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Protocol for a Methodology to identify and understand “What is hampering the effectiveness of existing approaches that aim to restore biodiversity and ecosystem function and services”

Call No.5/2018 EKLIPSE

Prepared by the EKLIPSE Expert Working Group (EWG) on:

Restoration effectiveness and the barriers of existing approaches that aim to restore biodiversity and ecosystem function and services in response to a BiodivERSA request

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Responses to comments

The Expert Working Group (EWG) has responded to all comments received in response to the Draft Protocol in this Final Protocol Document. The responses to all comments have been posted on the EKLIPSE website in the Document “Responses to Reviewers Comments to the EKLIPSE Restoration Working Group”. We encourage Reviewers to review the draft report produced as an output from the implementation of the Methodology when it becomes available, expected to be 30th April 2019.

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Introduction

A number of restoration targets and cross-sectoral actions aim to restore degraded ecosystems, both as a natural heritage to safeguard biodiversity and as a natural asset vital to enhanced ecosystem functioning and sustainable delivery of a range of ecosystem services in Europe. However, many of these efforts are not achieving their aims (Ockendon et al., 2018). The reasons for such limited achievement are wide ranging. To fully understand these reasons, we require the perspectives and understandings of a wide range of stakeholders including, but not limited to, practitioners, landscape managers, business', specialists, academics, policy makers and decision makers all of whom may be working across diverse fields such as climate responses, food security, biodiversity, circular economies, restoration technologies, NGOs, ENGOs, water-smart solutions and other industries and economic sectors. Restoration actions occur across a diversity of ecosystem types and have the potential, if implemented effectively, to improve human well-being and enhance the natural environment. The recently completed Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) Assessment Report on Land Degradation and Restoration highlights this (R. Scholes, L. Montanarella, A. Brainich, N. Barger, B. ten Brink & B. Erasmus, J. Fisher, T. Gardner, T. G. Holland, F. Kohler, J. S. Kotiaho, G. Von Maltitz, G. Nangendo, R. Pandit, J. Parrotta, M. D. Potts., S. Prince, M. Sankaran, 2018).

This request is of high policy relevance not only at the European Union level through Target 2 and Action 6a of the European Union Biodiversity Strategy to 2020, but also gains in importance following the approval of the United Nations Decade on Ecosystem Restoration (2021 to 2030), by the General Assembly on the 1st March 2019. The declaration emphasises the scaling-up of restoration to address the severe degradation of landscapes, including wetlands and aquatic ecosystems worldwide. It is anticipated that there will be a boost in landscape restoration to the top of national agendas building on a public demand for action

on issues such as climate change, biodiversity loss, and the resulting impacts on economies and livelihoods.

Target 2 states that *“By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems”*. A number of actions have already been completed to address this Target (http://ec.europa.eu/environment/nature/biodiversity/strategy/target2/index_en.htm), with a report being completed on priorities for the restoration of ecosystems and their services (Lammerant et al., 2014).

Target 2 of the Biodiversity Strategy is the only policy target that contains a direct and quantitative target for restoration. However, many other European Union level policies relate to restoration aims in indirect ways:

- There is a very strong linkage between the 15% restoration objective included in Target 2 of the European Union Biodiversity Strategy and the achievement of Target 1 namely the full implementation of the Birds and Habitats Directives and associated Natura 2000 network.
- Restoration actions will impact on existing legal obligations under the Water Framework Directive, the EU Bathing Water Directive, and the Marine Strategy Framework Directive, such as achieving good ecological status in lakes and rivers or good environmental status in marine waters;
- Restoration of degraded ecosystems will contribute significantly to the deployment of Green Infrastructure (Action 6b of the biodiversity strategy);
- Restoration of disused and derelict land in urban and peri-urban areas will ease the pressure for access to new land for development and reduce soil sealing and urban sprawl;
- Restoration actions can also deliver jobs and growth and a variety of economic and social benefits. Restoration actions have been and continue to be supported through EU funding mechanisms such as ERDF, EAFRD and Horizon 2020.
- Restoration can increase greenhouse gas uptake and the resilience of natural ecosystems and human settlements to the impacts of climate change and is an integral part of European Union policy on climate change adaptation.
- The greening measures introduced into the revised Common Agricultural Policy (CAP) could provide some opportunities for restoring the state of agri-ecosystems and optimizing the ecosystem services and resilience delivered by these ecosystems. (EKLIPSE Secretariat, 2018).

The findings of the mid-term review of the European Union Biodiversity Strategy (2015) highlight for Target 2 “Progress has been made on policy and knowledge improvement actions under this target, and some restoration activities have taken place in Member States.

However, this has not yet halted the trend of degradation of ecosystems and services. National and regional frameworks to promote restoration and green infrastructure need to be developed and implemented (EKLIPSE Secretariat, 2018).

For example, in the case of water bodies subject to the Water Framework Directive, after two updates of River Basin Management Plans (in 1999 and 2015), country reports showed that a substantial proportion of Europe's freshwaters did not achieve 'good status' (European Waters: Assessment of Status and Pressures, 2018). Other Directives for which restoration is relevant include the EU Bathing Water Directive and the Marine Strategy Framework Directive, which are concerned respectively with achieving good ecological status in lakes and rivers or good environmental status in marine waters. Further, restoration of degraded ecosystems will contribute significantly to the deployment of Green Infrastructure (Action 6b of the European Union Biodiversity Strategy). Often, effective monitoring of restoration projects is not guaranteed, thus, restoration goals remain unassessed or unattained. This represents in itself a failure of restoration (González, E., Sher, A.A., Tabacchi, E., Masip, A. & Poulin, 2015; Suding, 2011).

A number of approaches have been proposed to assess the effectiveness of restoration actions, such as the Society of Ecological Restoration (McDonald et al., 2016), IPBES Land Degradation and Restoration Assessment (Fisher, J., Montanarella, L., and Scholes, 2018), while other approaches such as the Best Available Techniques (BAT) currently in practice in the European Union may well provide a mechanism to assess the effectiveness of restoration actions (Giljam, 2017).

Much discussion has occurred around incorporating the ecosystem services concept into the science, practice and policies of ecological restoration (Tolvanen & Aronson, 2016). The methodology adopted by the EKLIPSE Working Group (EWG) aims to identify if barriers to effective restoration are created when linking the interactions between restoration, ecosystem services and biodiversity. Bullock et al (Bullock et al., 2011) provide examples of effective interactions between restoration, ecosystem services and biodiversity in i) the restoration of native jarrah forest on bauxite mines in Western Australia enhancing plant and vertebrate diversity as well as carbon sequestration and water storage, ii) restoration management of the Arkansas River, by the cessation of heavy metal inputs which has increased water quality and enabled the recovery of fish and invertebrate populations, and iii) the reinstatement of meanders in German rivers which has both decreased flooding risk and increased the diversity of the invertebrate fauna.

The reasons for the limited effectiveness of restoration are currently being explored at different levels (scientific, applied, policy) and from ecological, political, social and economic perspectives, see for example (Christian-Smith, J. & Merenlender, 2010; ETC/ICM, 2015; Gellie, N., Breed, M., Mortimer, P., Harrison, R., Xu, J., Lowe, 2018; Nilsson, C., Aradottir, A.L.,

Hagen, D., Halldórsson, G., Høegh, K., Mitchell, R.J., Raulund-Rasmussen, K., Svavarsdóttir, K., Tolvanen, A. & Wilson, 2016; Palmer, M.A., Menninger, H.L. & Bernhardt, 2010).

The Request

Following the EKLIPSE second call for requests (CfR.2/2017), the initial request focused on identification of knowledge gaps on ecosystem restoration, asking “Is missing knowledge hampering the effectiveness of approaches that aim to restore biodiversity and ecosystem function and services?”. The requester is BiodivERsA, a network of national and regional funding organizations promoting pan-European research on biodiversity and ecosystem services, and offering innovative opportunities for the conservation and sustainable management of biodiversity.

In order to refine the request, scoping activities were carried out between October 2017 and May 2018 resulting in a Document of Work (EKLIPSE Secretariat, 2018) with a revised question:

“What is hampering the effectiveness of existing approaches that aim to restore biodiversity and ecosystem function and services”

Afterwards, EKLIPSE put out a call and selected experts as part of an Expert Working Group (EWG). This group met in Brussels in July 2018 and in October 2018 and had several additional meetings remotely. The EKLIPSE Working Group has identified a structured process for organising the work tasks. This document outlines the choice of methodology, details of the methodology and expected outcomes.

Objectives

The aim of this protocol is to propose a methodology to assess the current knowledge of the reasons hampering restoration effectiveness and orient future research, policy and practice on ecosystem restoration. We propose that the findings of the Methodological Approach will assist us to identify the underlying reasons for identified barriers and so, with an understanding of the causes and consequences, provide us with the opportunity to suggest solutions to overcome these barriers. The Methodology will include supporting stakeholders and actors from a wide range of fields, such as private landholders, landscape architects, ecological engineering, circular economy, water, agriculture and food, biodiversity, species and landscape management and restoration practice to provide feedback which will better contribute to the European Union’s Policy, its implementation, governance and conservation strategies and assist practitioners, researchers, industries and economic sectors that are dependent on these natural assets (e.g. water- and fibre-related/dependent industries).

Methodological Approach

The methodological approach is designed to identify the key ecological, social, economic, financial, technical, cultural, legal and political barriers which may hamper effective restoration in terms of biodiversity, ecosystem functioning and ecosystem services. For this purpose, the EKLIPSE Working Group methodological approach includes literature scoping and expert/practitioner consultation. Following extensive deliberations by the EWG it was decided that the most productive method to respond to the question is to run the two processes, scoping review and Delphi Process, in parallel, which differs slightly from the Draft Protocol Approach. Both approaches are complementary: while the scoping review will provide information on the attention given to this topic in scientific literature, the consultation process will provide direct access to a wide range of actors including academics, practitioners, policy makers and others' perceptions on the main barriers hampering ecological restoration in the EU. The results of both approaches will provide significant new information with which to answer the Question. The tasks included in this methodological approach will be developed and implemented by EKLIPSE EWG members with the assistance of the EKLIPSE Secretariat and its Methods EWG, with the support of external personnel as needed.

The steps included are as follows:

STEP 1: SCOPING REVIEW: We will carry out a scoping review using *a priori* search terms defined and agreed by the EKLIPSE EWG. The review will be based on both scientific and grey literature and will be repeatable, through documenting search strings and database sources. The barriers will be identified qualitatively in the first instance and the team will explore the possibility of additional quantitative assessment. We will identify at what stage of the restoration process the barriers emerge and the degree of difficulty involved. This will provide a first view on the status of knowledge, finding gaps and opportunities for future restoration improvements. This approach will be coordinated by the EKLIPSE Working Group and will include as many geographic regions and sectors as possible across Europe.

Our initial search in the Web of Science database considered relevant studies to be those dealing with restoration effectiveness or performance at any level including biophysical and social factors. The search parameters to be used are:

Field 1: Topic: "ecosystem* and (review or meta-analysis)"

Field 2: Title: "restor*"

Years: 1999 to 2019 (last 20 years)

Database: Web of Science Core Collection, ticking on:

- Science Citation Index Expanded (SCI-EXPANDED)
- Social Sciences Citation Index (SSCI)

- Emergent Sources citation Index (ESCI)

Due to the limitation of time associated with this Request we restricted the search to those papers that included or evaluated results from multiple other papers or restoration actions. This approach eliminated specific results that will take more time to analyse than is available to achieve this Requests' results. For this purpose, we used the terms "review" and "meta-analysis".

From the selected studies, we gather data on what authors found as a limitation, barrier, constraint, impairment, or similar for restoration effectiveness. Studies with no reference to these terms but which however were interpreted to refer to such conditions are also to be included in the review database.

The EWG consider issues related to social sciences, including governance, policy and participation to be important aspects when identifying barriers to effective restoration and so our search includes social sciences databases.

STEP 2: IDENTIFICATION OF THE CHAIN OF RESTORATION ACTORS ACROSS LAND USE TYPES AND LAND TENURES, AND THE AUDIENCE FOR THE REQUEST FINDINGS:

The EKLIPSE Working Group will prepare a list of relevant actors across land use types and land tenures which deal with the development and implementation of restoration actions. The networks of EKLIPSE Working Group members, which incorporate diverse backgrounds across sectors such as policy, social dimensions, water, infrastructure, urban, agriculture, forestry, blue economy, and protected areas, will be used. The social, ecological and economic aspects of restoration will be incorporated into the list development. As for the public sector, we will include actors from at least three levels, local (municipalities or other minor administrative units), regional, and national (state government), and European level (EU or multi-country initiatives). Other actors include private companies, but also social actors such as NGOs or other public initiatives dealing with restoration. This step will be performed in parallel with STEP 1, coordinated by a member of the EKLIPSE Working Group with participation of all members of the EKLIPSE Working Group. This step intends to be extended to experts such that it covers the maximum diversity of countries/regions, ecosystem types and sectors across Europe.

STEP 3: DELPHI PROCESS

The Delphi technique is a structured, anonymous and iterative survey of a panel of 'experts' or selected participants (Mukherjee, N., Hugé, J., Sutherland, W.J., McNeill, J., Van Opstal, M., Dahdouh-Guebas, F. & Koedam, 2015; Okoli & Pawlowski, 2004). The Delphi process is an efficient transparent method of incorporating the views of the considerable range of actors,

which in this case refers to those working in restoration in diverse sectors across Europe. The method provides a good approach to represent the full geographic (European Union) range of these people. The Delphi process provides anonymity to the participants in ranking options. Other approaches which do not provide this anonymity can lead to social effects which may distort people's rankings of the options.

This step will enable the identification and ranking of the barriers to effective restoration, based on the knowledge/experience/perception of the large variety of social actors involved in restoration efforts. The Delphi process involves 6 stages: 1) Prepare the first round of the questionnaire; 2) Select and invite respondents; 3) Collect and analyse the responses; 4) Provide feedback to the participants; 5) Prepare, distribute and analyse the subsequent round of the questionnaire; 6) Iterate till consensus is reached.

The questions to be used for the participating stakeholders of the Delphi process will be developed by the members of the EWG and supported by initial scoping review findings. The Expert Groups' extensive deliberations on the most productive approach to receive the widest possible input to respond to the question, and find solutions, resulted in employing two processes, operating in parallel processes, that is the Scoping Review and the Delphi Process. The outcomes of these two processes can be combined into the final results to provide the widest possible input to answer the Expert Groups' question and to provide solutions.

The first round of questions aims at eliciting participants' knowledge of the barriers to effective restoration. Participants will be asked to consider multiple dimensions of restoration, and this will result in a preliminary list of barriers. These will be organized in a grid, grouped by dimension and steps of ecological restoration for each associated land use type, land tenure and relevant actors (Table 1). In referring to land use type we cover all ecosystems across the European Union. Similar barriers may be combined. In the second round, participants will be asked to rank the identified barriers according to their importance, justifying their decisions. They will also be asked to identify possible solutions. In a third round, these ranked barriers will be provided to participants and they will be given the opportunity to revise their rankings. By referring to land use type (Figure 1) we cover all ecosystems across the European Union.

Table 1. Example of a potential grid to collect the list of barriers per land use and land tenure type at different steps and dimensions of ecological restoration incorporating different actors

BARRIERS TO ECOLOGICAL RESTORATION						
LAND USE, LAND TENURE, ACTORS		Steps of Ecological Restoration (ER)				
Dimensions of ER		Planning	Implementation	Monitoring	Assessment	Adaptive management
	Ecological					
	Social					
	Economic					
	Technical					
	Cultural					
	Legal					
	Political					
	Financial & business planning					

Expected Outputs

The expected outputs for this request include:

1. A peer-reviewed report outlining the barriers identified. The report will group barriers in the manner established as the most efficient and useful for the many actors involved in restoration across the European region and will explore the effect of stakeholder involvement. Our methodology will assist in identifying how best to present the findings to ensure wide and useful relevance across many and differing actors. It will also explore potential explanations for those barriers and solutions to overcome them.
2. A concise paper (1-2) pages that can be easily read by policy makers.
3. Policy briefings summarizing the main findings and recommendations of the EKLIPSE Working Group work will be developed and appropriate opportunities for dissemination will be identified as the work progresses.
4. In addition, communication of outputs will be performed in targeted ways to the requester and other communities of interest, including policy-makers at the level of the European Union and respective Member States. For example, this might include a presentation by members of EKLIPSE Working Group on restoration as part of a workshop/conference with key stakeholders organised by EKLIPSE and the requesters

of the work (BiodivERsA). These tasks may be performed in collaboration with other institutions and organizations, as needed to promote the dissemination of the results of the project. When those outputs will involve publishing materials beyond the intended report (e.g., scientific articles, book chapters, books) and communications in scientific meetings, active members of the EKLIPSE Working Group will be eligible for authorship, the identity and order of authors following common publication practices in natural and social sciences. If outputs of the process are included as part of an academic work (e.g., M.Sc. thesis, Ph.D. thesis), recognition of the work of the EWG will be explicitly mentioned, and special care will be procured to prevent violating the terms included in non-disclosure agreements.

Confidentiality

The EKLIPSE Working Group will develop non-disclosure agreements to be signed by EKLIPSE Working Group members, as well as personnel that will collaborate with the project under a contract or on a voluntary basis. The agreement will ensure confidentiality of the information managed by the EKLIPSE Working Group, particularly personal information obtained in Steps 2 and 3.

Project timelines

1. Prepare and submit draft protocol – 7th November 2018
2. Revise and finalise protocol considering review provided by open consultation – 1st March 2019
3. Identification of stakeholders – end of January 2019
4. Identification of questions for stakeholders – Mid January 2019
5. Scoping review – Early April 2019
6. Delphi process finished – Early April 2019
7. Submit draft report to EKLIPSE [review process via open consultation, organized by EKLIPSE] – 30th April 2019
8. Final report to requesters – June 2019

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