

Multilingualism for pluralising knowledge and decision making about people and nature relationships

Layna Droz¹  | Marcela Brugnach²  | Unai Pascual³ 

¹Graduate School of Frontiers Sciences, Tokyo University, BC3 Basque Centre for Climate Change

²BC3 Basque Centre for Climate Change, IKERBASQUE Basque Foundation for Science

³Basque Centre for Climate Change (BC3); IKERBASQUE Basque Foundation for Science; Centre for Development & Environment, University of Bern

Correspondence

Layna Droz
Email: layna.droz@edu.k.u-tokyo.ac.jp

Funding information

Schweizerischer Nationalfonds zur Förderung der Wissenschaftlichen Forschung, Grant/Award Number: P2SKP1_194948

Handling Editor: Maraja Riechers

Abstract

1. The need for a pluralistic approach to biodiversity conservation science and policy is increasingly being recognized. We argue that plural perspectives require multilingualism in the sources and processes.
2. Unless the linguistic bias and the related issues in terms of legitimacy and validity, resistance to inclusion, and knowledge coproduction are meaningfully addressed, biodiversity science and its positive effects for conservation policy and practices will necessarily be limited.
3. We propose a series of options to address the linguistic biases in biodiversity conservation science and policy, including extending and tightening collaboration with environmental humanities scholars from diverse traditions as well as researchers from diverse linguistic contexts.
4. We conclude by showing how multilingualism is especially relevant for cross-scale and global biodiversity governance.

KEYWORDS

conservation, environmental policy, environmental sciences, global governance, multilingualism, science-policy

1 | THE IMPORTANCE OF LANGUAGE

This paper joins recent calls for a pluralistic approach to biodiversity science and policy (Coscieme et al., 2020; Hunter et al., 2021; Klütsch & Ferreira, 2021; Obermeister, 2019; Pascual et al., 2021) and proposes to go one step further. We argue that plural perspectives cannot be achieved without multilingualism in the sources and processes, especially for organizing knowledge coproduction that underpins high-level governance of science/policy initiatives such as those associated with the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). This is mainly because language is not a mere communication tool, but an essential machinery of meaning formation (Boroditsky, 2001; Kay & Kempton, 1984; Neuliep, 2017). Language plays a central role in how different people make sense of themselves, of 'nature' and its multiple associated values (IPBES, 2022a,

p. 8; IPBES, 2022b). For instance, the word nature, as used in dominant conservation discourses globally can take, when translated into other languages, very different connotations and meanings that are rooted in historical and etymological backgrounds and tainted by religious, cultural and scientific influences. Recent research on 12 East and South-East Asian languages shows that the words used to translate the word nature can include spirits, gods, humans, ancestors and so forth, reflecting complex realities that often hide wider and deeper cosmological mismatches and which cannot be forced into simplified nature categories (Droz et al., 2022). In contrast to this high diversity of views mediated and supported by linguistic diversity, a very narrow suite of languages dominates conservation research, starting with the predilection of several international institutions for research published in English, and other vehicular languages reigning over research in certain regions, such as Spanish in conservation research in Latin America.

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2023 The Authors. *People and Nature* published by John Wiley & Sons Ltd on behalf of British Ecological Society.

Language constitutes a means to construct worldviews through which reality is conceptualized (Anderson et al., 2022; Klemfuss et al., 2012; Whorf, 1956, 2012). Languages are closely tied to models of nature, society, culture and humanity (Jasanoff, 2004; Swedlow, 2012). Therefore, a linguistic pluralistic approach would necessarily entail modifying and producing new linguistic tools *within* the dominant language(s) in order to capture 'foreign' concepts that are the keystones of worldviews developed in other languages. Language has also been shown to influence decision-making processes, as linguistic expressions carry connotations and echo associated past experiences, beliefs and prejudices (Allan, 2007). In fact, research has shown that using one's native language exposes one more to heuristic biases in decision-making as when using a foreign language, because native language is closely tied to the inner emotional components of a person (Costa et al., 2014; Keysar et al., 2012). The values people hold for nature have also been shown to be influenced by languages and the connotations associated with meanings of nature (Tauro et al., 2021), as recently shown by Inglis and Pascual (2021) in the case of Basque people's values about forests. It follows that language underlies research approaches, both in terms of how the results of studies are communicated, as well as probably in terms of how the research methodologies are thought and designed thanks to linguistic conceptual articulations.

Notwithstanding the central role of language, it is interesting to note the limited regard for multilingualism in international high-level biodiversity science-policy governance bodies. Yet, it is important to note that the actual choices about use and promotion of language (e.g. English as working language in bodies such as in the Intergovernmental Platform on Biodiversity and Ecosystem Services, IPBES) as well as of the linguistic categorizations and the argumentative articulations used are necessarily political (Bashir & Batool, 2017; Jasanoff, 2004). These choices reflect as much the scientific evidence synthesized from a particular linguistic body of literature, as the cultural and political inclinations and power relations within the institutions (norms and rules) that allow the governance as well as the work of complex bodies such as IPBES. Far from being a neutral tool that convenes transparently scientific factual conclusions, language does constrain interpretations of the data and implicitly directs the normative and policy implications that can be drawn from these data. Including multilingual sources and researchers in knowledge-making for conservation governance is a matter of epistemic hygiene (Clark, 2015; Gates, 1991) and epistemic justice, and a key step to resist the 'globalising instincts that so easily erase difference and collapse meaning' (Hulme, 2010, p. 558) when trying to propose the kinds of knowledge and solutions that are thought to be understandable, adaptable to sociocultural contexts, and implementable by the manifold actors on the ground. In this sense, the attractiveness of international groups of experts speaking with 'one voice' based on consensual typologies composed of agreed-upon words and concepts may need to be nuanced; while acknowledging the need for diversity, such diversity may be 'defined and structured in such a way that potential conflicts and tensions remain hidden' (Díaz-Reviriego et al., 2019, p. 460). Linguistic dominance in the way

science is done as well as in the ways both national and international science-policy initiatives operate is tied to unbalanced geographical representation (Báldi & Palotás, 2021) as well as to the dominance of certain worldviews over others. Scientists are not immune to the cultural and linguistic biases that occur due to asymmetric power relations in the scientific community.

In this paper, we aim to illustrate the limitations of the general practices in high-level science-policy bodies, mostly conducted in English, as well as identify opportunities to address current linguistic biases in order to more effectively and equitably gather the required data and make it available to actors across social and linguistic contexts. Here, we pose that multilingualism in the sources and processes of global science-policy interfaces can improve biodiversity and environmental science and practice by: (1) widening the range of accessible literature, which could contribute to filling up knowledge and data gaps; (2) unlocking creative spaces and unleashing innovation regarding how we make sense and structure the data, as well as the policy solutions that may be drawn from this knowledge; (3) bridging linguistic and disciplinary silos that partition knowledge production through a two-way street communication, which would be mutually beneficial and prevent lags in research due to key findings remaining trapped within particular silos; (4) increasing inclusivity of diverse stakeholders in the processes, which would result in policy options enhancing legitimacy and uptake in diverse social contexts; and (5) contributing to the decentralization of the production of knowledge and policy-making, which could lead to the development of frames and solutions better suited across social contexts.

In what follows, we provide a positionality statement to describe how we dealt with multilingualism in the process of writing this paper. Although each of the three authors has different native languages (Basque, French, Spanish), we all have a long experience in writing and working in academic English under the umbrella of a similar scientific culture, thus the discussion and writing process were conducted directly in English without difficulties. In case of doubt regarding a given word, expression and its connotation, we settled for simpler yet clearer concepts. The process of translating the abstract into other languages was also enlightening and forced us to clarify the specific meanings in the primary English version and allowed us to change and adapt the paper accordingly. In contrast with the relatively—linguistically—smooth process of writing this article, each of us has had rich experiences in different national and international science-policy initiatives where the issue of working language was a major political factor and barrier for inclusion as well as presenting potential for cultural bias, while remaining largely unnamed and when named, only partially addressed. In contexts where the complexity of multilingualism and the stakes are higher (e.g. working as experts in IPBES) or cultural differences greater (e.g. collaborative research between Tibetan monks, experts of Japanese studies and researchers trained in Western sciences), we observed that politics and geographies do matter greatly and that the choice of language (associated with specific worldviews) is sometimes used as a tool to assert power, rather than to facilitate genuine communication and intellectual exchanges. These experiences provided the common motivation for writing this article.

In what follows, we first identify the different aspects of the linguistic bias in global biodiversity discourses and published reports, related to legitimacy and validity, resistance to inclusion, and knowledge coproduction. Then, we identify a series of opportunities to address the limitations of the current linguistic bias and to unleash the potential of multilingualism for biodiversity science and policy. Finally, we discuss how multilingualism is especially relevant for the important work of international science-policy bodies such as IPBES.

2 | LINGUISTIC BIAS IN GLOBAL ENVIRONMENTAL REPORTS AND DISCOURSES

The choice of language and vocabulary in high-level governance and at the global science-policy interfaces on environmental issues is enmeshed in political tensions at the intersection of power and knowledge. Far from being limited to technicalities related to language and translations, the linguistic bias is connected with questions of legitimacy and validity, resistance to inclusion and knowledge coproduction.

2.1 | Linguistic bias

The lack of linguistic pluralism at global biodiversity science-policy interfaces leads to twofold limitations, related to (1) the sources of knowledge and (2) the conclusions drawn for conservation policy and practice. First, the body of literature on which the global assessment reports on the state of biodiversity and policy options are based is rather linguistically exclusive, as it is largely limited to scientific sources in English. For example, over 96% of sources across the first eight IPBES assessments were in English (Lynch et al., 2021). This contrasts with the results from a study by Amano, González-Varo, et al. (2016) and Amano, Lamming, et al. (2016) who found that 35.6% of scientific documents on biodiversity conservation published in 2014 were in languages other than English. Further, a considerable and increasing amount of scientific evidence regarding biodiversity conservation is available in non-English languages (with more than 1000 studies in the body of literature reviewed), and that including such non-English literature can expand the geographical coverage by 12% to 25%, as well as the number of species covered by 5% to 32% (Amano, Berdejo-Espinola, et al., 2021; Amano, Rojas, et al., 2021). This number would probably be significantly higher if a wide variety of online and in-person search tools—for instance, other than Google Scholar, which is censored in a number of countries, and less relevant for a number of traditions and disciplines—were used; if the grey literature and reports from governments, consultancies and non-research-focused institutions were included; and if literature in humanities (Hammel, 2013) regarding the relations between human and the natural world were targeted. This reflects a significant linguistic bias in the English-speaking scientific community (Amano, Berdejo-Espinola, et al., 2021; Amano, Rojas, et al., 2021). It follows

that the knowledge developed and discussed in other languages and forms gets lost and not duly represented in assessment reports from where important policy options are suggested by world-leading experts (Meneghini & Packer, 2007). Second, the implications for policy options and policy agreements are discussed and framed within the confinement of a narrow set of languages (i.e. those languages that are official at the United Nations level), the range of possible statements both in terms of the linguistic constructs and categories of the dominant language, and in terms of the grammar and argumentative structure that is privileged in this language.

Importantly, these limitations are simultaneously intertwined with and reinforce the dominance of a specific form of scientific methodology. For example, there is a tendency among English-speaking researchers to assess the epistemological quality of research and articles based on the form of scientific discourse instead of the content. In 'sciences', the quality and validity of knowledge are often judged based on a strict presentation form composed of written statements in which some elements are required (e.g. hypothesis and methodologies), while others must be left out, even though they might have impacted the results as well (e.g. personal emotional state of the researcher while conducting the research). In fact, this strict frame that clearly dominates natural sciences and economics written in English leaves little room for oral stories or for experience-based knowledge, while experiment-based knowledge is privileged (Moezzi et al., 2017). However, rigorous methodologies and step-by-step verification procedures for experience-based knowledge have also been developed in many other traditions and cultures, mostly in languages other than English. For instance, the transdisciplinary and intercultural field of 'contemplative research'—the English term coined to capture a family of knowledge-making traditions that long existed in other linguistic spheres (e.g. Tibetan, Japanese and Chinese) emerged as an attempt to bridge the scientific tradition to wisdom traditions based on meditation practices, such as some Buddhist traditions (Wallace, 2007). Therefore, the use of one language to communicate knowledge creates or reinforces inequalities by privileging a specific linguistic group to whom this knowledge is made accessible. However, also importantly, it affects the form of knowledge that is considered valid and legitimate.

2.2 | Legitimacy and validity

The linguistic bias related to the sources of the global biodiversity assessment reports can limit the science-policy legitimacy of such efforts by failing to take into consideration entire sections of the existing multilingual scientific literature on a subject, which could also reinforce the often-mentioned knowledge and data gaps especially in various regions and what this may imply in terms of misrepresentation of these regions (Amano, Lamming, et al., 2016; Asase et al., 2021; Conde et al., 2019). The linguistic bias related to the policy implications suggested on the basis of the scientific synthesis can create rigidity regarding the proposed options that governments and other actors may follow. It also runs the risk of undermining

transparency regarding the normative and ontological assumptions that underlie the key concepts and arguments on which the scientific reports are based. This rigidity could lead to limiting on-the-ground uptake of the main messages stemming from the reports because the categories and arguments used may make it more difficult to connect to diverse worldviews (Cash & Belloy, 2020, p. 3).

Translation is far from a solution to lack of multilingualism in conservation science. In fact, more help by native English speakers to translate articles and research conducted in other languages into English (Khelifa et al., 2021) would not solve the issue of legitimacy; instead, it would reinforce the illusion that English is the only and neutral lingua franca to share reliable knowledge. Indeed, translations eliminate a web of interpretations and sociocultural connotations pertaining to the former language, while simultaneously endorsing novel connotations from the language and sociocultural context it is translated into (Gadamer, 1975, p. 386, in Tomuletiu, 2012). A literal translation into any language, such as English, of texts and oral records from other languages and traditions can remain obscure to someone who does not have the basic interpretative and contextual skills to decipher the message. Likewise, scientific papers written in a dominant language such as English sometimes appear to scholars from other traditions as patches of statements made of untranslatable linguistic categories articulated with a limited logic, along with a scarcity of contextual information and a lack of self-analysis from the side of the writing scientists. Each knowledge tradition produces and communicates knowledge within specific forms and assumes that the consumers have the necessary primary knowledge to decipher the message and to fill up the explanatory gaps, and knows and shares the underlying implicit assumptions as well. Correspondingly, credibility standards also 'differ depending on the audience' (Cash & Belloy, 2020, p. 6). To access and understand knowledge produced in forms that fundamentally differ from how one has been trained and confined for decades requires enormous efforts and flexibility, be it for the scientists working in English, or for the expert Buddhist monk used to work in Sanskrit and Pali, and oral analysis and debates.

Power can be a double-edge sword in the issues of legitimacy and validity of knowledge. The most powerful—the agents who are in a globally privileged position in the knowledge-making for international environmental governance and discourses, in terms of funding and opportunities—could also become the most short-sighted. Indeed, researchers who have the power to impose their political belief that valid knowledge is exclusively published in their language risk becoming trapped in this belief and miss out on knowledge produced elsewhere. In contrast, many researchers from other linguistic backgrounds *also* read English, which allows them to synthesize wider bodies of literature and knowledge. Especially in the humanities, English is, to many scholars, their 3rd or 4th language, after several other more relevant vehicular languages in their discipline or tradition. To force English as the only valid language for global knowledge sharing and creation excludes the existing richness of knowledge, and thus bypasses other knowledge creation contexts. It also forces other traditions and scholars to try to fit into the frame of reasoning and knowledge making imposed by the

tradition that dominates English language, namely Anglo-Saxon and North American views regarding what constitutes valid knowledge, including specific (and not universal) beliefs in particular logic, argumentation, writing styles and so forth.

Validity is a key challenge, as each language, discipline and knowledge tradition comes with its own baggage and view on what valid knowledge consists of: the criteria and methods to validate knowledge can differ significantly in different knowledge systems or branches within a system (Schweitzer, 2006; Tengö et al., 2014, p. 583). Pohl and Wuelser (2019, p. 117) have also pointed out that members of a thought collective 'do not only share a specific way of perceiving an issue; they also share basic assumptions about, for instance, what the right concepts for describing an issue are or what makes arguments about the issue trustworthy'. Dynamics of exclusion of knowledge critical of the mainstream are also at play in environmental sciences in English, between and within disciplines. For instance, within the field of research tackling environmental harm and conflicts, distinct disciplines often hold divergent criteria regarding what knowledge is credible and what form is convincing, and the borders of what constitutes each discipline may vary depending on language (Goyes et al., 2022). As a result of the political dynamics of exclusion within science-policy research related to biodiversity, divergent understandings of a concept emerge and flourish inside echo chambers. This observation has a dual implication. It partly explains the reluctance by actors using a dominant language in science of taking other knowledge systems—or disciplines—seriously. It also implies that the knowledge and policy options produced within such a limited frame can appear untrustworthy to stakeholders and decision makers who live and make sense of the world within another frame, thus jeopardizing the implementation of policy options.

2.3 | Resistance to inclusion

Calls for linguistic inclusion are often met with resistance because these considerations challenge the epistemological and political legitimacy of the existing work and procedures by pointing out the limitations, hence questions established power asymmetries. Nevertheless, epistemic hygiene requires reflexivity and the inclusion of external criticisms. Dominant science and policy actors such as intergovernmental and governmental agencies as well as international organizations can be reluctant to do this because (1) they are in a position of power and thus they do not *need* to question their own views (on the contrary to the one who criticizes, who often carry the burden of proof and must justify their criticism carefully); (2) to address criticisms openly risks giving them more traction, which could threaten the public image of the more powerful actors; and (3) a threat to their reputation can be later used by other groups to question the legitimacy of the institutions in which the science-policy brokerage is done. As a result, powerful actors tend to accept challenges only within the frame they prepared beforehand (e.g. closed-ended questionnaires) (Oubenal et al., 2017), from people they internally selected, on the mandate they predefined,

which allows them to keep control over the outcome, the messages, and the wording of the criticisms (point 2), while claiming to be self-reflective and inclusive, and minimizing the threat to their reputation.

The linguistic bias adds a layer of complexity to the power dynamics deeply rooted in the peer-review system of the 'Western' academia, as it leaves non-English publications, criticisms and debates simply off the radar (Hunter et al., 2021, p. 217). Translating or writing works from other languages and traditions into English would make these works *visible* to the readers of English, but it does not guarantee that these works will be considered seriously and included. Powerful actors at the science-policy interface can *deliberately* resist including divergent views in order to maintain the status quo in their favour. In this sense, resistance to inclusion does not—only—result from linguistic and disciplinary barriers and well-intentioned ignorance.

2.4 | Knowledge coproduction

The literature on knowledge coproduction already identified limitations related to the power dynamics at play in the knowledge production processes, with the objective of producing outputs useful—salient, credible and legitimate (Cash et al., 2003; Meadow et al., 2015)—to powerful decision makers, including at the environmental science-policy interfaces (Reyers et al., 2015). Decision makers are strongly embedded in local worldviews and restrained by politico-institutional and sociocultural factors, including language. So are the researchers and the knowledge they 'produce', which, far from being neutral, is 'enmeshed with politics and power' (Brugnach & Özerol, 2019; Hakkarainen et al., 2020). Recognizing these limitations, the literature on knowledge coproduction recommends generating actionable knowledge by negotiating with partners, through participatory, interactive, recursive or iterative processes between scientists and other groups, such as decision makers (Cash et al., 2003), stakeholders (van der Molen, 2018), indigenous people (Fazey et al., 2013) and students (Athakkakath et al., 2015). These partners can be 'aligned' or 'non-aligned', that is, with diverging sets of norms and interests in tension and lack of agreement on the problem definition (Marin et al., 2016). Diverse participatory strategies are used (Meadow et al., 2015), such as giving participants the opportunity to vote on suggestions of problem framing and solutions (Kruk et al., 2017), or offering the possibility to contribute in other forms than English-language texts, such as storytelling and other art forms (e.g. IPBES value assessment calls for contributions in 2020).

These considerations are particularly relevant for research on the relations between people and nature. The literature on knowledge coproduction has shed light on how the diverse technoscientific framings of humans and nature are coproduced through relationships of power in a socio-political (e.g. Jasanoff, 2004; Pickett et al., 2021; Smith & Dressler, 2017; Swedlow, 2012)—and we may add, linguistic—context of power relationships. Consequently, scientists need to be aware not to force 'foreign' concepts into their

own linguistic classifications, so that knowledge coming from 'other' groups and traditions is accurately represented and used (Steger et al., 2020). Beyond the disrespect it may represent, failure of doing so would risk losing the epistemological richness that comes along linguistic diversity. Indeed, while it is recognized (Tengö et al., 2014) that 'separating knowledge from its local, cultural, and epistemological context can involve significant risks for indigenous peoples and local communities' (Agrawal, 2002), the reverse is rarely addressed: Separating so-called scientific knowledge from its cultural and epistemological context also involves significant risks. On the one hand, it risks imposing this dominant knowledge as the only neutral, true and valid one on other contexts, which leads to a failure to implement efficient solutions (Brugnach et al., 2021; Ingram, 2013; van der Molen, 2018). On the other hand, it also risks ignoring its own limitations and biases, therefore remaining trapped inside its own silo. In this sense, it is not a matter of 'integrating' other knowledge systems inside the boxes created in the name of inclusion within the dominant framework (Dewulf et al., 2008); instead, it is a matter of zooming out of one's view and learning to see from other lenses.

3 | TOWARDS AN INTERCULTURAL AND MULTILINGUAL COPRODUCTION OF POLICY RELEVANT BIODIVERSITY SCIENCE

Here, we present a set of five options for action that, conjointly, may help unleash the richness of a multilingual and intercultural approach in environmental science and policy as well as increase the uptake of science-policy interfaces' works in diverse cultural contexts. Each option is illustrated with an example that deals with the practice of multilingualism in biodiversity science for conservation policy and practice.

3.1 | Include and collaborate with researchers from 'other' linguistic contexts

Most scientific research is conducted by teams, so it is not far-fetched to argue that research regarding how different human groups or human views interpret, value and act regarding the natural world should unfold team effort to encompass diverse linguistic spheres. If a team includes researchers who know more language than the within-team vehicular language, knowledge from several linguistic spheres could be included within the new common coproduced knowledge. For example, the research on the diversity of conceptualizations of 'nature' in 12 East and South-East Asian languages (Droz et al., 2022) was made possible thanks to the involvement of a dozen native or local experts working in environmental humanities from different countries and traditions. Each conducted a literature review in their own language(s) and reached out to other experts within their own linguistic traditions. Results were compared and discussed through multilingual discussions mainly in English, Japanese and Chinese during three online workshop sessions and a series of bilateral interactions.

Online networking tools make this type of methodology accessible and low-cost. Collaboration with researchers actively working in other languages considerably broadens the scope of the possible literature reviewed while not significantly increasing the costs or time that would be necessary for external researchers to get familiar with the literature and research conducted within a language foreign to them. Multilingual and multicultural collaboration can quickly and efficiently reduce the silo and echo-chamber effects and contribute to accelerating global sciences by reducing delays in the transmission of novel insights, data and findings.

In practice, multilingual communication and collaboration might also be unintentionally affected by power dynamics (e.g. who interacts with whom, who is listened to, whose knowledge is used), cultural differences regarding norms of self-expression and discussions within a group (e.g. openly expressing disagreement with an elder is considered disrespectful and impolite in many cultures), and by the institutions in place (e.g. norms and rules that guide the way discussion and decision-making procedures are designed and followed). These three aspects are part of culture, and they are also inseparable from the languages used. For instance, the very structure of some languages constrains speakers to use hierarchical politeness forms and indirect modes of expressions. This complexity underlying the use of language influences the content co-produced by multilingual knowledge coproduction processes. While face-to-face engagement and embodied shared experiences have been shown to facilitate collaborative action (Feldman et al., 2006), online or hybrid approaches for interaction can also have their advantages for multilingual collaboration, as they could allow the usage of automatic subtitles, automatic translations, recordings, the rapid usage of dictionaries by participants, and written chat exchanges with mediators and other participants to directly confirm linguistic doubts when they emerge without interrupting the flow of the discussion. Other process-oriented guidance for multilingual communication may include for instance altering the group composition or fragmenting it into sub-groups with different vehicular languages; training and actively reminding native speakers to be mindful of others and perhaps—counterintuitively—avoiding placing native speakers in their mother tongue's group, as this could create a linguistic imbalance with other non-native participants; taking the time to explicitly agree on shared norms of interactions with people having different levels of command and nuanced knowledge of other participants' languages at the beginning of meetings; and the creation of safe spaces by collaborative leaders who actively listen to participants' concerns individually prior to and after the meetings, especially with respect to potential cultural and linguistic biases (Brugnach & Ingram, 2012; Vansina, 2008).

3.2 | Conduct multilingual literature reviews when the study area covers regions where a single language is not dominant

Studies that attempt to be global in scope or to draw universalizing implications should be supported by syntheses that include

literature in as many languages as possible. Additionally, studies and reports that aim at covering regions where English is not the main language—namely, the vast majority of the world—should include other relevant main languages into the literature review (Nuñez & Amano, 2021). Given that research of this scope are conducted by teams, that many researchers are multilingual, and that including 'local' researchers in teams has already been recognized as desirable (Haelewaters et al., 2021), this seems manageable. Researchers who synthesize the literature in another language could also be mobilized as parts of teams to conduct the primary literature reviews. Such 'bridge people' or 'boundary organizations' (Colavito et al., 2019; Meadow et al., 2015) should not be mistaken for 'representatives'. They do not represent, they help different groups understand each other. When conducting literature reviews, as well as when evaluating research project proposals and reviewing articles, it is also crucial to distinguish linguistic skills from scientific quality (Amano, Rojas, et al., 2021). Multilingual and multidisciplinary literature reviews would better unveil important discrepancies between disciplines and languages on a same issue. For example, a multilingual and multidisciplinary literature review on the idea of 'anthropocentrism' showed that, despite the word benefiting from self-explanatory mirror translations and being used as a keyword in several high-level environmental governance documents, the concept is used to argue for or against different views depending on the language *and* on the discipline: as a non-animist cultural view that excludes life and spirits from the socio-political concerns in Japanese; in contrast with 'intrinsic values' in English; in contrast to theocentric historical views in French; to defend a legal shift towards the rights of *Madre Tierra* in Spanish; or to defend animal rights in German (Droz, 2022).

3.3 | Adopt a transparent and flexible vocabulary open to other terminologies and narratives

The assumptions behind the keywords that are regularly used in research should be questioned and made explicit and transparent. Ambiguity could offer a space for dialogue (Brugnach & Ingram, 2012), as long as it does not serve the dominant view to sweep under the carpet normative assumptions. Transparency includes indicating what the normative components are, what ontological background is assumed and what 'facts' people agree upon. Conducting this questioning through dialogues in various vehicular languages could help to highlight the limitations of the concepts thanks to the subtleties revealed by the process of translation. In this sense, translating scientific terms in various languages (Amano, Rojas, et al., 2021) would not only contribute to the uptake of papers that use these keywords but also to disambiguating the terms. Ambiguity emerges when there exist simultaneously multiple valid framings of an issue (Brugnach & Ingram, 2012, p. 61), which is unavoidable in global environmental governance. As any language conveys its own framing and connotations, every translation carries ambiguities. The difficulty of synthesis, translation and comprehension across linguistic framings probably contributed to the

fact that the dominant framing in biodiversity science remains highly technical. In turn, technical solutions become taken for granted and adopted without questioning the political context and sociocultural specificities. Water management constitutes a good example as the field tends to be dominated by expert voices and technical solutions (Conca, 2005), despite calls for integrating more diverse framings and for tackling biases linked to the interrelations between power and knowledge (Brugnach et al., 2017). Transboundary issues in water governance such as international risk management in the Lower Mekong Basin (Lan, 2021) highlight the need to work on an inclusive and transparent multilingual vocabulary to serve as a solid basis for discussions when linguistic and sociocultural worlds collide in the quest for a common sustainable use of a necessary resource like water.

3.4 | Rally environmental humanities scholars from the traditions relevant to the study area

Humanities—understood as not restricted to disciplines and methodology generally accepted in Western academia but also including other wisdom traditions such as Buddhist schools and unwritten traditions and practices—have a strong methodological experience in interpreting and translating texts and views (Berghaller et al., 2014). This hermeneutic knowledge can be applied to environmental questions, mainly to present-day environmental issues and knowledge making. Humanities also include political sciences, political philosophy, anthropology and so forth that have thoughtfully analysed the mechanisms of domination and conceptual domination from different viewpoints in diverse knowledge contexts. Research on religions can also contribute to identifying the limits and risks of eco-dogmatism and radicalization. For example, in climate-change research, there have been calls to use storytelling and narrative in order to provide a different set of data and voices and let researchers inquire differently (Moezzi et al., 2017, p. 7). Stories tend to be oriented to relationships, have a deep emotional and cultural component, and often bind together human and nonhuman factors across scales with intimate experiences and agency. Stories have the potential to engage and convince people, which is essential to make the work of climate and biodiversity science-policy interfaces more impactful to the wider society. Taking stories seriously could also be a way to tap into the creative potential of multilingualism as they might surface common insights, beliefs and perspectives that tend to be excluded from the 'scientific' processes (Ingram et al., 2019).

3.5 | Provide translations, but beware: Traduttore, traditore

As pragmatically translations cannot be avoided, they must be handled with caution. Beware of the assumption that translations give faithful and transparent access to the original message. Multilingualism is crucial precisely because languages are not neutral technical tools; they include different ways of arguing, different ways

of judging what is valid knowledge and methodology and so forth (Larsen et al., 2018). Translation does not mean that the translated text reflects the original truthfully. Translation is already a bridge and an interpretation. This is another reason for scholars and experts regarding the original text to be included in teams in order to avoid misinterpretations of the translated data. The non-straightforward aspect of translation particularly matters when it comes to policy-making. An example in point is the existence of terminological differences between the equally valid versions in each official language of the Swiss Constitution (German, French, Italian and Romansh). Article 120 of the Swiss Constitution on non-human gene technology refers to the dignity of creatures in German, Italian and Romansh (*der Würde der Kreatur; la dignità della creatura; la dignidad da las creatiras*), to the integrity of living organisms in French (*l'intégrité des organismes vivants*), and to the dignity of living beings in the translated (non-valid) English text (Engi, 2015). Although these differences probably do not have a significant impact in the implementation—as the text constitutes a general program which is further specified in other sets of laws and rulings they still reflect significant discrepancies in legal, ethical, religious and linguistic connotations and inclinations within a relatively small country that has a long history of practice of multilingualism. At the global level, we can expect such divergences to be much greater. This highlights the necessity to pay close attention to multilingualism in the sources and processes at the science-policy interfaces that support high-level environmental governance.

Bridges are to be built from both sides of the river. It is as important for scholars writing in English to make summaries of their work available in other languages (Steigerwald et al., 2022) as it is for research published in languages other than English. Native languages used in the study area should be prioritized, followed by bridge languages most relevant to the area at stake, for example, Spanish and Portuguese for the Latin Americas; French, Arabic and Swahili for a major part of Africa; Chinese, Japanese, and Indonesian for the respective regions; etc. These languages are already *lingua franca*, that is, vehicular or bridge languages used as second (or third or more) languages to make communication possible between groups of people who do not share a native language. Finally, authors participating in the research could pragmatically provide summaries in all their languages, especially in their native language, and journals could be expected to provide space and flexibility for accommodating the publication of these versions. Different geographical regions and disciplines have developed ways of dealing with multilingualism in research. Several preprint servers (e.g. EcoEvoRxiv) and journals already show the way by publishing summaries for each paper in multiple languages, while some offer tools to provide machine-generated translations of keywords and manuscripts (e.g. panlingua.rxiv.org). Many journals and researchers (Kulczycki et al., 2020) in the humanities and social sciences take a multilingual approach and publish summaries or complete articles in several languages most relevant to their domain.¹ In East Asia, it is common practice to publish the summaries and titles of papers in the 'other' language, for instance, the summaries in Japanese or Chinese for a paper published in English, which are then collected in university or national bilingual databases.

4 | RECOMMENDATIONS FOR BIODIVERSITY SCIENCE-POLICY PLATFORMS

These five points apply to biodiversity science for policy, especially when aiming at being efficient and relevant globally. The need for multilingualism at the science-policy interface is even more urgent for high-level environmental governance, especially for intergovernmental organizations such as IPBES, whose mandate is often global in scope. Regarding high-level environmental governance, the United Nations recognizes six 'UN languages' (Arabic, Chinese, English, French, Russian and Spanish), in which any delegation can express itself orally or by writing. Yet, in practice, most high-level biodiversity science-policy governance documents are drafted in English, and then translated into other languages, often with a substantial delay that can reach up to several years. Translations can also be highly technical, which often makes them difficult to understand to a native speaker who is not familiar with the original text and English grammar and concepts. The communication teams of most high-level environmental bodies are also organized around English, if not exclusively working in English with materials in other languages provided through external translators when absolutely required by the procedural mandate of the organization.

Collaboration between communication teams is also discussed and drafted in English. The hashtag #ForNature—which accounted over 400,000 interactions on social media platforms (Twitter, Facebook and Instagram) in the week of 30 June–6 July 2021—is an example of such a collaborative campaign, which was translated into the six UN languages during a second phase and remain mostly used in English, including when the main text is in another language. This accounts for the pragmatic desire to have a rallying cry across languages, platforms and institutions, which can be easily trackable and monitored. It echoes the aforementioned tension between the pragmatic need for common vocabulary for collective action, and the limitations of the convincing power of discourses that 'feel unnatural', 'disconnected' from and 'imposed' on other linguistic and cultural worldviews. Nevertheless, there are encouraging signs for more linguistically inclusive global science-policy interfaces. For example, IPBES called in 2020 for indigenous and local knowledge stakeholders to contribute to three biodiversity assessments constitutes a tentative to increase inclusivity, as contributors were invited, in six UN languages, to send songs, drawings, artworks and so forth related to the sustainable use of wild species, values of nature, and invasive alien species.² Environmental humanities scholars have a key role to play in bridging the methodological rifts in this enterprise.

5 | CONCLUSION

The global science-policy interfaces on biodiversity and environmental issues suffer from a linguistic bias in favour of English that erodes the uptake of proposed solutions to the sustainability crisis. Unless the linguistic bias and the related issues in terms of

legitimacy, resistance to inclusion, knowledge coproduction are addressed head on, biodiversity and environmental sciences and their policy implications will necessarily limit the solutions to the biodiversity loss and climate change. The lack of linguistic pluralism in the sources and processes of environmental reports leads to knowledge available in other languages being ignored—which undermines their scientific legitimacy—and to the policy implications drawn from this monolingual partial body of knowledge lacking traction in most of the world for failure to consider the diversity of local sociocultural contexts, namely, diminished political legitimacy. Yet, facing the urgency to make informed decisions and take actions to tackle the global environmental crisis, instead of waiting for a perfect solution grounded on 'valid' sciences, we might want to prioritize credible knowledge and cultural framings that are 'good enough' for policies to get through and to gather wide social, political and economic support. In this quest, languages, cultures, rhetoric and discourses play a pivotal role in convincing people across sectors.

It is crucial not to forget that the target users for environmental knowledge and policies are human individuals and groups that make sense of themselves, their practices and the world within diverse linguistic and cultural webs. Language intimately affects the way people make sense of reality, and frames the actions they can envision and take, as well as the normative directions they can assess and choose. This 'human' component in environmental knowledge is not to be underestimated. Simultaneously, different views—understood as an argument based on/leading to normative judgements—can be hidden behind an apparently similar conceptual building block, such as abstract constructs like 'nature' or 'anthropocentrism'. Plural linguistic perspectives are needed precisely because they are opening the ways of framing and making sense of ourselves and of our relation to the natural world.

The global environmental science-policy interfaces urgently need to break out of the silo mentality and engage in multilingualism in the sources and processes. This will require interdisciplinarity especially with cross-cultural environmental humanities, open collaboration with traditions and knowledge systems typically 'outside' the English-language academia, and to bring on board scholars who have been rigorously investigating humans and the natural world, but whose rich insights the international community has missed for lack of linguistic inclusiveness.

AUTHOR CONTRIBUTIONS

Laÿna Droz, Marcela Brugnach and Unai Pascual conceived the ideas and argument. Laÿna Droz led the writing of the manuscript. All authors contributed critically to the drafts and gave final approval for publication.

ACKNOWLEDGEMENTS

This research was partially funded by Swiss National Science Foundation Grant No. P2SKP1_194948, and by Maria de Maeztu excellence accreditation 2023-2026 (Ref. CEX2021-001201-M), funded by MCIN/AEI/10.13039/501100011033.

CONFLICT OF INTEREST STATEMENT

As a disclaimer, Unai Pascual served as a co-chair and author to several IPBES assessments, Marcela Brugnach and Laïna Droz have acted as IPBES reviewers, and Laïna Droz worked in the communication team of the IPBES secretariat (2017–2018, 2020–2021).

DATA AVAILABILITY STATEMENT

This manuscript does not include any data.

ORCID

Laïna Droz  <https://orcid.org/0000-0003-3138-9197>

Marcela Brugnach  <https://orcid.org/0000-0001-8522-8650>

Unai Pascual  <https://orcid.org/0000-0002-5696-236X>

ENDNOTES

¹ Examples of multilingual journals include: *Communicar* (sciences of communication and education: Spanish, English, Portuguese, Russian, Chinese), *Filosofia* (humanities: Spanish, Portuguese, French, German, English, Italian), *AAG* (geography: English, Spanish, Chinese), *Social Compass* (religion: French, English; Spanish, Italian, Portuguese and Russian).

² <https://ipbes.net/ilk-global-survey>

REFERENCES

- Agrawal, A. (2002). Indigenous knowledge and the politics of classification. *International Social Science Journal*, 54(173), 287–297. <https://doi.org/10.1111/1468-2451.00382>
- Allan, K. (2007). The pragmatics of connotation. *Journal of Pragmatics*, 39(6), 1047–1057. <https://doi.org/10.1016/j.pragma.2006.08.004>
- Amano, T., Berdejo-Espinola, V., Christie, A. P., Willott, K., Akasaka, M., Báldi, A., Berthinus, A., Bertolino, S., Bladon, A. J., Chen, M., Choi, C.-Y., Bou Dagher Kharrat, M., de Oliveira, L. G., Farhat, P., Golivets, M., Hidalgo Aranzamendi, N., Jantke, K., Kajzer-Bonk, J., Kemahlı Aytekin, M. Ç., ... Sutherland, W. J. (2021). Tapping into non-English-language science for the conservation of global biodiversity. *PLoS Biology*, 19(10), e3001296. <https://doi.org/10.1371/journal.pbio.3001296>
- Amano, T., González-Varo, J. P., & Sutherland, W. J. (2016). Languages are still a major barrier to global science. *PLoS Biology*, 14(12), e2000933. <https://doi.org/10.1371/journal.pbio.2000933>
- Amano, T., Lamming, J. D. L., & Sutherland, W. J. (2016). Spatial gaps in global biodiversity information and the role of citizen science. *BioScience*, 66(5), 393–400. <https://doi.org/10.1093/biosci/biw022>
- Amano, T., Rojas, C. R., Yap Boum, I. I., Calvo, M., & Misra, B. (2021). Ten tips for overcoming language barriers in science. *Nature Human Behaviour*, 5(July), 1–8. <https://doi.org/10.1038/s41562-021-01137-1>
- Anderson, C. B., Athayde, S., Raymond, C. M., Vatn, A., Arias-Arévalo, P., Gould, R. K., Kenter, J., Muraca, B., Sachdeva, S., Samakov, A., Zent, E., Lenzi, D., Murali, R., Amin, A., & Cantú-Fernández, M. (2022). Chapter 2. Conceptualizing the diverse values of nature and their contributions to people. *Zenodo*, <https://doi.org/10.5281/zenodo.6633760>
- Asase, A., Mzumara-Gawa, T. I., Owino, J. O., Peterson, A. T., & Saupe, E. (2021). Replacing 'parachute science' with 'global science' in ecology and conservation biology. *Conservation Science and Practice*, 4, e517. <https://doi.org/10.1111/csp2.517>
- Athakkakath, M., Al-Maskari, A., & Kumudha, A. (2015). *Coproduction of knowledge: A literature review and synthesis for a University Paradigm*. <https://www.semanticscholar.org/paper/Coproduction-of-Knowl>
- edge-%3A-A-Literature-Review-and-Athakkakath-Al-Maskari/4057ea2916c4f5076e48c34b0d096e3f98a48bb4
- Báldi, A., & Palotás, B. (2021). How to diminish the geographical bias in IPBES and related science? *Conservation Letters*, 14(1), e12786. <https://doi.org/10.1111/cons.12786>
- Berghaller, H., Emmett, R., Johns-Putra, A., Kneitz, A., Lidström, S., McCorristine, S., Ramos, I. P., Phillips, D., Rigby, K., & Robin, L. (2014). Mapping common ground: Ecocriticism, environmental history, and the environmental humanities. *Environmental Humanities*, 5(1), 261–276. <https://doi.org/10.1215/22011919-3615505>
- Boroditsky, L. (2001). Does language shape thought?: Mandarin and English speakers' conceptions of time. *Cognitive Psychology*, 43(1), 1–22. <https://doi.org/10.1006/cogp.2001.0748>
- Brugnach, M., Craps, M., & Dewulf, A. (2017). Including indigenous peoples in climate change mitigation: Addressing issues of scale, knowledge and power. *Climatic Change*, 140(1), 19–32. <https://doi.org/10.1007/s10584-014-1280-3>
- Brugnach, M., & Ingram, H. (2012). Ambiguity: The challenge of knowing and deciding together. *Environmental Science & Policy*, 15(1), 60–71. <https://doi.org/10.1016/j.envsci.2011.10.005>
- Brugnach, M., de Waard, S., Dubois, D., & Farolfi, S. (2021). Relational quality and uncertainty in common pool water management: An exploratory lab experiment. *Scientific Reports*, 11(1), 15188. <https://doi.org/10.1038/s41598-021-94517-6>
- Brugnach, M., & Özerol, G. (2019). Knowledge co-production and transdisciplinarity: Opening Pandora's box. *Water*, 11(10), 1997. <https://doi.org/10.3390/w11101997>
- Bashir, S., & Batool, F. (2017). English as a medium of instruction in Punjab: The 2009 experiment. *Lahore Journal of Policy Studies*, 7(1), 13–45.
- Cash, D. W., & Belloy, P. G. (2020). Salience, credibility and legitimacy in a rapidly shifting world of knowledge and action. *Sustainability*, 12(18), 7376. <https://doi.org/10.3390/su12187376>
- Cash, D. W., Clark, W. C., Alcock, F., Dickson, N. M., Eckley, N., Guston, D. H., Jäger, J., & Mitchell, R. B. (2003). Knowledge systems for sustainable development. *Proceedings of the National Academy of Sciences of the United States of America*, 100(14), 8086–8091.
- Clark, A. (2015). What 'extended me' knows. *Synthese*, 192(11), 3757–3775. <https://doi.org/10.1007/s11229-015-0719-z>
- Colavito, M. M., Trainor, S. F., Kettle, N. P., & York, A. (2019). Making the transition from science delivery to knowledge coproduction in boundary spanning: A case study of the Alaska fire science consortium. *Weather, Climate, and Society*, 11(4), 917–934. <https://doi.org/10.1175/WCAS-D-19-0009.1>
- Conca, K. (2005). *Governing water: Contentious transnational politics and global institution building. Global environmental accord: Strategies for sustainability and institutional innovation*. MIT Press.
- Conde, D. A., Staerk, J., Colchero, F., da Silva, R., Jonas Schöley, H., Baden, M., Juvet, L., Fa, J. E., Syed, H., Jongejans, E., Meiri, S., Gaillard, J.-M., Chamberlain, S., Wilcken, J., Jones, O. R., Dahlgren, J. P., Steiner, U. K., Bland, L. M., Gomez-Mestre, I., ... Vaupel, J. W. (2019). Data gaps and opportunities for comparative and conservation biology. *Proceedings of the National Academy of Sciences of the United States of America*, 116(19), 9658–9664. <https://doi.org/10.1073/pnas.1816367116>
- Coscieme, L., da Silva Hyldmo, H., Fernández-Llamazares, Á., Palomo, I., Mwampamba, T. H., Selomane, O., Sitas, N., Jaureguiberry, P., Takahashi, Y., Lim, M., Barral, M. P., Farinaci, J. S., Diaz-José, J., Ghosh, S., Ojino, J., Alassaf, A., Baatuwwe, B. N., Balint, L., Basher, Z., ... Valle, M. (2020). Multiple conceptualizations of nature are key to inclusivity and legitimacy in global environmental governance. *Environmental Science & Policy*, 104(Febuary), 36–42. <https://doi.org/10.1016/j.envsci.2019.10.018>
- Costa, A., Foucart, A., Arnon, I., Aparici, M., & Apesteguía, J. (2014). 'Piensa' twice: On the foreign language effect in decision making. *Cognition*, 130(2), 236–254. <https://doi.org/10.1016/j.cognition.2013.11.010>

- Dewulf, A., Francois, G., Hovelynck, J., & Taillieu, T. (2008). *Integrating knowledge across disciplines. Experiences from the NeWater Project*. January.
- Díaz-Reviriego, I., Turnhout, E., & Beck, S. (2019). Participation and inclusiveness in the intergovernmental science-policy platform on biodiversity and ecosystem services. *Nature Sustainability*, 2(6), 457–464. <https://doi.org/10.1038/s41893-019-0290-6>
- Droz, L. (2022). Anthropocentrism, the scapegoat of the environmental crisis: A review. *Ethics in Science and Environmental Politics*, 22, 25–49.
- Droz, L., Chen, H.-M., Chu, H.-T., Fajrini, R., Imbong, J., Jannel, R., Komatsubara, O., Lagasca-Hiloma, C. M. A., Meas, C., Nguyen, D. H., Sherpa, T. O., Tun, S., & Undrakh, B. (2022). Exploring the diversity of conceptualizations of nature in east and South-East Asia. *Humanities and Social Sciences Communications*, 9, 186. <https://doi.org/10.1057/s41599-022-01186-5>
- Engi, L. (2015). *Was verbietet die Würde der Kreatur?: zu den praktischen Konsequenzen der Verfassungsnorm*. Schulthess Verlag. <http://www.deutsche-digitale-bibliothek.de/item/XSCKFPQFNS3ZBCWXO7AEOSE7M43224OZ>
- Fazey, I., Evely, A. C., Reed, M. S., Stringer, L. C., Kruijssen, J., White, P. C. L., Newsham, A., Jin, L., Cortazzi, M., & Phillipson, J. (2013). Knowledge exchange: A review and research agenda for environmental management. *Environmental Conservation*, 40(1), 19–36. <https://doi.org/10.1017/S037689291200029X>
- Feldman, M. S., Khademian, A. M., Ingram, H., & Schneider, A. S. (2006). Ways of knowing and inclusive management practices. *Public Administration Review*, 66(s1), 89–99. <https://doi.org/10.1111/j.1540-6210.2006.00669.x>
- Gadamer, H.-G. (1975). *Truth and method*. Seabury Press.
- Gates, H. L. (1991). Critical Fanonism. *Critical Inquiry*, 17(3), 457–470. <https://doi.org/10.1086/448592>
- Goyes, D. R., Komatsubara, O., Droz, L., & Wyatt, T. (2022). Green criminological dialogues: Voices from Asia. *International Journal for Crime, Justice and Social Democracy*, 11(1). <https://doi.org/10.5204/ijcsd.2108>
- Haelwaters, D., Hofmann, T. A., & Romero-Olivares, A. L. (2021). Ten simple rules for global North researchers to stop perpetuating helicopter research in the global south. *PLoS Computational Biology*, 17(8), e1009277. <https://doi.org/10.1371/journal.pcbi.1009277>
- Hakkarainen, V., Anderson, C. B., Eriksson, M., van Riper, C. J., Horcea-Milcu, A., & Raymond, C. M. (2020). Grounding IPBES experts' views on the multiple values of nature in epistemology, knowledge and collaborative science. *Environmental Science & Policy*, 105(March), 11–18. <https://doi.org/10.1016/j.envsci.2019.12.003>
- Hammel, R. E. (2013). L'anglais, Langue Unique Pour Les Sciences? Le Rôle Des Modèles Plurilingues Dans La Recherche, La Communication Scientifique et l'enseignement Supérieur. *Synergies Europe*, 8, 53–66.
- Hulme, M. (2010). Problems with making and governing global kind of knowledge. *Global Environmental Change*, 20, 558–564.
- Hunter, N. B., North, M. A., & Slotow, R. (2021). The marginalisation of voice in the fight against climate change: The case of Lusophone Africa. *Environmental Science & Policy*, 120(June), 213–221. <https://doi.org/10.1016/j.envsci.2021.03.012>
- Inglis, D., & Pascual, U. (2021). On the links between nature's values and language. *People and Nature*. <https://doi.org/10.1002/pan3.10205>
- Ingram, H. (2013). No universal remedies: Design for contexts. *Water International*, 38(1), 6–11. <https://doi.org/10.1080/02508060.2012.739076>
- Ingram, M., Ingram, H., & Lejano, R. (2019). Environmental action in the Anthropocene: The power of narrative-networks. *Journal of Environmental Policy & Planning*, 21(5), 492–503. <https://doi.org/10.1080/1523908X.2015.1113513>
- IPBES. (2022a). Chapter 2. Conceptualizing the diverse values of nature and their contributions to people. In P. Balvanera, U. Pascual, M. Christie, B. Baptiste, & D. González-Jiménez (Eds.), *Methodological assessment of the diverse values and valuation of nature of the intergovernmental science-policy platform on biodiversity and ecosystem services*. IPBES.
- IPBES. (2022b). Summary for policymakers of the methodological assessment of the diverse values and valuation of nature of the intergovernmental science-policy platform on biodiversity and ecosystem services (IPBES). *Zenodo*, <https://doi.org/10.5281/zenodo.6832427>
- Jasanoff, S. (2004). *States of knowledge: The Co-production of science and social order*. Routledge.
- Kay, P., & Kempton, W. (1984). What is the Sapir-Whorf hypothesis? *American Anthropologist*, 86(1), 65–79. <https://doi.org/10.1525/aa.1984.86.1.02a00050>
- Keysar, B., Hayakawa, S. L., & An, S. G. (2012). The foreign-language effect: Thinking in a foreign tongue reduces decision biases. *Psychological Science*, 23(6), 661–668. <https://doi.org/10.1177/0956797611432178>
- Khelifa, R., Amano, T., & Nuñez, M. A. (2021). A solution for breaking the language barrier. *Trends in Ecology & Evolution*, 37, 109–112. <https://doi.org/10.1016/j.tree.2021.11.003>
- Klemfuss, N., Prinzmetal, W., & Ivry, R. B. (2012). How does language change perception: A cautionary note. *Frontiers in Psychology*, 3(March), 78. <https://doi.org/10.3389/fpsyg.2012.00078>
- Klütsch, C. F. C., & Ferreira, C. C. (2021). Closing the gap between knowledge and implementation in conservation science: Concluding remarks. In C. C. Ferreira & C. F. C. Klütsch (Eds.), *Closing the knowledge-implementation gap in conservation science: Interdisciplinary evidence transfer across sectors and spatiotemporal scales* (pp. 457–473). Springer International Publishing. https://doi.org/10.1007/978-3-030-81085-6_15
- Kruk, M. C., Parker, B., Marra, J. J., Werner, K., Heim, R., Vose, R., & Malsale, P. (2017). Engaging with users of climate information and the coproduction of knowledge. *Weather, Climate, and Society*, 9(4), 839–849. <https://doi.org/10.1175/WCAS-D-16-0127.1>
- Kulczycki, E., Guns, R., Pölonen, J., Engels, T. C. E., Rozkosz, E. A., Zuccala, A. A., Bruun, K., Eskola, O., Starčić, A. I., Petr, M., & Sivertsen, G. (2020). Multilingual publishing in the social sciences and humanities: A seven-country European study. *Journal of the Association for Information Science and Technology*, 71(11), 1371–1385. <https://doi.org/10.1002/asi.24336>
- Lan, N. P. (2021). A risk-based multi-criteria decision analysis approach to evaluating transboundary water development—The case of lower Mekong River basin. *Journal of Environmental Protection*, 12(5), 345–370. <https://doi.org/10.4236/jep.2021.125022>
- Laursen, S., Puniwai, N., Genz, A. S., Nash, S. A. B., Canale, L. K., & Ziegler-Chong, S. (2018). Collaboration across worldviews: Managers and scientists on Hawai'i Island utilize knowledge coproduction to facilitate climate change adaptation. *Environmental Management*, 62(4), 619–630. <https://doi.org/10.1007/s00267-018-1069-7>
- Lynch, A. J., Fernández-Llamazares, Á., Palomo, I., Jaureguiberry, P., Amano, T., Basher, Z., Lim, M., Mwampamba, T. H., Samakov, A., & Selomane, O. (2021). Culturally diverse expert teams have yet to bring comprehensive linguistic diversity to intergovernmental ecosystem assessments. *One Earth*, 4(2), 269–278. <https://doi.org/10.1016/j.oneear.2021.01.002>
- Marin, A., Ely, A., & van Zwanenberg, P. (2016). Co-design with aligned and non-aligned knowledge partners: Implications for research and coproduction of sustainable food systems. *Current Opinion in Environmental Sustainability*, 20(June), 93–98. <https://doi.org/10.1016/j.cosust.2016.09.003>
- Meadow, A. M., Ferguson, D. B., Guido, Z., Horangic, A., Owen, G., & Wall, T. (2015). Moving toward the deliberate coproduction of climate science knowledge. *Weather, Climate, and Society*, 7(2), 179–191. <https://doi.org/10.1175/WCAS-D-14-00050.1>
- Meneghini, R., & Packer, A. (2007). Is there science beyond English? *EMBO Reports*, 8(2), 112–116. <https://doi.org/10.1038/sj.embor.7400906>

- Moezzi, M., Janda, K. B., & Rotmann, S. (2017). Using stories, narratives, and storytelling in energy and climate change research. *Energy Research & Social Science*, 31(September), 1–10. <https://doi.org/10.1016/j.erss.2017.06.034>
- Neuliep, J. W. (2017). Sapir-Whorf hypothesis. In *The international encyclopedia of intercultural communication* (pp. 1–5). American Cancer Society. <https://doi.org/10.1002/9781118783665.ieicc0111>
- Núñez, M. A., & Amano, T. (2021). Monolingual searches can limit and bias results in global literature reviews. *Nature Ecology & Evolution*, 5(3), 264. <https://doi.org/10.1038/s41559-020-01369-w>
- Obermeister, N. (2019). Local knowledge, global ambitions: IPBES and the advent of multi-scale models and scenarios. *Sustainability Science*, 14(3), 843–856. <https://doi.org/10.1007/s11625-018-0616-8>
- Oubenal, M., Hrabanski, M., & Pesche, D. (2017). IPBES, an inclusive institution? Challenging the integration of stakeholders in a science-policy Interface. *Ecology and Society*, 22(1). <https://www.jstor.org/stable/26270054>
- Pascual, U., Adams, W. M., Díaz, S., Lele, S., Mace, G. M., & Turnhout, E. (2021). *Biodiversity and the challenge of pluralism* (Vol. 4, pp. 567–572). Nature Sustainability. <https://doi.org/10.1038/s41893-021-00694-7>
- Pickett, S. T. A., Cadenasso, M. L., & Rademacher, A. M. (2021). Coproduction of place and knowledge for ecology with the City. *Urban Ecosystem*, 25, 765–771. <https://doi.org/10.1007/s11252-021-01190-8>
- Pohl, C., & Wuelsel, G. (2019). Methods for coproduction of knowledge among diverse disciplines and stakeholders. In K. L. Hall, A. L. Vogel, & R. T. Croyle (Eds.), *Strategies for team science success: Handbook of evidence-based principles for cross-disciplinary science and practical lessons learned from health researchers* (pp. 115–121). Springer International Publishing. https://doi.org/10.1007/978-3-030-20992-6_8
- Reyers, B., Nel, J. L., O'Farrell, P. J., Sitas, N., & Nel, D. C. (2015). Navigating complexity through knowledge coproduction: Mainstreaming ecosystem services into disaster risk reduction. *Proceedings of the National Academy of Sciences of the United States of America*, 112(24), 7362–7368. <https://doi.org/10.1073/pnas.1414374112>
- Schweitzer, T. (2006). Epistemology: The nature and validation of anthropological knowledge. In *Research methods in anthropology: Qualitative and quantitative approaches* (6th ed., pp. 39–88). <https://rowman.com/ISBN/9781442268883/Research-Methods-in-Anthropology-Qualitative-and-Quantitative-Approaches-Sixth-Edition>
- Smith, W., & Dressler, W. H. (2017). Rooted in place? The coproduction of knowledge and space in agroforestry assemblages. *Annals of the American Association of Geographers*, 107(4), 897–914. <https://doi.org/10.1080/24694452.2016.1270186>
- Steger, C., Nigussie, G., Alonzo, M., Warkineh, B., Van Den Hoek, J., Fekadu, M., Evangelista, P., & Klein, J. (2020). Knowledge coproduction improves understanding of environmental change in the Ethiopian highlands. *Ecology and Society*, 25(2). <https://doi.org/10.5751/ES-11325-250202>
- Steigerwald, E., Ramírez-Castañeda, V., Brandt, D., Shapiro, J., Báldi, A., Bowker, L., & Tarvin, R. (2022). *Overcoming language barriers in Academia: Machine translation tools and a vision for a multilingual future*. <https://doi.org/10.32942/osf.io/m7wfy>
- Swedlow, B. (2012). Cultural coproduction of four states of knowledge. *Science, Technology & Human Values*, 37(3), 151–179. <https://doi.org/10.1177/0162243911405345>
- Tauro, A., Ojeda, J., Caviness, T., Moses, K. P., René Moreno-Terrazas, T., Wright, D. Z., Poole, A. K., Massardo, F., & Rozzi, R. (2021). Field environmental philosophy: A biocultural ethic approach to education and ecotourism for sustainability. *Sustainability*, 13(8), 4526. <https://doi.org/10.3390/su13084526>
- Tengö, M., Brondizio, E. S., Elmqvist, T., Malmer, P., & Spierenburg, M. (2014). Connecting diverse knowledge systems for enhanced ecosystem governance: The multiple evidence base approach. *Ambio*, 43(5), 579–591. <https://doi.org/10.1007/s13280-014-0501-3>
- Tomuletiu, S. (2012). *Listening to language in Gadamer's hermeneutics*. Electronic Theses and Dissertations. <https://dsc.duq.edu/etd/1288>
- van der Molen, F. (2018). How knowledge enables governance: The coproduction of environmental governance capacity. *Environmental Science & Policy*, 87(September), 18–25. <https://doi.org/10.1016/j.envsci.2018.05.016>
- Vansina, L. (2008). Psychodynamics: A field of study and an approach. In *Psychodynamics for consultants and managers* (pp. 108–155). John Wiley & Sons, Ltd. <https://doi.org/10.1002/9780470697184.ch6>
- Wallace, B. A. (2007). *Contemplative science: Where Buddhism and neuroscience converge*. Columbia University Press.
- Whorf, B. L. (1956). Science and linguistics. In J. B. Carroll (Ed.), *Language, thought, and reality: Selected writings of Benjamin Lee Whorf* (pp. 207–219). Cambridge.
- Whorf, B. L. (2012). *Language, thought, and reality, second edition: Selected writings of Benjamin Lee Whorf*. MIT Press.

How to cite this article: Droz, L., Brugnach, M., & Pascual, U. (2023). Multilingualism for pluralising knowledge and decision making about people and nature relationships. *People and Nature*, 5, 874–884. <https://doi.org/10.1002/pan3.10468>