

# Network of Actors in Agricultural Improvement for Food Security and Associated Local Planning in Most Vulnerable Areas to Climate Change in Central Tanzania; A case of Chololo Village in Dodoma Municipality

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**Abstract :** *Central semi-arid zone of Tanzania is the most vulnerable region to climate change in Tanzania, where networks of actors in agricultural improvement and associated local planning have become very important in ensuring sustainability for food security. Chololo is an example of village vulnerable to climate change in the region supported by several programmes to transform it to ecological village (eco-village). This study was therefore carried out in this village to assess the network of actors and associated local planning in improving agriculture for sustainability of food security. Specifically, the study identified the main economic bases of the village, examined the challenges for exploration of the economic bases and likewise assessed the role of local planners in developing those economic bases. In this study, several socio-economic data collection methodologies including key informant and telephone interviews, focus group discussions, transect walk, observation and documentary review were employed. The study involved 80 respondents from selected villagers of different age groups, gender and functions. The major findings of the study revealed that the local planners have important role in improving food security, however they lack necessary skills to facilitate agricultural improvement brought by other actors, which ultimately lead to poor adaptation to different innovations by the community. This study therefore recommends that there should be more effort from the government, civil societies and the community to ensure the local planners have the necessary skills to facilitate coordination and networking of different actors in the community for sustainable food security.*

**Keywords:** *Economic Bases; Food security; Local planning; Network of actors*

## INTRODUCTION

Agriculture is the main economic backbone and the source of rural livelihoods to majority of African countries including Tanzania where it contributes about 25-50% of the national Growth Domestic Product (GDP) and 65.5% of total national employment (URT, 2006; Chongela, 2015; Deloitte, 2016). Though many factors limit agriculture production, extreme variations on climatic conditions have been pressing the greatest threats for mankind survival and sustainable development of the food security in Africa where 70-90% of agricultural production systems strongly depend on annual precipitation (IPCC, 2007; Munang and Andrews, 2014). Tanzania is vulnerable to climate change as more than 80% of the population depends on climate sensitive rain fed agriculture for their livelihood (NBS, 2014). Central semi-arid zone of Tanzania is the most vulnerable region to climate change in Tanzania where sustainability of food security has become the most affected community needs (Hatibu, 1999; ACPC, 2011; Ndaga, 2012; Chongela, 2015). Chololo village is an example of the vulnerable area and among the poor village in Dodoma region that apply a range of adaptation innovations to transform into an Eco-village (Njau *et al.*, 2014). The Eco-village project is empowering the community to take up new innovations in agriculture, livestock, water, energy, and forestry with aim of reducing vulnerability to climate change (Sakai, 2012; Njau *et al.*, 2014). Climate Smart Agriculture (CSA) is among the innovative approaches on mitigation of the effects of climate change that improve sustainable food production (FARA, 2015). The enhanced food security by CSA is promoted through suitable coordination of integrated national policies (Munang and Mugendi, 2016), administrative planning and adequate Local Economic Development (LED)

networks of actors such as those who deals with financing mechanisms, risk management schemes, infrastructure and transportation interconnection, land division and ownership, water and energy functioning, communication and information system and institutional development. CSA also requires innovative technologies for sustainable crop and livestock production, afforestation, extension services, food processing and storage, supply and marketing (FAO, 2010; Munang and Mugendi, 2017).

## MATERIAL AND METHODS

### The Study Area

This study was conducted at Chololo village; Kikombo ward in Dodoma Municipality that is located about 50 km from Dodoma town. The village has the population of 4,079 people with 1,039 households (Njau *et al.*, 2014). The mean

household income for village was 1,750 Tshs per day at the time of this study, which was below the poverty line. The main sources of income are farming (94%), livestock (47%) and small business (24%) (ECOACT project, 2014). Covering an area of  $6.4 \times 10^3$  ha, large part of the village, which consists of six sub-villages: Kawawa, Lusinde, Jamhuri, Muungano, Siasa and Kizota were covered by shrubs, and mountains. Land uses for settlement and crop production, two planted forest and swamps and bare land consisted of 819.4, 10.8 and 232.6 Ha respectively as shown in Figure 1. Chololo village was therefore selected for this study as an example of the vulnerable area to climate change in the region, which had frequent droughts and insufficient food and an on-going effort to transform it into an Eco-village (Kalumanga and Bwagalilo, 2014).

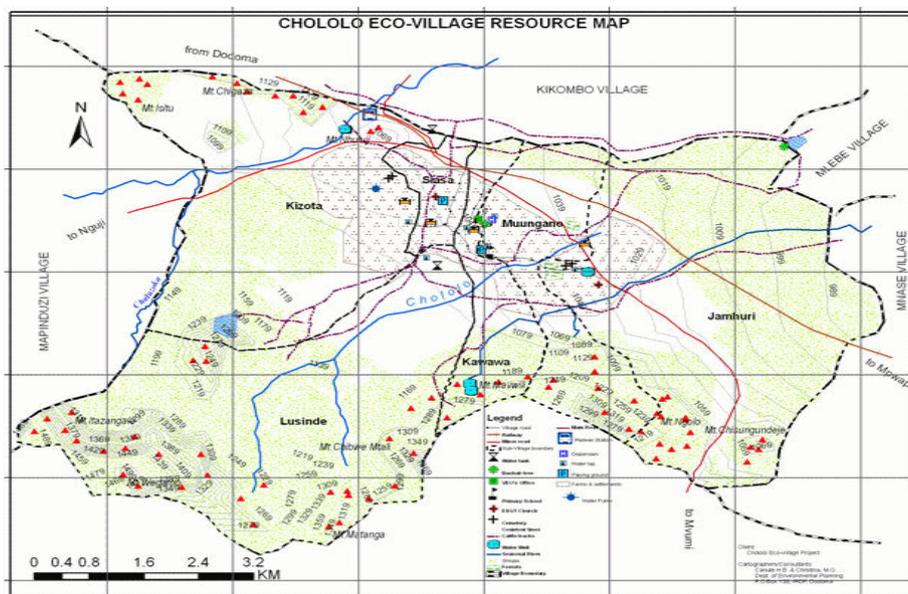


Fig 1: Chololo village resource map showing different land uses (Source: Njau *et al.*, 2013)

### Field Data Collection and Analysis

This study comprised of descriptive data that were collected from both primary and secondary data sources. Primary data collection comprised of several socio-economic methodologies; Key Informant (KI), face-to-face and telephone interviews with key staff from Dodoma Municipality, Chololo village chairperson, the ward counselor and eco-village project officials linked to the village. Focus Group Discussion (FGD) was employed to farmers of all ages, gender and functions; women and men, youths, elders, agriculturalists, livestock keepers, and different actors in the village while transect walk involved direct observation and dialogue to the residents in the streets. Secondary data were collected to support primary data using documentary reviews

where relevant: reports, journals, textbooks, articles, published papers, and electronic libraries were reviewed. Furthermore, content analysis was used to analyze data from the KI interview and FGD.

## RESULTS AND DISCUSSION

### The Main Economic Base (EB) of Chololo Ecological Community

This research revealed agro-pastoralism that is keeping animals and crop production as a major Local Economic Development (LED) system in Chololo village. In crop production, several cash crops (sunflower, simsim, green grams and nuts; groundnuts and bambara-nuts) and food crops (sorghum, millet, and pigeon peas) were produced for food and income generation respectively.

Small-scale vegetable production; tomato, spinach, and cabbage relied on unsustainable rainy and bore well water. Each household had between 2 - 4 acres of land customarily owned for production. Furthermore, multipurpose trees for fruits, fuel, and supplementation of fodder to animals were also grown in the village. Majority of animals were cattle, goats, sheep, pigs and small animals like rabbit as well as birds mainly chicken and dove. The maximum and minimum herd size owned by one household was about 80 and 2 respectively. The animals were providing food and income in terms of selling live animals, meat, eggs, hides, and manure so that they could buy household needs and in many circumstances for dowry expenses and safety net during dry seasons. Other sources of income came from petty trade services owned by individuals including sand mining, charcoal and local brewage, motorcycle transport, and small business. This practice of crop-animal production relied mostly on free land belonged to the village government and communally managed. It was from this land where livestock keepers used for grazing. Pasture being communally owned suffered from poor management whereby thorn bushes and erratic growth of wild grasses that were unsuitable for grazing were found. The average milk production per household was 2 litres per day only enough for household consumption. Contribution of livestock keeping on food security was noted by one of the villager;

Our livestock is the major source of family income. You can sell cattle, goat, or sheep and buy food any time you want. Moreover, in our culture, dowry is also determined based on number of livestock. That is why we respect animals than any other stuff. You can fail in farming but not in livestock keeping. For poultry, most households keep them only for consumption and selling to get quick money when needed. Therefore, livestock is more effective than farming (Chololo Village: Maria Chiwaligo on 12<sup>th</sup> September, 2017).

#### **Opportunities, which could Support the Exploration of the Economic Base**

From FGDs, KIs, and observation there existed abundant renewable energy: potential solar, wind and bioenergy that could satisfy energy required in water pumping for domestic and animal consumption. This available energy was not fully utilized to support domestic fuel and lighting thus saving the environment and time wasted on wood searching that could be utilized to improve food production. However, majority of people in the village had access to solar energy, which they used in water pumping at village level and running

television and radio to few households. The common uses of solar energy were for charging mobile phones and lighting through simple solar cells that were running on solar bulb locally known as 7000Tanzanian Shillings (Tshs) lighting bulb as narrated by the village chairperson when discussing about energy sources in the village;

In the village, we have electricity from national power supply but only two houses were connected. We expect to connect our primary school as you can see the electric poles end to the school buildings. Power connection costs as well as the quality and status of many houses in the village have hindered the use of electricity. However, the village uses solar energy in water pump. Here in the village almost every person uses 7000 Tshs light. This name came from the price of the garget (Chololo Village: Chairperson on 12<sup>th</sup> September, 2017).

When asked to elaborate more on the 7000 Tshs light, it was revealed that Chairperson was talking about a solar light. However, he did not know if 7000 Tshs light was also powered by solar energy simply because the light had no overhead solar panel connected to a visible battery for energy storage. He also noted that many people use 7000 Tshs light without being aware that they use solar energy though they put it in sunlight after every two to three days depending on their uses as he noted: -

It is not known that the 7000 Tshs light is also solar energy product. So here in the village, every household has at least one such light (Chilolo Village: Chairperson on 12<sup>th</sup> September, 2017).

Biogas establishment was another energy opportunity found in the village due to many livestock owned by the community. Although the Eco village project had tried to construct few samples of biogas, it was revealed that free-range livestock keeping practiced in the village and high water demand during construction and operation hindered their expansion among the village members. This was supported by one of the village as she noted;

The Eco village project introduced zero grazing here. They gave us improved cattle species hoping we will use them for biogas establishment and improve milk production. (Pause)

All cattle were sold because they were eating too much that nobody could afford to maintain them. For examples, they need a lot of pasture to feed them daily. The biogas also needed much water in operation, which is another problem here in the village. Therefore, all the biogas establishment plans were abandoned (Chololo Village: Martha Sabugo on 12<sup>th</sup> September, 2017).

Despite the lack of water to use in many aspects such as biogas operation, enough land private and publicly owned was available for rain water harvesting and thus water availability to the community. This land was arable and therefore very useful for crop production and livestock keeping. Land ownership systems included inherited, communal, and some private owned for lease or selling. However there was no reliable rainfall and rainwater harvesting technologies fully developed to offer support to crop irrigation and animal rearing especially during dry seasons. Rainwater harvesting in Tanzania is among the government strategies addressed to overcome the challenges of climate change and variability (URT, 2006). For their produce from animal and crop production, a good transport system (railway and feeder roads) offered suitable connection opportunity to improve exchange of goods and services to other parts of the region and therefore gain financial income. Nevertheless, the presence Village Community Bank (VICOBA) as a financial institution in Chololo community implied that people were already organized to culture of money saving and borrowing. This indicated a strong sense of community togetherness and a great sign of opportunity to invite more financial institutions to the village. Savings in agriculture for food security has support from the government through establishment of Tanzania Agricultural Development Bank (TADB) that has an intention of providing short, medium to long-term financing to agricultural sector (URT, 2016). As guided by the Local Gov't Act of 1982, that required all villages to have a suitable administration system, this was case for this village where chairperson and village council members were elected from among village members while village executive officer being employed by the government with decision making done through the village assembly. Furthermore, the village was offered sufficiently extension services from employed government extension officer and further services from the Eco project with enough labor supply though majority was unskilled. Lack of skills was common problem in many sectors in Tanzania including agriculture,

which was the backbone of the nation (Kasumuni, 2017).

### **Challenges Which Frustrate the Development of the Economic Base**

The rain-fed agriculture with unpredictable season patterns, longer dry seasons, and poor soils had been affecting livelihoods of the villages with little adaptations to the innovative technologies. This ultimately resulted into low yields in crop production. Despite low production among farmers, crop storage was very necessary for future use. Preservation was mainly done through traditional methods of ash mixed with leaves of neem tree and preserved in sacks inside rooms of living houses or dried over the trees. Their processing facilities such as milling machines for millet and sorghum were very few and therefore farmers used to sell their raw crops to local middlemen at a low price who later sold them to business people from Dodoma Municipality. This was because the village had no organized marketing system with pricing not in farmers' favor due to lack of market information and suitable financial services. Even though, income was being generated from livestock selling, shortage of grazing pasture especially during the dry season and lack of water for animals, insect-pests and diseases such as ticks especially during the rainy season with inadequate veterinary services were the main challenge facing animal production. The above-mentioned challenges needed a well coordination of local planning and village actors to ensure the village LED programmes were successfully operated to meet sustainable food production.

### **The Role of the Local Planners in Developing the Economic Base**

In this study a local planner was considered as a person who facilitate and coordinate all development actors in identifying and analyzing socio-economic situations. Also ensure social justice advocacy, budgeting and resource mobilization and finally coordinates other actors in managing project implementation, monitoring and evaluation.

The findings from this research work discovered that the local planners from the Chilolo eco-village who had a main role of developing the village economic bases, had minimum contribution on their enhanced food security. This was due to the missing of several roles. The local planners were supposed to facilitate planning for food security by involving all individuals, organizations, community groups and coordinating the role of each one in fulfilling their functions in sustainability of food security. The local planners were also required to mobilize other stakeholders from outside the village to engage in sustainability of food security

in the village, such as financial institutions, market networking and information linkages. Also to increase water supply through establishment of water harvesting technologies for domestic and production purposes would be another important role of the local planner. Furthermore, the local planner should have gone into lobbying for additional resources in the community from other planners in municipality and national-wise that will spear up sustainability of food security through crop and livestock production. These would have been things like small industries, farmers training and demonstration and so on. However, these were not featured in the village among local planners.

### Conclusion

Sustainable food security in climate change vulnerable areas of semi-arid central zone of Tanzania requires a well-coordinated network of actors in LED processes and desirable local planning. For the case of Chololo village, several LED programmes were suited to get an advancement to reach such sustainability. This included beekeeping and aqua-culture farms, value addition of farmers produces, strong markets and reliable information, irrigation schemes from boreholes water and rain harvesting technologies, more adoption to new technologies, uses of alternative energy sources such as energy saving stoves, solar and biogas, establishment of more financial institutions with insurance and environmental conservation bylaws. Such promotion would be well coordinated through local planner.

### Recommendations

Basing from the conclusion above, this study therefore recommends that there should be more effort from the government, civil societies and the community to ensure the local planners have the necessary skills to facilitate coordination and networking of different actors in the community for sustainable food security. The recommended efforts includes the government to set as a rule the required minimum level and type of education as well as skills to be acquired by all elected and appointed village leaders. A starting point should be on job training, seminars/workshop and study tours to the existing local planners at the same time the government in partnerships with other actors should review curriculum offered by respective training institutions to provide the necessary required skills.

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