Re-thinking research impact: voice, context and power at the interface of science, policy and practice

Reed, MSR; Rudman, Hannah

OVERVIEW ARTICLE

Re-thinking research impact: voice, context and power at the interface of science, policy and practice

Mark S. Reed[1] · Hannah Rudman[1]

Abstract

The world is facing unprecedented challenges on a scale that has never been seen before, and the need for evidence-informed solutions has never been greater. As a result, academics, policy-makers, practitioners, and research funders are increasingly seeking to undertake or support research that achieves tangible impacts on policy and practice. However, the impact of research is inherently subjective, with the same outcome perceived as either beneficial or negative by different groups, or by the same group in different contexts. It is therefore important to consider factors that may increase the likelihood that outcomes from research are perceived as beneficial (or otherwise) by interested/affected groups and non-academic partners, to help researchers avoid causing potentially harmful impacts, despite their best intentions. In this overview article, we discuss three considerations for re-thinking how research can deliver such outcomes: (i) sensitivity to context, (ii) representation and legitimisation of diverse voices and (iii) the management of power dynamics. We then discuss how these can be enacted in research and engagement processes that are designed to incorporate multiple ways of viewing reality and knowledge, as researchers become increasingly aware of their positionality, privilege, assumptions and biases. By considering how research and impact generation processes are mediated by context, power and voice, it may be possible to envision just transformations of knowledge systems that foreground the knowledge and needs of diverse groups, including those who have been historically marginalised, and without systematically recognising or privileging one group over another.

Keywords Decolonisation · Knowledge systems · Diversity · Inclusion · Equality · Transformations · Positionality · Privilege · Research impact · Knowledge exchange · Knowledge transfer · KMb

Introduction

The world is facing challenges of unprecedented complexity and uncertainty, which are bringing us to the edge of planetary boundaries where ecosystems may collapse, threating societal well-being and prosperity (Rockström et al. 2009; Steffen et al. 2015; Nash et al. 2017). Although global in nature, there are strong normative arguments for these challenges to be tackled in ways that engage with those who are most affected (a principle enshrined in the Aarhus Convention; UNECE 2001). This requires the co-production of solutions in policy and practice in ways that give voice and influence to a wide range of interested and/or affected groups (we avoid using the term "stakeholders" in this paper as part of a wider attempt to decolonise language used in research; Reed 2022), who are likely to perceive both challenges and solutions in contrasting ways, based on their own values and beliefs, as these influence their interpretation of evidence. Whether a policy or practice leads to beneficial impacts or harm also depends to a large extent on the context in which outcomes are perceived; the same group may perceive an outcome very differently in a different time or changed context (Reed et al. 2021). Current narratives around impact are implicitly positive in their definition, and fail to recognise that there are often both winners and losers (see technical definitions of impact by research funders around the world that refer to "demonstrable benefits", without asking the question, "for whom?"). It is especially important to recognise this subjectivity, based on the positionality of different

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✉ Mark S. Reed
mark.reed@sruc.ac.uk

[1] Thriving Natural Capital Challenge Centre, Department of Rural Economy, Environment and Society, Scotland's Rural College (SRUC), Peter Wilson Building, Kings Buildings, West Mains Road, Edinburgh EH9 3JG, UK

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groups whose values and interests may differ significantly between groups in relation to the impact. This is particularly important in cases where potential beneficiaries have historically been marginalised or delegitimised by researchers and other more powerful actors as part of a knowledge system that is centred around academic privilege. Indeed, while some successes have occurred whereby scientific knowledge has successfully informed policy and practice (Cvitanovic and Hobday 2018), it is also clear that evidence underpinning a number of historic policies and practices have led to negative unintended consequences. For example, the 'green revolution' in agriculture was intended to increase food security by increasing yields through technology transfer, but it actually contributed towards food insecurity by creating dependence on inputs, technologies and agricultural systems that displaced subsistence agriculture with cash crops, and further marginalised and impoverished those without access to land or technology (see Cook et al. 2021 for a recent review of the role of research evidence over time in the field of agricultural extension).

In some cases, and despite best intentions, unforeseen outcomes can be the product of unforeseen circumstances, reflecting the messy reality of environmental policy-making contexts (Reed and Meagher 2019). The relationship between research and impact does tend, after all, to be indirect, non-linear, complex and unpredictable (Befani et al. 2014; Posner and Cvitanovic 2019). And yet, it can be possible to predict unintended negative consequences on the basis of risks arising from the planned pathway to impact (Reed et al. 2021), or on the basis of who is invited (or excluded) from processes in which evidence is used to inform decisions (Newig et al. 2018). In reality, negative unintended consequences are often inadvertently designed into engagement and impact processes. For example, poorly designed and executed engagement, which fails to account for elite capture, various forms of cultural imperialism, the exacerbation of social inequities and opportunity costs for those who engage for little or no benefit (Cooke and Kothari 2001; de Vente et al. 2016).

These negative outcomes may be more pervasive in countries where research assessment exercises create conflicts of interest for researchers who have to evaluate their own impact to generate evidence that can be used in case studies (leading to reputational and sometimes financial rewards for researchers and their institutions). For example, evidence suggests that the evidence collection process for such evaluations is, in some cases, undermining trust in researchers who were previously perceived to have been acting in the public interest rather than in the interest of their selves or institutions. A number of databases of publicly available case studies have been developed where environmental research is claimed to have led to beneficial impacts, for example, from the UK's REF2014 (Research England 2014) and

Australia's Engagement and Impact Exercise (ARC 2019). Many research and funding organisations also now publish impact case studies, for example Australia's National Health and Medical Research Council (NHMRC 2021) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO 2019). However, such case studies can contain a selection bias towards those with positive outcomes and are typically evaluated and written from the perspective of the researcher or institution claiming the impact. Further, research studies of impact from environmental research have mostly been restricted to single case studies (e.g., Cvitanovic et al. 2016, 2018) or disciplines (e.g., Meagher and Martin 2017; Smith and Stewart 2017; Marshall et al. 2017), or they evaluate a specific impact or pathway, from a particular point of view. A number of studies of factors influencing specific outcomes of engagement in environmental management have also been undertaken (e.g., de Vente et al. 2016; Cvitanovic et al. 2019). Yet, few attempts have been made to examine the relationships between engagement and impact more broadly (but see Karcher et al. 2021 for a systematic review of recent literature). In doing so, it may be useful to distinguish between environmental research and wider evidence-based environmental governance processes. While the latter are often beyond the influence of researchers, different modes of research can influence governance processes in a number of ways. On one end of this spectrum are action research and practice-based research paradigms, which blur the boundaries between the users and producers of research, and between research and governance. They may start by studying or designing, and then helping enact environmental policies and practices, before producing more traditional research outputs towards the end of this process (if at all). At the other end of this spectrum are more traditional research projects operating in knowledge transfer or knowledge exchange paradigms, where there are clearer boundaries between the producers and users of knowledge (whether the flows of knowledge are uni- or bi-directional). Such projects may make recommendations for policy or practice, and researchers may continue to advise on, or build capacity for, environmental governance processes that draw on their evidence and expertise, and where relevant, the perspectives of interested/affected groups whose knowledge they have codified in their research (Raymond et al. 2010; Reed et al. 2013).

The lack of theorisation around the generation and assessment of impact is important for two reasons. First, current conceptualisations of impact based on the concepts of significance, reach and attribution lead to a narrow framing of the value of knowledge and a simplistic understanding of the causal links between research and impact. When operationalised in the context of national assessments, such conceptualisations of impact have the potential to drive the instrumentalization of knowledge, and bias impact generation

activities towards instrumental interpretations of value and outcomes that are easy to measure and attribute. Second, if we do not understand how impact generation and assessment processes work, it will be difficult to anticipate or avoid negative unintended consequences or develop processes that are more likely, in theory, to deliver incentives for responsible research and innovation. It is important to understand why some attempts to generate impact lead to negative outcomes for those who engage with the research(ers), while others lead to outcomes that are perceived to be beneficial by those who engage. By understanding what might explain these very different outcomes, it may become possible to re-think impact generation and evaluation processes, and structures that are needed in institutions and wider knowledge systems to support these processes (Reed and Fazey 2021).

To respond to this gap in the literature, we draw on literature and personal experience as researcher/practitioners operating at the interface of sustainability science, policy and practice, to identify and discuss some of the key considerations that influence the design and execution of engagement activities, and the extent to which they are likely to generate impacts that are perceived to be beneficial by interested/affected groups and non-academic research partners. Although much of our own research is transdisciplinary, we argue that engaging interested/affected groups can enhance the likelihood of impact in any research domain, including non-applied, "pure" research fields, where "being in the right place at the right time" in external networks increases "impact potential" by increasing the researcher's understanding of potential applications and making researchers more accessible to applied researchers and interested/affected groups who they may be able to help (Reed 2022). This may be in communicative, consultative, deliberative or co-productive modes (following the engagement typology of Reed et al. 2018).

To do this, first, we describe what is meant by research impact, and how to think about the potential positive and negative impacts research can have. Second, we examine the three key considerations that might increase the likelihood that engagement leads to beneficial outcomes for interested/affected groups, who as a result of engagement in the co-production of impacts become non-academic research partners. Finally, we discuss how these considerations can be used to guide us in delivering research impacts that incorporate multiple ways of viewing reality and knowledge, and benefit diverse groups and interests in complex systems.

Positionality of the authors

Given our goal of empowering marginalised groups to engage effectively in the delivery of research impacts that benefit them, it is important to first acknowledge our own positionality. Reed is a white, heterosexual, physically able, middle class male with a PhD, and was born and grew up in a developed country. Rudman is a gay female, but otherwise has similar reality. As such, we recognise that we are afforded multiple privileges in both our personal and professional lives that many other academic and non-academic partners are not. These privileges and our training as North Western researchers also influences how we approach and undertake research and impact activities. In contrast to Indigenous ways of knowing, that are typically place-based, relational, informal, holistic and which may include tacit and implicit knowledge (Houde 2007; Raymond et al. 2010; Reo 2011), we have drawn in this article on our own experience (as this has been shaped by our positionality), the experience of other Western researchers with whom we collaborate, and explicit knowledge codified in formal literature (much of which conforms to Western scientific norms of universality). We have sought to generalise lessons that could be applied beyond the contexts in which the insights were originally developed (in the work we cite), and recognise that it is unlikely that marginalised, disempowered and hard-to-reach communities will engage with or directly benefit from this work in their own specific contexts. However, being mindful of this, in sharing this perspective here, we do not seek to articulate concrete recommendations that can apply across every context. Rather, by sharing these insights we hope to help other researchers to become more aware of their own positionality and privilege within research and impact activities, to reduce the likelihood of adverse impacts from occurring.

It may be argued that by writing on this topic, we are centring ourselves in a conversation that should really be led by Indigenous voices and historically marginalised communities and those currently facing inequality and injustice, and that we should focus on amplifying these voices instead. However, to remain silent about the insights we have gained through writing this article would be to deny others with similar privilege the opportunity to learn from this experience and examine their own values, beliefs and practices around impact. In particular, Reed has become acutely aware that his PhD research sought to use Western science to evaluate and in some cases "validate" local knowledge (Reed et al. 2007, 2008; Reed and Dougill 2010), which is a form of epistemic racism (see Houde 2007; Nadasdy 1999; Simpson 2007; Shackeroff and Campbell 2007 for critiques of this approach). More broadly, much of his early work (e.g.,Reed et al. 2005, 2006, 2007; Reed 2007) is an example of "parachute" (Stefanoudis et al. 2021) or "helicopter" science (Minasny et al. 2020). This has been described as the practice of "international scientists, typically from higher-income countries, conduct field studies in another country, typically of lower income, and then complete the research in their home country without any further

effective communication and engagement with others from that nation" (Stefanoudis et al. 2021: R184). In some cases, this may take the form of tokenistic naming of local scientists on papers without giving them the opportunity to make substantive inputs (Minasny et al. 2020). Despite seeking to benefit and empower those he worked with to use both local and scientific knowledge to protect their livelihoods and the environment upon which they depended, Reed's training and early work was embedded in a discipline which centred and privileged the writing and perspectives of Western-trained researchers (Trisos et al. 2021). In contrast, non-Western knowledges have often been portrayed as "native", "lay" or "anecdotal" and thereby marginalized in ecological literature, systematically biasing contributions to the literature towards researchers (like Reed and his co-authors) who fit the Western scientific worldview (Gillman and Wright 2020; Schell et al. 2020). In writing this, Reed seeks to apologise for contributing towards these issues, whilst raising awareness among others in ecology and other disciplines, who could do more to value and foreground more diverse voices and knowledge systems, and recognise the expertise, languages and histories of inequality experienced by local populations and researchers, as well as the wider systems that perpetuate these inequalities.

While our many privileges are highly visible and overt, as part of a positionality statement it is relevant to disclose that we do not possess full neurotypical privilege. Neurodiversity and neurotypical privilege are often hidden and unacknowledged. Neurodiversity is used to reframe neurodevelopmental and mental health disorders from being inherently pathological to being a form of diversity that is worthy of support and inclusion rather than seeking conformity to societal norms based on those with more typical neurology (Singer 1999; Ortega 2009). Although typically applied to conditions such as autism, attention deficit hyperactivity disorder, developmental speech disorders, dyslexia, dyspraxia, dyscalculia, Tourette syndrome etc., it may also be applied to mental health conditions such as antisocial personality disorder, obsessive–compulsive disorder, depression and anxiety, if these significantly affect day-to-day functioning. Rudman is in the borderline/high functioning Autism zone. In Reed's case, he has suffered from debilitating bouts of depression, anxiety and panic attacks throughout his career, and has had to adapt the way he works to manage for this. In a profession that values mental acuity, issues with mental health remain stigmatised within academia, and so researchers often hide these challenges. In disclosing and writing from these realities, it is our hope that others with similar experiences can increasingly voice their struggles, find compassion and work to transform the systems and cultures that perpetuate neuronormative discrimination.

Writing this article has been a journey of increasing self-awareness as we have become aware of the work needed to decolonise our research and impact practices and decentre our voices in this debate. While this article is testament to the incompleteness of this journey, we wish to express our commitment to continuing on this road, and in so doing, learning from others who engage with this work, who can show us and others a more holistic and inclusive way to do research and impact.

The subjectivity of research impact

The attainment of research impact is a goal for many academics, academic institutions and research funders. The 'impact agenda' has generated considerable pressure for researchers who now have to demonstrate evidence of impact for funders, research assessments and career progression (e.g., Cvitanovic et al. 2015 in Australia and Moran et al. 2020 in the UK). This has led increasingly to an instrumentalization of impact, reflected in institutional mission statements, research strategies and the establishment of new institutional structures (e.g., Hart et al. 2015; Reed et al. 2022). These 'impacts' can manifest across a range of scales, for example, (i) impacts on individuals, (ii) impacts on research, (iii) impacts on organisations, (iv) impacts on ecosystems, and (v) impacts on society at large (Cvitanovic et al. 2021a). Open Science introduces the further need to involve citizen communities in the evaluation of impact. Participatory Action Research studies aim to create a transformative impact through the research process itself, and actors can help to design the indicators that will be evaluated to measure the impact of the research. The community can also be involved in the knowledge transfer process, translating and appropriating knowledge so it is integrated applicably to them (Nguyen et al. 2020).

However, it is important to note that a benefit perceived by one group at one time and place may be perceived as harmful or damaging by another group at another time or place. We must therefore acknowledge who is involved in delivering research impact, who decides what impact is desirable, and who (dis)benefits. Similarly, it is important to recognise that the relationships between research and impact are complex; a researcher aspiring to achieve one impact may discover unexpected alternative benefits or unintended negative consequences. Relationships between academic and non-academic partners are equally complex, with hidden power dynamics, biases and assumptions often disrupting planned pathways to impact (Langthaler et al. 2012; Scholz and Steiner 2015; Wanner et al. 2018; Fritz and Meinherz 2020). Recognising the inherently subjective nature of impact may be the first step that many researchers take towards recognising their own subjectivity and positionality as researchers, and recognising the multiplicity of ways that knowledge can be constructed and used to generate

benefits for others [guidance exists on operationalising this in a range of settings, including policy (e.g., Cairney 2021), international development (e.g., Brissett 2020), working with Indigenous groups (e.g., Woodward et al. 2020; Gewin 2021) and transdisciplinary research (e.g., Pohl et al. 2017; Dannecker 2020)].

Given these challenges surrounding the generation and evaluation of impact, we believe it is important to define research impact in relation to both perceptible and/or demonstrable benefits (after Reed et al. 2021), to emphasise the role of perception, and the implicit value judgements that inform the perceptions of non-academic research partners and others interested in or affected by research. We also want to draw attention to the focus of existing definitions (e.g., Research England 2014; Reed et al. 2021) on pre-defined (groups or classes of) individuals, organisations and society and seek to emphasise the need for those affected by research to self-identify and judge the outcomes of research in their own contexts, against their own criteria and values. We do not refer to publics and stakeholders, which may imply a hierarchy in which researchers determine "who's in and why" (Reed et al. 2009: 1933), and has echoes of colonial practices where settler became stakeholders as they staked their claim to Indigenous lands (Reed 2022). Instead, we refer instead to academic and non-academic research partners, recognising that the research may be led by academic or non-academic partners or co-led, and where people are not directly engaged in the research but are interested, have influence and/or may be impacted, we refer to interested/affected groups, after Freeman's (1984) definition of stakeholders.

Key considerations for re-thinking research impact

Here we outline three key considerations that we believe influence the design of engagement processes, increasing or decreasing the likelihood of outcomes that are perceived as beneficial by interested/affected groups and non-academic partners: (i) context, (ii) voice and (iii) power. These considerations have been identified based on the nascent literature on the impact of environmental research and our own subjective experiences working within research processes aimed at generating impacts.

Context

The first of our three considerations is *context*. A lack of appreciation for the context in which research is conducted and impacts are planned can lead to a range of negative unintended consequences (see Norström et al. 2020a, b). Context goes beyond simply considering the social-ecological (Ban et al. 2013), policy (Reed and Cairney 2021), governance (Lange et al. 2013), historical (Cook et al. 2021), political (Cairney 2021), or geopolitical systems (Leenhardt et al. 2013) within which research is embedded. Zimmermann et al. (2007) defined five types of context that need to be considered, each of which interact: individuality; activity; location; time; and relations. Building on this, Bell and Reed (2021) identified seven contextual factors influencing the outcomes of engagement processes: time; space; power; process design; history; politics; and culture. Focusing on the temporal dimension of context, Bell and Reed (2021) identified a range of contextual factors that can empower or disempower interested/affected groups and non-academic partners before (e.g., historical and structural factors that could marginalise or exclude different groups), during [e.g., agency, including freedom (from fear), and access to the resources and other means necessary to actively participate] and after an engagement process (e.g., social connectivity to feedback loops that keep people informed about how their knowledge is being used). By working to understand context, and how context affects our ability to deliver impact, it may be possible to improve the capacity of research, actions, and pathways to provide context-specific, and therefore more relevant, impact. By taking context into consideration more systematically (e.g., following Zimmermann et al.'s 2007 analytical framework), researchers are much more likely to become aware of the broader external factors that may influence whether their research can deliver impact, and whether these impacts may be perceived to be beneficial or harmful. In practical terms, Reed et al. (2018) argue for the use of "stakeholder analysis" to identify key groups with which impact plans can be co-produced, using logic models or Theory of Change approaches to capture the needs and contexts of beneficiaries. Similarly, Pohl and Wuelser (2019) proposes actor constellation analysis that uses role-play methods for identifying the relevance of various involved actors for tackling a specific research question, and Bell and Reed present a conceptual framework, the "tree of participation", that can be used to design engagement processes with context in mind.

Seeking deep understandings of a plurality of local processes or perspectives, rather than trying to generalise universal rules or extrapolate to other contexts, requires specific research approaches and designs. For example, place-based and ethnographic research that emphasises context can tend to be associated with relativist ontologies and subjective epistemologies (for a detailed description of ontology and epistemology, and their relationship to research, see Moon and Blackman 2014). While such research approaches can result in highly relevant, context-specific knowledge, and impact, they can fail to deliver on broader academic metrics of success, such as 'generalisability', 'transferability' and 'reach'. Alternatively, an interpretivist approach to impact

generation may enable non-academic research partners to critically evaluate and interpret the meaning of both local and scientific knowledges, adapting relevant insights from each source to local contexts. For example, Reed et al. (2009) ran focus groups with local communities in the Kalahari, Botswana, evaluating environmental management options arising from positivist science (from the literature) alongside options arising from local knowledge (from interviews and oral histories with local people), leading to the development of new hybrid options adapted to reduced labour availability and environmental degradation.

In summary, it is important to consider context in the generation and interpretation of impact if we want to generate outcomes perceived as beneficial by non-academic partners. An understanding of context enables us to appreciate the perspectives of supposed "beneficiaries", who may perceive planned impacts as compromising or damaging their interests or worse. This calls for a deeper understanding of context than simply assessing the compatibility of an outcome from research (such as an agricultural innovation) with biophysical systems or local political or institutional structures. It requires an understanding of social worlds, as they interact with and transform the physical world. Such understanding is an essential prerequisite for genuine co-production of research and impact, which has the potential to lead to more environmentally sustainable and effective outcomes from research that meet the needs of those who engage with the research process (Reed 2008; de Vente et al. 2016; Norström et al. 2020a, b). It is therefore essential to engage these actors early and throughout the research process, as well as considering who might become disempowered or disadvantaged as a result of the research or planned pathway to impact.

Voice

A second consideration as we re-think impact is that of *voice*. Who is given voice (and who has the power to choose who is given that voice) in any research and impact generation process matters. Attention to voice, through effective representation of the interests of interested/affected groups, was considered among the most important predictors of environmentally sustainable and socially desirable outcomes from engagement processes by de Vente et al. (2016) and Fritsch and Newig (2012). However, de Vente et al. (2016) and others (e.g., Reed et al. 2018) have emphasised the dependence of such outcomes on effective facilitation, especially when marginalised groups are represented alongside more powerful groups who may have played a role in the suppression of their voice previously.

Conversely, poor representation of beneficiary needs and interests can be a major barrier to impact, leading to the generation of unintended consequences for the interests of groups who were not engaged (Cooke and Kothari 2001; Adams 2008). This is particularly problematic when such groups are already marginalised, further delegitimising local knowledge, undermining trust and further marginalising and alienating vulnerable people (Bell and Reed 2021). Indeed, Fritsch and Newig (2012) conducted a case-survey meta-analysis of environmental management publications involving participatory approaches, many of which were initiated and written up by researchers, and found that research in which representation was skewed towards certain groups and excluded others, led to a bias in outcomes towards the interests of over-represented groups, typically at the expense of already-marginalised groups. Similarly, Few (2001, 2003) describes a situation, which he terms 'containment of participation', whereby more 'powerful' individuals (as described in the next section) or groups can consciously or subconsciously steer participation towards support for a specific epistemology, method, or even a predetermined outcome, by forging tactical alliances and blocking dissent.

Thus, researchers need to systematically consider the (sometimes competing) interests, values, knowledges, beliefs, norms and worldviews of their partners (including both individuals and groups) as they change over time in response to changing social and political contexts or changes in the personal circumstances of participants. In this way, it may be possible to avoid over-representing those most easily accessible to researchers (Colvin et al. 2016) and to represent, legitimise and amplify the diversity of perspectives and realities voiced by different groups (Moon et al. 2019). This typically calls for more relativist (rather than realist) conceptions of the world and research that constructs meaning in more subjective (rather than objectivist) ways that accept the potential for multiple competing realities and interpretations of reality (rather than searching for generalisable truths). Research that takes these sorts of ontological and epistemological positions may take an interpretivist research philosophy in which data are interpreted in context (see examples in the previous section), including methods such as oral history, biography or semi-structured interviews to generate qualitative data, which may be analysed using methods like Grounded Theory Analysis, which allow insights to arise inductively rather than externally imposing the voice of theory on the ideas that people expressed. Approaches based on critical theory, including emancipatory, feminist, participatory and action research, are designed to not only give voice to all those affected by an issue, but to give them the power to transform their worlds, using, directing and often leading research as one of many tools in that process. Methods here may include for example, cross-cultural research, ethnography and transect walks. While most of the methods used in these philosophies generate qualitative data, methods like longitudinal social network analysis generate insights from quantitative data and Reed et al. (2019) combined social

network analysis with semi-structured interviews to understand how knowledge was interpreted and transformed as it passed through social networks prior to generating impacts in policy and practice. Quantitative models may include issues of power and justice, and may control for contextual conditions, and as such, generalisability is not incompatible with context-sensitivity.

These research philosophies tend to focus on in-depth research in partnership with interested/affected groups to understand the complexity, subjectivity and contextual nature of their knowledge and perceptions. As a result, "stakeholder analysis" is typically used to ensure all voices are fully represented (Reed et al. 2009), before considering how these voices might be amplified and legitimised as part of an engagement process. Extending traditional interest-influence matrix approaches to stakeholder analysis, Reed et al. (in preparation) propose three criteria for identifying and prioritising interested/affected groups: interest, influence and impact. They argue that each should be considered in both its positive and negative form to provide an ethically robust analysis that can just as effectively identify hard-to-reach, marginalised voices as it can identify the "key players". It asks: who is interested in the issue/research, and who is not; who has the influence to facilitate or block benefits from arising for different groups; and who is likely to be impacted positively or negatively as a result of the issue/research (whether directly or indirectly). Now in addition to identifying key players who are highly interested, influential and likely to be positively impacted, it becomes possible to systematically identify hard-to-reach groups who are not currently interested, have no influence (either to facilitate or block), but who would be positively impacted, if only it were possible to make the work relevant enough to them and empower them to engage meaningfully in the process.

However, while this may be done with the best intentions of ensuring different groups are adequately and equitably represented and given voice, unintentional misrepresentation may occur when researchers are not mindful of their own power and privilege in deciding who can, and cannot, participate in research and impact processes (Colvin et al. 2016). Assumptions may be made about what would be best for different groups without them being present to participate in the discussion, or certain perspectives or knowledge bases may be inadvertently elevated to the exclusion of others (Hajer et al. 2015).

As such, we turn to focus on voice here, as the embodiment of empowered and equitable representation. Adequate consideration of voice means identifying all relevant interested/affected groups and then giving them the opportunity and capacity to actively engage in the research and/or impact generation process as equals. Creating the opportunity for identified groups to engage as equal partners in the research and/or engagement process requires consideration of the barriers that may prevent engagement, for example providing childcare, avoiding certain times of the day or year, adapting the design of engagement to cultural norms or making payments to cover the opportunity costs of engagement. Ensuring adequate capacity for engagement requires an assessment of the capabilities required for full involvement, for example ensuring engagement in relevant languages or providing interpretation, ensuring everyone has access to the same level of background knowledge to enable high-level discussion, and catering for both literate and illiterate participants.

In summary, an explicit commitment to representing and empowering multiple voices in the research and impact generation process is essential for research to generate outcomes that are perceived as beneficial to interested/affected groups and non-academic research partners. The more representative a process is, the more potential it has to amplify diverse and potentially conflicting voices. As such, giving voice to diverse groups does little to increase the likelihood of consensus. However, where representation has been facilitated and effectively managed, there is a greater likelihood that those engaged are willing to live with (rather than constantly revisit or undermine) outcomes they perceive as fair and transparent, and respect the needs and preferences of groups who might otherwise not benefit from the research process (Fritsch and Newig 2012; Reed 2018). Such information may deliver important insights about what might need to be changed to ensure an impact pathway actively mitigates negative consequences, especially for marginalised groups, and delivers outcomes that are perceived as beneficial by these groups (e.g., Bennett et al. 2017).

Power

Our third and final consideration as we re-think impact is that of *power*. The processes through which knowledge is created, shared, and used to generate impact are mediated through power relations and dynamics, including overt and covert forms of "power over" and "power with". Overt power involves the direct and observable exercise of power, for example to achieve compliance with regulations or social norms, whereas covert power tends to be less easily observed, as it may be implicitly integrated with institutional structures and processes easily (Clegg 1989).

Lukes (2004) suggests that power can be considered along three dimensions: the ability to influence decisions, prevent decisions being made or shape perceptions, preferences and decisions. The first dimension is typically overt and is typically viewed in instrumental terms as the ability of an actor to mobilise resources or other power bases to change a decision in their own self-interest. Of course, the power to influence decisions could be wielded by coalitions of actors for a wide range of purposes. The

second dimension is the power to prevent decisions being made and it can be either overt or covert, for example by preventing particular groups being represented or topics being raised, or narrowly framing issues in ways that excludes certain non-academic partners and their interests. The third dimension is a more covert, subtle and slowly developing form of power to change hearts and minds, shaping values and beliefs, which in turn might shape decisions and actions. Managing covert power in the research and impact generation process typically requires strategies such as negotiation, adaptation, compromise and concessions (Aaltonen and Sivonen 2009; Chinyio and Akintoye 2008), whereas more covert power dynamics require a deeper understanding of the existing values, beliefs, histories and agendas of participants, and methods for making these explicit (for example by running a pre-workshop questionnaire to identify values and discussing these explicitly through storytelling exercises), or reframing issues and positions to re-legitimise actors and their interests (Mahalingam and Ninan 2019). It also requires a de-centring of Western knowledges and research approaches to amplify other ways of viewing the world and 'doing' research (Panelli et al. 2009).

If our fundamental aim is to deliver impacts that are perceived as beneficial by interested/affected groups and our non-academic partners, we must look harder at the power dynamics in our research projects and impact pathways, and how these are perpetuated by funding and research assessment processes. Appropriate consideration of context and voice will benefit from a better understanding of how power is distributed within knowledge systems, and identify whether power may need to be redistributed if we are to achieve meaningful and transformative change. One of the key steps of better navigating power will be to go beyond simply addressing observable power hierarchies of governance and process (Gaventa 2006). We must also think about the broader enabling environment, and the deeper, less visible, power structures that facilitate or constrain change (Green 2016). Researchers and funders should aim to reflect on the more nuanced and sophisticated ways they may be able to identify, acknowledge, and redistribute power in their work (e.g., Reed et al. 2009; Bennett et al. 2017). Such emancipatory research seeks to facilitate "a politics of the possible by confronting social oppression at whatever levels it occurs" (Oliver 2007: 110). Oliver (1997: 16) went on to assert that "it is not possible to research oppression in an objective or scientific way….you cannot be independent in research oppression; you are either on the side of the oppressors or the oppressed." In their typology of roles researchers can play in policy networks, Reed and Cairney (2021: 30) defined the role of campaigner, including the explicit recognition and communication of personal values

underpinning research and impact, the promotion of specific policy recommendations to tackle unresolved issues, and the democratisation of the policy process "by giving a voice to marginalised groups whose perspectives you think should be heard alongside the more formal, codified forms of evidence you might be presenting as a researcher". Ultimately, thinking more critically about power will enhance considerations for context and voice, and could identify new and important opportunities for redistributing power to ensure our research can deliver impacts that are perceived as beneficial by interested/affected groups and non-academic partners.

Designing research and engagement for context, voice and power

How we design a research project or impact pathway should reflect its purpose and the desired outcomes, as well as the ontology and epistemology of the academic and non-academic research partners, and their assumptions and beliefs about the issues they wish to study or address (Moon et al. 2021). It is therefore important to consider how we design an impact process to ensure it adequately accounts for the nuances of context, voice and power discussed in the previous sections, and enables critical reflection on the positionality of the researcher in relation to their non-academic research partners and other interested/affected groups. Effective and appropriate design will help to ensure that the research and impact pathways maximise our opportunities to deliver positive benefits for all interested/affected groups and collaborators, while minimising the potential for unintended negative outcomes. In thinking harder about design, we can ensure our impact processes are appropriate and effective for all those who participate in the research process.

It is important for the researcher to be aware of their own biases and assumptions, as these influence the design of research and engagement, and be transparent about any real or perceived biases or assumptions that might exist (Cvitanovic et al. 2021b). At the most fundamental level, there may be ontological differences in the ways that different academic and non-academic research partners see the world, perceive reality and understand the nature of the issue they are exploring together. There may also be epistemological differences in the ways that each of these individuals perceive knowledge, including how it is created and what constitutes sufficiently valid knowledge for application, to generate impact. Depending on the training of both academic and non-academic partners, there are often strong biases in the environmental community towards ontologies that view the world as understandable in objective terms and hence pursue positivist, rationalist epistemological approaches to derive generalisable solutions with as much certainty as

possible. There is often an implicit hierarchy in this community, where more subjectivist approaches are considered suspect, leading (in the best case scenario) to solutions that are only applicable within the narrow context in which they were researched, and (in the worst case scenario) to bias and political influence.

Following Godrie et al. (2020), rather than attempting to turn this hierarchy on its head and critique the idea of the neutral, independent and objective researcher, we seek to enable researchers from traditions that prize these characteristics to become aware and accept the validity of alternative ways to view reality and knowledge. In this way, it may become possible to build impact on a foundation of research and engagement that is designed to incorporate plural and non-hierarchical ontologies and epistemologies. As such, it may be possible to empower more responsible and two-way learning between academic and non-academic partners with very different ontological perspectives on the nature of what is being studied. The outcome of dialogue at this level should inevitably be to influence the way in which an issue is studied, and as researchers become increasingly embedded within the realities of those they seek to help, they may become more aware of their positionality, privilege and biases. This too should influence the design of both research and engagement, enabling a more genuine co-production of knowledge and its application, in ways that are responsive to local social-ecological contexts, and the very different lived experiences of those who interact with those contexts. In this way, it may be possible for researchers to become more reflexive and aware of power relations in their research and engagement with non-academic partners (Godrie et al. 2020). This reflexive awareness may include reflection upon social interactions and practices that position different academic and non-academic partners in power hierarchies, and reflection on the broader epistemic, social and political context in which these interactions take place.

This is something that is increasingly recognised in Indigenous studies, and is now integrated into University research and impact strategies across Australia, New Zealand and Canada (Reed et al. 2022), as institutions grapple with their responsibilities to enable Indigenous people to "decide what is best practice in working with our knowledge" (Woodward et al. 2020: iv), and build capacity, engagement and impact with and for communities that were previously exploited under colonial rule. While aimed at enabling the appropriate use of Indigenous knowledge, Woodward et al.'s (2020) best practice guidelines may also provide useful advice for researchers working with interested/affected groups and non-academic partners in other contexts. For example, they emphasise the need to strengthen the governance of Indigenous knowledge to avoid its appropriation for research or other purposes that would strip the original knowledge owners of any power over how their knowledge is used.

However, they also emphasise the value in "weaving" knowledge from Indigenous people and researchers, using tools that are Indigenous-led and co-developed, explicitly managing power dynamics and promoting the inter-generational transfer of knowledge. Cook et al. (2021: 379) take this a step further to suggest that the goal should be to explicitly challenge "the traditional hierarchical hegemony of the external expert in research situations", to disrupt the beliefs and assumptions underpinning dominant knowledge systems and so make for "other voices and knowledges being recognised and acted upon". In parallel with this, communities of practice have grown up around community-engaged research, action research and community-based participatory research, which seek to do research in service to the needs of communities, co-producing and applying findings in practice and building long-term working relationships with community partners (Israel et al. 2013; Wallerstein et al. 2018; Parker et al. 2020). These and other similar approaches to research have the potential to underpin impact through trust building (between individuals and institutions) over time and the development of bonding, bridging and bracing connections between academic and non-academic partners, often mediated via boundary organisations and knowledge brokers (Reed and Fazey 2021; Cvitanovic et al. 2021b).

However, while there is increasing interest in the role of co-production (Miller and Wyborn 2018; Howarth and Monasterolo 2017; Djenontin and Meadow 2018; Nel et al. 2016; Chambers et al. 2021), it is important to consider that co-production may not be the most appropriate design for every project, nor the most feasible approach to take (Reed et al. 2018). For example, Beier et al. (2017) suggested that co-production can be expensive, time-consuming, and difficult to do well, and so may not be the most appropriate approach in all situations. The choice for design must also consider the time- and resource-limitations of interested/affected groups and non-academic partners to ensure benefits are maximised within the possible margins of each project. Instead, Reed et al. (2018) propose adapting the level of engagement to the purpose and context of the process, using a "wheel of participation" to legitimise four types of engagement (each with examples of implementation in the sustainability literature): top-down, one-way communication and/or consultation; top-down deliberation and/or co-production; bottom-up, one-way communication and/or consultation; and bottom-up deliberation and/or co-production.

Similar issues have also been raised in relation to open access initiatives that seek to democratise knowledge by making research data openly available for scrutiny and use. Open Science builds on the learnings of the Open Access movement and seeks to re-evaluate the role of research in a rapidly changing world by critiquing the status quo of knowledge production by "reassessing the power relations in our knowledge infrastructure, and by arguing that scientific

knowledge needs to be managed in collaboration with those who help generate it and will benefit from it". Open Science aims to develop the capacity for scientists—whether citizens or experts—to think, to search, and to publish and communicate valuable local knowledge. Open Science is now embedded in the European Commission's Horizon Europe programme, requiring beneficiaries of funding to make publications available in open access, and data as open as possible (European Commission 2021). However, when data have been collected by researchers in the global South, there is a danger that under-resourced researchers are unable to fully publish from their data before better resourced researchers from the global North exploit their data (Dwivedi et al. 2021). This could inadvertently further reinforce disparities between publishing patterns between the global North and South; for example, French-speaking Africa produces less than 0.01% of world scientific production.

Partly in response to this, the Open and Collaborative Science in Development Network from the Global South has developed a Manifesto of seven values and principles for a more inclusive and open science in development. The key principle is addressing the role of power and inequality in knowledge production, other principles suggest practicing "situated openness", where history, context, power and inequality are made explicit in the scientific research. "Community-research contracts" ensure more collaborative and reciprocal research practices that define the conditions under which knowledge can be shared (Traynor and Foster 2017).

It is clear that each of the three considerations discussed above are interrelated. Context will influence who has voice, which will in turn influence whether this process will need to consider redistributing power dynamics if it is to deliver meaningful change. For example, Colvin et al. (2015) found that a deeper understanding of context (including governance arrangements, how deliberations were undertaken, the conduct and interactions of participants and conflict legacy), was necessary to understand the "sometimes invisible social structures which underlie environmental and natural resources management", that might otherwise constrain the potential for social benefits to arise from research. Similarly, Colloff et al. (2017) addressed power imbalances and inequity as key for conservation adaptation and impact. However, given their inter-related nature, it is important to bear all three considerations in mind from the outset of any research project and impact pathway.

In Fig. 1, each of the three considerations (sensitivity to context, representation of diverse voices and the management of power dynamics) are visualised as three overlapping trees, which grow out of research and engagement that is designed to incorporate multiple ways of viewing reality and knowledge. As discussed above, effectively designed research and engagement processes are able to adapt to context dynamically, considering the positionality of the
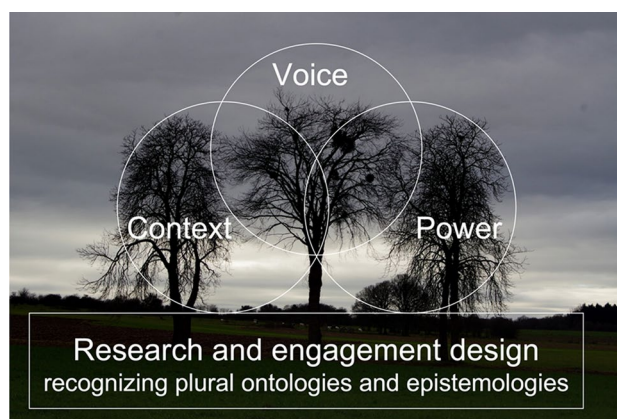

Fig. 1 Three considerations for re-thinking how research may lead to outcomes that are perceived as beneficial by interested/affected groups and non-academic partners (sensitivity to context, representation of diverse voices and the management of power dynamics). These grow out of research and engagement that is designed to incorporate multiple ways of viewing reality and knowledge (photo credit: Lode Van de Velde; CC0 Public Domain)

researcher and the role of history, culture and social factors that could limit the potential for impact, or contribute towards the generation of negative unintended consequences. The design of the research or engagement process is a major factor dictating whose voice is represented and heard, and process design can help avoid the emergence of unhealthy power dynamics or make their management easier. Finally, each of the tree canopies and unseen root systems overlap, representing the complex interactions, both seen and unseen, between the three considerations. It is impossible to fully understand or represent the voices of all those with a stake in the issue or research without understanding the context in which people found or lost their voice. Who is represented and who speaks (loudest) influences power dynamics, which in turn shuts out (or down) or gives voice to others, sometimes in subconscious, implicit and unseen ways.

By not adequately understanding and accounting for the three considerations described in Fig. 1, projects risk delivering unintended negative impacts, or no impact at all. In contrast, projects that understand and account for these considerations, may increase the likelihood of achieving impact, and may be able to more effectively navigate these complexities by integrating theseconsiderations in their design. In addition, by better designing research and engagement for different contexts, power dynamics and voices, projects can work towards delivering impacts that are perceived as beneficial by non-academic partners. In doing so, it is not possible to fully account for the complexity and unpredictability of global challenges, but research can become more responsive and reflexive, to better navigate change and complexity and deliver meaningful impact.

Conclusion

The international research community is beginning to pay closer attention to the ways in which we can develop more inclusive and participatory research processes, which can account for the subjective nature of impacts, as they are perceived by those who engage (Beier et al. 2017; Lang et al. 2012; Pascual et al. 2017; Nel et al. 2016; van der Hel 2016; Cvitanovic et al. 2019). Projects may be designed as a communicative (one-way flow of knowledge from interested/affected groups and academic partners to non-academic partners; Reed et al. 2018), consultative (one-way from interested/affected groups and non-academic partners to academic partners; Rowe and Frewer 2005), deliberative (two-way knowledge flow; Kenter et al. 2014; de Vente et al. 2016), or co-productive (joint production of knowledge; Miller and Wyborn 2018; Howarth and Monasterolo 2017; Chambers et al. 2021). Some projects will rely on boundary work (e.g., a knowledge broker or boundary organisations) to help better navigate the spaces between the considerations for context, voice, and impact (Cvitanovic et al. 2018; Bednarek et al. 2018).

However, such changes need to penetrate more deeply and widely into the knowledge system than a focus on projects or individual researchers can facilitate. Reed and Fazey (2021) call for a move away from the top-down strategies and plans of corporate impact cultures, and the implicit conflicts of interest they create for researchers (e.g., who may be able to use impacts in career progression, to get research funding or in the case of the UK's REF, generate significant quality-rated income for their institution). Instead, they argue for a move toward change driven by academic and non-academic research partners themselves in more co-productive impact cultures. Rickards et al. (2020) refer to this as a shift from first- and second-generation impact cultures to third-generation cultures. In first generation impact cultures, impact is viewed as an 'add-on' to research in which societal issues are 'rendered technical' (Li 2007, 2011) by transforming complex, context-specific issues that are typically beset with power struggles into depoliticised, technical problems (Weinberg 1966), which can then be solved via technical interventions (Ferguson 2006). In reality, the process of technical rendering is itself a political act as it centres and privileges technical expertise and formal, codified and generalisable forms of knowledge as more legitimate than informal, tacit and localised knowledge (Houde 2007). In so doing, the experts who control the processes of knowledge generation and dissemination may ignore the social and institutional structures that have historically marginalised those in greatest need. Second generation impact cultures integrate engagement earlier in the research cycle and are more two-way, focussing on improving "research impact literacy" (Bayley and Phipps 2019) across the institution and equipping researchers at all career stages with the skills they need to understand and meet needs among interested/affected groups and non-academic research partners.

In contrast to the current paradigm, which is dominated by first- and second-generation approaches, third-generation impact cultures question the assumptions underpinning current conceptions of impact and see researchers as part of a knowledge ecosystem, as opposed to seeing our evidence as the sun around which other actors should gravitate towards and then orbit around. The emphasis on systems thinking attempts to appreciate the range of inter-connected challenges towards which research might contribute evidence and generate impact, and how these are embedded in historical, socio-cultural, political and other contexts (Hall et al. 2006; Zimmermann et al. 2007). In this context, attention shifts from technical fixes, universal solutions or best practice drawing on expert knowledge, to best fit (Birner et al. 2006), good practice and context-specific options, drawing on diverse knowledge systems (Cook et al. 2021) and co-learning, co-design, and co-innovation processes (Bawden 1992; Gardien et al. 2014). Similar maturity models have been noted in the fields of policy engagement and agricultural extension, with the idea of expert-based advice and technology transfer being replaced with an increasing recognition that the role of policy analysts is inherently subjective and political (Cairney 2021), and the role of extensionists is to legitimise and empower groups and practices that have arisen in response to local socio-political and economic realities (Cook et al. 2021). In the context of extension, Cook et al. (2021) present a maturity model similar to Rickards et al. (2020) moving from technology transfer (first generation), towards participatory and then more decentralised models of advice (second generation), before moving towards systems thinking (third generation). However, simply understanding the complexity of the often-exploitative systems we seek to change does not necessarily lead to systemic change (Eidt et al. 2020; Turner et al. 2020). The very act of seeking to develop systems thinking may inadvertently solidify existing power structures, if led by those who currently hold power within the system, no matter how well meaning such attempts might be. It is therefore important to consider how transforming systems can contribute towards distributional justice (recognising the impacts of decision on and sharing benefits fairly between different groups across space and time), recognitional justice (recognising and valuing the rights, knowledges, worldviews, histories and cultures of these different groups) and procedural justice (ensuring inclusive and empowered participation of these groups in decisions that affect them) (Bennett et al. 2019). In this way, it may be possible to achieve just transformations of knowledge systems that foreground the knowledge and needs of diverse groups, including those who have been

historically marginalised, without systematically recognising or privileging one group over another or concentrating benefits among some groups at the expense of others. To operationalise third generation impact cultures, Reed et al. (under review) consider the role of institutional impact strategies, distinguishing between "achieving impact" strategies (with an emphasis on engagement, co-production, boundary organisations and detailed implementation plans) and "enabling impact" strategies (with more of an emphasis on building impact capacity and culture across institutions). Reed and Fazey (2021) go on to emphasise the need for such institutional strategies to be embedded within a wider culture change process, facilitating the development of co-productive impact cultures, characterised by individual autonomy and intellectual freedom, with limited need for institutional co-ordination, giving rise to specific impact goals co-produced with non-academic research partners as a primary consideration in research (as opposed to individualistic, research "and impact" or corporate impact cultures).

As more researchers work at the science-policy interface, there needs to be a stronger awareness of the ways research is mediated, and impact enabled or constrained, by context, power and voice. While it is difficult to predict whether pathways to impact will succeed or fail, it is possible to better understand the broader enabling factors that enhance our opportunities to deliver the positive benefits that are sought. While we do not pretend to offer a solution for the complexities of all research impact pathways, we contend that a better understanding of the key considerations outlined in this article will help us better navigate this complexity and improve our ability to design pathways to impact that are more likely to deliver outcomes that genuinely benefit non-academic research partners and others who may be interested in or affected by our work.

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