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Successful Community Participation in Climate Change Adaptation Programs: on Whose Terms?

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Abstract

Community participation in climate change adaptation (CCA) programs has been advocated for long, but its implementation remains uncertain. There is also very little understanding and consensus on how and to what extent local communities can and should be involved in these projects. Arguably, both the concept and practice of community participation remain equivocal and contentious due to a lack of systematic effort to define the participatory framework in CCA. While the framework for community participation can be adopted from other planning and management discourses, yet they are typically expert-driven. The local communities hardly play a role in designing the framework. This study, therefore, took an alternative approach to define the meaning and implication of community participation from local communities' perspectives. To this end, we used the grounded theory qualitative research methods to survey 50 respondents across five rural communities in climate change impacted Northern Ghana. To evaluate the communities' meaningful participation in the adaptation projects, respondents suggested three critical parameters—First, community participation in a CCA project can be considered successful if the project contributes towards the livelihood security of the community. Second, the project outcome should be tangible. Third, the project should enhance the community's skills and training such that the community can run a similar project in the future without much dependence on external agencies. This study provides an alternative methodological insight on how to design and operationalize meaningful community participation in CCA that will have universal application irrespective of the geographical and socio-cultural boundaries.

Keywords Community participation · Evaluation · Climate change adaptation · Ghana

Introduction

The literature on climate change has recently seen remarkable progress in the articulation of how community participation (CP) is an important mechanism for an adaptation strategy to become successful and effective (Galicia et al. 2015; Ross et al. 2015). However, an overwhelming number of studies have expressed concern over the ineffective and uncertain involvement of local communities in the adaptation process (Allen 2006; Few et al. 2007; Reid et al. 2009). Scholars have pointed out that the non-existence of a universal definition of participation (Arnstein 1969; Rowe and Frewer 2000) resulting in varied names, conceptualizations, characteristics, and expressions, is the key factor that is responsible for ineffective and trifling community engagement in climate change adaptation (CCA) (Samaddar et al. 2015; Piggot-Mckellar et al. 2019).

The CP in CCA in the initial phase has mostly been practiced through the awareness building in the local community about climate-change-induced risks and potential strategies for effective adaptation (Sheppard et al. 2011; Hung and Chen 2013). This participatory approach has been criticized for failing to augment the adaptation intention and aggravating the sense of fatalism among communities at risk of climate change (Few et al. 2007; Nkoana et al. 2018). An alternative and proactive model of CP involves

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local communities being solicited to reflect and observe the proposed CCA plans and policies (Ayers and Forsyth 2009; Larsen and Gunnarsson-Östling 2009). To further elevate CP, CCA programs have been designed to directly involve communities to identify the risk, engage them in preparing the plan, and likewise hold them responsible for implementing the plan (Collins and Ison 2009; Spires et al. 2014; Nkoana et al. 2018). Arguably, both the concept and practice of CP remain equivocal and contentious due to a lack of systematic effort to define the participatory framework in CCA. In addition to that, the mistake and mayhem over implementing meaningful community involvement are climbing high in the absence of an established nomenclature of participation, branded by copious terminologies, such as *community-based*, *bottom-up*, *participatory*, *collaborative*, *co-production* and so on (Piggot-Mckellar et al. 2019; Spires et al. 2014). Notably, like the disagreement over the definitions, the selection of appropriate participatory tools such as risk mapping, town watching, livelihood surveys, historical and seasonal group meetings, and rapid rural appraisal, which are explicitly designed to implement effective CP, remains daunting (Toth and Hizsnyik 2008; Roncoli et al. 2009; Samaddar et al. 2015b). Community-based adaptation is increasing with listed positive outcomes, including conflict regulation, better-accepted decisions, local empowerment, and optimization of local resources; but many of them are seldom empirically validated (Ashley et al. 2016; McNamara and Buggy 2017; Forsyth 2013). Thus, translating and documenting these activities into improved adaptation policy responses and scaling them up requires identifying the mechanism and framework of CP in CCA.

Unlike climate change discourse, a sincere effort has been made to define framework of CP in various management and planning studies. Noteworthy are—environmental planning, natural resource management, risk management, and joint forest management studies, to name a few (e.g. Rowe and Frewer 2000; Blackstock et al. 2007; Renn et al. 2013). Generally, a good CP framework is defined as one with a list of processes and outcome-based variables associated with the communities' involvement in the decision-making process (Chess and Purcell 1999; Reed 2008; Samaddar et al. 2017). This manifests in, for example, the continuous engagement of the community or relevant stakeholders, utilization of local resources and knowledge, good facilitation, accountability and fairness, ownership, equality, and so on. These criteria mostly derived from case study analyses, project experiences and, at times, a theoretical basis (Webler et al. 2001; McCool and Guthrie 2001; Samaddar and Okada 2006; Davidson et al. 2007; Carr et al. 2012), are envisioned as indispensable for effective CP among researchers, government and project officials or practitioners alike. These frameworks for CP have widely been applied and used, however their successful implementation remains elusive (Kwiatkowski 2011). The critical shortcoming of these frameworks is that they are mostly planner and researcher driven, and local communities have never enjoyed the prerogative to define their preferred ways of participation (Chambers 1997; Saxena 1997).

Meanwhile, the mainstream critical CCA scholarship is abuzz with numerous reasons for community-based programs to be defined from the local community's perspective. First, there are several participatory frameworks, and each approach is claimed to be more comprehensive and practical. However, these criteria are often case-specific and site-specific. A factor or a set of factors that make a project successful in one place may not be applicable elsewhere (Dodman and Mitlin 2013; Forsyth 2013). Second, even researchers who advocated for a particular normative principle of CP are now welcoming multiple voices and discourses (Webler and Tuler 2006; Webler et al. 2001). This is due to the realization that the definition of a successful CP is always value-laden (Rosener 1981). Hence, it requires taking into account the perspectives of local communities. Third, the degree of CP entails consequences for local power politics, cultural connotation, and social approvals (Samaddar et al. 2019). When the framework is the sole handicraft of the researchers and practitioners who belong to a different social environment, it often falls short of capturing the local social realism and impedes policy implementation (Saxena 1997; Wenger 1998). Fourth, a community-defined framework often reflects its values and assumptions and thus increases cooperation with the evaluation process and use of the results (Santos and Chess 2003). This makes the search for an alternative approach to define CP a timely call.

The present study, which is based on field survey conducted in the Tolon District of the Northern Region, Ghana, aims to investigate the process and outcomes of CP in CCA from the local communities' perspectives. Unlike other participatory approaches where effectiveness is defined by the researchers and policymakers, this study relies on local communities' climate change risks to define the processes for and outcomes of effective public participation in adaptation programs.

Study Area: Climate Change Impacted Northern Ghana

The study areas fall within Northern Ghana, which is a region challenged by climate change. We took five adjacent villages—Yoggu, Zagua, Kpalgun, Daboshie, and Fihini—in the Tolon District of Northern Ghana for our case studies. These villages were selected not only because they were vulnerable to climate change but also because, for a long

time, several community-driven CCA initiatives have been conceived. Nevertheless, these community-driven CCA projects have never been systematically investigated how effective they are in involving local communities. The Tolon District lies within the Guinea Savannah zone. In all these study villages, agriculture forms the base of the economy. Apart from crop production, the activities people engage in to make a living include animal rearing, poultry keeping, food vending, petty trade, and craftsmanship. The rainfall and temperature in the study areas are highly variable (Boakye-Danquah et al. 2014). The average temperature ranges from 25 to 36 °C, but it can rise to 45 °C from February to April. The average annual rainfall ranges from 900 to 1000 mm. Generally, the rainy season starts in April and reaches its peak in August and September. The rainfall then declines from mid to late October, and the long dry season sets in until March. However, in the last decades, rainfall distribution has become irregular, intermittent, and torrential.

Studies have shown that Ghana experienced a 1 °C rise in its temperature with a 20% decline in its rainfall level in the last 30 years, which culminated in increased evaporation, decreased and variable rainfall patterns, and frequent and pronounced droughts (Yaro 2013; Laux et al. 2008). Ghana may experience a 2.0 °C temperature rise by 2050 and a 3.9 °C rise by 2080, whereas the rainfall pattern is expected to decrease by 10.9% and 18.6%, respectively, by the given years (Kranjac-Brisavljevic et al. 1999; Laube et al. 2012). The increasing drought events and water scarcity due to fewer rainy days, shifting onset of rain, and erratic rainfall along with the rising temperature in the region are all seemingly increasing the local communities' risk to livelihood, which is predominantly subsistence farming based on rain-fed agriculture (Otsuki et al. 2014). A study by Akudugu et al. (2012) found that food insecurity, emigration, and hunger have become regular phenomena because of decreased crop yield due to climate change. Thus, there is an urgent necessity to design policy and programs focusing on enhancing local communities' adaptation capacities through household preparedness, local resources mobilization, and innovative technology dissemination (Boafo et al. 2014; Samaddar et al. 2018). Local communities' participation is, therefore, key for the successful implementation of these programs.

While dealing with CP in the Northern Ghana context, there is a need to introduce the traditional governance or chieftaincy system of the region. The chieftaincy system comprises a chief at the apex of the hierarchy and elders including the sub-chiefs, earth priest, senior citizens, and the Magazia (queen mother) (Owusu-Mensah 2014). In independent Ghana, this traditional governance system started to lose its political authority, and eventually, in 1992, the Constitution of the Republic of Ghana decided to set up a new institutional framework for decentralization. Under this constitutional set-up, each district has its own local representation—the District Assembly—which renders the deliberative, legislative, and executive responsibilities (Guri 2006). It comprises one elected person from each electoral area, which is further divided into Unit Committees whose elected representatives perform duties delegated to them by the Assembly. As a result of the political democratization process, the chief has lost all judicial, administrative, and military power in Modern Ghana. Nevertheless, chiefs continue to play important political and cultural roles in the village system (Crook 2005). Due to the existing customary land tenure system in Ghana, the village lands belong to the chief who is solely responsible for deciding their access, use, and management. The chief, still being the symbolic head of the community, plays critical roles in initiating and monitoring community development projects and pursuing the grassroots mobilization of community labor (Mahama 2009).

Methods

This study adopted grounded theory methods (Corbin and Strauss 2014) for which we relied largely on previous studies (Moore 1996; Tuler and Webler 1999; Santos and Chess 2003), which successfully employed similar qualitative research methods to evaluate public participation. The rationale behind adopting grounded theory methods is that unlike quantitative research methods, they do not necessarily restrict respondents' opinions to questions and items predetermined by researchers. The derived principles are, therefore, self-instigated and this process, in turn, facilitates a bottom-up approach to investigate the community's opinion on ideal CP (Moore 1996). The grounded theory methods allow respondents to take time to realize the actual meaning of questions and accordingly articulate their views (Denzin and Lincoln 2011). This is particularly important where the majority of the respondents have less formal education or are not considered a part of the mainstream society, which is the case in Northern Ghana.

Field surveys for this study were conducted in two phases: first in March 2016 and then in June 2016. The first author of the paper as well as the other authors from the local academic institute, University for Development Studies (UDS), played major roles in conducting the field surveys. Adhering to the tribal tradition in Northern Ghana, the first phase survey started after greeting the village chief. Thereafter, the village leaders called a village meeting where all sections of the villagers, irrespective of their gender and ethnicity, were invited. As the village meeting is a mass congruence in this region, this gathering was instrumental for understanding the general profiles of the

villagers and getting acquainted with potential respondents for open-ended interviews. During the meetings, we collected information on each village's socio-demographic compositions, traditional governance system, and the CCA projects and programs. Participants in the meetings informed us about various CCA programs initiated in the study villages, but specifics such as the names, objectives, and timeframes of the projects and information about funding and implementing agencies were not available. Therefore, soon after the meetings, we visited several government intuitions (e.g., the Tolon District Assembly, Environmental Protection Agency, National Disaster Management Organization) and several non-governmental organizations in the Upper West Region to get the particulars of the projects, but were unable to obtain them. We assume that the information on projects in these remote areas was not properly recorded by the concerned organizations. Accepting it as a limitation of our study, we decided to go ahead with only the information available from the villagers, predominantly because our study does not focus on evaluating any particular project but examining people's perspectives on participation in CCA projects in general.

The second phase of the field survey started two months after the village meetings to obtain direct and comprehensive perspectives from all sections of the community on CP in CCA. We relied on face-to-face, open-ended interviews of the villagers for data collection. We interviewed a total of 50 respondents in five villages using stratified purposive sampling (Patton 2001) to identify the same number of representatives for each group in a village. Our study objective was to learn about people's perceptions, concerns, and judgment about their meaningful involvement in CCA projects. In Northern Ghana, traditional leaders negotiate with external agencies to include the community's needs, demands, and visions in the decision-making process. The main conflicts or disagreements that exist in climate-change-related governance are between local communities and external agencies including donors, policymakers, implementing agencies or NGOs, and expert groups. As such, it is the village governing body that can shed a realistic light on how and to what extent communities are able or allowed to participate in different donor-funded CCA programs. With this in mind, we interviewed 10 respondents from each village, seven of whom were part of the village governance system—the village chief, a sub-chief or village elders, assemblyman, the village religious head ("Imam"—the Muslim religious head), the village youth leader, Magazia (village queen mother) and a school teacher (considered to be among the well-educated people in the village). The remaining three were ordinary people from the villages who had very little or no opportunity to participate in the village decision-making process. We canceled a total of five interviews because the respondents gave several incomplete, unsatisfactory, or irrelevant answers. They were later replaced by new respondents. The communities were purposively identified by local researchers from the UDS who had prior research experience and social networks in these villages. Apart from the Magazias (village queen mothers), we were able to successfully interview only two female participants. The potential women participants either refused to share their opinion on public issues to outsiders or were less interested and had little understanding of the study issues.

Keeping in mind the open-ended nature of the interviews, we prepared a set of questions, as given in Table 1, to systematically conduct them. They were not questionnaires; we did not ask the same questions to all the respondents but prepared questions to provide tentative readiness and guidelines to the surveyors to open up and maintain a dialogue with each respondent. Moreover, the questions were intentionally made repetitive and overlapping so that in case a respondent could not understand a question, the same could be examined in an alternative manner. We adopted this survey idea from the seminal work of Tuler and Webler (1999) on evaluating public participation through qualitative research methods. An interview generally took an hour and a half. All the interviews were tape-recorded with the permission of the respondents.

Following the grounded theory methods (Corbin and Strauss 2014), we used coding techniques for data collection. Three types of coding were used in this research: open, axial, and selective. We started with open coding for which we read the transcribed data and examined it line by line. We highlighted the key points in each sentence or paragraph. We then used the code to label the key points from the dataset. Open coding helped to break down the large data into smaller units. We then labeled each category with a name or title. We continued to examine texts and compare codes to make sure no more codes emerged. After the coding, we identified the patterns or concepts that had emerged from the data. Similar concepts were then grouped into one category to find more abstract concepts (category). Open coding helped us identify the key points and criteria of effective participation. The codes were assigned to two broad categories—process and outcomes of participation—and then assigned with sub-codes to develop sub-categories. Following this, we applied the axial coding process to identify the interconnections between the categories and codes. The open codes in one dataset were compared and contrasted with other datasets. Common patterns or interlinings emerged from axial coding, which helped to identify the core category of effective CP in CCA. Finally, following the grounded theory methods, we used selective coding to identify a central theme that integrated the categories emerging from the axial coding

Table 1 Survey preface and questions

Introduction and problem description	You may agree that the climate in your area has changed in recent times and you are facing many challenges as a result, such as insufficient water for drinking and irrigation, ponds and wells drying up, trees disappearing, a decrease in your farm production, and so on. To tackle the issue, the government and many NGOs undertake several programs such as afforestation, digging boreholes for drinking water, mini-dams, and alternative farming practices. The agencies, both government and NGOs, want the villagers to be involved in the project. But in many instances, the project officials do not know how to collaborate, inform, and invite people. Villagers also differ in opinions —some want to be involved, others do not. Therefore, we want to know what strategies can be implemented to ensure the involvement of the villagers, according to you.
Questions on the process of effective community participation	- What is the most important thing when outsiders want to work together with the villagers? - If a new company or NGO wants to start a new project, what process would you suggest they should follow? - How do you see your involvement as a community member in this process? - How should an outsider approach the community, and when and for how long should they involve the community? - Who should be involved in the community or villages and how? - How and where should meetings be organized? - Can you remember any previous project that failed to involve people? Why did they fail in your opinion? - Tell us about some successful climate change adaptation programs in this area. Tell us what process made the project successful? - Why do you think these processes are important?
Questions on the process of effective community participation	- What should the outcomes of the projects be to call them successful? - A project on climate change has ended. At present, based on what factors or signs can you say the villagers were successfully involved? - Why do you think these outcomes or results are important? - What is the true evidence to know whether a project is successful and has truly involved the participation of the local villagers?

process. To capture the central storyline or theme identified through the selective coding process, we used figures and diagrams to systematically plot the information. In this manner, we inductively generated the scheme of effective CP in CCA projects using the grounded theory methods.

Results

The field data suggested that the respondents did not necessarily suggest a complete set of criteria or steps that are prerequisites for a participatory process to be effective. Instead, a group of respondents suggested a fragmented step and co-factors for effective participation while another group suggested another subset of the participation process. Using axial and selective coding, we identified the interconnection between different process sub-sets and joined them to ascertain the central process principles of participation. The proposed process for effective CP was segregated into three successive stages:

- Phase 1: Agreed objectives and preparation of the draft plan
- Phase 2: Plan finalization and implementation
- Phase 3: Maintenance

The successful execution of each process phase depends on several co-factors or conditions, as shown by the orbit surrounding each phase in Fig. 1.

Phase 1: Agreed Objectives and Draft Plan Preparation

The respondents were of the view that a successful CP starts with an objective agreed upon by all participants, followed by the preparation of a suitable draft plan. However, the success of this process was subject to several factors, such as the entry protocol of the external agencies in a community and how they facilitated reciprocal dialogue with all sections and interest groups in the community to receive multiple voices and perspectives.

The respondents elaborated on three models of the draft plan preparation to describe the contrast between the existing practice and the ideal one, as shown in a series of self-explanatory illustrations in Fig. 2. According to the respondents, Fig. 2a, b represent two popular plan preparation models adopted by government agencies and NGOs. They argued that both the models were top-down approaches, each with a limited window for meaningful community involvement.

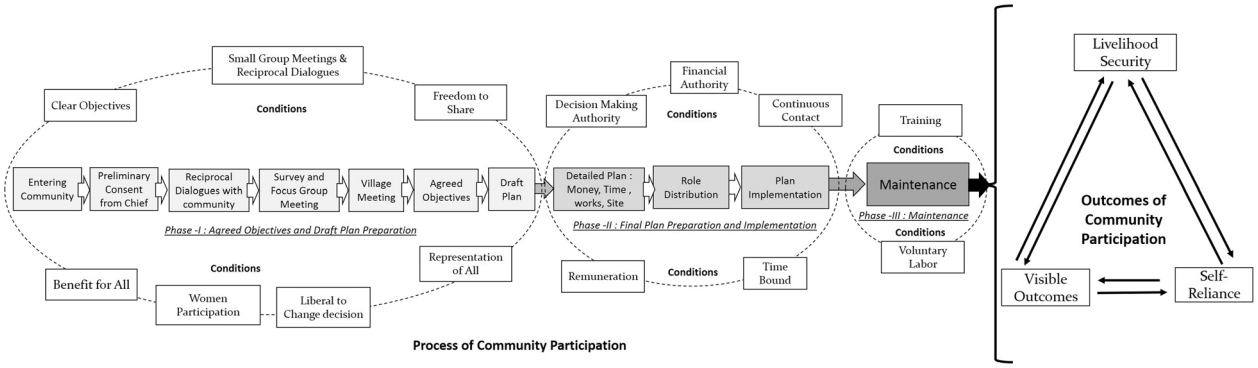

Fig. 1 Community participation framework from community's perspective

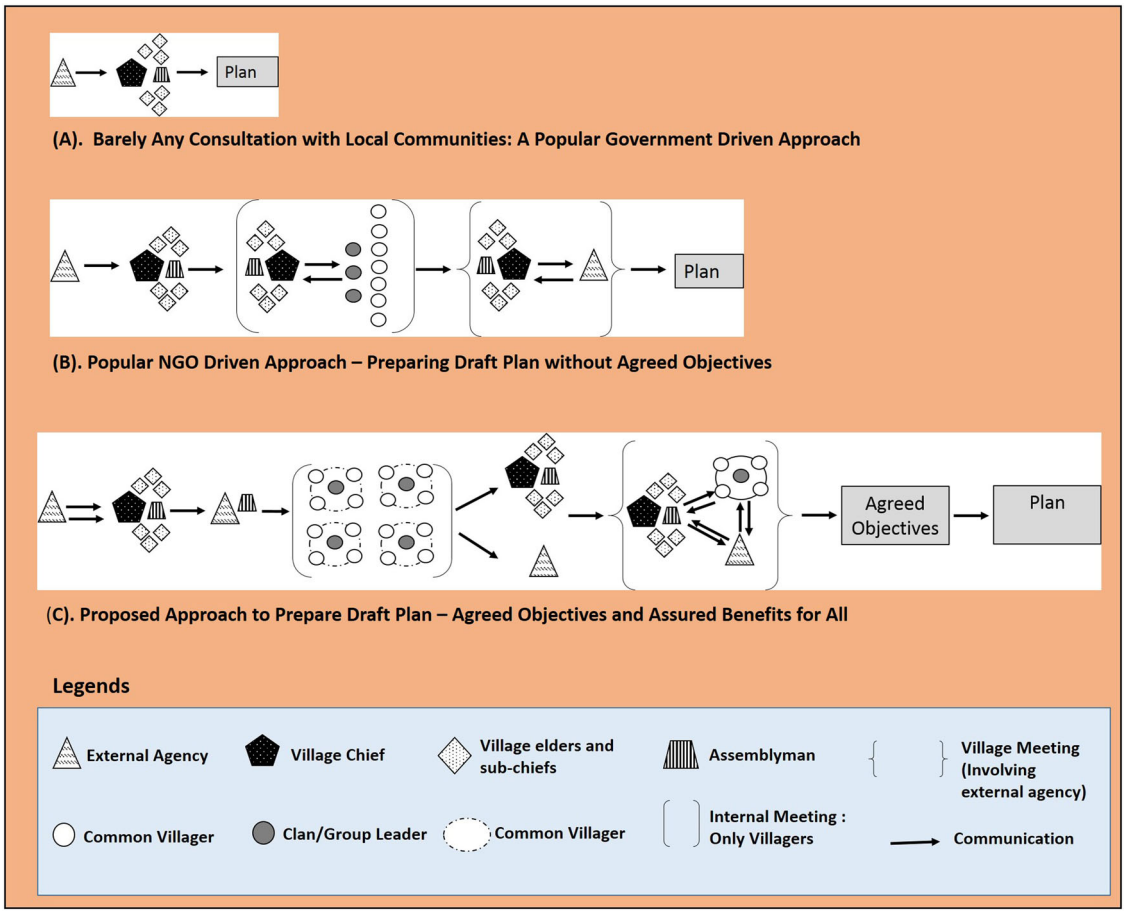

Fig. 2 Types of steps/procedures for draft plan preparation

For instance, Fig. 2a represents a case wherein the external agency drafted its plan without seeking suggestions from the local community, immediately after entering the community. In this case, the agency's interaction with the community was restricted to merely obtaining preliminary consent from the village council. External agencies have often assumed that local communities, by default, would agree to their prepared plans without requesting any modifications. This assumption was made because the projects were wholly or primarily funded by such agencies and meant for the development of the locals. Respondents noted that this practice was common when investment in the project was high; and the agencies assumed that the target communities would support the project without questioning the procedures involved. A senior citizen from Fihini explained,

"The people from government offices have very little patience to discuss the matter with villagers. They just want to get consent from the chief as a protocol and start work. They are always in hurry. If they come for digging a dugout, they know we are waiting for it for long. So … we should follow them anyways."

Figure 2b represents the model that was the most popular and generally adopted by NGOs. In this case, the external agency called for village meetings to ascertain a collective approval for the project immediately after getting consent from the village chief. However, only the village elites could talk and ask questions, while the participation of marginalized groups such as women, new settlers, and minor lineage groups was limited.

Figure 2c represents the model that the local communities proposed as ideal for the plan preparation process. The proposed process should be gradual, providing ample opportunity to grasp public opinion. Apart from village meetings, the external agencies should carry out surveys and hold focus group meetings to explore the true concerns and opinions of all groups, especially those of the marginalized communities. Afterward, external agencies should also invite them to prepare the draft plan and advocate the stakes of the poor in its preparation. This model is in contrast with the popular practice of the external agency alone preparing the draft first and then inviting local communities to provide suggestions.

Conditions for the Success of First Phase Participation

The respondents stated several conditions or factors as critical for establishing an effective first phase participatory process, as illustrated in Fig. 3. They argued that the agreed objective of the project should have three characteristics, namely, (i) clear objectives, (ii) flexibility to change the decision, and (iii) benefits for all. These factors mainly resonated with the creation of a democratic platform to ensure participation.

CCA projects often failed to meet the agreed goals because the tentative objectives of the project were too obscure for the villagers to follow, causing confusion and mistrust among the stakeholders. Communities did not want technical jargon to be used as confused them and made it difficult to carry out the project. A farmer from Daboshi shared,

"Last year, they (not sure if government officials or NGOs) interviewed me for a long time, checked my rice fields, and was asking me about time of plowing, harvesting, and what problems I face. But I have no idea what they want to do in future."

A schoolteacher from Zagua added,

"Clear objectives are more important for reaching agreed objectives. You want us to prepare food, dig ponds, water plants (for the project purpose)—(it is) okay. Then tell freely what your project will yield ultimately. Villagers will give you more."

The respondents argued that people's interests in the project often faded because the draft plan failed to address the 'benefits for all' aspect. Project objectives should serve the interests of all and assume a pro-poor outlook if resources are limited. Many projects in the past failed to reach a consensus, even after several meetings, because the external agencies did not like to deviate from their original plans. This frustrated the local communities.

A teacher from the community explained

"Tell freely what your project will yield ultimately. …-If I do not know the project, I am not happy to participate…-We wait for long and attend many meeting, but we do not know about the project. It frustrates us."

All sections of the community should have equal opportunities to participate in village meetings. Communities are not homogenous entities, more so when the settlements are sparsely located. In previous projects, communities that were located far away or consisted of seasonal migrants were often left out of the decision-making process. This may have been because such communities could not join the meeting due to their remote locations. Similarly, the elite groups from the villages refused to allow the participation of various marginalized groups, especially women, new settlers, and minority clans.

Women participants alluded they formed the most vulnerable populations in the village, and thus underwent a great amount of hardship to maintain their livelihoods. Yet, none of the projects initiated in these villages have sought ways to increase women's participation so far. A women respondent complained,

"Me and my children carry water from taps and ponds (see Fig. 4). We should walk miles daily for water. During summer it is so difficult and painful. Scorching sun, no bicycle, and heavy pot over your head … you see how tough our days are. But we always give our best. But when some outsiders came to install a borehole here, it is only the village male members who could decide the new water pump location. Although, none of them has any idea how we manage our water needs. But, we cannot say a word."

The Magazia of Yagua village added,

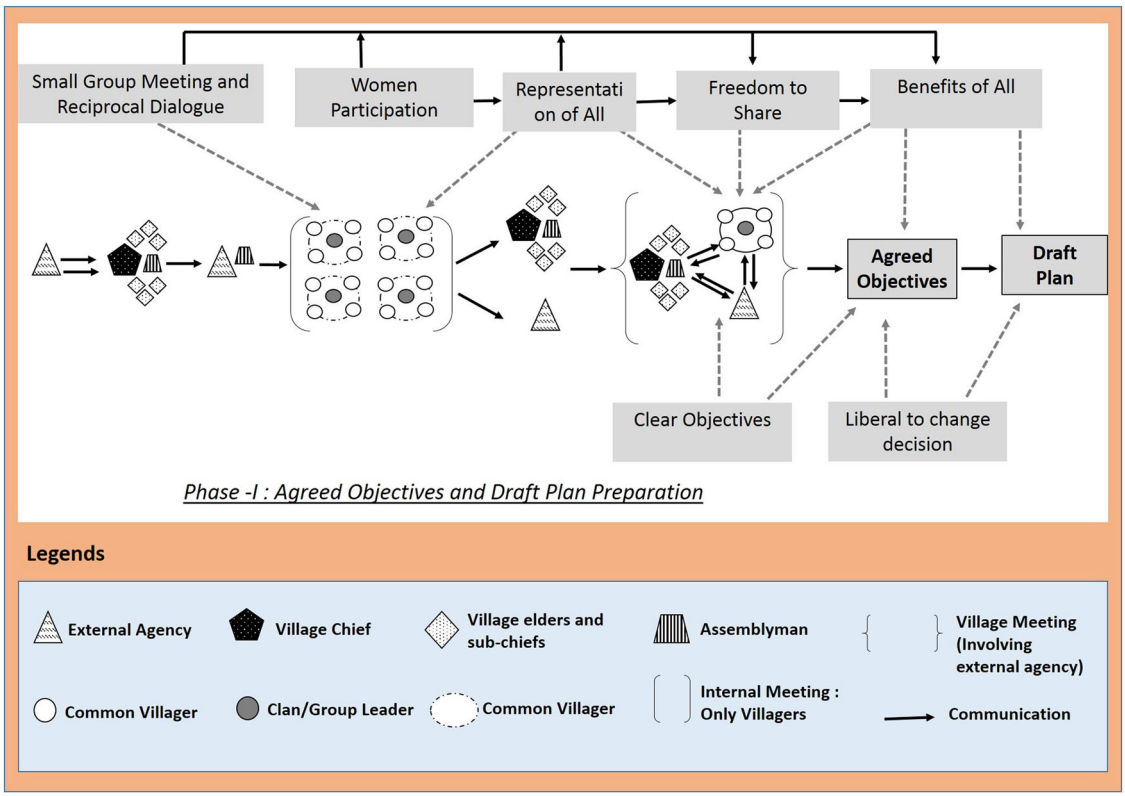

Fig. 3 Factors affecting the process of community participation in first phase of climate change adaptation program

> "The women cannot participate or talk freely when the chief and other elders make important decision about village matters. It's true that it is our culture. But they know that women are the spine of the village. So, if the women cannot speak in front of others is not acceptable."

The women respondents believed that there are ways to ensure women participation, such as through organizing women's meetings, granting decision-making power to the Magazia on village issues, and sincere discussion of women's concerns by the clan head in the village meetings.

Village meetings do not always serve as an ideal democratic platform to share ideas because of patriarchal hegemony, the dominance of one clan over another, and the local politics of the village. Therefore, external agencies, with the help of assemblymen, should have met people individually and organized focus group meetings to understand their concerns and vision.

A community member urged

> "People living in remote areas cannot always come and join. They should be invited and given time to send representatives."

The respondents believed that participation should not mean mere physical participation but also guarantee freedom for the marginalized groups to express their views. The external agencies did not allow people to speak elaborately because they assumed the villagers were mostly illiterate and hence could not add any substantial suggestions for village development and CCA.

A youth leader from Zagua explained,

> "Government officers think poor people do not understand anything. Many of our villagers own the same mentality! Everybody should be allowed to share (an opinion). Then it is called participation."

A villager elder added

> "- Everybody is equal and important members of the village. One's freedom resonates with the freedom of common villagers. Because of lack of school education, one should not be stopped to speak. Project manager should allow everybody to say what that person feels is important."

Phase 2: Plan Preparation and Plan Implementation

Local communities detailed the roles and responsibilities of the stakeholders based on agreed objectives to ensure the plan implementation.

Fig. 4 Children carrying water from long distance for household consumption using a donkey cart (photograph by S. Samaddar)

Factors and conditions essentials for plan preparation and implementation

Decision-making Authority The local communities felt that their actual participation had never really been achieved because they were given very little or no decision-making power. Whenever the opinions of the communities differed from those of the external agencies, the latter usually overlooked the former. If local communities strongly pursued their decisions, the external agencies would oppose, citing reasons such as the lack of money and resources, technical difficulties, and the suggestions being outside the scope of the project objectives. Finally, the project would be withdrawn or given to other communities based on the non-cooperation of others. Thus, communities were compelled to agree with the decisions taken by the external agencies. An assemblyman from Yagon admitted,

> "It happened many times. They (NGOs) came here … wanted to construct dugouts or boreholes. We did surveys together and many meetings. We showed them natural slopes, the places or ponds where rainwater can stay longer. Women prefer to select the location because they are the ones who collect water … long distance to walk. We want everybody, even adjoining villages, could get benefit out of it. But they (NGOs) decided something else. We disagreed and strongly asked them to consider our suggestions. Finally, what happened—they stopped the project and never came back. That was our fear. We know we cannot get into argument or disagreement."

Fig. 5 Picture depicts a failed dugout constructed by a development agent against the advice of the community (photograph by S. Samaddar, April, 2016)

The villagers were always apprehensive that disagreeing with the external authorities meant they would lose the project. The chief said,

> "They have sometimes money problems or they may have to be answerable to their office … so they would say that it is difficult to take all our requests. But if always villagers have to say yes against their (NGOs' and government's) wish and request … (it is) difficult to continue (works) and collaborations. They know very well … we alone cannot solve this water problem, so we depend on outsiders. But we tried to comprise again and again. Let them give the project to others."

Financial Authority The communities contended that the lack of power to influence the project decision originated from the lack of financial authority or capacity. The respondents strongly believe that collaborations with external agencies would be more useful if the communities had the requisite technical knowledge, skills, and experience. However, they would not be able to enjoy the power to influence project decisions without having required financial resources (see Fig. 5). An older community member of Zagua, arguing for the communities' power to influence project decisions, said,

> "If the government gives the money directly to us, like them (NGOs and government organizations) we can also decide what is to be done first, when, and how. We are not corrupt."

Like many others, the sub-chief of Daboshie maintained,

> "You can give us money and see how this strategy works. Many projects failed and we were blamed for not cooperating. I would suggest the government to gives us the money directly and check. We will better run projects and can make decisions freely for the betterment of our community."

Time-boundedness and remuneration

Participants argued that many projects failed due to the withdrawal of local villagers. Such incidences occurred

because of the slow progress of the project. People lost their motivation upon seeing no visible results. The local communities refused to contribute communal labor if the service continued for a long run without any payment.

The communities demanded remuneration for their long-term involvement in projects. Short-term voluntary involvement could be feasible, but the projects often require long-term involvement of the community. An older individual from the village of Fihini argued,

> "We should help; it's okay. But, you know, it does not mean that we offer only our communal labor. We get involved and spend our valuable times for long in various activities—meetings, surveys, and group discussion. These things go on for months. They consume long time. But we are not generally paid … (it is) not easy to get involved all the time without any remuneration. Will the project official also work like us without any payment? No!"

Continuous contact with the project officials

During the plan implementation, external agencies stopped communicating with the village communities for a while. Under such circumstances, the community had little knowledge of when the next phase of the project would start and the progress made by the project at the time. In such a case, a sudden call for participation also created confusion and mistrust in the project among communities.

Phase 3: Maintenance

Most of the CCA projects did not pay heed to how the local communities would continue projects after the external agencies exited. As the projects got over, funding stopped. The communities' lack of technical knowledge and skills further instigated the discontinuation of the projects. Therefore, the CCA project should have paid attention to the maintenance and followed-up on the projects to enhance the local communities' involvement. Respondents suggested the training of selected community members, especially the youth, who could serve as technicians for the villagers. A schoolteacher recommended,

> "Boreholes often get faulty. You can train some youth who may be useful to repair them."

The skills here could create jobs for the youth in the community. Besides, community leaders believe voluntary contributions such as giving household labor for a certain time, is critical for the sustainability of a project after a the end of the funding period.

Outcomes

The communities suggested that three outcome variables are important for judging whether a project successfully involved CP (see Fig. 1).

Livelihood Security Livelihood risks constitutes a major concern for local communities. Climate-change-induced risks such as droughts and floods increase the livelihood risks further. Therefore, when the community is well aware that a project would benefit them and reduce their livelihood risks through means such as increased crop production, better irrigation facilities, road construction and building mini-dams, people are more willing to participate in such projects. A villager stated,

> "I need water tank and you come here to build a bridge. Meaningless!! No? Tell people how they can increase their rice production. Organize a training program. All will come and give you land for the experiment."

Another chief revealed,

> "Generally, in your programs (CCA programs), our fellow villagers have high interest. Because they learn how to do farming better, how to increase soil water, and how to keep your animals at home. So, people participate in these projects happily."

Visible Outcomes The local communities conveyed their keenness to see a project produce visible results at the end of its term. Outcomes were generally visible when they were related to structural measures such as the construction of a dugout, installation of a borehole, or afforestation. Further, some training programs were considered to have visible outcomes for the local communities because the application of such knowledge could result in immediate and positive results. Such visible outcomes were perceived to be strongly correlated with livelihood security. Communities found their participation to be meaningful when projects helped them to improve their livelihood. Visible outcomes, in turn, also ensure the community's participation in future projects.

Self-Reliance and Empowerment Local communities explained that several projects had been initiated in the region to enhance their adaptation capacity against climate change, but such projects were helpful to the communities mostly on a short-term basis. This was because local communities had not been able to enhance their capacities to the extent that they would not need to depend on external

agencies anymore. Therefore, local communities demanded projects that focus on infrastructure upgradation or alternative income generation, which would make them more self-reliant and resilient against climate change in the long run. A true participatory project, therefore, should address how communities can enhance their self-reliance capacities.

Discussion

This study suggests that local communities should be directly solicited to intimate their preferred process of participation to determine whom to involve, and when, how, and to what extent to be involved. This will provide the initial determinants of meaningfully involved communities in CCA through creative adaptation. The implementing agencies can then substantiate these parameters with the local communities by informing them about other ideas and thoughts for effective CP proposed by researchers and fieldworkers. According to the study results, the major challenge of CP in CCA is that external agencies decide the issues of communities concerning climate change and how to tackle them. Local communities are perceived as outsiders to the project and are only solicited for feedback on predetermined plans. This diminishes the communities' feelings of ownership toward the project. Dodman and Mitlin (2013) identified that isolation of the village communities in the risk governance process was the key factor that led to the failure of community-based adaptation programs in developing countries.

Many studies (Sekine et al. 2009; Forsyth 2013; Nkoana et al. 2017) showed that the conventional adaptation programs were designed based on global and regional climate change scenarios that failed to address the local-level dynamics and social and cultural connotations of risks. Scholars (Roncoli et al. 2001; Egeru 2012; Williams and Hardison 2013) have shown that the entry point for effective community involvement in CCA would be the incorporation of local knowledge in the risk governance. Local knowledge is instrumental in identifying local vulnerabilities and the communities' inherent adaptation capacities (Burnham and Ma 2016). The present study findings suggest that community involvement should start from the risk appraisal or risk-assessment phase and consequently, the options for affordable and implementable interventions should emerge through a two-way communication process.

In this study, respondents argued that the desired participatory platform for CCA can be created if all sections of the community are given equal opportunities to participate in village governance. Further, local communities believe that participation should not be restricted to physical participation alone but also allow the marginalized groups freely express their thoughts. Women participants stated that they form the most vulnerable populations in the community and have to endure hardship to maintain livelihoods. Studies in Asia and Africa (Buggy and Mcnamara 2016; Arora-Jonsson 2011) have already found that people that are socially weak and politically marginalized are the most vulnerable to climate change risks and the least empowered to control the adaptation strategies. Many of these communities are compelled to take fatalistic stances against climate change (Yates 2014). Therefore, communities' direct involvement in risk appraisal and scoping processes will not increase their ownership of the project but rather their ownership of the problem. The implication here is that communities will subsequently accept the challenges of implementing CCA strategies, which will thereby encourage them to take on the responsibility to find alternatives and implementable solutions.

Our findings suggest that local communities failed to get involved because they had no financial resources or authority. As a result, external agencies could easily disregard their opinions in the actual decision-making process. Respondents suggested receiving direct financial support or funding from the government and donors would give them the financial authority and, further, the ability to influence the project's decision-making agenda. The community also demanded rewards and remuneration for their long-term involvement as they often sacrificed their time in return for their livelihood engagement. Previous studies also mentioned the similar political subjection of local communities in the risk governance process (Kwiatkowski 2011; Bele et al. 2013; Yates 2014). To date, community-based adaptation initiatives have been practiced because the local community's participation is required to legitimatize programs and plans initiated and designed by government agencies and donors (Ayers and Forsyth 2009). Thus, the locals' ability to contribute to the decision-making process is subject to the whims and caprices of the external agencies, simultaneously entrenching the pervading top-down approach of, "I plan, you participate" (Lahiri-Dutt 2004).

As CCA projects are initiated by external agencies, the parameters concerning the local communities' effective participation mainly revolve around the terms and conditions of collaboration between external agencies and the communities. However, some participants in the present study advocated for deliberation over plural voices within the community, which seems to be a bigger concern in the case of large, diverse, and stratified communities. Therefore, a focus group or face-to-face opinion survey by the external agencies before the consensus-building and plan preparation processes are initiated should be a standard objective of CP. The priority should be to accumulate the voices of the marginalized, poor, and vulnerable communities who have little to no say in the village governance system (Buggy and McNamara 2016; Piggott-McKellar

2019). The involvement of experts and other stakeholders through a common platform is also critical for effective CP. The opinions and information provided by the experts, derived from their significant field experience and scientific endeavors, can help reduce the biases and the knowledge gaps of local communities. Comprehensive information is critical for developing new perspectives. The insights from outsiders are, therefore, critical for a community to gain their ownership of the problem and identify the scope and opportunities to contribute to and collaborate with others for effective CCA.

The present study findings indicate that livelihood insecurities and visible outcomes of the project have been considered the critical outcome-based criteria for successful participation. A few previous studies (see Osbahr et al. 2008; Conway and Schipper 2011; Selvaraju et al. 2006) have also indicated similar parameters for effective community-based CCA. However, these studies focused on enhancing the communities' CCA capacities through livelihood securities. In the present study, livelihood security has been taken as an important outcome parameter of effective community involvement in CCA, but not as a parameter of successful adaptation strategies. In this case, the study findings suggest that while involving communities in CCA, the projects should directly demonstrate how it can improve communities' income generation and provide alternative livelihood support. When this linkage is directly perceptible, local communities may also regard it as the visible outcome of the project and consider their involvement meaningful. Livelihood insecurities under climate change uncertainty may further have greater planning implications. It is the poor and marginalized sections of the communities that face greater risks to improving their livelihoods under climate change uncertainties; for example, some people may choose to farm along the riverside for fertile land and irrigation, but face the risk of floods (Samaddar et al. 2014). Studies (Gentle and Maraseni 2012; Mubaya et al. 2012; Ubisi et al. 2017) reported that vulnerable communities do not adopt sustainable adaptation strategies because of livelihood insecurities. Instead, they limit their coping endeavors to the responses and reactions to risk. This vicious circle of livelihood insecurities and ineffective adaptation strategies is also responsible for the delayed self-reliance and prolonged dependency of communities on external agencies and donors. Therefore, addressing the local communities' livelihood insecurities is a prerequisite for their meaningful participation in CCA.

Conclusions

The lack of a comprehensive participatory framework hitherto has impeded the systematic evaluation of CP; thus, the need to implement CCA strategies is critical. Studies have previously been carried out to examine the gaps in community-based CCA and identify the factors that can potentially enhance the successful implementation of these projects (see Ayers and Forsyth 2009; Forsyth 2013; Reid et al. 2009; Dodman and Mitlin 2013). These studies fundamentally focus on the effectiveness and sustainability of the adaptation strategies with the involvement of local communities. It should be noted that the success of CCA projects does not necessarily mean local communities are effectively involved. Similarly, effective CP alone does not necessarily ensure the success of CCA. The insights from previous studies on community-based CCA are critical to understanding the factors responsible for enhancing local communities' adaptation strategies against climate change, but do not provide a comprehensive perspective on how local communities' participation can be enhanced and made meaningful. This pioneering study provides tools for planners and practitioners to systematically identify the existing gaps and enhance the implementation mechanism for participation.

This study has found that representation of all stakeholders, objectives that have been agreed upon, livelihood securities, continued engagement from plan preparation to implementation, empowerment, and capacity building are some of the key features for effective CP in CCA. These prerequisites of participation have already been established in previous studies on CCA (Forsyth 2013; Reid et al. 2009; Dodman and Mitlin 2013; Nkoana et al. 2018). The essence of this study is that unlike the existing models, the present approach advocates for a user-based framework that allows planners not to depend on predetermined criteria for participation, as such criteria are often susceptible to cultural viability and political acceptance. Hence, although the criteria for participation may vary, the method of evaluation can be universally applied across regions and cultures. The study provides critical methodological insights into how meaningful CP can be defined and operationalized in CCA. Therefore, it strengthens and fosters a pro-active bottom-up planning process for CCA.

This study should acknowledge several limitations. First, the findings of the study have been derived from four small, homogeneous, and rural communities in Northern Ghana. Therefore, no generalizations can be drawn unless similar research is carried out in large, multicultural, and politically complex settings. We speculate that reaching a seemingly agreed-upon process of participation will be a dauting task in a heterogeneous community. This will challenge the viability and execution of the user-based method proposed here. Second, the participation of women and youth groups was strikingly low and the sample size in this study was quite small. Therefore, the study may not adequately capture the voices of all sections of the community, particularly

those who are isolated and less empowered. Third, we used interpreters for the field-survey. The potential biases of interpretation and transcription of the information cannot be ignored, particularly when the research method is qualitative in nature. Fourth, the derived criteria for participation are still rather abstract and subjective, and therefore cannot be applied directly to real-life settings. The questions that remain concern how these intermediary criteria can be localized and operatized and the facilitation processes and participatory techniques can be adopted. Answering these questions in the future will strengthen the research around effectivee CP in CCA and the planning implications thereof.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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References

Akudugu MA, Dittoh S, Mahama ES (2012) The implications of climate change on food security and rural livelihoods: experiences from Northern Ghana. J Environ Earth Sci 2(3):21–29

Allen KM (2006) Community-based disaster preparedness and climate adaptation: local capacity-building in the Philippines. Disasters 30(1):81–101

Arnstein SR (1969) A ladder of citizen participation. J Am Inst Plan 35 (4):216–224

Arora-Jonsson S (2011) Virtue and vulnerability: discourses on women, gender and climate change. Glob Environ Change 21 (2):744–751

Ashley L, Zhumanova M, Isaeva A, Dear C (2016) Examining changes in local adaptive capacity resulting from climate change adaptation programming in rural Kyrgyzstan. Clim Dev 8 (3):281–287

Ayers J, Forsyth T (2009) Community-based adaptation to climate change. Environment 51(4):22–31

Bele MY, Sonwa DJ, Tiani AM (2013) Supporting local adaptive capacity to climate change in the Congo basin forest of Cameroon: a participatory action research approach. Int J Clim Change Strateg Manag 5(2):181–197

Blackstock KL, Kelly GJ, Horsey BL (2007) Developing and applying a framework to evaluate participatory research for sustainability. Ecol Econ 60(4):726–742

Boafo YA, Saito O, Takeuchi K (2014) Provisioning ecosystem services in rural savanna landscapes of Northern Ghana: an assessment of supply, utilization, and drivers of change. J Disaster Res 9(4):501–515

Boakye-Danquah J, Antwi EK, Saito O, Abekoe MK (2014). Impact of farm management practices and agricultural land use on soil organic carbon storage potential in the savannah ecological zone of Northern Ghana. J Disaster Res 9(4):484–500

Buggy L, McNamara KE (2016) The need to reinterpret "community" for climate change adaptation: a case study of Pele Island, Vanuatu. Clim Dev 8(3):270–280

Burnham M, Ma Z (2016) Linking smallholder farmer climate change adaptation decisions to development. Clim Dev 8 (4):289–311

Carr G, Blöschl G, Loucks DP (2012) Evaluating participation in water resource management: a review. Water Resour Res 48 (11):1–17

Chambers R (1997) Whose reality counts? Putting the first last. Intermediate Technology Publications Ltd (ITP)

Chess C, Purcell K (1999) Public participation and the environment: do we know what works? Environ Sci Technol 33 (16):2685–2692

Collins K, Ison R (2009) Jumping off Arnstein's ladder: social learning as a new policy paradigm for climate change adaptation. Environ Policy Gov 19(6):358–373

Conway D, Schipper ELF (2011) Adaptation to climate change in Africa: challenges and opportunities identified from Ethiopia. Glob Environ Change 21(1):227–237

Corbin J, Strauss A (2014) Basics of qualitative research: techniques and procedures for developing grounded theory. Sage publications

Crook R (2005) The role of traditional institutions in political change and development CDD/ODI Policy Brief no. 4, pp. 1–5

Davidson CH, Johnson C, Lizarralde G, Dikmen N, Sliwinski A (2007) Truths and myths about community participation in post-disaster housing projects. Habitat Int 31(1):100–115

Denzin NK, Lincoln YS (eds) (2011) The Sage handbook of qualitative research. Sage

Dodman D, Mitlin D (2013) Challenges for community-based adaptation: discovering the potential for transformation. J Int Dev 25 (5):640–659

Egeru A (2012) Role of indigenous knowledge in climate change adaptation: a case study of the Teso sub-region, Eastern Uganda. Indian J Tradit Knowl 11(2):217–224

Few R, Brown K, Tompkins EL (2007) Public participation and climate change adaptation: avoiding the illusion of inclusion. Clim Policy 7(1):46–59

Forsyth T (2013) Community-based adaptation: a review of past and future challenges. Wiley Interdiscip Rev 4(5):439–446

Galicia L, Gómez-Mendoza L, Magaña V (2015) Climate change impacts and adaptation strategies in temperate forests in Central Mexico: a participatory approach. Mitig Adapt Strateg Glob Change 20(1):21–42

Gentle P, Maraseni TN (2012) Climate change, poverty and livelihoods: adaptation practices by rural mountain communities in Nepal. Environ Sci policy 21:24–34

Guri B (2006) Traditional, authorities, decentralization and development. strengthening the capacity of traditional authorities for good governance and development at the local level. Center for Indigenous Knowledge and Organizational Development (CIKOD), Madina, Accra

Hung HC, Chen LY (2013) Incorporating stakeholders' knowledge into assessing vulnerability to climatic hazards: application to the river basin management in Taiwan. Clim Change 120 (1–2):491–507

Kranjac-Brisavljevic G, Bayorbor TB, Obeng F (1999) Rethinking natural resource degradation in semi-arid Sub-Saharan Africa: the case of semi-arid Ghana. Overseas Development Institute/University of Development Studies, London

Kwiatkowski RE (2011) Indigenous community based participatory research and health impact assessment: a Canadian example. Environ Impact Assess Rev 31(4):445–450

Lahiri-Dutt K (2004) 'I plan, you participate': a southern view of community participation in urban Australia. Community Dev J 39 (1):13–27

Larsen K, Gunnarsson-Östling U (2009) Climate change scenarios and citizen-participation: mitigation and adaptation perspectives in constructing sustainable futures. Habitat Int 33(3):260–266

Laube W, Schraven B, Awo M (2012) Smallholder adaptation to climate change: dynamics and limits in Northern Ghana. Climatic change 111(3–4):753–774

Laux P, Kunstmann H, Bárdossy A (2008) Predicting the regional onset of the rainy season in West Africa. Int J Climatol 28 (3):329–342

Mahama C (2009) Local government and traditional authorities in concert: towards a more productive relationship. Commonw J Local Gov 4:7–25

McCool SF, Guthrie K (2001) Mapping the dimensions of successful public participation in messy natural resources management situations. Soc Nat Resour 14(4):309–323

McNamara KE, Buggy L (2017) Community-based climate change adaptation: a review of academic literature. Local Environ 22 (4):443–460

Moore SA (1996) Defining "successful" environmental dispute resolution: Case studies from public land planning in the United States and Australia. Environ Impact Assess Rev 16(3):151–169

Mubaya CP, Njuki J, Mutsvangwa EP, Mugabe FT, Nanja D (2012) Climate variability and change or multiple stressors? Farmer perceptions regarding threats to livelihoods in Zimbabwe and Zambia. J Environ Manag 102:9–17

Nkoana EM, Verbruggen A, Hugé J (2018) Climate change adaptation tools at the community level: an integrated literature review. Sustainability 10(3):796

Nkoana EM, Waas T, Verbruggen A, Burman CJ, Hugé J (2017) Analytic framework for assessing participation processes and outcomes of climate change adaptation tools. Environ Dev Sustainabil 19(5):1731–1760

Osbahr H, Twyman C, Adger WN, Thomas DS (2008) Effective livelihood adaptation to climate change disturbance: scale dimensions of practice in Mozambique. Geoforum 39(6):1951–1964

Otsuki K, Jasaw GS, Lolig V (2014) Framing community resilience through mobility and gender. J Disast Res 9:554–562

Owusu-Mensah I (2014) Politics, chieftaincy and customary law in Ghana's fourth republic. J Pan Afr Stud 6(7):261–278

Patton MQ (2001) Qualitative research and evaluation methods, 2nd edn. Sage Publications, Thousand oaks, CA

Piggott-McKellar AE, McNamara KE, Nunn PD, Watson JE (2019) What are the barriers to successful community-based climatechange adaptation? A review of grey literature. Local Environment 24(4):374–390

Reed MS (2008) Stakeholder participation for environmental management: a literature review. Biol Conserv 141(10):2417–2431

Reid H, Alam M, Berger R, Cannon T, Huq S, Milligan A (2009) Community-based adaptation to climate change: an overview. Participat Learn action 60(1):11–33

Renn O, Webler T, Wiedemann P (eds) (2013) Fairness and competence in citizen participation: evaluating models for environmental discourse, vol. 10. Springer Science & Business Media

Roncoli C, Ingram K, Kirshen P (2001) The costs and risks of coping with drought: livelihood impacts and farmers[1] responses in Burkina Faso. Clim Res 19(2):119–132

Roncoli C, Jost C, Kirshen P, Sanon M, Ingram KT, Woodin M, Yaka P (2009) From accessing to assessing forecasts: an end-to-end study of participatory climate forecast dissemination in Burkina Faso (West Africa). Clim Change 92(3–4):433

Rosener JB (1981) User-oriented evaluation: a new way to view citizen participation. J Appl Behav Sci 17(4):583–596

Ross H, Shaw S, Rissik D, Cliffe N, Chapman S, Hounsell V, Schoeman J (2015) A participatory systems approach to understanding climate adaptation needs. Clim Change 129(1–2):27–42

Rowe G, Frewer LJ (2000) Public participation methods: a framework for evaluation. Sci Technol Hum Values 25(1):3–29

Samaddar S, Ayaribilla AJ, Oteng-Ababio M, Dayour F, Yokomatsu M (2019) Stakeholders' perceptions on effective community participation in climate change adaptation. In: Sustainable solutions for food security. Springer, Cham, pp. 355–379

Samaddar S, Choi J, Misra BA, Tatano H (2015b) Insights on social learning and collaborative action plan development for disaster risk reduction: practicing Yonmenkaigi System Method (YSM) in flood-prone Mumbai. Nat Hazards 75(2):1531–1554

Samaddar S, Okada N (2006) Participatory approach for post-earthquake reconstruction in the Villages of Kachh, Gujarat, India. Annuals of Disaster Prevention Research Institute, Kyoto University, No. 49B, pp. 197–205

Samaddar S, Okada N, Choi J, Tatano H (2017) What constitutes successful participatory disaster risk management? Insights from post-earthquake reconstruction work in rural Gujrat. Nat Hazards 85 (1):1–28

Samaddar S, Yokomatsu M, Dayour F, Oteng-Ababio M, Dzivenu T, Ishikawa H (2018) Exploring the role of trust in risk communication among climate-induced vulnerable rural communities in Wa West District Ghana. In: Saito O, Kranjac-Berisavljevic G, Takeuchi K, Gyasi EA (eds) Strategies for building resilience against climate and ecosystem changes in Sub-Saharan Africa. Springer, Singapore, pp. 247–264

Samaddar S, Yokomatsu M, Dzivenu T, Oteng-Ababio M, Adams MR, Dayour F, Hirohiko I (2015) Evaluating effective public participation in disaster management and climate change adaptation: insights from northern Ghana through a user-based approach. Risk Hazards Crisis Public Policy 6(1):117–143

Samaddar S, Yokomatsu M, Dzivenu T, Oteng-Ababio M, Adams MR, Dayour F, Ishikawa H (2014) Assessing rural communities concerns for improved climate change adaptation strategies in northern Ghana. J Disaster Res 9(4):529–541

Santos SL, Chess C (2003) Evaluating citizen advisory boards: the importance of theory and participant-based criteria and practical implications. Risk Anal 23(2):269–279

Saxena NC (1997) The saga of participatory forest management in India. CIFOR (Center for International Forest Research), Jakarta

Sekine H, Fukuhara K, Uraguchi A, Tan CK, Nagai M, Okada Y (2009) The Effectiveness of Community-based Adaptation (CBA) to climate change. GEIC Working Paper Series 2009–001

Selvaraju R, Subbiah AR, Baas S, Juergens I (2006) Livelihood adaptation to climate variability and change in drought-prone areas of Bangladesh: developing institutions and options. Rome, Italy: ADPC (Asian Disaster Preparedness Center) and FAO (Food and Agriculture Organization of the United Nations

Sheppard SR, Shaw A, Flanders D, Burch S, Wiek A, Carmichael J, Cohen S (2011) Future visioning of local climate change: a framework for community engagement and planning with scenarios and visualisation. Futures 43(4):400–412

Spires M, Shackleton S, Cundill G (2014) Barriers to implementing planned community-based adaptation in developing countries: a systematic literature review. Clim Dev 6(3):277–287

Toth FL, Hizsnyik E (2008) Managing the inconceivable: participatory assessments of impacts and responses to extreme climate change. Clim Change 91(1):81–101

Tuler S, Webler T (1999) "Voices From the Forest: What Participants Expect of a Public Participation Process". Society & Natural Resources 12:437–53

Ubisi NR, Mafongoya PL, Kolanisi U, Jiri O (2017) Smallholder farmer's perceived effects of climate change on crop production and household livelihoods in rural Limpopo province, South Africa. Change Adapt Socio-Ecol Syst 3(1):27–38

Webler T, Tuler S (2006) Four perspectives on public participation process in environmental assessment and decision making: combined results from 10 cases studies. Policy Stud J 34:699–722

Webler T, Tuler S, Krueger ROB (2001) What is a good public participation process? Five perspectives from the public. Environ Manag 27(3):435–450

Wenger E (1998) Communities of practice: learning, meaning, and identity. Cambridge University Press

Williams T, Hardison P (2013) Culture, law, risk and governance: contexts of traditional knowledge in climate change adaptation. In: Climate change and indigenous peoples in the United States. Springer, Cham, pp. 23–36

Yaro JA (2013) The perception of and adaptation to climate variability/change in Ghana by small-scale and commercial farmers. Reg Environ Change 13(6):1259–1272

Yates JS (2014) Power and politics in the governance of community-based adaptation. Community-based adaptation to climate change: emerging lessons. Practical Action Publishing, Rugby, pp. 15–34