FutureArcticLives

Future Arctic Livelihoods and Biodiversity in a Changing Climate

Deliverable 5.3

Data Management Plan

V1

By

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and

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1. Introduction

This document is the first version of the Data Management Plan (DMP) for the project **FutureArcticLives**. The DMP describes the life cycle for all collected, processed, and stored datasets and how data will be made available at the end of the project. The DMP also specifies data used by **FutureArcticLives** that cannot be made available by the project and the reason why. Additionally the DMP defines the roles in management of all data within the project, and describes where and how to access the datasets. All project participants are obliged to read and understand the basic principles of the DMP and must follow the rules of data storing and sharing within the project. The DMP is a dynamic document and will be updated as the project progresses.

1.1. The first version of the DMP

This first version of the DMP follows guidelines provided during the BiodivERsA Data Management Plan workshop June 3rd, 2021 and shall be delivered by June 26th, 2021 by **FutureArcticLives** executive committee. Hence, the DMP deliverable strives to comply with the guidelines provided by BiodivERsA during this workshop and as described in the guidance document for scientists on data management, open data, and the production of data management plans (Goudeseune et al. 2019). This first version of the DMP describes the procedures of curating input data (i.e. existing data) and storing output data (i.e. new data generated by the project e.g through fieldwork in WPs). Data and information generated by the project will be uploaded to a repository, some of which will be normalized. However, some input data belonging to for instance Greenland Statistics cannot be shared as work on this data will take place on Greenland Statistics servers with no option for export in accordance with National regulations on data protection. In other cases, output data generated by **FutureArcticLives** in principle belong to the University of the partner collecting the data. In such cases making data publically available is not given but depends on the evaluation of the University's data management officer. Finally, in some cases such as elite interviews conducted by **FutureArcticLives** it may be practically impossible to ensure adequate anonymization of respondents and where information provided may have a sensitive character it will not be possible to make data publically available or share data with researchers outside the project. These cases will be further described below.

All WP leaders will in collaboration with partners in their work package review the first version of the DMP draft prior to the approval by the Executive Committee.

Participants must prepare metadata descriptions for all data set used in the project, using templates found in the Annex. It is important that both input and output data are described using these templates. This information is essential for good data management (e.g. coordinating fieldwork and data collection) across tasks and WPs.

1.2. Following versions of the DMP

The DMP is a dynamic document and more elaborate versions will be delivered at an appropriate later stage. New versions of the DMP will be created whenever important changes occur due to inclusion of new data sets, changes in consortium policies or external factors.

2. Organization

This document will outline the general procedures for storing and preserving data within the **FutureArcticLives** project. Data management is organized at two levels:

- The partner level
- The project level

In addition, the DMP distinguishes between:

- Input data
- Output data

2.1. The partner level

Partners are responsible for handling and documentation of data collated (input data) and collected (output data) through the activities carried out by themselves within WPs and must provide a metadata description of each dataset. The explanation for this organization is that in accordance with national legislation in some partner countries data collected by University or research institution staff through projects regardless of funding belongs to the University. The University then conducts a risk and a consequence assessment to determine the possibility for data sharing depending on possible person sensitive questions and in accordance with GDPR regulations. In any case where national legislation with respect to protection of respondents is stricter than EU legislation national legislation takes precedence and means that making data publically available may be unfeasible. The relevant universities will in these cases typically evaluate requests to use the dataset on a case-by-case basis. Hence, organizing data management on a WP level is not feasible as partners from several universities and countries typically are involved in the same WP. However, meta-data descriptions of all input and output data collected by all project partners will be made publically available through the projects homepage with information about where to obtain the raw data and how to request usage of each worked dataset.

2.2. The project level

WP5, represented by the Data Management Group (DMG) is responsible for data management at the project level. This includes setting up and maintaining facilities for data storage and sharing among all project partners as well as external data users (i.e. a data repository). The DMG consists of the Executive Committee – defined in the collaboration agreement as consisting of the work package leaders. To the extent possible, i.e. when not in violation of national legislation or GDPR regulations, output datasets will be managed at the project level by the Data Management Group (DMG) (i.e. WP5) consisting of the Executive Committee and made publically available through the projects selected joint data repository. For input data this depends in addition on the requirements and permissions given by the original data owners.

2.3. Input data

Expected input data (collation in progress) includes a range of secondary data obtained from various sources by individual partners and WPs and will be associated with different rights and obligations in relation to data sharing determined by the original data owners as described in their license agreements. As an example, much of the input data to WP1 will be obtained from or through Greenland Statistics. In accordance with national legislation data will be anonymized by Greenland Statistics and all analysis undertaken on a server provided by Greenland Statistics. Only summary statistics, figures and regression output can be exported from the server. These precautions are required to comply with GDPR legislation due to the low human population in many communities in Greenland enabling easy identification of individuals. For the same reason it is at this point not clear whether access will be provided to the data at the community level or aggregated at the municipal or higher levels. Hence, for a substantial part of the input data in WP1 making data publically available is unfeasible. Similarly climate data provided to WP1 by DMI is either freely available from DMIs home

page or can be obtained from the Danish Meteorological Institute (DMI) at a cost. In both cases **FutureArcticLives** will be legally obligated by the license agreement not to share the data but can point to where it can be obtained and how. Similar requirements exists for data obtained from the Norwegian Meteorological Institute and the Swedish Meteorological and Hydrological Institute as well as data from the Norwegian Agriculture Agency. Conditions for the use of data from the Sami parliament of Sweden remains to be determined.

Meta data descriptions will be made for all input datasets and made publically available through the project homepage pointing out where the data can be obtained if not shared by **FutureArcticLives** through the selected data repository.

2.4. Output data

Expected output data includes data from household questionnaire surveys and stakeholder interviews including elite interviews and will be associated with different rights and possibilities for data sharing determined by ownership of the data in accordance with national law and the ability to ensure anonymity and comply with GDPR regulations. Because data according to national law for some partners belongs to the University the possibility of making data publically available is determined through what can be likened to a risk and a consequence assessment conducted by the University whose staff has collected the data, in accordance with applicable law. In practice it is often unclear to what extent the decision about potential future data sharing and publishing can be known before studies are undertaken and to what extent the consent sheet and any individual researchers promise about anonymity can be considered. In the case of surveys by Umeå University and NTNU in reindeer herding Saami households guaranteeing anonymity may be difficult and it is yet unclear whether data should be considered sensitive. In the case of elite interviews (interviews for instance with participants in specific positions at agency, state department or similar type of positions) that were originally to be carried out in WP4 anonymity can in principle not be guaranteed on this basis. Combined with the lack of clarity about application about national legal requirements and University guidelines for sharing or making data publically available this means that some project participants are currently abstaining from making such elite interviews as were originally planned within the project. These activities will instead rely on document, policy and legal studies.

3. Life cycle of data

The data life cycle of the data covers the complete flow of data, including:

- Data collection by individual participants determined by Research Plans building on project objectives and research questions.
- Standardization in accordance with the template for metadata description as laid out in Annex X
- Quality assurance (QA) and quality control (QC) by the DMG
- Uploading data into the data repository

3.1. Data description

The DMP provides for each dataset used in each WP the following information or addresses the questions below in a tabularized format (Tables 1-8). Elaboration is provided below each table where relevant.

1. An internal project ID number is assigned to each data item. This ID number will be replaced or supplemented by a DOI in future versions of the DMP for data that is sharable once the data is uploaded to a publically assessable repository. The ID number uses the following naming rule: WP

number – partner acronym, "I" for input data or "o" for output data and a number based on the order it appears in the list of datasets. Hence, the ID number for the time-series data on catch per month of individual species by location from individual hunters and fishers (occupational and recreational hunters) in Greenland for the period 1994-2019 as an example have the internal ID WP1-UCPH-1 because it is used in WP1 by UCPH and is the first dataset to be collated in accordance with the order of the objectives in WP1. An ID number is assigned to each dataset (input and output) regardless of whether or not the data will be physically stored by **FutureArcticLives** or a partner institution for easy reference and to facilitate production of the obligatory metadata description.

2. A short text description of the content of the data. Se above mentioned dataset for an example.
3. Source of the data or name of the data provider for input data where possible with a hyperlink to the relevant web page. For output data, the acronym is provided for the partner institution(s) generating and hence owning the data.
4. Description of the type of the data in the categories – text, numeric, images, recording (video, audio), and samples. Further description of e.g. unique identifier is provided as relevant.
5. File format in which the data is stored. This follows the most widely used convention in the discipline that conform to the international standards (based on the KNAW-DANS Preferred Formats overview, November 2015) to ensure future compatibility. These includes:

    - Document (.txt; .pdf; .doc; .docx; .odt)
    - Spreadsheet (.csv; xls; .xlsx; .ods)
    - GIS shapefile (.shp + tables)
    - GIS raster data (.geotif; .img)
    - Database (.sql; .mdb; .accdb)
    - Picture (.jpg; .tif; .png)
    - Audio (.wav; mp3)
    - Video (.avi; .mp4; .mov)

6. Volume of the data in kilobytes, megabytes, gigabytes or any other relevant unit of measurement.
7. Is the data considered sensitive in any way? The categories None, Personal data and Confidential data is assigned.
8. Ethical approval describes from whom (i.e. what ethical review board or other institution) an ethical approval or a research permit is required in the case of sensitive data and whether or not approval has been obtained, and if so in what appendix of the DMP the approval can be found. This entry also specify any requirements or concerns in relation to possibility for anonymization.
9. Rights and obligations in relation to license for using register data (input data). This specify whether or not the license agreement explicitly enables or prevents the project from sharing the raw data after the project ends. Where possible a link is provided to the online licensing agreement.
10. Data storage strategy, names and provides a link to the data repository where the data will be stored. This differs depending on data ownership, which in many cases is the partner university or research institution (i.e. the partner level cf. above). Consequently, each partner describes their strategy for storage of research data including level of password protection, frequency and means of backup and whether or not the repository uses a log to track data management and other process. Data that can be managed at the project level will be stored in the ERDA repository at the University of Copenhagen.

11. Data sharing describes whether and how data will be shared. This includes the categories – “destroyed after end project”, “Not shared”, “not shared but preserved” “shared upon request” or “openly shared”.

WP1.

Objectives:

Task 1.1: Evaluate hunter catch records as a user-generated source of monitoring data on species population trends to inform management decisions and assist overcoming inherent data constraints.
Task 1.2: Determine to what extent cash and subsistence income from individual species contribute to hunting households' total annual income as well as Greenland's national economy.
Task 1.3: Compare reliance on hunting and hunting yield composition over time and between locations and examine to what extent species substitute each other, how this is influenced by climate, hunting regulations and trade prices and evaluate potential biodiversity implications.
Task 1.4: Conduct future scenario analysis and simulations to predict household welfare, societal aggregated economic and biodiversity consequences of reduced access to individual species, due to climate change and proposed hunting regulations.
Task 1.5: Determine whether particular groups of hunters and fishers, such as highly specialized hunters in remote communities, are more exposed to these impacts than others.

Table 1. Description of **input data** in WP1.

1. Internal ID	2. Description	3. Source	4. Type	5. File format	6. Volume	7. Sensitive	8. Ethics	9. License	10. Storage	11. Sharing
WP1-UCPH-i1	Time-series data on catch per month of individual species by location from individual hunters and fishers (occupational and recreational hunters) in Greenland for the period 1994-2019 from Greenlandic hunting license (Piniarneq) and catch database (LULI)	Greenland statistics and or Ministry of Hunting, fishing and Agriculture; Greenland Self Rule Government	Numeric registered by social security number	csv	<1 GB	Personal data. Anonymization unfeasible	Security clearance handled by GS	Access only to anonymized data through GS server. Restrictions on export - prohibited	Access only through GS server	Not shared
WP1-UCPH-i2	Scientific monitoring data for selected species and populations in Greenland	Greenland Institute of Natural Resources	Numeric – point estimates, densities or counts	csv	<1 GB	No	None	No license agreement exist. Determined	Temporary storage in UCPH data repository ERDA.	Not shared

			for specific locations					on a case basis.	Subsequent import to GS server	
WP1-UCPH-i3	Temperature, precipitation, wind speed, cloud cover, air pressure, humidity and snow cover for the period 1994-2019 and ice charts for the period 2000-2019 in Greenland (available from DMIs homepage). Older ice charts can be requested	Danish Meteorological Institute (DMI)	Numeric data from GPS localized measuring stations	csv	< 1GB	No	None	DMI open data license allows open use, distribution and publishing.	Temporary storage in UCPH data repository. Subsequent import to GS server	Openly shared
WP1-UCPH-i4	Information about prices for individual species caught in Greenland on a monthly basis to the extent available	Local trading points. Alternatively, there is a report from the Hunting Division valuating species and cuts	Numeric registered as species price per unit by time and location	csv	<1MB	No	None	Requested through GS	Temporary storage in UCPH data repository ERDA. Subsequent import to GS server	Openly shared
WP1-UCPH-i5	Records on local trade in sealskin and fisheries landings in Greenland	Local buying stations and the Greenlandic fisheries license control (GLFK).	Numeric registered as species price per unit by time and buying point	csv	< 1GB	No	None	Publically available	Temporary storage in UCPH data repository ERDA. Subsequent import to GS server	Openly shared
WP1-UCPH-i6	Monthly household income from each source for all individuals registered in the hunting license register in Greenland for the period 1994-2019.	Tax Agency	Numeric recorded based on time and social security id	csv	<1GB	Personal data. Anonymization unfeasible	Security clearance handled by GS	Access only to anonymized data through GS server. Restrictions	Access only through GS server	Not shared

								on export - prohibited		
WP1-UCPH-i7	Management measures including closed seasons, quotas and local regulations enacted on a monthly basis for the period 1994-2019 in Greenland	Department of Hunting and Fisheries in Greenland Self rule government	Text describing numbers, dates and locations. To be converted to numeric measures	word	<1MB	No	None	Publically available	Storage in UCPH repository ERDA	Openly shared
WP1-UCPH-i8	Data on subsidies and aid schemes in relation to catch and fisheries as well as pensions, housing assistance and other social benefits received at the household level.	Department of Hunting and Fisheries and the Tax Agency in Greenland Self rule government	Numeric recorded based on time and social security id	csv	<1MB	Personal data. Anonymization unfeasible	Security clearance handled by GS	Access only to anonymized data through GS server. Restrictions on export - prohibited	Access only through GS server	Not shared
WP1-UCPH-i9	Local price data per month for fuel and ammunition in the period 1994-2012	Greenland Statistics	Numeric recorded based on time and location	csv	<1MB	No	None	Publically available	Storage in UCPH repository ERDA	Openly shared

WP2

Objectives:

Task 2.1: Assess the viability of Saami herder livelihood strategies and the risk of a collapse of reindeer pastoralism based on productivity forecasts.
Task 2.2: Determine to what extent cultural and intrinsic values and income derived from reindeer husbandry are important to the modern Norwegian and Swedish reindeer herder household including as an adaptation strategy in the face of climate change.
Task 2.3: Determine how the Saami adapts to varying impacts of climate change on grazing across geographical areas. The impact of climate changes on vegetation may differ across geographical areas, in both strength and direction. Consequently, the economic impact and optimal adaption strategies may also differ between geographical areas.
Task 2.4: Conduct future scenario analysis and simulations to predict the impact of climate change and the proposed adaption strategies and compare welfare effects across different geographical areas.

Table 2. Description of **input data** in WP2.

1. Internal ID	2. Description	3. Source	4. Type	5. File format	6. Volume	7. Sensitive	8. Ethics	9. License	10. Storage	11. Sharing
WP2-Umeå-i1	Data on reindeer production (reindeer numbers and weights) and losses to carnivores over time for different villages and countries for the period 2000-2020.	Saami reindeer herding community level/district level.	Numeric yearly data per reindeer herding community level/district	csv	<1MB	No	None	Publicly available	Umeå storage in personal computer NTNU Personal One Drive shared with researchers on WP2	Openly shared
WP2-Umeå-i2	North Atlantic Oscillation index, local weather data and satellite based observations of vegetation.	Norwegian Meteorological Institute and the Swedish	Numeric	csv	<1MB	No	None	Publicly available	NTNU Personal One Drive	Openly shared

		Meteorological and Hydrological Institute.								
WP2-Umeå-i3	Data on income and costs in reindeer herding.	Norwegian Agriculture Agency and the Sami parliament of Sweden (Sametinget).	Numeric Yearly data per reindeer herding community/district level.	csv	<1MB	No	None	Publicly available	shared with researchers on WP2	Openly shared

Table 3. Description of **output** data from WP2.

1. Internal ID	2. Description	3. Source	4. Type	5. File format	6. Volume	7. Sensitive	8. Ethics	10. Storage	11. Sharing
WP2-Umeå-o1	Household survey in selected reindeer herding areas quantifying market and non-market values of reindeer husbandry and a choice experiment evaluating preferred adaptation strategies.	Survey by NTNU and Umeå University	Numeric and text based data	csv and word	<5MB	Yes	Security clearance handled by UmU and NTNU.	Umeå storage in personal computer Encrypted with AIP (Azure Information Protection Viewer) and stored on NTNU Personal OneDrive shared with	Not shared

								researchers on WP2	

WP3

Objectives:

Task 3.1: Assess the degradation of and current state of marine ecosystem services supporting indigenous and local culture and livelihoods in the Porsanger fjord area.
Task 3.2: Identify local and indigenous conceptions of ecosystem health and indicators of wellbeing for coastal communities.
Task 3.3: Describe existing Harvest Control Rules (HCR) and identify how these may be adapted to fisheries management in the Porsanger fjord.
Task 3.4: Develop a proposed management plan for the Porsanger fjord, with suggestions for how it can be adapted to other areas in the same region.

Table 4. Description of **input data** in WP3.

1. Internal ID	2. Description	3. Source	4. Type	5. File format	6. Volume	7. Sensitive	8. Ethics	9. License	10. Storage	11. Sharing
WP3-UiT-i1	Existing database on local ecological knowledge identifying local perceptions of drivers of ecosystem change	UiT. CoastChange	Structured survey responses in Excel.	Excel	<1MB	Anonymized	Approved by the Norwegian Data Protection Office (NSD)	Approved by the Norwegian Data Protection Office (NSD) CoastChange	Microsoft Office, UiT sharepoint in restricted storage space.	Only for project members (WP 3)
WP3-UiT-i2	Personal and collective narratives on local ecological knowledge using mapping and visual ethnography techniques to identify local perceptions of ecosystem	UiT, CoastChange	Audio and video files from ethnographic narratives.	Mp4 Mp3	<6MB	Personal data. Anonymization unfeasible	Approved by the Norwegian Data Protection Office (NSD)	Approved by the Norwegian Data Protection Office (NSD)	On separate hard drive in locked archive at UiT.	Not shared, only accessible for responsible researcher

	services and drivers of ecosystem change.							CoastChange		

Table 5. Description of **output data** from WP3.

1. Internal ID	2. Description	3. Source	4. Type	5. File format	6. Volume	7. Sensitive	8. Ethics	10. Storage	11. Sharing
WP3-UiT-o1	Identication of ecosystem services and local perceptions of wellbeing in the Porsanger fjord	Survey by UiT	GIS format with tables and geodatabase files	ArcGIS Feature layers and .shp	<4MB	Not sensitive	Approved by the Norwegian Data Protection Office (NSD)	Dataset at dataverse.no and published at arcgisonline.com	Shared publically
WP3-UiT-o2	StoryMaps with narratives on ecosystem health and wellbeing in a context of climate change in coastal Sami communities	UiT	ArcGIS StoryMap with embedded videos	Web page at storymaps. arcgisc.com	<1MB	Videos will only contain footage where participants have given their consent to make the video publically available	Approved by the Norwegian Data Protection Office (NSD)	Videos stored at vimeo or YouTube. Published at storymaps.arcgis.com	Shared publically
WP3-UiT-o3	Literature review of state of marine social-ecological system in	UiT	Collection of literature and text describing	Word PDF	<1MB	No personal data	Not relevant	Microsoft Office, UiT sharepoint in restricted storage space.	Project members

	Finnmark and the Porsanger fjord		the collated literature					Dropbox for the project	
WP3-UiT-o4	Interviews with key persons on spatial management plan	UiT	Interviews with municipal and regional planners and politicians	Mp3	<1MB	Anonymized	Approved by the Norwegian Data Protection Office (NSD) No 608270 www.nsd.no	Microsoft Office, UiT sharepoint in restricted storage space. .	Not shared, only accessible for responsible researcher

WP4

Objectives:

Task 4.1: Analyse the synergies and trade-offs between policies and laws applicable to hunting, fishing and reindeer husbandry and their relation to those on biodiversity, climate and other relevant sectors at relevant levels.

Task 4.2: Discuss the extent to which policy or legal change and Nature Based Solutions (NBS) for mitigating and adapting to climate change may be undertaken, and the role for "agents of change" at local, regional and national levels.

Table 6. Description of output data from WP4.

1. Internal ID	2. Description	3. Source	4. Type	5. File format	6. Volume	7. Sensitive	8. Ethics	10. Storage	11. Sharing
WP4-AAU-o1	AAU will carry out qualitative interviews in case study areas assessing the potential for NBS and how the levels of infrastructures influence the utilization of NBS and how institutional processes are interpreted and reacted to.	Local hunters, citizens as well as infrastructure providers and local government in case study areas.	Notes, drawings, pictures	Document (.txt; .pdf; .doc; .docx; .odt) Picture (.jpg; .tif; .png)	<1GB	Personal data. Anonymization unfeasible	Following Greenlandic ethical demands	Temporary storage in AAU hardware. Subsequent import to AAU system. Se below	Not shared
WP4-AAU-o2	AAU will carry out elite stakeholder interviews at the regional, national and potentially EU level, to evaluate the extent to which actors at the different levels can implement NBS.	Elite stakeholders the regional, national and potentially EU level	Notes, drawings. pictures	Document (.txt; .pdf; .doc; .docx; .odt) Picture (.jpg; .tif; .png)	<1GB	Personal data. Anonymization unfeasible	Following Greenlandic ethical demands	Temporary storage in AAU hardware. Subsequent import to AAU system. Se below.	Not shared

4. Metadata description

All data will be associated with a README metadata file connected through the unique internal ID using a template. The template for metadata description will ensure that the following information is provided:

- Name of the dataset
- Name of the project (i.e. the project title – **FutureArcticLives**) and WP in which it is used
- Partner institution collecting and hence owning the (output) data and/or name and institution of the original (input) data owner
- Name of the project researchers involved in collecting (output data) and/or using the data (input data)
- Where the data can be obtained – either the raw data or the worked and merged dataset depending on license agreements
- Specification of the terms of use including information on the access level of the dataset and conditions for use, with indications of sensitivity of specific variables (e.g. person data)
- The objective towards which the data is to be used (equivalent to the task number)
- Procedures used to collect the data (for survey data this can refer to a survey protocol or a questionnaire)
- Brief description of the variables contained in the data. All data should be stored «as is» in the data repository without changing the names of variables in the existing datasets. this way data will be recognizable to the researchers that originally collected these data.
- Information on the status of the data and a to-do list to complete data wrangling
- List of changes made between different versions of the dataset (see section 3.3)

The metadata template is contained in Appendix 1.

5. Strategy for naming

FutureArcticLives will use a simple convention for naming files (including README metadata files) and folders in data repositories based on the project name (**FururеArcticLives**), the unique internal ID (cf. above), with the associated metadata description, a generic identifier (e.g. climate, habitat, production, socioeconomic, price etc. as relevant) and a version number reflecting changes made (deletion of part of the dataset for time periods or locations not included in analysis, variables calculated, transformations etc.). The metadata file describes variables contained in the original dataset as well as the time period and locations covered (either generically or through GPS locations). The version number (also reflected in the metadata description) reflects the changes made from one version of the dataset to the next. Where applicable (i.e. depending on partner repository) folders can be uses to further subdivide datasets base on the generic identifier.

6. Data storage

Due to the many different owners of the data collated and collected by **FutureArcticLIves** each partner will select their own repository in accordance with their institutions requirements and the nature of their data. However, metadata descriptions for all datasets describing where and how the data can be accessed or obtained will be published through **FutureArcticLives** homepage.

Common criteria for selection of data storage repositories include that:

- Data can be associated with searchable key words so that data can be discovered and used by others (findable)
- It must be possible to add metadata descriptions and a license agreement describing terms of use (interoperable)
- Data must be given a unique and persistent identifier (a doi number) making the data citable

FutureArcticLives joint data repository for project level data as well as the repository used default by WP1 is the Electronic Research Data Archive (ERDA - https://www.erda.dk/) delivered by the University of Copenhagen's SCIENCE HPC Center for the faculty of Science including collaborators and students. ERDA is password protected requiring a password upon login. All data on ERDA is automatically replicated over multiple disks with RAID technology and offers the ability to recover deleted files or 'roll back' files to earlier versions through a log. ERDA also enables cloud back up of local and shared files (like Dropbox), workgroups, association of multiple files (incl. license agreements and metadata files) and formats in folders and assigning a unique doi number to each file. **FutureArcticLives** is not expected to host person sensitive data at the project level or in WP1 and ERDA is not recommended for such sensitive data. However, if this becomes relevant UCPH provides an alternative system for such data called Sensitive Information Facility (SIF - https://sif.ku.dk/).
Data associated with publications will be made available through Zenodo.

Individual partners selected repositories are described below:
Ålborg University: Data collected in the case study areas during fieldwork for WP4 tasks, will be stored on local hard drives, in the form of a safe governed laptop with security established in collaboration with Alborg University IT security department. Encrypted USB drives will be carried along, as backup to have a second copy due to the risk of hardware failure.

When possible, data will be transferred to a secure network drive at AAU that is considered safe for personal data, with established and governed backup procedures etc. Access to these data are protected with compliant technical and organizational measurements.

Alborg University will seek repository solutions based on the data types and possible demands from publishers at a later stage, and also have the ability to use the local repository VBN for making the research data FAIR.

Umeå University: No original interview studies will be undertaken by Umeå University in WP4.

Luleå University: No original interview studies be undertaken by Luleå University in WP4.

Arctic University of Norway: Ecosystem services identification in geodatabase format will be stored at DataverseNO (https://dataverse.no), This is a curated, FAIR-aligned national generic repository for open research data from all academic disciplines. DataverseNO commits to facilitate that published data remain accessible and (re)usable in a long-term perspective. The repository is owned and operated by UiT The Arctic University of Norway. DataverseNO accepts submissions from researchers primarily from Norwegian research institutions. Datasets in DataverseNO are grouped into institutional collections as well as special collections. The technical infrastructure of the repository is based on the open source application Dataverse (https://dataverse.org), which is developed by an international developer and user community led by Harvard University.

Norwegian Institute for Nature Research:

Norwegian University of Science and Technology: Data collected in WP2, will be stored on NTNU One Drive in accordance with ordinary security routines at NTNU, password-regulated access, and backup procedures: https://studntnu-my.sharepoint.com/:f:/r/personal/annebjo_ntnu_no/Documents/FutureArcticLivesWP2?csf=1&web=1&e=f4SBuj. If further data protection requires, data will be transferred to NICE-1 that is considered safe for strongly sensitive data www.nice.ntnu.no.

FutureArcticLives recommends that partners keep at least two copies of backups in external drives to ensure data safety by avoiding risks of accidental deletion or failure of hard drives. It is recommended to keep at least two copies of backups in external drives.

7. Data preservation

All data underlying publications will as a minimum be preserved for 10 years in accordance with university code of conduct for research integrity and shared in a repository to the extent possible (cf. above) striving to make the data Findable, Accessible, Interoperable and Useable in accordance with the FAIR principles. The project website will host metadata descriptions for all datasets used including those used in publications as well as those hosted on the data owners server, containing descriptions of the data and using keywords consistent with convention in the research area and giving merged input data (where possible) and output data a unique and persistent identifier (i.e. a doi number) to make it “Findable” and “Accessible”. The metadata description will point to where data that cannot be shared can be obtained to make also this data “Accessible”. Each data file will further be subject to standardization and quality assurance by the DMG and stored with license agreements and describing the requirements of input and output data owners including in relation to GDPR rules concerning anonymization to make it “Interoperable”. All output datasets will furthermore be associated with data owners – i.e. the relevant universities - Material Transfer Agreement protocols to facilitate making it “Useable”.

Third party users will only have access to materials after they are published by **FutureArcticLives** or after an embargo of four years after the project lifetime as provided in the Grant Agreement (Article X). Each partner is required to adhere to the rules of engagement in data sharing as itemized in the Grant Agreement, i.e. protection of results (Article X), confidentiality of results (Article X), and processing of personal information (Article X).

Decisions on preservation of output data not included in publications will be made based on the nature of the data. Data that is difficult and/or costly to generate or impossible to reproduce (e.g. collected in remote locations) or has been processed by third parties will be preserved following university guidelines for specific types of data. Data that is confidential or cannot be anonymized will be destroyed after end project in accordance with university guidelines.

8. Step-by-step

The following description on access to the data repository by project participants covers only the project-level data repository ERDA. Principally the coordinator having created the repository for of **FutureArcticLives** in ERDA can as the only invite members to the repository and will do so for participants. ERDA enables specification of datasets that will be publically accessible through a doi number.

9. Roles

The roles different participants in **FutureArcticLives** in data management are described here.

9.1. Researchers

The individual researchers are responsible for:

- Communicating with the Data Management Group
- Develop a research plan describing their research activities in accordance with the objectives of **FutureArcticLives** and circulate it to or otherwise make it accessible to other project participants, update it based on comments and suggestions received and ensure that it is sufficient and understandable
- Upload and maintain participant level data in their institutions selected data repository (acknowledging the constraints described above)
- Ensure that a detailed metadata description is present in the format of a README file and associated with the relevant license agreement and material transfer agreement where relevant (cf. above)

9.2. Data Management Group

The DMG is responsible for:

- Supporting quality assurance of data and metadata descriptions
- Facilitating upload of input and output project level data to the joint data repository
- Informing researchers about the DMP and information herein.

Given the large legal and other variations between different countries, different researchers in the DMG cannot be assumed to take on responsibilities beyond what they can be aware of in relation to the legal circumstances in each of their home countries and home universities.

Members of the DMG:

Martin Reinhardt Nielsen – WP5 (UCPH)

Henrik Meilby – WP1 (UCPH)

Göran Bostedt – WP2 (Umeå)

Camilla Brattland – WP3 (UiT)

Carina Keskitalo – WP4 (Umeå)

10. Ethical guidelines

FutureArcticLives partners must carry out their activities in compliance with management of intellectual property rights and ethics principles described in Deliverable X (Ethical requirement report), as well as observe confidentiality of data as itemized in the Grant Agreement (Article X).

11. Authorship guidelines

Authorship of all publications produced by FutureArcticLives shall follow the guidelines given in the Vancouver regulations. Because there are various ways to interpret the Vancouver agreement (e.g. if authorship is acquired by creative efforts or not), no strict rules for authorship is stated in the DMP. However, the senior author on any manuscript developed in the name of **FutureArcticLives** are strongly encouraged to contact all persons that have contributed to any part of the scientific process, to ensure that all potential co-authors (with a significant contribution) are contacted and requested about their involvement in:

- The conception or design of the work
- The acquisition, analysis, or interpretation of data for the work
- Drafting the work
- Critically revision for important intellectual content
- Final approval of the version to be published
- Agreement to be accountable for all aspects of the work) in the manuscript

12. Publication

FutureArcticLives encourages all participating researchers to publish their findings in international scientific peer reviewed scientific journals open access in accordance with the collaboration agreement (Article X).

13. References

Goudeseune L., Le Roux X., Eggermont H., Bishop W., Bléry C., Brosens D., Coupremanne M., Davis R., Hautala H., Heughebaert A., Jacques C., Lee T., Rerig G., Ungvári J. (2019). Guidance document for scientists on data management, open data, and the production of Data Management Plans. BiodivERsA report. 48 pp. DOI : 10.5281/zenodo.3448251

14. Appendix

Metadata description template

Name of dataset (incl. internal ID and doi number):	
Project:	
Work package	
Data owner (i.e. institution)	
Involved researchers (collecting or using the data)	
Where can the data be obtained (i.e. link to repository)	
Terms of use (link to license agreement)	
Contributing to which objective in FutureArcticLives	
Data collection procedure (link to protocol, questionnaire etc.)	
Variable names	Brief description
	(Extend as appropriate)
To-do-list for data wrangling	
Version number and changes made since previous version	
	(Extend as appropriate)