COMMENTARY

Reflections for Biodiversity Researchers Engaging With Policy-Science Interfaces

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Carnaval, A., D. Zuppinger-Dingley, A. Paz, M. J. Santos, A. Berger, V. Marcilio-Silva, M. C. Marques, M. Tschol, A. Arth, F. Rosa, C. Pimiento, E. Mijts, L. Shannon, S. Karlsson-Vinkhuyzen, M. Paschke, J. Krasno, E. M. Spehn and R. Willemin 2026. Reflections for Biodiversity Researchers Engaging With Policy-Science Interfaces. Bull Ecol Soc Am 107(1):e70049. https://doi.org/10.1002/bes2.70049

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Abstract

Researchers who wish to engage in policy processes to help address the biodiversity crisis are often hindered by fear of the potential drawbacks to doing so. The complexity of political systems, the necessity to interact with policymakers or politicians outside of the work environment, the potential professional risks that may arise from engagement, advocacy, or activism, and the lack of institutional recognition and support for engaging in the science–policy interface may be daunting. Following the negotiation and adoption of the Kunming-Montreal Global Biodiversity Framework, a reflection on how biodiversity researchers may engage more in policy processes is timely. Here, we introduce and reflect on some of the tools that can empower researchers who would like to engage in (1) changing policies, (2) multidirectional communication, (3) building networks, (4) activism and advocacy, and (5) securing institutional support.

Key words: activism in science; biodiversity science; multidirectional communication; network building; science–policy interface.

Introduction

Aiming to halt and reverse biodiversity loss by the year 2030 and to ensure humans are living in harmony with nature by 2050, the Kunming-Montreal Global Biodiversity Framework (GBF) has set 23 action-oriented global targets for urgent uptake (CBD/COP15/Dec/15/4 2022). GBF Target 14, in particular, looks to engage all of society by ensuring

> *(…) the full integration of biodiversity and its multiple values into policies, regulations, planning and development processes, poverty eradication strategies, strategic environmental assessments, environmental impact assessments and, as appropriate, national accounting, within and across all levels of government and across all sectors, in particular those with significant impacts on*

biodiversity, progressively aligning all relevant public and private activities, fiscal and financial flows with the goals and targets of this framework.

To reach these GBF targets, an action agenda must catalytically inspire societal actors to take action, including nonstate and subnational, and it needs to be complementary between biodiversity, sustainability, and climate goals. This calls for concrete actions to make robust research and traditional knowledge available for decision-making (Leclère et al. 2020), which in turn requires collaborative effort between researchers and societal actors, including non-governmental organizations (NGO), marginalized groups, and indigenous peoples. This comprehensive action agenda will facilitate learning across governance levels, societal sectors, and regions, and can enable progress to be evaluated in a credible, transparent fashion (Chan et al. 2022). Halting and reversing biodiversity loss requires effective polycentric governance, building on knowledge, relationships, strategies, decisions, and implementation (Lubell and Morrison 2021).

Similar to the global Sustainable Development Goals proposed for 2030 (UN 2015), the GBF targets projected for 2030 and 2050 will transcend the work of generations of researchers and players. This means that professionals from around the globe and at all career stages have the opportunity to participate in the process of engaging in policies that integrate biodiversity and its multiple values at local and regional levels, starting now. Researchers can play different roles when participating in this policymaking process, from theoretical scientists to advocates of context-specific issues (Pielke 2007). Understanding how institutional systems (polity) affect decision-making (politics) and how policy change happens through policy actors (policymaking) can facilitate this engagement.

To encourage and support biodiversity researchers seeking ways to engage with the process of integrating biodiversity and decision-making (irrespective of their career stage), we address opportunities and challenges when linking research with policymaking. Who can mobilize meaningful and adequate action, and how? This piece shares our collective experiences, challenges faced, and lessons learned on how to (i) initiate, facilitate, and guide civic engagement to have an impact on policy and take the science–policy interface to the next level, (ii) establish dialogue at the local, regional, and global scales and effectively communicate with policy actors, (iii) build and leverage networks, (iv) engage in activism and advocacy, and (v) promote the institutional and cultural changes in science and academia that are crucial for more effective policy change (Fig. 1).

Insights

1. Changing policy is more than engaging with politicians

We have noticed that strengthening science–policy collaboration for biodiversity and environmental protection often depends on the policy being targeted. Frequently, our actions vary with the kind of policy making and with the group with whom we are interacting. Although a traditional description of the policy cycle exists—initiated with setting an agenda and moving on to decision-making, implementation, evaluation, and policy change (Jann and Wegrich 2007)—it often does not correspond to practice. Instead, this cycle may be more useful if understood as a simplified heuristic model of how policy change can happen or a normative model of how it should happen. The reality of engaging in policy is often more complex and more political (2006), and steps can happen in a different order, depending on which scale biodiversity researchers decide to act on and whom they are approaching. In addition, as important as the

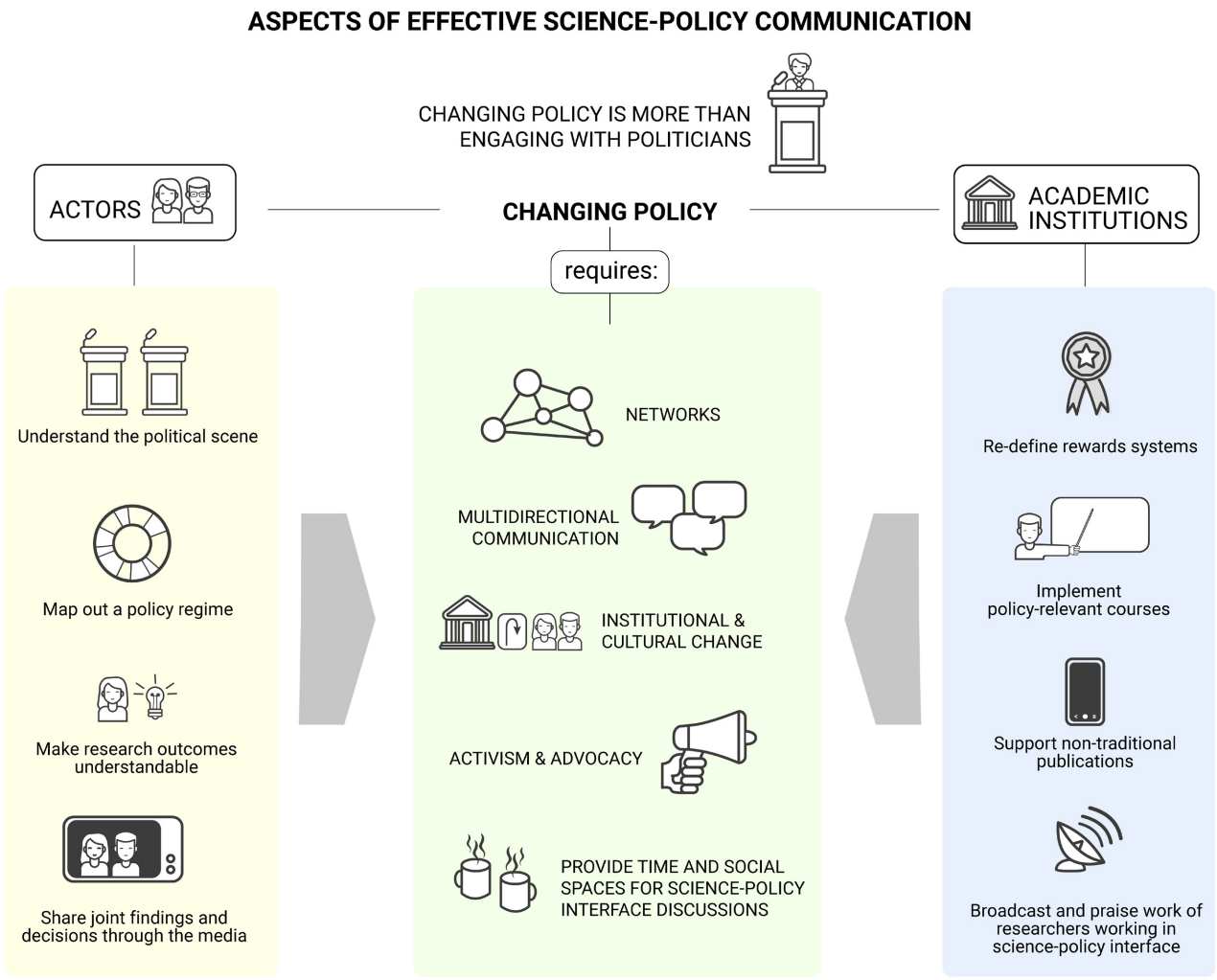

Fig. 1. The multiple ways by which biodiversity researchers can engage in policymaking: actions, needs, and institutional support. Illustration by Cirenia Baldrich.

policies themselves is the extent to which policies are implemented, monitored, evaluated, and, in case of deficiencies, remediated (Swanson et al. 2010).

An official mandate is a common, but not the only, avenue for researchers to contribute to policy. By asking for formal input from biodiversity researchers, decision-makers often open communication channels for policy guidance (e.g., Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES 2019)). However, policy change is not just the action of policymakers or politicians, but also that of individuals, organizations, and entire societies. Governance, for instance, is increasingly more polycentric, combining multiple levels and diverse types of organizations, including the public, private, and voluntary sectors (McGinnis and Ostrom 2012). Thus, researchers who work on biodiversity and global change have the opportunity to engage in multiple spheres to contribute to relevant policy change with socially robust, context-sensitive, and co-produced knowledge (Weichselgartner and Kasperson 2010)—even when they are not specifically invited or asked to. These actions can and should go beyond joining high-level (e.g., governmental) panels.

How can one do that? Two possible strategies are to informally reach out to local decision-makers and stakeholders, and to develop trust-based relationships with them: both can be relevant for policy change. In addition, researchers can influence policy by listening to, talking to, and working closely with various sectors of civil society, local communities, and NGOs (Galea 2021). By inviting those players to field excursions, experimental facilities, classes, and conferences (Rose et al. 2020), for instance, researchers can establish channels for sharing knowledge and experiences. Other examples of informal channels include (but are not limited to) City Hall meetings, environmental impact assessments, and open calls for document reviews. Institutions outside the national government (such as those involved in finance, the private sector, universities, international organizations, and treaties), and organized groups, communities, individuals, and their families, may all be policy actors. Biodiversity and global change researchers will increasingly be called to participate in all of these relevant fora.

2. Policy change requires multidirectional communication

Academic culture is often (or perceived to be) in an ivory tower (Bok 1982), that is, out of touch with the real world. Frequently, research results are disseminated through inaccessible literature or short communications that are not conducive to open and public communication and exchange. Because knowledge does not translate into action by itself, researchers or stakeholders must act beyond academic publications for their findings to guide changes in policy. This includes (but is not limited to) making the outcomes of the research accessible to all by using language and terms that are understandable to those outside the science community and articulating their relevance in lay terms. This can be achieved via press releases, infographics that summarize key findings, public talks and exhibits, social media, blogs, newsletters, and other communication channels (Geschke et al. 2023).

In any of those cases, better policymaking is achieved when researchers can dedicate time and effort to open multifaceted, multidirectional communication with stakeholders and policy actors, including the general public (Jolibert and Wesselink 2012). For that, it is important to understand that policies are not produced in a vacuum and are likely to be more effective and fair when co-produced: they are the product of political compromises that take into account multiple value systems and the priorities of different (or some more influential) stakeholders involved. These value systems are intrinsically intertwined with and influence public opinion. Often, when finding these compromises, the impact of academic research outputs will compete with the direct and short-term interests of some of the stakeholders involved. Gaining knowledge of the existing decision-making practices in political and administrative processes helps us as we navigate this science-policy realm (Šucha and Sienkiewicz 2020) and as we make our research relevant to ongoing conversations.

One useful strategy to identify important stakeholders at various levels, from local to global scales, is to make a map of the policy regime around a targeted objective (Fig. 2). This facilitates thinking strategically about the target audience with which we wish to open a conversation about our research (Toomey 2023). Strategic actor mapping offers us the possibility to specify the scale of action (local, regional, or global), making our goals more specific. Also, the regime can and should be discussed in a conflict-sensitive approach to avoid exacerbating tensions with potential antagonists. For instance, knowing the composition of biodiversity-relevant commissions is useful to address policy recommendations directly to parliamentarians and to reach the negotiation table and corridors where resources and decision power are currently held. Information on parliamentarians' contacts with lobbyists, professional associations,

Fig. 2. An example of a policy regime. A regime represents the actors—groups or individuals, governmental and nongovernmental—that set or influence the policy that one seeks to impact. In the center of the circle, this map identifies the targeted issue or policy change to be addressed. The actors are stakeholders with the ability to impact policy—they can be allies or opponents, and this can change over time. Biodiversity researchers can use this policy regime to identify potential synergies among actors, connections that can be strengthened, and challenges to overcome. This exercise can be used irrespective of the scale of the target issue: from making economic systems better aligned with biodiversity preservation to protecting a local fishery to changing tenure processes in an academic department. Illustration by co-author A. Berger.

advocacy groups, and academic institutions helps with networking, communication, and advocacy strategies, while making problems for climate and biodiversity governance more visible (e.g., vested interests, corruption, influence peddling, greenwashing, and lobbying) (Blue et al. 2018, Maxton-Lee 2018, Sarkki et al. 2020, Teichmann et al. 2020, Kenner and Heede 2021, Stott 2021, Supran and Oreskes 2021). Transparency databases (Transparency Register Management 2022) can be a useful resource to researchers as they identify relevant players and navigate this lobbying landscape.

Targeted communication also matters. It has been noted that communication and advocacy around biodiversity are more successful when they are specific to the region and the group being addressed or impacted (Rose et al. 2020). Local, regional, and even global stakeholders may respond to the same message very differently (see the Yucca Mountain controversy in Box 1). Achieving a single goal may require different types of messages, data, and communication strategies, depending on who is in the conversation.Importantly, communicating research means establishing a multidirectional dialogue (Jolibert and Wesselink 2012), rather than a monologue, to understand and address the needs, views, and concerns of each impacted group. Further, communication style differs according to the receiver and sender of the message. Alternative styles include presenting multiple lines of evidence or making one argument at a time, with more or less methodological and theoretical details as needed. As such, working with various stakeholders, be they farming communities, laborers, immigrants, children, investors, employers, or researchers, requires different skills and reflections about each group's assumptions,

Box 1. Communication and the Yucca Mountain controversy.

In 1987, the Environmental Protection Agency of the United States government proposed the establishment of a long-term nuclear waste repository in Yucca Mountain in the state of Nevada. Proponents of the use of nuclear energy as a cleaner alternative to coal and gas were in favor of the project and argued that it would make nuclear energy more viable as a replacement for gas and coal. Yet, Nevada Attorney General Aaron D. Ford claimed that there was too much scientific uncertainty to claim that the site would be suitable for a long-term nuclear waste repository (https://ag.nv.gov/Hot_Topics/Issue/Yucca/). This led the residents of the state to question the project, expressing concern about the safety of nuclear waste storage and transportation. Seeking more certainty around the issue, opponents of the repository lobbied with the federal government, which demanded its scientists predict if the Yucca Mountain Project would be safe for the next one million years. Given the challenges associated with predicting the many potential outcomes over such a long timespan, the discussion led to an impasse, and the repository was not built. Claims of uncertainty are particularly challenging for scientists and decision-makers, especially given that public impressions of what constitutes enough research to make policy decisions can always shift (Piano et al. 2021). However, transparency about assumptions and a true two-way understanding of the issues impacting all sides of the conversation can help to address uncertainty and facilitate decision-making.

values, judgment calls, and inherent biases (Bickford et al. 2012, Haddaway et al. 2017). To be effective communicators, researchers must become both senders and receivers of information (Gianotti and Duane 2016, Raymond et al. 2022, Geschke et al. 2023).

Listening to the questions, concerns, and needs of local communities, stakeholders, and policy actors offers time and space for a constructive dialogue that jointly identifies the contributions that research can make (Antusch 2022). This approach facilitates discussions and informs decision-making processes. This multidirectional communication in biodiversity research helps us (1) identify and understand environmental problems perceived from various perspectives by local, regional, and global stakeholders, (2) identify whether (and how) potential solutions would align with the needs of the communities we are interacting with, and (3) provide relevant information, data, and clarification in discussions and decision-making processes (Emmenegger et al. 2017, Lam et al. 2020, Shrivastava et al. 2020, Greenaway et al. 2022). Engaging those who are less privileged and most affected by the issues that science-policy dialogue addresses (e.g., global change and biodiversity loss) or by the outcomes of the science-policy dialogue (e.g., adaptation or mitigation measures to biodiversity loss) helps in recognizing the complexities of sustainability pathways and imagining suitable sustainable practices (Antusch 2022). Taking part in public discussions and dialogue, and addressing relevant issues for local communities, will help guide researchers to adjust their communication style to contexts where change is taking place. Local communities engaging in such dialogue invest their time and contribute knowledge, but they are often unrecognized. This issue needs to be addressed.

Researchers also use multidirectional communication skills as they engage in high-level discussions at the international level, such as at the Convention on Biological Diversity (CBD) or IPBES (Díaz 2022). In certain situations, communication is more successful at changing policy when targeting specific issues affecting biodiversity and advocating for informed solutions to stakeholders (Box 2; Table S1). Yet we

Box 2. Activism and the restingas in Southern Brazil.

When engaged in society and working ethically, academics can influence public opinion and contribute to political decisions as activists. An example took place in the restingas of the coast of the state of Paraná, southern Brazil. Restingas are a typical shrubby to herbaceous vegetation type that covers the sandy plains of most Brazilian beaches. This vegetation is home to a diversity of plants, resident and migratory birds, crustaceans, and other marine animals. It plays a crucial role in retaining sediments and maintaining the coastal sand dunes, providing protection against storm surges and sea level rise, both of which are expected to increase under future climates. Historically, restingas have been directly impacted by the growth of coastal cities and resorts, having been removed due to uncontrolled urban growth and unsustainable tourism. Due to their ecological importance, restingas have been recognized as permanent preservation areas protected by the Brazilian law (Native Vegetation Protection Law) since 1965: removal of vegetation is allowed only in exceptional cases, when the area is needed for legitimate public interest. The economic sectors, including commercial deals and trade, ports, and luxury homeowners, have pressured local and state governments to "clean up" local beaches by removing this vegetation type from the sandbanks in favor of alleged (but not demonstrated) development of tourism, transport infrastructure, and public safety. To accommodate these economic interests within the legislation, local rulers have been declaring these areas as of "public interest," justifying deforestation. In early 2019, an authorization from the environmental agency of the state of Paraná granted permission to remove the restinga of the coastal township of Matinhos (photo below), causing concern and indignation among scientists and locals. At the request of a law enforcement and crime investigation unit of the state of Paraná (called the Public Ministry), a group of 16 professors from Universidade Federal do Paraná produced a technical report that scientifically justified the need to preserve those restingas. Based on that document, the state prosecutors filed a request to halt cutting the restingas, which was accepted in court. As a result, the state government was forced to cease intervention, and the vegetation was preserved. A similar process took place again in 2023, and academics once more participated with a scientific report that helped to prevent an even larger destruction. Although the threats are continuous, it is clear that scientific knowledge and academic activism play a crucial role in this region. Photo courtesy of Ligia Carolina Alcântara Pinotti.

need more researchers able to engage in local decision-making at the root causes of biodiversity loss: our values and culture, consumer habits, travel patterns, trade, and allocation of subsidies. Engaging in defining incentives and safeguards for the local landscapes in which we live and work every day, and integrating biodiversity into all relevant policies (going beyond protected areas), can be, for instance, crucial to address GBF Target 14.

3. Policy change requires networks

Biodiversity researchers often feel uncertain about how to influence policy, possibly because of unfamiliarity and lack of training. Moreover, in several countries, systematic barriers impede researchers from underrepresented groups (e.g., racialized communities and women) from engaging in policy-impacting activities (e.g., accessing parliament members and politicians; Foxen 2017, Dunlop 2018, Geddes 2018). Networks provide and support access to activities at the science–policy interface and can be particularly helpful to researchers who want to engage in policy but do not know how or where to begin. Engaging in a network is a first step for individuals willing to act collectively to make biodiversity policy sustainable. This enables us to determine entry points, to learn about policy change processes firsthand, to interact in policymaking as part of a larger group, and to find allies who support envisioned policy changes.

These networks exist at multiple scales. Examples of networks that act at global scales include the Group on Earth Observations Biodiversity Observation Network (GeoBON; https://geobon.org/) and its multiple task forces, Future Earth (https://futureearth.org/), the Earth Commission (https://earthcommission.org/), and IPBES (https://www.ipbes.net/). Numerous networks exist at national levels, often promoted by National Academies of Science, national scientific societies, federal environmental offices, and funding agencies. At regional and local scales, biodiversity researchers are able to join smaller groups active in specific issues (e.g., groups of policymakers, business associations, small-scale producers, Rotary Club members, local wildlife and conservation clubs, urban gardeners, women's rights groups) and communicate research findings to each particular group, giving attention to the role that social cues, cultural values, and direct engagement play in influencing individual attitudes and behavior (Toomey 2023).

Social media and research communication platforms are especially useful to identify these networks. They also provide opportunities to connect with stakeholders, policymakers, or researchers active on social media and to post key messages to circles of contacts and acquaintances. More than a simple means of communication, these platforms also allow one to strengthen the power of a message and establish a public presence.

4. Biodiversity researchers are able to change policy through activism and advocacy

Other ways by which biodiversity researchers are able to promote policy change are to reach out to society directly and by "walking the talk". Researchers can, for instance, participate in scientific boards and in public and court hearings, write technical reports, work closely with NGOs (Bille Larsen et al. 2021, Bille Larsen and Lador 2021), promote gatherings of researchers and diverse members of society and policymakers, and write opinion pieces and publications for the general public.

Policy is also made, changed, and implemented by each one of us through our vote and our lifestyle. By actively supporting political agendas that benefit biodiversity and climatic justice and becoming

active members of the conversations around these agendas, we can promote policy change. Furthermore, our daily actions at home and work and our lifestyle can serve to inspire societal actors to support policies that benefit biodiversity (Vinkhuyzen and Karlsson-Vinkhuyzen 2014).

Moreover, although conventional science-policy work may be developed without prescribing to a particular position, some researchers are increasingly calling for and incorporating more advocacy and activism into their own profession. Frequently, this stems from a shared will to protect society from the existential threats posed by the climate and ecological crisis, while respecting the scientific principles of robust assessment, transparent communication of assumptions, and uncertainty (Gardner and Wordley 2019, Green 2020, Gardner et al. 2021, Antusch 2022, Racimo et al. 2022), and the need to recognize the complexity of the questions involved (Stirling 2010).

This dual role of activist researchers has been seen as in opposition (and potentially affecting) to the perceived trustworthiness of the research community (Beall et al. 2017, Kotcher et al. 2017, Palm et al. 2020, Cologna et al. 2021). However, researchers have been influential in changing detrimental policy and practices through their environmental, medical, and/or pacifist activism. In a recent example from Brazil (Box 2), a self-organized group of scientists reached out to the media to raise public awareness about the destruction of a relevant local ecosystem (the Restingas of coastal Paraná). Society was mobilized, and policy was changed.

5. Effective science–policy interchange requires institutional and cultural change in research and education

Biodiversity researchers may be reluctant to dedicate time and effort to science–policy exchanges if they perceive that they are not properly acknowledged or rewarded by the academic system. Although recent years have witnessed a clearer articulation about the importance of this topic within and for academia (Phillips and Maes 2012, Clark et al. 2016), academic performance has been traditionally measured through research and education outcomes to the detriment of broader services to society in research–policy interfaces. This has resulted in uneven opportunities, incentives, and payoffs for researchers interested in this kind of policy impact (Cairney and Oliver 2020). Because engaging in the policy process using our research results is seen as a time-consuming process and institutionally undervalued (Paschke and Zurgilgen 2019), early career researchers are often advised not to devote time to this before tenure, while senior researchers are often overloaded with administrative and teaching duties.

Research institutions can support both the generation of knowledge and the translation of this knowledge into policymaking and implementation by promoting research-based policy development and the development of community practices in research (Fig. 1, Table S2). Academic and research institutions can also assist these movements by providing guidance and legal security to researchers (e.g., internal services, legal insurance, or partnerships with lawyers specialized in environmental human rights defenders' defense) to engage their scientific knowledge in advocacy, activism, and policy outreach (Green 2020, 2021). Better recognition, legal security, and occupational safety will stimulate junior, mid-career, and senior researchers to gain relevant skill sets and will support researchers and students to engage directly in broader societal change. In addition, what constitutes a successful researcher for institutional reward and promotion systems may need to evolve to include acknowledging public communication or

policy outreach and the increased visibility it brings for both researchers and their place of work. At the university level, these practices can further stimulate collegial support, collaboration, and recognition for engagement with policy across faculty and departments. For example, universities and other teaching institutions may consider offering cross-departmental courses or fellowships and programs that engage with and influence policies in environmental issues (Dahinden et al. 2021, Antusch 2022). Examples include science communication courses (e.g., with journalism schools), science outreach (e.g., with art schools), and science-policy writing.

Numerous external initiatives promote advocacy and activism on environmental issues outside academia. Some examples include the Tyler Prize for Environmental Achievement, the Goldman Environmental Prize, the Environmental Media Awards, and the European Commission Natura 2000 Award. Whereas these awards do not offer support to researchers and other citizens as they engage in advocacy or activism to protect biodiversity, they reward extraordinary engagement *a posteriori*.

Final considerations

Now more than ever, after long years of social isolation and algorithmically self-mined information, people need conversations, debate, and diversity of thought and experience for optimal decision-making (Toomey 2023). Building on the power of group intelligence and experience and of shared learning, biodiversity researchers have the opportunity to do just that. Humans enjoy sharing personal experiences and embodied knowledge: knowledge based on collective and individual experiences, evidence, and emotional messages through stories and art. We enjoy being connected in local networks, be they centered on civic engagement events, advice, or peer discussion groups. These are the types of social structures likely to support sustained cooperation in a given decision-making process to suggest, discuss, accept, modify, or reject ideas among neighbors, colleagues, friends, or family members. As biodiversity researchers, we have access to a wide variety of ways to be involved in this science–policy interface. The space is open for all kinds of contributions, natures, and levels of involvement, and they are *all* relevant. A global shift into sustainable systems that accept the environmental boundaries of our planet is urgent and will require transformative thinking and actions to ensure environmental justice for all ecosystems and species. We hope to have highlighted some of the many ways by which biodiversity researchers can facilitate this transformation.

Acknowledgments

Debra Zuppinger-Dingley, Maria J. Santos, and Rémi Willemin were supported by the University of Zurich Research Priority Program (URPP) on Global Change and Biodiversity. Debra Zuppinger-Dingley was further supported by the Life Science Zurich Graduate School PhD Program in Ecology. AP was supported by an Ambizione grant from the Swiss National Science Foundation to Daniel Maynard (#PZ00P3_193612). The RCN grant DEB-1745562 from the US National Science Foundation (Cross-Scale Processes Impacting Biodiversity) supported the 2022 WBF workshop that led to the present manuscript and the participation of Ana Carnaval, Andrew Berger, Vinicius Marcilio-Silva, Andrea Paz, Jean Krasno, and Marcia Marques. Catalina Pimiento is supported by a PRIMA grant (no. 185798) from the Swiss National Science Foundation. Lynne Shannon was supported by the MISSION

ATLANTIC Horizon 2020 Research and Innovation Program (862428) and the South African Research Chair Initiative, funded through the South African Department of Science and Technology (DST) and administered by the South African National Research Foundation (NRF).

Author contributions

Conceptualization: DZD, ACC, VMS, AB, AP, RW, and MJS. Funding for participation of non-Swiss workshop organizing committee members: ACC. First draft: ACC, DZD, AB, VMS, AP, and RW. All authors fully contributed to subsequent drafts. Figures: AB, VMS, JK, and MJS. Tables: ACC, DZD, RW, AB, and MJS. Boxes: RW, AB, and MM.

Open research statement

No data were collected for this study.

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Supporting Information

Additional supporting information may be found in the online version of this article at http://onlinelibrary.wiley.com/doi/10.1002/bes2.70049/suppinfo

Table S1. Making a plan to initiate multidirectional communication, and using it to set policy change into motion.

Table S2. Possible institutional actions to support the development of skill sets for societal engagement and policy change at every academic level.