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What is a framework? Understanding their purpose, value, development and use

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Abstract
Many frameworks exist across the sciences and science-policy interface, but it is not always clear how they are developed or can be applied. It is also often vague how new or existing frameworks are positioned in a theory of science to advance a specific theory or paradigm. This article examines these questions and positions the role of frameworks as integral but often vague scientific tools, highlighting benefits and critiques. While frameworks can be useful for synthesizing and communicating core concepts in a field, they often lack transparency in how they were developed and how they can be applied. Positioning frameworks within a theory of science can aid in knowing the purpose and value of framework use. This article provides a meta-framework for visualizing and engaging the four mediating processes for framework development and application: (1) empirical generalization, (2) theoretical fitting, (3) application, and (4) hypothesizing. Guiding points for scholars and policymakers using or developing frameworks in their research are provided in closing.

Keywords Paradigm · Theory of science · Methodology · Social science · Frameworks

> *The development of 'frameworks' is at present probably the most common strategy in the field of natural resources management to achieve integration and interdisciplinarity.*
>
> Mollinga, 2008

> *…it is not clear what the role of a scientific framework should be, and relatedly, what makes for a successful scientific framework.*
> Ban and Cox, 2017

Introduction

Frameworks are important research tools across nearly all fields of science. They are critically important for structuring empirical inquiry and theoretical development in the environmental social sciences, governance research and practice, the sustainability sciences and fields of social-ecological systems research in tangent with the associated disciplines of those fields (Binder et al. 2013; Pulver et al. 2018; Colding and Barthel 2019). Many well-established frameworks are regularly applied to collect new data or to structure entire research programs such as the Ecosystem Services (ES) framework (Potschin-Young et al. 2018), the Social-Ecological Systems Framework (SESF) (McGinnis and Ostrom 2014a), Earth Systems Governance (ESG) (Biermann et al. 2010), the Driver-Impact-Pressure-State-Response (DIPSR) framework, and the Life Cycle Assessment (LCA) framework. Frameworks are also put forth by major scientific organizing bodies to steer scientific and policy agendas at regional and global levels such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (Díaz et al. 2015) and the Global Sustainable Development Report's transformational levers and fields (UN 2019).

Despite the countless frameworks, it is not always clear how a framework can be developed or applied (Ban and Cox 2017; Partelow 2018; Nagel and Partelow 2022). Development may occur through empirically backed synthesis or by scholars based on their own knowledge, values, or interests. These diverse development pathways do, however, result in common trends. The structure of most frameworks is the identification of a set of concepts and their general relationships — often in the form box-and-arrow diagrams — that

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are loosely defined or unspecified. This hallmark has both benefits and challenges. On one hand, this is arguably the purpose of frameworks, to structure the basic ideas of theory or conceptual thinking, and if they were more detailed they would be models. On the other hand, there is often a "black box" nature to frameworks. It is often unclear why some sets of concepts and relationships are chosen for integration into frameworks, and others not. As argued below, these choices are often the result of the positionality of the framework's creators. Publications of frameworks, furthermore, often lack descriptions of their value and potential uses compared to other frameworks or analytical tools that exist in the field.

Now shifting focus to how frameworks are applied. Some frameworks provide measureable indicators as the key variables in the framework, but many only suggest general concepts. This creates the need to link concepts and their relationships to data through other more tangible indicators. Methods to measure such indicators will also be needed in new empirical studies. These methodological and study design steps necessary to associate data to framework concepts is often referred to as "operationalizing" a framework. However, without guidance on how to do this, scholars are often left with developing their own strategies, which can lead to heterogeneous and idiosyncratic methods and data. These challenges can be referred to as methodological gaps (Partelow 2018), where the details of how to move from concept to indicator to measurement to data transformation, are not always detailed in a way that welcomes replicability or learning. This is not necessarily a problem if the purpose of a framework is to only guide the analysis of individual cases or synthesis activities in isolation, for example to inform local management, but it hinders meta-analyses, cross-case learning and data interpretability for others.

In this article, a brief overview of framework definitions and current synthesis literature are reviewed in the "What is a framework?" section. This is coupled with the argument that frameworks often lack clarity in their development and application because their positioning within a theory of science is unclear. In the "Mechanisms of framework development and use: a meta-framework" section, a meta-framework is proposed to assist in clarifying the four major levers with which frameworks are developed and applied: (1) empirical generalization, (2) theoretical fitting, (3) hypothesizing, and (4) application. The meta-framework aims to position individual frameworks into a theory of science, which can enable scholars to take a conceptual "step back" in order to view how their engagement with a framework contributes to their broader scientific goal and field. Two case studies of different frameworks are provided to explore how the meta-framework can aid in comparing them. This is followed by a discussion of what makes a good framework, along with explicit guiding points for the use of frameworks in research and policy practice.

What is a framework?

The definition and purpose of a framework is likely to vary across disciplines and thematic fields (Cox et al. 2016). There is no universal definition of a framework, but it is useful to provide a brief overview of different definitions for orientation. The Cambridge Dictionary states that frameworks are "a supporting structure around which something can be built; a system of rules, ideas, or beliefs that is used to plan or decide something." Schlager (2007, 293) states that "frameworks provide a foundation for inquiry," and Cumming (2014, 5) adds that this "does not necessarily depend on deductive logic to connect different ideas." Importantly, Binder et al., (2013, 2) note that "a framework provides a set of assumptions, concepts, values and practices," emphasizing the normative or inherently subjective logic to framework development. A core theme being plurality and connectivity. Similarly, McGinnis and Ostrom (2014a, 1) define frameworks as "the basic vocabulary of concepts and terms that may be used to construct the kinds of causal explanations expected of a theory. Frameworks organize diagnostic, descriptive, and prescriptive inquiry." In a review comparing ten commonly used frameworks in social-ecological systems (SES) research, Binder et al., (2013, 1) state that frameworks are useful for developing "a common language, to structure research on SES, and to provide guidance toward a more sustainable development of SES." In a similar review, Pulver et al., (2018, 1) suggest that frameworks "assist scholars and practitioners to analyze the complex, nonlinear interdependencies that characterize interactions between biophysical and social arenas and to navigate the new epistemological, ontological, analytical, and practical horizons of integrating knowledge for sustainability solutions." It is important to recognize that the above claims often suggest the dualistic or bridging positions held by frameworks, in both theory building and for guiding empirical observations. However, there is relatively little discussion in the above literature on how frameworks act as bridging tools within a theory of science or how frameworks add value as positioning tools in a field.

Every framework has a position, meaning it is located within a specific context of a scientific field. As positioning tools, frameworks seem to "populate the scientist's world with a set of conceptual objects and (non-causal) relationships among them," shaping (and sometimes limiting) the way we think about problems and potential solutions (Cox et al. 2016, 47). Thus, using a specific framework helps in part to position the work of a researcher in a field and its related concepts, theories and paradigms.

Four factors can be considered to evaluate the positioning of a framework: (a) who developed it, (b) the values being put forth by those researchers, (c) the research questions engaged with, and (d) the field in which it is embedded. For example, the Social-Ecological Systems Framework (SESF) (Ostrom 2009) was developed by (a) Elinor Ostrom who developed the framework studying common-pool resource and public goods governance from the 1960s until the 2000s. Ostrom's overall goal was (b) to examine the hindering and enabling conditions for governance to guide the use and provision common goods towards sustainability outcomes. Her primary research questions (c) related to collective action theory, unpacking how and why people cooperate with each other or not. The field her work is embedded in (d) is an interdisciplinary mix between public policy, behavioral and institutional economics. Scholars who use Ostrom's SESF today, carry this history with them and therefore position themselves, whether implicitly or explicitly, as part of this research landscape as systems thinkers and interdisciplinarians, even if they have other scholarly positions.

Frameworks are positioned within a theory of science. Understanding this positioning can guide scholars in comprehending how their engagement with frameworks contributes to the overall advancement of their field. To do this, taking a conceptual "step back" is necessary, to distinguish between different levels of theory in science. From the conceptually broadest to the most empirically specific, we can identify the following levels of theory: paradigms, frameworks, specific theories, models/archetypes and cases (Table 1). Knowledge production processes flow up and down these levels of theory. For example, as argued by Kuhn (1962), the purpose of a scientific field is to advance its paradigm. Thus, the study of empirical observations (e.g., case studies) — and the development of models or theories resulting from those data — are aimed at advancing the overarching paradigm. Such paradigms could be conservation, democracy, sustainable development or social-ecological systems.

There is a need to connect cases, models and specific theory up to the overall paradigms of a field to make aggregate knowledge gains. Here, the role of frameworks becomes more clear, as bridging tools that enable connections between levels of knowledge. From the top down, frameworks can specify paradigms with more tangible conceptual features and relationships, which can then guide empirical inquiry. For example, the Driver-Pressure-State-Impact-Response (DPSIR) framework (Smeets and Weterings 1999; Ness, Anderberg, and Olsson 2010) specifies how to evaluate policy options and their effects by focusing on the five embedded concepts in a relational order. Scholars can then generate more specific indicators and methods to measure the five specified features of the framework, and their relationships, to generate empirical insights that now have a direct link to the paradigm of sustainable policy development via the framework.

Furthermore, frameworks can also emerge from the bottom up, by distilling empirical data across cases and thus creating a knowledge bridge of more specified conceptual features and relationships that connect to a paradigm. In both top-down and bottom-up mechanism, frameworks can play a vital role in synthesizing and communicating ideas among scholars in a field — from empirical data to a paradigm. A challenge may be, however, that multiple frameworks have emerged attempting to specify the core conceptual features and relationships in a paradigm. A mature scientific field is likely to have many frameworks to guide research and debate. There is, however, a lack of research and tools available to compare frameworks and their added value.

Beyond their use as positioning tools, frameworks make day-to-day science easier. They can guide researchers in designing new empirical research by indicating which core concepts and relationships are of interest to be measured and compared. Scientific fields also need common fires to huddle around, meaning that we need reference points to initiate scholarly debates, coordinate disparate empirical efforts and to communicate findings and novel advancements through a common language (McGinnis and Ostrom 2014a; Ban and Cox 2017). As such, frameworks

Table 1 Levels of theory

Levels of theory[1]	Definition
Paradigms	Represent and encompass the large narratives that build and drive societies and cultures, including science.
Frameworks	Organize diagnostic, descriptive, and prescriptive inquiry, providing the basic vocabulary of concepts and terms to construct the causal explanations expected of a theory.
Specified theories	Specific causal relationships among core variables. Theory is a wide level, ranging from broad sweeping claims to specified interactions, for example with archetypes, which identify.
Models/archetypes	Recurrent patterns among cases in which general regularities that apply to all cases cannot be expected. A detailed context specific explanation of the functional relationships among independent and dependent variables.
Cases	Specific empirical observations of unique contexts with identifiable variable relationships and outcomes.

[1]https://sustainabilitymethods.org/index.php/Levels_of_Theory

Table 2 Suggested framework classifications in the selected synthesis literature

Literature	Classification/ typology
Cumming (2014)	(1) Hypothesis-oriented frameworks (2) Assessment-oriented frameworks (3) Action-oriented frameworks (4) Problem-oriented frameworks (5) Theory-oriented/ overarching frameworks
Binder et al., (2013)	(1) Ecocentric frameworks (2) Integrative frameworks (3) Policy frameworks (4) Vulnerability frameworks
Ness et al., (2007)	(1) Indicators/ indexes (2) Product-related [thematic] assessments (3) Integrated assessments

are useful for synthesis research, focusing the attention of reviews and meta-analyses around core sets of concepts and relationships.

There is, however, a tension between frameworks that aim to capture complexity and those that aim to simplify core principles. Complexity oriented frameworks often advance systems thinking at the risk of including too many variables. They often have long lists of variables which makes empirical orientation and synthesis difficult. On the other hand, simplification frameworks face the challenge of leaving important things out, with the benefit of clarifying what may be important and giving clear direction.

From a more critical perspective, the "criteria for comparing frameworks are not well developed," (Schlager, 2007, 312), and the positionality of frameworks has not been rigorously explored outside of smaller studies. Nonetheless, numerous classifications or typologies of frameworks within specific fields have been suggested (Table 2), although not with reference to positionality (Spangenberg 2011; Binder et al. 2013; Cumming 2014; Schlager 2007; Ness et al. 2007; Potschin-Young et al. 2018; Cox et al. 2021; Louder et al. 2021; Chofreh and Goni 2017; Alaoui et al. 2022; Tapio and Willamo 2008). These studies point to the question of: what makes a good framework? Are there certain quality criteria that make some frameworks more useful than others? There has undoubtedly been a rise in the number of frameworks, but as expressed by Ban and Cox (2017, 2), "it is not clear what the role of a scientific framework should be, and relatedly, what makes for a successful scientific framework. Although there are many frameworks […] there is little discussion on what their scientific role ought to be, other than providing a common scientific language." The meta-framework presented below serves as a tool for answering these questions and provides guidance for developing and implementing frameworks in a range of settings.

Mechanisms of framework development and use: a meta-framework

This section presents a meta-framework detailing the mechanisms of framework development and use (Fig. 1). The meta-framework illustrates the role of frameworks as bridging tools for knowledge synthesis and communication. Therefore, the purpose of the meta-framework is to demonstrate how the mechanisms of framework development and use act as levers of knowledge flow across levels within a theory of science, doing so by enabling the communication and synthesis of knowledge. Introducing the meta-framework has two parts, outlined below.

First, the meta-framework visualizes the levels along the scale of scientific theory including paradigms, frameworks, specific theory and empirical observations, introduced above. Along this scale, three mechanisms of logical reasoning are typical: induction, deduction, and abduction. Induction is a mode of logical reasoning based on sets of empirical observations, which, when patterns within those observations emerge, can inform more generalized theory formation. Induction, in its pure form, is reasoning without prior assumptions about what we think is happening. In contrast, deduction is a mode of logical reasoning based on testing a claim or hypothesis, often based on a body of theory, against an observation to infer whether or not a claim is true. In contrast to induction, which always leads to probable or fuzzy conclusions, deductive logic provides true or false conclusions. A third mode of logical reasoning is abduction. Abduction starts with a single or limited set of observations, and assumes the most likely cause as a conclusion. Abduction can only provide probable conclusions. Knowledge claims from all three modes of logical reasoning are part of the nexus of potential framework creation or modification.

Second, the meta-framework has four iterative mediating processes that directly enable the development and/or application of frameworks (Fig. 1). Two of the four mediating processes relate to framework development: (1) empirical generalization and (2) theoretical fitting. The other two relate to framework application: (3) hypothesizing, and (4) application (Fig. 1, Table 3). The details of the specific mediating pathways are outlined in Table 3, including the processes involved in each. There are numerous potential benefits and challenges associated with each (Table 3).

The value of a meta-framework

The presented meta-framework (Fig. 1) allows us to assess the values different frameworks can provide. If a framework provides a novel synthesis of key ideas or new

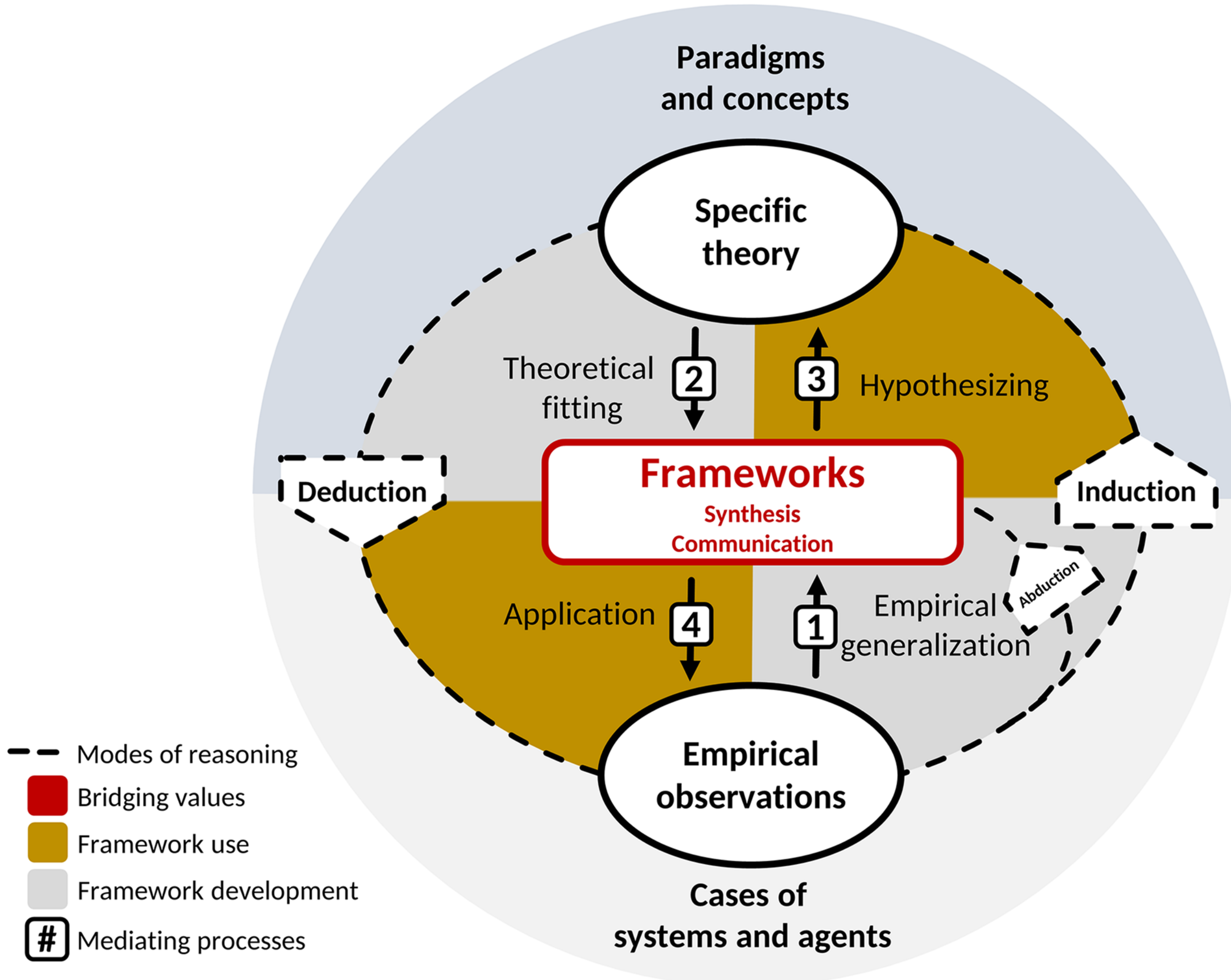


Fig. 1 A meta-framework outlining the central role frameworks play in scientific advancement through their development and use. In the center, frameworks provide two core bridging values: knowledge synthesis and knowledge communication. Three modes of logical reasoning contribute to framework development: induction, deduction and abduction. Frameworks are used and developed through four mediating processes: (1) empirical generalization, (2) theoretical fitting, (3) application, and (4) hypothesizing

developments in a field, and communicates those insights well in its composition, it likely adds notable value. If a framework coordinates scientific inquiry across the 1 or more of the four mediating processes, it likely acts as an important gatekeeper and boundary object for what may otherwise be disparate or tangential research. If it contributes substantial advances in 3 or 4 of the mediating processes, the value of the framework is likely higher.

The meta-framework can further help identify the positioning of framework such as the type of logical reasoning processes used to create it, as well as help clarify the role of a framework along the scale of knowledge production (i.e., from data to paradigm). It might be clear, for example, what paradigm or specific theory a framework contributes to. The meta-framework can add value by guiding the assessment of how frameworks fit into the bigger picture of knowledge contribution in their field. Furthermore, many scholars and practitioners are interested in developing new frameworks. The meta-framework outlines the mechanisms that can be considered in creating the framework as well as help developers of new frameworks communicate how their frameworks add value. For example, to link empirical data collection to theoretical work in their field.

The meta-framework can help compare frameworks, to assess strengths and weaknesses in terms of their positioning and knowledge production mechanisms. It can also help elucidate the need for, or value of, new

Table 3 Four mediating processes in knowledge production for using and developing frameworks as bridging objects in knowledge production. Each process interfaces with the development and use of frameworks, which act as bridging objects in knowledge production processes across the three modes of logical reasoning

Mediating process	Purpose	Process and practice	Benefits (+) and challenges (-)
(1) Empirical generalization	Development	Empirical comparison, meta-analysis or review. Inferring observations as representative of broader phenomena	• New variables added from data (+) • Existing variables modified (+) • Clarify variable relationships (+) • Validate hypotheses (+) • Criteria for adding variables (-) • Criteria for modifying variables (−)
(2) Theoretical fitting	Development	Explaining observations with existing theory or hypotheses.	• Theory as a construction base (+/−) • Informs potential components to include of broader value for the field (+) • Limits inputs from specific theory (−)
(3) Application	Use	Gathering diverse empirical observations. Taking what is known generally, as a guide for what is important to observe.	• List of variables to focus on (+) • List of relationships to focus on (+) • Which variables to choose? (-) • How to measure (i.e., what methods)? (−) • Limited set of variables (−/+)
(4) Hypothesizing	Use	Hypothesizing new relationships. Taking what is known generally, as a guide for suggesting new relationships to be tested.	• Use framework to derive new relationships (+) • Limits hypotheses based on new observations (−) • Framework likely limited to a specific perspective, aim or value (+/−)

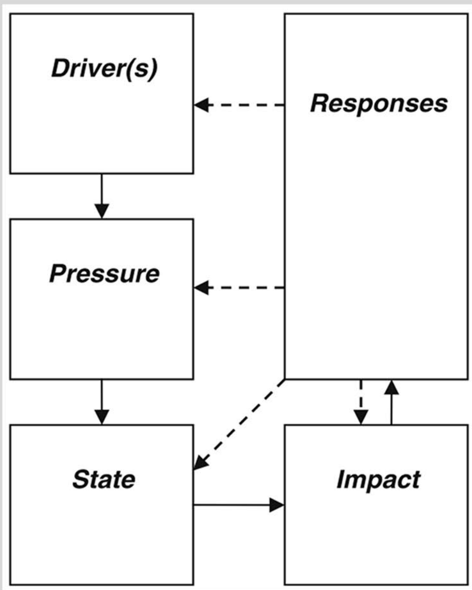
frameworks. This challenge is noted by Cumming (2014, 18) in the field of social-ecological systems, reflecting that "the tendency of researchers to develop "new" frameworks without fully explaining how they relate to other existing frameworks and what new elements they bring to the problem is another obvious reason for the lack of a single dominant, unifying framework." To showcase such as comparison, two brief examples are provided. The first example features the Driver-Pressure-State-Impact-Response (DPSIR) framework developed by the European Environmental Agency (EEA) (Box 1) (Smeets and Weterings 1999; Ness, Anderberg, and Olsson 2010). The DPSIR framework exemplifies a framework developed from the top-down (theoretical fitting) approach, to better organize the policy goal and paradigm of environmental sustainability to the indicators collected by EU member states. The second example highlights the Social-Ecological Systems Framework (SESF) developed by Elinor Ostrom (Box 2) (Ostrom 2009; McGinnis and Ostrom 2014a). The SESF exemplifies a framework developed from the bottom up (empirical generalization) to aggregate data into common variables to enable data standardization and comparison towards theory building to improve environmental governance. In the case examples (Box 1; Box 2), we can see the value of both frameworks from different perspectives. The examples briefly illustrate how the positionality of each framework dictates how others use them to produce knowledge towards a paradigm. In the case of the DPSIR framework, from the top-down towards a policy goal, and with the SESF, from the bottom-up towards a theoretical goal.

Discussion and directions forward

Frameworks are commons objects to huddle around in academic and practitioner communities, providing identity and guiding our effort. They focus scholarly attention on important issues, stimulate cognitive energy and provide fodder for discussion. However, reflection on the role and purpose of the frameworks we use needs to be a more common practice in science. The proposed meta-framework aims to showcase the role of frameworks as boundary objects that connect ideas and concepts to data in constructive and actionable ways, enabling knowledge to be built up and aggregated within scientific fields through using common languages and concepts (Mollinga 2008; Klein 1996).

Boundary objects such as frameworks can be especially important for inter- and transdisciplinary collaboration, where there may be few prior shared points of conceptual understanding or terminology beyond a problem

Box 1 | Drivers – Pressures – State – Impact – Response (DPSIR) framework



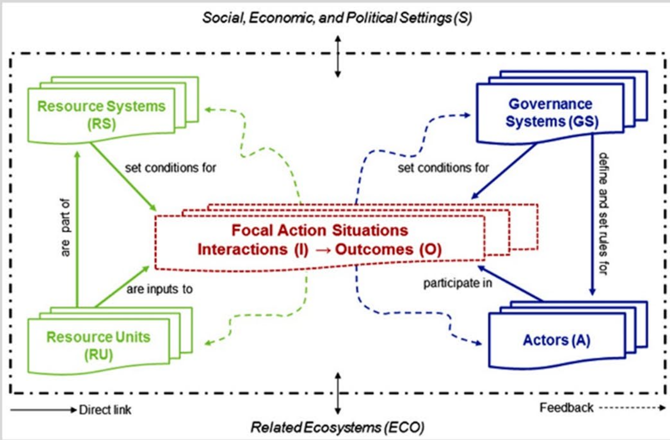
The European Environmental Agency (EEA) developed the DPSIR from its predecessor, the PSR framework, to organize the reporting of environmental indicators for policy evaluation in the European Union (EU). The framework provides an organizational structure for indicator classification (the five concepts in the name) and their relationships which enables the evaluation of policy options and their effectiveness to achieve environmental sustainability. The framework was created from the top-down, using theoretical fitting to provide an overarching structure for classifying environmental sustainability indicators to guide EU member states in structuring their data collection into the conceptual categories for aggregate and standardized assessments. States apply the framework by categorizing existing indicators and then evaluating where other indicators may be needed to understand the five conceptual categories. The framework is firmly situated in a policy development context, viewing government mechanisms as key to achieving environmental sustainability. The framework aims to enable the achievement of an environmental sustainability paradigm by providing a bridging structure to data collection that standardizes the interpretation of indicators and how knowledge is aggregated across diverse EU member states.

Box 1 Drivers – Pressures – State – Impact - Response (DPSIR) framework

context. Mollinga (2008, 33) reflects that "frameworks are typical examples of boundary objects, building connections between the worlds of science and that of policy, and between different knowledge domains," and that "the development of frameworks is at present probably the most common strategy in the field of natural resources management to achieve integration and interdisciplinarity," (Mollinga, 2008, 31). They are, however, critically important for both disciplinary specific fundamental research, as well as for bridging science-society gaps through translating often esoteric academic concepts and findings into digestible and often visual objects. For example, the DPSIR framework (Box 1) attempts to better organize the analysis of environmental indicators for policy evaluation processes in the EU. Furthermore, Partelow et al., (2019) and Gurney et al., (2019) both use Ostrom's SESF (Box 2) as a boundary object at the science-society interface to visually communicate systems thinking and social-ecological interactions to fishers and coastal stakeholders involved in local management decision-making.

An important feature of frameworks is that the very contestation over their nature is perhaps their main value. A framework can only be an effective boundary object if it catalyzes deliberation and scholarly debate — thus contestation over what it is and its value is seeded into the toolbox and identity of a scholarly field. Although most frameworks are likely to have shortcomings, flaws or controversial features, the fact that they motivate engagement around common problems and stimulate scholarly engagement is a value of its own. In doing so, frameworks often become symbols of individual and community identity in contested spaces. This is evidenced in how frameworks are often used to stamp our research as valid, relevant and important to the field, even if done passively. Citing a framework both communicates the general purpose of what a scholar is attempting to achieve to others, and orients science towards a common synthetic object for future knowledge synthesis and debate. These positioning actions are essential for science and practitioner communities to understand a research or policy project, its aims and assumptions. Historically, disciplines have provided

Box 2 | Social-Ecological Systems Framework (SESF)



Elinor Ostrom developed the SESF from the bottom-up, using empirical generalization to generate the variables in the framework from studying the governance of common-pool resources and public goods governance, starting in the 1960s. Empirical data from groundwater governance, policing reform, irrigation systems, forestry and fisheries informed the selection of variables hindering and enabling collective action among resource stakeholders attempting to achieve sustainability outcomes. Ostrom worked across public policy, behavioral and institutional economic fields to link the collection of empirical data on commons to governance and sustainability paradigms. Ostrom argued that the framework provides a common language for researchers developing coordinated research efforts to discuss findings. The framework can help structure data collection that is more comparable for theory building through the use of standardized variables. Modifications to the framework have been made be scholars using both theoretical fitting and empirical generalization from new data and theoretical advances. Current scholars tend to apply the framework to understand new empirical case studies, where the framework acts as a guide for focusing empirical attention on potentially important variables for governance and sustainability.

Box 2 Social-Ecological Systems Framework (SESF)

this value – signaling the problems, methods and theories one is likely to engage with. Frameworks can act as tools for bridging disciplines, helping to catalyze interdisciplinary engagement (Mollinga 2008; Klein 1996). As many scientific communities shift focus towards solving real-world problems (e.g., climate change, gender equality), tools that can help scientists' cooperate and communicate, such as a framework, will continue to play a vital role in achieving knowledge co-production goals.

Guiding points for framework engagement

An aim of this article is not only to reflect on the purpose, value and positioning of frameworks, but to provide some take-away advice for engaging with frameworks in current or future work. Over the course of this article, the question of "What makes a good framework?" has been explored. The meta-framework outlines mechanisms of useful frameworks and can help understand the positioning of frameworks. Nonetheless, more detailed guiding points can be specified for both the use and development of frameworks going forward. A series of guiding points are outlined in Table 4, generated from the literature cited throughout this article, feedback from colleagues and personal experiences applying and developing numerous frameworks. The guiding points focus on the two types of mediating processes, framework development and use (Table 4).

In conclusion, we need to know our academic tools in order make the best use of them in our own research, practice and knowledge communities. Frameworks have gained substantial popularity for the communication and synthesis of academic ideas, and as tools we all have the ability to create and perhaps the responsibility to steward. However, frameworks have struggled to find roots in a theory of science which grounds their contributions in relation to other scientific tools such as models, specific theories and empirical data. There is also a lack of discussion about what makes a good framework and how to apply frameworks in a way to makes those applications of integrative value to an overall community of scholars positioned around it. The meta-framework provided in this article offers insights into how to understand the purpose and positionality of frameworks, as well as the mechanisms for understanding the creation and application of frameworks. The meta-framework further allows for the comparison of frameworks to assess their value.

Table 4 Guiding points for future framework engagement, separated by development (or modification) and application

Framework process	Guiding points
Development and/ or modification	• Explain the framework's positioning: (1) who developed it, (2) the values of those researchers, (3) the research questions engaged with, and (4) the field in which it is embedded. • Explain the purpose of the framework, for example, which paradigms, specific theories and models it is intended to contribute to. • Explain each of the frameworks components and relationships, and how they were conceived (i.e., through review/meta-analysis, expert knowledge, empirical work, opinion). • Explain how the framework can be applied by others to increase methodological learning and data cohesiveness. • Explain why the framework is novel and adds value compared to other existing frameworks.
Application/ use	• Explain why the specific framework was selected for use, and not others. • Explain the step-by-step methodological processes developed or used to move from concepts to indicators to measurement to data transformation and analysis. • Explain how a current theory or paradigm link to the framework • Explain if and why framework was partially or fully applied. • Explain how the data collected or hypotheses generated, can be used by others.

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Declarations

Competing interests The authors declares that he has no competing interests.

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