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Plan for the Exploitation and Dissemination of Results

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Plan for the Exploitation and Dissemination of Results

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8 General Objectives of ECOTIP and its expected results

This document presents the Plan for Exploitation and Dissemination of Results (PEDR). The Plan has been designed and will be continuously updated in order to meet the objectives of ECOTIP which are:

- To map the current biodiversity of Arctic marine ecosystems and its past and present interaction with external drivers (multiple stressors), using traits as a measure of functional diversity
- To investigate the vulnerability of marine communities (with different trait compositions), functions and ecosystem services to multiple climatic and non-climatic stressors, and to determine their potential for ecosystem tipping points
- To use the analysis of functional (trait) diversity to predict a) changes in the local production and type of fisheries and b) in carbon sequestration by biological pump under multiple anthropogenic stressors
- To engage in dialogue and co-creation of alternative governance structures and adaptation strategies for the local and indigenous communities, as well as industries and regulatory authorities
- To ensure effective exploitation of the project results in international scientific assessments of Arctic biodiversity change and by policy-makers, to ensure dialogue, communication and dissemination to indigenous societies and European citizens, and to provide recommendations for optimizing the monitoring of Arctic biodiversity and ecosystem services

9 Priorities of the EU call to which ECOTIP responds to

ECOTIP addresses the call LC-CLA-07-2019 subtopic b) Changes in Arctic Biodiversity, under the call - H2020-LC-CLA-2018-2019-2020 'Building a low-carbon, climate resilient future: climate action in support of the Paris Agreement'.

***b) Changes in Arctic biodiversity (Research and Innovation action):** Actions should identify and analyse major drivers and implications of changing biodiversity in the Arctic, such as the role of invasive species, and how vulnerable land and/or marine ecosystems are with respect to combined human and natural influences. Actions should assess the ecosystems' responses to both external and internal factors and how these responses are impacting on indigenous populations and local communities at socio-economic level. Actions should also identify adaptation strategies in relation to the changes in Arctic ecosystems.*

The PEDR will be enhanced and optimized throughout the duration of the project to maximize the expected impacts as described in the EU Call:

- the implementation of the new integrated EU policy for the Arctic;
- the IPCC assessments and other major regional and global initiatives;
- enhanced engagement of and the interaction with residents from local communities and indigenous societies.
- support the EU Polar (Research) Cluster

In Table 1 we provide a comprehensive overview of the specific targets determined by the ECOTIP Consortium in relation to each of the expected impacts, and list concrete actions in which the project will contribute to these targets.

Table 1. The Expected Impact of ECOTIP

| | Specific target | ECOTIP contribution | |
|--|--|---|--|
| | | Initiated and in progress | Under planning and development |
| C o n t r i b u t i o n f o r t h e i m p l e m e n t a t i o n o f t h e n e w i n t e g r a t e d E U p o l i c y f o r t h e A r c t i c | Supporting Paris Agreement on <u>climate change</u> research, and developing a <u>climate adaptation strategy</u> for the Arctic region | <ul style="list-style-type: none"> Investigating the effects of climate change on biodiversity and related ecosystem services, including the feed-back loops for carbon sequestration | <ul style="list-style-type: none"> Helping to develop adaptation strategies together with the local communities |
| | Promoting <u>sustainable development</u> and innovation; enhancing economic, social and environmental resilience of societies, promoting blue growth opportunities including safe shipping | <ul style="list-style-type: none"> Providing new insights of the effects of increasing economic activities (shipping, mining, oil exploration) on the Arctic ecosystems and their services Investigating the effect of climate change and other stressors on Indigenous livelihoods and for coastal and off-shore business opportunities (blue economy) | <ul style="list-style-type: none"> Contributing to regulatory frameworks on sustainable use of marine resources Integrating Indigenous knowledge into recommendations for management strategies |
| | <u>Protecting the Arctic marine environment</u> and strengthening the ecosystem resilience, including biodiversity protection, establishment of marine protected areas and pollution control | <ul style="list-style-type: none"> Mapping of the multiple stressors, including pollution by oil, heavy metals, litter and invasive species, and investigating their effects on biodiversity, ecosystem functions and their services | <ul style="list-style-type: none"> Providing advice and participating in policy dialogues on the priorities for environmental protection Helping to optimize monitoring programs as components of the Pan-Arctic Observation System (EU H2020 INTAROS project) |
| | <u>Advancing international collaboration</u> on ocean governance, climate change, maritime environment and safety, fisheries, and research | <ul style="list-style-type: none"> Increasing scientific knowledge about the Arctic Ocean, including observations based on remote sensing | <ul style="list-style-type: none"> Providing new ecosystem data to supporting the international conventions and organizations such as the International Maritime Organization (IMO) |
| | Promoting open data, open infrastructure and contributing to existing observing network efforts, engaging in capacity building | <ul style="list-style-type: none"> Supporting open data and open access policy Educating graduate, post-graduate and PhD students and therefore providing for the next generation of Arctic experts | <ul style="list-style-type: none"> Promoting the use of internationally-agreed standards, protocols and best practices produced by relevant SCOR working groups and other made available via Ocean Best Practices initiative |
| C o n t r i | Intergovernmental science-policy Platform on Biodiversity and Ecosystem | <ul style="list-style-type: none"> Contribute with data and models to the future regional biodiversity assessments in the Arctic region | <ul style="list-style-type: none"> Engage in dialog of policy-relevant tools and methods for biodiversity monitoring, including identification of new indexes |

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| b u t i o n t o t h e m a j o r r e g i o n a l a n d g l o b a l s c i e n t i f i c a s s e s s m e n t s | Services (IPBES) regional assessments | | |
| | Intergovernmental Panel on Climate Change (IPCC) | <ul style="list-style-type: none"> • Enable existing Earth System Models to better resolve ocean biological processes and their role in climate regulation through delivery of new process understanding and a trait-based model approach | <ul style="list-style-type: none"> • Support improved representation of pelagic ecosystems in the IPCC Reasons for Concern (RFC) framework |
| | World Ocean Assessment | <ul style="list-style-type: none"> • Provide data, knowledge and new information for the next World Ocean Assessment or other small relevant assessments | |
| | Marine Biodiversity Observation Network (MBON); Circumpolar Biodiversity Monitoring Program (CBMP) | <ul style="list-style-type: none"> • Provide data for essential biodiversity variables (EBVs) and essential ocean variables (EOVs) according to the requirements for their measurement set jointly by MBON and GOOS • Engage in the dialogue for the development of marine EBVs in Arctic, including addressing of the key knowledge-gaps, optimization of monitoring and identification of trait-based indexes representing functional diversity and key ecosystem services | |
| | Arctic Biodiversity Assessment (Arctic Council) Working groups: The Conservation of Arctic Flora and Fauna (CAFF), Protection of the Arctic Marine Environment (PAME) and Arctic Monitoring and Assessment Programme (AMAP) | <ul style="list-style-type: none"> • Address knowledge-gaps identified in the most recent Arctic biodiversity assessment, particularly on microbial and plankton diversity and benthic processes • Provide new knowledge on the impact of climate change and other stressors on marine biodiversity | <ul style="list-style-type: none"> • Provide advice and knowledge to ongoing work on implementing the ecosystem approach to managing Arctic marine ecosystems • Provide recommendations for enhanced and optimized Arctic monitoring |
| | EEA (European Environmental Agency) | <ul style="list-style-type: none"> • Contribute with data and models to the future regional biodiversity assessments in the European Arctic • Contribute with new knowledge on the socio-economic impacts of biodiversity change | |
| | ICES Working Group on Integrated Ecosystem Assessment in the Greenland Sea; International Arctic Science Committee Marine Working Group | <ul style="list-style-type: none"> • Provide new marine biodiversity, climate and environmental stressor data and provide holistic interpretation of observed changes across the trophic elements • Contribute to the science advisory process by engaging in respective working groups proceedings | |

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| <p>E n g a g e m e n t a n d i n t e r a c t i o n w i t h l o c a l c o m m u n i t i e s a n d I n d i g e n o u s s o c i e t i e s</p> | <p>Strategies and initiatives to increase the involvement of Arctic Indigenous peoples in science and engagement of their knowledge systems by the Arctic Council, Greenland Government, and local communities themselves, including adaptation strategy for incorporation of potential changes in fishing resources</p> | <ul style="list-style-type: none"> ● Organize a stake-holder workshop for local communities at the beginning of the project to inform about the project, to ensure <i>active and needs-based engagement</i> of decision makers from the start (including use of Indigenous knowledge to guide study design), and identify early on the social actors and institutions that generate adaptation actions ● Conduct a series of interviews with local communities during the project to map significant changes in the (human) communities related to changes in past and present fisheries (subsistence as well as commercial), in consultation with the association of fishers and hunters in Greenland (KNAPK) ● Share and co-produce knowledge to obtain possible scenarios for future changes and alternative paths for social and economic developments in the region using a Bayesian network approach | <ul style="list-style-type: none"> ● Co-create assessments of risks, opportunities and adaptation to biodiversity change by fishery management, communities and industry ● Organise a final stake-holder workshop for local communities/municipalities in case study regions to share results, and embed and mainstream <i>usable</i> adaptation strategies within existing social actors and institutions that are ● Produce a review of recent (10 years) Local Ecological Knowledge (LEK) observations in Greenland in order to identify and categorize Greenlandic LEK observations and experienced impacts in relation to changing biodiversity and changing fisheries best placed to adopt those strategies |
|--|--|---|--|

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| <p>E U A r c t i c R e s e a r c h C l u s t e r</p> | <p>Provide policy-relevant information to respond to the impact of climate change on the Arctic's fragile marine ecosystem</p> | <ul style="list-style-type: none"> ● Seek to join the cluster to boost the dissemination, uptake and utility of its results ● Engage with similar-minded projects (e.g., those to be funded under LC-CLA-06-2019) to create synergies and enhance international cooperation | <ul style="list-style-type: none"> ● Engage in the use of common infrastructure to promote complimentary actions ● Provide policy advise through pro-active participation in the cluster to respond to the impact of climate change and to contribute to sustainable development |
|---|--|---|--|

10 ECOTIP's Plan for the Dissemination of Results

10.1 What types of results will be made available through ECOTIP?

To investigate the drivers and ecosystem consequences of biodiversity change, ECOTIP has developed a comprehensive approach that will combine:

- maps of stressors in the Arctic ocean, both using global climate models, existing data series and new sampling - WP1
- data series on the abundance of organisms related to climatic and non-climatic stressors, spanning in time from recent millennia to present day, and covering different geographic areas and seasons – WP2
- experimental studies on organism's tolerance and adaptability, and process studies on the pelagic and benthic systems – WP1 and WP2
- trait-based models synthesizing the ecosystem consequences of the biodiversity change, and predicting the future ecosystems – WP3
- statistical models predicting the future fish distributions – WP2
- Bayesian network to assess ecosystem vulnerability and to facilitate integration of local environmental knowledge with other field and model results – WP3, WP4 and WP5
- stakeholder workshops, interviews, case studies and data collection to collect baseline information on fleet structure and governance methods, and to explore changes, impacts and adaptation options with fishery stakeholders and indigenous communities – WP4 and WP5

ECOTIP is a multidisciplinary project which collects and generates new information spanning a number of disciplines, from physical oceanography to socio-economics. In Table 2 below we summarize the types or sources of data and model results which we anticipate that ECOTIP will generate and disseminate. The majority of information will be widely disseminated and available for further exploitation by both scientific and non-scientific users, many of which we directly engage during the project to consult on their specific needs.

Please note that this table is non-exhaustive and preliminary. More detailed and regularly updated information, including on dissemination level, will be considered by the ECOTIP's gradually evolving Data Management Plan.

Data

Table 2: Summary of data types and sources with examples of parameter groups.

| Domain | Data/model | Type/source | Parameter groups | Dissemination level |
|-----------------------|-------------------|---------------------------------------|--|---------------------|
| socio-economics | raw data | personal interviews | <i>to be defined</i> | non-open |
| | raw data & models | economic analysis | fishery fleets; governance models | open |
| | raw data | local ecological knowledge (LEK) | fish; other biological parameters | open |
| physical oceanography | raw data | seawater samples | water column temperature and salinity | open |
| | synthesis product | climate and stressor scenarios | water column temperature and salinity | open |
| biogeochemistry | raw data | seawater samples | dissolved gases; nutrients; carbonate system; suspended particulate material | open |
| | raw data | sediment traps | fluxes | open |
| | synthesis product | climate and stressor scenarios | oxygen, pH | open |
| biology | raw data | laboratory experiments | zooplankton; rate measurements (including production, excretion and grazing); fatty acids | open |
| | raw data | net tows | zooplankton | open |
| | raw data | acoustic surveys | fish | open |
| | synthesis product | remote sensing merged with in situ | pigments; phytoplankton and microphytobenthos | open |
| | raw data | seawater samples | pigments; bacteria and viruses; rate measurements (including production, excretion and grazing) | open |
| | raw data | omics, proteomics | other biological measurements | open |
| | raw data | eDNA | other organic chemical measurements | open |
| | raw data | chemical analysis | biota composition | open |
| | model | statistical model outputs | fish | open |
| | model | Matlab routines of trait-based models | phytoplankton and microphytobenthos; zooplankton | open |
| paleo oceanography | raw data | sediment cores | rock and sediment physical and chemical properties; rock and sediment biota; other organic chemical measurements | open |

Scientific Knowledge

ECOTIP results will contribute significantly to a number of knowledge gaps identified by global assessments on the state of climate (e.g. IPCC) and biodiversity (e.g. IPBES). On a regional level, ECOTIP results will also address gaps in scientific knowledge and capacity reported by expert working groups of the Arctic Council, and ICES among others. Table 1 provides an extensive list of groups and organizations which ECOTIP will engage with to maximize dissemination as well as exploitation of specific new scientific knowledge.

The primary means of disseminating this new scientific knowledge will be through scientific publications. In order to maximize their potential for exploitation ECOTIP will also directly engage with relevant working groups, which several of ECOTIP consortium members are already active members of.

- 1) Storylines: ECOTIP has established a number of dedicated task teams, spanning across two or more WPs, with the aim to among other things improve the focus of the research to maximize the exploitation of ECOTIP's new knowledge related to one of 7 so-called "storylines". Based on key questions and gaps identified from stakeholders, each task team will be responsible for refining and executing a set of adequate communication, dissemination and exploitation measures.

Policy recommendations

ECOTIP results will provide recommendations for enhancing and optimizing biodiversity monitoring efforts to support global and regional policies. Current capacity of long-term observations of marine biodiversity will be analysed with respect to scientific and societal requirements, and provide recommendations for enhanced and optimized monitoring in line with the best practices and international standards. Particular focus will be on monitoring elements currently not included in observing programs, such as invasive species via eDNA and on the benthic communities which can act as temporal couplers in the seasonal systems and reflect long term trends in overlaying water column production. Detailed recommendations for optimized sampling in the case study region of Greenland will be consulted with local managers and observing system implementers who will evaluate their impact and feasibility through a dedicated workshop planned towards the end of the project.

Using information from Tasks 1.2, 2.2-3 and 3.3 ECOTIP will inform the ongoing process of setting requirements for sustained global ocean observations of relevant Essential Ocean Variables (EOVs) and Essential Biodiversity Variables (EBVs) coordinated by the Global Ocean Observing System (GOOS) and the Marine Biodiversity Observing Network (MBON). Relevant EOV/EBV requirements, related to plankton in particular, will be refined with special consideration of data and information needs identified by climate (IPCC) and biodiversity (IPBES) assessments.

Methods

As can be seen from Table 2, ECOTIP will employ a combination of traditional and novel methodologies to address current gaps in scientific knowledge and/or resource management. We can distinguish between methods used for (i) collection of raw data and (ii) methods used to analyse data and/or generate model projections.

(ii) data collection and experimental methods

In order to map the multitude of stressors affecting the Arctic ocean ecosystem, ECOTIP uses:

- in situ observations from past and new hydrographic surveys conducted both in the open ocean and in coastal waters, including inside fjords.
- remote sensing observations of key environmental abiotic and biotic factors obtained from public repositories such as ESA Climate Change Initiative

To enable examining empirical responses of biota to changes in anthropogenic stressors the project relies on a number of well-established field data collection methods such as water sampling, net tows, acoustic surveys, sediment traps and sediment cores, as well as the rapidly developing methodologies of omics, proteomics and eDNA.

High innovation potential is associated with generalizing the use of eDNA in fisheries and ecosystem surveys, moving the science from research to application (e.g. through enabling detection of invasive species in Arctic harbours).

The new methodology in ECOTIP also includes development of paleo-oceanography to investigate the changes in biota over the past millennia, such as the detection of zooplankton remains in sediment cores. This will allow comparisons of past and present drivers of species distributions, and give new insights on the effects of multiple stressors and the speed of the recovery in marine biota. This new methodology along with the results will be described in a scientific publication, and will be available in open access.

In addition, ECOTIP will conduct laboratory experiments with tolerance of organisms to complement field and modelling work so that combined information can help resolve the complex question of how organisms with different trait composition respond to changing conditions.

(ii) analysis methods and tools

To provide new insights into the functioning of the Arctic ecosystem, the project will rely on statistical analysis of the links between biota and climatic and non-climatic stressors from last millennia to present day (Tasks 1.2, 1.3 and 2.1) and dedicated process studies to gain understanding of the cascading effects of the changes in the primary producers to the food web transfer and biological pump (Task 2.2).

In order to increase our capacity to predict changes in ecosystem services under scenarios of climate and human pressures, ECOTIP will use a trait-based approach to modelling the ecosystem interactions. This methodology represents a disruptive innovation in ecosystem modelling. By developing new model concepts and applications ECOTIP will for example increase the potential for resolving greater detail of biological processes in existing ecosystem models, including Earth System Models which will be used in the 7th Climate Model Intercomparison Project (CMIP7) and form the basis for IPCC AR7.

Assessing the socio-economic consequences of Arctic biodiversity change and addressing the mitigation and adaptation options is done by:

- using mixed-method case studies of recent adaptations to ecosystem change in the inshore and off-shore fisheries and the fishery management system in West Greenland.

- conducting a retrospective analysis of economic, social and cultural impacts and trade-offs of different regulatory options, including the relative support for small- vs large- scale fisheries or commercial fishing vs other use of resource (e.g., tourism).
- mapping and organising the fishing fleet in homogeneous sub-fleets, and analysing the impact that management systems and measures, social networks, local traditions, and changes in biological community compositions and stock abundance, have on the fleet
- modelling the development of fishing effort, assuming the fishing fleet to adapt to changes in constraining factors, and optimising fleet performance within given constraints
- exploring, in a co-design approach, how fishery stakeholders perceive risks and opportunities in relation to changes in biodiversity and fish stock distribution.
- collecting Local Ecological Knowledge (LEK) of biodiversity change and their impacts on the fishery by reviewing the recent (10 years) LEK observations in West Greenland

In this domain ECOTIP will use an innovative approach to co-create with local stakeholders in Greenland an assessment tool (based on a probabilistic Bayesian network model) that both integrates traditional knowledge with scientific expertise, and provides forecasts that are relevant for both scientific and societal needs. To enable immediate and targeted exploitation of these co-created scenarios, we will organize two stakeholder workshops in Greenland. The first workshop in Greenland, to identify the needs of local stakeholder groups and consult on the format and user-interface of the support tool, was rescheduled due to COVID-19 for May-June 2021. We are currently exploring the possibility of holding a workshop in a virtual setting should travel and in-person meetings be not feasible in that time frame. The second workshop, near project-end, will enable the same groups of stakeholders to carry out simulations with adaptation options and recommendations. The scenario-exploration support tool will provide one of the key legacies of the ECOTIP project.

10.2 Who are ECOTIPs “results” stakeholders and target groups?

Figure 1 below illustrates the various pathways which the project will use to reach its targets.

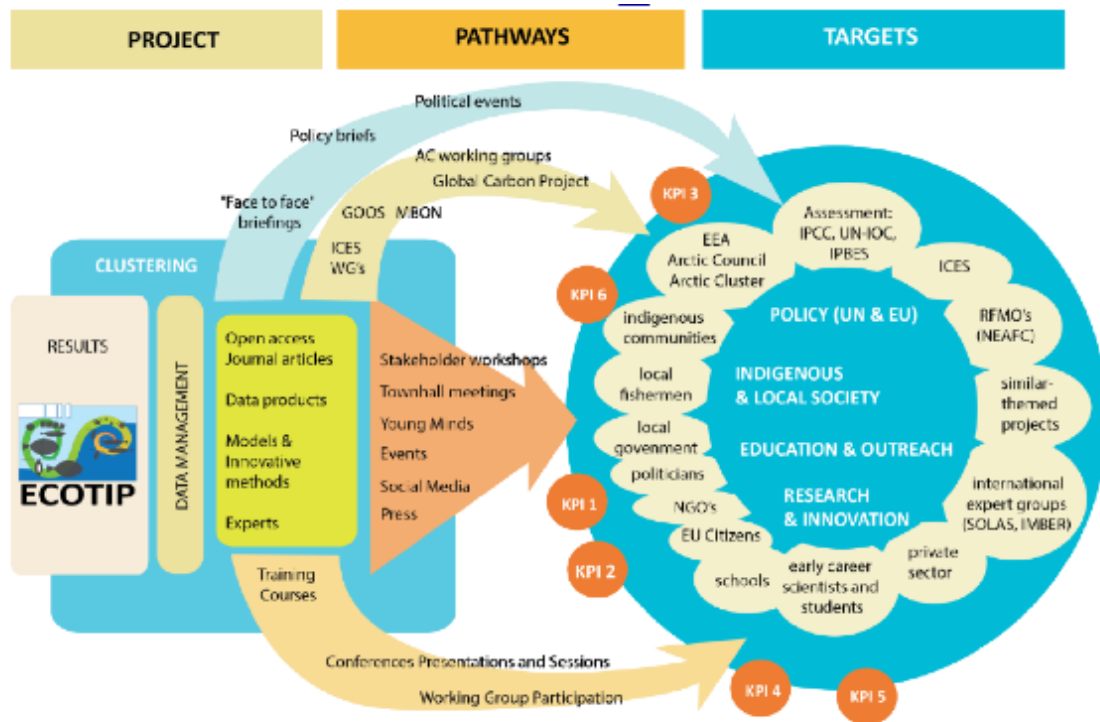


Figure 1: Pipeline from ECOTIP results and outputs to its targets (reproduced from the project proposal). The Key Performance Indicators (KPIs) are listed under Monitoring and Evaluation.

Furthermore, Table 3 (below) provides a more extensive list and plan of which preferred pathways/measures and channels will be used according to each target group.

Table 3. Target groups and the dissemination and exploitation strategies to reach them

| Target Category and Specific Targets | Dissemination and exploitation measures and channels per target group <i>(with responsible partners italicised)</i> |
|---|---|
| <p>Scientific community</p> <ul style="list-style-type: none"> · Individual scientists · Early career scientists · Specific scientific groups including working groups of the Scientific Committee on Oceanic Research (SCOR) and Integrated Marine Biosphere Research (IMBeR) · Other specific EU Cluster and specific projects) – FACE-It & Charter · Life Projects Nature and Biodiversity · Earth Observation products | <ul style="list-style-type: none"> ● Scientific articles /PhD thesis <i>(all partners)</i> ● Scientific conferences <i>(all partners)</i> ● Webinars <i>(all partners)</i> ● ECOTIP website and associated online repositories <i>(GRIDA-website, IOPAN-central ECOTIP repository, Zenodo, DTU-Researchgate, all partners – to feed info)</i> ● Social media (Facebook, Twitter) including leverage via Partner Institutions, Researchgate <i>(GRIDA-website, DTU-Researchgate)</i> ● Meeting with other projects including through EU Polar Cluster <i>(GRIDA & DTU in lead)</i> ● Summer schools and trainings including use of existing structures including APECS, Polar Cluster and others <i>(WP5 including GRIDA & DTU with input from relevant partners)</i> ● Media including opportunities through “The Conversation” and other outlets <i>(GRIDA in lead to coordinate with input from all partners)</i> |
| <p>Scientific Advisory Bodies</p> <p>Major scientific assessments and groups</p> <ul style="list-style-type: none"> · IPCC · IPBES · UN World Ocean Assessment · GOOS Expert Panels · Working Groups of the Arctic Council including CAFF, AMAP, PAME · IASC · ICES Working group on Integrated Ecosystems Assessments | <ul style="list-style-type: none"> ● ECOTIP website and associated online repositories <i>(GRIDA-website, IOPAN-central ECOTIP repository, Zenodo, DTU-Researchgate, all partners – to feed info)</i> ● Scientific articles /PhD thesis <i>(all partners)</i> ● Policy briefs on adaptation options / cookbook <i>(WP5 in collaboration with WP4)</i> ● Face to face meetings, briefings, and participation in meetings <i>(all partners)</i> ● Input of information directly to observers or governments involved in the scientific advisory bodies <i>(WP5 to keep an overview and alert to opportunities, with input and participation from all partners where relevant)</i> ● Nomination of ECOTIP researchers to expert working groups in CAFF, AMAP and other working groups where opportunities arise <i>(WP5 to keep an overview and alert to opportunities, with input and participation from all partners where relevant)</i> ● Participation in peer review processes and open consultations as and when opportunities arise <i>(WP5 to keep an overview and alert to opportunities, with input and participation from all partners where relevant)</i> |

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| <p>EU and other international bodies</p> <ul style="list-style-type: none"> • EU policy including Arctic and blue growth • EEA • UN Environment | <ul style="list-style-type: none"> • Frequent dialogue with EU Project Officer as a door opener to opportunities (<i>DTU in lead</i>) • Participation in peer review processes and open consultations (e.g. Arctic policy public consultation) (<i>WP5 in lead to identify opportunities for input with input and participation from all partners</i>) • Specific opportunities for policy briefings and input at EU events through the Polar Cluster and Results Booster process (<i>GRIDA & DTU to follow Polar Cluster process with input from all partners where relevant</i>) • Active participation of ECOTIP within the EU Polar Cluster including specifically the working groups of Education, Communication, Data Management (<i>GRIDA & DTU to follow Polar Cluster process with input from all partners where relevant</i>) • Nomination of ECOTIP researchers to the “Eu Polar Expert Group” set up by EU PolarNet (<i>DTU & GRIDA to identify opportunities, all partners where relevant</i>) • Dedicated ECOTIP dissemination session at EU Parliament or other venue towards end of the project (<i>WP5 in lead</i>) • Use of EU Comms desk, Horizon Magazine and other media opportunities to reach EU policy makers (<i>GRIDA in lead to coordinate with input from all partners</i>) |
| <p>Indigenous and local communities in Greenland <i>(current list taken from ECOTIP Task Group on Stakeholder Interactions)</i></p> <ul style="list-style-type: none"> • Greenland Institute of Natural Resources /the Climate research Centre • SQAPK (travels or online) • Greenland Employers (also representing the three below) • Royal Greenland • Polar Seafood • Municipalities • Ministry of fisheries etc. • Ministry of environment etc. • Ministry of industry etc. • Youth • ICC • WWF | <ul style="list-style-type: none"> • Online and face to face meetings (<i>WP4 in lead</i>) • ECOTIP Stakeholder meetings (<i>WP4 in lead</i>) • Co-development approach and input from stakeholders during workshops (<i>WP4 in lead</i>) • Scientific presentations at townhalls/gymnasiums (<i>WP4 in lead</i>) • ECOTIP website (possible Greenlandic section based on expressed need) (<i>GRIDA</i>) • Social media especially Facebook (<i>GRIDA & relevant partners and their press officers</i>) • Alerting local media to events, radio interviews etc. (<i>WP4</i>) • Policy briefs on adaptation options and cookbook (<i>WP5 in collaboration with WP4</i>) • ECOTIP photo exhibit and preparatory work (<i>GRIDA in collaboration with WP4 and other partners</i>) • Other opportunities where available |
| <p>European Citizens</p> <ul style="list-style-type: none"> • General interested citizens • < adults from 16+ (interested in “mainstream” newspapers and more complex topics) • Teachers and students in the 11/15 age group | <ul style="list-style-type: none"> • Preparation of Press releases (<i>GRIDA & all partners and their press officers</i>) • Direct approach to media of interest (e.g. Arctic, European, Greenlandic) and working directly with journalists *including opportunities for embedding journalists in research (<i>GRIDA/DTU/all partners</i>) • Use of social media and leveraging partner institutions social media accounts (<i>GRIDA & all partners and their press officers</i>) • ECOTIP photo exhibit and collaboration with natural history museums or other *specific age group tbd (<i>GRIDA in lead</i>) • Young Minds Journal (for 11-15 years old) (<i>DTU</i>) |

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| | <ul style="list-style-type: none"> ● Public lectures (<i>all partners</i>) |
| <p>NGOs and Private Sector organisations</p> <ul style="list-style-type: none"> ● See above list for Greenland-specific list ● Other include: <ul style="list-style-type: none"> ○ Lighthouse Foundation ○ Oceana ○ European Fishmeal and Fish Oil Producers (EFFOP) | <ul style="list-style-type: none"> ● Face to face briefings (<i>all partners</i>) ● Interactions during conferences and working group & ● Policy briefs & cookbooks (<i>WP5 in collaboration with WP4</i>) |

10.3 What are ECOTIP’s dissemination channels and platforms?

- **Open access scientific journals**

The primary means of disseminating the results of ECOTIP among the scientific community will be through publications in peer-reviewed scientific journals. These publications will help ensure ECOTIP’s main goals which are (i) to evaluate the consequences of biodiversity change in the Arctic marine environment, (ii) to estimate any potential tipping elements in the ecosystem functions behind these services, or (iii) to understand their effects on human societies.

ECOTIP conforms with H2020 requirements to make all peer-reviewed scientific publications generated by ECOTIP available in open-access. This means, at the very least, that we will ensure that these publications can be read online, downloaded and printed.

In close collaboration with the data management team and according to the Grant Agreement, we will ensure that:

1. a machine-readable electronic copy of the published version or final peer-reviewed manuscript accepted for publication is deposited in a repository (online archive) for scientific publications, as soon as possible and at the latest upon publication.
2. open access to publications is provided through:
 - a. self-archiving (green open-access)
 - b. open access publishing (gold open-access)
3. open access — via the repository — is provided to the bibliographic metadata that identify the deposited publication

The Management Team, after consultation with the steering committee, will ensure requisite resources are available for at least 30 publications in green open access mode. Whenever possible, use of gold open access will be encouraged through one of many open access journals searchable at <https://doaj.org/> - an independent, community-curated online directory that indexes and provides access to high quality, open access, peer-reviewed journals. Where applicable, ECOTIP will benefit from the new Open Research Europe publication services recently made available for all H2020 grant beneficiaries. ECOTIP project partners will be encouraged to consider submitting research manuscripts and/or data articles using this free, open and transparent (open peer-review) research publishing model. More details can be found at: <https://open-research-europe.ec.europa.eu/>

ECOTIP partners should be cautious of journals which may misuse the Open Access model by charging high fees without providing adequate editorial services and peer review.

For details and tips on how ECOTIP will meet the open access requirements, please see Section 4.3. Project partners are also encouraged to make use of relevant fact-sheets prepared by the OpenAIRE project: <https://www.openaire.eu/openaire-h2020-factsheets>

- **Data platforms and online data-results-model repositories:**

In ECOTIP, we have taken several steps to optimize means of disseminating observational data and model results through adequate platforms and repositories. Below is a brief summary. The accompanying deliverable report 5.3 Initial Data Management Plan contains more detailed information.

ECOTIP will use a dedicated central data repository, hosted at IOPAN and mirrored at servers of selected partner institutions. This repository enables the project to disseminate its results in accordance with all the FAIR data principles of (i) findability (ii) availability (iii) interoperability and (iv) reproducibility.

For dissemination purposes, project partners will opt whether to disseminate their results via the central ECOTIP repository or via databases and datastreams previously established at and preferred by their institutions. Regardless of their choice, each partner will be encouraged to submit, whenever possible, data and metadata according to international standards, e.g. DARWIN CORE, INSPIRE, to ensure that the information becomes as far as possible machine-readable by any other standardized database or data integrator in Europe and beyond.

Data will be initially available only within the project consortium. According to the ORDP, the data will be made publicly available on an agreed timeline unless subject to any concerns related to privacy, intellectual property rights or jeopardizing the project's main objectives. Each dataset or product released will have an assigned DOI number. This service will be offered both by the ECOTIP central repository, and optionally also by Zenodo's ECOTIP community (<https://zenodo.org/communities/ecotip-arctic/>).

Depending on the type of data collected or products generated, results might be deposited into more field-specific databases, for example for molecular or socio-economic data.

New model code developed in ECOTIP will be freely and openly available to the public by depositing it on a version control GitHub public repository. All code will be published on GitHub during the duration of the project. As in the case of data and scientific publications, EU funding will be acknowledged.

- **Webinars and other online platforms**

ECOTIP will make use of online platforms and consider webinars to disseminate the results of the project. COVID-19 has shown that online events and conferences are certainly possible and effective at reaching a large and targeted audience, and ECOTIP will make use of this knowledge and experience gained for the future. Particularly in the later stages of the project, when a good volume of results is available. ECOTIP will make use of its existing channels and networks, including the Polar Cluster and other networks, to advertise such events and ensure a high level of participation.

- **ECOTIP website**

The ECOTIP website (ecotip-arctic.eu) serves as a gateway for information about the project and its results. It serves both as a communication and dissemination platform. All major results of the project, including published scientific articles, will be highlighted under the “Resources” and specifically within the section “Publications and Results”. New results will be highlighted on the home page. To monitor the scientific outputs and ensure timely dissemination, the website will automatically harvest bibliographic metadata from the ECOTIP Community on Zenodo and/or from the ECOTIP central repository. In addition, all deliverables of the project that are labelled as “public” will be hosted on the project website. Towards the end of the project, the website will be transformed to highlight major project outcomes and synthesis to both ensure legacy and promote exploitation of project results beyond the project duration (see also Section 3.4).

- **Press releases, social media, and Research gate**

ECOTIP has a media and social media strategy which is elaborated in detail in the Communications plan (see Annex of that plan). Press releases will be developed, (in collaboration with partner institutions press officers where relevant) for journal articles and other results which are likely to generate interest by other scientists and the broader public. For any results that are likely to generate major interest in the media, DTU/GRIDA must be informed and is required to liaise and inform the EU Commission well in advance. In addition, targeted social media messages will be developed on a case by case basis, and rolled out through partner institutions. A project portal on Research Gate has been established which will act as a conduit of scientific results to partners’ extensive network.

- **ECOTIP Policy briefs and publications**

For non-scientific audiences, ECOTIP will produce policy brief(s) and a “cookbook” (D5.7) related to the socio-economic work and development of possible adaptation options and recommendations for fisheries stakeholders in Greenland. The policy briefs will digest the most important scientific findings in language relevant for policy makers. The cookbook will serve as a training manual on adaptation options and planning for such a cookbook will take place well in advance. Furthermore, additional policy briefs may be considered for good opportunities throughout the project, for example at important EU or national or regional events. In developing such publications, ECOTIP will seek the inclusion and partnership with important stakeholders or target groups themselves to ensure there is a strong ownership of the results and the process.

- **Targeted face to face briefings**

Face to face meetings are an important dissemination tool and ECOTIP will use these where necessary. Table 3 provides an overview of the possible face to face briefings.

- **Nomination of experts to scientific / policy assessment processes, working groups etc.**

As elaborated under Table 3, ECOTIP will track important assessment and policy processes and identify possible opportunities for the nomination of ECOTIP scientists to form part of such processes.

- **Events:**

Events, whether online or in person, are key for ECOTIP to disseminate its results and promote exploitation. Table 4 (below) will be kept regularly up to date for the coming year ahead in order to ensure sufficient advance preparation ahead of each event, and for tracking and KPI purposes. It is the responsibility of partners to keep track of events attended, what was presented and approximate audience numbers.

The type of events that ECOTIP will engage in is broad and depends on the target audiences, and includes:

- Scientific conferences
- Scientific and advisory group meetings
- EU Polar Cluster and related meetings
- Stakeholder meetings in Greenland
- Policy relevant events

Furthermore, [an excel sheet \(active google doc\)](#) has been developed which links all the deliverables that the project will receive to their dissemination and exploitation, including the preferred channels to reach the specific targets.

- **Summer schools & training workshops**

ECOTIP will develop a communications training workshop for early career scientists, ideas for which are further elaborated under the Communications Plan.

10.4 Strategy for the exploitation of ECOTIP results

Apart from communication through peer-reviewed literature and scientific conference presentations, ECOTIP will liaise with a number of international research projects and programs such as IMBeR, IOCCP and US OCB to contribute to their scientific agendas and implementation plans. Furthermore, we will liaise with, build on or contribute to the work of several international expert working groups whose terms of reference are compatible with the objectives of ECOTIP. These include the Integrated Marine Biosphere Research (IMBeR) Human Dimensions Working Group, the Scientific Committee on Oceanic Research (SCOR) Working Group 149: “Changing Ocean Biological Systems (COBS): How will biota respond to a changing ocean?”, or the IOC-UNESCO WG on Integrated Ocean Carbon Research particularly with respect to the impact of plankton diversity changes on ocean carbon sequestration.

ECOTIP has also already approached the similar-minded Horizon 2020 projects to create a research cluster of climate projects to optimise the synergies among projects and also increase the efficiency of results exploitation.

10.4.1 Exploitation of data

ECOTIP will produce and disseminate new data according to FAIR principles. We will maximize the exploitation potential of new data by encouraging submission to public databases and data integrators which require use of common vocabularies and standards for metadata and data, respectively. This will ensure not only that ECOTIP stakeholders but also any interested users have machine-readable access and exploit ECOTIP project results.

In addition, we will take measures to actively encourage certain groups users and stakeholders to exploit project results. This will be done through pointing towards adequate data during expert working group meetings, technical workshops as well as scientific conferences, etc.

10.4.2 Exploitation of new knowledge

ECOTIP will facilitate optimal exploitation of project results to address gaps in knowledge related to the Arctic climate, marine biodiversity change, its drivers and consequences, as identified by IPCC, IPBES and relevant international expert working groups providing scientific assessments and policy advice.

A newly established ICES WG on Integrated Ecosystem Assessment in the Greenland Sea will benefit from project results (Tasks 2.1-3, 3.3), feeding into annual ICES ecosystem overview advice. Direct and early communication with the WG, through joint membership in both ECOTIP and the ICES WG of one of consortium partners, will maximize the potential of ECOTIP to generate data and knowledge of exploitable value by the ICES WG.

To address fundamental biological processes which remain unquantified and as such are a key knowledge gap identified by IPCC, ECOTIP will promote the uptake of new mechanistic understanding and a trait-based approach (Tasks 2.2-3, 3.1-2) in existing Earth System Models used to inform regional and global climate assessment. To this end, new model code developed during the project's lifetime (e.g. using GitHub's private repositories; web-based hosting service for version control using Git) will be opened to the public to foster further exploitation and innovation among the ecosystem and climate modelling communities.

ECOTIP will participate actively via GRID-Arendal in the working groups of the Arctic Council to link the research to on-going and/or planned assessment work. The project has been included in the EU Polar Cluster and will contribute to its activities including generating policy advice in support of the integrated EU Arctic Policy (e.g. by linking up with EU PolarNet or its successor). In October 2020, ECOTIP participated in the first meeting of the EU Polar Cluster. ECOTIP consortium members have signed up to each of the Task groups of the cluster.

Table 1 in Section 2 provides a summary of other examples of new knowledge and targets for its exploitation as currently initiated and anticipated by ECOTIP.

In addition, it should be noted that after the official end of the project, the current project website will be transformed into the ECOTIP Research Findings website providing access to the research results of the project to support future research and investment, scientific assessments as well as marine management decisions and policies. The domain name of the project website will be assigned to DTU. The website and ECOTIP central data repository at IOPAN will archive all

documentation related to the project, including publications, and will be accessible for 5 years after the end of the project.

11 Main Tasks and Responsibilities in Dissemination and Exploitations

11.1 Partner' Responsibilities & timeline

A summary of the responsibilities and involvement of each partner with regards to dissemination and exploitation is outlined under Table 3. Each partner also has the responsibility of tracking its own activities and where relevant its impact, through Key Performance Indicators (KPIs) which are outlined in this document under Monitoring and Evaluation. A few useful guides have been developed to aid partners in their obligations:

- **An open access peer-reviewed publication checklist (See Annex)** has been developed for the process required with open access journal articles, which all partners should follow.
- **A summary sheet for partners on ECOTIP Communications, Dissemination and Exploitation & Data Management** will be prepared by early 2021 which includes useful reminders, a quick guide to the various obligations and good practise for all partners to follow.

11.2 Acknowledgement of EU funding and disclaimer

In disseminating the project results the beneficiaries will acknowledge the research funding according to the Art. 29.4, 29.5 and or Art. 38.1.2. of the grant agreement.

Any dissemination of results (in any form, including electronic) must:

- (a) display the EU emblem and
- (b) include the following text: "This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869383".

NB! When displayed together with another logo, the EU emblem must have appropriate prominence. ECOTIP partners may use the EU emblem without first obtaining approval from the Agency.

NB! Any dissemination of results must indicate that it reflects only the author's view and that the Agency is not responsible for any use that may be made of the information it contains.

11.3 Open Access requirements

ECOTIP complies with all EU requirements regarding provision of open access to project results. This includes mandatory open access to all peer-reviewed scientific publications generated by the project, following three steps as described above in the section on "scientific journals".

Majority of ECOTIP publications will be disseminated in green open access mode. If needed, WP5 will assist each author in self-archiving preprints in a freely accessible institutional or specialist online repository, or on a website. To ensure maximum flexibility for authors and maximum impact for the project, authors will be able to choose between self-archiving preprints in the ECOTIP central repository (see section above), or at one of the open access reprint servers such as zenodo.org,

arxiv.org, or more specifically for biological results: biorxiv.org. A dedicated Zenodo community has been set up for the ECOTIP project (<https://zenodo.org/communities/ecotip-arctic/>). All the available repositories have the capacity to assign DOIs. It is important that each deposited publication must be accompanied bibliographic metadata placed also in the repository including the following: (i) terms ["European Union (EU)" & "Horizon 2020"], (ii) name of action, acronym and grant number - *see suggested formula text in section above*, (iii) publication date, the length of the embargo period (if applicable) and a persistent identifier.

As recommended by the Commission, ECOTIP partners are encouraged to retain their copyright and grant adequate licences to publishers, e.g. through one of Creative Commons licences. Where possible, contributors should also be uniquely identifiable, and data uniquely attributable, through identifiers which are persistent, non-proprietary, open and interoperable (e.g. through leveraging existing sustainable initiatives such as ORCID for contributor identifiers and DataCite for data identifiers).

Providing open access to peer-reviewed publications in scientific journals is the responsibility of all project partners who are encouraged to use the ECOTIP open access publication checklist available in the Appendix. While the dominant type of scientific publication is the journal article, ECOTIP scientists are also strongly encouraged to provide open access to other types of scientific publications including:

- monographs
- books
- conference proceedings
- grey literature (informally published written material not controlled by scientific publishers, e.g. reports).

ECOTIP also strives to maximize open access to project's data which is needed to evaluate or reproduce the results from ECOTIP scientific publications. Our voluntary commitment to the Open Research Data Pilot is described briefly below, and in greater detail in the Data Management Plan.

11.4 Open Research Data Pilot

ECOTIP participates in the Open Research Data Pilot (ORDP) which enables open access and reuse of research data generated by ECOTIP as a Horizon 2020 project. This means that ECOTIP will meet the following conditions:

- develop (and keep up-to-date) a Data Management Plan (DMP).
- deposit data in a research data repository.
- ensure third parties can freely access, mine, exploit, reproduce and disseminate data.
- provide related information and identify (or provide) the tools needed to use the raw data to validate our research.

These conditions set by the ORDP will apply to:

- the data (and metadata) needed to validate results in scientific publications.
- other curated and/or raw data (and metadata) which we specify in the DMP.

The accompanying deliverable Initial Data Management Plan provides details on how ECOTIP will manage and preserve data according to these ORDP requirements, while also considering the need to balance openness with protection of scientific information, commercialisation and Intellectual Property Rights (IPR), privacy concerns, and security.

12 Risks and barriers to exploitation and their mitigation

The following risks and possible barriers have been identified, and strategies for their mitigation in the project are elaborated below.

| Risk or barrier | Mitigation strategy |
|---|--|
| Project delays and mismatch between timing of outputs and deliverables across different work packages leading to further delays and less effective approach | ECOTIP has established several layers of communication to ensure that issues are spotted in a timely manner. These include the meetings of the steering committee, regular work package meetings, a number of “task groups” dedicated to special cross-work package topics, and storyline groups. These ensure there is sufficient communication across work packages and partners. Communications are facilitated through the use of a dedicated platform, SLACK. |
| Mismatch of timelines between assessments and policy processes and ECOTIP results | ECOTIP will identify in advance opportunities to engage in policy processes to ensure effective planning of resources. In addition, ECOTIP will ensure research results will be available on time before committing to engage in specific policy processes. |
| A lack of Stakeholder interest, engagement and or understanding for the Bayesian networks work | ECOTIP will undertake regular stakeholder meetings including pre-meeting online discussions in order to introduce the topic, goals etc. This will be supported by effective communication from WP5 to ensure there is a good understanding of the process and the desired outcomes and benefit to the stakeholders. |
| COVID-19 and possible other side effects including restricted travel | ECOTIP will monitor this situation very closely and take appropriate mitigation measures. These include holding meetings online as far as possible, including with stakeholders; working with existing partners and institutions on the ground, and planning for these risks and being realistic about what can be achieved. Should research plans be significantly affected, a conversation will be taken with the EU. |

13 Monitoring and Evaluation

13.1 ECOTIP’s Key Performance Indicators

| Key Performance Indicator | Specific Indicator | Roles / Responsibilities |
|-------------------------------------|---|------------------------------|
| KPI 1: Online communications | Number of website unique visitors/ unique visits/pageviews over a given time period | WP5 with input from partners |

| | | |
|--|--|---|
| reach, (social) media footprint | | |
| | Number of downloads of information products, estimated readership | WP5 with input from partners |
| | Audience statistics for both print and online media reach (on other platforms) | WP5 with input from partners |
| KPI 2: Face-to-face meetings | Number of people attending events including presentations, public lectures, etc. | All partners responsible for gathering estimates of number of people attending events (in person or online) – will be collated by WP5 |
| | User feedback on quality and design of products targeted at different audiences. | All partners responsible for keeping testimonials (e.g. written emails or other) expressing user feedback – will be collated by WP5 |
| KPI 3: Policy impact | Appearance or mention of ECOTIP research results or recommendations in policy documents and or documents informing policy processes ranging from local to global | All partners responsible for monitoring where relevant, WP5 will collate |
| KPI 4: Science impact | Number of publications, number of citations, number of reads and downloads from preprint repositories (e.g. journal websites, ResearchGate). Citations will also be tracked on Google Scholar. | All partners responsible for monitoring where relevant their publications, WP5 will collate |
| KPI 5: Collaboration and synergies | Number of partners engaged in activities led by or co-organized by ECOTIP | All partners, WP5 will collate |
| | Number of cluster activities sponsored/co-organized | All partners, WP5 will collate |
| KPI 6: Local and indigenous societies | Number of outputs from stakeholders with regards to expert opinion in Bayesian model development | All partners, WP5 will collate |
| | Number of users of assessment tools | All partners especially WP4 , WP 5 will collate |
| | Documented instances where the project has had an influence on Indigenous and local society members | All partners but especially WP4 – WP5 will collate |

14 Annex

14.1 Open Access Publication (OA) Checklist for ECOTIP partners

During writing/submission of a manuscript

- Check in the DOAJ (Directory of Open Access Journals) if the journal of your choice allows Open Access publishing/if there is an OA-deal.
- Contact DTU ahead of the planned submission to verify eligibility for publication cost reimbursement, and to agree whether the publication will follow the gold or green open access track. If using a subscription-based journal, check on [SHERPA/RoMEO](#) which article version (e.g. pre-print or post-print) is free to be made publicly available at which time (green OA).
- Prior to submission, ensure that all contributors have a persistent identifier associated with their names, e.g. [ORCID](#).

At submission

- Indicate during submission that you wish to publish OA.
- Provide ORCID identifiers for each contributor.
- Acknowledge project funding by including the following text into the manuscript: “This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 869383”.

After publication:

- In one of the agreed repositories deposit a machine-readable electronic copy of either:
 - the published version of the article (gold OA), or
 - the final peer-reviewed manuscript accepted for publication, pre-print or a post-print (green OA).
- Contact IOPAN and confirm the publication DOI along with other bibliographic metadata.
- When using Green OA, verify that open access to a version of the publication is provided no later than 6 months after publication (12 months for Social Sciences and Humanities)