

# Review of Climate Policies and Roles of Institutions in the Policy Formulation and Implementation of Adaptation Plans and Strategies in Nepal

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## Abstract

Adaptation is undeniably crucial to address the complex issues and impacts of climate change at all levels in Nepal. The favorable policies and adaptive capacities of the communities are equally important to adapt to the climatic risks and hazards. The policies such as NAPA, national climate change policy and LAPA have been formulated in Nepal to address these climatic risks and hazards at national and local levels. Correspondingly, the communities and institutions are also adapting through their own efforts and initiatives. These institutions have contributed vital roles in policy formulation and effective implementation of adaptation plans and strategies as guided by NAPA and LAPA. This review paper has explored and analyzed the climate policies in Nepal, strengths and gaps in such policies, roles of local institutions in the policy formulation and effective implementation of adaptation plans and strategies. It has reviewed and analyzed the existing literature relating to climate change policies and adaptation plans and strategies. The paper highlights the climate policies, followed by roles of institutions in effective adaptation and the analysis of climate change adaptations especially focusing on *mobility, storage, livelihood diversification, communal pooling and market exchange*.

**Key words:** *climatic risks and hazards, local adaptation, NAPA, climate policy, local institutions*

## Introduction

Climate change is a cross cutting and an emerging global concern of the present world (Adger et al., 2005; Tiwari et al., 2012; Manandhar et al., 2013; Regmi et al., 2014). It has multiple and complex interactions, direct and indirect impacts on almost all livelihood sectors such as agriculture, forestry, health, water from global to local levels (IPCC, 2014). The poor and marginalized people, living in the rural and fragile ecosystems, are highly vulnerable and are the first to face these impacts (Agrawal and Perrin, 2008; UNWTO, 2009; Regmi and Bhandari, 2013), as they are dependent on the climate sensitive livelihood sectors and resources. In Nepal, 82.92% of the population resides in the rural areas and dependent on such climate sensitive livelihood sectors and resources (CBS, 2013).

The climatic risks and hazards have reduced the livelihood options and benefits in the rural, remote and fragile areas (Agrawal and Perrin, 2008). Adaptation is indispensable to respond such adverse climatic risks and hazards by adjusting natural or human systems for favorable benefits and opportunities (IPCC, 2007; Maharjan and Joshi, 2012; Regmi and Bhandari, 2013; McDowell et al., 2014). Many governments have developed adaptation policies and plans at various levels and integrated into broader development plans and agenda (IPCC, 2014). Nepal has also developed and submitted National Adaptation Programme of Action (NAPA) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2010 with its national adaptation priorities to deal with such climatic risks and hazards (MoE, 2010; Saito, 2012). Furthermore, Government of Nepal (GoN) has

endorsed national climate change policy and National Framework of Local Adaptation Plan of Action (LAPA) in 2011 to implement the NAPA priorities (Regmi and Karki, 2010; GoN 2011; Regmi and Bhandari, 2012; Regmi et al., 2014). The GoN has also established climate change council under the chairmanship of the Prime Minister and strengthened Ministry of Science, Technology and Environment (MoSTE - *then Ministry of Environment*) and its mandate by approving climate change division (Regmi and Bhandari, 2012). But, very few studies were conducted to review and analyze these policies and roles of institutions (public, private and civic) in their formulation and implementation until now.

Many institutions are directly or indirectly involved in the process of formulating these policies at both national and local levels in Nepal (Regmi et al., 2014; Dixit, 2015). The roles and contributions of these institutions are crucial in the successful formulation of these policies and plans (Agrawal and Perrin, 2008; Agrawal, 2010; Chhetri, et al., 2012). These institutions also play vital roles in promoting, implementing and sustaining adaptation plans and strategies (Regmi and Bhandari, 2013). Moreover, Raymond and Robinson (2013) emphasized on analysis of factors that affect implementation of adaptation across the institutions and social groups in different places, regions and also sectors.

Since, there is limited analysis of the policies and roles of institutions in climate change studies in Nepal, this paper reviews, analyzes and contributes to the climate change policies especially concentrating on NAPA, national climate change policy and LAPA. The paper also analyzes the roles and contributions of institutions (public, private and civic) in policies and implementation of adaptations and strategies at both local and national levels. The paper further analyses the strengths, gaps and challenges of climate policy, NAPA and LAPA and analyze the factors of different types/categories of institutions in implementing adaptation at local level in Nepalese context.

## Methodology

This is a review paper, especially concentrated on existing literatures relating to climate change policies and roles of institutions in policy formulation and implementation of adaptation plans and policies in Nepal. The content analysis of national adaptation programme - NAPA, national climate change policy, and local adaptation plan - LAPA was done in terms of its objectives, features, targets, executing bodies and implementation gaps. Furthermore, the roles of different institutions were analyzed in implementing these policies and implementing adaptation plans and strategies.

This paper used the framework of rural institutions proposed by Agrawal (2008), especially to analyze the roles of institutions in implementing adaptation plans and strategies. The framework has categorized the formal and informal institutions into - civic (*membership and cooperative based institutions*), public (*bureaucratic and elected local government organizations*) and private (*service and business organizations*) institutions (Agrawal and Perrin, 2008). These institutions are supporting adaptation for different purposes and functions such as information gathering and dissemination, skills development, networking, in policy making processes, mainly focusing on 5 categories of adaptations namely *mobility, storage, diversification, communal pooling* and *market exchange*.

Based on the review and analysis, the paper is divided into three different sections. First section deals with climate change policies and plans, leading to roles of institutions in climate policies and implementation of adaptation plans and strategies with some key examples. The last section of the paper discusses the strengths and gaps of climate change policies including NAPA and LAPA, roles and functions of rural institutions including factors of adaptation plans and strategies mainly focusing 5 categories as mentioned above.

## Climate policies in Nepal

Climate change issues and concerns have been increasingly discussed and debated in the environment and sustainable development agenda both in the research and policy levels since 1990 (Ahmad, 2009). Regmi et al., (2014) further supported the recognition of climate change adaptation in scientific and policy arena at the global, regional and national levels. Nepal has endorsed and adopted numerous international policies, agreements and commitments related climate change including the UNFCCC and Kyoto Protocol (Tiwari et al., 2014). In line with these international agreements and commitments, the GoN has also developed and endorsed NAPA in 2010 (MoE, 2010) and also sanctioned climate change policy (MoSTE, 2015) and LAPA in 2011 (GoN, 2011).

### *National Adaptation Programme of Actions (NAPA), 2010*

The GoN developed and submitted a comprehensive and inclusive NAPA to the UNFCCC. It aims to enable the country to respond climate change challenges and opportunities strategically through assessing climate vulnerabilities and prioritizing

adaptations; developing and finalizing short term and long term adaptation priority projects; development and maintenance of knowledge management and learning platform and development of a multi-stakeholder framework of actions. It aims in mainstreaming the outcomes into national development agenda beyond NAPA to assist in poverty reduction, livelihood diversification and building community resilience (Tiwari et al., 2014).

NAPA is the basis of all adaptation related projects/priorities in Nepal. The whole process followed the programmatic, participatory and bottom up approaches with multi-stakeholder's engagements by the establishment of 6 thematic working groups (TWGs); led by different line ministries. The TWGs are mainly agriculture and food security, forest and biodiversity, water resources and energy, climate induced disasters, public health and urban settlements and infrastructure (MoE, 2010). It has identified specific priorities on each TWG. It has proposed 9 clusters as NAPA priorities and integrated adaptation measures focusing on the thematic areas. It has also identified the key adaptation needs, priorities and existing adaptation practices on the thematic areas. It has prioritized 80% of the total budget for implementation of the NAPA projects/priorities at the local level (Village Development Committee (VDC)/Municipal level) (MoE, 2010; Tiwari et al., 2014).

The MoSTE is the responsible agency for overall coordination of NAPA among line ministries, departments and other institutions that are responsible for implementing the NAPA projects/priorities at the central level. It is also responsible for monitoring and evaluation of adaptation plans and strategies at the national level, whereas, District Coordination Committees (DCCs), formed at District Development Committees (DDCs), are primarily responsible for execution and monitoring of adaptation plans and strategies at the local level (MoE, 2010).

### ***Climate change policy, 2011***

The GoN has also endorsed national climate change policy in 2011, which supplements NAPA priorities in line with international policies relating to adaptation and mitigation (Mainaly and Tan, 2012; Davis and Li, 2013). It aims to improve livelihoods through adaptation and mitigation to address the adverse climate change impacts, adoption of low carbon socio-economic development path and fulfilling country's commitments and collaboration to national and international agreements relating to climate change. It has 7 specific and policy targets mainly on climate change adaptation and disaster risk reduction; low carbon economic development and climate resilience; financial resources; capacity building and participation; research; technology development and transfer; and climate friendly natural resource management (MoSTE, 2015). It has specific institutional reforms such as climate change council to coordinate the climate related programmes at the policy level and the MoSTE for operative and management functions (Davis and Li, 2013).

### ***Local Adaptation Plan of Actions (LAPAs), 2011***

Nepal is the first country to develop a formal LAPA framework in the World (Peniston, 2013; Tiwari et al., 2014). This LAPA framework operationalizes the objectives and priorities set by NAPA and climate change policy, which has mandatory provisions to disburse at least 80% of available climate budget directly to the local level implementation. The GoN has also developed the LAPA manual/guideline for the institutions to implement LAPAs at different levels (GoN, 2011; Peniston, 2013) based on the localized and specific climatic trends, its impacts and adaptation strategies (Maharjan and Nayak, 2012).

The village development committee (VDC) or municipality and district development committee (DDC) is the most appropriate administrative and geographic unit for LAPA processes, which was also identified in NAPA process (Mainaly and Tan, 2012). Based on the outcomes of the LAPA pilots in 10 districts under Climate Adaptation Design and Piloting project - Nepal in 2010 (CADP-N, 2011), a total of 70 LAPAs have implemented across 14 districts, covering 69 VDCs and 1 municipality, in mid and far-western regions of Nepal in 2014. These LAPAs have been incorporated and budgeted in the annual government planning (Peniston, 2013; GCCA, 2014). Additional 30 LAPAs are in the final stage for implementation. The total fund projected was 40 million USD for implementation of LAPA priorities, out of which Department for International Development (DfID) and European Union (EU) committed 23 million USD (Chaudhary et al., 2014).

The LAPA framework has mainly emphasized on the integration of adaptation and resilience into local<sup>1</sup>-to-national development planning processes. The main approaches in the framework are reach-up and draw down, flexible, inclusive and responsive that specifically supports adaptation and development processes (GoN, 2011). LAPA framework clearly indicated to support adaptation planning and addressing the location specific climatic hazards and issues of the most vulnerable communities and households (Helvetas, 2011; Regmi et al., 2014), integration of LAPAs into village, municipality, district and sectoral level planning based on Local Self Governance Act (1999), timely implementation and sustainable delivery of LAPAs and constant monitoring and feedback. It basically provides the vertical and horizontal linkages through bottom up planning process among the government and non-government organizations for effective adaptation planning and implementation considering the issues of effective participation, gender, marginalized and ethnic people.

## **Analysis of roles of institutions in policy formulation and implementation of adaptation plans and strategies**

### **Roles of institutions in policy formulation processes**

The GoN has claimed the participatory, inclusive, flexible and responsive process of formulating NAPA, climate change policy and LAPA with the active participation of public, private and civic institutions (MoE, 2010; GoN, 2011; Tiwari et al., 2014; MoSTE, 2015). The NAPA-TWG members comprised of 15 members representing government agencies, civil societies, academic institutions and relevant UN agencies. All TWG members played crucial roles in multi-stakeholders consultation processes in NAPA process. The multi-disciplinary teams were created in coordination with NAPA project team, while preparing the NAPA. Whole consultation processes including induction workshops, 3 regional and 3 national consultations were participated and contributed by representatives of these institutions. Some non-government organizations even coordinated and led the transect appraisal exercises and regional consultation processes. Over 60 representatives of public, civic and private institutions participated and contributed the consultation processes in both agro-ecological zones and thematic areas (MoE, 2010).

The consortium such as Multi-stakeholder Climate Change Initiatives Coordination Committee (MCCICC) was formed at national level to coordinate the climate change activities with the relevant ministries and institutions, academicians and donors. The committee is also responsible for improving communication among the relevant institutions to foster synergy, avoid duplications and optimize benefits. It also facilitates in developing consensus for financing, effective implementation, monitoring and evaluation of adaptation plans and strategies identified by NAPA. It composed of representatives of NAPA-TWG coordinators, office of the Prime Minister and Council of Ministers, National Planning Commission, institutions working on climate change, academia, local governments and development partners (donors and implementing agencies) (MoSTE, 2015).

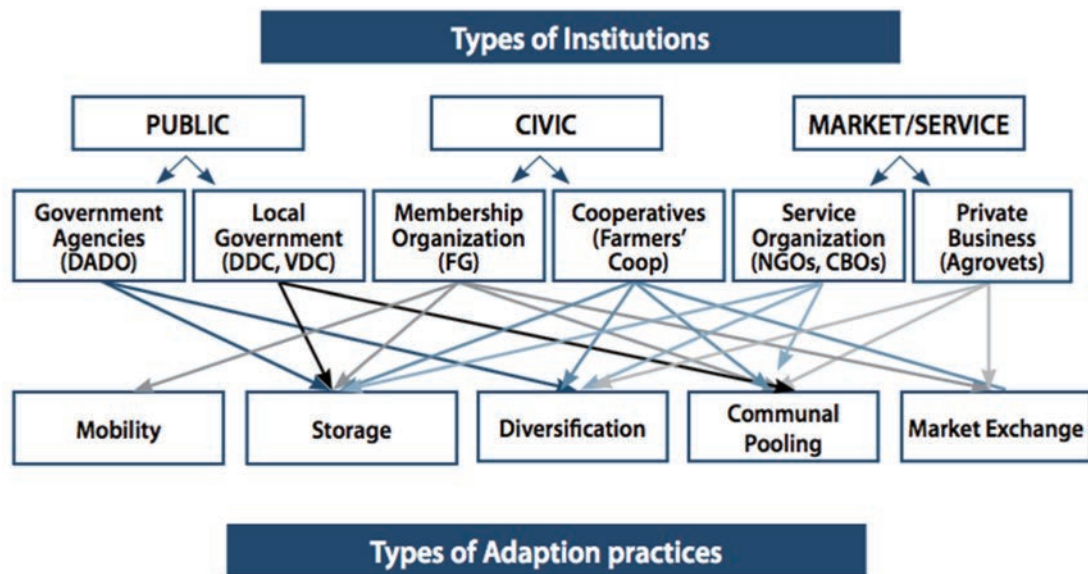
Davis and Li (2013) emphasized on the roles of the institutions in the effective implementation of these adaptation priorities through the process of submission of the proposals to MoSTE for review and approval. At local level, the DCC will effectively monitor and provide technical supports for efficient implementation of climate change policies and adaptations. The membership and function of DCC is flexible based on the nature and requirement, but it's important to involve the district level public, private and civic institutions in the process (MoE, 2010). It is, sometimes, difficult for consensus and also to convene regular meetings and provide technical supports, since it's a consortium with representatives from different sectors and institutions. Furthermore, It's a lengthy process to even select and replace the representatives in these committees and consortiums.

The LAPA was designed and piloted by Climate Adaptation Design and Pilot project-Nepal (CADP-N) which was the collaborative project of the MoSTE, International Institute for Environment and Development (IIED) and the Institute of Social and Environment Transition (ISET) with active participation of key national institutions in the process. Each institution had specific roles in the process. The international institutions provided technical supports whereas national institutions implemented the pilots on thematic areas such as agriculture, forestry, health, water and sanitation as guided by the NAPA priorities. The MoSTE played crucial role in coordination and providing technical support and guidance (CADP-N, 2011). It also involved the local stakeholders and institutions such as Village and/or Municipality Councils in the process. These institutions at the local level are the executive and decision making bodies to effectively plan, implement and integrate the LAPAs into sectoral and development planning processes. Furthermore, these institutions especially the councils are responsible for coordination, monitoring and evaluation.

### **Roles of institutions in implementation of adaptation plans and strategies**

The success of any adaptation plans and strategies among the rural poor is highly depended on the nature and support of existing formal and informal institutions and their connections with local and vulnerable communities (Chhetri et al., 2012). Agrawal (2008) conceptualized the framework with public, civic and private institutions, which influence adaptation by 3 central ways - structuring the impacts and vulnerability; mediating individual and collective adaptation responses to impacts; and facilitating access to external resources as intermediaries. These institutions enhance the adaptation plans and strategies of rural poor in 5 possible forms of adaptations - *Mobility, Storage, Diversification, Communal pooling* and *Market exchange* (Agrawal, 2008; Agrawal and Perrin, 2008).

However, only few institutions have directly focused on all these categories of adaptation and integrated into the development planning process, however these institutions have significantly enhanced the capacities and diversified the livelihood options and security of the communities. Maharjan et al., (2011a) also found same categories during LAPA piloting in Dhading district. In the pilot, public institutions such as District Agriculture Development Organization (DADO) and other sectoral agencies prioritized mainly on storage and diversification, whereas local government (DDC and VDC) prioritized on storage and communal pooling. Likewise, farmers' groups emphasized on mobility, storage, communal pooling and market exchange and farmers' cooperatives also emphasized on diversification additionally. Correspondingly, NGOs/CBOs prioritized their efforts on storage, diversification



**Figure 1.** Linkages between types of institution and adaptation in Dhading district, Nepal

**Source:** Maharjan et al., 2011a

**Notes:** DADO - District Agriculture Development Office, VDC - Village Development Committee, DDC - District Development Committee, FG - Farmer's Group, NGOs - Non-governmental Organizations, CSOs - Civil Society Organizations

and communal pooling and business like agro-vets were interested in diversification, communal pooling and market exchange (Figure 1).

Agrawal and Perrin (2008) and Agrawal (2010) further reviewed and analyzed more than 118 adaptation plans and strategies in the rural settings. Mostly adaptation plans and strategies were found either in a single category or combinations of two categories were prevalent. However, the mobility and market exchange were found comparatively less. The households having surplus amount of production and multiple options of adaptation are more inclined to involve in market exchange (Agrawal and Perrin, 2008). In many cases, smallholder farmers and indigenous peoples are depended on traditional coping practices (Piya et al., 2013). In some parts of rural Nepal, farmers practice participatory seed exchange of traditional landraces, drought or flood tolerant crops among themselves as a coping mechanism (Maharjan et al., 2011b). Some of the key examples of coping and adaptation plan and strategies in each category of the framework are described below with the roles of institutions in its establishment, management and sustainability.

### Mobility

Transhumance system is a widespread form of mobility of herded livestock as a traditional adaptation practice in high Himalayas of Nepal to escape freezing winter before snow covers the pastures. It's a location specific community-based adaptation in the form of mobility in the region. NAPA has prioritized on promotion of such community-based adaptation through integrated management of agriculture, forest including pasture and biodiversity (MoE, 2010). Aryal et al., (2014) revealed that this practice is sustainable, despite the direct influence of changes in policies and issues of socio-economic and cultural transformations, market inaccessibility on the grazing patterns and adaptive responses. The policies in Nepal have continuously neglected this system of livestock management, which has significant importance in the people's livelihood in the region. Panday and Gyawali (2015) has highlighted the roles of public institution, in managing this system through implementation of policies, capacity building through incentives and technologies.

Likewise, labour migration, either seasonal or long-term, is considered as a key adaptation strategy in rural Nepal (Dixit, 2015). Many researchers found that migration has positive contribution to the households' economies, which enhanced the adaptive capacities of the family to deal with climatic risks and hazards (Regmi et al., 2009; Dixit, 2015). Particularly, poor households are migrating to India, since they don't have any other options. Sherpa (2010) found that labor migration is direct correlated with agricultural production and ultimately with climate change. Decreased agricultural production compelled farmers to migrate in search of better and stable jobs, which eventually increased women's workload in agriculture, especially in weeding, watering, harvesting and storage. The labor and employment policy-2062 B.S.<sup>2</sup> has emphasized on promotion of production oriented



employment by eliminating forced labor migration, but in reality whole family migration has become prominent in rural areas because of many factors including economic factor and low agricultural productivity (Gentle and Maraseni, 2012). Both public and private institutions have crucial roles in proper implementation of government policies and programmes and securing migrants rights (Bhattarai, 2005).

### Storage

Farmers have been playing key roles in maintaining seed diversity for generations. They have been conserving diverse seeds suitable for specific and stressful environmental conditions. These are specific adaptation practices to manage the quality and resistant seeds both at household and community levels. The farmers in the Western Terai of Nepal store their seeds and grains in the 2<sup>nd</sup> floor of their houses and in elevated places in the building to protect from the floods (Maharjan and Sigdel, 2010; Maharjan et al., 2011c). Likewise, Community seed banks (CSBs) are the source of such valued landraces and seeds at the community level (GoN, 2013; FAO, 2014). It has emerged as an effective rural institution to improve the accessibility of poor and marginalized farmers to diverse seeds during crop failure and seed shortages that enhance local food security, agro-biodiversity conservation, thus reduced the vulnerability of crop loss (Regmi et al., 2009; Maharjan et al., 2011b).

Public, private and civic institutions have significant roles in promotion, management and sustainability of CSBs in Nepal (Joshi, 2013; Shrestha and Sthapit, 2014). NAPA has emphasized on building adaptive capacity of community through improved systems and access to services for agriculture development (MoE, 2010). Maintenance of such diverse and adapted seeds in CSBs enhances the accessibility of farmers that support in reducing climatic risks and increasing resilience (Regmi et al., 2009). There are evidences that such landraces can withstand climatic stresses. For example, farmers in Kanchanpur district, Nepal experienced *Tilki and Shyamjira*, rice landraces, were resistance to the flood in 2008 (Maharjan et al., 2011b; Maharjan et al., 2011c). Likewise, Regmi et al., (2009) also found *Mansara* rice as drought tolerant and early ripening that is suitable even for low fertilizer and late monsoon period. Therefore, farmers crossed *Mansara* seeds with modern variety through participatory plant breeding (PPB)<sup>3</sup> that they perceived as an important approach for maintaining local agro-biodiversity. In addition, participatory germ-plasm exchanges within the CSB have promoted on-farm management and help community to cope with climate change adversity (Maharjan et al., 2011b). Considering its importance, GoN has prepared operational guideline of the CSB in Nepal (DoA, 2015).

#### 4.2.3. Diversification

Many institutions have concentrated on adaptation plans and strategies for livelihood and income diversification to enhance communities' adaptive capacities and food security (Maharjan et al., 2011a). Home garden is an example of such diversification that has integrated diverse crops such as fruits, vegetables, fodders and livestock for family nutrition, source of income and also reducing the risk of crop failure from climate risk and variability (Regmi et al., 2009; Weerahewa et al., 2012). Home gardens have efficiently utilized all livelihood resources and factors such as natural, financial, social and human capabilities for food security, economic benefits and also reduction of climatic risks.

Home gardens contribute a wide range of social, economic and environmental benefits to the rural farmers, in addition to food and nutrition (Sthapit et al., 2006). Additional practices such as beekeeping, livestock and micro-enterprises are also integrated for sustainable income generation. In many cases, water collection ponds and micro-irrigation are identified as effective adaptation practices for rural farmers. Furthermore, farmers' field schools and community seed and information center are effective for raising awareness on climate change issues and increase access to related information (Maharjan et al., 2011a).

Maharjan et al., (2011c) found that farmers in Western Nepal had replaced rice cultivation with vegetables such as cauliflower, potato and sugarcane because of untimely occurrence of rainfall in the region, which ultimately change their food habits. Also, cultivation of water stress tolerant crops such as groundnuts, tomato, bottle gourds, cucumber and watermelon become common for satisfying farmers' needs. River bank farming of such tolerant crops has gained popularity with the support of some NGOs and CSOs. Ghimire and Bista (2009) emphasized on role of conservation agriculture such as minimum tillage, biogas and biofuels, crop rotation and mixed farming, agroforestry and sloping agricultural land technology (SALT) as effective adaptations and livelihood diversifications in rural Nepal. They further underlined that such practices have strengthened both farm economy and ecology, which are essential for higher resilience to climate change.

#### 4.2.4. Communal Pooling

Both formal and informal pooling/network among institutions and communities are necessary for collective security and adaptation against climate risks and impacts (Nepal, 2011). Micro finance institutions, community forest user groups, irrigation groups, micro-credits and cooperatives have played key roles in uplifting livelihoods and enhancing livelihood security by diversifying income generation that ultimately reduces the vulnerability and spread risks of the rural communities (Gentle and

Maraseni, 2012; Tiwari et al., 2012; Dixit, 2015). In addition, farmers are also engaged in value addition and marketing of local commodities through farmers' groups and networks, with support of institutions. These ultimately diversify farm produces and also increase food security, since neglected and underutilized species are also being conserved and integrated, and also income generation become more diverse and resilient (Regmi et al., 2009).

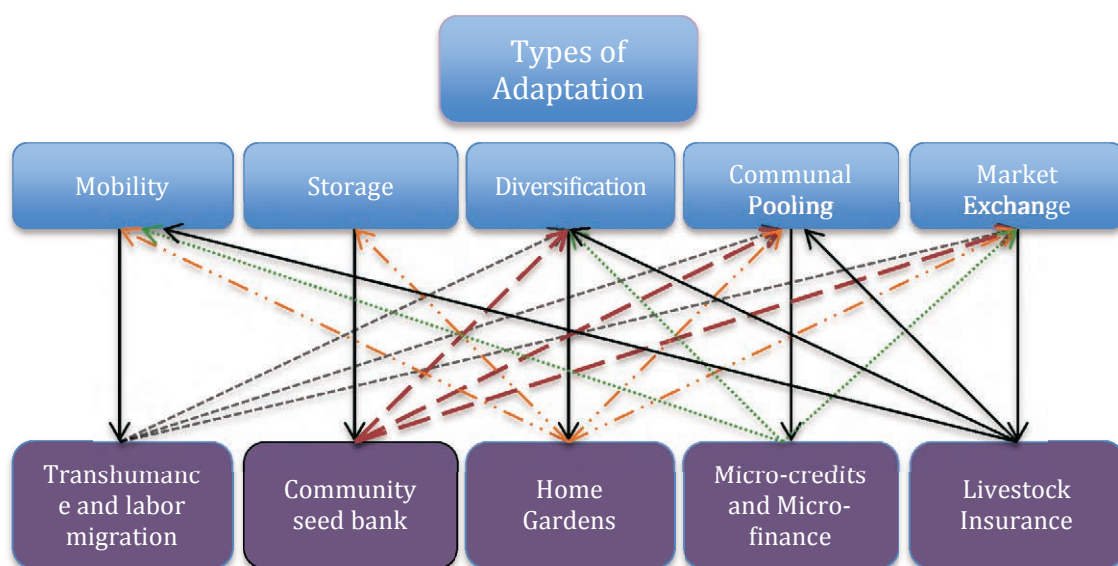
Community empowerment is very crucial to motivate rural people by improving access to knowledge and resources. Community biodiversity management fund (CBM Fund)<sup>4</sup> is an example, which was used as mechanism to achieve the twin goal of biodiversity conservation and livelihood improvement in Western Terai (Maharjan et al., 2010). In addition, community seed information and resource center (CSIRC) as a LAPA pilot also enhanced accessibility to information and seed has improved both community affiliation and resilience of the farmers in the rural areas (Maharjan et al., 2011a). Likewise, community groups, especially in Western Terai initiated leasehold farming, especially targeting Dalit and landless groups with the support of seeds and technology from the institutions. Participatory seed exchange in Western Nepal is also proven to be effective in strengthening community relationship and group solidarity (Maharjan et al., 2011b). The group cohesion and solidarity support and assure the poor and marginalized people to cope with climate risks, stresses and shocks within the community (Regmi et al., 2009).

#### 4.2.5. Market exchange

Maharjan et al., (2011a) found that adaptation practices with regular means of income and directly linked to the market are more sustainable. They reported the introduction of livestock insurance, as a LAPA pilot was effective especially for goat and buffalo that was initiated by Ako agriculture and multipurpose cooperative in *Jogimara, Dhading* district of Nepal. The farmers were attracted to livestock because of low agricultural productivity due to climate induced hazards such as drought, landslides and hailstones, thus, cooperative initiated to promote livestock rearing and secure farmers from the emergency incident of livestock loss. The insurance serves as livestock compensation mechanism for the poor and vulnerable households when their livestock is affected by climate risks and hazards. Priya (2010) revealed that development of insurance mechanism for agriculture is one of the most sustainable market based adaptation approaches in the climate change context.

#### 4.2.6. Discussion on roles of institutions in adaptation plans and strategies in Nepal

In Nepal, many rural people and institutions are coping with current climate stresses autonomously. There are many successful adaptation plans and strategies in the forms of mobility, storage, diversification, communal pooling and market exchanges that are being implemented by the communities and local institutions. However, lack of reliable climatic data source and forecasting system to predict future climate scenario is the biggest challenge, not only for the communities and local institutions, but also at national level. Therefore, coping and adaptation is mostly done on ad hoc basis, not well prepared or well organized (Regmi and Bhandari, 2013). Thus, the government needs to design and implement effective plans and strategies based on national and local climate policies to adapt to climate change impacts to achieve economic and social prosperity (Dixit, 2015)



**Figure 2.** Inter-linkages of different forms of adaptation plans/strategies with examples

While analyzing these specific examples of adaptation plans and strategies, it is found that one form of adaptation plan or strategy is supportive to other forms. For instance, Transhumance system of livestock movement and labor migration, are supporting diversification, communal pooling and market exchange as well. Likewise, the community seed bank, though, its main objective is to conserve, store the seeds and grains to enhance the farmers' accessibility towards seeds and genetic materials, it truly supports in diversification, communal pooling and market exchange (Shrestha et al., 2006). Similarly, Home garden is the diversification mode of adaptation, which also provides additional benefits of mobility, communal pooling, market exchange and storage (Sthapit et al., 2006). In that sense, there are multiple linkages and connections between these forms of adaptation plans and strategies (figure 2). Nevertheless, it is important to build the adaptive capacities and minimize the adverse impacts of climate change that needs appropriate policy, proper planning with adequate resources in addition to the enhanced adaptive capacities.

## Discussion

### Analysis of climate policies

Climate policies, either adaptation or mitigation, both are firmly cross-sectoral in nature. Ahmad (2009) emphasized on government's responsibility to formulate and effectively implement the appropriate policies and institutional frameworks to deal with climate change. The effectiveness of such policy and framework is adjudged with its effective implementation. However, effective implementation of these policies and frameworks remain constantly challenge in Nepal with limited data and resources availability (Manandhar et al., 2013). Most of such policies and frameworks are top-down in nature. Very few such policies and frameworks are developed and implemented at the local grass-root level, though the severity and adversity are observed comparatively higher at local level (Regmi et al., 2014). The analysis of strengths and gaps or weaknesses of these policies are presented hereunder:

### Analysis of strengths and gaps of NAPA and climate change policy

Integrated climate policy with suitable policy and administrative arrangement is needed at national and local level (Ahmad, 2009). NAPA and climate change policy are developed as integrated policy at national level. It has covered a wide range of sectors and stakeholders for its implementation (GoN, 2011). NAPA was guided by the international policy and science debates since it was devised according to decision 29/CP.7 and annotated guidelines developed by the Least Development Countries Expert Group (LEG) (MoE, 2010). Both NAPA and the policy followed the participatory approach involving multi-stakeholders in the process. NAPA defined 6 thematic priorities for its effective implementation. It is increasingly important to recognize the national and local priorities and implement the priorities accordingly, however, some national planners argued that the NAPA followed the broad top-down estimation approach and copied the global plans. It has generalized the needs and failed to capture the local level needs (Chaudhary et al., 2014).

NAPA in Nepal has estimated that a total cost of 350 million USD is required to implement all the NAPA priorities and actions (MoE, 2010). But, Oxfam (2011) argued that the total cost requirement is over a billion USD in order to implement NAPA priorities effectively. The GoN has not specified budget sources, except relying on external climate financing. The GoN has to maintain and fulfill the conditions related to the public financial management system, security, stability and transparency in order to access and properly manage this climate finance (Regmi and Bhandari, 2012). Initially, there was not any funding commitment for these identified NAPA projects, except the indication of 10-12 million USD from the Least Developed Countries Fund (LDCF). However, 14 donors agreed to coordinate and align with the government by signing a donor compact in 2009 (Oxfam, 2011). The funding commitment was increased to 538.24 million USD for adaptation from 2009 to 2012. However, only 246.44 million USD (45.78% of the total committed fund) is fully or partially relevant to adaptation (Baral and Chhetri, 2014).

Institutions and their roles are crucial in commencing, developing, promoting and sustaining adaptation policies and plans. The MoSTE in Nepalese context is responsible as a functional institution for both NAPA and climate change policy (MoE, 2010; MoSTE, 2015). However, Regmi and Bhandari (2012) argued that MoSTE has neither confidence nor capacities to coordinate among ministries, departments, donors, government agencies and civil societies for transparency and accountability.

Climate change policy complements the NAPA and acknowledges the poor, marginalized people, indigenous nationalities and women that are facing greater impacts of climate change as they have the least resiliency and adaptive capacities (Mainaly and Tan, 2012). However, it failed to consult with the multi-stakeholder institutions in the process of finalizing it (Regmi and Bhandari, 2013). Many civil society and community groups criticized on dominance of international agencies on the policy (Helvetas, 2011). It's not shared to wider public as Regmi and Bhandari (2012) found that most of community and civil society groups are unaware of existence of such climate change policy, though it is believed that community participation and multi-stakeholders consultation is crucial. However, Baral and Chhetri (2014) discussed that the policy preparation process was participatory with contribution of



multi-stakeholders in the initial draft. They further added that many donors, government and civil society organizations appreciated the national climate policy as the positive step forward addressing the adverse impacts.

The climate change policy has some ambitious goals such as establishment of a climate change center for research and monitoring, regular policy and technical assistance. Similarly, establishment of new and centrally administered climate change fund especially for adaptation and resilience was ambitious without clear guidance for management, utilization and disbursement of fund at the grass root levels, which have limited progresses in its implementation. It's not clear on the practicality of fund disbursement mechanism, transparency and accountability, though it has mentioned about the announcement of the fund on the annual basis (Davis and Li, 2013). Recently, the Ministry of Finance has introduced the separate budget code based on the pilot conducted by National Planning Commission and UNDP in 2012 (Baral and Chhetri, 2014).

Moreover, the policy is very general and brief that lacks clarity on the formal mechanism for implementation and authority for monitoring and evaluation. The policy, itself, has identified certain risks in terms of clear mechanisms in prioritizing adaptation and mitigation measures, information sharing, lack of coordination for implementation of policies and programmes, inability in managing resources, lack of laws for implementation of policies, lack of initiation and support of national and local governments, NGOs and private sectors including user groups. However, there is no any plan or strategy or mechanism for risk management in the policy (MoSTE, 2015).

The political transition and governance failure might be the main issue. There are problems between public, private and civic institutions, since the public institution has its own administrations, systems and structures, whereas private and civic institutions have own norms and practices. The government has vested interest on the issue of coordination and management of climate fund. Likewise, the issue of lack of trust, clarity of roles and responsibilities among ministries, departments, donors and civil societies are major challenges, which was never discussed among these institutions transparently. In terms of civil society representations in MCCICC, for example, there was an issue of transparency and inclusiveness in governance and selection mechanism, which has been raised by some of civil society institutions. Furthermore, the issue of excessive political interferences coupled with weak monitoring, evaluation and law enforcement remain continuous challenge. Despite lack of commitment for fund required for NAPA, many stakeholders constantly raised the issue of corruption in climate finance (Regmi and Bhandari, 2012).

### **Analysis of strengths and gaps of LAPA and inter-connection with NAPA and climate change policy**

NAPA has 6 priority thematic areas and 9 clusters that emphasized on local level decision making and control over on adaptation plans and 80% funds disbursement at grass root level (MoE, 2010; Davis and Li, 2013; Dixit, 2015). LAPA processes also followed participatory through top down and bottom up approaches considering the needs and concerns of local communities in the process of identifying adaptation and development priorities (MoE, 2010; Mainaly and Tan, 2012). LAPA is taken as a mechanism to formulate and implement national adaptation plans at the local level (Mainaly and Tan, 2012).

It's important to understand and analyze the organizational designs for effective local planning and implementation. The LAPA, basically, followed the formal government-ratified framework from national to local level in line with NAPA and climate policy. It is a decentralized channel of national to local development planning similar to Local Self Governance Act (1999) (Chaudhary et al., 2014). The VDCs and Municipalities, the local administrative units for LAPA implementation, are capable to identify and prioritize the adaptation needs and priorities at local level with minimum transaction costs. The village level and Municipal level councils are responsible for executive decisions for integration of top-down and bottom-up adaptation planning and mainstreaming into sectoral development plans. The roles and responsibilities are clearly defined for the councils including channelization of development and climate adaptation budgets (GoN, 2011).

However, review and analysis of climate change policy openly showed the failure even in identifying key agents and actors for implementation at local level, simply because there is no any government's institutional mechanisms and capacity for planning local adaptation at local level. Even at the central level, the issue of coordination and management of climate fund remain challenge. Furthermore, there is not any programme to support climate change adaptation in the VDC and district level in some districts (Gentle and Maraseni, 2012). Moreover, there is no elected government at the moment for effective implementation and coordination with the line agencies (Tiwari et al., 2012).

The LAPA experience, itself, is still in infant stage which will require working with other sectors and stakeholders at local level for up-scaling it's learning to wider geographical areas (Peniston, 2012; Chaudhary et al., 2014). However, some non-government agencies and projects such as World Wildlife Fund (WWF), CARE Nepal and Livelihood Forestry Project (LFP) have been effectively implementing LAPAs and Community adaptation plan of actions (CAPAs/CAPs) in collaboration with public, private and civic institutions at the local level in some parts of the country (Tiwari et al., 2012). The local and national governments including service providers have limited capacity to manage the fund, which is expected to increase, though LAPA is not yet commenced fully (Chaudhary et al., 2014).

### **Analysis of strengths and gaps of role of local institutions in implementing adaptation plans and strategies**

Often many development processes neglect the local issues and overlook the role of local institutions in the top-down perspectives (Sanyal, 2005; Regmi et al., 2014). Even NAPAs and national climate change policy failed to address the local concerns and the roles of local institutions and communities effectively in the planning process (Agrawal and Perrin, 2008). However, LAPA successfully mobilized those institutions and community groups in adaptation planning by recognizing their roles in adaptation, though not successfully integrated their needs in the planning processes because of structural and governance barriers (Regmi et al., 2014). LAPA experiences showed that range of such institutions is relevant for adaptation planning based on their strengths. It also recognized that sharing risks and benefits among these institutions could be a good starting point for developing adaptive responses (Peniston, 2013). Dixit (2015) found that shared learning dialogues between affected communities and public, private and civic institutions including researchers are useful in developing and implementing soft and hard resiliency and adaption measures to reduce climate vulnerability.

Dixit (2015) additionally emphasized on effective and creative engagement of governments, private sectors and civic movements in order to address short-term and long-term climatic hazards and problems. Each institution either public or civic or private need to understand local climatic contexts and should be responsible for specific roles and contributions based on situation and expertise for effective and efficient implementation of local adaptation plans and strategies. However, Helvetas (2011) and Regmi and Bhandari (2012) discovered that there wasn't any discussion on the roles of public, private and civic institutions in translucent approach. The main issue among these institutions is power dynamics and control over the resources. For instance, the donors and non-governmental organizations control over climate change financing in Nepalese context. Furthermore, monitoring system and law enforcement are very futile in Nepal, which is associated with political interferences and corruption issues as well.

Dixit (2015) further revealed that plural institutions and approaches are required to respond to climate change at local, regional and national levels. Public institutions such as local governments, especially VDC and Municipality, which are also the main institutions of LAPA implementation, are key for efficient implementation of local adaptations, however, VDC/Municipality mainly focuses on infrastructure development without effective planning and emphasis given on social protection schemes. Likewise, public institutions responsible for technology innovations need to understand the extent for appropriate technology to reduce vulnerability (Chhetri et al., 2012). In many cases, the climate change adaptations are unprepared and unplanned to address immediate risk and hazards without proper coordination among the local institutions (Gentle and Maraseni, 2012).

Similarly, the private (market/service) institutions and international non-government organizations within the local areas are mainly supporting food supply, infrastructure development or raising awareness among the communities based on their organizational goals and objectives (Maharjan et al., 2011a). It's also somehow top-down in nature, very few organizations practice local level planning based on the local needs. However, it's important that local communities have rights to organize, have access to and raise their voices and concerns through diverse public, private and civic institutions, which will, in deed, enhance and build the resilience and adaptive capacity (Dixit, 2015).

### **Analysis of factors of adaptation plans and strategies**

At present, many institutions have been implementing adaptation plans and strategies in the sectors and thematic areas identified by NAPA and LAPA. These adaptation plans and strategies are depended on local climatic contexts, scales of climate change impacts vis-à-vis needs, requirements and adaptive capacities of the local community, which vary with sectors and locations (Adger et al., 2003; Adger et al., 2005). In many cases, socio-economic, political, cultural and ecological contexts, geographical settings and scales influence decisions on adaptation (Adger et al., 2003; Adger et al., 2005; McDowell et al., 2014). It is also revealed that autonomous adaptation is necessary at local scales for remote and rural areas (McDowell et al., 2014; Regmi et al., 2014). The local adaptation must fulfill the local needs of the community while addressing climatic hazards (Nepal, 2011). It is important to ensure effective participation of local people and institutions in planning, decision-making, and control mechanisms as well as enhance their capacities including essential supports (Sharma et al., 2011). In addition, it is very important to analyze the differentiated impacts of climate change on different livelihood sectors and hierarchical groups such as gender, caste/ethnic groups, social groups, geographical locations for effective adaptation planning (Gentle and Maraseni, 2012; Dixit, 2015).

Most of the adaptation plans and strategies found elsewhere are specific to local climatic conditions and adaptive capacities of the communities (IPCC, 2014). The community's adaptive capacity, leadership and ownership are key for effective adaptation process at the local level. It is also important to link local adaptation plans and strategies to the national adaptation and development planning process, with combined framework and approach of top-down and bottom up (Peniston, 2013). Local adaptation plans and strategies are directly interrelated and influenced by policy and institutional framework (GoN, 2011; McDowell et al., 2014) and associated with socio-economic, political and environmental factors (Adger et al., 2003; Adger et al., 2005). Often higher-level institutions dominate the lower levels in terms of powers, rights and duties (Adger et al., 2003).

Despite the challenges and obstacles, many of these institutions are implementing numerous adaptations plans and strategies both at local and national levels. These institutions have mainly concentrated and considered on location specific climatic trends, factors and issues, which are also prioritized in NAPA and LAPA. Adaptive capacity of the community is highly influenced by multiple factors such as technology, resources, skills, capabilities and the governance in addition to natural and physical factors (Regmi and Bhandari, 2013). All these adaptations are contextual and driven by specific socio-economic, human, natural and physical resources and factors.

## Conclusions

Climate change is a complex phenomenon as it impacts all livelihood sectors at all levels. Poor and marginalized people are the most vulnerable because of poverty, fragility, marginality and climate vulnerability. Climate change has further aggravated the poverty at individual, household and community levels, since they are highly dependent on climate sensitive resources for their livelihood and wellbeing. Over exploitation of these resources and increased anthropogenic interventions further led to aggravation of climatic risks and hazards. In contrary, increased climatic risks, hazards and shocks further destroyed the resources, livelihoods and infrastructures in many areas.

Everyone is concerned about climate change and its adversity at present. Therefore, policies and institutional frameworks are being formulated and executed at national and international levels. Likewise, many institutions (public, private or civic) at different levels have concentrated their efforts on reducing climate change impacts. However, climate change impacts and adaptations are closely centered to peoples' well-being and livelihood resources. The people with high resiliency and adaptive capacities have fewer impacts of climatic risks and hazards, as they can easily cope up or adapt with it by utilizing the resources and capacities they have. However, coping and adaptation are not easy and simple as many factors including policy and institutional, socio-economic, physical and natural and human capital are directly or indirectly associated with it.

It's a principal advancement that government has developed and endorsed climate change policy, NAPA and LAPA in Nepal. All these policies and plans are interconnected. For instance, climate change policy and NAPA guide LAPA to implement the adaptation and increase resilience at the local level. It's more important now to implement these policies effectively to deal with the present and future climate risks and hazards. The resources, skills, technology, human capabilities, and enabling environment are required to effectively implement in the real scenario. In order to effectively implement these policies and plans, all institutions (public, private and civic) need to support and cooperate each other in pluralistic or integrated approach. It is also important to consider factors associated with efficient and effective execution of climate change policies.

It is predicted that the climatic risks and hazards will be increased in future and situation will be even worst and harsh, which means we need to prepare for the devastating and painful situation than today. More efforts are required at national and global levels for addressing and resolving the impacts through adaptation and mitigation. There are many examples of evidences of such individual and integrated approaches in Nepal and abroad, which needs to multiply and replicated in Nepalese context. The GoN explicitly needs to consider factors affecting climate change impacts and adaptation and ensure enhancing adaptive capacities and effective participation of poor, marginalized and Dalits, indigenous nationalities, women, children and youth in the implementation of climate change adaptation and related programmes. Therefore, detail study and analysis of factors affecting climate change adaptation in line with existing policies is necessary for Nepalese context.

Furthermore, It is very crucial to build or strengthen the adaptive capacities at local level to efficiently manage, implement and take the lead in decision and control over. The local institutions (public, private and civic) could play crucial role in building or strengthening people's capacities and address the local climatic risks and hazards. These institutions should take the lead in commencing and implementing adaptation plans and strategies both at national and local levels. The consultation and cooperation among the institutions and stakeholders during policy formulation should continue even in the implementation phases based on sectoral expertise and experiences.

## Notes:

<sup>1</sup> local - Village Development Committee, Municipal and District level

<sup>2</sup> B.S. - Bikram Sambhat - Nepalese year

<sup>3</sup> Participatory Plant Breeding - Both breeders and farmers have equal roles and responsibilities in all activities of breeding/developing new variety

<sup>4</sup> CBM fund - monthly savings of farmers with supplementary seed money provided by external sources that is distributed to needy farmers, especially women, as loan with minimum interest on rotational and priority basis

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