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RESEARCH ARTICLE

Institutional challenges in scaling-up climate change adaptation actions: experiences from rural communities in Senegal and Kenya

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Regional institutions in Africa have the potential to reinforce the adaptive capacity of rural communities in handling climate change impacts. The institutional arrangements provide the rationale for scaling-up adaptation actions by setting the roles of individual players involved in the planning process at local, national and regional levels. The scaling-up then seeks to extend and disseminate the lessons learnt across the levels to support refinement and inclusive implementation of long-term climate change adaptation strategies. This article discusses these considerations through studies of two rural communities faced with the implementation of climate change adaptation strategies in Senegal and Kenya. The cases illustrate different approaches of institutional arrangements and scaling-up of adaptation actions from community to national levels. The lessons from the communities are typical of most vulnerable rural regions and were hence important for extended dissemination considering that the impacts of climate change in Africa are felt largely at community levels. A reduction of this vulnerability requires efficient and realistic adaptation strategies that seek to understand the rural communities while developing considerate policy-based alternatives at all levels of administration.

Keywords: institutional challenges; climate change impacts; rural communities; adaptive capacities; Kenya; Senegal

1. Introduction

The vulnerability of most African countries to the effects of climate variability and change is recognized to depend on its current and future adaptive capacities, influenced to a large extent by the levels of economic development and adoption of feasible climate change adaptation strategies (Chinowsky, Schweikert, Strzepek, & Strzepek, 2015; Nkomo, Nyong, & Kulindwa, 2006). Because these factors vary considerably across the region, it is often challenging to have a homogeneous assessment of the vulnerabilities. Nonetheless, since the impacts of climate change in Africa are largely felt at the community levels, it is rational to understand how the communities respond to their immediate climate change-related needs in order to develop considerate and sustainable policy-based alternatives (Arndt et al., 2015; Webster et al., 2012). To this end, local institutions make it easier to examine the environmental risks faced by the rural populations, their cultural responses and social configurations that facilitate individual and collective adaptation. Furthermore, the institutions create environments in which future investments in adaptation and mitigation actions become attractive and

profitable through service availability and social stability (Grin, 2010; Mapfumo, Adjei-Nsiah, Mtambanengwe, Chikowo, & Giller, 2013).

More often, the effects of climate change on communities occur through hazards that are historically familiar and for which they have a rich repertoire of strategies and adaptive practices in place. With continued changes, however, the intensities and frequencies of climate-related hazards may overstretch the existing coping capacities making it necessary to revise or develop new strategies (Bryan et al., 2013; Sheffield et al., 2014). Today, that is the case with most regions of Africa where extreme climate events have led to frequent floods and drought with severe negative impacts on agricultural production and food security. In such cases, the need for external support through the governments and concerned development partners is inevitable to strengthen the coping capacities of the vulnerable communities, while taking advantage of the existing local institutions and strategies (Kates, Travis, & Wilbanks, 2012; Munang, Thiaw, Alverson, Liu, & Han, 2013). At times, however, the effects of climate change may occur through hazards and mechanisms

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that are totally unaccustomed to the communities. In such a case, the communities could benefit from lessons and strategies that have worked in other locations with experience from such hazards. In this regard, it is important for the local institutions to develop and guide the adaptation processes through strategies that are robust enough within their communities. With support from the national and regional institutions, this can be achieved by accommodating and combining the new lessons and existing indigenous community-based adaptation (CBA) practices (De Trinchiera et al., 2014; Figueiredo & Perkins, 2013).

1.1. *The role of institutions in climate change adaptation*

The adaptation to climate change in Africa is increasingly being viewed as a development issue given its severe effects on various socio-economic sectors (Parry, 2009; Pasquini, Ziervogel, Cowling, & Shearing, 2015). There is hence the growing need to mainstream climate change adaptation strategies into the development planning of most countries of the region. The adaptation strategies should, however, be holistic enough to create synergies among multiple objectives of sustainable economic development, including disaster risk reduction, poverty alleviation and policy mainstreaming (Arndt & Thurlow, 2015; Naess et al., 2015). Generally, institutions in Africa can enhance the capacities of vulnerable communities to respond to various climatic risks through coordination of joint actions better positioned to respond to external climate-related shocks, thereby promoting sustainable management of concerned natural resources. With respect to climate change adaptation, three types of local institutions namely civic, public and private can be distinguished (IFAD, 2003; IPPG, 2010; Khalil, 1995).

These institutions shape the impacts of climate hazards on livelihoods through information gathering and dissemination, resource mobilization and allocation, development of skills and capacity building, and provision of leadership and networking with other decision-makers and institutions (Agrawal, McSweeney, & Perrin, 2008). However, given the expected increase in the magnitudes of climate change impacts, it is becoming likely that robust adaptation in most countries of Africa will require support from concerned development partners considering insufficient resources available for adequate responses by the governments and the intertwined complexity of reducing poverty. Because most resources for the implementation of adaptation actions at the moment only exist if previously registered in national strategies in line with national development agenda, there is an urgent need for sound coordination between local and national strategies to enable identification and scaling-up of best practices to other regions with such vulnerabilities (Berger, 2009; Lybbert & Summer, 2012).

Experience in various parts of Africa has indicated that sound institutional coordination can be achieved through participatory CBA approaches, which allows for sufficient ownership of the adaptation strategies by the rural communities thus ensuring sustainability (Boko et al., 2007; Reid & Huq, 2014). In this regard, non-governmental organizations (NGOs), civil society organizations and community-based organizations (CBOs) play an important role in ensuring appropriate advocacy feedback mechanism that promotes continued community participation in the development activities (Rauken, Mydske, & Winsvold, 2015; Wilbanks, 2007). For sustainable adaptation to be achieved within this complex structure, the concerned institutions – often with varied interests and potentials – need to work in a coordinated way by overcoming the frequent mismatch prevalent among their structures at various levels of the implementation process.

1.2. *Challenges of scaling-up of adaptation actions in Africa*

There exist several approaches of scaling-up adaptation actions, including the top-down, bottom-up and vertical and horizontal approaches among others (Archer et al., 2014; Schipper, Ayers, Reid, Huq, & Rahman, 2014). While a majority of studies have proposed the top-down and bottom-up approaches in climate change adaptation actions, still there exist several challenges faced with scaling-up of climate change adaptations in localized regions of Africa. Generally, on-time and coordinated climate change adaptation actions require the availability of reliable early warning information in good time for dependable management decisions to be made (Ogallo, Boulahya, & Keane, 2000; Olang, 2009). Due to data constraints, however, a majority of the climate forecasting models used for most regions in Africa are still course estimates of the actual atmospheric conditions leading to uncertainties about the impacts of the climate change and hence response of the concerned natural systems (Schlosser & Strzepek, 2015). This uncertainty of the model prediction and subsequently the unstable risk levels associated, consequently, complicates the scaling-up process by the local institutions that must work with this level of reliability.

In order to properly scale up CBA efforts in Africa, it is inevitable to recognize and address other challenges concomitantly. The location-specific nature of the local knowledge necessary for CBA poses a major scaling-up challenge since the parameters defining the needs of one community may not usually match those of another community (Rauken et al., 2015; Reid & Schipper, 2014). There hence is the need for concerned institutions working in different areas to complement and capture the key lessons from the communities that can be scaled-up to other regions. Furthermore is the need to align the CBA strategies with other development

programmes with similar objectives (Reid & Huq, 2014; Schipper et al., 2014). Such coordinated efforts are still limited in most regions due to competing objectives and lack of sufficient resources. An initial step towards achieving this, however, will be the need for capacity development at the concerned local and national levels, especially on the design and management of the CBA projects. This will also include strengthening the capacities of the local CBOs and NGOs towards verifiable monitoring, reporting and evaluation of the climate change adaptation projects (UNDP, 2009).

For most regions in Africa, adequate and successful scaling-up of adaptation actions are still not only fragmented and limited in scope and scale but are also isolated from the actual development challenges of the communities (Rippke et al., 2016; Shackleton, Ziervogel, Sallu, Gill, & Tschakert, 2015). Limited knowledge of the best practices and measures that can be adopted for improved adaptation further hinders preparation of the requisite institutional capacities important to support climate risk management. At the moment, the existing institutional capacities, relationships, policies and practices to assess and manage climate change risks are not sufficiently developed to support formulation and implementation of efficient solutions to a problem that has complex multisectoral effects (Huntjens et al., 2012). This includes challenges related to the distribution of authority and responsibilities between different institutional levels and a lack of communication, transparency and coordination among different sectors concerned with the scaling-up process (Arndt et al., 2015; Niang et al., 2014).

Considering the challenges of scaling-up of climate change adaptation action faced by most regions in Africa, this study purposed to understand how two local communities in East and West Africa implement climate change adaptation strategies with a view to acquire lessons that could help in scaling-up such initiatives across other levels in future. The key research questions investigated here included the following: What are the existing local institutions towards climate change adaptation in the study regions? Can the existing actions and institutions be refined and promoted to enhance better coordination of the adaptation strategies?

2. Theory and methods

2.1. The study regions and approach

The studies illustrated in this contribution were carried out in two rural communities located in the western parts of Senegal (case study I) and Kenya (case study II) and illustrate different approaches to institutional scaling-up at community levels. Case study I was implemented by the Ecological Monitoring Centre (Centre de Suivi Ecologique – CSE) in Senegal and presents a situation where in the absence of formal structures, the communities were encouraged to set up locally and link up later with existing

subnational and national institutions (CSE, 2010). Study case II was carried out by the IGAD – Climate Prediction and Application Centre (ICPAC) in Kenya and illustrates a situation where localized informal institutions at the community level initially existed. However, the existing institutions were strengthened through the study and subsequently, linked to other local institutions including district-level government and national institutions.

The two research studies were sponsored by the Department for International Development (DFID)/International Development Research Centre (IDRC) under the programme for Climate Change Adaptation in Africa (CCAA). Overall, the projects employed a participatory action research (PAR) approach that is a stepwise process where a group of people (i) identify a problem, (ii) act together to resolve it, (iii) see how successful their efforts are and (iv) if they are not satisfied, they try again for improved results. The approach provides a dual commitment in studying a system, while concurrently collaborating with its members in changing it towards an agreeable and desirable direction. The approach also emphasizes on the importance of collaboration and co-learning as primary aspects important in successful scaling-up processes (Gilmore, Krantz, & Ramirez, 1986; Gogoi, Dupar, Jones, Martinez, & McNamara, 2014).

2.2. Case study I: the InfoClim project

2.2.1. A regional observatory for producers' climate change adaptation

In West Africa, access to information on climate change and identifying the appropriate technical alternatives to address the impact of the changes is one of the challenges faced by rural populations particularly at individual levels. And so how could agricultural farmers, often isolated in the rural regions, be given greater access to the relevant information to help them adapt their farming practices and socio-economic strategies to climate change? To address this challenge, the InfoClim project focused on establishing a regional observatory participatory platform to collect, document and share information with a view to build the capacity of vulnerable populations to cope with variability and adapt to climate change. The goal of the project was to provide a framework where farmers and other stakeholders can share experiences and express their climate-related information needs. Consequently, the observatory was set up in four communities in the Western region of Thies located about 70 km to the East of Dakar – the capital city of Senegal.

To achieve its objectives, the project committed concerned technical and administrative teams, while forging partnerships with local authorities and NGOs such as the Green Senegal – FONGS. A methodological workshop was organized at the onset of the project to harmonize

various contributions of the partners in the process of setting up the observatory. Preliminary studies were also conducted to better understand the production systems in place, including the local perceptions on the manifestations of climate change and its impacts on livelihoods. The information gaps and existing needs for climate change adaptation were collectively identified through a participatory approach, which favoured strong institutional arrangements that involved various stakeholders such as farmers, scientists, extension service officers, local authorities and rural communities.

2.2.2. Building a favourable institutional environment

Following the workshops and initial surveys, it was apparent that communication between the various extension services (i.e. meteorology, agriculture, forestry and livestock) was not systematic or well established especially within the area of climate change adaptation. Previously, the services assisted the local communities in a sectorial manner resulting into fragmented, as opposed to integrated, information provided to local users. Furthermore, collaboration between governmental institutions and the relevant NGOs was not well established at the beginning of the project. Nonetheless, the lack of coordination was noted to be less pronounced at the national level, which had inter-ministerial structures collaborating in common fields of activity, including on climate and climate change-related issues. Consequently, the project identified and considered the existing institutional frameworks, including the existing CBOs and NGOs, which were active but independently providing some of the services to the communities. In collaboration with all of these stakeholders, the project built a favourable institutional environment (i.e. an observatory) with an integrated mechanism for collating, dissemination and sharing of information between the various actors at the subnational level. From the onset, the mechanism also provided an opportunity for interactions, enabling the users to get familiar with other representative research institutions and extension services thereby enabling constructive dialogue across the various fields related to climate change adaptation and natural resources management in general.

2.3. Case study II: the Nganyi project

2.3.1. Integrating indigenous and scientific knowledge for climate risk management

In East Africa, a majority of the rural communities in localized regions still have difficulty in using the seasonal climate forecasts commonly provided by the National Meteorological and Hydrological Services (NMHS). To understand this deficit, ICPAC undertook a project within the Nganyi rural community, which is a sub-clan of the Abasiekwe clan of Bunyore located in western Kenya.

The study concentrated on early warning as part of adaptation to climate change strategy given the dominance of subsistence rain-fed agriculture in the region. Generally, the elders from the Nganyi community are renowned for their rare indigenous knowledge (IK) skills, ability and power to ‘make’ and predict rain. This ability is grounded on a number of biophysical, social and astronomical indicators and relies on their keen observation of nature around them. The results of their work complement and sometimes baffle the rapidly improving meteorological science of rainfall prediction. On the other hand, modern-day climate scientists have been developing seasonal climate forecasts, with increasing accuracy over the years, based on an understanding of the physics of the atmosphere to predict the most probable future weather/climate conditions.

The technologies have advanced at a fast pace, improving on tools for climate observation, monitoring, prediction and early warning systems. Today, the scientists can provide good seasonal rainfall forecasts, sometimes with lead times of over three months to support adaptation in various sectors (Sheffield et al., 2014; Ogallo et al., 2000). However, in spite of the availability of improved forecasts, vulnerability to climate change impacts still continues at the community level. Many reasons can be attributed to the continued vulnerability, including inadequacy of the scientific forecast considering the course spatial and temporal scales of the forecast or a lack of good knowledge of how the new generation probabilistic forecasts can be translated and used to support adaptation at local levels. Despite the reasons, however, the limitation is an indication that existing institutional arrangements that govern the development and dissemination of the forecast may be weak or are totally independent. It is hence important to find ways of integrating the rich IK within these communities with modern-day climate forecasts through a framework that links and strengthens all the relevant institutions. This implies that modern-day climate scientists and other risk managers would no longer consider IK as outdated and at variance with modern-day science. This would enhance the resilience of vulnerable communities to the negative impacts of climate variability through integrated climate risk management approach.

2.3.2. Community institutions and adaptation activities before the project

From the initial survey, it was noted that indigenous climate information was available and highly used in the Nganyi community to inform farming activities even before the implementation of the project. However, there were no strong institutions guiding the integration, development and use of the information. The information was disseminated based on cultural norms with loose informal institutional arrangements involving respect and deference to

elders in the community. The reconnaissance survey also revealed that a good percentage of the community had at one time accessed the Kenya Meteorological forecasts through print and/or electronic media. However, the information was not locally targeted, with most community members not being able to demystify the forecasts leading to them ignoring the information in totality.

Before the project, the existing formal and informal institutional systems worked independently in an uncoordinated manner. The formal system included the regional seasonal climate outlook forecasts provided for the Greater Horn of African region. The regional information is often discussed and downscaled by the NMHS of the member states for applications by the respective countries. In this case, the Kenya Meteorological Department (KMD) downscales the regional forecast to the national and subnational levels, and disseminates to the rural communities through various government ministries and agencies. However, to the Nganyi community, this information was not user-specific and effective in supporting local adaptation strategies considering its coarse spatial resolution. On the other hand, the existing IK forecasts were uncoordinated, informal and largely based on individual experiences of various local experts living in different parts of the region.

3. Results and achievements

3.1. Case study I: improved organizational framework for adaptation actions

The rules governing the flow of information within the different organs of the observatory were set collaboratively following PAR methods. From the production of information to its dissemination and use, responsibilities were shared between scientists, extension services, NGOs, CBOs and farmers. All these ensured one of the first achievements, which allowed the observatory to be largely managed and maintained by the communities as a way of monitoring and disseminating climate information directly to their fellow farmers. The inventory of the existing information distribution channels enabled the project partners to agree on the structure of the observatory, information to be collected and modalities for its management. An implementation plan was agreed allowing the designing of an organizational structure which defines various organs of the observatory and their specific roles. It also specified the functional relationships between the organs, including the flow of information (Figure 1) leading to an improved organization framework in the region. The producers (farmers) from the four study communities constituted the basis of the organizational framework. The other organs included the Forum of Actors (FOA), Local Committee for adaptation to Climate Change (CLCC), Regional Steering Committee (CRP) and National Scientific and Technical Committee (NSTC).

Discussion exchanges, organized in the form of panel discussions and workshops, brought together farmers, CBOs, local authorities, extension services and scientists and provided opportunities to hold open conversations on adaptation actions. The provision of technical information allowed open discussions evolving towards operational aspects, such as ways for implementation of agrometeorological options thereby scaling-up (and out) appropriate adaptive actions. The exchanges also provided frameworks for collaboration and mutual learning between producers themselves through sharing of experiences and opportunities to highlight problems and best practice case of successes. Within the observatory, each of the four farming communities elected a representative to the CLCC to act as a relay between them and the other partners. Each CLCC is composed of seven members, each dealing with one of the six local study themes (i.e. rain-fed agriculture, livestock, horticulture, arboriculture, forestry and water). The seventh member of the CLCC was the committee coordinator. The CLCC had the responsibility of collecting relevant information needs of the community, including relevant successful local experiences and practices, and conveying it to the other partners in the observatory.

The CLCC met regularly, more particularly just before and during the rainy season in line with the agroclimatic forecasts in order to share best practices such as planting times, adapted seed varieties, opportunities and potential difficulties. In this co-learning approach, the farmers were considered as researchers who also experience new situations by practice. Based on their experiences, the farmers could collect relevant data, locally analyse them and share their experiences and lessons learnt. The CRP was composed of the subnational technical services (i.e. extension services working in different sectors such as agriculture, water and forestry), the coordinators or presidents of the CLCCs and representatives of the NGOs. Its role, as a subnational institution, was central in the institutionalization and operationalization of the observatory. The CRP was under the authority of the Governor, the supreme authority of the subnational region who appoints or confirms the CRP members including the coordinator of the CLCC. The CRP acted as a facilitator between the farmers and different communities of subnational region on one hand, and the farmers and the technical and scientific institutions on the other hand, and was responsible for analysing and facilitating quick access to the information needs expressed by the producers through the CLCC. The CRP also coordinated the process of integration of climate change issues into the planning processes. The participating NGOs acted as active members of the CRP and facilitated the process of disseminating the best case practices to and from other regions thereby scaling-up the local experiences. They helped the local committees in the development of the action plans while actively participating in the monitoring and evaluation processes.

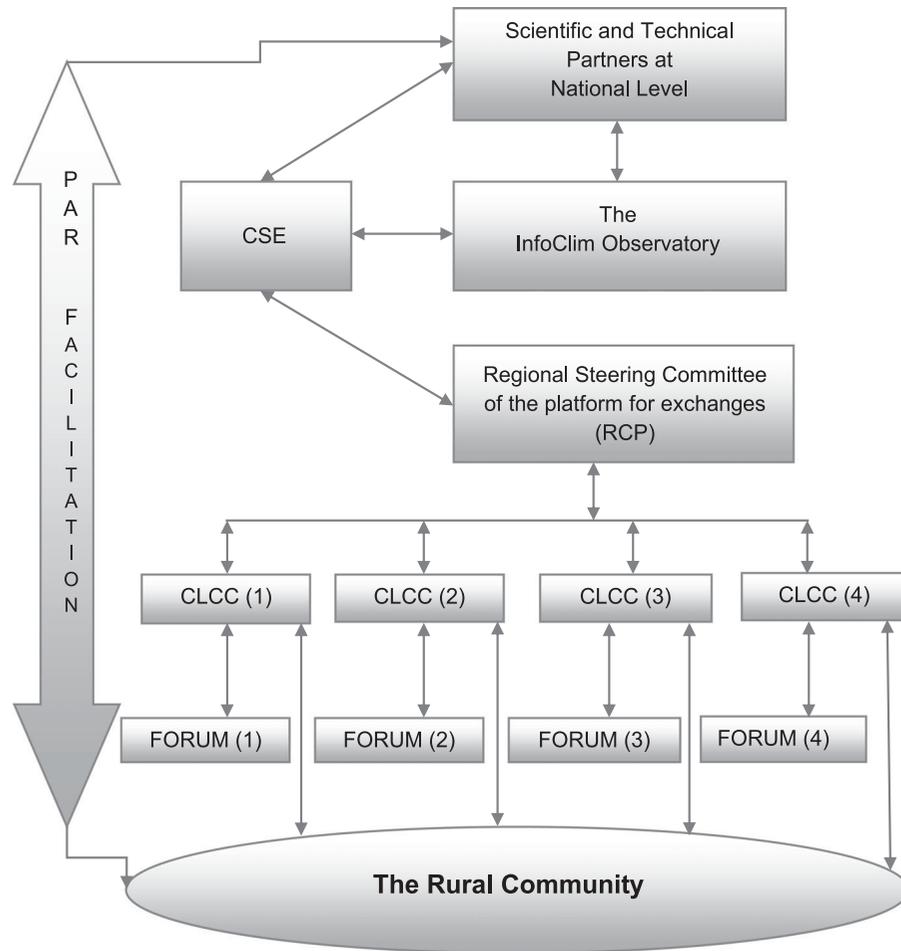


Figure 1. Improved organizational framework guiding the development and dissemination of information for the InfoClim Observatory.

The NSTC comprised institutions at the national level, including the Ecological Monitoring Centre as the project lead organization, Department of Meteorology, Laboratory of Physics of Atmosphere, Laboratory of Gender and Agriculture Research Institute. For the purpose of disseminating experiences and influencing policy-makers during the project life cycle, several meetings were held at the national level with participation of the key players on the fields of climate change adaptation and early warning (i.e. the National Food Security Commission). For the purpose of scaling out, several workshops were conducted in the different regions of the country during which the results and the experiences of the project were presented, shared and discussed.

3.2. Case study II: adaptation actions and elements of sustainability

Using PAR methods, the project identified and employed active institutions that already existed in the region to support the flow of early warning climate information. The solutions to address the identified shortcomings were

collaboratively designed and implemented with the institutions and community stakeholders. Though the individual forecasting continued, the project managed to bring together all the forecasting elders under one umbrella before the beginning of every rainfall season to congregate and agree on one forecast through a consultative consensus-building process. The elders validated the data from each other making the resultant forecast more credible and acceptable for the entire region. To strengthen this new initiative further, the elders formed and registered a welfare society known as the Nganyi Welfare Association (NWA), together with a constitution defining its governance. The project set up a mechanism that promoted sharing and harmonization of information between the existing small sub-clans thereby providing common adaptation activities to the whole region. In terms of the climate information from the KMD, the project contributed to the decentralization of meteorological services resulting in the appointment of Provincial Meteorological Directors (PMD) with the mandate to downscale the national forecasts to specific demands of a target area. This additional structure ensured the delivery of location-specific early

warning climate information to inform adaptation actions at community levels, an indication of a bottom-top vertical scaling-up of climate change adaptation actions.

Furthermore, the project created a forum that linked the PMD and the NWA, held at the beginning of every rainfall season, where the two sets of forecasts could be merged through a consensus-building process. This ensured the provision of a single harmonized climate early warning product to the community. Considering that the information from the KMD is normally provided in terms of probabilities and could not be readily translated into action by a large percentage of the community, collaboration with other experts who could translate the information was sought. In this regard, the project organized various exchange meetings at the beginning of every rainfall season where relevant technical personnel at the district level (i.e. ministries of agriculture, water and environment) participated in defining the activities that community members were to undertake during the coming season in line with the harmonized forecast. Using these personnel, the seasonal forecast was packaged and presented to the members of the community in terms of advisories of what actions to take or crops to plant given the expected seasonal performance. In summary, merging of the two sources of information ensured exchange of experiences at different spatial and temporal scales thereby enhancing the resilience of communities to the negative impacts of climate change and variability. The improved institutional framework (Figure 2) provided a means of ensuring the sustainability through ownership of the information, and the adaptation actions, thereby strengthening the local and national administration levels.

4. Discussion and lessons

The case studies presented in this contribution illustrate different approaches of institutional arrangements and scaling-up of adaptation actions from community to national levels. The studies indicate that although some form of communication of climate information to the local communities already existed, they were not systematic but rather individualized and fragmented with very loose institutional arrangements. This provided very little interaction between the concerned groups and stakeholders who needed to work together to manage climate risks at various levels. This deficit in communication is a major challenge across many regions as already established by other studies which recognize the urgent need to develop and link local and national institutions for adaptation actions to reach broader and longer term impacts (Schipper et al., 2014; Suarez, Mendler, Bettina, & Boykoff, 2014).

Through the study, it was established that scaling-up of adaptation lessons requires a multi-stakeholder approach with a need of establishing and linking institutional platforms for community, national and regional knowledge

generation and sharing. In this regard, PAR methods provide a good basis for supporting scaling-up and CBA practice that greatly improved structures that recognize and integrate the existing local needs with the national planning strategies to create synergies that promote target societal development. Some of the key lessons and elements of sustainability learned by the study towards scaling-up of climate change adaptation in Africa included the following:

- (I) Recognition that a participatory approach to climate information communication can facilitate the development of a dynamic partnership based on the comparative advantages of each partner, thereby reinforcing ownership by all the stakeholders.
- (II) Recognition of the need for collaboration between the local community or end users of information and the national technical services, such as meteorological and agriculture advisory services, in producing relevant, location-specific information that reinforces the knowledge base needed to plan and engage actions.
- (III) Empowerment of local institutions, as well as national institutions, to integrate climate change issues in the development planning processes in a holistic and concerted manner that favours synergies of action between institutions at different levels.

5. Conclusions and recommendations

The impacts of climate change and variability still hamper most efforts of development at local community levels in Africa. These impacts operate at various scales and cannot be adequately addressed by individuals or isolated project-based community interventions. It is therefore essential that synergies among the multiple objectives of sustainable development, poverty reduction, disaster risk reduction and climate change adaptation are harnessed for greater adaptation and mitigation. In this regard, institutions play an important role in shaping the capacities of communities to create such synergies. It is also important for supporting institutions to recognize that local communities have existing systems that they have successfully used to deal with previous cases of climate variability and change over the years. However, because the local institutions are often isolated and their efficiencies are limited by inadequate capacities, external supports that strengthen and employ them as pathways for effective information dissemination and scaling-up of adaptation actions are imperative.

Such an adaptive learning process proves to work best for most communities in Africa and has been adopted by some international agencies for applications across other regions in Africa (Otzelberger, Percy, & Ward, 2015). Also, merging of local and modern-day science information can lead to an integrated climate risk management that

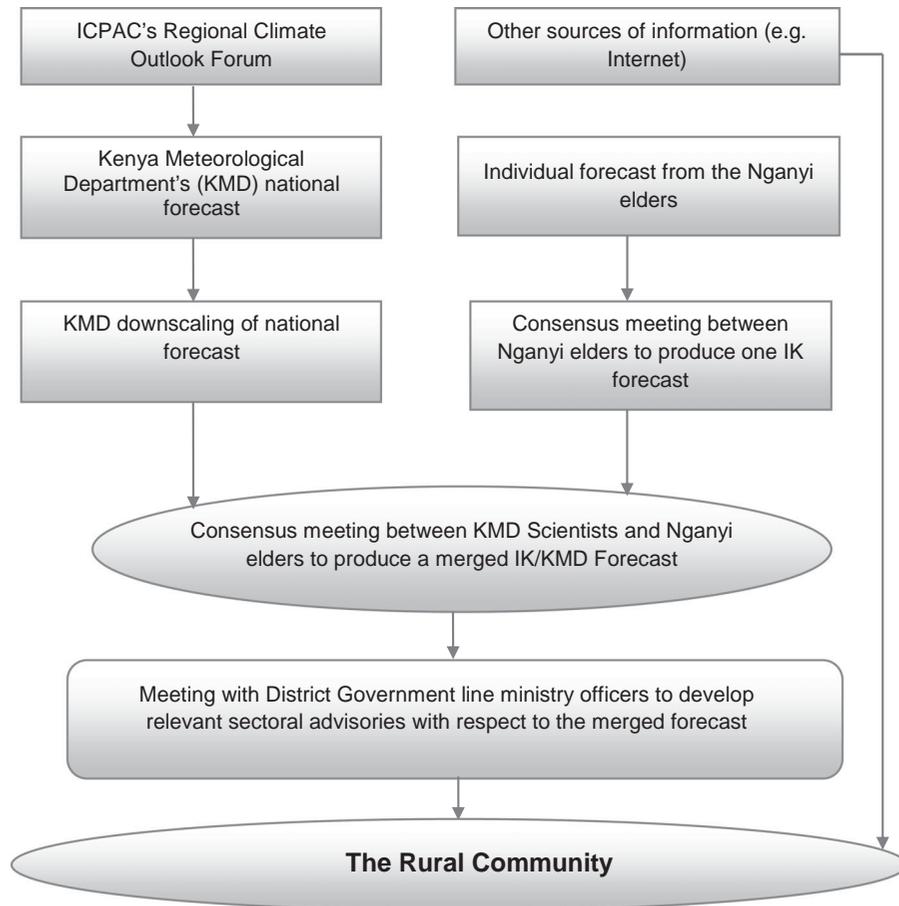


Figure 2. Improved institutional framework guiding the development and dissemination of climate information to the Nganyi community.

promotes poverty reduction and sustainable development overall. However, because it is not possible that all communities' adaptation strategies will be supported through donor funding only, the concerned organizations need to collaborate to identify best practice measures that can be adopted across other regions for broadened adaptation and climate risk management. This way, also, it will be possible to develop policies that can guide mobilization of funds through the relevant ministries and government institutions, and channelling of funds in an appropriate way to enhance community adaptation and resilience in a more compact and sustainable manner.

Disclosure statement

No potential conflict of interest was reported by the authors.

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