Engaging stakeholders for risk governance and risk management of climate change adaptation and disaster risk reduction: A protocol for a systematic literature review

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Abstract

The recent droughts in Central Europe and unprecedented floods in Central Europe have revealed our vulnerability to extreme weather events. Besides climate change as a driver of more frequent and intensifying weather extremes, demographic change and socio-economic development exacerbate severe impacts. International frameworks for disaster risk reduction and climate change adaptation (e.g., SENDAI framework, EU Strategy on adaptation to climate change) acknowledge the critical need to integrate risk governance, communication, and operational mechanisms for coping with extreme climate events throughout the entire Disaster Risk Management cycle.

In order to integrate current state-of-the-art governance approaches for improved knowledge integration by means of co-creative approaches towards user and stakeholder engagement and increased accountability, we first need to identify and analyze existing methods. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), we have developed a protocol for a systematic literature review (SLR) and started the review process.

This protocol describes the process of conducting an SLR to provide a state-of-the-art overview of risk governance and risk management approaches through stakeholder engagement and transdisciplinary knowledge co-production processes. The review will focus on the areas of climate change adaptation (CCA) and disaster risk reduction (DRR). The literature search will include scientific databases as well as grey literature. Eligibility and exclusion criteria are defined. Results will be synthesized qualitatively. Quantitative analysis regarding the occurrence of certain approaches should help to identify research gaps and develop a taxonomy.

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Registration

This protocol is registered at [RIFS-Public](), the publication repository of the Research Institute for Sustainability – Helmholtz Centre Potsdam (RIFS). It can be found under the Digital Object Identifier (DOI) [10.48481/rifs.2023.025]().

1. Introduction

The recent droughts in Central Europe and unprecedented floods in Central Europe have revealed our vulnerability to extreme weather events (Zscheischler et al., 2018). Besides climate change as a driver of more frequent and intensifying weather extremes (Arias et al., 2021), demographic change and socio-economic development exacerbate severe impacts. International frameworks for disaster risk reduction and climate change adaptation (e.g., SENDAI framework (UNISDR, 2015), EU Strategy on Adaptation to Climate Change (Forging a Climate-Resilient Europe - the New EU Strategy on Adaptation to Climate Change — English, 2021)) acknowledge the critical need to integrate risk governance, communication, and operational mechanisms for coping with extreme climate events throughout the entire disaster risk management cycle. DIRECTED aspires to foster disaster-resilient European societies by expanding our capabilities to communicate, utilize, and exchange state-of-the-art data, information, and knowledge between different actors; boosting the integration, accessibility, and interoperability of models; facilitating knowledge sharing; improving dialogue and cooperation encompassing all levels of actors based on enhanced community engagement, and developing new governance and risk management strategies using a bottom-up, value-driven co-development approach. Central to DIRECTED are four Real World Labs that co-develop new governance, interoperability, and knowledge production frameworks and demonstrate their benefits for enhanced disaster risk governance

supported by innovative technical frameworks to access, transform, and integrate data and models into customized workflows for creating actionable solutions.

To improve governance interoperability, the researchers will provide an innovative and empirically tested risk governance framework that facilitates the application of risk models to support DRR and CCA planning and decision-making processes and builds long-term governance capacity for information and knowledge integration. It is the aim to integrate current state-of-the-art governance approaches for improved knowledge integration by means of co-creative approaches towards user and stakeholder engagement and increased accountability. This involves merging the International Risk Governance Council's Risk Governance Framework with the Tandem framework developed by SEI, the risk layering approach put forth by IIASA, and scoping alignment with other governance frameworks for DRR and CCA planning and decision-making processes, such as the SHIELD model from the ESPREssO project.

1.1. Objective

The aim of the systematic literature review is to provide a state-of-the-art overview of risk governance and risk management approaches through stakeholder engagement and transdisciplinary knowledge co-production processes. The review will focus on the areas of climate change adaptation (CCA) and disaster risk reduction (DRR). It is anticipated to better understand the three academic communities,

i.e., the CCA, DRR, and risk governance communities, to identify commonalities and differences as well as potentials for effective collaboration. Findings will be synthesized qualitatively to identify similarities and differences, as well as strengths and weaknesses. Quantitative analysis regarding the occurrence of certain approaches should help identify research gaps and develop a taxonomy. Specifically, the review will answer the following questions:

1) What risk governance and risk management approaches exist for disaster risk reduction or climate change adaptation by means of stakeholder engagement and/or transdisciplinary knowledge co-production? (RQ1)
   a) Who are the stakeholders included in these approaches, and at what level are they operating (e.g., multi-level governance, type of stakeholder (institutions))?
   b) What are the commonalities and differences in these approaches (e.g., level of engagement, operationalization/conceptualization of risk)?
   c) What are the overall conclusions (e.g., drivers and barriers, burdens and benefits) that can be drawn regarding the advantages and limitations of risk governance and risk management through these approaches?

2. Method

This study follows the [Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)](#) framework (Page et al., 2021). The following section describes the eligibility criteria, information sources, and the search strategy developed. The selection process, data extraction, and critical appraisal are outlined, as are the risks of biases and data synthesis.

2.1. Eligibility criteria

Studies will be selected according to the criteria outlined below.

2.1.1. Study designs

We will include literature evaluating risk governance and risk management approaches through stakeholder engagement and transdisciplinary knowledge co-production processes in a qualitative or quantitative manner. The approach under consideration should at least include one stakeholder other than governmental actors. Specifically, risks regarding climate change adaptation and disaster risks will be considered.

2.1.2. Timeframe

There will be no exclusion based on the year of publication or the timeframe under consideration in a selected study.

2.1.3. Publications

Literature from academic journals and conferences will be included. To cover grey literature, searches on selected databases will be carried out (cf. 2.2)

2.1.4. Language

Literature reported in the English language will be included.

2.1.5. Exclusion Criteria

Reports that are not formally published in sources such as scientific journal articles, editorials, letters, and commentaries will be excluded during the screening process unless obtained from the sources or considered specifically valuable for the review. Reports not published in the English language will also be excluded from the review.

2.2. Information sources

A search strategy will be developed in accordance with the updated PRISMA 2020 framework (Page et al. 2021) as well as the Cochrane Handbook for Systematic Reviews of Interventions (Higgins et al. 2022). Databases to be searched include Clarivate's Web of Science (WoS) and ELSEVIER's Scopus. To ensure literature saturation, we will scan the reference lists of key studies or relevant reviews identified throughout the search. Finally, we will circulate a bibliography of the included articles to the systematic review team. Additionally, we will search the United Nations' Office for Disaster Risk Reduction (UNDRR) platform PreventionWeb, the Stockholm Environment Institute's (SEI) platform weADAPT for current grey literature, as well as the European Commission's CORDIS website.

2.3. Search strategy

The search strategy is derived from the objectives of the SLR. The literature search shall aim to find state-of-the-art scientific publications relevant to answering the main research question. To do so, a search string is developed where key concepts are derived from the main research question (RQ1). A preliminary search is executed in Clarivate's Web of Science databases to identify relevant keywords for each concept. The keywords are checked for synonyms using online dictionaries to ensure completeness and reviewed by the review team. The various keywords and synonyms are then combined using the OR operator and nested in brackets. Concepts are combined using the AND operator. To exclude concepts, phrases, or words, the NOT operator is used. Truncation is used to avoid limitations given by different word endings or prefixes. Multi-word phrases are combined using either quotation

marks or the WoS NEAR/-operator (PRE/ or W/ for Scopus).

The developed search strings are reviewed by the review team. A librarian or information specialist is consulted to review the search strategy and developed search strings. Titles, abstracts, and keywords will be searched. To include grey literature, selected keywords, decided on by the review team, are used to search the aforementioned information sources (cf. 2.2). The aim of the search strategy is to maximize sensitivity of the searches whilst striving for a reasonable precision in the search results. Alerts are set to monitor the publication of relevant literature throughout the reviewing process. The search will be documented. The search strategy will be tested to see if known-to-be-relevant studies are identified. If necessary, the search strategy will be refined.

2.4. Study records

During the review process, data will be managed using shared Zotero libraries and online collaboration tools, e.g., Nextcloud. Additionally, a software tool, i.e., CADIMA, developed by the Julius Kühn-Institut – Federal Research Centre for Cultivated Plants (JKI) in Germany, will be used for study selection, data extraction, and data synthesis (Kohl et al., 2018).

2.4.1. Selection process

The review team will collaboratively screen the titles and abstracts yielded by the search against the inclusion criteria. To reduce bias, this will be done in two selected teams, randomly drawn from the review authors. Each team will screen all reports independently. We will obtain full reports for all titles that appear to meet the inclusion criteria or where there is any uncertainty. The review team will then screen the full-text reports and decide whether they meet the inclusion criteria. We will

resolve disagreements through discussion. Furthermore, we will record the reasons for excluding literature. Neither of the review authors will be blind to the journal titles nor to the study authors or institutions.

2.4.2. Data collection process

Data from relevant studies will be collected using CADIMA, where the data extraction process will be developed and documented. The review team will be trained in the use of CADIMA in at least one online workshop. If needed, data extraction forms will be developed and distributed among the reviewers. In the case of the use of the data extraction forms, tests will be conducted using known-to-be-relevant studies by two reviewers independently, and the reviewers will be trained in the application of the forms using example studies. The extracted data will be summarized. Data abstracted will include metadata for the report, demographic information, methodology, and important outcomes.

2.4.3. Data Items

The following presents a list of data items to be extracted from the reports:

Report Metadata:

- Bibliographic information
- Journal ranking
- Funding information
- Time of study
- Timeframe of the study
- Temporal direction of the study, i.e., ex-ante or ex-post

Content data:

- Topic, i.e., CCA or DRR
- Terminology
- Type of risk
- Geographic information
- Financial information, e.g., costs of the approach, financial benefits, etc.

- Strength and weaknesses of the approach
- Drivers and barriers of the approach
- Risks and opportunities of the approach
- Burdens and benefits
- Summary of results/outcomes
- Uncertainties
- Biases

Methodical data:

- Type of stakeholder engagement approach/co-production process
- Type of (risk) governance/management approach
- Sampling strategy
- Start- and endpoint
- Method of analysis and evaluation
- Type of method, i.e., quantitative, qualitative, or mixed approach

Stakeholder data:

- Involved stakeholders
- Demographic information
- Level of engagement

2.5. Outcomes

According to the objective, the review seeks to identify state-of-the-art risk governance and management approaches through stakeholder engagement and/or transdisciplinary knowledge co-production processes. By analyzing the selected studies, knowledge about similarities and differences, as well as strengths and weaknesses, of the various approaches is synthesized. Moreover, through the systematic review, we will be able to draw conclusions about the appropriateness and effectiveness of various risk governance and management approaches, provided that enough data is available. Furthermore, our goal is the identification of research gaps and potential synthesis towards the development of a taxonomy for risk governance through stakeholder engagement.

Thus, primary outcomes include:

1) Strengths and weaknesses of different types of co-production processes or stakeholder engagement approaches used
2) Commonalities and differences among the different scientific communities in approaching risk governance and/or risk management through stakeholder engagement or transdisciplinary knowledge co-production processes.

Secondary outcomes include:

1) The types of risk conceptualizations used
   a) The types of risks considered
   b) Drivers and barriers to an approach
2) The types of stakeholders involved
   a) The number of stakeholders involved
   b) The levels of stakeholder engagement
3) Identification of research gaps
4) Development of a taxonomy

2.6. Critical appraisal

To assess the quality of the selected studies, critical appraisal tools are adapted according to Ryan et al. (2020). To assess qualitative studies, the Critical Appraisal Skills Programs (CASP Checklists - Critical Appraisal Skills Programme, 2018) are used. Quantitative studies are assessed through the Study Quality Assessment Tool (National Heart, Lung and Blood Institute, 2016), and mixed method approaches through the Mix Method Assessment Tool (Hong et al., 2018).

2.7. Risks of bias in individual studies

Individual studies will be assessed for their biases. These include (1) selection bias, (2) engagement bias, (3) hypothetical bias, (4) weighting bias, (5) model-based bias, (6) bias in measurement of the outcome, (7) data bias, (8) methodological bias, (9) randomization bias, and (10) allocation bias.

2.8. Data synthesis

A systematic synthesis will be provided, with information presented in the text and tables to summarize and explain the characteristics and findings of the included studies. We will synthesize the outcomes qualitatively. This includes the methods used, their similarities and differences, as well as their strengths and weaknesses, risks of bias of the participatory approaches used, and, if possible, a geographical analysis. We will quantitatively assess the occurrence and frequency of risk governance and management approaches in relation to the types of risks and risk conceptualization approaches.

2.9. Meta-Biases

We will discuss possible meta-biases such as publication bias, outcome reporting bias, or language biases qualitatively.

2.10. Confidence in the cumulative estimate

We will summarize our confidence in the resulting body of evidence. This will include the risk of bias across studies, inconsistencies, imprecision, indirectness, meta-biases, and factors that increase the confidence in effects, where possible. This will be done using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach (Schünemann et al., 2013). If necessary, the approach will be adapted according to the review.

Authors' contributions

PE has designed the protocol for the review and developed the search strategy. All authors contributed to the review of the protocol, the development of the selection criteria, the risk of bias assessment, the search strategy, and data extraction criteria. All authors provided their expertise on relevant issues. All authors will review the selected reports and collabo-

rate on the analysis and evaluation of the data to be synthesized. The writhing of the review will be done collaboratively, with PE being the lead author.

Amendments

Changes to this protocol will be published in the form of amendments. These will be attached to online publication and documented in a changelog, given the date of each amendment, a description of the changes, and the rationale leading to the amendment. Minor changes will not be incorporated into the protocol. In the event of major changes to the protocol, a new version will be provided, including a list of changes to the previous version. PJS will be responsible for approving future amendments. PE will be responsible for the inclusion and documentation of future changes. Depending on the contributions, all authors will be responsible for implementing future amendments.

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