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LOCAL PEOPLES' PERCEPTION OF CONFLICT CAUSES, EFFECTS AND COPING STRATEGIES ACROSS FOREST REGIMES IN GHANA: IMPLICATION FOR MICRO-LEVEL GOVERNANCE

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ABSTRACT

Conflicts over the use, control and management of forest and tree resources are prevalent in the forested landscape of Ghana. These conflicts undermine sustainable forest management as they destroy the resource base, threaten food security and thwart efforts towards poverty alleviation especially in forest fringe communities. This study explored forest and tree resources conflicts in terms of causes, effects and coping strategies across the protection, production and plantation regimes in the Tano-Offin Forest Reserve from local people's perspectives and ascertain the implication for micro-level governance. The study is based on document analysis, community meetings, semi-structured questionnaire survey among 212 inhabitants of Chirayaso and Kunsu Nyamebekyere No. 3, and 137 inhabitants out of the 212 respondents in the same villages bordering the plantation and production regimes respectively in the Tano-Offin Forest Reserve. With respect to the protection regime, the survey was conducted among 119 inhabitants living in the middle of a globally significant biodiversity area (GSBA). The findings revealed that the three regimes do have diverse actors governed by different laws and strategies, however whilst some actors in the plantations and production regimes do benefit from forest resources, none of these are experienced by inhabitants in and around the protection regime. Secondly, the study revealed that local people do indeed access forest resources to meet their subsistence and commercial needs however most of these resources are done illegally against the prevailing laws. Furthermore, the application of Pareto analysis identified seven key factors that cause forest conflicts at the micro-level in terms of their frequency of occurrence which calls for policy and research consideration. Lastly, several coping strategies were seen to be employed to minimise conflict incidences. However effectiveness was attributed to the actions and inactions of the conflict parties, the conflict management third parties as well as the intensity of the conflict. The paper therefore concludes with recommendations ranging from exploring quality tools to unearth natural resources conflict causes to ensuring equitable benefit sharing to include inhabitants at the protection regime.

Key words: *Conflict, Quality tools, Local people, Micro-level governance, Conflict management, Forest regimes*

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ACROYNMS

CBAGS	Community Biodiversity Advisory Groups
CFCs	Community Forest Committee
FAO	United Nations Food and Agriculture Organization
FC	Forestry Commission
FSD	Forest Services Division
FVS	Fire Volunteer Squad
GPS	Ghana Police Services
GSBA	Globally Significant Biodiversity Area
HFZ	High Forest Zone
IUCN	International Union for Conservation of Nature
LI	Legislative Instrument
MTS	Modified Taungya System
NGOs	Non-governmental organisations
NRM	Natural Resource Management
NTFPS	Non-timber Forest Products
OASL	Office of Administration of Stool lands
RUDEYA	Rural Development Youth Association
SRA	Social Responsibility Agreement
SPSS	Statistical Package for Social Sciences
TBI	Tropenbos International Ghana
TUC	Timber Utilization Contract
TUP	Timber Utilization Permit
UENR	University of Energy and Natural Resources
UNU-INRA	United Nations University-Institute of Natural Resources in Africa
UvA-AISSR	University of Amsterdam-Amsterdam Institute for Social Science Research
VPA	Voluntary Partnership Agreement

INTRODUCTION

1.1 Background of the Study

Forest governance reforms have emerged to curtail the fast rate of deforestation, forest degradation and desertification in many countries. These have facilitated the global environmental governance debate of which Ghana is not exempted because such debates often do have great impacts (both negative and positive) on national governance processes. Within Ghana's forest sector, governance is among the key issues at the pivot of the nation's development agenda (Derkyi et al., 2012). However, widespread conflicts over forest and tree resources undermine these attempts to ensure good forest governance and sustainable forest management (SFM), as well as improving livelihoods (Ostrom, 1999; Yasmi, 2007). Conflicts over the use, control and management of forest and tree resources are prevalent in the forested landscape of Ghana. These conflicts undermine sustainable forest management as they destroy the resource base, threaten food security and thwart the efforts towards poverty alleviation especially in forest fringe communities. Sometimes, the effects of these conflicts result in injuries and even deaths as often seen in timber related conflicts (Derkyi, 2012). In practice, the assertion that forest resources contribute to the livelihoods of 90% of the 1.2 billon people living on less than one dollar a day or play important role in forest rural livelihoods in Ghana could be justified if the mode of access (legal and illegal) of these resources are factored into such analysis since illegal access plays an important but not exclusive role in these conflicts.

Some conflict incidences have been reported to influence policy reform, equality and equity in resource distribution, as well as strengthen social cohesion indicating the constructive nature while others are destructive in nature (Castro and Nielsen, 2001; Hirschman, 1994). There are also scholars who perceive conflict to have both negative and positive impacts. According to Deutsch and Coleman (2000) and Kriesberg (1998), conflict is neither good nor bad. Rather it is the way in which it is handled which determines its constructiveness or destructiveness. Natural resources conflicts such as forest conflicts have multiple and interdependent causes or drivers which could

further be unbundled as manifest behaviour or antecedent or underlying conditions. From the global perspective, some authors have indicated drivers such as vague policy directions, institutional failure, competition between different land uses, and poverty (Tyler, 1999; Ostrom, 1999) as the key elements of conflicts over renewable natural resources. Other factors include tenure insecurity, greed, corruption and weak law enforcement (Contreras–Hermosilla, 2001; Kaimowitz, 2003). Local level forest conflicts context, are often driven by manifest behaviour such as need and greed for timber, non-timber forest products (NTFPs) as well as forestland for farming activities, with antecedent conditions being poverty, limited livelihood options and a scarcity of farming land (Derkyi, 2012). In terms of dynamics, forest conflicts can be violent or non-violent disagreements or confrontations over the ownership of or access to land or the resource benefits, however Derkyi (2012) observed that non-violent forest and tree related conflicts occurred more than violent conflicts at the community level in protection, production and plantation forest regimes.

Conflicts therefore become inevitable, with institutions, mechanisms and competence to manage them being either weak or absent. These hamper forest governance processes, and present challenges to multiple actors at the different levels of scale diverging and conflicting interests. Forest managers therefore face difficult choices when it comes to creating an enabling governance environment for Sustainable Forest Management (SFM) and ensuring an equitable distribution of resources for diverse actors especially the poor whose livelihood source is dependent on the forest and its resources. Over the past decades, co-management concept has gained recognition in both theory and practice in natural resources management (Borrini-Feyerabend et al., 2000; Carlsson and Berkes, 2005) with the central tenet being a partnership between two or more different actors, most often between state and non-state actors. In this partnership, the different actors negotiate, define and guarantee amongst themselves an equitable sharing of management functions, power, entitlements, decision making and benefits (McCay and Acheson, 1987; Berkes et al., 1991). This partnership has often been associated with conflicts management among resource users and /or between users and managers (Pomeroy and Berkes, 1997; Sen and Nielsen, 1996). However, in practice such partnership if not well guided rather results in

conflicts between/among partners emerging from control of or allocation or use rights. In Ghana's forest sector, the Modified Taungya System (MTS) introduced in 2001 is co-management arrangement between the Forestry Commission (FC) and forest fringe communities with the aim of reforestation of degraded forest reserves with the ultimate objectives being sustainable forest management and poverty reduction.

1.2 Study objectives

Most conflict research aims at describing and analysing conflicts case by case. For instance, in analysing the forest over tree and resources causes, effects and coping strategies at micro-level, Derkyi (2012) conducted a case by case analysis of these variables among the local people living in and around the Tano-Offin Forest Reserve without analysing these variables across the three regimes.

In order to identify common patterns and differences in terms of conflict causes, effects and coping strategies, this study aims to analyse the aforementioned variables across the three regimes (i.e. protection, plantation and production) and ascertain their implications on forest governance in Ghana's High Forest Zone (HFZ).

The study is underpinned by three assumptions. The first is that restricted access to, control of and allocation of forest and tree resources in view of prevailing governing systems lead to increased forest and tree conflicts and that such conflicts compromise SFM and livelihoods. Second, the application of quality tools such as fishbone diagram, Pareto analysis and affinity diagram offer insight in understanding the drivers or causes of conflicts at the micro-level from quality management perspective. Third, positioning conflict management strategies employed by local people in Moore's conflict management continuum depicts common and unique conflict management strategies across different conflict types and those peculiar to some conflict types.

Against this background, the overall objective of this paper is to explore the forest and tree resources conflicts in terms of causes, effects and coping strategies across the three forest regimes (protection, production and plantation) in the Tano-Offin Forest Reserve from local people's perspectives and ascertain the implication for micro-level governance.

1.3 Research Questions

Based on the above objective the following research questions emerge:

1. What governing systems prevail and how do they influence the three regimes?
2. What are the socio-economic characteristics of the inhabitants and how do forest and tree resources contribute to their livelihoods?
3. How do quality tools help our understanding of the causes of forest and tree-related conflicts in the three regimes and what are the effects?
4. What coping strategies prevail and how is their level of effectiveness?
5. What mechanisms are needed to manage forest conflicts to ensure SFM and implications of the findings for micro-level governance?

1.4 Organisation of the Study

This paper is structured into six (6) sections. Section 1 presents the introduction and highlights the overall objective and research questions. Section 2 provides the theoretical focus of the study whiles Section 3 touches on the methodology. Section 4 is the study results which elaborate the governing system from legislation and institutional perspectives and respondents' socio-economic characteristics and dependence on forest and tree resources. The section further highlights the causes of conflicts as perceived by the local people using quality tools namely the Fishbone diagram, Pareto analysis and Affinity diagram. It also delves further into the effects and coping strategies and their effectiveness as well as strategies to minimise these conflicts. Section 5 discusses the findings and assesses the implications of the outcomes on micro-level governance. The section (6) ends with a conclusion and recommendations.

LITERATURE REVIEW

In this section, three strands of literature are discussed, these are forest and tree resources, conflict and conflict management, micro-level governance complemented by quality analytical tools to unbundle conflict causes.

2.1 Forest and tree resources as livelihoods for local people

Ellis (1998: 4) defines livelihood as 'the process by which rural families construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living'. This definition corroborates the World Bank (2004: 1) assertion that forest resources contribute to the livelihoods of 90% of the 1.2 billon people who live on less than one US$ a day. These people depend fully or partly on these resources to meet their daily subsistence and commercial needs. This dependence is not only tangible in terms of economic resource but as environmental, social and cultural resource (Hellström, 2001). In view of the multifaceted benefits of forest resources to people, Sunderlin et al. (2005) mentioned five ways in which these resources play in the livelihoods of people.

First, forests are an important source of maintaining agriculture, both directly as a source of farming land (i.e. shifting cultivation) and indirectly through soil formation and securing water supplies.

Second, timber resources are a major source of revenue for those working in the timber industry and for the country as a whole. In the context of Ghana, Marfo (2010: xi and 2) asserted that forests create about 100,000 jobs through direct employment in the legal timber industry and an estimated 130,000 jobs in chainsaw milling.

Third, non-timber forest products (NTFPs) such as food items, medicinal plants, bush meat, forage and fibre though often regarded as 'safety net' play an important socio-economic role in most local communities, not only for subsistence and commercial purposes, but also for their cultural and spiritual values. Unfortunately in most countries like Ghana, there is absence of aggregate data on the economic contributions of NTFPs at the micro-level.

The fourth way forest resources contribute to livelihoods is through environmental services which support farming and agroforestry systems (such as soil formation and securing water supplies as mentioned above).

Finally, Sunderlin et al. (2005) mentioned a number of indirect livelihood benefits, such as the boosting of local markets due to the presence of a logging workforce and the creation of a road network which facilitates access to markets, health services and education. Despite their importance as sources of livelihood, access, allocation and management of forest resources also create challenges associated with illicit uses, restricted access, an unfavourable governing system and competing claims that undermine their importance to forest (Derkyi, 2012).

2.2 Forest and tree resources conflicts and conflict management strategies

From organisational management perspective, Pondy (1967: 299) asserted that conflict can be readily understood if it is considered to be a dynamic process. The reason being that conflict relationships between two or more individuals in an organisation can be analysed as a sequence of conflict episodes. Each conflict episode begins with conditions characterised by certain conflict potentials. The parties to the relationship may not become aware of any basis of conflict, and they may not develop hostile affections for one another. Depending on a number of factors, their behaviour may show a variety of conflict-prone traits. Each episode or encounter leaves an aftermath that affects the course of succeeding episodes.

Conflicts over forest and tree resources are defined as 'perceived or actual opposing or competing needs, values and interests between two or more parties related to the allocation, access, ownership or utilisation of a resource (Derkyi, 2012). Conflicts differ according to context (Moore, 2003; Wall and Callister, 1995) and causes. For the latter, due to the complexity of natural resource conflicts there are usually many causes and many interconnected issues, and that makes it difficult to pinpoint the key issues in the conflict scenarios.

Different scholars have symbolised these conflicts in different ways. In the view of Schmidt and Kochan (1972: 362) the two underlying causes of conflict are 'perceived goal incompatibility' with respect to the resources and

activities that the conflicting parties share and the 'perceived opportunity for interfering with the attainment of one another's goals'.

From the perspective of other authors, among the main driving factors are power plays (Le Billon, 2001; Marfo, 2006), competing and diverging interests and the needs of stakeholders (Warner, 2000), the scarcity of environmental resources (Homer-Dixon, 1999), the resource curse (Le Billon, 2001), inequity in benefit sharing and the absence or inadequate consideration of conflict management in national policies, policy or institutional lapses and failures (Tyler, 1999; Derkyi, 2012).

As a social phenomenon and process, the pivot of the conflicts is the human being-termed either as 'stakeholders' or 'actors' or 'resource users' (Grimble and Wellard, 1996; Kotey et al., 1998). In terms of level of occurrence, conflicts occur at household level, at local level within or between communities, at national level and at international level (FAO, 1996; Fisher, 2000). As indicated earlier that conflict is a dynamic process, literature reveals that it involves a sequence of stages, which can be categorised into 'violent' and 'non-violent', with variations in the level of intensity (Axt et al., 2006). Axt et al. (2006: 5) asserted that one pitfall in conflict literature is that most studies are concentrated on violent conflicts (particularly wars) rather than on non-violent conflict.

Derkyi (2012) reveals that forest and tree resources conflicts in Ghana's high forest zone are often non-violent compared to violent. Since natural resources conflicts are inevitable, different conflict management approaches and coping strategies had been employed. These are classified in three categories, i.e. avoidance, consensual approaches (negotiation, facilitation, moderation, consultation, conciliation and mediation) and non-consensual approaches (arbitration, adjudication and coercion) (Moore, 2003; Wehrmann, 2008). The management of conflicts are done by the conflict parties or mediated by third parties through the different coping strategies.

2.3 Micro-level forest governance

Governance is a relevant discourse in the development of a global forest regime (Arts, 2006). Ros-Tonen and Kusters (2011) view forest governance to encompass (i) the processes, mechanisms and formal and informal institutions in place to take decisions on forest use, (ii) the actors involved in these

decisions and (iii) the way in which forest policies, laws and regulations are enforced on the ground (Ibid.: 189). Governance or the lack of it, in forestry is a central issue that affects millions of people engaged in forest-related livelihood activities at all levels.

For this reason, good forest governance is essential to protect people's livelihoods and improve their well-being, and to protect them from the consequences of illegal logging and unauthorised removals of forest resources. Forest governance operates at different levels of scale ranging from the global to the local or from Macro to Micro.

This study which is micro-level oriented aims to understand local people's access to forest resources for livelihood and the nature of conflicts emanating from their actions or inactions in relation to other stakeholders. At the micro level, forest governance faces several challenges such as multiple actors with diverse interests, access and allocation rights and diverging powers often resulting in conflicts. Mehta et al. (2001) add to these challenges the ecological, livelihood, knowledge and socio-political uncertainties that may affect people's use of natural resources. According to Bavinck et al. (2005: 28) such uncertainties can make governance processes 'very troublesome'.

This therefore confirms what Zartman (1997) asserted that conflict management cannot be separated from governance, and that the right mechanisms should be put in place to deal with conflicts among groups before they escalate and block the governing process.

2.4 Analysis of forest and tree resources conflicts causes from Fishbone, Pareto and Affinity diagram perspectives

In trying to understand conflict and its dynamics as well as management strategies, the use of conflict analysis has been used to gain a deeper understanding of the conflict dynamics. Some analytical tools often employed are conflict assessment framework and the conflict wheel (USAID, 2004; Mason and Rychard, 2005). This study however attempts to understand the causes of forest and tree resources conflicts using quality tools applicable in Quality Management discipline.

According to Karuppusami and Ganhinathan (2006:372) total quality management (TMQ) is an integrative management philosophy aimed at continuously improving the quality and process to achieve customer or simply

building of quality into products and process and making quality a concern for all. Since natural resources conflict is a process, the application of the quality tools have the potential to provide in depth understanding of the conflict situation and indicate which conflict causes need attention to facilitate interactive micro-level governance and improve forest related livelihoods. The three quality tools employed are the Fishbone diagram (Causes and Effect), Pareto analysis and Affinity diagram (see section 3.5 for detailed description of the tools).

The conceptual framework indicates the micro-level forest governance which is the interaction of three components –forest regimes, the politics that govern the regimes and the actors, who access, allocate, manage or control the forest resources. In view of having such interactions conflicts arise, the application of quality tools such as fishbone diagram, Pareto analysis and affinity diagrams provide the causes of conflicts whiles Moore's continuum aids in the different coping strategies use to deal with the conflict incidences at the different regimes. From figure 1, it is expected that the understanding of the conflict causes and coping strategies will provide the space for interactive micro-level governance process that is capable of minimising or preventing conflict incidences related to access to forest resources for livelihood needs.

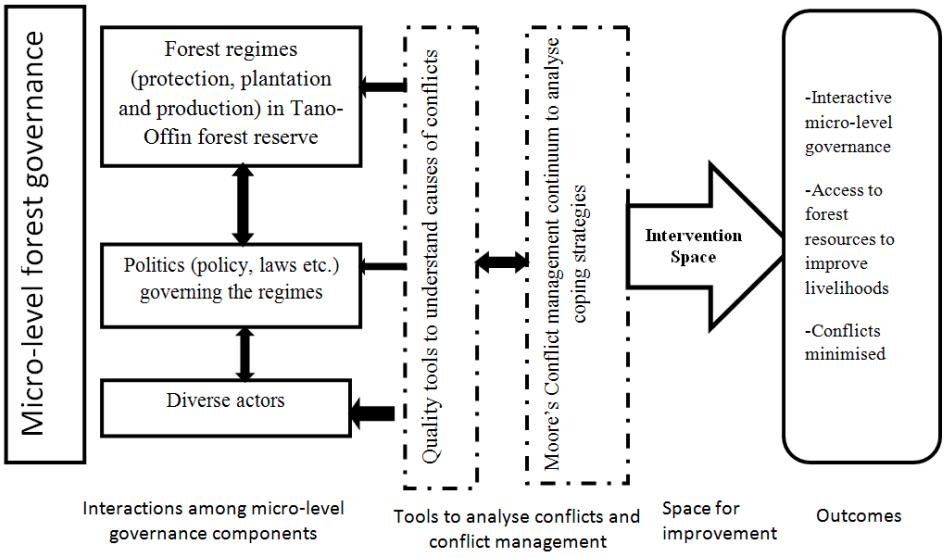

Figure 1: Conceptual framework depicting tools to analyse and manage forest and tree resource conflicts and expected outcome

METHODOLOGY

3.1 Research design

According to Maxwell (2005:2) a research design refers to the underlying plan or protocol for carrying out the research. It encompasses (i) the justification of research objectives and questions, (ii) the conceptual framework and underlying theories (iii) the rationale that underpins the study design, (iv) the rationale that underpins the choices as regards to participants, time and places of data collection, and (v) concerns related to validity and reliability.

The data for this study was based on existing forest governance process, forest and tree livelihood conflicts and conflict management strategies database that the researcher collected from 2008-2012 with funding from Tropenbos International Ghana.

The overall design of the study was a case study approach in different governance regimes using a mixed method of quantitative and qualitative strategies with different research techniques in the data collection process (i.e. Document analysis, inception meetings, informal interviews, questionnaire, validation meeting) (Derkyi et al., 2013).

An essential component in case study research is defining the unit of analysis. In this study, the three units adopted are the three regimes of Tano-Offin Forest Reserve namely protection, plantation and production; individual analysis based on actors' perspectives and conflicts over forests and tree resources, management strategies and governing systems prevailing at the micro-level.

This working paper however explores the forest and tree livelihood conflicts and coping strategies across the three regimes of Ghana's high forest zone. Specifically, it analyses conflicts causes and effects on the local people in these regimes employing three quality tools and techniques namely Fishbone (or Cause-effect or Ishikawa) diagram, Pareto analysis and Affinity diagram and positioned the conflict coping strategies in Moore's conflict management continuum.

3.2 Study area

This study was undertaken in the Tano-Offin Forest Reserve which falls under two administrative districts, namely Atwima Mponua and Ahafo-Ano South representing the southern and northern portions of the reserve respectively. Forty-two communities border the reserve, including an 'admitted' village[1] called Kyekyewere, which is located inside the reserve. Three communities from Atwima Mponua administrative district and one from Ahafo-Ano South administrative district were selected as case study sites for an in-depth analysis of conflicts over forest resources and conflict management strategies at the local level.

The selection of these communities was primarily based on the prevailing management regime to ensure that it was representative of each of the three management regimes – protection, plantations and production.

Secondary selection criteria related to location and accessibility were also considered. Kyekyewere was the only village located in a strictly protected area that is a Globally Significant Biodiversity Area (GSBA[2]) and was selected for that reason. Chirayaso and Nyamebekyere No. 3 were selected because of their active involvement in the Modified Taungya System (plantation regime) and functional operation of timber harvesting (production regime) in which the inhabitants had to negotiate with timber contractors for timber benefits such as the social responsibility agreements (SRA).

[1] Admitted villages refer to the rights of people who had their village in the reserve area before its designation as a reserve to continue inhabiting the designated areas. Similarly, the law recognises admitted farms in forest reserves to preserve the right to farm.

[2] The GSBAs are set aside within a forest reserve to ensure that some forest blocks or entire forests are preserved in a condition that is as close to nature as possible in order to preserve unique flora and fauna. The GSBA concept is an innovation in Ghana's conservation system that advocates for the protection and conservation of all kinds and sizes of living organisms as well as the ecosystem (Kyerehet al. 2006: 6).

Table 1: Study communities and number of respondents selected in accordance with the management regimes

Forest reserve	Administrative district	Forest management regime	Study community	Number of respondents
Tano-Offin	Atwima Mponua	Protected management regime – GSBAa	Kyekyewere	119
	Atwima Mponua and Ahafo Ano South	Plantation management regime – the Modified Taungya System	Chirayaso and Nyamebekyere No. 3	212
	AtwimaMponua and Ahafo Ano South	Production management regime	Chirayaso and Nyamebekyere No. 3	137

[a]GSBA = Globally Significant Biodiversity Area

3.3 Profile of the production, plantation and protection management regimes

The Forest Services Division (FSD) of the Forestry Commission (FC) has categorised the forest reserves under their jurisdiction into different management regimes. The system is based on the forest protection strategy designed in 1993 (Kotey et al., 1998). These are the timber production areas [742,600 ha (47%)], where the forest area is designated primarily for the production of wood, fibre, bio-energy and/or non-wood forest products. The permanent protection areas [352,500 ha (21%)] consist largely of hill sanctuaries, but also include swamp sanctuaries, shelterbelts, special biological protection areas like GSBAs, intact forest sanctuaries, provenance and fire protection areas. Of this area, 69% is inaccessible for logging (except at very high cost) and 16% is degraded. Only 15% (which is protected on grounds of genetic diversity) is well stocked and accessible. The convalescence areas [122,000 ha (7%)] are those with reduced stocking through overexploitation, fire and poor management, but which are considered capable of rehabilitation (mostly through different reforestation schemes) within one felling cycle (40 years).

Figure 2 shows the schematic representation of the three regimes. In this study, the Tano-Offin GSBA forms part of the larger Tano-Offin Forest Reserve and lies between latitudes 6054’ and 6035’ north and longitudes 1057’ and 2017’ west. In the high forest zone of the southern part is the protection regime. The Tano-Offin reserve covers a gross area of 413.92 km2 that includes the admitted village land and farms covering a total of 6.27 km2

and the GSBA covering an area of 178.34 km2. The GSBA portion is classified as an upland evergreen (UE) forest (Hall and Swaine, 1976) because of its location on isolated hills within the area of the moist semi-deciduous (MS) forest type and endowed with rich flora and fauna.

However, over the years, changes have been occurring in this special Upland Evergreen Forest through gradual deforestation. The plantation regime within the forest reserve (mostly located in the production management area) consists of various compartments[1] in the reserve. Since the MTS became operational in the reserve in 2002, twenty-seven villages have been involved in the scheme of which Kunsu-Nyamebekyere No. 3 and Chirayaso were selected. Each of the MTS beneficiary communities is given degraded forest area in a specific compartment with the aim of reforesting it, using the Modified Taungya System[2]. Similarly, the production forest is divided into compartments of approximately 128 hectares each (1,600 m x 800 m).

A group of such compartments constitute a concession or timber utilisation contract (TUC) area. Each concession or TUC area has a harvesting schedule, which is a timeline for logging individual compartments (ITTO, 2005). According to the manual of procedures (MoPs)[2] that guides the Forestry Commission timber exploitation activities; the timber contractor prepares the logging plans. The TUC ranges from one to forty years, during which trees must be felled according to a harvesting schedule.

Both commercial timber harvesting and non-timber forest products (NTFPs) are exploited in the on-reserve production areas.

[1] The MTS is an agroforestry system that was introduced in Ghana in 2002 in a bid to support both rural livelihoods and address Ghana's deforestation problem. It is an adapted version of the old taungya system, which was suspended in 1984 partly due to a lack of farmers' support for it. Under the MTS, farmers receive land to grow food crops alongside the planted timber trees during the early years of plantation development (Ledger et al., 2010).

[2] The FC uses manuals for production, management and planning such as the 1998 Manual of Procedures for Forest Resource Management Planning in the High-Forest Zone, the Manual of Procedures for Stock Survey and Yield Allocation (1995), and the 1998/2003 timber resources management regulations (ITTO, 2005).

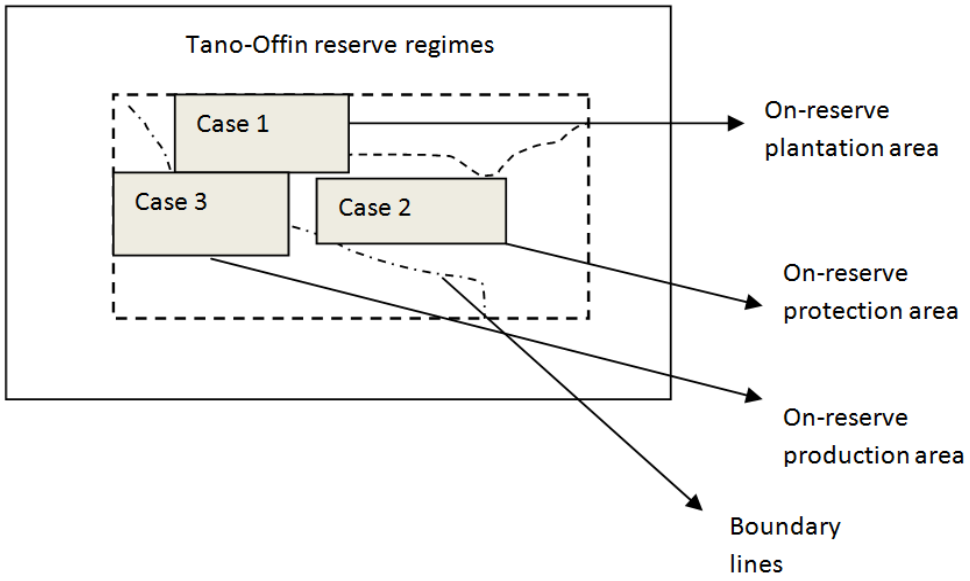

Figure 2: Schematic presentation of the forest management regimes in Tano-Offin Forest Reserve

3.4 Data collection

The data for this study were collected from September 2008 to February 2010. A review of secondary data mostly from Derkyi (2012) centred on the politics of the protection, plantation and production regimes touching on the institutional structures and policies and regulations governing the three regimes. The open and closed survey questions used in this study centred on the socio-economic characteristics of the respondents, dependence on forest resources for livelihoods, their perception of forest and tree related conflicts they have been engaged in or witnessed, causes (antecedent and manifest), actors, effects and conflict management strategies.

In the protection regime, the survey was conducted in June-July 2009 and involved 119 individuals, using a simple random technique without replacement, who responded to the semi-structured questionnaires from an adult population of 450. These individuals constituted 70% males and 30% females.

In February 2010, a validation meeting was organised with 30 people of Kyekyewere village to validate the findings. Similarly, in the plantation regime, semi-structured questionnaires were administered to 212 respondents randomly selected in the two villages in 2010. For Chirayaso (n= 103) and

Kunsu-Nyambekyere No. 3 (n=109),of the 212 respondents who responded to the questions on the plantation (MTS) area, 137 individuals representing 56% males and 44% females also responded to questions regarding production regime conflicts and conflict management as shown in Table 3 for Chirayaso (n=83) and Kunsu-Nyambekyere No. 3 (n=54).

In February 2010, two meetings with 36 and 45 community members from Chirayaso and Kunsu-Nyambekyere No. 3 respectively were also held in the two villages to validate the survey findings. In order to ensure the reliability of the findings, the survey respondents were randomly selected and the survey questionnaires were piloted in order to ensure that the researcher, field assistants and respondents understood the questions.

3.5 Analysis

The secondary data captured were documentary analysed. The use of Statistical Package for Social Sciences (SPSS) and quality tools and techniques like Fishbone diagram (Causes and Effects; Ishikawa Diagrams), Pareto chart and Affinity diagram were used to analyse the primary data.

Using SPSS, local people's demographic characteristics, dependences on forest and tree resources for livelihoods and effects of conflicts were descriptively analysed. The antecedent conditions and manifest behaviours conflict causes were presented analytically in the fishbone diagram. A Cause-and-Effect Diagram is a tool that helps identify, sort, and display possible causes of a specific problem or quality characteristic. It graphically illustrates the relationship between a given outcome and all the factors that influence the outcome. This type of diagram is sometimes called an "Ishikawa diagram" because it was invented by Kaoru Ishikawa, or a "fishbone diagram" because of the way it looks (Ishikawa, 1968).This quality tool was used to understand local people's perception of forest and tree livelihood conflicts in their environs and why they occur. The understanding of why conflicts occur (causes) gives the opportunity to change those causes and in turn change the effects. In order to achieve that, some steps were taken. First, the conflict causes were put under the different conflict types as categories. Second, under each category, the causes of the conflicts as mentioned by the respondents were placed linking antecedent causes to manifest behaviour to enable the presentation of fishbone diagram with interconnected causes among the

different categories, all leading to the effect which is conflicts in the different regimes.

Since cause-and-effect diagrams identify only possible causes, the Pareto chart was used to identify which causes to be focused on first and this was done through accessing the frequency of occurrence of the causes mentioned by the respondents in the three regimes. The Pareto Chart or Pareto Diagram, named after the famous economist Vilfredo Pareto (1848-1923), is a common tool for quality control and is used as part of a Pareto Analysis to visually identify the most important factors, most occurring defects, or the most common problems, or in other words "the vital few". It is “a series of bars whose heights reflect the frequency or impact of problems. The bars are arranged in descending order of height from left to right. This means the categories represented by the tall bars on the left are relatively more significant than those on the right” (Scholtes et al., 1988).

The applications of the Pareto principles focus efforts on the problems that offer the greatest potential for improvement, showing their relative frequency or size in a descending order. The chart gets its name from the Pareto Principle thus the analysis of the different underlying causes of conflicts is based on the proven Pareto principle that 20% of the problem sources cause 80% of the problems. The reason is to help concentrate on those causes that will have the greatest impact if remedied, thus separate the significant ‘few’ from the useful many. In relation to this study, it is assumed that 20% of the causes of conflicts mentioned by the local people are causing 80% of the conflicts in respective regimes (or vice versa) (Karuppusami and Gandhinathan, 2006).

An Affinity Diagram is a management technique used to gather large amounts of data (ideas, opinions, issues) and organises them into groupings based on their natural relationships. Using the Affinity diagram, the underlying and manifest causes of the conflicts as mentioned by the local people were positioned in the typology of drivers of conflicts and deforestation (see Geist and Lambin, 2002; Tyler, 1999; Homer-Dixon, 1994; Schmidt and Kochan, 1972). This quality tool helps to understand and sort opportunities by placing them under common themes. The rationale is to simplify complex information and help improve whole categories of opportunities rather than single cases.

The conflict management coping strategies as mentioned by the respondents were also analysed by adapting Moore's conflict management continuum (Moore, 2003).

3.6 Limitations of the research

This study offers comprehensive analyses of governance arrangements in the three regimes- causes, effects and coping strategies of forest and tree resources in Ghana's high forest zone from local peoples perspectives at the micro-level. A limitation encountered was in analysing the conflict causes using the quality tools. In the application of these quality tools and techniques, stakeholder brainstorming exercises have been the usual approach adopted (Tague, 2004; Tata communication, 2012), however, in this study, the researcher used the data of the local people for the categorisation. This however does not have effect on the findings since these are the views of the local people.

RESULTS

4.1 Politics of the protection, production and plantation management regimes

This section presents the institutional framework by looking at institutions as a structure and as rules and strategies governing the forest regimes of Ghana. It highlights the similarities and differences of the rules and structures within the three regimes. It also presents the actor constellation and positioned it in the governing actor framework of the forest sector.

4.1.1 Institutional structures in and across the three forest regimes at the micro-level

The structures identified in governing the management of the different regimes belong to five actor governing structures at the micro-level namely the statutory, market, customary, civil society and hybrid in addition to the transnational structure as shown in Figure 3.

From the statutory level, the district Forest Services Division (FSD) of the Forestry Commission (FC)[3] is responsible for the management of forest reserves at the micro level, headed by a manager and two assistants. Range supervisors and forest guards are the frontline officials in frequent contact with the local communities and timber operators with a key role in reserve boundary cleaning and patrolling; and measuring and issuance of log conveyance certificates respectively. The local government arm of the government known as the District Assemblies also complement the efforts of the District FSD through enactment of by-laws that govern environmental management. The other relevant actors in the statutory category are those in charge of forest law enforcement, being the Ghana Police Service, Military and the Judiciary. The Administrator of Stool Lands – established by the 1992 Constitution and 1994 Stool Lands Act (Act 481) – is in charge of the management of stool lands on behalf of the communal landowners as well as the disbursement of royalties to the respective beneficiaries.

The market actors consist of TUC holders, illegal loggers and chainsaw millers currently known as artisanal millers, commercial plantations

[3] The Forestry Commission (FC) is responsible for the management and regulation of the forestry sector in Ghana

developers, and NTFPs traders. The TUC or concession holders have legal right to operate in forest reserves for a specified period through competitive bidding and permit system. It has been argued that this group of actors have strong influence at political level as well as the de facto control over large forest areas (Mayers and Kotey, 1996). Another actor in the marketing structure is the chainsaw miller.

However, this category belongs to the informal private sector because of the criminalisation associated with their operations since the adoption of LI 1649. These actors may come from a blend of formal, market and traditional governing structures and operate from micro to macro levels in Ghana geopolitical settings (Derkyi, 2012).

Even though their activities are illegal because it results in loss of revenue to the country and destruction of forest resources, these actors paradoxically provide lumber for the domestic market (Marfo, 2010). Investors in commercial timber plantations have access to degraded portions of forest reserves to plant trees using different arrangements with respect to their engagement with local communities (Hoogenbosch, 2011) and their operation takes place in the plantation regimes. Traders engaged in NTFP – both plants products and bush meat – need a permit from the Forest Services Division and licence from the Ghana Wildlife Division respectively to access these resources.

The third actor structure of interest is the customary institution made up of the traditional leaders, stool land owners and local people often living in or close to the forest resources. The customary governing structure has different levels of hierarchy but in this study mention is made of chiefs and elders at the local level which often comprise of the chief (locally referred as 'Odikro which literally means 'caretaker of the village'), queen mother and elders. These traditional institutions reside near the forest resources but are not landowners.

From the study sites, Kyekyewere, which is an admitted village, has two chiefs representing the Nkawie-Panin stool and the Nyinahin stool respectively. These two stools, in addition to the Hia and Kontri stools are the stool[4] landowners of the reserve. The Chirayaso chief owes allegiance to the

[4] In statutory law, a stool (or skin) is defined as any person or body of persons having control over community land, including family land, as a representative of a particular community (Kasanga, 2003).

Nyinahin stool, while the Kunsu-Nyamebekyere No. 3 chieftaincy owes allegiance to the Hia stool. The local chiefs and elders have remarkable role in conflict resolution at their jurisdiction especially those related to land and forest conflicts (Derkyi et al., 2013). The local communities' actors include NTFP collectors for domestic use, hunters and herbalists who access forest resources for their subsistence use.

As a hybrid governing structure coined by Derkyi (2012), it is a blend of two or more of the other governing structures. At the local level, the statutory institutions (e.g. FSD and District Assemblies) have collaborated with local people to achieve common objectives. Three actors within this structure that play a pivotal role in the production and protection regimes are the Unit Committee, the Community Biodiversity Advisory Groups (CBAGs) and Community Forest Committees (CFCs). The CFCs and CBAGs were established to serve as a channel through which the FSD could implement its collaborative forest management activities by acting as social fences in protection and patrolling.

The Modified Taungya System (MTS) farmers are engaged in a co-management arrangement with the FC, under which they are allocated rights to plant crops in reforestation schemes in return for tending the tree seedlings and saplings and a share in the proceeds thus active in the plantation regime. Preventing and combating wild fires are done by Fire Volunteers Squads and the Unit Committees, a concept mooted under the local government system stimulate local development based on communal labour and village fundraising to build schools, clinics, wells and latrines. The civil society governing structure in the forestry sector consists of national and international environmental organisations as well as non-governmental organisations (NGOs) that contribute to capacity building, forest restoration, and advocacy for policy reforms. In this study, the role of the Rural Youth Development Association (RUDEYA) for grassroots community development was seen in the promotion of the Modified Taungya System through collaboration with the International Union for Conservation of Nature (IUCN) to support in the registration of MTS farmers in Tano-Offin Forest Reserve.

The stool can only hold land in trust for communal landowners but has no say in the management of forest resources, which fall under the jurisdiction of the FC. The management of stool lands is in the hands of the Administrators of Stool Lands, which body is part of the formal/statutory governing structure (Derkyi, 2012).

The diverse roles of transnational governing structures have also contributed to micro-level forest governance. In the plantation regime, the financial supports from the World Bank, United Nation Food and Agriculture (FAO), the IUCN-Netherlands and African Development Bank resulted in the restoration of degraded forest reserves in forest plantation establishment and giving legal recognition to local farmers under the MTS through registration. Figure 3 highlights the interrelations between the governing structure where lack of satisfaction by any of the parties often leads to misunderstanding and results in conflicts as parties have diverse interest and roles in sustaining the available resources.

4.1.2 Policies, regulations and strategies governing the forest regimes

There are laws that govern the management, allocation and use of forest resources, protection and reforestation as well as sanctions. The Forest and Wildlife Policy (FWP) of 1994 is the prevailing policy that governs forest resource management in Ghana. It is a policy that marked a paradigm shift towards collaboration of resources management and benefits to all segments of society as termed by Derkyi (2012) as 'era of pro-poor forest policy and emergence of collaborative governance''.

Nonetheless, in practice the policy document strategies are being confronted with implementation challenges coupled with the dynamics in international forestry dialogue which calls for recognition of emerging contemporary issues such as climate change, law enforcement and equitable benefit sharing in the current policy document. Thus, the FWP of 1994 underwent a review since 2008 and it is expected that a new FWP which is being published will be enacted soon.

The enactment of the Forest Ordinance (Cap 157) of 1927 gave the then Forestry Department the authority to select land suitable for reservation and declare them forest reserves. However, at the onset of the reservation process, some land and forest ownership rights remained unaltered in the form of admitted farms or villages and admitted or communal rights. Both rights are granted in the Tano-Offin Forest Reserve. Admitted or communal rights encompass hunting rights, footpaths to water sources and the right to collect non-timber forest products (NTFPs) for communal use.

Access to timber for commercial purposes in the production regime is regulated through the Timber Resources Management Act (547) and amended Act 617 and LI 1971-Timber Resources Management (Amendment) Regulation 2003, which established the basis for competitive bidding in timber resource allocation. The granting of timber harvesting rights stipulates that it is illegal for any person to harvest timber from any land without a Timber Utilisation Contract (TUC) or Salvage permit. As a means to curtail the prevalence of illegal timber causing deforestation, Ghana signed the European Union - Voluntary Partnership Agreement (VPA) to improve the governance process in legal timber trade and law enforcement especially in the production regime. The agreement outlines stages to promote legal trading in timber while ensuring social safeguards for vulnerable groups during implementation.

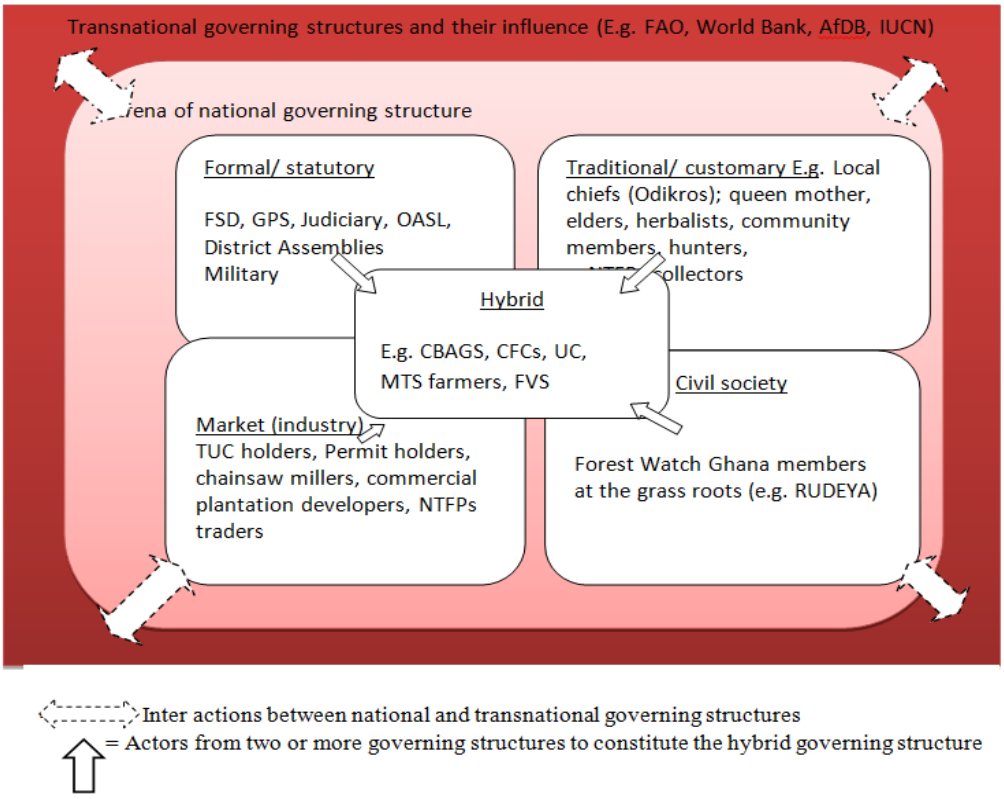

Figure 3: The actor governing structure for forest sector at the micro-level of Ghana (adapted from Derkyi, 2012).

CBAGS=Community biodiversity advisory groups; CFCs=community forestry committees; FSD=Forest Services Division; FVS=Fire Volunteer Squad; NTFPS=Non-timber forest products; UC-Unit committee; MTS=Modified Taungya System; OASL=Office of Administrator of stool lands; GPS=Ghana Police Services; TUC=Timber Utilisation Contract; RUDEYA=Rural Development Youth Association.

In 2003 during a policy reform, the Timber Utilisation Permit (TUP) was introduced to provide timber resources on non-commercial basis for social and community purposes to the District Assemblies, town committees, rural community groups or NGOs. The law that governs the plantation regime is the Forest Plantation Development Fund Act, 2000 (Act 583) and Amended Act 2002 (Act 624). These Acts consolidate the forest improvement Fund for the development of private commercial plantations and establish both public and private plantation growers to participate in forest plantation development in Ghana. Since formally no logging or commercial NTFPs occur in the protection forest regime, specifically the Globally Significant Biodiversity Areas (GSBAs), the prevailing legislative instrument governing the regime is the Forest Protection Decree NRCD 243 of 1974 amended by the Forest Protection Amendment Act 2002 (Act 624). This law which defines forest offences and prescribe sanctions is also applicable to the other two regimes though without the coming to force of the GSBA strategy, the inhabitants in and around such forest reserves are further restricted of their access and use rights to forest resources even sometimes for subsistence use. This Act declares that all operations within forest reserves (with the exception of NTFP extraction for communal use which often requires informal permission) require written permission from the Forestry Commission with punishments being imposed if permission is not sought from a FSD official higher than a technical officer or forest guards.

With the enactment of these laws, some strategies were put in place to ensure their effective functioning. Key among them is the benefit sharing schemes which are predominant in the production and plantation regimes compared to the protection regime. Table 2 presents the benefit sharing allocation among the stakeholder beneficiaries in the production and plantation regimes. In the production regime in forest reserves, two key benefit sharing schemes prevail- the royalties and social responsibility agreement (SRA). Timber royalties in Ghana dates back to the 1927 Forest Ordinance Act. It was a period when

stool landowners were given a role in forest management under colonial rule with a percentage of the revenues generated.

The current benefit sharing arrangement is enshrined in Article 267 (6) of the constitution of Ghana, complemented by Act 547. The benefit-sharing scheme as stipulated in the constitution still holds for the on-reserve forest. The distribution among beneficiary stakeholders occurs when the FC has taken its share of 60% management fees from the royalties accrued from the on-reserve. The second benefit is the SRA, an agreement introduced into Ghana's forest management system as part of the TUC procedure in the late 1990s. It is an agreement between a TUC holder in both on and off-reserve production areas and the land-owning communities (forest fringe communities) (FC, 2004). The legal instruments governing this arrangement are Act 547 and the Timber Resource Management Regulations (L.I. 1649) of 1998. The agreement is made up of two parts.

The first is the code of conduct that entails the contractors' role to ensure that all timber operations are conducted with due respect for the rights of the communities in terms of their customs, beliefs, infrastructure and livelihoods.

The second part concerns the social obligations, i.e. a specific agreement drawn up between the community and the contractor based on the stumpage or the monetary value of the trees removed from the TUC area. The financial value of this social obligation is stipulated in the L.I. 1649 section 13(1b) stating that:

'a social responsibility agreement should be entered into with the landowner *to assist the inhabitants within the contract area with such amenities as specified in the agreement at a cost of not less than 5% of the annual stumpage from the operations under the TUC.'*

Table 2: Benefit-sharing schemes across the production and plantation regimes

Stakeholder beneficiaries	Production regime (Royalties) (%)	Plantation regimes (MTS) (Planted timber benefits) (%)
Forestry Commission	50.05	40
Administrator of stool lands	5.0	-
District Assembly	24.8	-
Traditional council and Stool landowner	20.2	15
MTS farmers	-	40
Local communities around the plantation area	-	5

From the legal perspective, the MTS under the plantation regime is governed by land lease and benefit sharing agreements that clearly state the tenurial arrangements, responsibilities as well as the benefits of each of the parties involved in the scheme. In the interest of this study, Section (8) of the lease agreement states the mechanisms of managing disputes or conflicts as follows:

> '*In case of any dispute, difference or controversy arising out of, or in connection with this lease, that cannot be settled amicably between the parties, it shall be settled in accordance with the provisions of the Arbitration Act 1961 (Act 38) and any subsequent amendments by a panel of three arbitrators. Each party shall appoint one arbitrator and the two arbitrators shall appoint the arbitrators who shall be the umpire. The place of arbitration shall be at the arbitration centre, Accra, Ghana, or any other places as the arbitrators and the parties may agree. The language of the arbitration shall be English. The decision of the arbitrators shall be final (FC, 2005)*'.

The benefit sharing agreement of 2005 outlines four key actors that form the institutional body of the MTS as shown in Table 2. The FC receives 40% of all proceeds obtained from the plantation (i.e. the timber revenues), excluding those from non-permanent food crops unless by mutual agreement with the farmer. The farmers receive 40% of all the proceeds obtained from the tree plantations and all the non-permanent food crops except when agreed

[5]The Forestry Commission has decreased its on-reserve benefit share to 50% (OASL/ FC, 2010).

otherwise. The landowner and the local community receive 15% and 5% respectively of all proceeds obtained from the tree plantations, excluding proceeds from non-permanent food crops.

In terms of responsibilities, the FC is responsible for the financial management, marketing and technical inputs of the plantation investment. The taungya farmer is responsible for the provision of labour and maintenance of the modified taungya plantation. The third party is the 'landowner' – generally the stool responsible for guaranteeing access to the land and security of tenure for all parties concerned. The fourth party to the agreement is the 'local community' responsible for assisting in the prevention of wildfire and illegal activities within the plantation. In 2010, in order to strengthen the MTS groups, the FC, in consultation with some key forest stakeholders from the local communities, university, civil society and other government institutions, drafted a constitution that must be adopted by each MTS group to guide the governing of the groups (FC, 2010).

Unfortunately none of these benefits in terms of access to degraded forestlands for MTS, future access to 40% of timber revenue from planted trees, royalties and SRA are being derived by inhabitants who live in (like Kyekyewere Admitted village) or around GSBAs protection regime. These according to Derkyi et al; (2013) increase the inhabitants' illicit access to forest resources for their livelihoods.

The preceding discussions have centred on the statutory laws that govern the forest resources. It is worth mentioning that there are still some customary norms that govern forest resources. Saplings of economically or culturally important trees or herbs tend to be preserved, protected from fire and nurtured into maturity on both food and tree crop farms.

4.2 Local people's socio-economic characteristics and forest and tree livelihoods across the regimes

4.2.1 Socio-economic characteristics

Chirayaso and Kunsu-Nyamebekyere No.3, located around the production and plantation regimes have estimated adult population of 770 and 240 respectively of whom 103 and 109 individuals were involved in the study respectively. Kyekyewere village in the protected regime on the other hand has an estimated population of between 400-500 adults, of whom 119

individuals were also involved in the study. Generally, the occupations of the inhabitants of these three communities are agrarian in nature.

From Table 3, it is deduced that distribution according to gender across the regimes are 83 males (70%) and 36 females (30%) for protection; 54% of the respondents are men and 46% are women in the plantation and 56% (n=77) were males and 44% (n=60) females in the production regime. With respect to age range, majority of respondents from the plantation regime (46%) and the production regimes (47%) are in the age range of 18-35 years while the age range of 36-53 constitute the highest number of respondents (52%). Across the regimes, the age range of 53+ represents the least number of respondents.

In terms of religion and education, Christianity dominated across all the three regimes whilst majority of the respondents have middle and Junior high school certificates distributed as 76%; 54% and 68% for protection, plantation and production respectively. The difference between the number of migrants and indigenes were not wide even though across the regimes more indigenes were recorded than migrants.

As already indicated, the three communities are agrarian in nature however it is interesting to observe that in the protection regime there are diversity of occupations compared to the production and plantation regimes as shown in Table 3. Majority of the respondents in protection regime are under single occupation but cut across farming (53%) which may occur in lands related to admitted farms, off-reserve and GSBA. The rest are chainsaw milling, trading, handicraft, teaching, farm labouring and chainsaw rental whiles under the single occupation only farming, chainsaw milling and MTS are in the production and plantation regimes.

Under the multiple occupations, only 15% of the respondents in the protection regime are engaged in crop farming and others (include tailoring, hair plaiting, seamstress, driving, mechanics, trading, livestock rearing, masonry, charcoal production, chainsaw milling and teaching.). Majority of the respondents from the plantation (62%) and production (60%) regimes are engaged in MTS and off-reserve farming activities or MTS and other jobs such as civil service employees (mainly teaching), pensioners, artisans (or handicraft workers) and chainsaw milling.

4.2.2 Local people's forest and tree related livelihoods and challenges

Resources from the forest reserve contribute to the livelihoods of the inhabitants of Kyekyewere in the form of chainsaw milling, NTFPs for domestic use or trade, farming land, or a combination of these. For the inhabitants of Chirayaso and Kunsu-Nyamebekyere No. 3 in the plantation and production regimes, access to the forest resources are through degraded forestland under the MTS, chainsaw milling, NTFPs for domestic use and trade, and the provision of forest services (i.e. boundary clearing, working with timber firms and as forest guards). For most respondents (74%) in the protection regime access is through collection of NTFPs for domestic use. For 61% this is the only way they make use of the forest reserve, and for 13%, it is one of the ways in which resources from the forest reserve contribute to their livelihoods. The NTFPs collected include mushrooms, pestles, game, snails, medicinal plants and chewing sticks. Some of these NTFPs are also benefited by the inhabitants in the plantation and production regimes but to a lesser extent.

Secondly, the reserve contributes to people's livelihood through illegal chainsaw milling (11%), followed by illegal farming (9%). Sixteen per cent of the respondents make use of forest resources in multiple ways. According to the respondents in the plantation and production regimes, the contribution of MTS to livelihoods are immense and this has improved their wellbeing through (i) employment in the form of farm labour and micro-enterprises (notably petty trading), through food crops revenues from the MTS; (ii) improvement in school attendance of their children; (iii) quality housing; and (iv) food security throughout the year.

According to the respondents, access to forest and tree-based livelihoods are not without challenges. For the respondents in the plantation and production regimes, these problems are related to boundary disputes; illegal farming, food crop theft, unfair distribution of taungya land, and the confiscation of lumber and machines by the FSD-military task force. Those in the protection regimes are confronted by poor road network due to the location of the village resulting in rotting of foodstuff before they get to the market centres in the nearby towns like Nyinahin and Nkawie.

Another challenge according to the respondents is the absence of MTS which leaves them poorer compared to their neighbouring communities who are

engaged in MTS. Restricted access to NTFPs for domestic and commercial use were mentioned across the three regimes.

Table 3: Socio-economic characteristics of respondents across the Protection, Plantation and Production regimes in Tano-Offin Forest Reserve of Ghana

Variables	Forest regimes frequencies (n) and percentages (%)		
	Protection (n=119)	Plantation (n=212)	Production (n=137)
Gender			
Male	83 (70%)	114(54%)	77(56%)
Female	36 (30%)	98(46%)	60(44%)
Age range			
18-35	42(35%)	97(46%)	65(47%)
36-53	62(52%)	74(35%)	52(38%)
53+	13(11%)	41(19%)	20(15%)
No response	2(2%)		
Level of education			
No education	13(11%)	42(20%)	16(12%)
Informal *(evening school normally in the local language)*	2(2%)	14(7%)	-
Primary level	9(7%)	24(11%)	14(10%)
Middle / Junior High School (9th grade)	90(76%)	114(54%)	93(68%)
Post-secondary/Senior High School	5(4%)	18(54%)	14(10%)
Religion			
Christianity	101(85%)	192(91%)	127(93%)
African tradition	1(1%)	3(1%)	1(1%)
Free thinkers	11(9%)	7(3%)	3(2%)
Islam	4(3%)	10(5%)	6(4%)
No response	2(2%)	-	-
Origin			
Migrants	53(45%)	88(41%)	64(47%)
Indigenes	66(55%)	124(59%)	73(53%)
Occupation			
None	9(7%)	6(3%)	4 (3%)
Single			
Farming	63(53%)	20(9%)	16(12%)
Chainsaw milling	12(10%)	4(2%)	4(3%)
Trading	6(5%)		

Handicraft	4(3%)		
Teaching	2(2%)		
Farm labour	3(3%)		
Chainsaw rental	2(2%)		
Modified taungya system(MTS)		43(20%)	25 (18%)
Others[6]		6(3%)	5(4%)
Multiple			
Crop farming and others[7]	18(15%)	2(1%)	
MTS and off reserve farming		95(45%)	70(51%)
MTS and others[8]		36(17%)	13(9%)

4.3 Local people's knowledge of forest and tree resources conflicts and conflict parties

In order to fully understand the causes of forest and tree livelihood conflicts in the three regimes, it is essential to present the context in which these conflicts occur. These are crucial to understanding the underlying and manifest causes from the perspectives of the local people. These are therefore presented under conflict general category, sub-categories, conflict types and sub-types in Table.

4.3.1 Conflict sub-categories, types and sub-types across the three regimes

The study revealed that disputes or conflicts over forest and tree resources in Tano-Offin gazetted forest fall into 3 general categories and 6 sub-categories where protection and production regimes have two common sub-categories being forest resource and land use based conflicts. Under the sub-categories are 18 conflict types and 15 sub-conflict types as shown in Table 4. The classifications of the conflicts are based on the regime in which the conflicts occur, the livelihood portfolios of which the conflicts evolve; level of intensity as well as the classification by Wehrmann (2006) as the legitimacy of actions and the actors involved.

4.3.2 Conflict actors constellation across the regimes

[6] Included trading, farm labourer, hairdressing, pastoral job, worker of administrator of stool lands, chainsaw millers, teachers, artisans, prison officials

[7]Others include sewing, hair plaiting, , driving, mechanics, trading, livestock, masonry, charcoal production, chainsaw milling and teaching

[8] Included civil service employees (mainly teachers), pensioners, artisans (or handicraft workers) and chainsaw millers

The study revealed that the diverse actors in the three regimes involved in the livelihood conflicts and operate at different levels of scale, namely at community, district, regional and national levels. Chainsaw milling conflict is prevalent in the production and protection regimes with the principal actors being chainsaw millers or artisanal millers. These include community members (either indigenes or migrants) and external operators who migrated from elsewhere purposely to engage in the milling activity. Counterparts in the conflicts include the TUC holders, traditional authorities, community members and farmers, FSD and military or the FSD and police officials, lumber buyers and carriers.

There are also conflicts among the operators themselves. Less visible to the respondents, but behind the operators, are actors at district and national levels who finance the operations. Actors involved in conflicts around NTFP collection for domestic use and hunting are mainly village inhabitants. Their counterparts in the conflicts are FSD officials. Actors involved in commercial NTFP trade are mainly outsiders, but also resident villagers. Actors involved in the extension of admitted farms include farmers in conflict with other farmers with whom they share a common boundary, or with FSD officials, chainsaw millers, food crop thieves, farm labourers or family members.

Finally, conflicts arising from illegal farming occur between illegal farmers (both natives and migrants) on the one side, and FSD officials, the military taskforce, CBAGs, or chiefs and elders on the other. The plantation regime's conflict types are more intra-group than inter-group. Conflict types such as boundary disputes, degraded land allocation and high fee for land preparation revolve around MTS farmers and their leaders, and among farmers. The inter-group conflict types revolve around farmers and FSD officials, farmers and chainsaw millers and food crop thieves.

Table 4: Livelihood components around which conflicts evolve in the three regimes in Tano-Offin forest reserve

General categories	Conflict sub-categories	Conflict types	Conflict sub-types
Protection regime	Forest resource based	Chainsaw milling	• Chainsaw milling conflicting with statutory legislations • Log theft resulting in confrontation among chainsaw operators, FSD and farmers • Coercive action of FSD/Military resulting in violence.
		NTFPs for domestic use (plants)	• Access to forest resources without verbal permission from forest guards.
		NTFPs for commercial use (plants)	• Commercial access without permit from FSD
	Forest land use	Hunting	• Hunting during closed season (August-December)
		Extension of admitted farms	• Limited access to admitted land due to increase in population • Trespassing into forestland die to defaced or lost boundary pillars
		Illegal farming	• Illegally farming in the forest reserve

Plantation regime	Institutional and operation	▪ Disproportionate allocation of forest land ▪ Farmers failure to plant the trees ▪ High fees for land preparation	
	Competing claims and inadequate protection for the claims	▪ Food crop theft ▪ Fire setting to trap game ▪ Crop and tree destruction	
	Uncertainty of the continuity of the plantation development	▪ Uncertain of future timber benefit distribution among individual participants ▪ Slow pace in documentation of farmers profile ▪ Insecurity of timber theft and risk of fire	
Production regime	Forest resource based	▪ Chainsaw milling	• Chainsaw millers felling trees without permit and permission from the FSD/TUC holders • Theft among chainsaw millers for lumber and fuel (gasoline)
		▪ NTFPs for domestic use (Plants)	• Limited access to NTFPs without verbal permission from forest guards

Table 4: Contd.

General categories	Conflict sub-categories	Conflict types	Conflict sub-types
Production regime	Forest resource based	NTFPs for commercial use (plants)	• Access without written permit from FSD
		Hunting	• Hunting during closed season (August-December)
	Operational conflicts within TUC areas	Social responsibility agreement	• Local people confrontation (violent and non-violent) with timber operators regarding payment of SRA (5% of tree stumpage fees)
	Forest land use	Boundary disputes	
		Illegal farming	

Source : Field survey 2009-2010

4.4 Local people's perception of the causes, effects and parties involved in forest and tree related conflicts

4.4.1 Fishbone diagrams of the causes of conflict in each of the regimes

The fishbone analysis resulted in the presentation of fishbone diagrams for each of the three regimes. The causes (manifest and antecedents) are categorised under core components of the conflict effects. From the protection regime as shown in Figure 4, conflict causes are put under six core components such as chainsaw milling, NTFPs domestic and trade, hunting , illegal farming and extension of admitted farms conflicts. Except for hunting conflicts, causes of conflict like limited job access, economic hardship and poverty were mentioned in all the other five components. Generally, causes such as greed, scarcity of farmland, access of resources without permits and boundary disputes cut across all the components. Abuse of prohibited period of hunting was unique to hunting conflict.

Similarly, limited job access, economic hardship and poverty were also mentioned as the cause of production regime conflicts in all the six components as shown in Figure 5 (under the production regime). Other important causes were access to forest resources without formal permits (e.g. NTFPs plant related and logging) and licence (hunting conflicts). While some of these causes cut across the six components, there are some that are only unique to a particular conflict component. For example, conflicts arising from timber benefits are caused by log thefts, reluctance of TUC holders to fulfil SRA code of conducts and obligation which when not well negotiated results in road barricade by local people. The reason is to prevent the TUC holders to transport the logs to the saw mills.

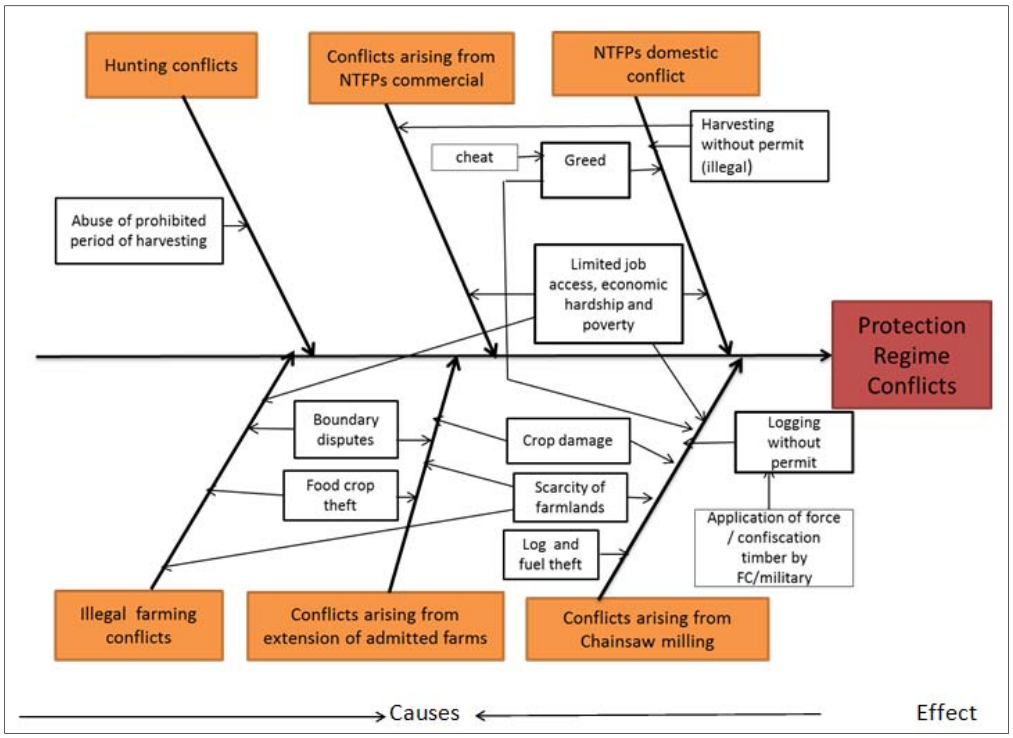

Figure 4: Fishbone diagram showing the causes and effect of forest and tree resources conflicts in Protection regime

The two components under plantation regime as shown in Figure 6 have both manifest and antecedents causes. Under the institutional and operational conflicts, causes such as greed, disproportionate allocation of forest land, boundary disputes, refusal to plant timber trees and inability to pay land preparation fees are among the antecedent causes mentioned. Under these are multiple manifest factors such as denial of MTS plots, greed unclear boundary line, abuse of power by leaders and trespassing into another's plots.

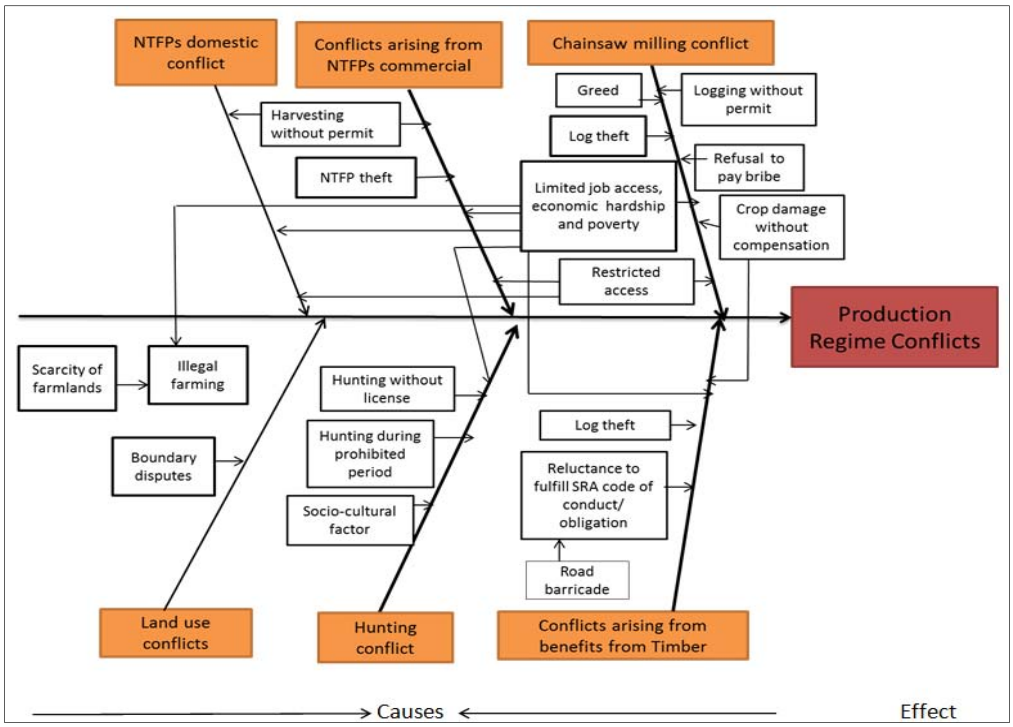

Figure 5: Fishbone diagram showing the causes and effect of forest and tree resources conflicts in Production regime

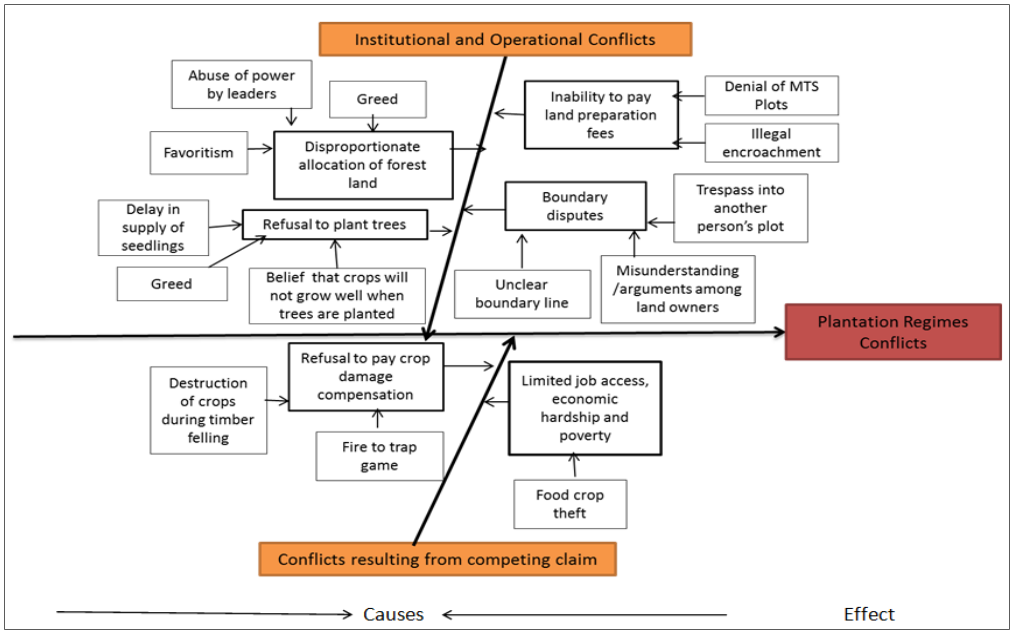

Figure 6: Fishbone diagram showing the causes and effect of forest and tree resources conflicts in Plantation regime

4.4.2. Pareto analysis of the conflict causes under each of the regimes

Figures 7-10 show the Pareto chart of causes of conflicts for each of the three regimes. Under the protection regime (see figure 7), four issues namely i) access to forest resources without permits; ii) boundary disputes; iii) scarcity of farmland and iv) limited job opportunity, economic hardship and poverty were mentioned by the respondents as the vital few with a cut-off point of 81.1%. From Pareto principles' perspective, it could be interpreted that 81.1% of forest and tree conflicts in the protection regime came from four causes of conflicts as indicated above. The production regime vital few causes of conflicts as shown in figure 8 include i) access to forest resources without permits or licence; ii) limited job opportunity, economic hardship and poverty; iii) log thefts and iv) reluctance of TUC holders to fulfil SRA obligation and code of conducts. Notwithstanding these four vital few causes covering 82.2% of the total frequency, there are six useful many causes such as greed and desire to get rich easily, restricted access or bureaucracy of obtaining permit and refusal to pay bribe.

The protection and production regimes share common conflict causes under the vital few and these are i) access to forest resources without permits or licence and ii) limited job opportunity, economic hardship and poverty.

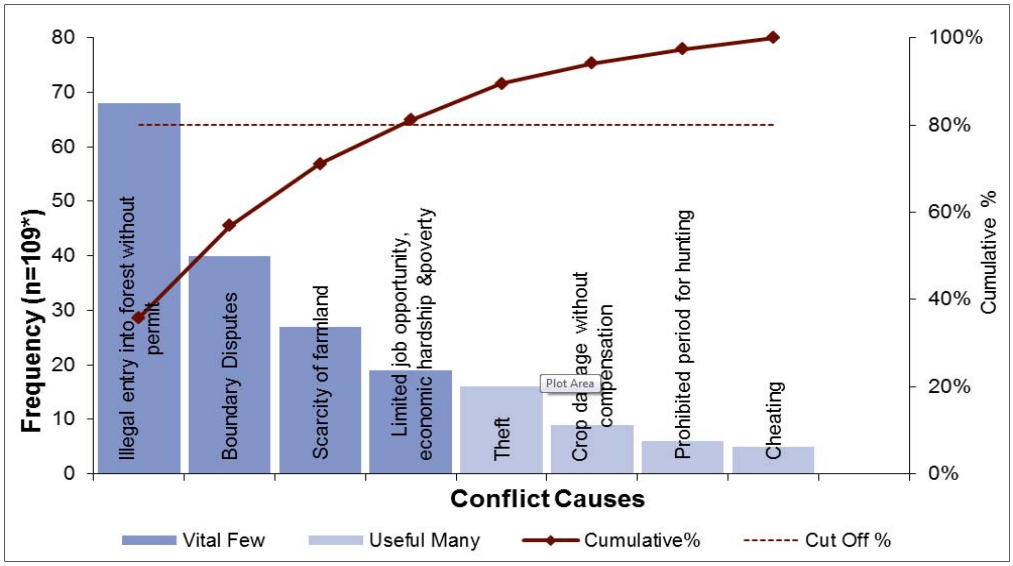

Figure 7: Causes of forest and tree resources conflicts in protection regime of Tano-Offin Forest Reserve

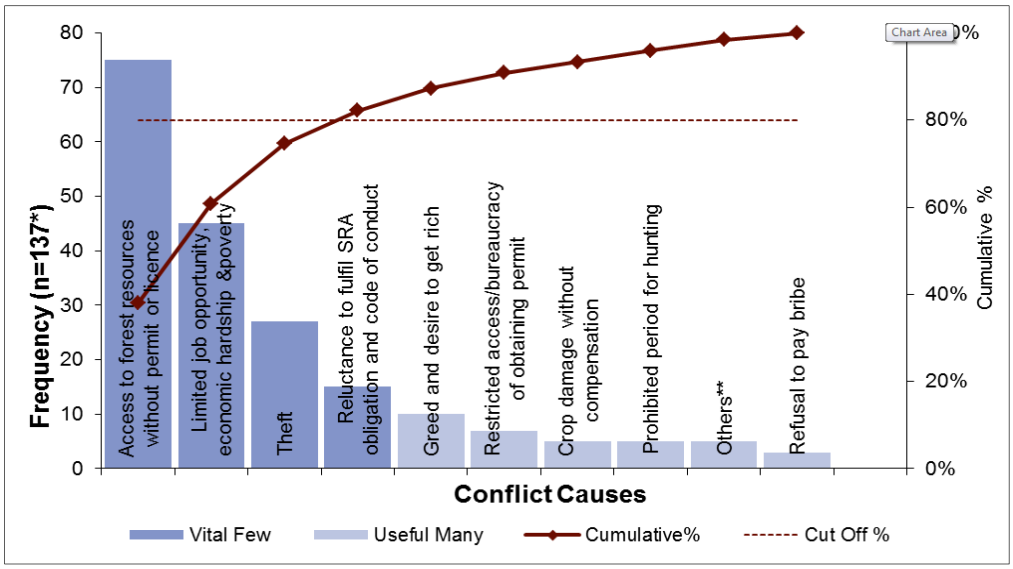

Figure 8: Causes of forest and tree resources conflicts in production regime of Tano-Offin Forest Reserve

Similarly, the plantation regime has two vital few conflict causes covering 83.0 % of the total frequency. These are boundary disputes and disproportionate allocation of forestland. Whiles both the production and protection considered limited job opportunity, economic hardship and poverty conflict cause under the vital few, this conflict cause is among the useful many causes under the plantation regime. The plantation and protection regimes also share a common conflict cause of boundary dispute under the vital few causes.

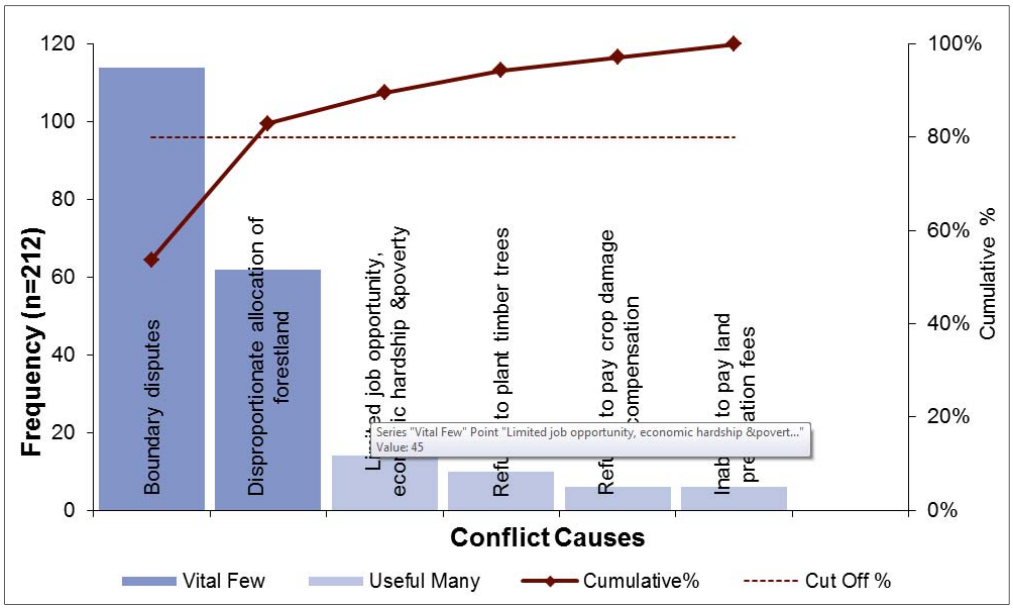

Figure 9: Causes of forest and tree resources conflicts in plantation regime of Tano-Offin Forest Reserve

4.4.3. Positioning local people's conflict causes in typologies using Affinity diagram

The different causes of conflicts across the three regimes mentioned by the local people were then categorised under six typologies of conflicts causes in literature using the affinity diagram which enabled common pattern to be identified. These are i) Policy, legislation lapses and institutional challenges (Tyler, 1999); ii) Perceived goal incompatibility (motivational forces) and iii) Perceived opportunities for deliberate interference with the other's goals (Schmidt and Kochan, 1972); iv) Environmental scarcity (including structural scarcity based on unequal distribution) (Homer-Dixon, 1994); v) Socio-cultural and vi) Economic factors (Geist and Lambin, 2002) as shown in Table 5.

Table 5: Local communities opinions of the drivers' of conflicts related to forest and tree livelihoods in Tano-Offin forest zone positioned under conflict typologies

Typologies of Conflict Causes/drivers	Local peoples underlying and manifest Forest and tree livelihood conflicts
Policy and legislation lapses and institutional challenges	• Harvesting of NTFPs without permit • Abuse of prohibited period of hunting • Coercive action and confiscation of forest products by FC/ military task force

	• Restricted access to forest resources and Procedural difficulties obtaining permits to harvest timber and NTFPs • Hunting with license • Encroachment in the forest for farming (illegal farming) • Delay in supply of tree seedlings to farmers by FSD leading to refusal to plant trees • The absence of internal forest boundary markers or pillars.
Perceived goal incompatibility (motivational forces)	• Boundary disputes (unclear boundary lines, trespassing to another person's plots, Force takeover of plots etc) • Food crop theft • Logs and fuel theft
Perceived opportunities for deliberate interference with the other's goals	• Refusal to pay for crop damage compensation during timber felling and sometimes destruction of crops by fire through hunting • Timber operators' reluctance to fulfil Social responsibility agreement code of conducts and obligation resulting in road barricade and confrontation between operators and local people
Environmental scarcity (including structural scarcity based on unequal distribution)	• Population increase • Farming land scarcity • Poor fertility of farmlands • Financial greed resulting in illegal exploitation of timber, excessive harvesting of NTFPS, acquisition of excess MTS Plots by committee executives • Rent seeking by officials from chainsaw millers • Disproportionate sharing of forestland for MTS due to favouritism and unable to pay for land preparation fees • Cheating
Socio-cultural	• Refusal to plant timber trees due to the believe that planting of the trees first before food crops under retard the growth of the food crops • Hunters refusal to give the thigh of the game harvested to the chief
Economic factors	• Limited job opportunities, economic hardship and poverty

Keys: NTFPs =Non-timber forest products; FC=Forestry Commission; FSD=Forest Services Division; MTS=Modified Taungya System.

4.4.3 Effects of conflicts across the regimes

Conflicts impacts or effects are determined and varied depending on how the conflicts arise, the duration and how the parties and third parties deal or manage the issues. Even though the conflict types studied in each regime are unique and also share cross-cutting causes, both negative and positive effects were indicated by the local people, some of these effects were also found to be immediate whiles others were expected. From the three regimes, some

negative effects included hatred, insults and fights between actors on issues bordering on the destruction of food crops, the evacuation of illegal farmers, the confiscation of chainsaws and/or lumber by forestry officials and the arrest or prosecution or imprisonment of offenders. In some instances, the offenders receive beatings from the FSD/military patrolling team or vice-versa that sometimes lead to injuries and death. Most of these effects according to the study respondents are linked to chainsaw milling conflicts. Boundary-related conflicts are also triggered by multiple effects and included arguments, fighting, misunderstanding, quarrels, hatred, summons from the authorities (chiefs, elders and taungya leaders), illegal farming, loss of interest in engaging in the plantation scheme, the destruction of crops, disagreements, threats and sometimes leading to invoking of 'gods' (curses[9]). However, most of these conflicts are non-violent in nature compared to chainsaw milling disputes.

It is interesting to indicate that in the production regime, reluctance of timber operators to fulfil SRA obligation and code of conducts result in bad state of communities' infrastructures such as schools; destruction of properties and road blockade to prevent movement of logs from the reserves to the cities. From the protection regime, the inhabitants traced some of their conflicts effects from historical perspective. According to the elders, the outcome of the reservation process over many centuries has resulted in farming land becoming scarce and infertile because of high population growth and continuous cultivation of the same piece of land for many years. Furthermore, they claimed that the creation of the GSBA in the early 2000s covered part of their portion of the forestland previously allocated for farming. Community members who were aggrieved because portions of their admitted farms are now part of the GSBA, extended their farms into the reserve 'illegally' (according to statutory law), with the risk of FSD officials arresting them or destroying their crops. According to the respondents, attempts to get forestry officials to resolve the boundary problem have proven to be futile.

Despite these negative effects, some interesting positive effects were also observed in plantation regime. Conflicts arising because of the

[9] Invoking of 'gods' (curses) is a local way of dealing with problems, and employed especially when a person is falsely accused. The accused person calls on the 'gods' to be a mediator or judge in the conflict situation. It has spiritual implications. If the accused person is indeed innocent, then the accusing person gets sick until some rituals are performed to help him or her to recover or to die peacefully.

disproportionate allocation of forestland cause grievances and protest and almost resulted in violent clashes in Chirayaso village. However, prompt intervention by the FSD official and the chief and elders of the village helped to ensure a peaceful end to the demonstration and resulted in positive impacts which strengthened the MTS group in the village. This resulted in four decisions undertaken by the conflict management actors in the presence of the entire community. First, the aggrieved farmers were promised to be allocated new plots of degraded land. Second, it was agreed that the executives should have four plots of land instead of one received by ordinary members to compensate for their leadership. Third, old taungya executives who were involved in the disproportionate allocation were replaced with newly elected ones and, finally, the chief and elders tasked the FSD officials to investigate the alleged exorbitant fees as made clear. Nonetheless, within the plantation regime, the study revealed that the abrupt discontinuity of the MTS without proper communication and exit strategy from the Forestry Commission to the local community partners has the potential to proliferate illegal farming in the reserve which unfortunately has the huge impact on the reserve due to change in land use if not detected on time. The abrupt discontinuity of the MTS according to the local people may have future negative effects on their wellbeing since it became a major source of livelihood. From the production regime four possible effects and implications were deduced as shown in Box 1.

Box 1: Possible conflict effects and implications in production regime

1. Communities and farmers succeed and/or fail to materialise their SRA benefit right

- Communities fail to fulfil their benefit rights if TUC holders deny them their SRA and thereby negotiate benefits with individuals instead of the entire community.
- Communities only acquire benefit rights after effective negotiation about the SRA obligation between the communities and the TUC holders are made and if the latter adhere to the code of conduct related to the SRA. However, the regular occurrence of road blockades indicates that some negotiations fail. In such cases, local communities succeed in claiming their rights through mediation by either the FSD or the District Chief Executive or through coercive action until the TUC holders meet their demands.

2. Communities and chainsaw millers' gain and/or lose access to timber resources

- *De facto* access is obtained by community members who illegally enter the forest reserve to gain access to farming land, NTFPs and, on a few occasions, to engage in chainsaw milling. Chainsaw millers beyond community settings also gain access to timber resources. Both actors lose when they are arrested or confronted by forestry officials or law enforcement agencies.

3. TUC holders lose timber to chainsaw millers and other TUC holders

- Through theft, some of the logs within TUC areas are appropriated by chainsaw millers and sometimes by a neighbouring TUC holder with the excuse being unintentional trespassing.

4. FSD fails to materialise revenue rights due to illegal logging

- In this case, the revenue intended for national economic development and/or key stakeholders' royalties go to individual pockets.

Keys: TUC=Timber Utilisation Contract; FSD=Forest Services Division

4.5 Local people's perception of the conflict management prevailing and its effectiveness

4.5.1 Local peoples' spectrum of conflict management strategies employed in different conflict types in the three regimes

Managing conflicts in the three regimes according to the local people is a blend of different strategies. The analysis also revealed that some of these conflict incidences are not managed since the offenders often escape (avoidance). According to the study, the application of one coping strategy to the other is dependent on the conflict actors and their respective parties. According to the respondents, the application of negotiation and arbitration in chainsaw milling are done either through i) dialogue among chainsaw operators, between chainsaw operators and farmers and sometimes between operators and forest guards (ii) bribery, which involves chainsaw operators and FSD/military personnel or Elite (either political or traditional) interferences. Adjudication in this conflict type also involves different stages. When the offender is arrested by the FC or the combined military team, the offenders are sometimes fined by the forestry officials or taken to court for prosecution where the judge either gives fines or imprisonment sentence to the culprit according to the prevailing law of Act 547 as shown in Figure 10.

The use of non-violent force or coercion was reported to occur in conflicts evolving around illegal farming, NTFPs for commercial use/trade and institutional and operation conflict specifically in the plantation regime. This was found in contrast to timber benefits and chainsaw milling conflicts where actors resort to either non-violent directive action and or violent action. For instance, it was revealed in the study that in conflict surrounding the reluctance of timber operators to fulfil the SRA obligation and code of conducts, if all negotiation and mediation strategies fail, local people resort to road blockade to prevent the timber operator to work and sometimes leads to violence. In hunting conflicts, two conflict management strategies prevail: arbitration through the district court system and negotiation. Here the magistrate normally resolves such an offence using arbitration (giving a mild sanction to the offender) rather than the adjudication process by fining the culprit based on the level of offence. Alternatively, if the offender pleads with the official upon arrest, he receives a warning not to lay game traps again. The actors in this conflict type use different conflict management strategies to

deal with the conflict incidences. In relation to the timber benefits like SRA, negotiation is the most frequently used approach, followed by mediation by the FSD or the District Chief Executive officials when negotiation fails or sometimes leading to non-violent and violent conflicts.

Within the institutional and operational conflict, the actors involved use a blend of conflict management approaches to manage the conflict incidences with the use of meditation and negotiation to deal with boundary-related, disproportionate allocation and non-payment of fees for land preparation issues. Coercion was mentioned exclusively in relation to conflicts arising from farmers refusing to plant trees and as the sole strategy to 'solve' these conflicts, and referred to the force applied by the FSD when it destroys crops of the disobedient farmers but these are non-violent.

The most common coping strategy reported in relation to admitted farm conflicts is a blend of mediation, arbitration negotiation, facilitation and moderation and avoidance as shown in Figure 10. Actors involved in mediation–arbitration include the chief and elders, family elders, landowners, a joint team of chief and elders or Unit Committees. Negotiation occurs mainly in conflicts among farmers, between the FSD and the community, and between the FSD and farmers. Facilitation and moderation often involves the creation of a special conflict resolution team made up of family elders or a joint team of chief and elders, forest guards and Unit Committee members.

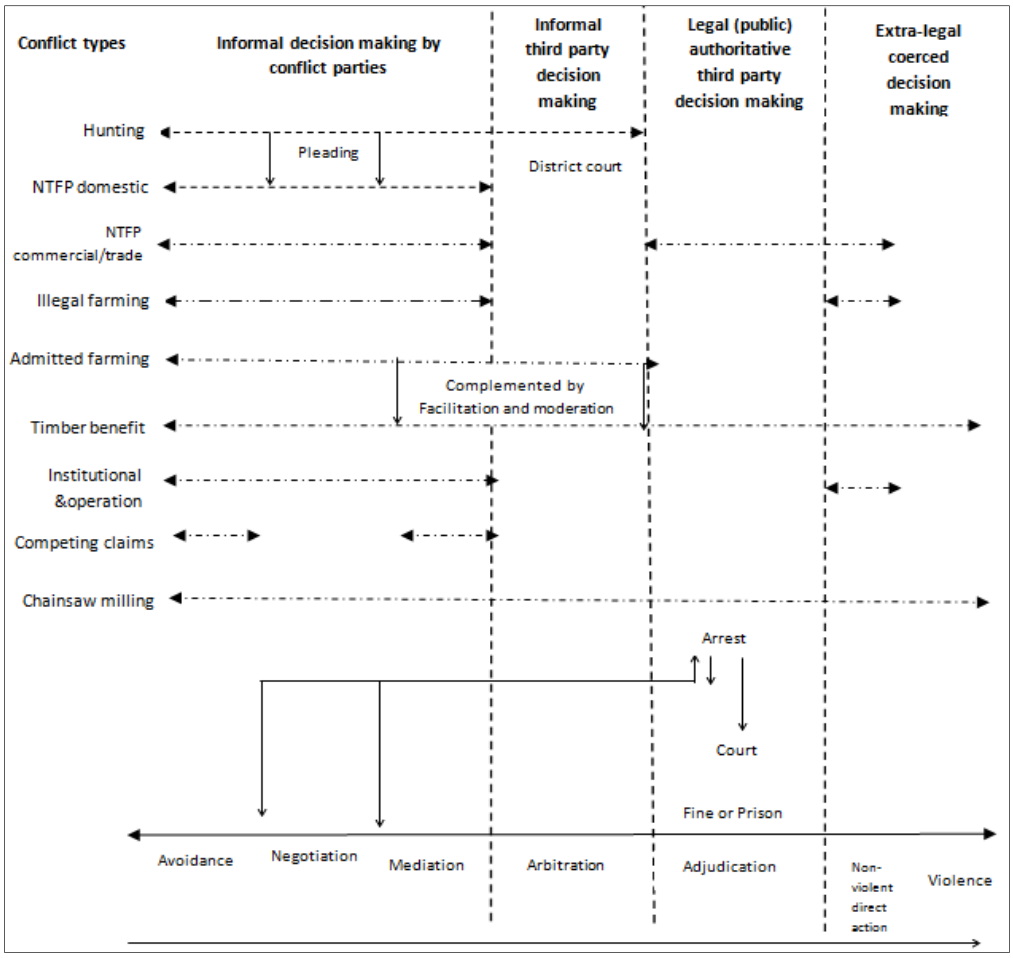

Figure 10: Perceived Spectrum of conflict management strategies employed in different conflict types in the three regimes (Source: Author, in scheme adapted from Moore, 2003)

4.5.2 Perceived effectiveness of managing the conflicts across the three regimes

It was revealed among the study respondents from the protection, production and plantation regimes that conflict management actors either being led by third parties or resolving among them have generated both positive and negative outcomes. In the production and protection regimes, respondents indicated that factors such as the culprit's acceptance of faults and supremacy of the intervening actors have positively influenced conflict management

outcomes. Culprit's acceptance of faults often resulted in agreements being reached based on a common understanding and tolerance between the parties, strong family ties and the desire for peace.

The role of the intervening third party actor such as the Unit Committees, chiefs and elders, family elders, FSD officials, police and court, also according to the respondents, contributed to successful conflict management. In the plantation regime as discussed under effects or impacts of the conflicts, the study respondents reported that the prompt and unbiased mediation by the FSD and the chief and elders of the Chirayaso village brought about peace after the mob demonstration by the aggrieved youths who did not get access to the MTS plots. This finally resulted in positive impacts which strengthened the institutional and operational arrangements of the MTS group in the village.

Nevertheless, some factors were found to hinder conflict management processes including (i) the lack of arbitrators to plead for community members (reference was made to a contested piece of admitted farmland in the GSBA), (ii) greed, and (iii) impatience and pride on the part of the parties leading to misunderstanding and disagreement. Other impeding factors include the illegality of operations in the forest reserve (especially in chainsaw lumbering and farming), restricted access to permits which people need to enter the forest, inflexible and recalcitrant behaviour exhibited by some people and bad judgment by a party due to favouritism.

4.8 Proposed strategies by local people to manage forest and tree resources conflicts at the micro-level

Local people involved in the study were asked of strategies to minimise or manage forest and tree resources conflicts at the micro-level, this led to the mention of different suggestions. From their perspective, in order for the MTS co-management arrangement between the Forestry Commission and local people under the plantation regime to be further improved, the local people first called for periodic education of farmers on the principles (do's and don'ts) of the MTS, backed by regular monitoring by both MTS leaders and FSD officials to help check on farmers who decline to plant trees at the specified times. Secondly, they proposed the development of mechanisms for the early detection and resolution of misunderstandings among farmers before they escalate into conflict situations. Thirdly, in order to improve the

prospects for the food crop component of the scheme, the farmers called for a wider tree planting distance of 6 m x 6 m instead of the present 3 m x 3 m spacing. This according to them will allow them to cultivate food crops on their tree farm for more than the usual three years until canopy closure, after which they cannot cultivate light-demanding food crops anymore. This is to enable them stay longer on a piece of forestland and derive more benefits from it, and also create an incentive to maintain the trees, with positive effects on the quality of the timber stand.

At the production regime, respondents proposed that effective conflict management involves the collaborative efforts of stakeholders especially at the local level. From a validation meeting at the local level, consensus was reached on the roles indicated in the survey outcomes. Accordingly, the chiefs and elders at community level could play advisory, educating, mediating and monitoring roles. The hybrid actors' roles (i.e. those of the CBAGs and CFCs) should centre on collaboration with the FSD, traditional authorities and communities, as well as on education and advising on issues of forestry and support of preventing and mediating conflicts. The role for the FSD should include education, consultation and effective implementation of forestry activities such as the MTS and boundary cleaning. Law enforcement agencies (i.e. police, military and judiciary) must ensure efficient and fair enforcement and judgement. The local arm of government (i.e. the District Assembly) needs to engage the communities in education and support them by mediating in their forest benefits (i.e. SRA negotiations). According to the respondents at the protection regime, legal access to forest resources to improve their livelihoods in the middle of the protected forest was a proposal to the FSD. Furthermore, there was a call on the FSD to resolve the perception by some inhabitants of the protection regime that portions of their admitted farms were incorporated into the GSBA during the demarcation of the GSBA from Tano-Offin Forest Reserve.

DISCUSSION

The discussion is divided into three sections linking them with literature. Section one reflects on the politics of the forest regimes and the second analyses the conflict causes, effects and coping strategies. The last section is on the implications of the forest and tree resources conflicts on micro-level governance.

5.1 Politics of forest regimes

Diversity of institutional structures prevails at the forest sector at the micro-level ranging from the statutory, customary, civil society, hybrid and transnational structures as indicated in the result. Under each governing structure, diverse actors operate across the level of scales (i.e. local, regional, national and international) and their activities have influence (positive or negative) on the forest resources and the local people at the micro-level. The actors in each governing structure do interact not only amongst themselves but with actors in the other governing structures. These occur as they access, allocate, manage or use forest resources as well as ensure the enforcement of the laws governing the resources. This brings to fore the three styles of governance as indicated by Kooiman and Bavinck (2005) as self-governance, hierarchical and co-governance found across the regimes. For example, the co-governance style in this study was seen in the plantation regime under the MTS where the state is in partnership with local people for shared benefits; however these are not without challenges as seen in the result.

Furthermore, the dynamics of actors in this sector also call for the hybrid governing structure and support the assertion that the transitional nature of the Ghanaian governance process do not allow a number of actors to fit into or be static at one specific actor category (Derkyi, 2012). This departs from the conventional categorisation of forest actors as primary, secondary, tertiary or as state, civil society or private (Kotey et al., 1998; Mayers and Koety, 1996) since some actors do have double ‘’hats’’ depending on their interest of forest issues in question or are organised by one or more of the governing structures making those actors hold allegiance to them. In this study, the position of MTS farmers is hybrid because they owe allegiance to the customary governing structure (since that is their origin) and the statutory and sometimes to civil society, depending on who established and supported them. As actors

are diverse, so are the rules and strategies (both formal and informal) that govern access, allocation and enforcement of these resources. Some of these laws or strategies are unique to a regime while others cut across. The Timber Resource Management Act (547) and Amendment Act 617 and Legislative Instrument 1971 regulate production regime timber resource allocation and give ownership right of planted trees to individuals under plantation regime. On the other hand, Act 624 which is on forest offences and sanctions cut across the regimes.

A key weakness with respect to resource benefit sharing is the absence of any tangible benefits for people in and around the protection regime. While the distribution of timber revenue and plantation benefits are distributed amongst stakeholders as indicated in Table 2, none of such benefits get to inhabitants around and in the protection regime. It is therefore not surprising that access to forest resources especially at the protection regime are characterised by illegalities and criminalised by statutory laws. This is a situation, Peluso (1992) referred to as "the progressive criminalisation of customary rights of forest resources", which according to Amanor (2005) are such that acts are not acknowledged by local people as an act of defiance since their objective is to achieve subsistence thus defying such statutory law as an act of defiance.

Such incidences stimulate conflicts between them and the forest officials. From the preceding discussion, one would have thought that forest illegalities especially those related to livelihoods would occur only in the protection regime where access is restricted. However, it is also prevalent in production regime as well as plantation where the latter was seen as more intra-group conflicts than inter-group. The former however from literature conform to the concept of *'bundles and webs of powers'* by Ribot and Peluso (2003:154) where from the study, actors like chainsaw millers cannot gain legal access to commercial timber compared to TUC holders. This trend of restricted access to small scale industry may be expected to be changed when chainsaw millers are organised under the legal structure termed as ''Artisanal millers'' under the VPA to fulfil Article 17 of the agreement.

5.2 Conflict causes, effects and coping strategies across the regimes

Analyses of the different causes of conflicts in the three regimes revealed that context indeed play a key role in conflict types, causes and actors (Moore, 2003). In spite of these differences, some of the conflict types, causes and effects as well as the actors also do cut across as seen especially in the production and protection regimes. Conflicts that revolve around chainsaw milling, plant related NTFPs for trade and domestic uses, hunting and forest land use are common in these two regimes as shown in the Fishbone diagrams. Conflict causes such as greed; limited job access, economic hardship and poverty and abuse of access or restricted access to the forest and tree resources were mentioned under the entire regime.

In his article, the Left: where Greed meets envy, McGinley (2012) brought to fore the difference between greed and envy. According to the author, greed is the desire to have more and depending on how that desire is acted upon, can be beneficial or detrimental. While envy, on the other hand is acted upon, there is no good, only bad because in worst cases it leads to mass theft and murder (American Thinker, August, 19, 2013).

While the Fishbone analyses present the overall overview of the causes, the Pareto analysis presents which of these causes will have the greatest impact if remedied (Karuppusami and Gandhinathan, 2006). In all the three regimes, seven causes were identified under the vital few according to Pareto principles. These are i) access to forest resources without permit; ii) scarcity of farmlands; iii) limited job opportunity, economic hardship and poverty; iv) boundary disputes; v) log theft; vi) disproportionate allocation of forestland and vii) reluctance of TUC holders to fulfil SRA code of conduct and obligation. Thus, the Pareto tool becomes an important tool for management decision since causes mentioned are from majority of frequencies of occurrence. The application of the affinity diagram becomes relevant because the causes mentioned at the micro-level could be positioned at the macro or global typologies of conflict causes and deforestation drivers (e.g. Tyler, 1999; Schmidt and Kochan, 1972; Homer-Dixon, 1994; Geist and Lambin, 2002) as shown in Table 5.

These conflicts were seen to be characterised by both positive and negative effects as well as immediate and expected effects. Positive effects ensure stronger collective action as seen in the plantation regime where denial of

access to forest land for farming under the MTS by leaders resulted in demonstration which positively changed the management structure through election and equitable distribution. Literature reveals that strong collective action is an essential pre-requisite for sustainable resource management (Ostrom, 1990). Likewise, negative effects result in disharmony, mistrust, injuries and abuse of prevailing laws as shown under all the three regimes where access to forest resources are done without the necessary legal requirement. Such state also results in negative effect on the forest environment.

As shown under the production regime, destruction of community assets and denial to compensate result in blockade of road which affect the stability of the community as well as economic loss to the timber industry and the country's economy in general. Most of these conflicts as indicated by the local people are managed through a blend of coping strategies (i.e. negotiation, mediation, arbitration, adjudication, coercion) (i.e. non-violent and violent) and some are also not managed at all (avoidance) as shown using Moore's conflict management continuum. According to the local people, a conflict type may employ all these range of strategies and may be successful or unsuccessful depending on the conflict actors, intensity of the conflict as well as the third party. This indeed re-echoed the assertion that building the capability of forest actors is one of the key steps to detect early warning signals and minimise conflict incidences (Derkyi, 2012; Yasmi, 2007; Marfo, 2006).

5.3 Micro-level forest governance implications

The assertion of Zartman (1997) that conflict management cannot be separated from governance, and that the right mechanisms should be put in place to deal with conflicts among groups before they escalate and block the governing process has indeed been confirmed at this micro-level study. From the study, there is a clear indication that the different conflict types, their causes and effects do not only affect the people engaged in the conflicts but also affect the rules or laws governing the resources through abuse or disregard of the laws which invariably have effect on the forest regimes resulting in decline of the resources. It must however be made clear that unfavourable governing system (politics) on local people or other stakeholders whose dependencies are high on the forest resources also do result in

weakness of enforcement of the law and competition amongst resource users resulting in conflicts (Amanor, 2005 and Puelso,1992). From conceptual perspective, this study indicates that functional interactive micro-level forest governance can be seen if the interactions among the actors, politics and the natural assets in question are analytically assessed using quality tools to understand which components of the governance system do conflicts arise and the vital few causes that need policy or research considerations.

This, from Figure 5 should be well aligned with Moores' conflict management continuum to find possible intervention(s) for improvement which may result in equitable access to resources for livelihood needs, capability of actors to detect early conflict signs in order to minimise them and overall ensure functional interactive micro-level governance.

CONCLUSIONS AND RECOMMENDATIONS

This section presents the conclusion and makes recommendations for policy and research considerations.

Forest governance reforms have emerged to curtail the fast rate of deforestation, forest degradation and desertification. However, this calls for clear understanding of the dynamics of the interaction of the different components of the systems and the conflicts emerging. Reflecting on the first assumption of the study, the study has indeed confirmed that restricted access to, control of and allocation of forest and tree resources lead to increased forest and tree conflicts which are more prevalent in the protection and production regimes compared to the plantation regime. Using quality tools from total quality management discipline, this study employed the Fishbone diagram, Pareto analysis and the Affinity diagram which have offered insight into understanding the causes or drivers of conflicts from the three regimes at the micro-level.

For instance, the application of Pareto analysis has led to a methodology for identifying and ranking the problems that offer the greatest opportunity for improvement. The methodology has also helped find solutions to address these problems at source with the active involvement of main actors in the field. These tools were complemented by Moore's conflict management continuum to understand the different coping strategies employed by conflict actors and third parties. From the study, seven key causes were scored high in terms of their frequency of occurrence which calls for policy and research consideration. Despite the wide range of coping strategies employed, effectiveness was attributed to the actions and inactions of the conflict parties, the conflict management third parties as well as the intensity of the conflict.

The study has indeed shown that quality tools such as the ones used in this study and others are relevant analytical tools to understand the dynamics of conflict drivers or causes in natural resource management.

POLICY RECOMMENDATION

This study has generated some recommendations for consideration in the policy and research arena and reflects the views of both the researcher and the local people.

1. Application of quality tools to conduct conflict analysis in natural resources management

Quality management tools such as the Fishbone diagram, Pareto analysis and the Affinity Diagram have been useful to unearth the different causes of forest and tree livelihood conflicts, identify and rank the problems that offer the greatest opportunity for improvement as well as position these causes at the micro-level to the debates of conflict causes typologies at the macro and global perspectives. There are also other equally excellent qualities tools such as the force field analysis and scatter plot among others that will help to understand complex situations and provide solutions or improve results or performance.

2. Constitution of a stakeholder brainstorming team

Literature has indicated that the application of quality tools and techniques has achieved much positive impact in terms of improving the quality performance of products and process when the exercises are collectively done by a team of stakeholders using brainstorming exercises. It is therefore recommended that policy makers, development workers and researchers in forestry sector or natural resources arena can take this study findings at another level, where groups of stakeholders will be constituted to re-analyse the causes of the conflicts as well as the conflict management strategies mentioned by the local people using the same tools applied so as to identify more intervention spaces to improve natural resource conflicts at the micro-level. Even though Pareto Principle calls for greater attention on the 'Vital Few', there is however the need for the brainstorming team to critically assess and re-assess the 'Useful Many' factors to ensure that a factor(s) under such category if not addressed, will not affect the quality or performance of the products or the process in question.

3. Conflict analysis in forest or natural resources management (NRM) should pay equal attention to the three governance components

The relationship between natural resources and conflict is not new. Forest resources conflict goes beyond competing claims among actors/parties but touches on the governing system elements such as access, power imbalances, unfavourable policies, as well as state (whether decline or abundance) of the resource in question. It is therefore recommended that conflict research to find holistic interventions to prevent or minimise these conflicts need to consider all the three key governance components-namely i) the natural system (e.g. forest, water, agriculture, etc); the governing systems (statutory and customary rules and laws, etc) and the human system (actors) and their interactions thereof (see Kooiman et al., 2005, 2008; Derkyi, 2012). Such research may call for multi-disciplinary approach using expertise from different disciplines to achieve result oriented research.

4. Exploring opportunities to improve income security from the modified taungya system

Improving the prospects for the food crop component of the scheme, the farmers called for a wider tree planting distance of 6 m x 6 m instead of the present 3 m x 3 m spacing. This according to them will allow them to cultivate food crops on their tree farm for more than the usual three years until canopy closure. This is to enable them stay longer on a piece of forestland and derive more benefits from it, while at the same time also creating an incentive to maintain the trees, with positive effects on the quality of the timber stand. Further research is needed on how such income can be realised through thinning, engagement in carbon schemes and cultivation of shade-tolerant crops to enable a farmer to stay on the piece of land until the trees mature.

5. Building the capabilities of forest actors in natural resource conflict management

The call to enhance conflict management capability among actors in natural resources management (both managers and users) is not new but is an echo of previous studies on natural resources conflict management (e.g. Derkyi, 2012; Marfo, 2006; Yasmi, 2007). Before such action can be achieved, it should begin with the capacity building of the resource managers in early detection of conflict signals and management strategies to improve upon the soft skills of the managers to have effective interactions among themselves and the

resource users. It is recommended that such skills should be given to the resource managers at the forefront of the resource assets. These skills must be accompanied by logistics such as vehicles and protective clothing in order to enable them to monitor the activities in the forest on a regular basis, which helps to curtail illegalities at an early stage. In addition, there is the need to equip the Forestry Commission district offices with computers and accessories to enable their staff to keep proper records and track forest offences cases. It is believed that training Forestry Commission officials will have a multiplier effect on other stakeholders, but this will not occur without technical and financial support from civil society and international donors.

6. Improving state-local people partnership at the micro-level

Local people involved in the study were asked of strategies to minimise or manage forest and tree resources conflicts at the micro-level, and this led to different suggestions. From their perspective, in order for state-local people partnership (e.g. MTS co-management) to be further improved, there is the needfor periodic education of farmers on the principles (do's and don'ts) backed by regular joint monitoring to detect early challenges and opportunities.

7. Micro-level stakeholders' collective actions to improve conflict management

Local people recommended that effective conflict management involves the collaborative efforts of stakeholders especially at the local level. Accordingly, the chiefs and elders at community level could play advisory, educating, mediating and monitoring roles. The hybrid actors' roles (i.e. those of the CBAGs and CFCs) should centre on collaboration with the FSD, traditional authorities and communities, as well as on education and advising on issues of forestry and support of preventing and mediating conflicts. The role for the FSD should include education, consultation and effective implementation of forestry activities such as the MTS and boundary cleaning. Law enforcement agencies (i.e. police, military and judiciary) must ensure efficient and fair enforcement and judgement. The local arm of government (i.e. the District Assembly) needs to engage the communities in education and support them by mediating in their forest benefits (i.e. SRA negotiations).

8. Equitable benefit sharing to include inhabitants at the protection regime

Policy makers should reconsider the limited or absence of resource benefits of inhabitants living in and around rich globally significant biodiversity areas in order to minimise the prevalent illegal access to forest resources and prevent the extinction of flora and fauna for human survival.

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APPENDIX: RAW DATA FOR PARETO ANALYSIS

Causes of conflicts	Frequency under each forest and tree livelihoods						Total
	Chainsaw milling	Admitted farm extension	Hunting	Illegal farming	NTFP commercial	NTFP domestic	
Illegal entry without permit	31			19	15	3	68
Cheat	4					1	5
Theft	12	3		1			16
Limited job access, Economic hardship and poverty	10			5	3	1	19
Scarcity of farmland	2	15		10			27
Boundary disputes		35		5			40
Destruction of food crops during timber felling	4	5					9
Prohibited period for hunting			6				6
*Protection regime (multiple responses) n=109**							

*=multiple responses to conflict causes

Pareto Table for protection regime

		Cumulative Percentage Cut-off: 80%	
#	**Conflict Causes**	**Frequency (n=109*)**	Cumulative%
1	Illegal entry into forest without permit	68	35.8%
2	Boundary Disputes	40	56.8%
3	Scarcity of farmland	27	71.1%
4	Limited job opportunity, economic hardship &poverty	19	81.1%
5	Theft	16	89.5%
6	Crop damage without compensation	9	94.2%
7	Prohibited period for hunting	6	97.4%
8	Cheating	5	100.0%
*Production regime n=137**			

Causes of conflicts	Frequency under each forest and tree livelihoods							Total
	Chainsaw milling	NTFP commercial	NTFP domestic	Hunting	Illegal farming	Boundary dispute	TUC	
Illegal entry/felling despite ban of chainsaw milling /without permit or licence	44	17	1	6	5	2		75
Limited job opportunity, Economic hardship and poverty	27	11	3	1	1		2	45
Theft	12	3					12	27
Betrayal/mistrust	3							3
Crop damage without compensation	3						2	5
Restricted access /bureaucracy of obtaining permit	5	1	1					7
Greed and desire to get rich	9				1			10
Prohibited hunting season				5				5
Social cultural factor				1				1
Scarcity of farmland					2			2
Refusal to clean forest boundary						2		2
Reluctance to fulfil SRA obligation/code of conduct							15	15

*there were multiple responses to conflict causes. Others (Land scarcity (2), Refusal to clean forest boundary (2) & Social cultural factor (1)

Pareto Table for production regime

		Cumulative Percentage Cut-off: 80%	
#	Conflict Causes	Frequency (n=212)	Cumulative%
1	Boundary disputes	114	53.8%
2	Disproportionate allocation of forestland	62	83.0%
3	Limited job opportunity, economic hardship &poverty	14	89.6%
4	Refusal to plant timber trees	10	94.3%
5	Refusal to pay crop damage compensation	6	97.2%
6	Inability to pay land preparation fees	6	100.0%

Plantation regime (n=212)

Underlying causes	Manifest	Frequency
Boundary disputes	Trespassing, land take over, greed, unclear boundary lines intentional and un-international means, ownership misunderstanding, arguments	114
Disproportionate allocation of forest land	Abuse of power by MTS leaders, favouritism, misunderstanding, population increase against land given for sharing, greed,	62
Poverty	Crop theft,=unemployment/greed	14
Refusal to pay crop damage compensation	Destruction of food crops, fire set by hunters	6
Inability to pay land preparation fees	Denial of MTS plots, fees high, illegal encroachment	6
Refusal to plant timber trees	Delay in the supply of seedling at the appropriate planting seasen, belief that food crops will not grow when trees are planted first, greed	10

Pareto Table for plantation regime

Cumulative Percentage Cut off: 80%

#	Conflict Causes	Frequency (n=212)	Cumulative%
1	Boundary disputes	114	53.8%
2	Disproportionate allocation of forestland	62	83.0%
3	Limited job opportunity, economic hardship &poverty	14	89.6%
4	Refusal to plant timber trees	10	94.3%
5	Refusal to pay crop damage compensation	6	97.2%
6	Inability to pay land preparation fees	6	100.0%

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