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WORKING PAPER

Participatory Scenario Development and Future Visioning in Adaptation Planning: Lessons from experience

Part I

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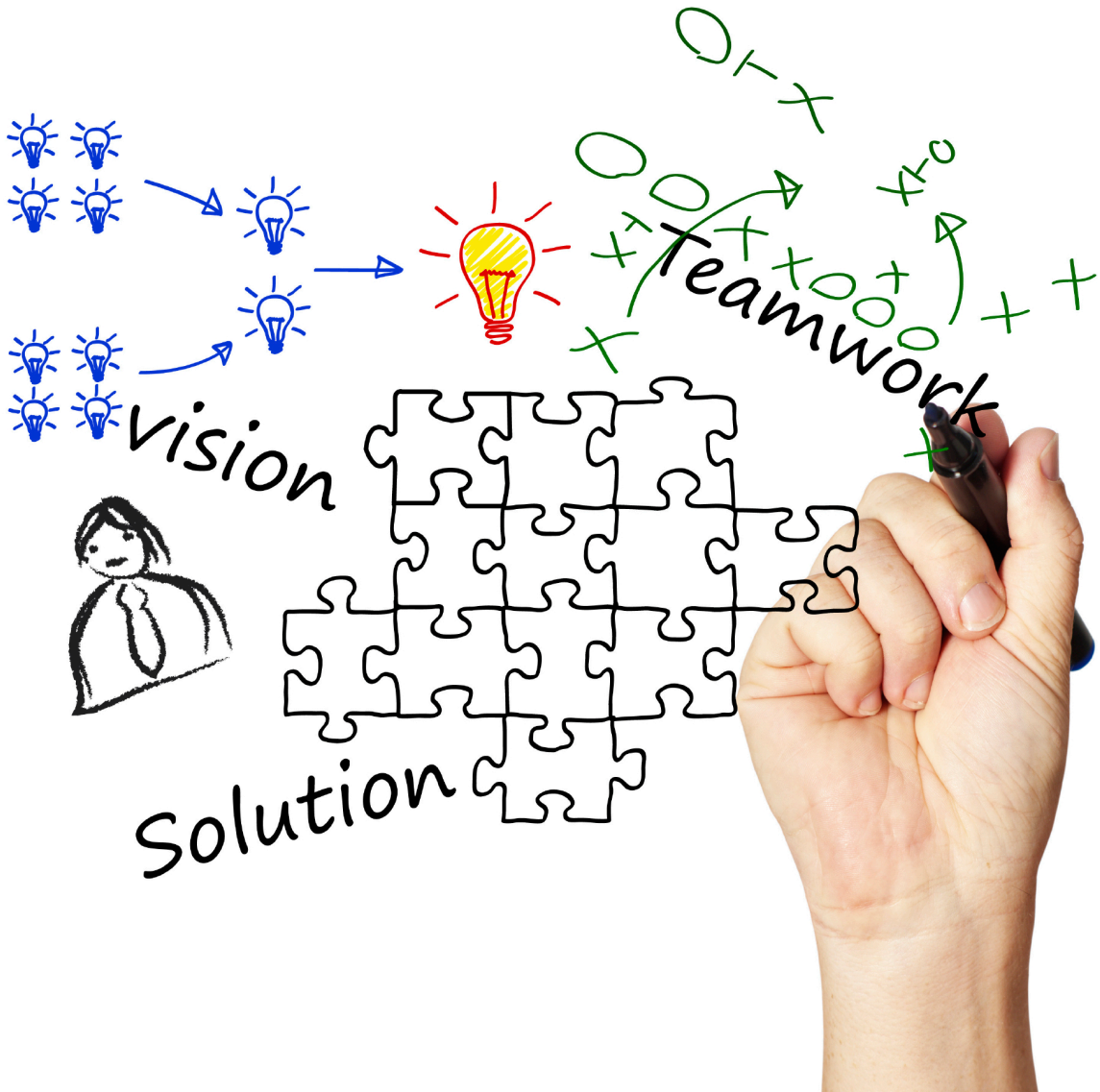

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Participatory Scenario Development and Future Visioning in Adaptation Planning: Lessons from Experience Part I

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Introduction

The magnitude of both observed and projected impacts of climate change and climate variability has focused much of the attention of public and policy-makers on the increasing need for climate change adaptation. While there is a growing literature on adaptation planning, there is also an emerging focus on the contributions of current and future development choices to regional and national vulnerability and resilience to climate change (Eriksen & O'Brien, 2007; Schipper & Pelling, 2006). Current trends indicate that in order to create effective responses to climate change, adaptation and mitigation measures should be coordinated with social and economic development priorities in an integrated manner, taking into account the priority socioeconomic development needs of countries and regions (Organisation for Economic Co-operation and Development [OECD], 2006).

In the case of adaptation planning, understanding the risks to the biophysical system are just as important to understanding the associated implications for human and social capital, capacity, and resilience. While climate models and projections can help facilitate adaptation planning through improved understanding of potential climate impacts on the biophysical environment (van Aalst, Cannon, & Burton, 2008), the resulting climate scenarios provide only a simplified characterization of the full array of significant climate variables (Smith and Wandel, 2006) and their potential consequences for diverse sectors, resources and social groups. To compensate for such identified gaps, current approaches to adaptation often investigate exposure, sensitivity and available capacities to current challenges including climate variability. They then try to address how the uncertain impacts of climate change can be reduced by the process of adaptation under unknown future socioeconomic circumstances (see, for example, frameworks by Smith and Wandel, 2006 and van Aalst et al., 2008). Furthermore, participation of stakeholders is increasingly emphasized in developing adaptation options, for its ability to build on diverse expertise and knowledge and for its overall benefits in increasing the legitimacy and relevance of the identified adaptation options (see, for example, community-based adaptation approaches, in Huq and Reid, 2007). Building on gathered experiences with participatory approaches in adaptation, we argue that structured processes are needed that can bring together current challenges, potential future socioeconomic pathways and climate change impacts to determine how different stakeholders view the range of policy and management options available to them, and to identify appropriate policies and adaptation actions in the context of and across plausible development pathways.

In this paper, we introduce and present major lessons learned from the application of participatory scenario-based tools in adaptation planning as applied in the World Bank *Economics of Adaptation to Climate Change (EACC)* study.[1] We illustrate how such tools provide opportunities to increase the usability of information on climate change impacts when developing adaptation responses and exploring linkages between development, projected climate change and relevant adaptation responses. We first outline the key aspects and framework for participatory scenario development with a focus on climate change. We then provide examples of the application of the framework and present lessons learned. We conclude with remarks on potential future applications of participatory scenario development in adaptation planning. This paper is followed by another publication outlining specific applications of participatory scenario development (PSD) in three countries: Ghana, Honduras and Tajikistan.

[1] The EACC study was funded by the governments of the Netherlands, the United Kingdom, and Switzerland, as well as by the World Bank.

Overview of Participatory Scenario Development in the Context of Climate Change

Scenario approaches have emerged as an effective method for taking a long-term view when harmonizing diverse socioeconomic and environmental goals (Raskin, Banuri, Gallopín, Gutman, Hammond, Kates, & Swart, 2002). In this paper, we define a scenario as a story about the future that can be told in both words and numbers, offering an internally consistent and plausible explanation and description of how events may unfold over time (Gallopín, Hammond, Raskin, & Swart, 1997). The literature distinguishes two types of scenarios: explorative scenarios showing what *could* happen and normative scenarios (or backcastings) exploring preferred futures and showing how a solution to a particular problem might look like (Carlsson-Kanyama et al., 2008; Robinson, 2003). The outcomes of the scenario planning (the created scenario) can be used for multiple purposes, ultimately providing better policy or decision support and stimulating engagement in the process of change (Jaeger et al., 2000; Carlsson-Kanyama et al., 2008).

Although scenarios in early applications were developed by expert groups, combining such expert scenario approaches with participatory approaches has been gaining attention as a potentially powerful tool to engage a variety of stakeholders in discussion about preferred future actions and acceptable trade-offs. In this paper, we describe the use of PSD as a method to explore preferred adaptation interventions and, ultimately, preferred future pathways for a region in the context of potential climate change.

The qualitative and participatory techniques applied in a PSD exercise encourage discussion, deliberation, and the exchange of thoughts. The process helps identify different views on the issues and actions available drawing on stakeholders' views, experiences and resources. The desire is also to facilitate the framing and re-framing of perceptions and conceptions of problems, resulting ultimately in greater social learning (Patel, Kok, & Rothman, 2007).[2] A number of arguments in favour of participation in scenario development have been put forward in the literature (Volkery, Ribeiro, Henrichs, & Hoogeveen, 2008; Patel et al., 2007; Stirling, 2006): including that participation helps to

- Support the democratic rational for intrinsic social desirability of equity of access, empowerment of process, and equality of outcome, with the aim of countering the exercise of power.
- Give access to practical knowledge and experience, learn about new problem perceptions and identify new challenging questions.
- Gather diverse, extensive and context-specific knowledge to take more careful and explicit account of divergent values and interests.
- Bridge gaps between the scientific communities and governments, businesses, interest groups and citizens, thus providing a reality check for research assumptions and methodology.
- Improve communication between scientists, decision-makers and stakeholders and facilitate collaboration and consensus building on problem solving.

[2] In other circles, participation can also be understood as a means to enrich assessment and decision making through involvement of citizens and stakeholders in the process. In the latter case, participation is part of a decision-support process, instead of a way to organize the decision-making process itself. Process as a goal and process as a means can be considered as two ends of another axis. Both deal with the fundamental question of the weight and impact attached to the participatory process and its output (Kasemir et al., 2003).

To date, participatory scenario approaches in climate change research have mainly focused on impacts and mitigation actions in relation to varying levels of greenhouse gases (GHGs) in the atmosphere. For example, the Intergovernmental Panel on Climate Change (IPCC) Special Report on Emissions Scenarios (SRES) scenarios[3] have been used to help stakeholders envision potential GHG-mitigation targets and needed actions at regional, national and local levels. Examples include the ULYSSES project, which involved citizens in climate policy debates in an urban context (Kasemir, Jaeger, & Gardner, 2003) and the COOL project, which engaged policy-makers, business and industry representatives, and NGOs in a discussion of potential scenarios of long-term options for far-reaching GHG emission reductions (Kerkhof & Wieczorek, 2005). Further applications of PSD on pathways of possible emission reductions and low-carbon futures have been developed for specific regions (e.g., for Europe, see Matthes, Gores, Graichen, Repenning, & Zimmer, 2006) and countries (e.g., for France, see Fink, 2009). Recently, Shaw et al. (2008) applied the PSD process in British Columbia (Canada) with a focus on developing scenarios of local futures under different SRES scenarios.

[3] The IPCC SRES provided explicit linkages between development choices and the level of GHGs, illustrating that development decisions could considerably alter the level of future emissions and thus climate change impacts (Nakicenovic & Swart, 2000).

The Use of PSD

The purpose of developing and using scenarios[4] was to help anticipate and understand the consequences of climate change in the context of desired and plausible socioeconomic futures in developing countries. The scenarios were also used to provide a context in which stakeholders identify, prioritize relevant adaptation options over time to create pathways. Given the desired futures as identified by stakeholders, PSD helped relevant stakeholders to explore both hard (e.g., technologies and infrastructure) and soft (e.g. awareness raising and policy) adaptation interventions. Furthermore, the PSD mapped out alternative, robust adaptation pathways that combine a variety of soft and hard adaptation options in plausible sequences relevant across a number of scenarios and regions in the studied countries.

There are a number of sources outlining key steps in PSD methodology (Kok, Patel, Rothman, & Quaranta, 2006; Patel et al., 2007; Wollenberg, Edmunds, & Buck, 2000). Compared to recent applications of scenarios presented by Carlsen et al. (2012) that focused on the use of explorative scenarios, we focused on backcasting to explore desired developed pathways and adaptions needs and actions within them. Specifically, we built upon existing thinking and achievements in the PSD field to customize a qualitative-based PSD process in light of the lack of sufficient data and technical resources available in the communities and countries participating in the study. Qualitative scenarios were developed based on participants' understanding of the system, as discussed in small groups and plenary sessions and guided by input from relevant experts and facilitators. Secondary data was used to describe current development trends and climate change projections to help inform participants' desired future as well as adaptation pathway. During the design of the PSD process, we focused on creating opportunities to identify trends that are not only related to climate change, but which will strongly affect the severity of the future impacts and needs for adaptation (e.g., deforestation in upper watersheds; migration of particular social groups from the community; possible changes in market prices).

The PSD framework was applied in various workshop settings. These included two national workshops and two to five regional workshops in each country. The length of the workshops ranged from one to two days. At each workshop, anywhere from 15 to 45 people participated, including policy-makers, academics and research affiliates, community leaders, civil society representatives, government agency representatives, and donor representatives.

Prior to the workshops, local facilitators in each country were consulted to discuss development challenges, gather information on climate change impacts and identify local presenters for the PSD workshops. The study team also worked closely with local organizers to determine locally appropriate workshop elements, including the length of the workshop, appropriate types of groups created to inform scenario development, elements of the scenarios, and the types of boundary conditions introduced, including those related to projected changes in climate.

[4] The approach was developed within the Economic of Adaptation to Climate Change project: http://climatechange.worldbank.org/content/economics-adaptation-climate-change-study-homepage.

Structure of the PSD Workshops and Sample Results

Although the nature of each PSD workshop differed slightly, reflecting the different regions and phases of the project, all followed a similar structure. This included eight key steps, moving from the identification and discussion of development challenges and drivers of desired future scenarios to the identification and discussion of impacts of climate change and relevant adaptation options (see Figure 1).

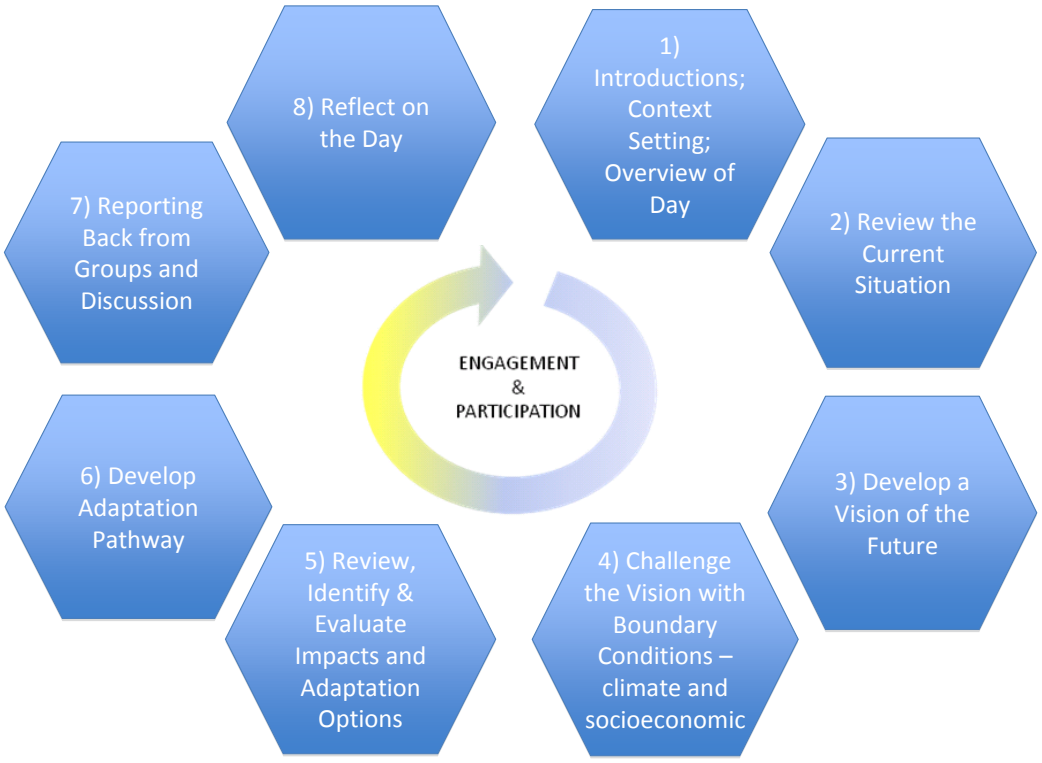

FIGURE 1. KEY ELEMENTS OF THE PSD WORKSHOP APPLIED IN THE STUDIED COUNTRIES

1. **Introductions, context setting and overview of the day:** The workshops opened with an introduction to the overall focus of the workshop and a detailed review of the planned activities.
2. **Review of the current situation:** Participants were invited to discuss the driving forces of current development within their country/region, including agricultural change, urbanization and use of natural resources. Depending on the perceived magnitude of current climate-related issues, key drivers of change often included existing levels of flooding, drought and extreme weather events. From this, key sectors and/or geographic regions of greatest concern to participants considering current and future changes in climate were identified.

3. **Develop a vision of the future:** Participants were then divided into groups based on either geographic region or economic sector (e.g., forestry, fisheries, agriculture) and asked to develop a detailed future vision of their region/sector using their expert and/or local knowledge (for examples, see Kok et al., 2006). Participants were encouraged to develop their desired futures without specific consideration of climate change but rather their knowledge and awareness of all development trends and challenges in their targeted region or sector. Using a process of backcasting, participants worked backwards from their desired future, identifying a series of detailed steps that could be used to achieve the vision (Robinson, 2003). An example of a created future vision is presented in Figure 2.

FIGURE 2. AN EXAMPLE OF A CREATED FUTURE VISION FOR FORESTS ZONE FROM GHANA.

4. **Challenge the vision with boundary conditions—climate and socioeconomic:** The identified scenarios, or visions, were carefully examined for their resilience and ability to stand up to "what if" questions given current knowledge of future climate and socioeconomic trends. For example, what if annual rainfall declines over the next 20 years? Or, what if women are expected to gain greater economic responsibilities and wages? The ensuing discussion encouraged participants to identify the first-, second- and third-order impacts of such changes, creating a number of plausible impact chains for each scenario (Figure 3). In order to inform this discussion, participants were provided with summaries of available information through expert presentations and handouts. The result was an evaluation of the attainability of the desired future conditions given a set of identified boundary conditions.

FIGURE 3. OUTLINING POSSIBLE CONSEQUENCES OF CLIMATE CHANGE BY CONNECTING ENVIRONMENTAL ISSUES WITH WELL-BEING AND NEEDED ADAPTATION OPTIONS IN GHANA AND BY USING IMPACTS AND ADAPTATION CARDS IN MOZAMBIQUE.

5. **Identify, review and evaluate impacts and adaptation options:** We continued working with the created impact chains for each scenario, and participants focused on identifying adaptation options to reduce, or minimize, any adverse impacts, as well as strengthen any positive impacts. Recommended adaptation options were meant to increase the resilience of created pathways under the constraints presented by introduced boundary conditions. If the impacts were considered too severe within a particular scenario, the scenario was considered unsustainable (i.e. not resilient enough in the context of the impacts over the applied time horizons). Following the timescale applied in the EACC study, we operated with a horizon of 2050, within which short-term measures were considered those required within the next five years (up to 2015), medium-term horizons were those required within the next 10–15 years (up to 2030) and the long-term horizon included those measures required out to 2050.
6. **Develop adaptation pathways:** After identifying adaptation options (Table 1), groups focused on extracting a series of actions that stakeholders deemed to be crucial for the future resilience of each scenario in the context of projected socioeconomic and climate change. These actions could include the adaptation options identified in the previous step, but also the elements of the created future scenarios important for the overall resilience of the scenario. During this step, we compiled the actions across all the groups to create a set of actions that were robust across all different scenarios. The participants were then asked to identify short-term priorities linked to current or ongoing initiatives within the region/country that they were aware of, followed by recommended actions that are needed to achieve the longer-term goals.
7. **Reporting back from groups and discussion:** In this session, participants presented their prioritized adaptation options at different timescales as developed in their groups. The purpose of the session was to create integrated adaptation pathways to demonstrate priority interventions across regions or sectors. Participants were then encouraged to cluster similar actions and explore synergies and minimize trade-offs in related sectors such as agriculture, water management and food security.
8. **Plenary discussion and reflection on the workshop:** The final session provided opportunities for the participants to reflect on the process and discuss issues that emerged during the workshop. We concluded the workshop with participants completing a workshop evaluation questionnaire.

TABLE 1. EXAMPLES OF COMPLEMENTARITIES BETWEEN HARD AND SOFT ADAPTATION MEASURES IN AGRICULTURE AND WATER RESOURCES MANAGEMENT IN GHANA, MOZAMBIQUE AND BANGLADESH

HARD: INFRASTRUCTURE AND CHANGES IN PRACTICES	SOFT: GOVERNANCE, TRAINING AND CAPACITY DEVELOPMENT
• Building grain silos • Improved post-harvest technologies such as setting up small-scale agro processing industries to utilize farm products	• Promoting community-based governing structures to manage silos • Farmers' education–water harvesting and contour farming • Training centres and microfinance and getting skills for off-farming season activities and skills in agro-processing • Cooperative-type structures in managing equipment • Accessible loans for processing activities • Improved market support, marketing skills and alternative skill training to promote self-employment and economic diversification • Vocational training–especially for youth, in places with high in-migration; and creation of markets and training in other sector skills including hairdressing, sewing, carpentry
• Promoting sustainable agriculture, organic farming and appropriate technology to reduce degradation • Drought-resistant and early maturing crops–better utilization of water, diversified production • Erosion control by encouraging contour farming and water storing • Building dams • Building flood-resistant roads to ensure market access	• Sensitization to eat more legumes and promoting traditional recipes • Education–sensitization about using livestock and nutritional complement rather than social capital • Developing agricultural extension services and passing the options through district assemblies, to intensify education in weather projections, water harvesting, new planting techniques and providing information about new crops better suited to the area and climate • Funding and more research on potential changes in planted crops • Consultation with local communities on locations, size, overall suitability, upstream and downstream impacts and benefits of different types of dam • Consultations to properly allocate resources for road development so disadvantaged communities will get access as well

Key Lessons Learned

The above framework was applied in three to seven workshops in each country: Bangladesh, Ethiopia, Ghana, Mozambique and Vietnam. Below, we outline three key lessons learned from its application in the EACC study social component and suggestions for future applications.[5]

The Importance of Place-Based Climate Change Discussions to Enhance Relevance

Similar to experiences with scenarios in the corporate environment, the process of participatory scenario development has helped stakeholders develop their own understanding of the potential consequences of climate change (Wack, 1985). As a result of this understanding, stakeholders can better inform and design national and/or sub-national adaptation frameworks based on their very local and intimate knowledge of both the challenges and the solutions.

In general, climate projections convey data related to changes in mean temperature, rainfall, and sea level,[6] but fall short of expressing the direct relevance of this data for place-based actions and policies. Current gaps in the relevance of climate models and projections to decision makers include:

- The availability of projections is limited for very local areas, e.g., less than 50 square kilometres.
- Only a limited number of variables are currently projected. These primarily include basic climatic variables such as temperature and precipitation, with considerably less information available on the second- and third-order impacts on resources, built infrastructure and societal issues
- The presentation of results often reflects a style appropriate for other researchers and academics, instead of for decision makers and relevant policy-makers with diverse sectoral expertise, but limited understanding of climatology, climate modeling and projections.
- The presentation of uncertainties is such that it is often not clear how the uncertainties in the climatic variables would translate into uncertainties in the impacts on water resources, agricultural production and other resources.

A PSD approach can assist in making sense of quantitative projections of changes in climate variables by collectively exploring overall sector, or regional, first-, second- and third-order impacts, as well as preferred adaptation pathways, using both locally relevant and expert knowledge.

[5] More detailed results are presented in the other papers of this special issue.

[6] For example, in climate-crop models the impacts of the projected changes in mean temperature and rainfall are projected on specific crops such as wheat, maize and rice. In a classic study characteristic of the genre, the resulting changes in crop yield are characterized as ''impacts of climate change'' (Parry & Rosenzweig, 1993).

The Necessity of Developing Integrated Adaptation Measures to Enhance Credibility

A typical scenario-driven approach to climate change focuses on future climate only, but is not closely matched with detailed scenarios of plausible changes in socioeconomic indicators. The PSD approach to adaptation described here can help not only in outlining a dynamic development baseline within a particular country context (consistent with one of the key goals of the broader EACC study), but also in identifying both development and adaptation priorities to assist in addressing climate impacts in the context of overall development. Particularly when surveying the needs of those most vulnerable to climate change, overall improvements of living conditions, skill development and access to basic services are considered crucial to ensuring pro-poor adaptation. Regardless of climate change, disadvantaged communities across the globe face significant food shortages, unemployment, deteriorated social networks, and lack of access to basic services such as healthcare, water and sanitation, and housing. Many of these challenges contribute significantly to the development deficit already apparent in much of the developing world, and will be exacerbated by climate change over time. As a result, preferred adaptation pathways must be in line with desired development pathways to improve living conditions and economic development consistent with beneficial adaptations to climate change.

When identifying adaptation options, participants were encouraged to think about infrastructure development and other hard interventions, as well as soft interventions such as the design of relevant educational and training programs, changes to existing governance and institutional structures, and adaptations to and revisions of policies and management options. During the PSD process, measures prioritized by the stakeholders were naturally integrated across these categories (see for example Table 1). Such integrated adaptation measures recognize the need for upgrading infrastructure, but also the need to explore opportunities to develop ecosystem-based measures to supplement or replace infrastructure. They also recognize the importance of changes in governance to ensure that it won't limit access to adaptive and coping strategies and, finally, the importance of training and skill development so the farmers can learn how to use technologies, plant different crops, and change their practices for food storage and processing to better prepare for climate change impacts. The future scenarios provide opportunities to identify trends that are not related to climate change, but that will strongly affect the future risk from climate change (e.g., deforestation in upper watersheds, migration of certain groups from the community).

The Need for Stakeholder Participation in Planning for Adaptation to Enhance Legitimacy

Like other participatory approaches in adaptation research, PSD provides a structured process for participants to interact. Specifically in the context of adaptation, the workshop process tends to bring together stakeholders who do not usually engage in dialogue. This was confirmed by the participants, who valued highly the interaction with peers representing different sectors and institutions in a structured and goal-oriented manner that is usually not available to them.

The strength of the process lies in the opportunity to integrate information, projections of sectoral changes, climate, and development plans in order to develop effective adaptation actions and policies. Feeding new information about future trends into the assessment process has to be done very carefully in order to prevent people from focusing only on that new information. If introduced in the right way, the information can help the community to arrive at better-informed adaptation choices and priorities.

Furthermore, it is crucial to determine the role of participation and the application of the PSD approach in the overall project design. Participation increases the relevance and legitimacy of the created adaptation options, but it is also important for defining the purpose of developing adaptive actions. Participation can serve different purposes, including reviewing and/or validating model approaches, outlining preferred actions, making recommendation for policy-making and guiding program priorities. It is crucial to have upfront a clear expectation about the types of results and role of participation to avoid unrealistic expectations of the stakeholders.

Challenges in Applying PSD

It would be remiss of us to not mention the many challenges in applying the scenario framework described herein. These include ensuring that the approach and the outcomes are relevant for the involved stakeholders, climate change projections are accessible at a relevant scale, and the results of priority adaptation options are disseminated to those responsible for any associated allocation of financial resources. If using an international team of workshop designers and facilitators, as was the case for the EACC social component, a skilled and qualified local team must also be designated as collaborators to ensure relevance and ownership of both workshop content and format, as well as the continued use of the results for informing national and sub-national decision making. Customizing the PSD workshop design and methodology to the local, regional, or national context can be a time-consuming activity. As with most development frameworks, what works for a local PSD workshop in rural Ethiopia will not be appropriate for a national PSD workshop in Bangladesh.

When using participatory methodologies such as PSD, trust and recognition are important in order to ensure participants are willing to share information on development challenges, planning documents, climate change projections, historic data, and evaluation of policies and development documents. In addition, some countries are farther along in mainstreaming adaptation into broader development targets. Any existing data, plans or progress in this field must be factored into the design of the PSD so that the advances to date are not lost but rather strengthened, supported and elaborated using a customized PSD design. This can be particularly challenging when working with national or sub-national data from developing countries to design visualizations to support to the PSD process. The value of the visualizations to the PSD process is inherently dependent on the quality and completeness of the data. If the visualizations developed are too broad or abstract for participants to find useful, workshop facilitators and organizers risk discrediting the PSD process due to the ineffectual presentation of incomplete information.

In addition to the logistical challenges and necessary considerations when designing a PSD approach, there can be significant cognitive challenges for participants when asked to imagine and identify alternative future scenarios. This is particularly the case with longer horizons. For example, although one might find it easier to identify future challenges and opportunities for oneself or one's children, the same activity for one's grandchildren may prove too abstract or distant in the future, and therefore difficult to imagine. As such, the timelines which are used in a PSD workshop must be carefully considered to ensure not only the comprehensiveness and availability of good quality data, but that they are manageable and effectual for participants to understand and work with.

Finally, it is important for the effectiveness of the process to connect the PSD with existing stakeholders networks that can assist in identifying key stakeholder groups and actual participants, compared to a research team that often has a limited access to wider stakeholders groups beyond like-minded and often fairly technical audiences. Therefore it is necessary to emphasize the cross-cutting character of the workshop and the importance of different experiences. Based on the feedback from the workshops, the participants with a climate change focus appreciated the opportunities for interactions and collaboration with other experts.

Concluding Remarks

It has been apparent during the PSD workshops that stakeholders are at least as much concerned about climate change and its consequences as they are about the development of their regions and people. PSD can contribute to better understanding the potential consequences of climate change and adaptations, especially that the actual options and their effectiveness are dependent on other socioeconomic decisions, developed capacities and impacts of global and regional development. Especially with potentially increasing funding available, adaptation linkages with the wider concerns of stakeholders should be fostered, because pro-poor adaptation options and increasing adaptive capacities cannot be separated from the overall need to improve development status. Use properly, adaptation needs can guide and enhance priority development activities with relevance to projected climate change impacts.

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