



**LITERATURE REVIEW**

# Inclusive Engagement of Indigenous Communities in Scientific Research: Opportunities and Challenges

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**ABSTRACT**

Global challenges are complex, inter-disciplinary and span political boundaries. This warrants an integrative, multi-faceted approach involving the social, economic, ecological and technological disciplines. The integrative approach also needs to identify and empower local stakeholders such as indigenous communities. In this review, we provide a balanced view of opportunities and challenges which characterize the potential and insufficiencies of the current knowledge and institutional frameworks within the context of including indigenous/local communities in modern scientific research, especially in mitigating global challenges such as climate change and biodiversity loss.

**Keywords:** global challenges, climate change, biodiversity loss, inter-disciplinary research, sustainability, local knowledge, indigenous communities

## INTRODUCTION

Complex global challenges such as climate change, biodiversity loss, depletion of natural resources warrant post-normal concepts of science (Funtowicz and Ravetz, 2003) to harness trans-disciplinarity (Klein, 2014), and integrate parallel knowledge systems such as those of indigenous/local communities (ILCs) (Agrawal, 2002). Such challenges can be efficiently encountered with coordinated frameworks empowering multiple stakeholders to contribute to the solutions both in terms of knowledge and action (Burke and Heynen, 2014). One of the main bottlenecks in addressing these challenges is the lack of grass-root participation-driven implementation (Arnstein, 2007). ILCs are defined as the “uncolonized” and having sustainable lifestyles thereby causing minimal damage to the environment despite their complex interactions with the environment (Fragoso and Reo, 2013). The ILCs occupy over a quarter of the global land surface covering about 40% of all terrestrial protected areas and home to 80% of the biodiversity world-wide (Garnett et al., 2018; Inter Press Service, 2017) and serve as repositories of inter-generational knowledge on their local ecosystems encompassing the landscape, waterbodies, flora, fauna and the soil (Reyes-García and Benyei, 2019; Sobrevila, 2008). According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), the intergovernmental body which assesses the state of biodiversity and its ecosystem services, ILC knowledge is defined as “knowledge formed through the direct dependence on local ecosystems, and observations and interpretations of change generated and passed down over many generations, and yet adapted and enriched over time.” (IPBES Deliverable 1(c)). There are however gaps in the published scientific literature about ILC knowledge with most studies being biased towards particular habitats, populations and species (Cámara-Leret and Dennehy, 2019). Apart from the gaps in knowledge profiling, recent studies have also pointed out that projects documenting such knowledge have displayed low levels of inclusiveness of the ILCs (Benyei et al., 2019). In this review, we present a non-exhaustive list of opportunities and challenges which are faced by the scientific community in including ILCs in various forms of research.

## OPPORTUNITIES

### Source of Best Practices for Dissemination and Exchange

Climate change and biodiversity loss represent two classic examples among many of current global challenges which cannot be solved with one-dimensional technology-driven solutions (Kammen, 2013). In this context, collaborative approaches which

embrace a diversity of knowledge-systems (Agrawal, 2002; Kammen, 2013; Sterling et al., 2017) including those from ILCs are required. The practices of ILCs are deeply rooted in working with nature to achieve steady state and homeostasis. Despite their complex interactions with the environment (Fragoso and Reo, 2013), most of these communities tend to have minimal ecological footprints while drawing subsistence. Due to largely beneficial effects which have evolved over time, their knowledge contribute to many best practices in biodiversity conservation such as agroforestry, agroecology, pastoral systems to name a few (Kelbessa, 2013; Reyes-García and Benyei, 2019).

### **Empowering Stewardship of Natural Resources and Biodiversity**

“Stewardship” is recognized as a strong value based attribute for social and environmental protection (Bennett et al., 2018). Due to their long-standing relationship with their immediate ecosystems, ILCs can be considered as one among the best placed agents to take up the stewardship role with support from scientific experts. The platform of stewardship also sets the stage for a co-operative relationship (Dumay et al., 2019) with other stakeholder organizations. In addition to the above, data about ecosystem services generated from the collaborations between scientists and ILCs is also expected to impart bargaining power to the communities on negotiation tables discussing land rights and propriety (Popkin, 2016).

### **Upliftment of Marginalized Communities**

Historically, ILCs have been subject to oppression, violence, denial of fundamental rights, displacement from traditional lands and social discrimination (Campo, 2006). Eventhough many countries have taken steps to acknowledge and remedy some of the historical injustices committed against the ILCs, the communities remain largely marginalized. Inclusive and targeted re-integration of ILCs provides the roadmap for creating social cohesion and thereby generate more social capital along with the desired ecological benefits of ecosystem conservation (Benyei et al., 2019).

### **Access to Genetic, Molecular and Species Diversity**

ILCs inhabit some of the richest hotspots on the planet in terms of genetic and molecular diversity (Garnett et al., 2018; Inter Press Service, 2017). ILC knowledge also involves the use of various natural compounds with prophylactic properties for traditional healing and medication (Alade et al., 2015). With proper benefit sharing and consent (Popkin, 2016), such knowledge can be used for the discovery of new therapeutic compounds. Despite these high-reward opportunities, most engagements involving ILC involvement in climate change studies for example are characterized by extraction of knowledge by outsiders with minimal participation from and benefits for the communities (David-Chavez and Gavin, 2018). In response to such “colonial” engagements, frameworks have been developed to assess and assist community engagements in scientific practice (David-Chavez and Gavin 2018). Collaborative research (Popkin, 2016) with the ILCs also provides much needed tactical knowledge (Kelbessa, 2013; Reyes-García and Benyei, 2019) for conservation.

## **CHALLENGES**

### **Research Frameworks in Academia and Governmental Support**

In most countries, the trend in terms of research priorities over the past 4-5 decades has overwhelmingly been on technology. Concomitantly, in modern scientific dogmas, there has also been an over-emphasis of value-neutral research (Harding, 1995) which discounts the contextuality and positionality of the investigator or knowledge-bearer. In the case of ILCs, the relationships between the communities and their ecosystems impart the context in addition to several capabilities (Sangha et al., 2018). In the current discussion, value-neutral research could stand in the way of scientists being able to acknowledge the intellectual integrity of ILCs and their knowledge which has accumulated and evolved out of the relationships between the communities and their landscapes or ecosystems. More importantly, the services rendered by the ILCs and ecosystems in which they reside (Cámara-Leret et al., 2019) have largely been ignored. In fact, despite the availability of metrics and integrated frameworks (Sangha et al., 2018) to capture the economic contributions of ecosystems and ILCs, the uptake of such evidence into decision-making has been negligible. Although epistemological differences exist, co-existence of ILC knowledge with modern scientific knowledge is thought to be beneficial (Tengö et al., 2014).

### **Inferring, Documenting and Integrating Uncodified Knowledge**

ILC knowledge is usually passed over generations by word-of-mouth and oral traditions. Although linguistic barriers can be overcome, a more serious obstacle lies in interpreting the uncodified knowledge behind the practices of the communities (West et al., 2013). This can vary across different indigenous cultures and hence the interpretation strategies need to either involve trained translators or mediators such as non-governmental organizations who can help infer the knowledge behind the practices. Here again, a collaborative and inclusive approach involving the communities goes a long way in interpreting the uncodified knowledge (Iseke and Desmoulins, 2015; Popkin, 2016).

### **Accessibility and Establishing Social Contacts**

The lack of basic infrastructure such as roads poses a limitation in terms of accessibility of the communities to researchers. Yet another barrier revolves around the intricate question of establishing contacts in the first place. Should “uncontacted tribes” be left as they are or should engagement and contact be established? The safe and sensible option would be to establish contact since this opens the door for engagement and communicating with the communities that they are important stakeholders in responding to the challenges which directly or indirectly will affect their livelihoods and ecosystems. This is not a trivial task since

in many cases, there is a certain degree of mistrust between the ILCs and the outside world due to the perception on the part of the communities that scientific endeavor is a strategy of the political state to exert control (Fernandez-Gimenez et al., 2006; Herring et al., 2013).

### Managing Intellectual Property Rights

Engagement between scientists and ILCs has also resulted in tensions related to knowledge propriety and ownership (Popkin, 2016). Such challenges are triggered either by an intrinsic assumption on the part of scientists that representatives from ILCs do not intrinsically appreciate co-producing findings and/or intentional exclusion by the scientists. Such situations transpire in unsustainable collaborations and could derail the usually large amount of communication and trust-building initiatives and efforts invested beforehand to start up the collaboration. Fortunately, good practices and frameworks (David-Chavez and Gavin, 2018) exist by which knowledge-sharing and co-production with mutual consent can be incentivized for long-term collaborative traction and productivity (Iseke and Desmoulins, 2015).

## CONCLUSION

Although ILCs have contributed minimally to the progression of complex global challenges like climate change and biodiversity loss, they have been at the receiving end of the immediate effects of global challenges as well as of industrialization and the exploitation of natural resources (Begotti and Peres, 2019). At the same time, they have also been the direct victims of social exclusion, racism and institutional discrimination (Herring et al., 2013). However, due to the complex long-term interactions of the ILCs with their environment and their exposure to a wide variety of economic and socio-ecological pressures (Fragoso and Reo, 2013), their inclusion in research is all the more justified. It has also been suggested that ILCs are good examples to investigate human ecodynamics because of the intrinsic adaptive mechanisms of such knowledge systems (Fitzhugh et al., 2019).

In this review, we identify the opportunities and incentives for scientists to engage with ILCs in the context of conservation and mitigation/adaptation to climate change and biodiversity loss. Given the challenges to fruitful engagements, we also point out why such engagements need to be participatory, inclusive, respectful and consent-driven, thereby honoring the cultural identity of the ILCs (Popkin, 2016). We hope this sets a precedent for policy makers in government, independent research bodies and other funding agencies to allocate financial resources and jurisdictional access to facilitate the equitable inclusion of ILCs in scientific research.

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