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Institutional Capacity and Strategy to Enhance Social-Ecological Adaptation for Climate Change, South Ethiopia

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ABSTRACT

Institutional capacity analyses is likely to define the kind of next step that can be taken to properly plan, implement and report climate change adaptation and mitigation interventions. Although Ethiopia has developed a comprehensive climate resilient green economy strategy, there remained gaps in institutional capacity to implement it accordingly. The objective of the study was to assess the capacity and resources need of key institutions involved in climate change adaptation and mitigation efforts in southern Ethiopia. Comprehensive data collection tools were prepared and various indicators were used to determine the capacity and resources need of the selected institutions. Existing level of awareness and practical prioritization of climate change adaptation and mitigation interventions varies from institution to institution in terms of the comprehensiveness of planning, climate knowledge management, investment, and implementation capacity of climate specific initiatives. The investigation revealed that the capacity of key implementing institutions were minimum in this region where activities are implemented. This assessment suggested the need for strengthening institutional capacity in the region so as to realize the resilient green economy strategy.

Keywords: *adaptation; climate resilience; institutional capacity; strategies*

Introduction

Global climate change is a change in the long-term weather patterns that characterize the regions of the world. Since long time, scientists have been stating unequivocally that the earth is warming and human activities, especially in the form of burning of coal and oil and land use changes have warmed the earth by significantly increasing the concentrations of heat-trapping gases in the atmosphere (IPCC, 2007). According to this report, the more of these gases humans put into the atmosphere, the more the earth will warm in the decades and centuries ahead. The impacts of warming can already be observed in many places, from rising sea levels to melting snow and ice to changing weather patterns. Further, scientific literature contains numerous descriptions of observed and potential effects of global climate change on species and ecosystems such as freshwater supplies, and human health (Jonathan et al., 2009).

The risks associated with climate change call for a broad spectrum of policy responses and strategies at the local, regional, national and global level. According to Fussel and Klein (2002), the UNFCCC (United Nations Framework Convention on Climate Change) highlights two fundamental response strategies: mitigation and adaptation. While mitigation seeks to limit climate change by reducing the emissions of GHG (greenhouse gases) and by enhancing 'sink' opportunities, adaptation aims to alleviate the adverse impacts through a wide-range of system-specific actions. To properly implement these strategies by countries or agencies, it is important to understand existing institutional capacities in relation to the anticipated and or already experienced risks and determine the needs if there is limitations. This could be done in the contexts of different institutions given with the responsibilities to deal with climate change issues at national and sub-national level. As discussed by Plaxedes and Mafongoya (2017), institutional capacity analyses is likely to define the kind of next step that can be taken to properly plan, implement and report climate change adaptation and mitigation interventions. This is also because, capacity is not static, rather will grow in order to allow for a progressive strengthening of actions over time.

In Ethiopia, despite the continued efforts to ensure socio-economic development and ecological sustainability, climate change coupled with other factors have been posing severe challenges to smallholder farmers, pastoral communities and urban residents (Stephen Devereux, 2006; Adefires, 2016). Cognizant to the complex issues related to climate change, the country has developed a comprehensive adaptation and mitigation plan called Climate Resilient Green Economy (CRGE) Strategy. The CRGE among others aims at achieving middle income economy by 2025, while following low carbon growth model. As stated in different parts of the CRGE strategy, besides the direct effects such as an increase in average temperature and change in rainfall patterns, distributions and amount, climate change also presents the necessity to switch to a new and sustainable development model. Such development model is required to minimize the negative effects of climate change and at the same time to enhance utilizing available opportunities to enhance sustainable social-ecological developments. Equally important is that, the strategy underlines that, effective implementation of the strategy itself and the success of adaptation and mitigation efforts depend among others on national and local level institutional capacity and capabilities (FDRE, 2011). If the gaps between existing capacities and required capacities are large, it is not possible to implement this strategy, implying the need for assessing and understanding existing capacities and gaps in the various sectoral institutions responsible to implement the CRGE strategy. Similarly, OECD (2000) underlines that, comprehensive response to climate change impacts demand critical understanding of, for instance, the ability of individuals and groups, and their organizations to address various issues as part of a range of efforts to achieve sustainable development.

Capacity is critical to every phase of policies dealing with climate change and other issues, from inception to implementation and evaluation, and strengthening capacity is an essential aspect within the overall process of building institutions for climate change adaptation and mitigation. Willems (2004) argue that, institutional capacity has been described as an ability to mobilize existing policies and resources to address imposed risks and to initiate new policy issues, if necessary. Capacity can also be considered as enabling environment within which individuals and organizations can interact to implement a strategy such as climate adaptation and mitigation strategy (Willems and Baumert, 2003). As mentioned above, designing and implementing capacity building interventions demands information about the status of the institution under investigation which may be considered as two categories: building *climate-specific capacities*, refer to capacities which may influence other policy areas but mainly aims at fulfilling climate objectives; and *climate-relevant capacities*, refer to capacities that are developed for reasons other than the need to address climate change problems and implemented in different sectors although they may have significant impacts on the success of climate actions or policies.

Various international organizations and countries have been showing strong interest to support efforts to adapt to climate change in developing countries. Vincent and Cull (2014) suggest countries to identify and prioritize adaptation needs by themselves, which is eventually dependent on an assessment of the capacity of various institutions and actors that involve in planning, implementing, monitoring and reporting adaptation interventions. The institutional capacity assessment also needs to thoroughly assess needs of a particular institute and actor for it to be filled via undertaking capacity development interventions, where this study was also conducted taking into account the above-mentioned suggestions. The overall objective of this study was to investigating institutional capacity of selected institutions in southern Ethiopia and strategy to enhance social-ecological adaptation for climate change.

Materials and Methods

The study was conducted in Hawassa and Arbamich districts of regional institutions in Southern Nation Nationalities and People region where the Environment Forest and Climate Change Commission (EFCCC) Highland Climate Change Adaptation project is implemented. The selection of the institutions was based on their high level involvement in the implementation of the Climate Resilient Green Economy (CRGE) strategy in the country. These include four selected institutions: Ministry of Agriculture (MoA), Ministry of Finance and Economic Cooperation (MoFEC), Ministry of Water, Irrigation and Electricity (MoWIE) and National Meteorological Agency (NMA) at national replicas at regional level.

To collect the necessary data, first, comprehensive data collection materials were prepared. Both the checklists and questionnaires were prepared based on the consultation of the US Aid Framework for Institutional Capacity Assessment and also PEN Prototype (People and Environment Network) of the CIFOR. Once the sample framework was understood, a total of forty respondents were selected purposely from the target sectorial ministries' replica at regional level. Respondent were selected based on their seniority and leadership positions related to the CRGE unit, but also include other responsible staffs from each line institutions.

In this study, capacity and resource need of the selected institutions was assessment by focusing on the level of mainstreaming and implementation of the CRGE strategy. This is by taking into account that, understanding the level of integration and implementation of the CRGE strategy and other climate change related activities into the overall mandate of each institution will allow a holistic evaluation of the capacity of an institution to manage climate change related interventions and or programs. Various indicators were used to determine the capacity and resources need of the selected federal institutions and their replica at regional and sub-regional level. The major indicators/ parameters include governance and planning of climate change related activities; resources availability and presence of climate specific and or related plan; existing knowledge/skills to create, manage and communicate climate data/information to wider stakeholders; and overall institutional capacity to implement and monitor and evaluate and report activities/ programs that contribute to climate change adaptation and mitigation. Detail data were also collected on human, financial and material availability in each institution and in relation to climate change adaptation intervention planning, implementation and monitoring and reporting. Further, data was collected on pervious experiences and success stories (if any) of the institutions in terms of planning and implementing climate change adaptation programs. Availability of technologies and other inputs and level of CRGE strategy integration into the main agenda of the respective institutions were also assessed. Further, efforts were made to identify barriers that undermine successful planning and implementation of climate change adaptation initiatives. This is based on the premises that, characterizing a given institution in terms of the above-mentioned indicators reveal whether that particular institution is able or not to effectively implement climate change adaptation and mitigations initiatives now and in the future, and thereby, contribute to the fulfilment of targets set in Ethiopia's ambitious Climate Resilient Green Economy strategy by 2030.

Results and Discussion

Institutional Capacity and Resource Need

The overall findings show that, the institutions mentioned their strong willingness to strengthen leadership, coordination, and capacity to implement climate change adaptation and mitigation activities. There are efforts to establish CRGE units, in most cases represented by focal person and in some cases supported by steering/technical committee. The steering/ technical committee provides institutional support to the planning, implementation and reporting of climate related activities. Table 1 brief institutional capacity and resource need assessment in selected institutions in the study areas, below.

Governance of Climate Change Management Activities

To reduce climate change impacts, communities and experts needs to have better awareness and cooperate as the challenge cannot be addressed by one party. An assessment was made at selected four institutions at south region to understand how climate issues are administered in different sectors including Environment Protection and Forest Authority, Agriculture and Livestock Resources, Water and Irrigation, Finance and Economic Corporation and Meteorology Agency. It was found that all sectors have specific missions and strategic plan to address climate change related issues, which is also compatible with the overall missions of the organizations. There however difference among the sectors in the level of attention given to climate issues. For instance, bureaus of Agriculture and Livestock Resources & Meteorology Agency given high priority to the climate change missions in combination to the mandate of the respective institutions, whereas, other bureaus such as Environment Protection and Forest Authority, Water and Irrigation and Finance and Economic Corporation gives insufficient, low and moderate priority as compared to other missions of the organizations, respectively. Another common issue was

existing low cooperation among sectors and rather exiting overlaps of mandates among institutions that implement the CRGE strategy such as Environment Protection and Forest Authority and Agriculture and Livestock Resources offices. In general, except in Metrology Agency, there is an observed shortage of awareness among most staffs and leaderships as far as climate mission of the sector is concerned, which calls for planning and implementing of continuous capacity building on the CRGE strategy.

Climate Information and Data Management

As indicated in governance section, most staffs of the assessed sectoral institutions lack deep knowledge of climate change information and data management which is critical to achieve climate mission. In comparison, leaderships and some staffs from Agriculture and Livestock Resources and most staffs from Meteorology Agency have good understanding of climate information and are able to make use of the information. The two institutions also established formal climate communication and coordination mechanisms that have a good commitment on implementation of climate change adaptation missions. However, most staffs and leaderships of Environment Protection and Forest Authority, Water and Irrigation and Finance and Economic Corporation have limitations on understanding of climate information which will have its effect on the implementation of climate change management interventions. Except meteorological agency all institutions does not generate climate information by themselves, but access from the Agency and other sources. There is no archived historic climate data in these institutions which is at least in the context of their special mandate and the assigned climate mission. In general, it can be said that, both access to climate information/data and full understanding and utilization of it is a challenge in most regional bureaus. Although there are other factors, this however is much related to the lack of specialized experts in these sectors.

Planning of Climate Change Related Activities

All assessed sectors in the region have written plan to implement climate change objectives and all sectors except water and irrigation office revised their plan and management documents annually. In contrast, Water and Irrigation and Meteorology Agency highly addressed climate change risks, challenges and opportunities on their plan. On the other hand, Agriculture and Livestock Resources and Finance and Economic Corporation moderately addressed climate change risks, challenges and opportunities in their plan, whereas Environment Protection and Forest Authority fairly addressed climate change risks, challenges and opportunities in their plan. Key stakeholders are consulted during planning and the plan also includes the necessary resources, where gender is somehow mainstreamed in the paling.

Resource Need and Management for Climate Change Related Activities

Resource is the main thing to consider during planning phase of climate activities and others. It is obvious that, without skilled manpower, infrastructure and budget, it is difficult to achieve climate change adaptation missions. In contrast to this very true fact, our assessment show that, there is no sufficient climate change specialized experts in the institutions. Similar to other regions, climate change related activities are mainly planned and implemented by experts from natural resource and other disciplines. In comparative terms, bureau of Agriculture and Livestock Resources and Meteorology Agency have better climate change experts. Existing scarcity of specialized climate experts undermines full understanding and use of climate information and eventually climate change adaptation and mitigation goals.

Financial resource for climate change is not adequate and stable in almost all sectors, mainly at Agriculture and Livestock Resources, Finance and Economic Corporation and Meteorology Agency. In relative terms Environment Protection and Forest Authority and Water and Irrigation sectors have funding which is also said to be stable. Infrastructural need to achieve and support climate change priorities and objectives are labelled as modestly adequate in Agriculture and Livestock Resources and in Finance and Economic Corporation bureaus, whereas in Water and Irrigation and Environment Protection and Forest Authority the needs are moderately adequate and inadequate respectively.

Implementation and Monitoring and Evaluation of Climate Change Interventions

At strategic planning level, the CRGE strategy could be said to have properly mainstreamed in all targeted sectors of the SNNP region, and

hence there is moderately progressing efforts to address climate change issues. Similar to other regional states, in the SNNP, there are many programs and activities underway and directly and indirectly contribute to climate change goals. There is strong monitoring and evaluation system in targeted climate change adaptation goals and evaluation once M&E conducted, findings and recommendations were incorporated in existing strategies in all sectors except Water and Irrigation bureau. The issue however is the lack of strong early warning system in these institutions which could inform and facilitate communities where there exist climate related risks. It is only Meteorology Agency that have more or less strong early warning system in place. In the meantime it is worth mentioning some sectors such as Bureau of Agriculture and Livestock is able to establish extension system to reach and address affected communities at grassroots level. Similarly, Meteorology Agency has good experience in documenting, storing and disseminating climate change knowledge, despite the lack of independent extension system to reach grass-root level.

Table1. *Institutional capacity in selected institutions in the study areas*

Capacity streams, needs & strategies	Institutional capacity
Governance	• All sectors have specific mission and strategic plan to address the impact of climate change. • The missions is compatible with overall missions of the organization • ALR & Meteorology bureaus gives high level of priority to the mission but EFA, WI & FEC gives insufficient, low, moderate priority respectively. • All sectors staffs and leadership members have lack of awareness on mission except metrology agency. • Lack of integration and overlaps in co-ordination and institutional arrangement in implementing climate missions indicated across all sectors.
Information, data and management	• No climate specialized expert, but natural resource management experts have good knowledge on climate issues • ALR & metrology staff & leaderships understand climate information, data but EFA, WI & FEC have limitation to understand climate info & data • All institutions do not generate climate information and have no archived historic data in context of their special coverage in implementing its missions except metrology bureau. • All sectors have established communication and coordination mechanisms of climate change issues across relevant parts of the organizations
Planning	• All sectors have a written plan to implement its climate change objectives • The plan is widely congruent with other objectives of the organization and addressed climate change risks, challenges & opportunities in a medium level • The plan included all resource requirements and key stakeholders are consulted during planning • And the plans are gender mainstreamed
Resources	• ALR & metrology bureaus have climate change experts but the other sectors doesn't have • ALR, FEC and metrology bureaus' doesn't have adequate finance resources to achieve the climate change objectives and the budget also not stable but EFA & WI bureaus have relatively adequate budget to climate change • All sectors major sources funds are from government but metrology agency have bilateral source

Strategy to Enhance Social-Ecological Adaptation for Climate Change

The findings showed weak institutional capacity and irregular arrangements across the institutions to properly plan implement and report climate change adaptation and mitigation programs. Unfortunately, there is increasing social-ecological vulnerability both in rural and urban areas. The complex issues call for integrated and strategic efforts to build institutional and expert capacity, and thereby, enhance social-ecological resilience of the smallholder farmers in rural areas and these of urban residents. Below, list of strategies to be considered in the future to build institutional capacity and community resilience according to the context of the project intervention areas:

Development Strategies

- Reduce dependency ratio by giving family planning training to the rural communities to have few number of family size.
- Mainstream gender in development strategies so as women can be empowered and benefited equally thereby contribute to household's resilience.
- As education helps to build awareness of farmers about climate change, strengthening formal and informal education enhances adaptive capacity and lessened individual's vulnerability to climate change and variability.
- Since the livelihoods of the farmers are mostly dependent on crop cultivation and livestock rearing, there is a need to modernize these to increase production and productivity so as to minimize farmers' vulnerability to climate change and variability.
- Creating market information to the farmers by establishing farmers' unions as well as provide credit and saving schemes to the farmers to build their adaptive capacity.
- There is a need to establish good early warning and climate forecasting systems that inform the farmers so that farmers can reduce the degree of exposure (e.g. drought) by taking a proactive measure before severe damage will be implicated. Market information system and agribusiness (value addition) should have been developed up to root levels.
- The role of extension service to farmers is critical so that they use drought resistant crop and livestock varieties; enhance soil and water conservation practices, and small scale irrigation development to minimize their sensitivity to drought and flooding.
- Although the development of institutional capacity is a great challenge from national to sub-national levels in Ethiopia (due to limited resources), strengthening and developing such capacity is an important element for climate change adaptation through strengthening cross-sectoral collaboration consistently.
- Supply farm inputs (fertilizer, pesticides and herbicides) to farmers with fair price.
- Development of basic infrastructures such as water, health, schools, and market places.
- In the case of urban settings, to minimize the prevailing air pollutions, urban forestry and greening, urban green infrastructure development, proper urban planning and sanitation, pre-urban landscape management should be included in the overall development plans of city administrations.
- The watershed management campaigns in rehabilitating the degraded landscapes should have been strengthened and best practices should be scaled up.

Generally, specific climate change adaptation capacities should be strengthened in each implementing institution at local level: individual climate change skills of the government staffs; organizational specific mandate on climate change; co-operations among organizations on climate change issues; ability of mainstreaming climate change issues and community indigenous knowledge on climate change are some to mention. These also supported by climate change adaptation relevant capacities such as short and long term training opportunities to selected target groups and implementing agents.

Coping and Adaptation Strategies

Based on the findings, different short term coping and long term climate change adaptation strategies were identified across the studied communities and areas. The major are summarized as follows.

- Income diversification through sale of charcoal, grass, poles, apiculture, and various other forest products, and also sale of livestock and livestock products to strengthen mitigation options against prevailing changing climate.
- Familiarizing farmers to store grain prior to harsh times and intensifying crop cultivation to increase production and productivity. In this case, application of improved varieties and homemade fertilizer application has increased as the productivity of land races has decreased from time to time. The issue however is to access these technologies due to the rampantly increasing price against the declining capacity to many households to afford them.
- Utilizing of available water resources for irrigation should be enhanced against fluctuating and shorten rainy season. Through efficient and effectively utilizing

the small streams to enhance the productivity of their farmland focusing on cash crops should be very encouraged.

- Strengthening reforestation, soil and water conservation and tree planting to enhance household livelihoods.
- Training smallholder farmers on modern agricultural technologies so as to sustain their production and on use alternative energy sources.
- Involvement in alternative livelihood options such as modern beehives, poultry farming, and petty trade.

Challenges and Opportunities of Climate Change Adaptation

Table2. *Challenges and opportunities of climate change adaptation in study areas*

Challenges	Opportunities
• Weak institutional capacity to support the communities • Declining adaptive capacity of the households/communities, which again affect choice and implementation of adaptation strategies. • Lack of integration and or joint planning among public, civic and private institutions to enhance social-ecological resilience of communities • Lack of good governance and existing widespread corruption such as in distribution of farm inputs to farmers, which often undermine the efforts of farming households to enhance productivity and resilience • Increased prevalence of diseases, pests and invasive species. In most of the studied areas, respondents were mentioning new occurrence of pests, diseases that are often not treatable by their capacity • Unaffordable farm inputs price, for instance improved varieties and fertilizer • Unsound extension and early warning systems	• Growing implementation of watershed management initiatives and increasing knowledge and willingness of the communities to participate • The Climate Resilient Green Economy strategy of the country as a development direction could be a great opportunity to focus on environmental resources management, access to finance and technology • The second growth and transformation plan of Ethiopia • The improving participation of different actors to build the capacity of the farmers. • Excising and improving community based knowledge and experience about soil and water management. • The presence of NGOs working at the study areas

Training Strategies

Table3. *Training need for farmers and staffs in study areas*

Farmers training and field demonstration in areas of	Staff training (combined on-job and short to long term trainings)
• Land management systems • Fertilizer application • Post-harvest loss minimization • Zero tillage and grazing • Cultural advocacy • Efficient resource utilization • Climate change impact awareness • Credit and saving schemes • Alternative livelihood options (e. g. beekeeping)	• Risk management and assessment • Early warning and climate forecasting • Natural resource and agricultural extension • Climate data analysis and interpretation • Planning and implementation • Monitoring and evaluation • Scaling up best practices • Specific field of a particular staff's specialization

Conclusions

The thorough assessment result shows the difference among institutions in the level of priority given to the CRGE and or climate change related issues. Whereas, experts in some of the institutions perceive the need to strengthen institutional capacity (i.e., human, financial, technological, policy wise) to address the complex climate change issues, others perceive it as integral development issue; hence give relatively less priority to climate compared to the overall mission of their institutions. There is also difference among institutions in the number of experts assigned to deal with the CRGE mission where the issue of climate change is mainly dealt with, for instance, in some of the sectorial ministries there could be a single expert expressing him/herself as CRGE focal person, but engage more in activities in other departments. Few institutions assigned

relatively large number of experts, however, there is scarce activities and finance for them to plan and implement the CRGE mission. In general, our observation show that, there is weak institutional capacity to deal with climate change adaptation and mitigation assignments compared to what is expressed in the CRGE strategy and the extensive mission given to each of the federal ministries. This call for strengthening capacity building processes, but this time such interventions should be result based and focused.

The gap to plan and implement climate change management related interventions and the overall CRGE strategy get worse as we go down to lower administration levels. There is clear difference among regional institutions and departments within regional institutions in the level of priority given to climate issue in particular and the CRGE strategy in general. Many experts in the lower administration levels perceive CRGE as project of the federal government, hence they are ready to carry out if there will be a project. This implies limitations in the mainstreaming of the CGRE strategy into the regional GTP-II. Particularly, at root level, there is serious knowledge gap about the CRGE strategy and climate change issues in general. Most experts see climate change adaptation as same as development plan, and hence they rarely use climate data during planning and also implementation. The serious institutional capacity gap in the region to plan, implement and report climate change adaptation and mitigation programs need urgent action from the federal institutions side.

There is a need to build the capacity lower administration levels to initiate and implement specific climate change adaptation and mitigation activities; develop and strengthen grassroots experts' and decision makers skills and knowledge on climate change, particularly how to mainstream climate matter into their main missions; re-visit organizational structures and strengthen CRGE units by human power, finance and working modalities and improve horizontal and vertical co-operations among departments with institutions and between institutions to achieve climate change management targets. Some of these recommendations could be achieved via organizing experience sharing, on job training, simple and focused brainstorming on issues related to climate change impacts, climate data, CRGE mainstreaming and how and the need to report the status and responsibility of that particular institution on planning, implementing and reporting on climate change adaptation and mitigation issues.

Annex. *Major problems and interventions for future climate change situations.*

Districts	Major problems	Intervention /strategies
Arbaminch Zuria Woreda (Rural)	• Drought	• Enhancing small scale irrigation schemes • Focusing on supply drought resistant and early maturing crop varieties • Alternative livelihoods such as beekeeping • Supplying farm inputs with fair price and timely • Early warning system at the district in collaboration with meteorological agencies
	• Pest and diseases	• Disease resistant crop and livestock varieties • Applying research based crop production mechanism • Timely delivery of herbicide and pesticide • Strengthening animal health posts • Integration of modern and indigenous prevention mechanism
	• Environmental degradation	• Strengthening watershed management practices • Adoption of conservation agricultural practice • Enhancing sustainable utilization of natural forests • Conservation of aquatic resources (e.g. fish resources)
	• Land tenure	• Strengthening land certification for the farmers • Encourage land ownership and property right
Hawassa City administration (Urban)	• Insufficient infrastructure	• Increasing access to drinking water and electricity coverage • Enhance urban green infrastructure
	• Epidemic disease outbreak	• Integrating scientific and indigenous pest prevention mechanisms

	• Environmental degradation (pollution)	• Supporting watershed management practices • Strengthening urban landscape conservation actions (e.g. tree planting and maintenance, flood diversion ditches) • Making clear demarcation for Hawassa Lake (e.g. buffering) • Establish good early warning system for flood and earthquake risks • Improvement of waste treatment and drainage system • Minimize industrial pollutions • Rehabilitate wetlands around the city

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