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# Editorial: Gender and social consideration in climate and impacts research and services

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## Editorial on the Research Topic

### Gender and social consideration in climate and impacts research and services

The integration of social science into technical scientific pursuits has long been a goal for applications driven and climate change resilience solutions. This is especially true in the geosciences where remote sensing, Earth observations and geospatial technologies have been shown to have tremendous benefits into decision making at many scales. However, there are many documented and unrealized challenges involved in this alignment that the community has yet to overcome in any systematic fashion. Case-studies, pilots projects, and short-term studies exist but scalable solutions don't seem to be widely pursued. Additionally, the integration of women, or other traditionally marginalized groups continues to be lacking. This is in spite of overwhelming evidence that applications without inclusive community participation are at best insufficient and at worst harmful, while inclusive applications science results in better outcomes at every level.

This collection seeks to address these research gaps in incorporating social science and underrepresented voices in climate services by providing reflections on frameworks and approaches to build inclusive geo-services. These frameworks provide the tools teams can use to provide a platform for diverse stakeholder identification and needs assessments, pinpoint gaps and challenges in information dissemination, select priority actions, and continuously develop services that benefit the entire community. The frameworks presented present the readers with opportunities to follow the author's journeys to development, showcasing lessons learned and case studies illustrating them in action.

[Fernandez-Bou et al.](#) provide a thought provoking glimpse into “3 challenges, 3 errors, and 3 solutions to integrate frontline communities in climate change policy and research.” This perspectives paper offers an honest insight into this multidisciplinary teams approach toward years of efforts promoting climate justice in an increasingly diverse, under represented, and climate shock prone area in California. Through

their work, the authors describe these lived challenges and errors and showcase the solutions to try to build better systems. Following these author's journeys toward integrating the communities builds a common narrative and justification for interesting solutions. Not only in light of largely insufficient climate change policy and resilience strategies but due to real damage being done to this community by sub-par policy design, implementation, and enforcement.

Excellent follow-ons from [Fernandez-Bou](#) are [Ovienmhada et al.](#) and [Huyer et al.](#) which provide readers with reviews, critiques, and applications of several design methods with an eye toward inclusivity. [Ovienmhada et al.](#) describe several methods in detail including their strengths and weaknesses toward inclusive design. After the reviews, [Ovienmhada et al.](#) describes their choice to use a Systems Architecture Framework (SAF) for their use case with working with Green Keeper Africa (GKA) on invasive water hyacinth control in Benin. This process puts stakeholders, their needs and most importantly perhaps, their values, in order to design a system that is useful for their objectives. Building systems following this framework seems to illustrate not only inclusivity but also sustainable design. From a larger context, it is easy to see how this process can be used at larger scales, for water hyacinth control in other parts of the world, for invasive species management more generally, and even ecosystem management.

[Huyer et al.](#) meanwhile applies their framework for climate resilience agriculture (CFA) and also includes scalability as an important component toward inclusive service design.

While the previously described papers explain their needs based approach in depth, perhaps what may have been lacking from those approaches was intersectionality. Also known as an acknowledgment of an individual's many diversities and the combined effects that frame that individuals lived experiences. For example, gender is only one aspect of an individual's identity. Adding race, cast, income-status, education-level, etc. add not only complexity to that person's lived experience but when those statuses are from minority and or marginalized groups the negative bias is most often amplified. Intersectional approaches to climate solutions are explored more in depth through [Cannon](#) and [Kadel et al.](#)

[Cannon](#) uses an intersectional framework to review risk relationships among landfills, disasters, race, class and gender. This paper not only advances intersectionality studies but also improves best practices for building these considerations into research design and analysis. [Kadel et al.](#) also describes their intersectional approach implemented by the International Center for Integrated Mountain Development (ICIMOD). The approach described by [Kadel et al.](#) is applied to a case study in Nepal toward integrating gender into a Climate Resilience Forest Management System (CRFMS) and is also planned to be used to further integrate gender into additional ICIMOD services.

Finally [Moore's](#) policy brief takes a deep dive into the landscape of Indigenous Peoples (IP) in the Amazon region. His deep understanding of the intricacies involved with including

these groups despite perceived challenges in interconnectedness provide context and solutions to including them into geospatial service provision for that region. This work not only advocates for the inclusion but shows appropriate pathways for doing so.

Advocating for diverse voices in climate change solutions is challenging. It is not well funded, and it requires true interdisciplinary science. It is also often limited also by a lack of data. The research that contributed to this collection was informed by data that was able to be disaggregated into different classes (sex, race, other marginalized status, etc.). Without such data questions around differential effects of minority or marginellid status cannot even be asked. As scientists from all fields collect data it is imperative to collect these categorizations to the best of our abilities in order to develop inclusive science. These papers illustrate concrete steps toward inclusive and intersectional climate service development across many sectors including in the agriculture, water, forestry, and disasters contexts. Further, it is the editors hope that these series of papers not only support the justification inclusive climate science but make it achievable to implement for any research team.

## Author contributions

EA wrote the draft Editorial. KG and SS provided valuable comments to enhance the Editorial. All authors contributed to the article and approved the submitted version.

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