

Communicating climate change and biodiversity loss with local populations: Exploring best-practices and postcolonial moments in eight case studies from across the globe

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Abstract

Climate change and biodiversity loss trigger policies targeting and impacting local communities worldwide. However, research and policy implementation often fail to sufficiently consider and involve them. Therefore, we present the results of a collective self-assessment exercise for eight case studies of communications regarding climate change or biodiversity loss between project teams and local communities. We develop eight indicators of good stakeholder communication, reflecting the scope of Verran (2002)'s concept of postcolonial moments as a communicative utopia. We demonstrate that applying our indicators enhances communication, although we discover a divergence between timing, complexity, and (introspective) effort. Three cases qualify for postcolonial moments , but scrutinising power relations and genuine knowledge co-production remain rare. While we verify the potency of various instruments for deconstructing science, their sophistication cannot substitute trust-building and epistemic/transdisciplinary awareness. Lastly, we consider that reforming inadequate funding policies helps improving the work in and with local communities.

1. Introduction

Climate change and biodiversity loss are concepts born and refined in global fora (Wilson, 1988, 1992; Radkau, 2011). The respective discourses, which are dominated by concepts of the Global North (Ducarme et al., 2020), take place among scientists, politicians, civil servants, and highly specialised segments of civil society.^[1] The concepts are based on the post-enlightenment consensus that humans and nature follow different rationales (Hinchman and Hinchman, 2001; Whyte, 2019). Although the two concepts have different origins (Zaccai & Adams, 2012), both generate discourses seeking sustainability, trigger public policies, and impact communities worldwide (Pascual et al., 2021; Ansari & Holz, 2020).

Anybody who has conducted transdisciplinary research or organised community-focused activities has probably noticed the stark asymmetries that occur when communicating topics related to climate change or biodiversity loss (Goldman et al., 2018). Since technoscientific representations of quantifiable causes and effects often remain alien to local perspectives, such terms typically encounter a lack of comprehension on the local level. Research on transdisciplinary science communication (Fischhoff, 2011; Jahn et al., 2012; O'Lear, 2015; Schönenberg et al., 2017) demonstrates that we do not deal with a mere communicative gap but an entire cascade of tangible barriers in approximating 'the local' (Brosius et al., 1998; Whyte 2019).

Nonetheless, thoughtful communication has a pivotal influence on successful research and joint project/policy implementation (Leombruni, 2015). Yet, it is especially the creative co-production of knowledge that requires attention (Howarth & Monasterolo, 2017). Ostrom (1996) defines co-production as a process in which a common product is created through the contribution of actors from different organisations. Accordingly, co-production can improve the effectiveness of research by linking it to community preferences and needs, which contributes to feasible solutions. Hence, co-production addresses the 'relevance gap' towards solving common problems (Durose et al., 2012).

Furthermore, policies often seek to include local actors through co-managing natural resources for conservation, mitigation, and adaptation strategies (Devine-Wright, 2013). However, neglecting to include communities during the various stages of a project creates a gulf that can hardly be bridged afterwards, ultimately eliciting failure to achieve intended goals or even causing collateral damage (Schönenberg, 2019). For example, although the UN Conference on Environment and Development acknowledged the value of indigenous and local knowledge for sustainable resource management back in 2002, bridging the communicative gap between different knowledge systems has not been adequately included in development or research programmes (Matuk et. al, 2020). The success of climate and biodiversity goals depends on adequate communication and the agency attributed to local communities^[2]; there are still many gaps and barriers to address (Lambert & Beilin, 2021; Fernández et al., 2015).

In this article, we pick up these threads by examining how project teams actually communicate with local communities within the context of projects addressing climate change or biodiversity loss—and reflect on best practices and their own perception of diverging concepts.^[3] We analyse eight case studies that present such interactions during and after field work in eight different countries (covering four continents). Each case study involves a specific set of approaches towards making global concepts accessible and connecting them to indigenous and local knowledge. We evaluate the case studies based on a set of eight indicators. They are derived from the critical literature on the communicative status quo as well as Verran's (2002) communicative utopia of *postcolonial moments* projecting disruptions of epistemic power relations, which foster the co-existence and discursive construction of alternative knowledge systems. Postcolonial moments are also part of the endeavour to increase the agency of local actors. Hence, our indicators suggest where communicative processes should start connecting co-produced knowledge to sustainable transformation processes at the local level (see also Norström et al., 2020; Hill et al., 2020; Wyborn et al., 2019).

Method-wise, we draw learnings from evaluating the case studies based on our indicators. The case studies originate from our own field work, which is why the approach amounts to a collective self-assessment and a peer-learning exercise. The narrative reflection of our own work alongside the diversity of backgrounds and experiences among the authors ensures a process that mimics an expert survey.

We aim for three contributions: first, we augment the academic discourse on communicating climate and biodiversity issues to the local sphere. Second, the article helps researchers and professionals in the field by providing communicative best practices and highlighting drawbacks to avoid. To this end, the study develops a model of the inner logic of progress towards postcolonial moments as well as tangible and straightforward insights on the benefit of various communicative elements. Third, we hope that the article stimulates a discussion among policymakers, project financers, and perhaps also among local communities on the role of, and requirements for good communication in the context of projects targeting climate change and biodiversity loss.

The remainder of the article is structured as follows: Section 2 constructs a theoretical background and indicators of good stakeholder communication regarding climate change and biodiversity loss.

Subsequently, Section 3 presents and deconstructs the case studies according to various criteria (Appendix and Supplementary Material contain a case study matrix and detailed accounts of the case studies). Section 4 analyses, evaluates, and discusses the case studies, based on the indicators defined in Section 2. Section 5 portrays three best-practice examples of good communication. Section 6 sums up the article's conclusions and offers policy recommendations.

[1] The spectrum can be seen in the participant structure of the Conventions of Biodiversity and Climate Conference of the People side events.

[2] Although these local communication issues arise especially in the Global South, where most top-down measures for combating the consequences of climate change and biodiversity loss are implemented, we would like to emphasise that things are no better in the Global North, e.g. in European agricultural policy.

[3] To this end, we limit the scope of analysis to the (expert) messenger and the message that is being sent, but we do not actively discuss the role of recipients (except for their feedback as to whether the communicative process was successful or not). Furthermore, we do not distinguish between different elements of climate change and biodiversity loss policies and projects but limit ourselves to the communication process of a generic project.

2. Theoretical Background And Indicator Design

Climate and biodiversity are mostly approximated by technoscientific approaches such as computational models of geoscience, ecosystems, the energy economy, and any combinations thereof (see e.g. Gettelman & Rood, 2016; Jeevanjee et al., 2017); much of which is prominently covered in reports by the IPCC and the IPBES. These approaches allow for simplified shifts between global and local perspectives; however, reducing the discourse to models and numbers limits the factual scope of the analysis (Ryngaert, 2016). Quantifiable transformations that rely on de-contextualised approaches (cf. Lacey, 2012) suggest that analysis and solutions are objective; yet, such methods typically neglect social, political, cultural, or local economic aspects (Ansari & Holz, 2019; cf. O'Neill et al., 201 caused by 7; cf. Nash et al., 2020; see also Devine-Wright, 2013). Typically, biases and insufficiencies in data and methods intensify when approximating the regional level (Ansari et al., 2020; Maraun, 2016).

O'Lear (2015) provides a critical perspective with a Science and Technology Studies (STS)-oriented reflection of the technoscientific ontologies of climate change. She finds that the dominant approaches, including the fixation on carbon indicators and their inherent cultural perception biases, obscure collateral damages on the local scale, ultimately causing the perpetuation of injustice in the access to resources. O'Lear (2015:2) links this phenomenon to Nixon's (2011) concept of 'slow violence': "*Slow violence is not a movement, as are environmental justice and climate justice, but it is a concept that focuses attention on latent, gradual, and invisible negative externalities related to mis- or abuse of environmental resources and ecosystems.*"

This aligns with a general marginalisation of local populations by implementing technoscientific environmental solutions without an integral drive towards mutual exchange and dialogue. For instance,

state authorities can restrict the access to natural resources in a protected area, a top-down action that threatens local communities' ancestral livelihoods and their relationship with land or may criminalise local customs, products, and economies (Nygren, 2000; Holmes, 2007; de la Vega-Leinert & Clausing, 2016). Prominent examples are the effects of hydroelectric dams, mining, or agro-industrial activities. Even if the impact of techno-centric top-down action is felt slowly, it is nonetheless violent; it is a gradual loss of agency and life quality that may sometimes be unintentional yet could often have been prevented by appropriate transformation management. Hence, communication may also be the key for preventing slow violence from gradual change caused by secondary effects^[4]. Consequently, the epistemic, financial, and political dominance of the protagonists leading the scientific and global policy process has resulted in predominantly technoscientific approaches and solutions that often fail to consider the abundant sociological and anthropological research covering the issues (Liverman, 2009; Daniels & Endfield, 2009). Such bias is deeply rooted in the history of knowledge production, and scholars rarely explore "the ways in which science can be conceived as being composed of 'travelling narratives'" (Turnbull, 2002:273). Hence, a critical reflection on the origins of scientific presumptions is necessary. Answering James Clifford's (1992) question "*how do theories travel among the unequal spaces of postcolonial confusion and contestation?*": between social media and interdisciplinarity, attention should be paid to circulating narratives transporting fragmented rights and wrongs.

Accordingly, changing the perspective towards a deeper understanding of the perpetuation of unsustainable lifestyles and its overcoming may be crucial, such as proposed by Hulme (2018:335): "*The challenge of responding to climate change is to turn our gaze away from making firmer, newer, or more integrated scientific knowledge and instead to ask why enacting directed change is so hard to accomplish. It is less about asserting firmer facts about the world or constructing less uncertain projections of the future. Rather, it is more about cultivating appropriate public spheres of contestation and deliberation about multiple and diverging worldviews, beliefs, and value systems.*" Hulme emphasises the limited powers of human agency due to the complexity and uncertainties prevalent in climatic systems. According to him, the fusion of method-based scientific and holistic local knowledge—something amounting to a knowledge-perception-narrative nexus—might close knowledge gaps despite different worldviews. Is it probably more than a communicative gap, due to "*the problem that the difficult normative dimensions of the relationship between knowledge, values, and action have not been sufficiently attended to*" (2018:334). This is precisely the path on which we would like to follow up.

The literature covers different examples for bridging the communication gap from diverse knowledge systems and perspectives, such as Mar Delgado-Serrano et al. (2017) for Latin America and Hill et al. (2020) for Australia. However, Verran's (2002) work on postcolonial moments may be the most powerful description of the necessary paradigm shift. In the context of an encounter between Western scientists and Aboriginal landowners for a workshop on fire regimes, in which local knowledge was met with incomprehension and ignorance, Verran highlights the importance of being aware of the various biases towards local knowledge. She (2002:730) describes *postcolonial^[5] moments* as disruptions to "*power relations characteristic of colonising*", involving "*both, making separations, and connecting by identifying*

sameness"; this 'sameness' "is not a dominating universalising", but it "enables difference to be collectively enacted". Postcolonial moments happen when competing knowledge systems find ways to clarify similarities or disagreements in new ways without alienating each other, fostering mutual understanding and interest for a discursive construction of each other's world. This process requires allowing enough time for reciprocal approximation and dialogue towards postcolonial moments of understanding (cf. Dryzek & Pickering, 2018, on ecological reflexivity as a way to reframe sustainability in a context of maladaptive modern institutions).

Why do we consider such postcolonial moments desirable, and what can be gained from them? Assuming that creating an effective communicative level between different knowledge systems is an extraordinary challenge, it is difficult to find reference points for a genuinely non-hierarchical exchange. The concept of postcolonial moments offers identification with a common goal based on the generalisation of comparable practices to achieve this goal. The remaining tension in the construction of sameness can be bridged by the storytelling of practical examples that would fit generalisations, supported by mutual respect for differences. This is where we locate the possibility of theorising jointly, pointing out differences and naming similarities. While academics working in the Global South often find themselves in colonial traditions, the pursuit of postcolonial moments offers the chance to break those power relations and reallocate agency. The latter increases the options for co-production by respecting differences and acknowledging the common colonial past. In the words of Verran (2002:757), postcolonial moments offer "*a starting point for non-hierarchical knowledge exchange between different knowledge systems*". In this sense, the concept connects to creative co-production (Ostrom, 1996), which has been operationalised by Durose et al. (2012) towards closing the 'relevance gap'.

Constructing a discursive space for such exchange on equal terms requires reflecting on power relations, time, and space for communication (Fitzgerald 2004, Latour 1979). Therefore, and building on the theoretical framework established above, we define a set of indicators of good stakeholder communication regarding climate change and biodiversity loss (see Table 1). These criteria reflect the settings of a *good* communicative process as suggested by the interdisciplinary literature covering the co-production of knowledge. (1) implies the (sufficient) allocation of time and human resources to the communicative process (Fitzgerald, 2004; Jahn et al., 2012); (2) deals with the space permeated by power relations in which knowledge production takes place (Latour 1979; Fitzgerald 2004); and (3) refers to the unequal access to natural resources by the different actors involved (Ribot & Peluso, 2003; Dietz, 2018). (4) is necessary to connect to specific knowledge systems and 'the local' (O'Lear, 2015; Brosius et al., 1998), and (5) requires sensitivity from the involved parties as well as a clear and respectful inner attitude (O'Lear, 2015), which can also be fostered by (6) (del Mar Delgado-Serrano et al., 2017). This may lead to (7) and (8) (Verran, 2002).

⁴ Secondary effects are unintended and often neglected collateral damages that arise from policies or projects (such as, for instance, the disruption of fish reproductive cycles or the disappearance of sacred sites by a hydroelectric dam).

^[5] The postcolonial critique investigates the role of cultural forms and systems of knowledge in legitimising and sustaining asymmetrical power relations and the associated processes of exclusion and domination (Omar, 2012; Said, 1978). The foregoing reflections are thus aimed at problematising and calling into question the established concepts and interpretations of development.

Table 1: Indicators of good communication

#	Indicator	
1	An acknowledgement of the role of communication and the resources it requires	
2	An analysis of the local and intra-project power relations	
3	A reflection on environmental injustice	
4	A deconstruction of technoscientific concepts	
5	A de-hierarchisation of communication	
6	An inclusion of local narratives	
7	An appreciation of diverging worldviews, beliefs and value systems	
8	A decentring of knowledge and value systems	

3. Case Study Overview

This section introduces our eight case studies^[6]. They originate from eight different countries in four different regions: Brazil and Columbia in South America, India and Bangladesh in South Asia, Tanzania and Egypt in Africa, and Germany and the British Isles of Scilly in Europe, each one covering a distinct communicative process.

In the Brazilian Amazon, deep carbon measurements in the context of indigenous REDD projects led to the case study “Communicating Climate Change: What's the forest worth?” (Strey et al., 2017). In

Columbia, extensive field work on the management of protected areas provided the basis for the case study “Co-producing and co-learning climate adaptation strategies in biodiversity conservation: lessons from Colombian protected areas” (Múnera & van Kerkhoff, 2019). The case study “Communicating Climate change in the Indian Sundarbans” originates from a remote area of northeast India, where climate change was known as a term though not as a concept. Similarly, the case study “Communicating grassroot stakeholders: Climate change and biodiversity crisis in the coastal Bangladesh” reports from the experience of investigating the consequences of aquatic biodiversity loss in Bangladesh (Hossain & Hasan, 2017). From Tanzania, the case study “Ecosystem Services as a rallying concept in multi-stakeholder workshops on biodiversity management and conservation” covers the usage of an innovative toolbox for stakeholder communication (de Bisthoven et al., 2020). Moving indoors, we also have two case study examples of more conventional communications: the case study “The Aswan DESIRE Workshop on socio-economic impacts of RES in MENA countries” from Egypt (DESIRE, 2017) and the case study from the German Baltic Sea coast, “Dissidence and sabotage to redress scientific bias in communicating desirable coastal land management futures” (de la Vega-Leinert et al., 2018). Our last case study, “Fieldwork experiences from climate change adaptation research on the Isles of Scilly”, covers the experience of extensive field work on a British archipelago on local climate change impacts (Petzold, 2016, 2017).

The Supplementary Material provides detailed narrative accounts of each case study. Moreover, the Appendix contains a compact matrix presenting all case studies with their locations and key facts regarding project context, communication context, duration, and intention, communication recipients, (ex-ante) challenges, instruments used, special achievements, drawbacks, surprises, and main learnings. We defined the categories of the matrix a posteriori to enable comparison.

Each case study is an ex-post empirical observation of a communicative process with a local community or local experts. All dialogues happened within research frameworks or, in one case, capacity building projects that did not explicitly investigate communicative processes. Instead, the researchers developed their communication strategies solely to fulfil their projects' objectives without explicitly considering the topics addressed by this study. Therefore, the variety of contexts and communication instruments provides a valid basis for analysing the determinants of successful communication and for extracting conclusions and recommendations that may be extrapolated.

[6] The case studies were selected from a pool of more than 20 case studies responding to a call by Ansari & Schönenberg.

4. Analysis And Discussion

This section discusses the case studies. We start by assessing the case studies based on the eight indicators defined in Section 2. Subsequently, we discuss to which extent the indicators have proven to be a valid measure of communicative achievements. We then move forward to identifying best practices and their determinants among the case studies.

4.1 Assessing the case studies

We start with an individual assessment of each case study, summed up in Table 2.

In the **case study from the Amazon rainforest (Brazil)**, researchers communicated with indigenous people to gather research data on deep carbon, and, in a second step, to provide the communities with the respective data for REDD+-negotiations. The second goal was formulated after a sound reflection of power asymmetries and environmental (in-)justice in compensation schemes. However, the research project neither foresaw knowledge co-production nor transfer towards the researchers. On the contrary, the communication was limited to a unilateral presentation of scientific facts by deconstructing carbon towards energy. Since the community perceived the communication as a mere top-down event, indigenous leaders remained indifferent to the research results, despite their explosive political nature. Instead, they showed interest only in practical matters such as carbon pricing. During a joint field trip with indigenous youth, it became clear that the technoscientific conceptualisation of climate change (i.e. *something to be measured*) prevented a more profound knowledge exchange.

In the **Colombian case study**, most indicators of good communication were eventually fulfilled. Extensive consultation during the project and translations of the relevant material to the local language contributed to the communications' de-hierarchisation, which was also apparent during the workshops. The project set out to deconstruct the technoscientific framing of climate adaptation and biodiversity conservation by creating engagement between belief and knowledge systems, analysing the institutional factors shaping decision making, eliciting stakeholders' past experiences with change. They included local narratives to work with 'future proofing', drawing from shared ideas about the benefits for protected areas, and built a baseline of climate-change-related knowledge. The researchers have shown a deep appreciation of the local in mentioning that "local knowledge on adaptation can be as important as science for informing decisions". The team has proven diligence by adjusting the resources allocated for each workshop individually and timing, location, and context.

Table 2: Indicators of good communication in the different case studies

Remark: an empty cell marks no significant fulfilment, '+' marks fulfilment, '++' marks strong fulfilment of the indicator

Case Study Indicator	Amazon Rainforest (Brazil)	Columbia	Mousuni Island (India)	Shyamnagar Upazila (Bangladesh)	Aswan (Egypt)	Lake Manyara Basin (Tanzania)	Baltic Sea (Germany)	Isles of Scilly (United Kingdom)
1. Acknowledgment of necessary resources								
2. Analysis of power relations								
3. Reflection of environmental injustice								
4. Deconstruction of technoscientific concepts								
5. De-hierarchisation of the communication								
6. Inclusion of local narratives								
7. Appreciation of divergence								
8. Decentring knowledge and values								
Postcolonial moment conceivable								

Regarding the **case study from the Indian Sundarbans**, researchers aimed at studying the vulnerability of local communities to climate-related hazards. The scientists claimed to transparently communicate this goal and the purely scientific nature of the project. The technoscientific approach was deconstructed by visualising the relationship between the destruction of the mangroves and extreme weather events and personalising the impact on local communities, especially women, over time. A joint resource-mapping achieved trust-building and the inclusion of local narratives. It was followed by the joint construction of a historical timeline of events, which demonstrated extreme weather events and subsequent mangrove depletion over time. An appreciation of divergence is evident from the learnings: the researchers concluded that local knowledge should be better assessed and included in climate adaptation plans and that scientists should research the socio-economic and cultural characteristics of local communities beforehand. The study also found that maladaptation practices resulted not only from information asymmetry but also a lack of agency and alternatives. However, the researchers did not anticipate the resources necessary for sharing information on how global climate change and biodiversity loss exacerbate the frequency of extreme events on these islands. While the researchers reacted with successful improvisations, they could not entirely deconstruct technoscientific concepts.

The **Bangladesh case study** covers a long-term investigation of community perceptions on changes to biodiversity, productivity, and livelihood as well as adaptation responses. The scientists were aware that stakeholders are accustomed to a top-down approach, which is why they invested time and instruments in the de-hierarchisation of communication and the deconstruction of the technoscientific concepts. This was reflected in the intuitive nature of questions, which covered personal experiences that exemplified the impacts of climate change and biodiversity loss with changes in livelihood and their suspected reasons. At the beginning of each dialogue activity, the team would initiate interactive storytelling using local dialects and examples from the surrounding ecosystems. They aimed to include local narratives to encourage broad participation while further de-hierarchising the discussion and allowing the participants to create their own biodiversity narratives through their own stories and scenarios. The scientists emphasised a substantial communicative gap between scientific understanding and common 'problems', which could only be bridged by a clear understanding of the local perspectives. This case study fulfils all indicators striving towards a postcolonial moment.

The **Egypt case study** depicts a conventional communication, where project results were disseminated in a top-down style. Thus, the communication was overly hierarchical and did not break through the firm social hierarchies among attendees. The researchers have actually assessed the local and intra-project power relations quite well; however, the considerations did not affect the workshop planning. This resonates well with the non-acknowledgement of other requirements, such as interpreters. Technoscientific approaches were not deconstructed or connected to local narratives apart from employability and local economy. More advanced stages of communication—such as a decentring of systems—were not pursued. However, it is noteworthy that these shortcomings occurred primarily because of differences between the European team and the local academics, who organised the event mostly by themselves. Hence, the pivotal communication to assess might not be the one taking place during the workshop but instead the one related to the organisation process. However, the final audience had a positive impression of the workshop and were satisfied with the results. Thus, there may be significant untapped potential in the community for further communication efforts.

The **case study from the Lake Manyara Basin (Tanzania)** shows a highly sophisticated approach towards the co-production of a decision-support system. The researchers used a multitude of communication techniques to capture and include local views, supported by simultaneous language interpretation. Also, using a co-produced stakeholder analysis, the researchers aimed at assessing and including local power relations. They were open to learning from the local population, and their evidence-based approach aimed at integrating mainstream perspectives and local knowledge into one structure. However, and despite their multitude and sophistication, the deconstruction of technoscientific knowledge was only partially successful: the target audience did not fully comprehend the (North and South) researchers' presentations and group exercises on social-ecological systems (particularly, the valuation and flows of ecosystem services). The local community's tendency to expect 'quick solutions' from the researchers indicates that the implication of local scientists and colleagues from elsewhere in the Global South may not suffice to de-hierarchise the communication and lead to a postcolonial spirit.

With regards to the **Baltic Sea case study (Germany)**, few of the indicators were fulfilled. The project team engaged experts and the local community in a strongly steered communication about science-driven scenarios on coastal land management. Due to the somewhat contradictory expectations by the funding agency (a strong emphasis on specific modelling approaches while also demanding participatory settings), scientists originally planned to control the agenda, the proposals to be considered by stakeholders and the evaluation methods rather than to yield power to involved stakeholders, engage in true co-design and create a balance between both sides. Although the project invited different voices in different participation formats and included visualisation instruments, stakeholders had little possibility to shape the project. The discussion remained a hierarchical scientist-to-expert and local population approach. During a session of interactive group discussions, a group of stakeholders in strong disagreement with the scenarios presented rejected the top-down rules of evaluation to achieve their own goals and bring their preferences to the fore. This spontaneous bottom-up response contributed to a delayed appreciation of divergent views, fed internal critique of the conventional distribution of power within the communication, and the deconstruction of the technoscientific language by the project team. However, this could not fundamentally alter the predetermined conditions and power structures within the project.

In the **Isles of Scilly case study (United Kingdom)**, interviews about climate change adaptation were conducted individually. They included non-dominant voices, and interviewees could decide on the terms of the interview. Thus, the communication could be de-hierarchised, and a multitude of local narratives—also marginal ones—were emphasised. These efforts also showcase the non-prescriptive role taken by the researcher; he learns from the participants in their chosen settings, thus appreciating their perspective and system. Also, through extensive trust-building, the researcher presents himself as a mediator of diverging perspectives and values. Climate change was deconstructed to hazards and impacts, although the islanders' widespread awareness of climate-change issues might have pre-empted this effort. Notably, the case study was spread over multiple seasons, which has significantly contributed to trust-building and, hence, the communication's success.

4.2 Discussing the role of the indicators

The indicators relate to different phases of the project process (see Figure 1). An acknowledgement of necessary resources is required **before the project starts** (i.e. when designing the project). Analysing power relations and reflecting on environmental justice relate to the underlying theoretical framework and necessitate interdisciplinarity; these aspects are relevant when exploring the region/community **before the actual fieldwork starts**. Having some idea about these concepts is a precondition for the de-hierarchisation of the communication, which—alongside a deconstruction of technoscientific approaches and the inclusion of local narratives—occurs **during the communication**. An appreciation of divergence and the decentring of systems arise from the participants' mindset **during the knowledge exchange** as well as **during the evaluation** of results.

In our case studies, a comprehensive reflection of frame-conditions (power and justice) or a successful de-hierarchisation occur less frequently than the inclusion of local narratives or a deconstruction of the respective technoscientific approaches. In other words, "on-the-spot" shaping of the immediate communication seems to be more widespread than ex-ante scrutiny of the situation. Consistent with the structure postulated in the previous paragraph, the indicators for the further sophistication of the communication to happen during and after the knowledge exchange (i.e. the decentring of belief and knowledge systems and the appreciation of divergence) appear even less frequent; we see them mostly in case studies that already fulfil the other indicators.

Thus, we anticipate an idiosyncratic structure of advancing the communication towards postcolonial moments; the structure's order adheres to the social and introspective effort required to fulfil the indicator instead of its actual timing (Figure 1). It disengages into a general divergence of timing, logic, and complexity. Considering the resource requirements (e.g. time, human resources, inviting stakeholders) is both the earliest and most obvious action. When approaching the field work, shaping the immediate communication^[7] is an easily recognisable need for achieving project results. Scrutinising situations and circumstances must (primarily) happen beforehand, but they require more active efforts by researchers and practitioners and a mature perception of the communicative process. A further sophistication, however, requires more than careful planning at every stage—it demands an inner, personal effort driving the project: powerful project professionals and academics need to lay down their guard and their widespread beliefs of hegemony concerning scientific knowledge as the panacea or sole possible framing of reality to start learning from and with local communities.

Furthermore, only a few case studies made efforts to explicitly include a reflection on social-environmental injustice. This observation is not necessarily at odds with the framework we suggest, but it may lead to a caveat. It is conceivable that analysis of the power relations and environmental injustice are rather substitutes than complements. To move the communication forward, it is not essential to scrutinise all aspects if the communication has risen to a level where the participants feel confident enough to voice their concerns about secondary effects and slow violence. On the other hand, the lack of reflexivity towards environmental injustice in our case studies confirms that even projects with sophisticated communications tend to focus on interpersonal relations while neglecting overarching mechanisms within the human-nature interaction, which are increasingly shaped by criteria of capitalist exploitation (Altvater 2007; Harvey 1996; Dietz 2018).

4.3 Identifying and discussing determinants

This subsection reflects on the insights acquired hitherto, and it discusses selected elements that enable successful communication. While the previous subsection focussed on a more abstract, conceptual level, this part covers a more tangible approach towards assessing the case studies. It relies on the various details indicated in the project matrix (see Appendix) in addition to the assessment made in Table 2. For many, sophisticated techniques (including visualisations) that break down technoscientific concepts may

be the most intuitive approach towards designing 'proper' communication with local communities. Indeed, all (but one) of our case studies rely on such methods, ranging from problem-solution trees to drawing imagery to conducting interviews. While the case studies suggest that respective methods are necessary to enable a common understanding, their comparison showcases that they are neither sufficient nor can take a 'one size fit all' form. The Bangladesh case study, which fulfils most indicators, contains only a single oral approach to the deconstruction, and it abstains from any more sophisticated elements (such as visualisations). In contrast, the example from the Baltic Sea shows that visualisations alone do not guarantee successful communication, especially if their underlying normative premises are not openly discussed and negotiated with participants.

The case study from Tanzania deserves special notice in this regard. Among all case studies, it uses the most sophisticated toolbox of instruments during the communication. However, they were only partially successful in deconstructing science, since some topics remained opaque to the audience. Furthermore, the community expected 'quick solutions' from the project team. The latter hints at the approach's shortcoming in de-hierarchising the communication and transforming it into a genuine, decentring process of exchanging knowledge and beliefs between both sides. Instead, and although half of the scientists were from the Global South, the local community continued to perceive a top-down process.^[8] Hence, while a broad set of instruments may boost the communication, it does not necessarily help the process' move up the ladder' for various reasons (cf. Figure 1).

Instead, the case study comparison offers two other, less apparent elements for enabling a sophisticated exchange: efforts in trust-building and allowing a pluralist, inclusive panel of voices. Both are central for intercepting group dynamics and for enabling an unbiased exchange. Here, the event's location also appears to be of particular importance: communication in the ambience of the stakeholders rather than in sterile conference rooms, which are more familiar to scientists, contributes to trust-building and eye-level communication. Besides the case studies from India and Colombia, the Isles of Scilly example shows outstanding efforts towards achieving these elements. Here, the researcher invested in public relations to introduce the local population to his project, and he interviewed members of the community individually while letting them decide on all 'terms' of the communication. A counterexample may be the Baltic Sea group discussions: some participants rebelled against the non-negotiated terms of the scientist-led evaluation approach; they thereby reclaimed some control over the process and managed to be heard. In the Bangladesh case study, efforts towards trust-building are less obvious, but the lengthy (and intimate) opening discussions conducted in local dialects may have acted as such.

Moreover, the comparison confirms that the allocation of necessary resources—time, in particular—is not only the most basic indicator, but it is instrumental for the communication's success. The case studies that encountered the strongest drawbacks were those with the shortest time frame. In contrast, case studies that allocated more time typically received far better results.

The issue of planning is part of a bigger picture: as concluded in the Brazil case study, local stakeholders' interests—mostly issues concerning their livelihoods—diverge from researchers'^[9] questions driven by the

frontiers of their fields. Hence, at best, projects should be co-designed with key stakeholders from the start.

However, while most of our discussion focuses on how researchers can improve the process, it is crucial to remark that their hands are often tied by rigid, bureaucratic, and unappreciative funding policies. Especially in the Global North, grant allocation and budgeting practices by national research agencies often prove to be a roadblock by neglecting (or prohibiting) spending adequate resources on genuine stakeholder involvement (Bloch & Sørensen 2015). Almost all case studies have expressed the concern that their funding (and the red tape behind it) actively prevented them from sophisticating their approach to communicating with local stakeholders. Currently, an increasing number of calls demand stakeholder interaction and interdisciplinarity on paper, but genuine efforts towards knowledge co-production and mechanism co-design—a political decision (Wyborn et al., 2019; Clark, 2003)—are neither met with interest nor the necessary resources.

^[7] *The de-hierarchisation may however be a need less perceptible for the practitioners, since it transpires as soon as the field work starts but actually implies a further sophistication of the process. Therefore, the indicator goes beyond the rather instinctive notion of the other indicators shaping the immediate communication.*

^[8] *Due to a lack of time, further methods of de-hierarchisation (e.g. group exercises for alternative eco-management options, a facilitation of local NGO support) could not be realised. This lack of a participative identification of local solutions is what may have created the observed ‘passivity’.*

^[9] *International development projects can have very similar issues. They are often derived from wider policy aims of the financing party, which do not need to be in line with the locals’ interests or troubles.*

5. Stories Of Postcolonial Moments

Postcolonial moments circumscribe a utopian communicative process, for which a lack of coherent (science) communication and the status-quo of knowledge generation need to be overcome. Therefore, the prospect of a method that structures these challenges along clearly defined indicators to generalise cross-culturally and create sameness (Verran, 2002) in understanding each other's meanings opens a new and creative perspective.

Believing in the formative power of narratives, we selected three stories that broadly qualify for postcolonial moments. The following paragraphs provide additional background on communication experiences in Colombia, Bangladesh, and the Isles of Scilly.

In Bangladesh:

Even after all the preparatory work, we had difficulties making the local participants understand the concept of biodiversity, its value, and its tangible impact on their livelihood. We, therefore, introduced the interactive half-hour session at the beginning of every discussion. The facilitators would start this

session building on very familiar notions, using local dialects, and referring to the participants' very own ecosystems. The participants were eventually able to catch up very quickly, as they found themselves in familiar territory. Thereupon, the group would become very interactive and ready to share central information with the facilitators. The interactive storytelling approach invigorated the participants and acted as an icebreaker. Still, facilitators worked continuously towards keeping the session as interactive as possible, using follow-up questions. As a result, the participants were able to grasp the concept of climate change and its impact on biodiversity; they completed their story, based on their own scenarios. The study bestowed a crucial lesson for the scientists: the gap between the scientific understanding of climate change/biodiversity loss and practical 'problems' of the marginalised community can only be bridged by understanding the community's perspective and unearthing their knowledge-base, their way of problem identification, and their thinking on possible adaptive measures—using their very own language.

In Colombia

The "Future-proofing Conservation Project" in Colombia worked under the assumption that experiential learning is central to building capacity and understanding complex concepts. It involved creating spaces for stakeholders for developing and sharing ideas as well as discussing social values and the benefits from protected areas. Workshops with protected area staff and local stakeholders helped to explore key questions around ecological, social, and economic values, and expectations for the future. This was the baseline to examine questions about knowledge ("How will climate change affect these values?") and rules ("How can we prepare our institutions, and what have we learned from the past?"). We adapted these workshops to local contexts and realities (i.e. times, needs, and expectations). Crafting this common narrative helped to identify where and how to start, while introducing climate change adaptation as a forward-looking policy, conducting planning and management, and determining practical tools to enable this. This facilitates the identification of different or additional management to support the provision of benefits from protected areas. The narratives were broadly positive, centred on how people can explore their knowledge and values to improve protected area management in the face of unpredictable climate change.

On the Isles of Scilly (United Kingdom)

There is not a single "postcolonial moment", but a combination of various experiences during the fieldwork that had signs of mutual approximation and dialogue. The trustful relationship with research subjects allowed for an open and informal way of engagement with them that involved discussing and jointly reflecting the research goals, question and method. This engagement led to intense conversations on an equal footing. In some cases, they would concern the islands' future and societal development in general. In other instances, they would lead to very critical and challenging discussions about the research's key arguments, its approach, and the role of human agency. Such discussions happened partly in rather intimate environments, such as at people's homes, on a fishing boat, or at their workplace. Despite sometimes being highly challenging, they were always respectful and open. This exchange provided a crucial contribution to a "postcolonial" perspective. It influenced the case study's research

approach and the interpretation of findings along with a more balanced representation of "local voices". Moreover, it also affected the researcher's way of looking at the world and his place as a researcher in a diverse community home to people ranging from residents with a long tradition of dealing with local challenges to newcomers with novel visions to external experts with specialist know-how.

6. Conclusions

Roughly 30 years have passed since climate change and the loss of biodiversity entered the global political agenda initially. Knowledge on these issues has grown considerably thereafter, but progress towards solving them has been meagre. Instead, 'slow violence' associated with the secondary effects of climate change and biodiversity loss, their mitigation, and land-use change spreads among local communities, especially in the Global South. These local communities are essential for data collection and policy implementation, but significant communicative gaps between researchers/practitioners and local communities often prevent success.

Therefore, this study has taken a closer look at the role of communication. At its core, it has focussed on presenting, analysing, and discussing eight case studies of communications between researchers and local communities, summarised in a matrix (Appendix). Our study was eventually guided by the prospect of designing a method that structures the communicative challenge when addressing problems related to climate change and biodiversity loss along clearly defined indicators for good communication striving for postcolonial moments.

The rich panel of case studies, which crosses geographical and cultural boundaries and combines various instruments, approaches, and degrees of communicative success, allowed us to make substantial learnings on how communication *is* and how it *should* be conducted. Case studies with an advanced approach towards communication (as measured by our indicators) had more communicative success and approached postcolonial moments, which allowed for disruptions of epistemic power relations towards the co-existence and discursive construction of alternative knowledge systems. In the other cases, the communication processes yielded significant drawbacks, even leading to rebellious reactions among local stakeholders. Insufficient progress towards postcolonial moments was often visible in the form of a local disinterest in project results and a focus on quick solutions or monetary benefits. Especially when the communication was not sufficiently de-hierarchised, this would be the case.

Furthermore, the case studies suggest a divergence between timing, complexity, and (inner) effort towards (action for) sophisticating the communication. The indicators thus revealed an intrinsic logic and system of interdependency that does not correspond to the eventual timing within the project but follows patterns of rising complexity and inner efforts from the project team (planning, shaping the immediate communication, ex-ante scrutiny of the situation, and sophisticating the communication eventually). Therefore, and although the case studies often presented a multitude of instruments towards shaping the immediate communication, they rarely exerted deeper efforts towards scrutinising power relations or moving towards the equal co-production of knowledge.

This, however, contrasts with the necessities in the field. Whether the aim was to explore new fields, to develop and implement solutions, or to disseminate and exchange existing knowledge, the case studies have shown that knowledge could only be co-produced by carefully creating de-hierarchised spaces for exchange. Although various (sophisticated) instruments in the practitioners' toolboxes have proven to help deconstruct science, this analysis has shown that they are not always sufficient to remove barriers entirely. Instead, our results suggest that even simple instruments may suffice, while trust-building and allocating enough time for the communication seem to be the more critical factors. Instruments and communicating on equal footing hence hardly substitute one another; instead, a combination of well-designed elements and an advanced awareness of the scientists is required.

We are aware of two limitations to our approach. First, and this applies to all case-study research, there is no way to ensure the generality of our results. However, we believe that the substantial variation within our sample—covering different regions, approaches, teams, aims, instruments, resources, and degrees of success—ensures a high validity. One active shortcoming is that our sample includes no development project; however, we have no reason to believe that the results cannot be transferred to such communications. Second, our approach dichotomises the involved parties into an 'external' project team and local stakeholders. While this approach helps to focus on the communicative process, it neglects the role of power relations within the project teams. These may, however, be able to provide explanations for some behaviour observed, such as the asymmetries found in the sophistication of projects. In fact, our observations suggest that diverging aims and power asymmetries within project teams may be as influential as the outsider-local gradient: who sets project parameters, who decides on budget allocation, who communicates, and who is interested in what?

Proceeding to policy recommendations, we hope that this article stimulates debate among financers about the importance of high communication standards in respective projects. Especially in the Global North, adverse grant allocation and budgeting practices by national research agencies typically neglect (or even prohibit) financing anything but a narrow definition of cutting-edge research. Even research carried out by or with researchers from the Global South is often considered not 'scientific' enough by funding agencies and scientific publication outlets. Project activities that seemingly diverge from a colonialist (or even just conventional) approach, such as genuine stakeholder involvement, are usually considered ineligible expenses. Yet, as this article and the vast body of literature we cited have shown, raising the bar of communication standards when interacting with local populations is not only a matter of development and ethics, but it is a prerequisite for excellent science. This structural deficit in research governance can also not be simply absorbed by the development sector, as their goals may not necessarily align with those of climate/conservation scientists. Currently, an increasing number of calls demand stakeholder interaction and interdisciplinarity on paper, but genuine efforts towards knowledge co-production and mechanism co-design are met with neither interest nor the necessary resources.

Therefore, and in line with Hulme's (2018:335) demand for a reorientation of research agendas towards a deeper understanding of the barriers towards sustainable lifestyles and their overcoming, our recommendation to policymakers is clear. We advise financing bodies to specifically require advanced

communication styles in future research and policy implementation and alter grant and budget practices accordingly. A genuine cross-fertilisation between qualitative social sciences/humanities and quantitative approaches need to become the modus operandi in development-oriented research. Indicators such as ours or postcolonial moments themselves should become project deliveries to which adequate resources and time are allocated. We also encourage all researchers and development practitioners to insist on good communication practices—perhaps even consider our indicators when preparing and implementing fieldwork.

Combating climate change and biodiversity loss may first require changing the way we as scientists, development practitioners, and policymakers think and talk about.

Declarations

Declarations and acknowledgements

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Contributions:

Conceptualisation, supervision, methodology, analysis: DA, RS

Writing, material preparation: DA, RS, WB, AC, PH, MH, JH, LJ, CM, JP, CS, SS, MV

Editing: DA, RS, AC, ND, MF, MH, JH, LB, CM, JP, CS, SS, MV

Resources: MA, LB, AC, ND, MD, CF, OG, PH, HH, MH, JH, LJ, HK, CM, JP, AR, MS, CS, SS, SSK, LK, MV, CW

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Figures

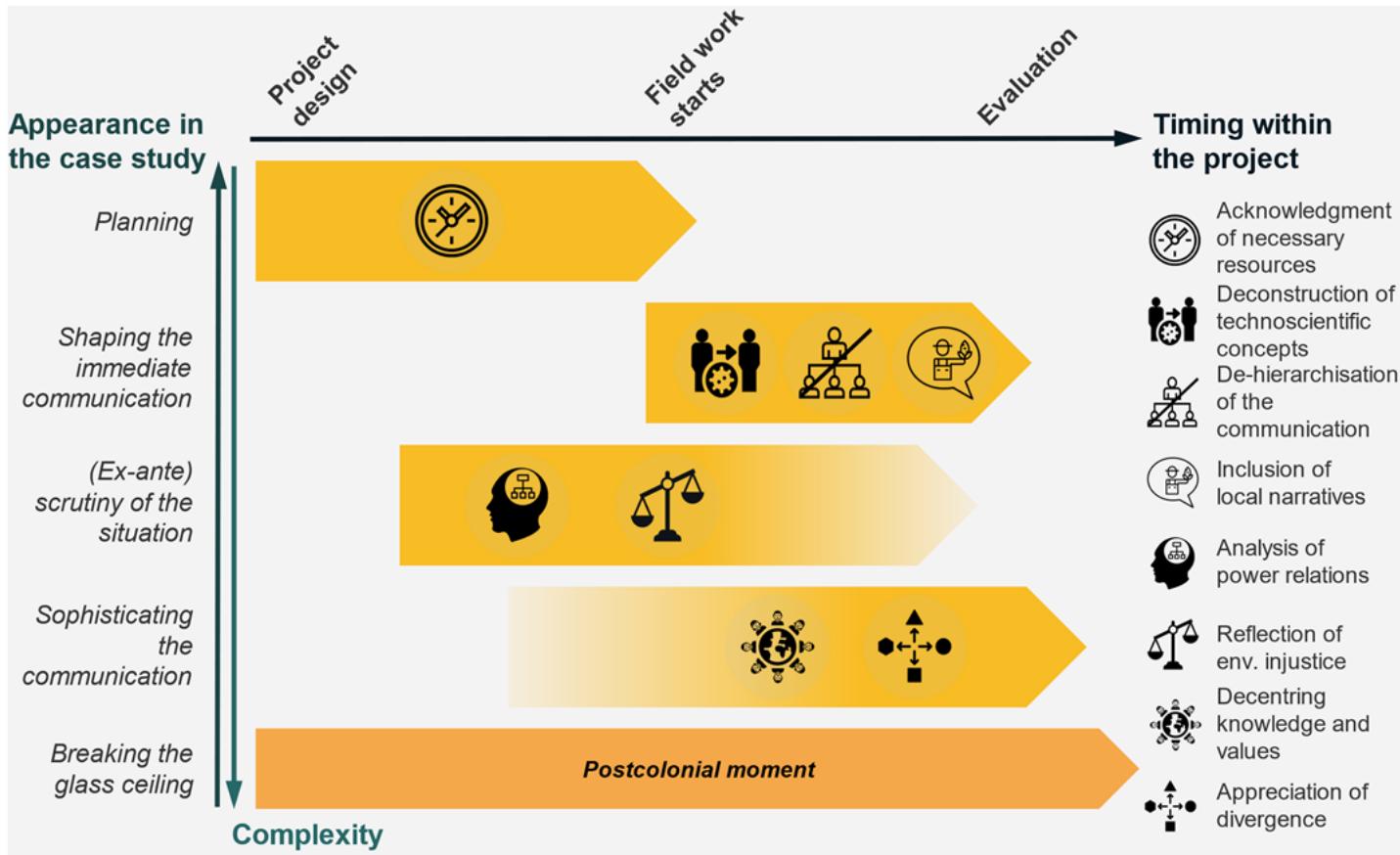


Figure 1

Illustration of the proposed structure of indicators and their timing within the project

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