

The Role of Local Level Institutional Arrangements in Climate Change Adaptation of Rural Dwellers in Northern Ghana

silas uwumborge takal

uds

TAHIRU ABDUL-WAHAB (✉ tahiru.abdulwahab21@uds.edu.gh)

uds

Research Article

Keywords: Climate Change, Institutions, Institutional Arrangements, Adaptation Strategies

Posted Date: August 3rd, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1919504/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Literature on the contribution of local level institutions to the development of collective response strategies to socio-ecological change is limited. In this article, the role of local-level institutional arrangements in developing and mobilising stocks of adaptive capacity is examined. Using Focus Group Discussion and Interviews, participants drawn from 7 communities in the Saboba district of Ghana were engaged on the local level institutional arrangements, their impacts on climate change adaptation and their effects on the climate change decision making of rural dwellers in the district. Using the qualitative content analysis technique to analyse the data, it was evident that local level institutional arrangements impacted the practise of adaptation strategies both negatively and positively. The positive impacts included serving as a channel for conflict resolution and mediation, source of security, and source of unity, and the negative impacts included the following: corrupt tendencies, loss of income, higher cost of production, decreased output, and high cost of shea nuts. The study also showed that the impacts of these institutional arrangements influenced climate change adaptation decisions making on: acquisition of land and trees; sharing of profits; and purchasing of shea nuts for processing into butter. The study concluded that institutional arrangements at the local level are critical for climate change adaptation, which is a key response mechanism for rural communities threatened by climate change impacts.

Introduction

Climate change has been identified as the leading human and environmental crisis of the 21st century (Malhi et al., 2020). It is a phenomenon that is currently posing a lot of development challenges to many countries worldwide (Borowski, 2020). These countries, many of which are in sub-Saharan Africa, continue to struggle in their development because their national economies are mainly supported by agricultural commodities, mostly food and non-food crops. Climate adaptation has become an important and urgent issue in recent global debate (Nightingale et al., 2020). In part, this can be attributed to the recognition that the climate system will undergo changes in the coming century regardless of reductions in greenhouse gas emissions, mainly due to the thermal inertia of the oceans and the long atmospheric lifetime of carbon dioxide and other greenhouse gases (Matthews and Caldeira, 2008). Certainly, in many parts of the world, these effects are already in play, with potentially disastrous consequences for the rural poor (Adger et al. 2009). The rural poor have faced climatic threats through the adaptation of strategies that are not climate-dependent that have evolved over time (Fan and Rue, 2020). Climate change adaptation is an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects that moderates harm or exploits beneficial opportunities (Parry et al., 2007). The adaptation process involves reducing the vulnerability of rural communities, regions, or activities to climate change and variability (Schipper, 2007). Climate change adaptation is therefore a key response mechanism for human settlements threatened by climate change impacts. Institutions, as social entities charged with directing and regulating social activity, have a crucial role to play in meeting this challenge (Dovers and Hezri, 2010). Institutions not only influence how households are affected by climate change; they also shape households' ability to respond to climate change and pursue various adaptation

practices; and they mediate the flow of external interventions in the context of adaptation (Agrawal, 2001). Rural institutions are crucial in shaping adaptation and its outcomes. Whether historically developed adaptation practises or strategies among the rural poor will be successful or not depends crucially on the nature of the prevailing formal and informal local institutions (Agrawal, 2001). Adaptation to climate change is highly local, and its effectiveness depends on local institutions through which incentives for individual and collective actions are structured and how these local-level institutions function (Agrawal, 2001). However, efforts to adapt to the impacts of climate change depend on the success of specific institutional arrangements because adaptation never occurs in an institutional vacuum (Agrawal, 2001). That is, climate change adaptation interventions in most climate-impacted areas often neglect the roles of local level institutional arrangements in helping rural dwellers to effectively respond to climate change impacts holistically and in a manner that will sustainably build their resilience and safeguard their livelihoods against inherent and potential climate impacts due to their vulnerability context and geographical location. Thus, local-level institutional arrangements often create a barrier that must be addressed in order to fully achieve climate change adaptation outcomes. Essentially, the fact that rural dwellers have been given climate change adaptation technologies, capacity building, or finance does not often lead to a reduction in vulnerability. This study is therefore designed to investigate the institutional roles in the adaptive strategies of rural dwellers in the Saboba District of Northern Ghana, in view of the socio-cultural differences in most African societies.

Conceptual Framework

When the livelihoods of the rural poor are impacted, they will make decisions that will help them respond to the impacts of climate change on their livelihood. The decision-making culminates in either adaptation or coping, with either of these impacting their livelihoods differently. While coping strategies are mostly reactionary, they are not mostly effective in reducing climate impacts on livelihoods. However, adaptation strategies are mostly fully planned interventions that result in long-term responses to addressing climate impacts. This is indicated in Fig. 1 by both solid arrowed lines (for adaptation) and broken arrowed lines (for coping). The option of adapting to the impacts of climate change on their livelihoods through technologies, capacity building, and finance will impact their livelihoods and reduce vulnerability. Adaptation will have major or the desired impacts on their livelihoods and reduce vulnerability because, from the framework of adaptation, it is done within the environment of governance (institutions). Climate change adaptation is therefore a key response mechanism for rural communities threatened by climate change impacts. As a means of adapting to climate change impacts, various strategies may be employed depending on the nature and scale of the threat, the spatial form, and the function of affected communities. The implementation of these strategies is done within the confines of institutions as a governance tool or rule, as shown in Fig. 1 below:

Methodology

Study area

The study was carried out in Saboba, in the Northern Region of Ghana. The study area included seven communities, namely: Kimuatiek, Kitiiek, Buagbaln, Sobiba, Tilangbelni, Kuwani, and Buakuln. The district lies between latitudes 240 N and 250 N, longitudes 270 E and 130 E, and covers a land area of approximately 1,100 square kilometres (Saboba District Assembly, 2010-2013). Saboba District has a population of 65,706, of which males constitute 49.2 percent and females represent 50.8 percent (GSS, 2014).

Primary Data

Primary data was collected through key informant interviews and focus group discussions (FGDs). Seven farming communities were selected from the Saboba District randomly. Each FGD was made up of ten community members. A total of seventy individuals were engaged in the FGD. Participants were put into two main groups across the study communities and the discussions were held on separate days. Participants were selected based on two criteria: being a resident of the study community and being above the age of nineteen. Key informant interviews (fourteen in all) were conducted with older people in the communities who could give further details on various institutional arrangements and also on the climate change adaptation strategies, their evolution and practises within the communities, and the linkages of the institutional arrangements to responses to climate impacts.

Data Analysis

Data analysis was done using the qualitative content analysis technique. This is a systematic and replicable technique that compresses many words into fewer content categories based on rules of coding. The interviews were transcribed from the recording device, and then the responses were coded for each area of questioning. The information was then reviewed and categorised into major thematic areas. After transferring and comparing the data, some new themes and sub-themes emerged.

Presentation Of Results

Socio-Demographic Characteristics of Participants of the Focus Group Discussions

Out of a total of seventy participants engaged, fifty (50) were female and twenty (20) were males. The study revealed that the main livelihood activity of the people across the seven communities where focus group discussions and key informant interviews were conducted was farming, though a few of them occasionally engaged in fishing. The people are engaged in the production of cereals such as maize, beans, millet, groundnuts, and also tubers such as yam, cassava, and sweet potato. Most of the participants involved were between the ages of thirty and fifty. Only a few were between the age ranges of 20–30 or above fifty. Forty-five (45) had no formal education, three (3) had senior high education, seven (7) had junior high education, and fifteen (15) of them had primary level education.

Climate Change Adaptation Strategies and Livelihood Activities

The strategies identified included charcoal burning, Shea nut processing, dry season farming, petty trading, bee keeping, animal rearing and fishing (oysters).

Institutions Identified in the Study Area

The research revealed that institutions such as Utindan (landlord), the chieftaincy, farmer-based organizations, youth groups, women's groups, and the family (both nuclear and external) govern the practises of these identified climate change adaptation strategies. Supporting formal institutions to the above informal institutions include the Ministry of Food and Agriculture (MoFA), the Saboba District Assembly, NADMO, and non-governmental organisations (NGOs) such as World Vision Ghana and the agricultural unit of the Evangelical Presbyterian Church, Ghana.

Existing Local Level Institutional Arrangements for the Implementation of Climate Change Adaptation Strategies:

These institutional arrangements differ with respect to each of the identified climate change adaptation strategies, and these are discussed as follows:

Institutional Arrangements for Dry Season Farming

The research revealed that the institutional arrangement for dry season farming depended on the type of land ownership prevailing in the study area. These were identified as family lands and community lands. The institutional arrangements are also different for migrants and indigenes.

Institutional arrangement for acquiring Family Land

It was revealed that for family land, the institutional arrangements were as follows: any person needing to use land that is for a family would have to first of all identify a piece of land along the river Oti, then contact a family member as the first point of call. The family member, on behalf of the land seeker, contacts the extended family head. The extended family head then calls an extended family meeting of all married men for them to decide on whether the family land should be given out to the person for dry season farming. The above description is the institutional arrangement for migrants. For indigenes, the prospective dry-season farmer only needs to contact his or her family head, who then calls a meeting of all married men for the land to be allocated to the person.

Institutional arrangement for acquiring Community lands

The study revealed that to acquire communal land for dry season farming, the main actors are the community members, the family head, the chief, and the Utindan (landlord). The prospective dry-season farmer contacts any community member and makes his or her intentions known to him or her. The

community member contacted then reports the issue to his or her family head. The family head also, on behalf of the land seeker, presents the request to the Utindan (landlord). The Utindan then invites the chief of the community for consultation and then convenes a meeting of himself, the chief and his elders. The result of the meeting is communicated to the prospective dry season farmer through the community member that was contacted. The above description is the arrangement for migrants. For indigenes, any family member wishing to do dry season farming contacts his family head. The family head also, on behalf of the land seeker, presents the request to the Utindan (landlord). The Utindan then consults the chief of the community and convenes a meeting of himself, the chief, and his elders. The actors involved are therefore the same for both indigenes and migrants. The arrangements are different for migrants because they are considered aliens and, as such, do not know the structure of the communities; hence the need to contact a community member for them to take them through the proper channels for land acquisition.

Impacts of the Institutional Arrangements on Dry Season Farming

The impacts of the above institutional arrangements were put into two main categories: positive and negative impacts.

Positive Impacts (benefits)

The positive impacts that were revealed during the focus group discussion include the following:

Source of security, Channel of Conflict Resolution, and Mediating Role The negative impacts of this institutional arrangement include the following: Corrupt Tendencies (Favouritism and Cronyism) in the Allocation of Land for Dry Season Farming; Vulnerability of Rural Dwellers to the Institutional Arrangement; Control Over Land and Land Limitation.

Effects of Institutional Arrangement on Decision-Making Regarding Dry Season Farming

The research revealed during the discussions that in instances of delay resulting from favouritism by the Utindan and the chief, the inhabitants in the study area acquired land through the help of a royal or a close relation of the chief or the Utindan. It was also revealed that there are elders who are respected by both the 'commoners' and the royals, and in situations of favouritism, they rely on those respected elders in the communities to intervene. It also came up during the discussion that if all this fails, they resort to going in for family lands since the landlord and the chief do not have direct influence on those lands. Though it is much easier to acquire family land compared to community land, the challenge with family land is that, due to large family sizes, one may only be able to acquire a very limited amount of land from a family. As a result of land limitation, the rural dwellers resorted to intensification of crops on a single plot.

Institutional Arrangement for Charcoal Burning

It was identified that there are two main ways of acquiring trees for this adaptation strategy depending on which tree or tree ownership is being practiced. These were identified as trees on family land and trees on communal lands. Therefore, the structure of the institutional arrangement depended on the location of the tree. This institutional arrangement varies depending on whether the prospective charcoal burner is an indigene or a migrant and also whether the tree to be felled was on the family land or on community land.

Institutional Arrangement for Trees on Family Lands for Charcoal Burning:

It was revealed that to acquire a tree on family land, the actors included the family head, the charcoal burner, and the married men of the family. The institutional arrangements are as follows: any person needing to fell a tree on family land needs to first of all identify a tree or trees and then proceed to contact a family member. The family member on behalf of the charcoal burner contacts the extended family head. The extended family head then summons an extended family meeting of all married men for them to decide whether the tree on the household land should be given out to the person for charcoal burning. The inhabitants revealed that the decision to give or not to give out the tree/trees for charcoal burning depended on the type of tree in question. For instance, under no circumstances should the household head give out a 'dawadawa' tree for charcoal burning. Food trees were not given for charcoal burning, but any other tree was allowed to be felled for charcoal burning.

Trees on Community Lands

To acquire a tree/s on communal land for charcoal burning, the main actors are the community members, the family head, the chief, and the Utindan (landlord). The prospective charcoal burner contacts any community member and makes his or her intention known to him or her. The community member contacted then reports the issue to his or her household head. The household head also, on behalf of the charcoal burner, presents the request to the Utindan (landlord). The Utindan then invites the chief for consultation and then proceeds to summon a meeting of himself, the chief, and his elders. The result of the meeting is then communicated to the prospective charcoal burner through the community member that was contacted. For an indigene, he or she will proceed to see his or her family head and the process continues as explained above.

Impacts of the Institutional Arrangement on Charcoal Burning:

The positive impacts included the following: source of security for the charcoal burner; and conflict resolution channel; while the negative impacts included the following: Corrupt Tendencies in the Allocation of Trees to Charcoal Burners.

Effects of the Institutional Arrangement on Decision-Making Regarding Charcoal Burning

Despite the positives, the rural dwellers agree across the seven communities that this institutional arrangement is impacting negatively on their charcoal-burning business. The research revealed during the discussions that with the issue of favouritism by the Utindan and the chief, the inhabitants in that situation acquire trees on communal lands through the intervention of other royals or close relations of

the chief or the Utindan. Though it is much easier to acquire trees on family land compared to trees on community land, the challenge with trees on family land is that, due to large family sizes, one may only be able to acquire a few trees for charcoal burning because some family members are also engaged in charcoal burning. It was also revealed that there were elders who were respected by both the 'commoners' and the royals, and they relied on those respected elders in the communities to intervene. The royals and the relations of the chief contacted are often seen as noble and respected by most people in the community and are people who do not demand money in order to intervene in such circumstances. It was also revealed during the discussion that if all this fails, they resort to going in for trees on family lands since the landlord and the chief do not have direct influence on those trees.

Institutional Arrangement for Shea nut procession

The processes included the following: the group leader calls a meeting where the women decide on the quantity of nuts to purchase and how much money each member will contribute. The group leader then appoints two women from among the group to purchase the nuts from the nut sellers who are from the republic of Togo and also from other inner communities within the district. When the nuts are purchased, the leader calls another meeting for the group members to decide on days for the processing of the nuts into butter. After the processing, the group leader appoints two other women to sell the butter and reports to the group leader.

Positive Impacts of Institutional arrangement on Shea nut procession

The formation of the group helps the women seek financial and logistical support from the Saboba district assembly and also NGOs. These NGOs mostly prefer to support groups other than individuals. World Vision Ghana for instance have always provided funds and organized training sessions for women groups in the study area. Negative Impact include the following: No Access to Shea Trees, Poor Attitude to Work.

Effects of Adaptation Decision–Making on Shea Nut Processing

The institutional arrangement for Shea nut processing is seen to be impacting negatively on Shea nut processing as an adaptation strategy despite it serving as a source of unity among them. Since the Shea nut trees are located in the Republic of Togo and in the inner communities within the district, they have been chased and prevented from picking the nuts by the Togolese authorities a number of times, and from other communities within the district. The women have therefore decided to purchase the nuts from the Togolese. Though the challenge of getting access to Shea nut trees has made this expensive to adapt, it is also beneficial in that the women groups often receive support from World Vision Ghana in the form of money to purchase Shea nuts for processing. The decision to purchase the nuts has helped them to continue with this adaptation strategy. On the challenge of poor attitude of members towards work, it came up during the discussion that they have decided to share the profits accruing from the sale of the butter not only based on their individual contribution but also on attendance, punctuality and seriousness to work, and this has helped them to hold on to the adaptation strategy despite the challenges.

Institutional Arrangement for Animal Rearing

The institutional processes included the family members adding their individual animals to that of the family head. The family head also negotiates the terms of agreement with the Fulani. Whatever terms that are arrived at are the product of the negotiation on proposals put forth by the Fulani herdsman and what the animal owners can afford. Most times the agreement is in the form of providing food and accommodation and or bearing the medical expenses for the Fulani man and the family. In some cases, also, the Fulani man is provided with accommodation, given a piece of land to farm to feed his family and are given a cow at the end of every five years. When the terms are agreed upon, the family head then engage the services of a Fulani man to take care of the animals. The family head then proceeds to inform the Utindan (landlord), who then also sermons the chief and his elders for the information to be disseminated to them.

Impacts of the Institutional Arrangement on Animal Rearing

Positive Impacts: Channel for Conflict Resolution between the Fulani Herdsmen and the Animal Owners, Source of Unity and Security for the Animal and Farm Owners. Negative Impacts: Loss of Animals.

Effects of Adaptation Decision-Making on Animal Rearing

The main challenges with animal rearing are the loss of cattle and the constant summoning of animal owners by farm owners for the destruction of their crops by the animals. From the Focus Group Discussions, they attribute the loss of the cattle to the Fulani herdsmen. With this, most of them have decided to leave the care of their cattle to their children, who are either supposed to be on the farm or in school. Those who still engage the services of Fulani herdsmen have normally held the Fulani herdsmen responsible for the loss of any of the animals. That is, a respective Fulani herdsman is made to pay for the lost animal. On the issue of constant summons at the chief's palace as a result of the destruction of crops by cattle, the animal owners share the fines imposed on them by the chief with the respective Fulani herdsman.

Discussion Of Results

Existing Institutional Arrangements for Climate Change Adaptation

Aryal et al. (2020) defined climate change adaptation as the adjustment in human or natural systems to actual or anticipated weather changes. In the study, rural residents also adjusted to climatic changes by implementing the following climate change adaptation strategies: Dry season farming, charcoal burning, shea nut processing, and animal rearing. These adaptation strategies are common and have been practised across the study area as livelihood activities. It was revealed through key informant interviews that the frequency and extent of practised now was as a result of agricultural stresses. Based on the evidence gathered from the interviews conducted with key informants across all the seven communities,

it implied that in times past, the practise of these strategies was minimal when the weather favoured the rural dwellers and when they harvested enough food to meet the needs of their families all year round. With shorter rainy seasons, prolonged droughts, and constant flooding when it rains, farming, as a major livelihood of the people in the study area, is disrupted. Rural dwellers have therefore intensified the practise of these strategies because they are not directly climate-dependent. According to Agrawal (2008), climate impacts affect disadvantaged social groups more disproportionately, and those local institutions centrally influence how different social groups gain access to and are able to use assets and resources. This statement by Agrawal (2008) implies that all adaptation practises in any geographical location depend for their success on specific institutional arrangements. From the Focus Group Discussions (FGDs) and key informant interviews conducted, the study found out that different adaptation strategies are governed by different institutional arrangements. The research identified four major climate change adaptation strategies that are intensively practised across the seven communities. This included charcoal burning, dry-season farming, animal rearing, and shea nut processing into butter, which were governed by different institutional arrangements. The main actors responsible for these adaptation strategies included the family, chiefs and their elders, women's groups, farmer groups, and the Utindan, which are broadly classified as civic informal institutions by Uphoff and Buck (2006). Different institutional arrangements govern different adaptation practices, though the actors involved may be the same because different adaptation practises require different regulations and different natural resource bases that are required for effective execution of these adaptation practices. Different types of regulatory mechanisms exist at both the family level and the community level. Sanctions for offenders are meted out by the respective family heads in the case of dry season farming. Also, during the dry season, farming taking place on the communal land is regulated by the Utindan in consultation with the chief and his elders. Charcoal burning is also regulated either by the community or the family. The issuance of trees on community land for charcoal burning is sanctioned by the community leadership, while the issuance of trees on family land is carried out by the family head. Also, each adaptation strategy requires a different set of resources for effective execution or practice, and this confirms the assertion by Agrawal (2008) that institutions act as the means of delivery of resources to facilitate adaptation and thus govern access to such resources. In the study area, the resource needed for dry season farming was land, and the institutions responsible for the delivery of this resource were the Utindan, the chief and his council of elders, and family heads. For charcoal burning also, the natural resource required was trees, and the institutions responsible for its delivery were the Utindan, the chief and his elders, and also family heads. In the case of the Shea nut procession, the resource needed was shea nuts, and the women's groups regulated the delivery of the nuts. The availability of a particular resource for an adaptation strategy depended on the ownership, which was directly linked to the type of institution. The ownership was either that of the community or the family. Access to natural resources was gained through these different institutional arrangements. Therefore, the type of institutional arrangement depends on the type of adaptation strategy and the type of resources required.

Impacts of Institutional Arrangement on Effective Climate Change Adaptation:

Positive Impacts

The positive impacts of the institutional arrangements that were revealed from the Focus Group Discussions were that the institutional arrangements serve as sources of security for their practices and as a channel for conflict resolution and mediation. For instance, dry season farming is done in the dry season, which is also the time when people leave their animals to move and graze about freely. These animals pose a potential threat to these dry-season gardens and hence a threat to the capacity of the rural dwellers to adapt to the impacts of climate change. The farmers have their farms secured under these arrangements because they have formally acquired the plots on which their farms are situated. The farmers, therefore, have every right to summon any animal owner who has allowed his animals to destroy a farmer's garden before the Utindan and the chief for compensation. The Utindan and the chief normally take such summons very seriously because they were involved in the allocation of the plots to the dry season farmers. In order to ensure that the farmers are duly compensated for losses incurred, the arrested animals are detained in the chief's palace until the compensation is paid to the respective farmer. The institutional arrangements serve as channels for conflict resolution among the rural dwellers. The research revealed that conflicts usually arise between the various farmers as a result of the scramble for land. Since the various institutional arrangements are made up of actors, and these actors interact with each other in the quest to adapt to climate change impacts, the tendency for conflict issues to arise is eminent. The research also found three forms of conflicts that usually arise: farmer-wildlife or livestock conflicts that occur when wildlife or livestock invade farms for fodder or to access water resources since dry season farms are located along the river Oti; farmer-pastoralist or Fulani conflicts that occur when livestock destroy crops while trying to access watering points; and land contestation, which occurs when two or more farmers quarrel over the true boundaries of plots allocated to them. This agrees with the work done by Ngaruiya and Scheffran (2016) on actors and networks in resource conflict resolution under climate change in rural Kenya. They identified farmer-livestock and farmer-pastoralist conflicts as a result of the interactions between the multiple actors in gaining access and using natural resources, especially land and water. These conflicts are resolved by these institutional arrangements. The major institutions responsible for resolving these conflicts in the study area are the Utindan, the chief and his council. The actors involved in the institutional arrangement for resolving these conflicts disagree with the quasi-formal conflict resolution plan, which comprises the local chief, elders, agricultural extension officer, and police identified in rural Kenya in the work done by Ngaruiya and Scheffran (2016). The difference between the two arrangements is that the quasi-formal conflict resolution plan in rural Kenya involved formal state actors such as the police to enforce the payment of compensation, while the arrangement in the study area was constituted entirely by informal actors. This finding means that institutions have inbuilt conflict resolution mechanisms that resolve conflicts that may arise from the interactions between institutional actors. Resolving conflicts promptly among the adaptation practitioners ensures that losses incurred while adapting are minimised and this enhances their chances of making more gains to supplement what they make from their major livelihood activity, which is farming. This improves their ability to adapt to agricultural stresses caused by climate change.

Negative impacts

According to Batiran and Salim (2020), institutions reinforce the difficulties relative newcomers face in gaining access to natural resources such as land. In the study area, these impacts were produced as a result of the institutional constraints on access to natural resources such as land and trees for effective execution of climate change adaptation strategies. The research revealed that the institutional arrangements also impacted negatively on the climate change adaptation strategies of rural dwellers in the study area, and this was as a result of the institutional constraints on access to natural resources. The negative impacts revealed included corrupt tendencies such as favouritism and cronyism in the allocation of land and trees, and also the vulnerability of women, especially widows. It was found that the various institutional arrangements favoured some people in society more than others. The study revealed that the institutional arrangements governing all the climate change adaptation strategies in the study area seem to favour some individuals, especially when it comes to communal lands. The royals were more favoured by the institutional arrangement by virtue of their status in the communities compared to non-royals. For instance, it was cited that a close relative of either the chief or the Utindan was most likely to go through these institutional arrangements more smoothly and quickly. By virtue of their status in the communities, the royals are entitled to certain privileges that are not available to the non-royals; the institutional arrangements still favoured them when it came to acquiring land that was available to all of them. For instance, farming around sacred grooves is the preserve of only the royals. This reduces the ability of the non-royals to properly adapt to the impacts of climate change. Direct family relations were some of the reasons for the institutions favouring some people to the detriment of others concerning access to communal lands, especially. It explains why royals were more favoured when it came to access to communal lands. The institutional arrangements also favoured men compared to women in the study area. This is because women are not involved in decision-making on key natural resources such as land. In the study area, the traditional set-up frowns on women partaking in decision-making concerning land. This confirms the findings made by Sagre Bambangi and Abdulai Abubakari (2013) on the ownership and access to land in urban Mamprugu in the Northern region of Ghana that women are less favoured compared to their male counterparts due to the patrilineal system of inheritance practised in the Northern part of Ghana. The research also revealed that some social groups were made vulnerable by these institutional arrangements. Women, most especially widows, were made more vulnerable by these institutional arrangements. Their vulnerability arose from the fact that they had no direct access to land except through their husbands, or in the case of a widow, any surviving married male in the family or a male child. Due to the patrilineal system of inheritance, a woman who acquired land before the death of her husband retains the land only through her male children or any surviving male in the extended family after the death of her husband. This means that their ability to get land for dry season farming, for example, depended on the willingness of their husbands to approach or contact the chief or the Utindan for communal land. It is all because of the exclusion of women from decision-making concerning natural resources such as land in the northern parts of Ghana. As confirmed by Sagre Bambangi and Abdulai Abubakari (2013), land in the northern parts of Ghana is primarily owned by the Utindan (a traditional priest chosen from the original settlers of the communities) and administered by the chief and his elders. Land is also owned by families, which is also administered by family heads. In the case of the women's group engaged in the processing of shea nuts into butter, their main vulnerability was the fact that they

had no access to the shea nut trees. This was mainly because the trees are located in the communities inland and also in the Republic of Togo across the Oti River. This means that the resource is outside the territory of Ghana and access is therefore restricted. The Shea nut trees were absent on the Ghana side of the river Oti because the research found that the Ghana side of the river is low-lying and often gets flooded during the rainy season. Shea nut trees are proven to grow well in drier soils but cannot thrive in areas that are often flooded. The findings about the absence of shea trees in flood prone areas along the river Oti agree with the findings made by Boffa (2015) in the work done on the opportunities and challenges in the improvement of the shea resource and its management, which suggest that shea trees occur in wetter conditions but not as often and for as prolonged as they are out-competed. This suggests that shea trees may not thrive well in areas that are often flooded, like the area along the river Oti in the study area. The women had only the option of buying the nuts from pickers from Togo and also from inland communities. Their vulnerability is as a result of the fact that they have no control over the Shea nut trees and, by extension, Shea nuts, and so their ability to practise their adaptation strategy depends solely on nut pickers from the Republic of Togo and also from communities inland. Despite the difficulty in obtaining Shea nut trees, this adaptation practise is still widely practised among women's groups. The reason was that the women's groups enjoyed support from Word Vision Ghana in the form of training, provision of logistics and also funds to purchase the nuts.

Effects of the Institutional Arrangement on Adaptation Decision-Making

Institutions, according to Adger et al. (2009), are one of the major barriers to climate change adaptation and, as such, influence decision making. The impact of institutional arrangements on climate change adaptation strategies triggers decision-making. These decisions were either taken individually or in a group. In the study area, climate change adaptation decisions were made collectively by the women's groups involved in shea nut processing into butter. The decisions made with regard to how best to gain access to trees and nuts for effective practise of the adaptation strategy were made. However, decision-making was based on the particular adaptation strategy. For instance, the women group involved in the processing of shea nuts into butter took the decision to contribute money in order to purchase the nuts from the Republic of Togo because the nuts were outside of the territorial jurisdiction of the group. The institutional arrangement governing this adaptation strategy could not guarantee access to Shea nut trees in the Republic of Togo and in inland communities, hence their resolve to put resources together in order to sustain this climate change adaptation strategy, which they all agreed was beneficial to the women group. The other institutional impact was identified as the poor attitude of members of the women's group towards work. This impact also triggered decision-making. The women usually shared the profits accrued from their activities based on the contributions of each member. It came up during the discussion that, because of the challenge of poor attitude to work, they have decided to share the profits accruing from the sale of the butter not only based on their individual contribution but also on

attendance, punctuality, and seriousness to work. The decision to purchase nuts for the procession has helped the women's group proceed with this particular climate change adaptation strategy.

The institutional impact of favouritism by the Utindan and the chief in the issuance of trees on the community land has prompted the charcoal burners to make decisions. They engage other royals to intervene in order for them to help in gaining access to trees for their business. Money is involved in engaging other royals in gaining access to trees. The continued involvement of other royals lengthens the process and could lead to other complexities in gaining access to natural resources such as trees and land for climate change adaptation in the future. This decision has also helped the rural dwellers acquire trees on community lands to carry out their climate change adaptation strategy. The dry season farmers also seek the intervention of the royals in order to get access to community lands to enhance their adaptation practises.

In animal rearing, the rural dwellers were compelled to take the decision to pass on the cost of a lost animal to the Fulani herdsman concerned. This decision is meant to reduce the incidence of animal loss in the study area.

Conclusions

Climate change adaptation is a key response mechanism for rural communities threatened by climate change impacts. As a means of adapting to climate change impacts, various strategies may be employed depending on the nature and scale of the threat, the spatial form, and the function of affected communities. The implementation of these strategies is done within the confines of institutions as a governance tool. The study identified dry season farming, charcoal burning, animal rearing, and shea nut processing into butter as the main adaptation strategies in the study area. All these adaptation strategies were governed by different traditional institutional arrangements. The institutional arrangements impacted the climate change adaptation strategies as a result of the interactions between the institutional actors. The impacts were either positive or negative. The source of security, the channel for conflict resolution and mediation, and the source of unity in communities were some of the positive impacts of the institutional arrangements on climate change adaptation strategies in the study area. Favouritism, cronyism and other corrupt tendencies in the allocation of land and trees, vulnerability of women, especially widows, and land limitation were some of the negative impacts of traditional institutional arrangements on climate change adaptation strategies in the study area.

The above-mentioned institutional arrangements had an impact on rural residents' climate change adaptation decision-making. The decisions made included purchasing Shea nuts by women groups involved in Shea nut processing into butter; sharing proceeds based not only on contributions but also on seriousness to work and punctuality; involving royals and other respected elders in the communities in land and tree acquisition; acquiring trees on family lands rather than trees on community lands. These decisions are carried out either collectively or individually. The decisions made were also in response to

the impact or barriers imposed by these institutional arrangements on access to resources needed for the effective execution of the climate change adaptation strategies.

Recommendations

It is recommended that the supporting institutions in the study area, that is, the Ministry of Food and Agriculture (MoFA), the Saboba District Assembly, NADMO, and civil society organisations such as World Vision Ghana and the Agricultural Unit of the Evangelical Presbyterian Church, Ghana, be well resourced by the state of Ghana to properly provide financial, consultation, and logistical support to the traditional institutional arrangements. The supporting institutions should be empowered through by-laws by the Saboba district assembly to play a mediation role in traditional institutional arrangements. In this sense, they will be able to mediate when rural residents face difficulties acquiring or gaining access to natural resources required for the effective implementation of their climate change adaptation practices. It is also recommended that migrant elders who have stayed in the study area for a long time be made part of the decision-makers of the communities. These elderly people should be made a part of the chief's council so that they can also champion the views of the migrants in the study area concerning land and its acquisition. It is recommended that further research be conducted into how institutional arrangements increase a social group's vulnerability to climate change. The youth and women should also be allowed to be part of deliberations on issues concerning land. The young and women are those who are mostly engaged in the practise of these adaptation strategies and, as a result, should be part of the decision-making process concerning land. This will give them direct access to land for the affective practise of these adaptation strategies.

Family heads from each of the extended families should also be part of the chief's council to reduce the incidence of favouritism, cronyism, and corrupt tendencies in the issuance of communal lands for effective practise of climate change adaptation practices.

Declarations

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Adger WN, Dessai S, Goulden M, Hulme M, Lorenzoni I, Nelson DR, Naess, L.O, Wolf J, Wreford A (2009). 'Are there social limits to adaptation to climate change?' *Climatic Change*, vol. 93, pp 335–354.
2. Adger, N.W. (2003) *Adaptation to climate change in the developing world. Progress in Development Studies*, 3(3) Pp.179–195.
3. Agrawal, A. (2008). *The role of local institutions in adaptation to climate change. International Forestry Research and Institutions Program (IFRI) Working Paper*, pp 8–10
4. Agrawal, A. (2001). *Common Property Institutions and Sustainable Governance of Resources. World Development* 29(10): 1649–72
5. Aryal, J. P., Sapkota, T. B., Khurana, R., Khatri-Chhetri, A., Rahut, D. B., and Jat, M. L. (2020). *Climate change and agriculture in south asia: Adaptation options in smallholder production systems. Environment, Development and Sustainability*, 22(6):5045–5075.
6. Batiran, K. and Salim, I. (2020). *A tale of two kewangs: A comparative study of traditional institutions and their effect on conservation in maluku. Forest and Society*, 4(1):81–97.
7. Boffa, J.M. (2015) *Opportunities and challenges in the improvement of the Shea resource and its management, Global Shea Alliance, World Agroforestry Centre. Pp 37*
8. Borowski, P. F. (2020). *Nexus between water, energy, food and climate change as challenges facing the modern global, european and polish economy. AIMS Geosci*, 6:397–421.
9. Dovers, S. and Hezri, A. (2010) 'Institutions and policy processes: the means to the ends of adaptation,' *Wiley Interdisciplinary Reviews: Climate Change*, Vol. 1: 212–231
10. Francis. (2002) *Rural livelihood, Institutions and Vulnerability in South Africa; Working paper series: Development Destin Studies Institute. pp 4–7.*
11. Fan, S. and Rue, C. (2020). *The role of smallholder farms in a changing world. In The role of smallholder farms in food and nutrition security, pages 13–28.*
12. *Ghana Policy Journal* (2013) *Ghana National Climate Change Policy. Ministry of Environment, Science, Technology and Innovation, Accra. Pp 21*
13. *Ghana Statistical Service* (2014). *Saboba District Analytical Report, Accra, Ghana. pp 1–3*
14. Grace.W. Ngaruiya, Jurgen Scheffran (2016) *Actors and Networks in Resource Conflict Resolution under Climate Change in rural Kenya; Earth Systems Dynamics. pp7-8.*
15. IPCC (2001) *Climate Change Synthesis Report: Third Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press. Pp 4–7*
16. Ivey, J. L., J. Smithers, R. C. de Loe, and R. D. Kreutzwiser (2004) *Community capacity for adaptation to climate-induced water shortages: Linking institutional complexity and local actors. Environmental Management* 33(1): pp36-47
17. Leichenko, R. M. and K. L. O'Brien (2002) *The Dynamics of Rural vulnerability to Global Change: The case of Southern Africa. Mitigation and Adaptation Strategies for Global Change*.7 (1) Pp.1–18.

18. Matthews, H. D. and Caldeira, K., (2008). Stabilizing climate requires near-zero emissions. *Geophysical Research Letters*, pp35
19. Mortimore, M. and W. M. Adams (2001). Farmer adaptation, change, and crisis in the Sahel. *Global Environmental Change* 11: 49–57
20. Neuendorf, K. A (2011) *The content analysis guidebook*. Thousand oaks CA: Sage pp-10
21. North, D. C. (1990) *Institutions, Institutional Change and Economic Performance*, Cambridge: Cambridge University Press. Pp 9
22. Nightingale, A. J., Eriksen, S., Taylor, M., Forsyth, T., Pelling, M., Newsham, A., Boyd, E., Brown, K., Harvey, B., Jones, L., et al. (2020). Beyond technical fixes: Climate solutions and the great derangement. *Climate and Development*, 12(4):343–352.
23. Parry, M., Arnell, N., Berry, P., Dodman, D., Fankhauser, S., Hope, C., Kovats, S., Nicholls, R., Satterthwaite, D., Tiffin, R. and Wheeler, T., (2007) *Climate Change Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge: Cambridge University Press.
24. Saboba District Assembly (2010): *Saboba Medium-Term Development Plan (2010–2013)*. Saboba, Northern Region. PP. 10
25. Sagre Bembang, and Abdulai A, (2013) Ownership and Access to land in Urban Mamprugu, Northern Ghana, *International Journal of Research in social sciences*; vol 2 pp 7–8.
26. Schipper, E. L. F. (2007) *Climate Change Adaptation and Development: Exploring the Linkages*, University of East Anglia: Tyndall Centre for Climate Change Research, pp 7–10
27. Springer, Cham. Malhi, Y., Franklin, J., Seddon, N., Solan, M., Turner, M. G., Field, C. B., and Knowlton, N. (2020). *Climate change and ecosystems: Threats, opportunities and solutions*.
28. Uphoff, N., L. Buck. (2006). Strengthening rural local institutional capacities for sustainable livelihoods and equitable development. Paper prepared for the Social Development Department of the World Bank.
29. Weber, R.P (1990) *Basic Content Analysis*. Newbury Park, CA: Sage pp 3–8.
30. World Commission on Environment and Development (1987) *Our Common Future*; Oxford University Press: New York, USA, pp 20–22

Study Area Map

The study area map is available in the Supplementary Files section.

Figures

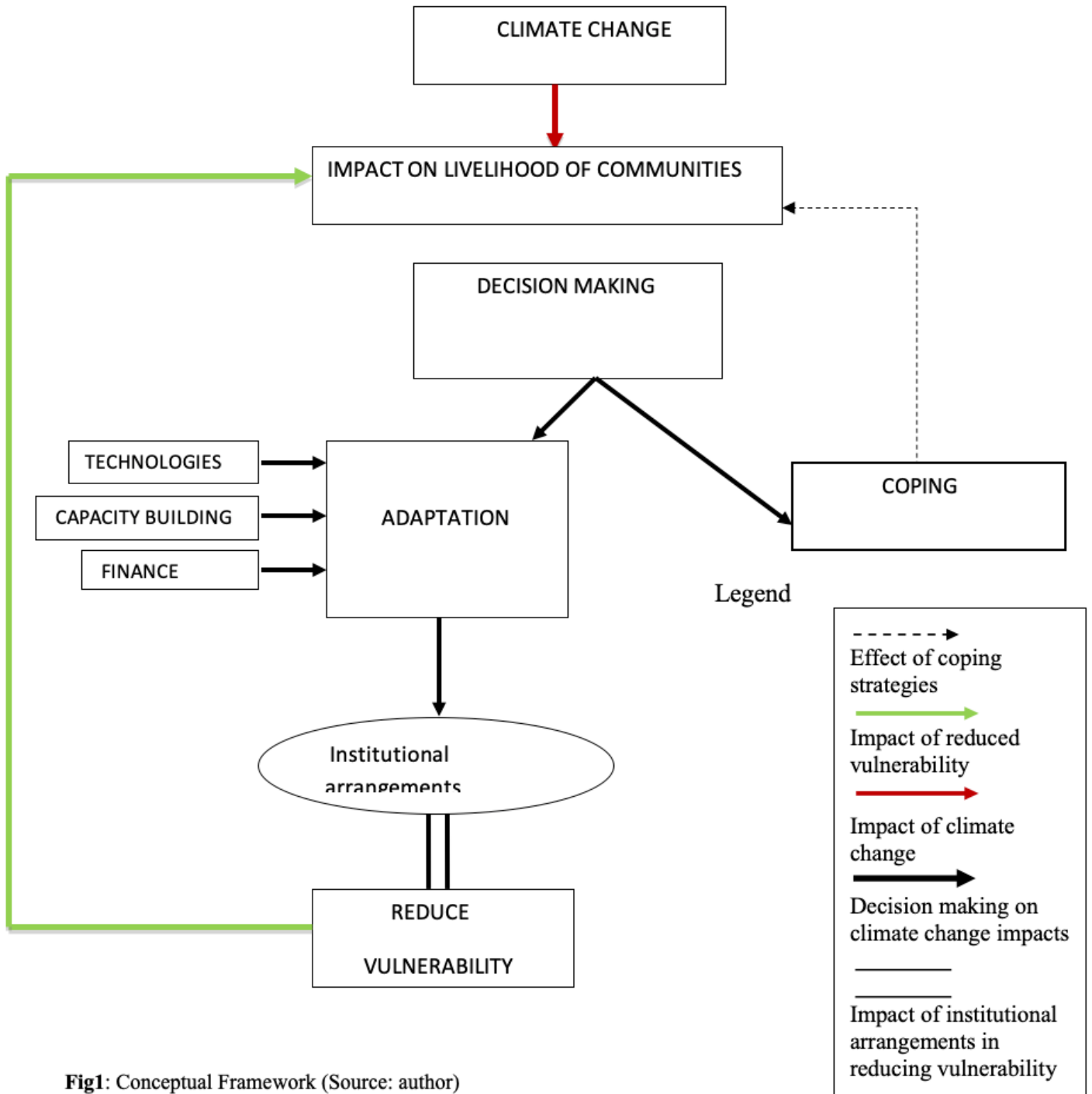


Fig1: Conceptual Framework (Source: author)

Figure 1

Conceptual Framework (Source: author)

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Map.png](#)

