or existing technology and know-how. If such data are needed, the ownership and IP right of each partner will be considered according to the Consortium Agreement (CA). Moreover, measurement campaigns and field surveys will be performed in the impact assessment of the demonstration and planning activities of Hydro4U, and thus new data are generated.

For D&C activities data will be collected via social media campaigns (e.g. for subscription to the project newsletter and for the registration to events). Participants need to actively agree to the temporary storage and further use of their data in the frame of the project actions. GDPR rules will respected.

Additional data sources are:

- Feedback from participants at stakeholder workshops and consultations (personal communication)
- Market surveys
- Literature study/review and open data (re-use of existing data)

2.4. Data utility

Hydro4U will work with these data and deliver condensed reports and results. Finally, Deliverables will be published (PUBLIC), which are mainly reports but also the mentioned demonstrators as a physical project outcome. The public project outcomes will be useful for:

- Governmental institutions and agencies in their decision-making process
- NGOs
- Hydropower operators and industry
- Investors
- Local municipalities
- Universities

In Annex 7.1 of this DMP, a list of all public Deliverables with a description is provided. Despite these 17 public Deliverables, there are 33 confidential Deliverables, which are only for the members of the consortium (including the Commission Services).

3. FAIR data

Hydro4U will manage data for publication in accordance with the principles of FAIR data management (Findable, Accessible, Interoperable and Re-usable data). The project aims to maximise access to and re-use of data generated by the project. At the same time, there are datasets, or parts of datasets, used or generated in this project that cannot be shared freely in order to protect the IP rights, respect given permissions (e.g. if data are provided only during the lifetime of the project), and other rights.

In general, Hydro4U will use a combination of different systems for a comprehensive data management:

- **Sync&Share**: Sync&Share (S&S) will be used mainly for collaborative working and quick data exchange within the consortium. This means that the consortium can work together on documents or data simultaneously during the project. The access will be limited to the project members. For Sync&Share the data are hosted and saved at the

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Leibniz Computing Centre. Data protection is ensured after German and European Law (https://syncandshare.lrz.de/).

- **TUM Workbench:** This tool is used for general project management, assigning the data to tasks and adding metadata to the data. This tool will be used for tracking data within the project, uploading the raw data and archiving the curated final data with their metadata. This is essential to avoid the loss of data. The access is restricted to the project members.
- **mediaTUM**: This tool is linked to TUM Workbench. Selected data, which are stored in TUM Workbench, can be published on mediaTUM.

3.1. Findable

Before storing data to TUM Workbench, the public accessible datasets in Hydro4U will be named according to the following naming convention.

(1) Kind of data: Kind of data should indicate whether it is a result of a measurement, a photography, technical drawing, simulation etc.
(2) Version number: The version number should indicate the version, run, measurement campaign etc.
(3) Related Work Package or Deliverable: This information might be ignored, if there is no WP or Deliverable directly related (e.g. existing data for one of the demonstration or planning sites, which are not collected as part of a WP and could be of interest for more than one project member). If the file is related to more than one WP, all (WPxyz) must be mentioned, e.g. the file is related to WP2 and WP3 please add "WP23"
(4) Related Demonstration or Planning Site: This information might be ignored, if there is no site connected to such data, as for instance a literature review
(5) Partner producing the data / file
(6) Storage Date: This information shall show the date of storage in the format: Year-Month-Date

For instance, the first numerical hydrodynamic simulation at the study site "Case1", related to WP2, generated by TUM on XX.YY.ZZZZ will have the following name: "ZZZZ-YY-XX_ WP2_Hydro4U_HydrNumSIM_Case1_TUM_v1"

Further details on the data will be given in the metadata set including keywords. During data creation, such information is saved in a simple README.txt file in the relevant folder in a first step. Later, the information is added to the data in the designated form when uploading to TUM workbench. It can later be accessed as pdf.

3.2. Accessible

Hydro4U wants to generate impact and thus the results of the project, i.e., some selected Deliverables, must be publicly available. Hydro4U takes each beneficiaries' background and ownership rights on existing data or on newly generated data into consideration as highlighted in the Consortium Agreement. This is in particular important, as the demonstrator is close to a commercial product (TRL approx. 7/8) and the hydropower sector is highly competitive.

Thus, only invited persons have access to the internal data platforms used in Hydro4U. On external side, publicly relevant raw and curated data are stored on TUM workbench to save the data on the long term and beyond the duration of the project. Data from TUM workbench will be made available using mediaTUM, which will be managed by TUM. Here different levels of access can be managed, full public or limited access. Each project partner will nominate a

DataManager, which will have access after the project to TUM workbench to handle upcoming queries.

The public available Deliverables will be integrated on the Hydro4U website via links to mediaTUM.

3.3. Interoperable

The published datasets, which are mainly reports, cannot be manipulated or extended by external users. In the generation of these datasets, we ensure good quality and readability by an internal reviewing process before publication. Moreover, Hydro4U will follow the Thesaurus GEMET (https://www.eionet.europa.eu/gemet/en/about/).

3.4. Re-use

The data or rather the project results, i.e., the Deliverables, should be re-used during and especially after the lifetime of the Hydro4U project, since we want to generate a long term impact. Thus several Deliverables are public Deliverables, such as Hydro4Us replication guideline on SHP (D5.9). Since Hydro4U is an innovation action, with high involvements of industry, the amount of research data is limited, and several Deliverables have to be confidential.

4. Allocation of resources

Costs for open access publications are considered in Hydro4Us budget. Moreover, each beneficiary is responsible for the data they produce, and they will nominate a DataManager.

5. Data security

Hydro4U uses different data platforms (S&S, mediaTUM, and workbench), which are strictly following European and German data protection and management standards (e.g. redundancy, mirroring, monitoring) and thus data security is ensured.

6. Ethical aspects

Ethical standards and guidelines of Horizon2020 will be rigorously applied, regardless of the country in which the research is carried out. Hydro4U involves the following Third Countries: Kirgizstan, Uzbekistan, Kazakhstan. The activities implemented in these Countries (and if relevant, any other Third Country) must comply with Horizon 2020 ethics rules. The beneficiaries confirmed their GDPR compliance in the Grant and Consortium Agreement, including relevant systems and privacy practices and deploy privacy-by-design and privacy-by-default.

7. Annex

7.1. List of Public Deliverables

#	Name	Short description	Type
D2.4	Template for incorporating SHP into WFEC agreement at tributary level	Climate-proofed" sharing regimes including template for incorporating SHP into WFEC agreement at tributary level will be defined that explicitly take uncertainties into account and preferences of different sectors, through stakeholder engagement. Based on this, policy dialogues and capacity building activities with local stakeholders are carried out.	Report
D3.4	Delivery of both FCPS and HSPS equipment packages	GHE has manufactured the FCPS solution as a pre-installed unit to be ready for delivery to the site "Shakimardan". GHE has manufactured the electrical and mechanical (turbine) equipment of the HSPS solution and these components are delivered to MUHR whereas the general assembly of all parts will take place and the HSPS unit will consequently be ready for delivery.	Demonstrator
D5.1	Hydro4U Replication plan. 1st release	Definition of the Hydro4U replication strategy and harmonization of the information produced along the Project during the 1st year	Report
D5.10	Replication Guideline tool validation	Validation of the final version of the replication tool by means of three workshops for future hydropower project promoters	Report
D5.2	Hydro4U Replication plan. 2nd release	Revision of the Hydro4U replication strategy and harmonization of the information produced along the project and within WP5 related to the 1st replication pillar: assessment of hydropower scenarios in Task 5.2	Report
D5.4	Hydro4U Replication plan. 3rd release	Revision of the Hydro4U replication strategy and harmonization of the information produced along the project and within WP5 related to the 1st and 2nd replication pillars: assessment of hydropower scenarios in Task 5.2 and feasibility studies in at least 3 test cases in Task 5.3	Report
D5.5	Replication of scenario-based impact assessment of future small-scale hydropower development in CA	Provision of region-specific conclusions based on task 1.4 for CA and assisting material (maps, tables) in order to support policy design and strategy development for SHP uptake	Report
D5.7	Hydro4U Replication plan. 4th release	Revision of the Hydro4U replication strategy and harmonization of the information produced along the project and within WP5 related to the three replication pillars: assessment of hydropower scenarios in Task 5.2, feasibility studies in at least 3 test cases in Task 5.3 and interactive replication guideline tool in Task 5.4	Report
D5.9	Hydro4U Replication Guideline tool	Software development and beta version of the replication tool for internal use within the consortium	Other
D6.6	Published MOOC and educational material for students and professionals	In relation with Task 6.4, completed and published Massive Open Online Course (MOOC) for students in higher education and professionals. The MOOC comprises multi-media presentations, written course materials, case studies, exercises, lectures, examination materials and guidance for lecturers. The sources for the materials are the two project demonstrations as well as other SHP projects. The language is English. The MOOC will be published on an open education platform.	Websites, patents filing, etc.
D6.8	Exploitation Impact Report	This report will summarise the different activities realised within the "Task 6.3 Support exploitation impact" namely: • the different relevant external developments, competitors, patents, regulations and market trends to help assess the exploitation opportunities and	Report

		to identify, understand and mitigate barriers to market entry, • exploitation materials related to exploitable results prepared during the project and, • synergy activities organised during the project for the market uptake and deep impact of the exploitable results.	
D7.2	Data Management Plan	Data Management Plan Description	ORDP
D7.3	Internal Project Communication Strategy	A strategy is defined and implemented how to communicate in the most effective way among the partners to ensure an efficient exchange of information. The strategy needs to be implemented for communication between Management, WP Leaders and Partners as well as between the partners directly.	Report
D7.4	Planning and organization of the different board meetings	The plan of different meetings for GA and SC has to be made following the schedule and frequency of the different meeting types.	Report
D7.5	Project management plan first revision	Based on the WBS and Gantt chart developed in D7.1 the revision will check consistency and stage and quality of the implementation of the actions during the first period. If necessary some things will be adapted.	Report
D7.6	Project management plan second revision	Based on the WBS and Gantt chart developed in D7.1 and the first revision in D7.4, the second revision will check consistency and stage and quality of the implementation of the actions during the first period. If necessary some things will be adapted.	Report

7.2. Deliverable D1.1: Template – tabular summary and fact sheets on relevant (geo)data

Metadata form: \<short name\>
Hydro4U / WP1

Processing: \<insert name of person who processed this data entry\>
Time period of data survey: XX.XX.2021(-XX.XX.2021) \<insert the time period or day you fill in this form\>
Citation of data: XXXX

D A T A F O R M	
ID	
Category	
Data (short name)	
Data (long name)	
Originator	
Publisher	
Provider (organization / contact person)	
Creation date	
Publication date	
Publication place	
Data format	
Type of data	
Availability	
Online Link	
Data description	
Status of data (completed or ongoing survey)	
Spatial extent of data	
Specification of spational extent of data	
Temporal extent of data (series)	
Quality of data (in terms of reliability / completeness)	
Quality of data (in terms of spatial accuracy)	
Other information	