BRIDGING PLANNED AND AUTONOMOUS CLIMATE CHANGE ADAPTATION APPROACHES FOR SUSTAINABLE AGRICULTURAL PRODUCTIVITY: EVIDENCE FROM THE ECOSYSTEM-BASED ADAPTATION IN THE TALENSI DISTRICT BY SMALLHOLDER FARMERS

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ABSTRACT

The effects of climate change in Ghana pose a threat to sustainable development, hence food security. Phenomena including drought, prolong dry season, flooding, storms and increased temperatures have become prevalent in the country, with several implication for food production. Particularly, the small-scale farmers in the country who account for about 80% of domestic agricultural production have limited resources to invest in appropriate technologies in order to adapt to the changing climate variability. In the Talensi district several staple cereal crops as well as tubers are affected by the shortening of the growing season. Small-holder farmers in the district have considerably relied on traditional knowledge for the production of food in the communities in the mist of this variability. World Vision Ghana with support from World Vision Australia started the implementation of a climate change project in the district in 2009 with the aim of improving the resilience of the people through improved adaptive capacity of small-holder farmers. This paper seeks to understand the synergistic relationship between the autonomous practices by the indigenes and the planned adaptation measures in shoring up food security in the communities. Focus group discussion, individual and group interviews were adopted to collect data from respondents in three purposively sampled beneficiary communities. Findings from the study revealed that bridging indigenous knowledge with the planned approaches leads to higher food crops yields and thereby strengthening the adaptive capacities of beneficiaries in these communities. These findings imply that planned adaptation programmes need to identify and incorporate indigenous knowledge and practices into their activities in order to achieve greater success.

Key words: Food security; resilience; indigenous knowledge; smallholder farmers

1.0 INTRODUCTION

Conventional agricultural land preparation activities in the research area are often slash and burn at the beginning of each farming season prior to planting which contribute to land degradation. This manifests in declining agricultural yields and loss of environmental services such as wild foods that traditionally subsidized household diets, wood stocks, etc. World Vision Ghana (WVG) with support from World Vision Australia (WVA) started Farmer Manage Natural Regeneration (FMNR) project with the aim of improving the livelihood of the people through improved adaptive capacity of small-holder farmers in 2009 in the Talensi District o the Upper East region. The project approach involved blending the planned ideas with the local approaches that were adopted by the small scale farmers. This paper is a presentation of the bridged points of the project and its impact on the output of the small-scale farmers in the region.

1.1 BACKGROUND

In Ghana, underlying structural factors of vulnerability such as population pressure, declining ecosystems, poverty, conflict, vulnerable rural livelihood activities amongst others have been exacerbated by climate change leading to increase in human vulnerability to environmental factors, (IOM …). In recent years, annual rainfall volumes have been declining, forest cover and the associated indigenous biodiversity and arable soils disappearing. The net result is a population that is staggering between food crises with shorter recovery periods, (WVI, 2012), thus posing a threat to sustainable food security, (WFP, 2013). Effects of climate change including drought, prolong dry season, flooding, storms and increased temperatures have become prevalent (CC DARE (…), affecting the activities of the small-scale farmer. Integrating adaptation into development strategies will address the impact of climate change thereby reducing pressure on natural resources, improve environmental risk management, improve the resilience of people, and increase the social well-being of the poor, (United Nations 2013).

Adaptation practice is both planned and autonomous. Planned approaches are consequence of deliberate policy and project decisions while autonomous approaches are more reactive to the changing climatic conditions. People in hazard-prone areas have adapted to the effect of climate change using their own capabilities, skills, knowledge and technologies to improve resilience and self-sufficiency, (Ensor and Rachel, 2009). Because of the frequent occurrence of climate extreme events, local people have developed extensive reactive beneficial skills, knowledge, and management systems that enable them to interact with their environment which sustains the livelihoods that they depend on, (IPCC, 2012). These knowledges have sustained rural societies and their environment in many parts of the world for centuries, (Ensor and Rachel, 2009). Little of these approaches have been incorporated into formal climate change mitigation and adaptation strategies, (Nyong, et al 2007).

Small-scale farmers in Ghana account for about 80% of domestic agricultural production, and about 84% of farming households in the upper east region, (WFP, 2013). However they have limited resources to invest in appropriate technologies in order to adapt to the changing climate variability. They have considerably relied on traditional knowledge for the production of food in the communities, (Arndt et al 2014, Nyong et al 2007). The main objective of the study is therefore to understand the synergistic relationship between the autonomous and planned adaptation measures in shoring up food security in the beneficiary communities of the FMNR project.

1.2 METHODOLOGY OF THE STUDY

The study assessed the synergy between planned and autonomous climate change adaptation approaches by small-scale farmers in the Upper East Region for improved output. Primary data was collected from the communities and complemented by secondary information from the district and the program office level. The research adopted mixed approach but with much emphasis on participatory research approach, (Chambers, 1994). This approach was adopted because; community-based inquiries can provide more knowledge about changes in a situation, (Anirudh et al, 2004). The approach was used to illicit information from small-scale farmers on the approaches adopted and its effect on their outputs. Three farming communities (two beneficiary communities and one non-beneficiary) were purposively sampled. Primary data as well as both published and unpublished secondary data were used to provide the basis for analyses and conclusion of the study. Focused group discussion; community group discussion; observation, in-depth interviews and questionnaires were used to collect the data. Both qualitative and quantitative techniques were adopted to analyze the data.

2.0 THE STUDY AREA

The three communities studied are located in the Talensi District of the Upper East Region of Ghana. About 84% of the households in the region are farmers as compared to 45.8% in the country (GSS, 2013). Also, about 90% of the inhabitants livelihoods depend on climatic condition and about 49.1% of the inhabitants are food in-secured (WFP 2013). The climatic condition is tropical and has two distinct seasons – a wet season with erratic rainfall that runs from May to October and a long dry season that stretches from November to April. The mean annual rainfall ranges between 88mm-110mm with the maximum being 950mm while the maximum temperature is 45°C in March and April with a minimum of 12°C in December (DMTDP, 2014). The visible environmental problems in the district include: deforestation; silting of water bodies; soil erosions and Bush fires which are mainly caused by poor agriculture practices, charcoal production, activities of herdsmen, hunting, honey tapping and surface mining.

2.1 RESULTS AND DISCUSSION

Farmer Managed Natural Regeneration (FMNR) is a technique that improves lands that have been degraded leading to loss of biodiversity and soil fertility. It encourages regrowth from the stumps of cut-down trees, protects and prunes the regrowth into new trees. The approach has a 100% success rate of trees survival. It can be implemented as an on-farm agroforestry activity or managed as a community forests. The two beneficiary communities of interest implemented the two approaches: community forestry; and on-farm mixed agroforestry. The community forests are protected from agriculture activities, over-exploitation, and it's managed by the communities' FMNR Lead Farmer Groups. The groups are made up of 20 Lead Farmers each who are responsible for pruning and protecting the site and its regrowth. In return, they are allowed to harvest their off-cut as firewood and other natural resources such as grasses. The on-farm approach is a mixed agroforestry practice that allows the farmers to prune shrubs on their farms to become trees. Other complementary activities implemented by the project include: education on behavioural change; skills and occupational training; provision of improved and drought tolerant crops; climate information gathering and communication amongst others. The autonomous approach adopted by the farmers before the project included: wage labour temporal migration; assets portfolio diversification; changing production technology; occupational diversification; formation of farming associations amongst others.

2.2 CONVERGENCE OF THE TWO ADAPTATION APPROACHES

This section analyses the convergence of the two approaches adopted by the beneficiary communities. FMNR and the autonomous approaches converged at most points that resulted in the benefits of the project.

2.2.1 Production technology (Composting, mulching and soil conservation)

Prior to the implementation of the project, farmers in the beneficiary communities valued and practised organic fertiliser techniques inputs such as manuring and mixed farming. Farmers gathered animal droppings during the dry season and spread it on their lands during the lean season before ploughing. They also piled up household scraps over the year, and then scattering the pile over a small area, such as a vegetable plot during the lean season. These local approaches were improved by the project by training farmers on composting and its application in the communities. The improved technique involved collecting the stalks and debris and transferring it into a pit dug on the field (which preserves moisture in the dry season, permitting decomposition), then adding smaller quantities of manure, leaves, weeds and household waste and allowing it for some time before spreading it on the farm. Prior to the project, all crops stalks would be burned off annually after harvesting which exposed the land to erosion and degradations. The expansion of improved composting has made organic fertiliser available to more household without sufficient number of livestock. The project approach also included leaving crop stalks on fields to prevent erosion and; encouraging livestock and birds to graze and defecate on the farms. These techniques are used to increase soil fertility and crops yields by farmers.

2.2.2 Livelihood diversification

As a way of minimizing the effects of climate change on their livelihoods, local people diversified some of their livelihood activities including sale of convenient items in the villages; processing of shea butter; occupational diversification amongst other activities. To help improve on the livelihoods of these people, the project supported the Lead farmers to create Group bank savings account; establishment of village savings and loans associations (VSLA); support of two bullocks for field ploughing and income generation activities, bee keeping etc. The groups were further trained in association management skills, and encouraged each group member to build up a capital reserve for future farming investments by saving a little of their income with the VSLA. The bullocks provided affordable traction or service for members and a source of income generation by hiring them out to other farmers. Through the VSLA, the members mobilized savings from the group members and offered business capital to group members which was used to expand their businesses such as shea-butter extraction, selling of salt, pepper, gari amongst others at the community levels.

2.2.3 Communal pooling

The farmers in the communities formed associations and groups which were used to support each other in their farming activities. Members of the groups benefited from the entire group through rotational services among members. These groups were useful for the project since the lead farmers who were responsible for the community forestry was dependent on this background. Through this group climate information was easy to spread from one member to another since they constantly met to take decision on the community forestry. The groups also served as grounds used to demystify traditional fear that growing trees causes the planter to die as well as demonstrated that trees do not suppress crop growth when pruned effectively and the suppression of bushfires that does not expose the land to harsh weather conditions. Planting of trees especially economic ones like mango, shea and dawadawa was encouraged through the groups.

2.2.4 Market exchange

Some community members had started selling various items in the communities and beyond to supplement household income and provide basic needs for the family. These items included the sale of wild fruits, soap, pepper, salt and the introduction of new items in the communities as well as the sale of seeds and other farm inputs. The project improved these processes by introducing training on business management practices such as record keeping; customer care; group dynamic etc. The introduction of bee keeping in the communities and the training on bush fire suppression increased the sale of honey in the communities and the sale of fruits. The collective decision-making and agreements have strengthened the unity and collaborative spirit of the project communities to fight bush fires which is yielding positive results on the environment and their crops yields.

3.0 BENEFITS OF THE PROJECT

An assessment of the benefits of the project during the survey revealed that numerous benefits were achieved as a result of the synergetic approach that was adopted by the project. These benefits are enumerated below.

3.1 IMPROVED SOIL FERTILITY AND CROPS YIELDS

In all the focused group discussions of the FMNR adopters, participants revealed that the key benefits of the project was improved soil fertility and increased crops yields. One of the farmer groups indicated that;

"The applications of compost, agroforestry, bushfire suppression and mixed farming have resulted in increased in soil fertility. We use to burn the stalks after harvesting but now we leave them to decay into the soil as well as use some of it for composting. Previously we cleared the entire shrubs on the field but now we prune the shrubs and the leaves drop back on the land which increases soil fertility. Also the mixed farming allows the droppings of the animals to fertilize the farm lands. In the past, the traditional notion was that trees affect the growth of crops negatively. But we have come to realise that it is untrue. Rather, where there are trees and they are well pruned, soil fertility increases, leading to good crop yields." (Tongo-Beo Men)

This information was corroborated with the World Vision Ghana office who revealed that 94% of the project beneficiaries revealed an improvement in soil fertility, of which about 75% indicated that it was improving a lot and has resulted in increase in crops yields. The non-adopters in the observed community indicated that their soil fertility was decreasing. According to them, they had started learning how to prepare composting since they saw the change it was bringing in the yields of those communities that adopted the FMNR approach.

"We have also started learning how to prepare composting. This is because we are seeing how it is improving the yields of our colleague farmers in Yameriga and Tongo-Beo. The soil fertility is decreasing drastically and there is nothing we can do to improve on it than to try what the others are doing and it is helping them" (Kaare community leaders).

The FGDs at the communities and the KIIs at the implementing agency offices attributed the increased in soil fertility to: FMNR increased leaf-drop, wind protection and run-off; bushfire suppression; elimination of field-burning; grazing livestock in the dry season; and improved Compost' technique.

"Some of us have our outputs increased by three folds, for instance, I used to get three to four basins of sorghum from my field. After applying compost, manure and not burning the stalk on my field I got close to three bags on the same field [equivalent of 12 basins)" (Yameriga Lead farmer)

A corroboration of the output levels of crops at the District MOFA Monitoring and evaluation Office revealed that between 2009 and 2010, the average output of maize increased from 1.95metric tonnes/hector to 2metric tonnes/hector while vegetable crops increased from 2.39metric tonnes/hector to 5.2metric tonnes/hector between 2009 and 2013 in the district. The increment was dominated by the FMNR project communities. The benefit of the improved crops yields contributed to improved household food security and income as well as creating a cost saving to the household.

3.2 IMPROVED ACCESS TO FODDER AND LIVESTOCK SECURITY

Fodder for domestic animals in the Upper East Region of Ghana has become very scarce. This is because, the bushes are burnt in the dry season and since the dry season has become so long, it becomes difficult to get feeds for the animals. Cattle, sheep and goats get lose as a result of the scarcity. The animals travel long distances in search for food in the dry season. In the two beneficiary communities that the research covered, fodder in those communities are progressively increasing and reducing the number of animals that get lose in the dry season. They also indicated that their animals are fatter and healthier and have up to 3-4 times market value than the animals in the non-beneficiary communities. This is because the community forest and the individual farms that are not burnt serve as feeding grounds for these animals. The animals do not wander around looking for feeds. The implication is that more time is saved as young boys have more time to attend school as they spend less time herding their cattle and ruminants in the forest and the grown-ups also spend more time on other activities than looking after the herds.

"Our animals no longer roam far for pasture because there is ample feed around. The grasses in the community forest are not burnt. The landscape is also cooler and attracts animals all over the surrounding villages that come to graze. Our animals look more healthy and fatter such that we can bargain for a better price when they are offered for sale." (Tongo-Beo Lead Farmers)

"We sell our animals to cater for household needs like children's school fees; health; buy consumables for the household. Animals are very important assets in our lives. Previously some of our animals used to die due to hunger, but with the introduction of FMNR, there's more pasture for animals and they don't roam far. We didn't know and we were always burning the bush, but now we don't burn the bushes and our animals feed there. Children now spend more time in school than looking for animals in the bush. We also spend less time looking for the animals in the dry season. They are always around the community forest all time grazing" (Yameriga Chief)

As compare to the non-beneficiary community that was survey, the Tindana and elders complained that the chance of their animals being stolen by people outside their communities is higher. They spend much time looking for their animals which wander around for food in the dry season. Some end up being stolen while others too loses their market value because they do not get enough fodder to feed.

3.3 IMPROVED DIET: WILD FRUITS AND ANIMALS (BUSH MEAT)

The study revealed that there is increased in availability and access to local wild foods such as fruits, nuts and wild animals such as rabbits and partridges in the beneficiary communities. The increase in the access leads to increase in access to diet which translate to increase in nutritional values for both children and grownups. The major cause of this achievement is due to the suppression of bushfires which allows mature fruit trees to bear fruit, and also serve as habitat for the wild animals. When the information was corroborated with WVG and district level MOFA, it was revealed that about 46% of the project beneficiaries observed that the FMNR practices have generated more wild fruits and food in the communities. The community members also expressed that there are more wild animals which are used for bush meat and improves household diet. The improved diet and income is also as a result of the project supplementing bush meat with breeder rabbits to some lead farmers.

"*Some wild animals that were almost extinct are returning in the forest. For some time now we have begun experiencing the return of wild animals such as partridge, birds, rabbits and mice. These animals are hunted for and used as food in the household as well as sold for additional household income in the family" (Yameriga chief).*

3.4 INCREASED ACCESS TO NATURAL RESOURCES SUCH AS CONSTRUCTION MATERIALS AND FIREWOOD

In the research area, over 95% of the households depend on fuelwood and charcoal for their household energy. Construction materials are also mainly local materials like rafter, grasses (for thatch) and wood for other building purposes. This study revealed that access to these materials improved in the beneficiary communities over the period. The firewood is gotten from the pruned branches while some of the matured branches are harvested for building or construction materials.

"We prune the trees and use the pruned branches for firewood. We also cut the dried branches on the trees and use them for firewood. Because we don't burn the forest too, the grasses are there all year round and they are much taller than before. We harvest those grasses and use them to roof our buildings. We also select and cut the matured branches and use them as rafters" (Yameriga Chief).

"In the past, we used to travel long distance to obtain grasses for thatch. These days we don't go far and get the grasses for the thatch. A lot of time is saved and we are able to do other activities other than using the whole day to search for the grass" (*Tongo-Beo Lead Farmers*).

This situation was different in the non-beneficiary community (Kaare). They still face the challenge of spending much time to look for rafters and grasses to roof their buildings.

"*We travel long distance to look for rafters and grasses to roof our buildings. One can spend the whole day searching for only two bundles of grass", (Kaare Tindana and elders).*

Corroborating this information with the WVG office and the MOFA district office revealed that FMNR beneficiary households harvest four times more rafters from their own fields, and twice as many harvest firewood from their own fields than the non-beneficiary communities in the project area.

3.5 PROTECTION FROM CLIMATIC EXTREME EVENTS LIKE STORM

Climatic extreme such as storm is very frequent and causes devastating effects to crops and lives. The severe winds can rip off the roof of buildings; cause wind erosion; level or push crops on the ground and even push down trees including economic trees. The community forest and the agroforestry practices on the farms serves as wind breaks and the consequence of the effects of storm have reduced in the project communities. The fire suppression has also increased the quantity of leaves on the farms which checks erosion when there is heavy rain.

"Previously there used to be heavy storm that carried away our crops and rip off our buildings. Though we still experience heavy storm, it doesn't affect our crops like before. The trees serve as wind breaks and reduces the effect on our lives. The time we used to spend on reworking on our roofs and buildings after storm is no more. Times are saved and use it on other activities including farming. Leaves of trees also prevent soil erosion. The leaves also serves as mulching and the land does not dry in time" (Yameriga Lead Farmers).

4.0 CONCLUSION AND IMPLICATION

Bridging autonomous adaptation with the planned approaches leads to higher commitment and therefore improves on outcomes that go a long way to strengthen the adaptive capacities of beneficiaries. The indigenous and planned approaches converged at various points and this has resulted in increased commitment in the implementation of the project leading to higher achievement in the outcomes of the project. Local adaptation approaches are relevant for food security and environmental protection and should be identified and incorporated in planned approaches. These findings imply that planned adaptation initiatives need to use consultative and participatory process to identify and mainstream context-relevant autonomous and indigenous knowledge and practices in order to achieve greater success and increase sustenance of outcomes.

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