How does climate science matter for the society? A stakeholder-driven and user-inspired solution for coastal Bangladesh

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Background

Climate science matters critically for society, particularly since we are heavily exposed to various challenges caused by climate change (IPCC, 2007), and eventually that is also critical for achieving Sustainable Development Goals (SDGs) by 2030. With a regional focus on coastal Bangladesh, which is heavily exposed to climate change impacts, this brief addresses how a stakeholder-driven and user-inspired climate science can have meaningful impacts on enhancing adaptation decision-making and community resilience.

Currently, Bangladesh ranks as one of the countries most vulnerable to the impacts of climate variability and change (Huq and Ayers, 2007; Maplecroft, 2015; World Bank, 2009). The current climate change projections demonstrate higher changes of intensity and frequency of various extreme climate events is likely to occur in Bangladesh, with a detrimental effect on the country's efforts to achieve different developmental goals, including SDGs (World Bank, 2009). The IPCC estimates suggest that various parts of the world can experience significant sea-level rise in the coming years.

In Bangladesh, a 45 cm sea-level rise is projected to inundate 75% of the Sundarbans, which is nation's largest mangrove forest located in the southwest coastal region. Sundarbans are also the natural defense or shock absorber to extreme climate events. Moreover, a one meter rise in sea level would flood 18% of country's total land impacting 11% of country's entire population (IPCC, 2001). Currently, coastal Bangladesh experiences various adverse impacts caused by climate change, such as sea-level rise, tropical cyclones, and salt intrusion in cropland and groundwater supplies. Climate change is likely to worsen these existing challenges in coming years/decades.

As a response, Bangladesh has adopted various policies and invested heavily in climate-related innovations and adaptation solutions (World Bank, 2009). However, not all adaptations initiatives are supported by appropriate climate information, early warning or related climate services. A recent study demonstrates that 45% of the people who are affected by different extreme climate events (e.g. farmers, fishermen) in Bangladesh do not receive adequate or appropriate climate information that can help their adaptation decision-making (Al Mamun et al. 2013). However, poor and marginalized farmers in developing regions can improve their adaptation decision-making if they receive appropriate demand-

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driven climate information in a timely fashion (Grainger-Jones, 2013). Therefore, climate services, which involves production, translation, transfer, and use of climate science knowledge and information in adaptation decision-making, is crucial in addressing livelihood challenges in many parts of the Global South, more particularly for challenges associated to SDGs in local contexts.

This science brief lays out a plan for developing a stakeholder-driven and user-inspired boundary organization that can contribute to the coproduction of localized climate information and help the local community to enhance their adaptation decision-making and community resilience. . In addition, the brief suggests the process of science-policy-decision-making interface functions at the community level and advances local understanding and capacity for adaptation decision-making in addition to overall efforts to achieve resilient and sustainable development in a local context.

User-Inspired Science for Decision-Making:

The current issue is that existing climate information providers generate information that is either useful only in very specific cases, and/or have limited interactions with the end users. However, optimally, decision-making and management exercises should synthesize various information comprised of political, economic, and social factors, particularly for issues related to climate change that involve complex climate-society interactions (Buizer, et al., 2010; Clark, 2007). An improved understanding of these processes and complexities can help us identify how people make their decisions and how they utilize new information (Ferguson, 2015).

In addition, often climate science products are not credible or useful to its end users (e.g. poor and marginalized farmers in coastal Bangladesh), because they address the wrong issues based on unrealistic assumptions, and generate solutions that can be difficult to follow or are misleading (Wynne, 1989; and National Research Council, 1996). This is mostly because of the absence of interactions between (climate) science producers and consumers. Evidence from coastal Bangladesh supported the similar arguments when the local farmers highlighted that they receive little to no climate information, and sometimes they have no ideas or understanding about those information (Ahmed, 2015). Due to this disconnection, produced climate services remain under-used and have limited implications into adaptation decision-making and community resilience.

User-inspired climate science can be instrumental in bridging between science producers and consumers (e.g. farmers) to create avenues for innovations (e.g. co-production of knowledge), in order to make science more useful for achieving desired outcomes or impacts in the local context (McNie, et al., 2007; National Research Council, 2008). Co-production of knowledge, through collaboration between science producers/providers and those who use science to make various decisions (Meadow, et al., 2015), offers opportunities to improve the use of science. The incorporation of climate science users in the knowledge production process can be instrumental for making climate-related information more transparent, legitimate, and easier to integrate with existing knowledge. This way, the end users (e.g. farmers) can feel greater ownership of the produced climate

knowledge and integrate those into their livelihoods decision-making (Jasanoff and Wynne 1998; Cash et al. 2006; Lemos et al. 2012; Robinson and Tansey 2006). Through the co-production of climate knowledge, people get better access, understanding, and use of climate information in their decision-making (Guido et al., 2013; Meadow, 2015). Collaborations among science, society, and policy are critical for co-producing knowledge that provides preconditions for intriguing new research questions and innovative solutions to real-world problems (Ferguson et al., 2014).

Concept, Stakeholders, and Stakeholders Engagement Process:

Concept:

In Bangladesh, provisions of climate services is very much top-down in nature, and tends to overlook the importance of incorporating user-needs, demands or local knowledge (Ahmed, 2015). Local people generally are not part of the development of climate information even though they represent the majority of potential users. There are needs for a certain kind of boundary organization that can act as a community hub for climate innovations and also work as a community center where various stakeholders will meet to share and discuss their aggregated climate information and knowledge.

Stakeholders:

Local people in coastal Bangladesh, whose livelihoods are largely dependent on climate-sensitive sectors (e.g. farming), will be the primary beneficiaries of the proposed community-centered boundary organization. Local governments and non-governmental organizations will be involved and benefit from this process, since they will play important roles in the process of coproducing climate information. Community hubs for climate innovations such as local boundary organizations should be dedicated to bridging gaps between and within the climate information production and consumption communities.

Stakeholders Engagement Process:

The process of stakeholder engagement will represent local people's understanding and engagement of how change happens, more particularly, the pathways, factors, and relationships that bring and sustain changes in a local context. There should be three major components in this process: firstly, the co-development of climate information with the inputs from local community and climate science producers (e.g. Bangladesh Meteorological Department); secondly, connection of those co-developed knowledge for addressing local climate challenges. Finally, this will result in transformational impacts through improved adaptation decision-making and community resilience.

The brief concludes that if we want to maximize the impacts of science on society, the entire process should have: a) a user focus, b) opportunities for heuristic learning, c) stakeholder engagement, c) deliberation, and d) an iterative processes of evaluation that can contribute to enhance adaptation decision-making and community resilience.

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