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LOOKING BEYOND THE OBVIOUS:

Uncovering the Features of Natural Resource Conflicts in Uganda

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ABSTRACT

Disputes over land, water, forests, rangelands, and other resources, both privately and commonly-held, are omnipresent across Africa and increasing in number due to the socioeconomic and environmental changes happening on micro- and macro-levels. Communities in Africa have a variety of mechanisms rooted in customary and statutory institutions to deal with disputes. This paper uses community-level survey data from Uganda to investigate the determinants of natural resource conflicts and the type of institutions people turn to for conflict resolution. The findings identify four primary types of conflicts (over private land boundaries, common-pool resources other than water, water resources, and conflicts over other resources) and reveal that several factors such as agroecological potential, poverty level, population density, and proximity to roads and markets affect the likelihood of a resource-related conflict. The results also show that even though most people turn to the local government (a formal institution) for arbitration, customary institutions still play an important role in conflict management, especially for the poorer communities where formal institutions are weak. The type of conflict also matters for the type of institution chosen to resolve it with the conflicts over commons being mediated through customary institutions, while all the others are usually channeled through the local government. The findings point to the importance of both customary and formal institutions for conflict resolution options in Uganda, highlighting the need to examine their potential complementarities.

Keywords: Natural resources, conflict resolution, customary institutions, formal institutions, Uganda, sub-Saharan Africa

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LOOKING BEYOND THE OBVIOUS:

Uncovering the Features of Natural Resource Conflicts in Uganda

Ephraim Nkonya¹ and Helen Markelova

1. INTRODUCTION

Production systems, which for most households in the developing world include natural resources, have always been prone to conflicts. The literature shows that disputes over land, water, forests, rangelands and even by-products such as grass and manure are omnipresent across Africa (Cousins, 1996). These conflicts stem from the multifunctional roles played by these resources and their embeddedness into the web of human relations as multiple users have overlapping claims and rights to various resources based on both statutory and customary laws (Haro et al., 2005; Upreti, 2004a).

Such conflicts are getting more and more ubiquitous in light of the changing environment conditions, various population dynamics, and the effect of several decades of environmental mismanagement by governments, all of which has led to the increasing competition for the diminishing resources (Cousins, 1996; Deininger and Castagnini, 2004). Land degradation and rapid population growth have reduced the stock and quality of natural resources and this has also contributed to frequency and intensity of conflicts (Westing et al., 2001; UNCCD, 1994). Previously, researchers viewed communities as homogenous entities and the environment as relatively stable, assuming a linear relationship between the two. This view has since been abandoned (Leach et al., 1999). The effects of the increasing number of local, national, and international resource-related conflicts have shown that not only the availability, but also access and use rights have tremendous welfare consequences on the resource-dependent poor (Cousins, 1996; Buckles and Rusnak, 1999).

Communities in Africa have always had endogenous mechanisms to deal with disputes. Before and during the colonial period, most of them relied on well-established customary institutions to mediate and resolve conflicts. However, with the arrival of the colonial powers, the traditional authority structures began to disintegrate, coming under even greater pressure from rapid social, political, and economic changes that followed independence (Cousins, 1996). Most resource-related disputes now have taken on political and sociocultural dimensions, making their effective resolution an even more challenging task (Buckles and Rusnak, 1999).

The foundations for the resolution mechanisms have fallen along the lines of customary versus statutory institutions. While the state has legal powers to enforce its regulations, communities often perceive endogenously-created rules as more legitimate, hence increasing compliance (Markelova and Swallow, 2008). With the wave of political and administrative decentralization sweeping the continent in the

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last two decades, state authority structures have been moved “closer” to the local communities (Olowu, 2003). In many cases, these new local authorities are elected, making them more transparent and accountable to their constituents (Ribot, 2001). The rules made by the decentralized authorities are often perceived as internal to the communities and evoke more trust than the removed central government. However, local governments have been characterized by low capacity to enact and enforce bylaws and to resolve conflicts (Deininger and Castagnini, 2004; Means et al., 2002). This has given customary institutions an opportunity to grow even in countries where they are not given legal rights to arbitration of natural resource conflicts (Toulmin, 2008; Toulmin and Quan, 2000).

This paper uses community survey data from Uganda to investigate what type of institutions people turn to for conflict resolution. Peer-reviewed accounts show that the decentralization process in Uganda was more successful than in other parts of Africa (Olowu, 2003; Onyach-Olaa, 2003). Using a number of decentralization criteria,² studies by Ndegwa (2002) and Ndegwa and Levy (2004) ranked Uganda as the second most decentralized country in sub-Saharan Africa (SSA). The high performance of decentralization makes Uganda an interesting case study for SSA and other developing countries. The next section discusses the causes and types of natural resource conflicts, mechanisms used to resolve them across Africa, provides the background information on the current Ugandan administrative structures and the relevancy of Uganda as a case study. The following section presents the data and discusses the methodology used in this analysis. The subsequent section describes the results, followed by conclusions and policy implications.

2. NATURAL RESOURCE CONFLICTS IN AFRICA

Nature and impacts of conflicts

Since natural resources are intrinsically linked with many aspects of the production systems, numerous examples of conflicts are found across Africa. They range from competition over scarce resources, such as grazing lands and water points, to disputes over land boundaries and ownership rights, to arguments over the access and use of common-pool resources such as forests (Upreti, 2004a and 2004b; Edossa et al., 2007; Tyler, 1999). The literature on conflicts in natural resources divides them into several categories according to scale: community-level, inter-community, or supracommunity (Sanginga et al., 2007; Edossa et al., 2007). There are also conflicts at the farm level that involve individual farmers or farmer(s) and a group of farmers (Deininger and Castagnini, 2004). These conflicts have been increasing with the population and land degradation, both of which lead to higher pressure on land. For example, in Uganda only about 10 percent of land parcels were affected by land conflicts before 1990, but this number rose to 23 percent in 2004-2005 (UBOS, 2007).

Even though the majority of the natural resource conflicts happen on the local level, most of these conflicts stretch beyond the local level to involve actors at

² Decentralization criteria used were: administrative, political, and fiscal decentralization, downward accountability, upward accountability, and system stability/durability (Ndegwa, 2002).

other levels. Intensity varies from locally contained disputes to violent clashes between groups over resource ownership rights and responsibilities (Sanginga, 2007; Suliman, 1999). Even though the smaller localized disputes may be effectively resolved, even the trivial conflicts related to natural resources can linger under the surface for generations to one day erupt into large-scale inter-ethnic violence (Deininger and Castagnini, 2004). Survival is often at stake in such conflicts with potentially wasteful use of human capital and depletion of the resources necessary for individual and community livelihoods putting the long-term peaceful co-existence of various groups in jeopardy. Bloodshed may be an extreme, but a possible outcome (Buckles and Rusnak, 1999). For example, the genocide in Rwanda in the 1990s was rooted in the conflicts over scarcity of arable land in the south of the country (Ohlsson, 2000).

Any type of conflict is deleterious for the livelihoods of the resource-dependent communities as well as society as a whole. Perhaps the most costly land conflict in Sub-Saharan Africa is the conflict around land in Zimbabwe. The conflict has undoubtedly contributed to the declining economic growth in Zimbabwe (Chitiyo, 2004; Economist, 1999; ICG, 2004). Deininger and Castagnini (2004) examine the productivity impact of land conflicts in Uganda caused by unclear tenure rights, competition between traditional and modern rights systems, inheritance disputes, and weak institutional environment to support land reforms. They conclude that conflicts lower land productivity by inflicting crop damage, including perennial crops, leaving land unused as a result of fear to cultivate, and undermining land markets. These outcomes lead to diminished productivity of land, forcing more disadvantaged segments such as widows to make sub-optimal use of their land by depriving them of potential rental income, and resulting in an overall sub-optimal social land use. They conclude that economic loss is a common outcome of land-related conflicts. Thebaud and Batterbury (2001) show that other resources, such as water, can be in the center of a long-term violent conflict as in the example of the conflict over access to wells and boreholes between Fulani and Tubu tribes in eastern Niger. This pro-longed conflict between the two herder groups had a serious impact on market activities and economic development of the region.

This paper focuses on the micro-level disputes that happen between individuals from the same community or from a different community, and, more rarely, between community members and local government representatives or large landowners. Besides the limitations in data that preclude the possibility of examining the supracommunity conflicts, the latter are actually of lesser interest to this paper since its main objective is to investigate what locally-available institutions people use for conflict resolution. Such institutions and their resolution mechanisms in most cases are unable to deal with larger-scale disputes that go beyond the local scale (Sanginga et al., 2007).

Causes of conflicts

Upreti (2004b) defines conflict as “a clash of interests, complaints in public, protests, and filing cases with the local administration and courts” (p.372). This definition serves the purposes of this paper as it can be extended to describe disputes over land, water, forests, and other natural resources. The interaction

between these resources and their users, as well as between users, is a complex process involving multiple relationships, which makes it more prone to disputes.

Buckles and Rusnak (1999) highlight that natural resources are embedded in the social space where complex interactions between stakeholders take place, leading to various relationships of inequality when more powerful groups have the ability to limit access to resources for others. This inequality of access in some cases may be exacerbated by the scarcity that natural resources are subject to. In addition, resources are not only used for livelihood purposes, but often fulfill a cultural function, such as symbolizing ethnic identity as in the case of the Maasai pastoralists in Kenya. The authors conclude that conflicts that arise due to this particular nature of resources can only be resolved when these underlying tensions are reconciled, which is not likely to happen.

What remains common among the numerous instances of conflicts across Africa is where they take their root. The literature identifies several leading causes of natural resource disputes:³

1. Increasing resource scarcity due to:
 - Population dynamics (especially migration) that put extra pressure on scarce resources (Unruh, 2002; Leach et al., 1999);
 - Environmental changes, such as droughts and other effects of climate change (Turner, 1999; Cousins, 1996);
 - Worsening resource conditions, such as land degradation (Ohlsson, 2000; Westing, et al., 2001; Cousins, 1996; Suliman, 1999).
2. Increasing international and domestic trade flows that create additional demand for resources (Tyler, 1999);
3. Increasing commercial pressures on land and partner resources from global economic crisis and climate change response strategies (Swallow and Meinzen-Dick, 2009; Von Braun and Meinzen-Dick, 2009);
4. Nested and dynamic systems of property rights, with unclear or undefined rights for some groups (Upreti, 2004a; Unruh, 2002; Thebaud and Batterbury, 2001);
5. Years of political instability and conflict that resulted in mismanagement and weak natural resource management (NRM) institutions (Deininger and Castagnini, 2004; Edossa et al., 2007).

We will discuss in details these and other factors in the theoretical framework that guided our analytical approach at community level.

Conflict resolution institutions

The literature shows that multiple institutions⁴ participate in various capacities in outlining the rules of access and use of natural resources, including conflict

³ These causes are not listed in any particular order (severity, etc), but as a list of various reasons contributing to the increasing instances of resource-related conflict in Africa.

⁴ We define institutions broadly here to include both “rules of the game” (North, 1990) and organizations that shape and enforce those rules (Kirk, 1999).

resolution mechanisms. These include the state and its various agencies at different administrative levels, international agencies, non-governmental and parastatal organizations, and customary and religious institutions (Meinzen-Dick and Pradhan, 2002). They can also be distinguished along the line of formal and informal, which is usually understood as originating in the state (formal) or the customary (informal) law and tradition. This distinction becomes the principal approach to institutions adopted in this paper.⁵ As each type of institution brings its own method to disputes, Agrawal and Ostrom (2001) argue that the outcome depends on who crafts the rules that are applied to a certain conflict.

Customary institutions are in most instances endogenously crafted and enforced, legitimized by social norms and legitimate only in the eyes of the local resource users (Leach et al., 1999). Local courts, councils of elders, and traditional landlords are just some examples of these authorities who draw their right to manage conflicts from customs or local bylaws, but are in most cases not viewed as legitimate by the state (Olowu, 2003; Edossa et al., 2007; Upreti, 2004a). Compared to statutory institutions, customary institutions have lower costs of conflict arbitration and enforcement (Colding and Folke, 2000; Schlager, 2005). These institutions are deeply embedded into the social fabric of the communities, and often their objective in a conflict situation is to maintain peace and stability rather than to punish the wrong-doer (Cousins, 1996).

As a result of being deeply rooted into the community, customary institutions are often perceived as more trustworthy, fair, and better able to deal with conflict when compared with state institutions (Gibson et al., 2005; Edossa et al., 2007; Unruh, 2002). This is why in recent years there has been a trend among development agencies to engage traditional institutions into their programs for greater effectiveness and acceptance with the local communities (Cousins, 1996). The methods of enacting and enforcing customary institutions are quite different from the formal institutions (discussed below). While formal institutions are written and enacted by a legislative body, customary institutions are not written and are not enacted by a legislative body (Leach et al., 1999).

However, customary institutions are not always egalitarian and can be subject to the local power politics (Campbell and Shackleton, 2001). Besides, new situations have arisen as a result of recent demographic, economic, and environmental changes that are not covered by the content of customary rules and regulations (Cousins, 1996). Since customary institutions tend to be oriented to a specific ethnic group, they tend to work better in communities with the same ethnic group and fairly homogeneous socio-economic characteristics (Bikaako and Ssenkumba, 2003; Poteete and Ostrom, 2004). Hence, customary institutions are weak in communities with diverse socio-cultural characteristics, especially in situations where migration and other demographic shifts have changed the ethnic composition of a community.

Formal institutions are written laws and regulations that are enacted by a legislative body such as a parliament or local government councils. Formal institutions that are enacted by a legislative body higher than the village or

⁵ We use this distinction because it is common, especially in the economics literature, but note that many customary systems are highly formalized.

community council are imposed and enforced exogenously by a third party (Leach et al., 1999). In countries with decentralized governments, village councils may have legal rights to enact their own bylaws. If enactment of such bylaws is done in consultation with community members, these bylaws are regarded as internal but some key requirements may still render such bylaws to have some form of external influence. For example, decentralization acts in many countries require that the local government bylaws and ordinances should be compliant with national level statutes (Shvestova, 2003; Nkonya et al., 2008a; Olowu, 2004). This is the case in Uganda, where the Uganda Local Government Act of 1997 requires that the local government bylaws and ordinances should be compliant with the national statutes (Onyach-Olaa, 2003).

While formal rules can be made by the state and international and national NGOs, for the purpose of the discussion and analysis in this paper, only statutory ordinances are considered and referred to as "formal." By formal institutions, for the purposes of this paper, the authors imply the written laws and regulations that are enacted by a legislative model by a national or a local government body. As will be discussed later, we divide the conflict resolution institutions into only two categories due to limited number of observations available for this study.

Much of the natural resource literature points out that the involvement of these formal institutions in dispute resolution is often perceived as corrupt and ineffective due to the lack of legitimacy in the eyes of the local resource claimants. Moreover, such involvement is often expensive, seen as benefitting local elites, and, in some instances, inaccessible to the non-elites (Upreti, 2004a; Leach et al., 1999; Tyler, 1999; Agrawal and Ostrom, 2001). However, the state has the power to back up its action with statutory law, the legality of which cannot be disputed.

With the wave of the decentralization reforms that have been sweeping across the continent in the past few decades, the perceptions about state agencies have begun to change, as have their functions and modes of operation. By bringing the state closer to the communities, the rules and regulations created and enacted by the decentralized bodies have become more responsive to the local needs (Tyler, 1999; Markelova and Swallow, 2008). In countries where these decentralized authorities have sufficient decision-making powers and a certain degree of fiscal autonomy, their decisions and involvement in local conflict resolution has been perceived as legitimate and effective by local communities (Sanginga et al., 2007; Olowu, 2003). The reduced distance between the state and its constituents can increase accountability; facilitate easier monitoring and enforcement of certain rules regarding the use and access to resources, and lead to positive welfare outcomes (Larson, 2002). In some cases, these decentralized structures operate in close relationship with the traditional institutions, especially in the area of natural resource management (Campbell and Shackleton, 2001; Nkonya et al., 2008; Wily, 2006).

However, local government institutions in SSA remain weak due to the limited financial and human resources to enforce regulations (Brockington, 2007; Ostrom, 1990; Larson, 2002). Besides, while decentralization is still perceived by scholars to be a more effective governance alternative for Africa, it has not had uniform success everywhere. In some instances, the "new" local authorities were superimposed on the traditional governance structures, leading to tensions and further distrust (Onyach-Olaa, 2003; Edossa et al., 2007). Larson (2002)

emphasizes that the apprehension about the effectiveness and fairness of local governments is not unfounded based on the often low technical capacity in managing natural resources as well as perceived bias toward local elites. This weakness has strengthened the role that customary institutions play in conflict resolution.

Trends in conflict resolution in Africa

There is no doubt that the instances of the resource-related conflicts are increasing, especially as the resource conditions are deteriorating under the pressure from changing environmental conditions and population dynamics (Ntambirweki, 1998; Adams and Turner, 2006). Concurrently, the institutional environment is also changing signifying a potential change in the mechanisms that people use for conflict resolution.

The literature reports that the recent trend has been toward preference for state institutions in times of dispute (Edossa et al., 2007; Leach et al., 1999; Cousins, 1996). This comes as no surprise: since the colonial period, the customary institutions have been undermined by the more powerful state and have declined and/or eroded in some places. In others, they have been incorporated into the colonial and post-colonial administration, resulting in mixed hybrid systems (Turner, 1999; Delville, 2000). For example, the Rural Code of Niger gives customary institutions a role in land conflict arbitration for land held under customary tenure (Delville, 2000). Decentralization in some places virtually replaced the traditional structures with the locally elected government officials (Sanginga et al., 2007; Campbell et al., 2001). Even with the growing interest in participatory approaches and community-based natural resource management, in many cases there is an expressed respect for the traditional institutions, but little consideration or decision-making power being granted to them (Edossa et al., 2007).

This study attempts to contribute to the existing literature on the institutions in natural resource management by analyzing the determinants of choice of customary or formal institutions in conflict resolution. The study also examines the factors that affect the occurrence of conflicts. Results of the study will help in designing policies that take advantage of each of the two institutions in natural resource conflict arbitration.

Natural resources and decentralization reforms in Uganda

Uganda presents a particularly interesting case for the investigation of the institutions for conflict resolution. Sanginga et al. (2007) in their thorough account of the resource-related conflicts in Uganda highlight that the majority of the households interviewed report having experienced more than three natural resource conflicts. These include boundary disputes, disagreements over animal grazing lands, and other conflicts related to the fragmentation of small land plots and access to common-pool resources caused by encroachment, land grabbing, and even privatization. The authors also underscore that the prevalence of land conflicts is linked to the pluralism in property rights introduced in the course of the recent decentralization reforms and co-existence of a variety of land tenure arrangements also make Uganda an interesting case-study.

These arrangements range from customary in most of the North, to freehold in the South, to *mailo* in central Uganda. Land under *mailo* is the land that was previously awarded to absentee landlords during the British colonial rule on the vast territory of the Buganda kingdom, the main ethnic group in Uganda. Freehold tenure was also an agreement between the British and several kingdoms in Western Uganda. Leasehold tenure was introduced by the British and consisted of an agreement between a lessor and lessee that the lessee will enjoy exclusive possession of the land of the lessor for a specific and certain duration in consideration of a payment. Leasehold can be either private or statutory.⁶ Through several land reform laws and the Constitution of 1995, Uganda now has four types of land tenure systems: freehold, *mailo*, leasehold, and customary (Deininger and Castagnini, 2004; Rugadya, 1999).

The Local Government Acts of 1997 assigns many responsibilities to local government, including community affairs, land surveying, road maintenance, and collection and expenditures of local revenue, thus equipping them with fiscal authority (Olowu, 2003). While the traditional institutions that were typically used for conflict resolution were already on the decline, the new nested layer of administrative structures provided a new platform for creating and enforcing rules for NRM, mimicking the administrative hierarchy of the Buganda Kingdom, the largest ethnic group in Uganda (Banana et al., 2007). Despite its success in performance of decentralization, weaknesses of the local governments to enforce NRM regulations persist in Uganda.

Uganda's decentralization reforms have been generally acknowledged as fairly successful in terms of devolving a significant amount of autonomy and decision-making powers to the lower levels, including certain fiscal powers (Larson, 2002). A review of decentralization performance in Africa put Uganda second after South Africa in terms of the effectiveness of local decentralized institutions (Ndegwa, 2002; Ndegwa and Levy, 2004). However, the abolition of the graduated taxes in 2005, which contributed 80 percent of the local government revenue, reduced the ability of the local governments to finance their plans and to govern independently (Green, 2008). Central government financing of local governments has increasingly declined due to the creation of new districts that increase the operational costs. Uganda is now the country with the fourth largest number of sub-national administrative units,⁷ and consequently, the smallest average number of people per sub-national administrative unit among large countries in Africa (Green, 2008). The emerging concern is that the districts are becoming too numerous, too small, financially non-viable, and difficult to supervise and monitor by the center. Such weaknesses again underline the role that customary institutions will continue to play in conflict resolution.

Table 1, based on Sanginga et al. (2004), represents the five-tiered structure of the decentralized local government in Uganda. According to Sanginga et al. (2007), while most levels are responsible for dispute resolution, Local Council

⁶ In the survey used for this analysis, there was no community with predominantly leasehold land tenure, and therefore is not used in the study. This type tenure is quite limited in rural areas and is typically found in urban areas.

⁷ The first three are: Russia, Philippines, and Turkey (Green, 2008).

1 (LC1) level was found to have the highest capacity to manage conflict, most likely due to its proximity to the communities, as opposed to the higher LC2 and LC3 levels. Interestingly, while a substantial number of people still choose to turn to the clan elders and community groups for mediation and negotiation during a dispute, more people turn to the LC1 leaders for formal arbitration of conflicts. While the literature on conflicts emphasizes the critical role of social capital for dispute mediation, Sanginga and colleagues argue that their findings confirm the importance of social capital: even though LC1 represents essentially an extension of the state, its structures are based on social ties and traditional authority structures.

Table 1: Levels and functions of local government structures in Uganda

Local government level	Composition	Some functions ⁸
Local council 1: Village (composed of about 50 households)	9 members, at least 4 women	-Make bylaws -Resolve problems and disputes - Enforce bylaws
Local council 2: Parish (composed of 3-10 villages)	Depending on the number of villages, with at least 4 women from the village	-Monitor administration of projects -Resolve problems and disputes
LC3: Sub-county (composed of 2-10 parishes)	Depending on the number of parishes, with at least 1/3 women, 2 youth, 2 persons with disabilities; include elected councilors from parishes	-Local government -Enact bylaws -Formulate sub-county budget -Resolve problems and disputes
LC4: County (composed of 3-4 sub-counties)	5 members, chairpersons or vice-chairpersons from each sub-county	-Advise district officers and members of Parliament -Resolve problems and disputes
LC5: District (composed of 3-5 countries)	36 members, including 12 female councilors, 2 youth, 2 people with disabilities, and 19 elected councilors	-Exercise all political and executive powers -Ensure implementation and compliance with government policies -Levy and collect taxes

Source: Sanginga et al. (2004).

3. THEORETICAL FRAMEWORK OF DETERMINANTS OF NATURAL RESOURCE CONFLICTS AND CHOICE OF INSTITUTIONS FOR CONFLICT RESOLUTION

This study analyzes the determinants of occurrence of natural resource conflicts at community and household level and the choice of institutions to resolve them. Based on the literature, we discuss the major factors that affect both outcomes. This discussion forms the basis of the empirical model that will be discussed in the next section.

⁸ Only functions related to NRM or conflict resolution are listed here. For a full description of the responsibilities of each government level, see Sanginga et al. (2007).

1. Legitimacy and strength of existing institutions: Legal pluralism offers opportunities for communities to select an institution that they consider capable of resolving resource conflicts (Poteete and Ostrom, 2004; Toulmin and Quan, 2000). Wittmer et al. (2006) note that institutions should be compatible with the socio-cultural environment that prevails in the community. This legitimacy is defined by the socio-cultural and legal environment prevailing in a community. Meinzen-Dick and Pradhan (2002) note that strength of institutions, or their capacity to create and enforce rules, determines their effectiveness. Weak institutions are not likely to be used for resolving conflicts. An institution, by statutory law, may be charged with the responsibility to resolve conflicts, but such a statutory institution may not enjoy legitimacy in a community due to its exogenous nature and ineffectiveness as a result of low capacity. Hence, communities may question their validity and dispute-resolution ability, and, therefore, choose other institutions to resolve conflicts. Hence in this case, legitimacy of an institution is not what is defined by the statutory laws but how the communities view such institutions. We expect customary institutions to be perceived as more legitimate in resolving conflicts related to land boundaries in remote areas and/or with predominantly customary land tenure.
2. Community-level socio-economic characteristics: The literature on legal pluralism identifies a large number of socio-economic factors that determine choice of institutions for claiming rights and access, resolving conflicts, and managing natural resources (see a review by Gurung et al., 2006; Poteete and Ostrom, 2004; Ostrom, 1990; Meinzen-Dick and Pradhan, 2002; Agrawal, 2001; Wittmer et al., 2006). For brevity, we discuss the major types of socio-economic characteristics that determine the choice of institutions for conflict resolution at community and household level. Poverty, a factor that is correlated with a large number of socio-economic factors, is a key determinant of choice of conflict resolution institutions. Poor communities, which are often located in remote areas, away from roads and major cities (Ahmed et al., 2007), will tend to choose customary institutions that are well-understood in such communities and readily available at reasonably low cost (Wittmer et al., 2006; Bhattarai and Hammig, 2001; Means et al., 2002). Less educated communities also tend to choose customary institutions to avoid the formal institutions that involve written laws and rather complex legal proceedings (Platteau, 2004; Means et al., 2002). The expensive and long process of arbitration through the court system of formal institutions makes them less accessible to the uneducated and poor farmers living in remote areas (Means et al., 2002). On the contrary, communities with high literacy rate, which are closer to markets and roads (Ahmed et al., 2007), will tend to choose formal institutions to resolve conflicts. High population density is likely to increase resource scarcity and degradation, both of which are likely to increase frequency and intensity of conflicts (Toulmin, 2008; Westing et al., 2001) thus requiring formal institutions to resolve them. Conflicts in such areas are also more likely due to resource scarcity than other factors.

3. Characteristics of conflict: Choice of institution to resolve conflicts depends on the type of conflict (Fitzpatrick, 2005; World Bank, 2003; IIED, 1999). Conflicts involving communities with different socio-cultural characteristics and/or covering large areas (example, transboundary water resources) may be best solved using formal institutions (World Bank, 2003; Fitzpatrick, 2005). Conflicts involving boundaries of land held under customary tenure are likely to be resolved through customary structures (Toulmin and Quan, 2000; Fitzpatrick, 2005). Severe conflicts that threaten peace and security and/or lead to loss of lives and property in most cases involve formal institution (Fitzpatrick, 2005; Toulmin and Quan, 2000; Wily, 2006). Customary institutions are better equipped to resolve conflicts involving common grazing lands and other collectively owned natural resources that are held under customary arrangements (Fitzpatrick, 2005; Toulmin, 2008; Toulmin and Quan, 2000). Hence, the characteristics of a conflict matter for the institutions chosen to resolve it.
4. Cost of conflict resolution: One of the factors that has limited widespread application of formal land tenure system and decentralization is the high cost of enforcing formal regulations (Francis and James, 2003; Prud'homme, 1995). This has left a vacuum that the customary institutions, which are less costly and readily available in rural areas to provide conflict resolution and other natural resource management services, can fill, especially since they are embedded into the community structures (McAuslan, 2006; Leach et al., 1999). Hence, we expect poor communities to choose customary institutions for conflict resolution.
5. Stock and condition of natural resources: Abundance of resources may reduce the level of competition and consequent conflicts (Ostrom, 1990). However, in what has been known as the Dutch disease, abundance of natural resources has also been associated with conflicts (Sachs and Warner, 2001).⁹ Resolution of such conflicts always involves formal institutions since they lead to civil wars and involve resources that contribute significantly to the economy or the interests of the politicians, so their scale falls beyond the scope of this paper and availability of data, especially in Africa, where the Dutch disease conflicts are largely related to oil and minerals. However, land-based conflicts in the region have been more frequent in areas with resource scarcity or areas with conflicting land use such as in the cases of the pastoral versus crop farming uses (Muhereza and Otim, 2002; Westing et al., 2001; UNCCD, 1994). Bardhan (1993) observed that collective action to protect natural resources is likely to break down under resource scarcity, leading to severe conflicts. Such conflicts may threaten peace and security and hence attract the attention of the formal institutions. However, weak formal institutions in remote areas may still enhance use of customary institutions in highly degraded areas. Therefore, we expect an ambiguous relationship between formal institutions and the stock and condition of

⁹ However, recent studies have questioned the Dutch disease theory---for an example, see De Soysa, and Neumayer (2007).

natural resources. We also expect an ambiguous relationship between stock of resources and occurrence of conflicts, but a positive association between severity of natural resource degradation and conflicts.

6. Policies and external institutions and market conditions: Policies and institutions in a given country may strengthen customary institutions to mediate conflicts. A number of countries have recognized the role of customary institutions to mediate resource conflicts (Sunderlin et al., 2008; Toulmin and Quan, 2000; Toulmin, 2008). For example, the Rural Code in Niger integrates customary systems into formal law (Delville, 2000). It gives traditional chiefs a special role in the land conflict arbitration, organization and management of rural lands, and planning and management of natural resources acquired under customary land tenure (Gnoumou and Bloch, 2003; Delville, 2000). In many countries however, statutory laws do not give customary institutions a specific role in conflict resolution (McAuslan, 2006). For example, in Uganda the Land Act of 1997 recognizes the customary land tenure, but customary institutions are not given explicit role in land conflict arbitration, despite the fact that 54percent of the households in Uganda own land under customary tenure (UBOS, 2003). Yet, the government land conflict arbitration system through the village and district councils is not well-established to handle the land conflicts (Sanginga et al., 2007; Deininger and Castagnini, 2004). Based on these findings, we expect communities to choose the type of institution depending on their institutional capacity to resolve conflicts. In high market access areas, where formal institutions are strong, we expect communities to choose formal institutions and customary institutions in remote areas, where formal institutions are weak. Likewise, access to roads and markets opens cultural diversity and socio-economic diversity that could compromise the effectiveness of customary institutions to resolve conflicts (Toulmin, 2008; Toulmin and Quan, 2000) and those in high market access to use formal institutions.

4. DATA

1. Hence, we expect communities in remote areas to use customary institutions. We use community level data to analyze the natural resource conflicts and the institutions used to resolve them. A community level survey covering 123 LC1s was drawn from a sample of 972 rural LC1s that were randomly sampled in the 2002/03 Uganda National Household Survey (UNHS). The sampling was weighted using population of each district. The criteria used for sub-sampling the 2002/03 UNHS communities were the level of poverty and the endowment of natural resources at district level. Eight districts were purposively selected to represent three levels of poverty and endowment of natural resources (Table 2).¹⁰

¹⁰ For more information on data collection, see Nkonya et al. (2008a)

Table 2: Selected communities in each agroecological potential zone

Agroecological potential zone	Communities selected (#)	Districts selected	Poverty Status¹	Natural resource endowment (Agricultural potential)²
Unimodal low	43	Arua, Lira, Soroti, Kapchorwa	High	Low potential
Bimodal low	21	Mbarara	High to medium	Low to medium potential
Bimodal medium	19	Soroti	Medium	Medium potential
Bimodal high	40	Iganga, Masaka, Kabale	Low	High potential
Total	123			

Note: Some districts span over more than one agricultural potential zone. Hence they are listed in zones that a large share of their area falls.

¹ Using UNHS 2002/03 data, rural poverty status of a district was ranked using poverty incidence, which is the share of people living in households with real consumption per adult equivalent below the poverty line of the region. The poverty incidence rate is classified into three major groups: low (below 40%), medium (from 40% to 50%), and high (above 50%).

² Agricultural potential is an abstraction of many factors—including rainfall level and distribution, altitude, soil type and depth, topography, presence of pests and diseases, presence of irrigation, and others—that influence the absolute (as opposed to comparative) advantage of producing agricultural commodities in a particular place (Ruecker et al., 2003).

The unimodal rainfall zone spans from northwestern to northeastern regions of Uganda. The area receives about 400 – 700 mm of rainfall in the semi-arid northeastern region and up to 1200 mm in the northwestern and northern parts. The highlands in Kapchorwa district receive above 1200 mm. This zone is characterized by high level of poverty. A recent survey showed that 61percent of the population in northern Uganda was below the poverty line (UBOS, 2006). This is almost twice the national poverty level of 31percent (UBOS, 2007). This zone is least endowed with water, vegetation and agricultural potential in general. The bimodal low rainfall zone is in the southwestern cattle corridor area in the Mbarara, Rakai, and Ntungamo districts.¹¹ This zone receives about 700 – 1200 mm per year, and the predominant land tenure is customary. The bimodal medium rainfall zone lies in the north central districts with the cattle corridor area crossing the region. The zone receives about 900 – 1200 of rainfall. Land tenure in the zone is mainly customary in the far north parts of the zone but mailo in the southern parts. The land tenure system in the central region is mailo, which gives landholders freehold title.¹² The bimodal high rainfall zone is in the Lake Victoria Crescent region and the southwestern highlands. The zone is well-endowed with natural

¹¹ The cattle corridor area runs from northeastern Uganda through the north central districts to the lowland dry plains in southwestern Uganda (Magunda and Majaliwa, 2006).

¹² *Mailo* is freehold by definition since the owner owns it indefinitely. It acquired a special name due to its history (see earlier in the paper) ---it was given by the colonialists to the king and other nobilities in the Buganda kingdom. This sets it apart from other freehold system that the government currently gives to people.

resources, and its share of people below the poverty line is lowest: 16 percent in the central region and 21 percent in the southwestern highlands (UBOS, 2006).

The community level poverty was quantified using secondary data obtained from the Uganda Bureau of Statistics (UBOS). To represent the degree of poverty for each community, we used the poverty gap, which is the difference between the poverty line and the real private consumption per adult equivalent. The poverty gap for each community was obtained by aggregating the household level income data.

A semi-structured instrument was used to collect data from 10 – 15 key informants who were purposefully selected to provide information on institutions, natural resource governance and management, and labor issues on behalf of the entire community. Typically, the key informants selected were the village chairperson or secretary, secretary for environment, secretary for agriculture, women and youth, and some other community members. This group provided information on the type of conflicts and institutions used to resolve them as well as other primary data used in the present study.¹³

We found that, overall, in 85 percent of all reported conflicts, formal institutions were chosen for resolution, while the informal institutions were consulted in 15 percent of the cases. Table 3 summarizes the variables discussed above and their expected association with choice of institutions and occurrence of conflicts. However, the table does not include factors that cover the entire country (for example, policies and external institutions). The table also reports the summary statistics of the variables used in the econometric model. The statistics are based on the community level survey conducted in 2003 (see the description of the data above).

Table 3: Descriptive statistics of variables used in econometric analysis

Variable	Expected sign on:		Mean
	Choice of formal institution	Probability of conflict	
Type of conflict that occurred in 2002 (% of all conflicts reported)			
Private land boundaries	+/-		55.98
Common natural resources	+/-		8.15
Water	+/-		12.50
Other conflicts ¹	+/-		9.78
Poverty gap (%) ²	-		13.00
Communities with program and organization with focus on agriculture and environment (%)	+	-	35.87
Literacy rate (%) ³	+	+/-	52.30
Distance to all-weather road (km)	-	-	2.47
Potential market integration (PMI) (index) ⁴	+	+	187.87
Population density (people/km ²)	+	+	367.32

¹³ The poverty gap variable is an exception and was derived from the UBOS 2002/03 data, as explained above.

Households with no land (%)	+/-	+	7.37
Woodland degraded (%)	+/-	+	16.59
Pasture degraded (%)	+/-	+	18.15
Cropland with irreversible degradation (%)	+/-	+	1.23
Land tenure (% of communities with)			
Customary ⁵	-	-	86.31
Freehold	+	-	5.40
Mailo	+	+	8.33

¹Includes livestock feeding on crops and cutting trees on someone else’s farm.

² Rural poverty gap in 2005/06 was 9.7% (UBOS, 2006).

³ Literacy rate in 2005/06 was 66% (UBOS, 2006).

⁴Potential market integration is the travel time from a location to the nearest five markets, weighted by the population size of those markets (a higher value of PMI indicates better market access) (Wood et al., 1999). PMI is a continuous variable and decision to assign a given area a degree/level of market access (example, high market access or low market access) is arbitrary.

⁵Land conflicts in areas with customary land tenure in Uganda have been lower and higher in areas with freehold and *mailo* tenure (UBOS, 2007).

5. MODEL

Our major objective is to analyze the determinants of conflict occurrence and the choice of institutions used to resolve such conflicts. Given that the type of conflict also determines the choice of institution for conflict resolution, the empirical model specified below will be estimated:

$$\begin{aligned} P(w_i) &= \beta_1 x + e_1 \\ P(R_{ij}) &= \beta_2 x + \tau w_i + e_2 \end{aligned} \quad (1),$$

where $P(w_i)$ is the probability to have conflict w of type i ($i=1,2,3, 4$) in 2002 (one year before data was collected); x is the vector of determinants of conflicts (see Table 3 for list of determinants); e_1 is error term of $P(w_i)$; $P(R_{ij})$ is the probability of choosing institution j for resolution of conflict i , with $j = 1, 2$; $\beta_1, 2$ and τ are coefficients of the associated covariates; and e_2 is error term of $P(R_{ij})$.

Since $\text{Cov}(e_1, e_2) \neq 0$ and w_i is endogenous, we use the maximum likelihood bivariate probit model, which is recursive and therefore addresses the endogeneity of w_i (Greene, 2003). The error terms of both equations are assumed to be independently and identically distributed as bivariate normal, that is,

$$\begin{pmatrix} e_1 \\ e_2 \end{pmatrix} \sim HDN \left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix} \right] \quad (2),$$

where $\rho = \text{cov}(e_1, e_2)$. $\text{Cov}(e_1, e_2)$ was significantly different from zero (at $p = 0.01$) for all equations estimated, and therefore estimating univariate probit models will give biased estimators equations. To assess the robustness of the results, we report both the bivariate and univariate probit models. Even though the degree of natural resource degradation is endogenous over a long period of time, it is exogenous in this model since the degradation process takes a long time while both dependent variables (choice of institutions and occurrence of conflicts) were estimated for a single period, year 2002/03.

Due to the small number of communities included in the survey, we estimate a parsimonious empirical model that reflects only the major determinants of choice of institutions and the probability for a conflict to occur. We represent the socio-economic characteristics of the communities using the following variables: poverty gap, literacy rate, and distance from all-weather road, potential market integration (PMI), presence of programs and organization with focus on agriculture and environment, population density, land tenure, and the share of landless communities' members. PMI is an index of market access –it represents the travel time to the nearest five markets, weighted by their population (Wood et al., 1999). Other socio-economic characteristics such as ethnicity are important, but this was highly correlated with the agricultural potential, which is discussed below. The stock of natural resources is represented by the agricultural potential, which is in this study is defined as the average length of crop growing period of a selected crop in a given area rainfall pattern (bimodal versus unimodal), maximum annual temperature, and altitude (Ruecker et al. 2003).

To improve identification of the equations, we dropped some covariates from each equation. Even though this is not necessary given that the biprobit model is non-linear (Wilde, 2000), having different sets of covariates for each equation improves identification. To choose the variables to drop, we performed a Wald test using the full bivariate probit model for choice of institutions and type of conflicts to determine the variables that we could drop. The coefficients of agricultural potential, PMI, and degree of degradation of woodlands, pasture and cropland were jointly not significantly different from zero at $p=0.10$, so they were dropped in the second stage model (choice of institutions). Some variables were also dropped for having very few or no positive values. For example, there were no conflicts around access to common-pool natural resources other than water in the bimodal low and high rainfall zones.¹⁴ We also checked for multicollinearity for all models using the variance inflation factor (VIF). Multicollinearity was not a concern as the VIF for all models was less than 10 (Mukherjee et al., 1998).

6. RESULTS

Over 80 percent of the 123 communities reported having experienced conflicts over natural resources, with a total of 156 conflicts. Over 64 percent of the conflicts reported were related to private parcel boundaries (Table 4). The bimodal medium and high rainfall zones, where population density is among the highest in the country, reported that conflicts over private land boundaries constitutes the largest share of conflicts in those areas. This is a reflection of the high frequency of land related conflicts in densely populated areas in Uganda (Deininger and Castagnini, 2004). Communities holding land under customary land tenure also reported the largest share of conflicts on private land boundaries, access to water, and other common natural resources. The communities with customary land tenure systems reported the lowest share of conflicts resolved. However, all conflicts that were presented to the customary institutions were resolved (Table 5). Hence, the high share of unresolved conflicts in communities where the predominant land tenure is

¹⁴ The econometric results tables will report the variables dropped.

customary may be due to the fact that such conflicts were not presented to the customary institutions for resolution. The apparent reluctance of people to present their conflicts to customary institutions could be due to the lack of legal recognition of customary institutions to resolve land conflicts. This underscores the weaknesses of the customary institutions that may be partly due to the limited role that the Land Act gives the customary institutions in conflict resolution and land administration in general.

The second most reported type of conflict is over access to water, which accounted for 15 percent of the conflicts reported and was most common in the drier areas (unimodal rainfall zone in northern and northwestern regions). Conflicts over common resources other than water accounted for 10 percent of the conflicts, and, consistent with Westing et al. (2001), Cooke et al. (2008), and Adams et al. (2003), the conflicts were most common in the drier areas. This could be due to the presence of common grazing lands along the cattle corridor and other northern districts. Scarcity and the consequent conflicts over fuel wood from local forests or woodlands are also more prevalent in drier areas (Cooke et al., 2008).

Table 4: Type of conflicts across agricultural potential zones and land tenure systems (proportion)

	Number of conflicts	Private land boundary	Access to commons other than water	Access to water	Other conflicts ¹	Total ²	Conflicts resolved
Number of conflicts		100	15	23	18	156	
Agricultural potential							
Unimodal	64	0.55	0.20	0.20	0.05	0.41	0.67
Bimodal low	29	0.59	0.00	0.14	0.28	0.19	0.62
Bimodal medium	16	0.81	0.13	0.06	0.00	0.10	0.75
Bimodal high	47	0.74	0.00	0.11	0.15	0.30	0.83
Land tenure							
Customary	134	0.82	0.10	0.14	0.09	0.90	0.68
Freehold	8	0.67	0.00	0.11	0.00	0.78	1.00
<i>Mailo</i>	13	0.50	0.00	0.00	0.21	0.71	0.80
Total ³	156	0.64	0.10	0.15	0.12	0.86	0.72

¹Other conflicts reported include destruction of cropland by livestock, cutting trees on private land, erosive land management by upland farmers, conflict over use of public vs. private road, sale of land without consultation with other household members, conflict over use of a common market ground, and dumping of refuse by municipal officials.

²Row total percent could exceed 100% since communities reported more than one type of conflict.

³The total number of conflicts by land tenure type adds up to 155 (not 156) since leasehold type is omitted (see explanation earlier in the paper).

The LC1 was the most frequently used institution for resolution of all conflicts (Table 5). This underscores the role that the local government institutions play in land administration and demonstrates the high performance of decentralization in Uganda reported by Ndegwa (2002) and Ndegwa and Levy (2004). Nkonya et al.

(2008) also found higher compliance with natural resource management regulations enacted by LC1. The customary institutions were the second most used institutions for conflict resolution while exogenous institutions (sub-county and district governments and central governments) were the least important. The low frequency of use of external formal institutions in conflict resolution is consistent with literature (Upreti, 2004a; Leach et al., 1999; Tyler, 1999; Agrawal and Ostrom, 2001).

Table 5 shows that almost all conflicts taken to LC1 or customary institutions were resolved, demonstrating the effectiveness of the local institutions, and 92 percent of conflicts taken to higher level government authorities were resolved. Table 4 shows that overall, 72 percent of all reported conflicts were resolved, indicating that some conflicts were not taken up to any authorities for resolution. As expected, the rate of successful conflict resolution is highest for the customary institutions, which resolved all the conflicts they mediated. The LC1 also resolved 99 percent of the conflicts while the exogenous institutions resolved 92 percent. It is possible that these conflicts were more severe – requiring higher authority and therefore taking more time to be resolved. The results underscore the need to strengthen the LC1 and customary institutions, which are more effective and accessible to the local communities.

Table 5: Conflict resolution institutions by type of conflict (percent)

Type of conflict	LC1	Higher level government	Customary
Private land boundary	77.50	10.00	12.50
Non-water commons	25.00	50.00	25.00
Water	75.00	0.00	25.00
Other conflicts	75.00	6.25	18.75
All conflicts	74.56	10.53	14.91
Conflicts resolved	99	92	100

The unimodal rainfall area, which is the poorest and where the customary land tenure is predominant, reported the largest share of conflicts resolved by customary institutions (Table 6). As expected, the few communities where freehold is the predominant land tenure reported the largest share of conflicts resolved by LC1 and higher local government council or central government. Surprisingly, the bimodal high rainfall zone, where the mailo land tenure system is predominant also used the customary institutions for conflict resolution. Likewise, communities holding land under mailo reported the largest share of conflict resolution using customary institutions, an even higher percentage than in customary tenure areas. This could be due to the formal recognition of the cultural king (kabaka) in 1993 (Griffiths and Katalikawe, 2003) and the historical land tenure that was and continues to be heavily linked to the royal clan. No communities holding land under freehold tenure reported to have used customary institutions for conflict resolution. This is expected given that communities holding land under freehold are likely to be oriented to formal institutions and therefore less attached to the customary institutions.

Table 6: Conflict resolution institutions by agricultural potential zones and land tenure (percent)

	LC1	Higher level government	Customary	Paired test ¹
Agroecological potential				
Unimodal	68.18	13.64	18.18	a,b
Bimodal low	77.78	16.67	5.56	a,b
Bimodal medium	83.33	8.33	8.33	a,b
Bimodal high	77.50	5.00	17.50	a,b
Land tenure				
Customary	75.80	9.90	14.30	a,b
Freehold/leasehold	85.70	14.30	0.00	a,b
<i>Mailo</i>	62.50	12.50	25.00	a,b
All zones/land tenure	74.56	10.53	14.91	a,b

¹ The following pairs are significantly different at least at p = 5%: a =LC1 and high level government, b = LC1 and customary; c = high level government and customary

Table 7: Degree of degradation of pasture, cropland and woodlands

	Woodland	Pasture	Cropland ¹
	percent degraded		
Agricultural potential			
Unimodal rainfall	24.9	25.5	0.4
Bimodal low rainfall	35.4	12.3	0.9
Bimodal medium rainfall	61.5	19.8	2.5
Bimodal high rainfall	14.0	34.0	5.6
Land tenure			
Customary	25.9	21.7	2.5
Freehold	0.0	0.0	0.6
<i>Mailo</i>	24.6	13.0	2.2

¹ Refers to irreversible degradation.

Table 7 reports the degree of degradation of land-based resources – pasture, cropland, and woodlands. The woodlands are most degraded in the bimodal medium rainfall area, where the cattle corridor occupies a large area and where charcoal harvesting is high (Namaalwa et al., 2007). The cattle corridor area is one of the land degradation hotspots in Uganda (Magunda and Majaliwa, 2006). Woodlands are the major type of forest in Uganda and a major source of fuelwood, among other uses. It is estimated that woodlands account for 81 percent of forest cover in Uganda (Bakkebø, 2005). Woodlands are especially abundant along the cattle corridor area. Surprisingly, the bimodal high rainfall zone reported the largest share of pasture degraded. This is an area with limited number of livestock. Hence, this could be due to a relative reference to the past stock of pasture. The rapidly growing population and the growing demand for livestock products in the region could have led to rapid degradation of pastures. The bimodal low rainfall, which is located in the southwestern cattle corridor area, reported the lowest share of

pasture degraded. This could be due to the improved management pasture in the Mbarara and Ntungamo area compared to the other zones. Rangeland is one of the major forms of land use in the bimodal low rainfall zone (Wurzinger et al., 2008).

The bimodal high rainfall zone also reported the largest share of cropland with irreversible degradation. The zone is one of the hotspots of land degradation in Uganda. For example, Nkonya et al. (2008b) reported only 15 percent of the plots in the bimodal high rainfall and in the bimodal low rainfall zones had positive nitrogen and potassium balances (the difference between nitrogen inflows in a unit crop area and outflows). This was the lowest share of plots with positive nitrogen and potassium balances. The major reason behind such high degree of cropland degradation is the high population and production of perennial crops that deplete nutrients more than the annual crops (Nkonya et al., 2008b). Use of fertilizer in the bimodal high rainfall zone is also much less than the case in other zones. Communities with predominantly freehold tenure reported the lowest share of woodlands, pasture, and cropland degraded. This is contrary to Nkonya et al., (2008b) who used plot level data and observed no significant difference between nutrient balances and soil erosion of plots under freehold and customary and mailo land tenure. The plot level data used by Nkonya et al. (2008b) is richer and more reliable than the community level data. The seemingly better natural resources under the freehold that is reported in the present study could be due to the method of assessment that the communities used. For example, farmers may base their degradation assessment on visible forms of land degradation such as soil erosion, land clearing, and so on. The plot level survey based the land degradation on soil nutrient depletion, which is not visible.

7. ECONOMETRIC RESULTS

Determinants of natural resource conflicts

The type of conflict determines to a large extent the choice of conflict resolution institution. Hence, we look at the determinants of conflict, which will help us to better understand the determinants of choice of institutions for conflict resolution. In the reporting of the results, we use the estimations of the biprobit model, which is the model of choice given that the rho test shows that $cov(e_1, e_2)$ is significantly different from zero.¹⁵ Table 8 shows that poverty increases the probability of conflicts over private land boundaries. This finding echoes Ohlsson's study (2000), who also observed that poverty could lead to conflicts. However, the results also show that the high level of poverty reduces the likelihood of conflicts over access to water and other conflicts. These results are consistent with the literature on the effective customary institutions for water management in poor areas and with other studies that have shown stronger collective action among the poor to deal with a limited resource base (example, Whitehead and Tsikata, 2003; Gebremedhin et al., 2004; Nkonya, 2008).

The results also show that communities with low literacy rates are more likely to have conflicts over commons other than water. This result could be

¹⁵ We also report the probit results to check for robustness.

explained by the low capacity of poorly-educated communities to access legal documents that outline the rules for the use of the commons or by their inability to create and implement bylaws that would guide this use, consistent with the findings of Nkonya et al. (2008a). Landlessness, which in some studies has been shown to be associated with poverty (see Lastarria-Cornhiel and Mehmed-Sanjak, 1999; Nkonya et al., 2008b), did not have statistically significant effects for all types of conflict except for the negative effect on water conflicts in the probit model. The latter is likely explained by the low demand for water (for agricultural use) from landless households. Even though several of these results point to the connection between poverty and higher incidence of conflicts, this does not mean that only the poor are involved in the conflicts. The literature shows that the conflicts involve both the well-off and the poor. For example, land grabbing by the well-off from the poor is a common problem in developing countries (Deininger, 2003).

Areas with higher population density are associated with lower probability of conflict over access to water. This is consistent with Wood et al. (1999) who show that in Uganda communities with higher population density are concentrated in the area around Lake Victoria, which has sufficient water resources. Higher population density and better access to markets, measured as the potential market integration (PMI) and distance to roads, increase the probability to have conflicts over private land boundaries, consistent with the results from UBOS (2007) that showed greater incidence of land conflicts in the central region, which has high PMI and population density. In addition, higher population density and opportunities to participate in markets may raise land values, which would result in more conflicts. However, higher PMI reduces the probability for conflicts over commons other than water to occur. This could point to the strength of formal institutions in areas with high PMI to manage commons.

Natural resource conditions also have significant impacts on occurrence of conflicts. Consistent with theory (see Ostrom, 1990; Westing et al., 2001), degradation of pasture and cropland are associated with higher propensity of conflicts over commons other than water. Contrary to theory, however, the share of cropland with irreversible degradation reduces the likelihood of conflicts over boundaries of private land and access to water. Similarly, the share of woodlands degraded reduces the probability of conflicts over the commons other than water. The share of pasture degraded also reduces the probability of conflict over access to water and other conflicts to occur. One possible reason for these puzzling results could be that conflict resolution institutions are already well-developed and effective in highly degraded areas. It is also possible that members of communities with severe natural resource degradation move out of agriculture and hence reduce the propensity to quarrel over natural resources-based sources of livelihood. Further studies should look at migration and income diversification in these areas, and the role that local institutions play or how they change as population changes.

Although land tenure and NGO activity do not have a significant effect, agricultural potential does have significant impacts on the probability for natural resource conflicts to occur. Compared to the unimodal rainfall communities, those in the bimodal medium rainfall are more likely to have conflicts over private land boundaries, corresponding to the UBOS findings (UBOS, 2007). On the other hand,

these communities are less likely to have other conflicts (such as livestock feeding on crops and cutting trees on someone else's farm)¹⁶ and conflicts over commons.

8. Determinants of choice of institutions for natural resource conflict resolution

As expected, the type of conflict is the most significant determinant of choice of institution to resolve them. In all four equations estimated, the impact of type of conflict on choice of conflict resolution institution was significant at $p = 0.01$. Communities experiencing private land boundary conflicts, water conflicts, and other conflicts are more likely to choose formal institutions to resolve them. As shown in Table 5, about 88 percent of the private land boundary conflicts were resolved by formal institutions (LC1 or higher-level government). This underscores the effectiveness of the local government institutions in Uganda and supports the findings by Ndegwa (2002) and Ndegwa and Levy (2004) who found Uganda to be the second country in Africa in terms of the success of the decentralization reforms. The higher likelihood of choosing formal institutions to resolve access to water conflicts could be due to the Ugandan government's significant investment in developing water resources for both livestock and drinking water. The water sector budget increased from US\$ 30 million in 1998/99 to US\$68.3 million in 2002/03 (MWLE, 2006). Consequently, access to improved water sources in rural areas rose from 20.3 percent in 1990 to 55 percent in 2002 (MWLE, 2006). The government is likely to install formal conflict resolution mechanisms in areas where it commits to water development investments.

Results also show that communities were more likely to choose customary institutions to resolve conflicts on access to commons other than water. This is consistent with Fitzpatrick (2005) and World Bank (2003) who observe that customary institutions are best suited for managing the commons such as grazing lands, forestry, and woodlots. The results demonstrate the importance of having multiple institutions to resolve different types of conflicts. As pointed out earlier, formal and customary institutions each have weaknesses and strengths, and this highlights the need to enhance each to exploit their strengths.

In this estimation, the effect of poverty on the choice of institutions was not statistically significant, but the coefficients point to the likelihood that the poor communities may choose customary institutions to resolve conflicts related to private lands, and formal institutions for all other conflicts. The literacy rate also did not render statistically significant effects. Interestingly, the results show that the landless are more likely to choose formal institutions to resolve water-related conflicts.

Population density increases the likelihood of choosing formal institutions for resolving private land boundary and access to water conflicts. This association shows the importance of formal institutions in the densely populated communities, where land boundary conflicts are severe and costly. Such areas are also likely to have ethnic and socio-economic diversity, which could undermine the effectiveness of the customary institutions. High population density also increases the scarcity of

¹⁶ Even though these are less severe conflicts, they may be unavoidable at times given the scarcity of trees and the dynamics of the crop-livestock interaction in the dry areas.

resources, leading to more severe conflicts that could require the involvement of formal institutions.

Controlling for the level of poverty, education, and other covariates, proximity to all-weather roads reduces the probability of choosing formal institutions to resolve disputes on access to water. This is contrary to expectation and could be due to the strong customary institutions in the Buganda area (southern Uganda around Lake Victoria that also has high road density). The Buganda cultural king (kabaka) is well respected and plays a role in land conflict resolution (Coldham, 2000). Distance to all-weather road does not have an impact on the choice of institution to resolve disputes over private land boundary, access to commons other than water, and other conflicts. This is contrary to expectation that communities in remote areas would choose customary institutions due to poor development of formal institutions in such areas (Platteau, 2004), but may once again point to the effectiveness of the decentralized institutions in Uganda. Potential market integration (PMI), the condition of natural resources, type of land tenure, presence of agricultural and environmental NGOs, and type of land tenure did not have significant effects on the choice of conflict resolution institution.

Table 8: Determinants of occurrence of conflicts and choice of conflict resolution institutions (biprobit and probit)

Variable	Private land conflicts		Conflicts over commons (other than water)		Conflicts over water		Other conflicts	
	Biprobit	Probit	Biprobit ¹	Probit ²	Biprobit ³	Probit	Biprobit	Probit ⁴
Type of conflict								
Poverty gap	6.413**	-0.141	0.038	0.630	-7.686***	-4.185	-21.548	-17.203*
Literacy rate		-1.138	24.047***	15.868***		-2.719		0.564
Landless (%)	0.000	0.001		-0.001	-0.014	-0.012*	-0.011	-0.019
Population density	0.001*	0.000	-0.001	0.000	-0.001*	0.000	-0.002	-0.001
Distance to all-weather road (km)	0.122**	0.021*	-0.125	-0.167	-0.085	-0.088	-0.040	-0.067*
Potential market integration (PMI)	0.004*	0.001*	-0.024***	-0.013***	-0.003	-0.001	-0.001	-0.002
Woodland degradation (%)	0.004	0.002	-0.063***	-0.022*	-0.003	0.007	0.002	-0.004
Pasture land degradation (%)	0.002	-0.001	0.031***	0.023***	-0.023***	0.002	-0.021*	-0.019**
Crop land degradation (%)	-7.603***	0.002	223.149**	0.318***	-3.68**	-0.020	-1.839	-0.046
Land tenure	-0.136	0.083			0.261	0.559	-0.071	-0.002
Programs/NGOs with focus on agriculture and environment		0.007		-0.224		0.181		-0.171
Agroecological potential (cf. unimodal low rainfall)								
_Bimodal low	0.617					-0.436	-1.095	-0.315
_Bimodal medium	1.431**	0.236	14.241***	-1.788*			-8.1***	
_Bimodal high	0.482	0.163			-0.458	-0.196	-0.745	-0.565
Constant	-1.698**	0.780	13.570***	7.824**	1.155	0.796	2.502	1.535

Variable	Private land conflicts		Conflicts over commons (other than water)		Conflicts over water		Other conflicts	
	Biprobit	Probit	Biprobit ¹	Probit ²	Biprobit ³	Probit	Biprobit	Probit ⁴
Type of conflict								
Institution choice model (formal=1, customary=0)								
Type of conflict	1.749***	-0.050	-2.043***	-0.473	1.188***	0.147	1.406***	0.474
Poverty gap	-0.432	6.997	0.745	3.365	1.489	7.063*	1.911	7.013
Literacy rate	0.541	-0.836		-1.007	-0.690	-0.716	-2.210	-1.321
Landless (%)	0.143	0.189***	0.160	0.262**	0.147**	0.188***	0.145	0.195***
Population density	0.001**	0.003**	0.001	0.002*	0.001*	0.003**	0.001	0.003**
Distance to all-weather road (km)	0.052	0.239*	0.064	0.192*	0.149*	0.239*	0.136	0.240**
Potential market integration (PMI)		0.005		0.005		0.005		0.005
Woodland degradation (%)		0.003		0.004		0.002		0.003
Pasture land degradation (%)		-0.011		-0.012		-0.011		-0.012
Crop land degradation (%)		-0.036***		-0.033***		-0.036***		-0.036***
Land tenure	0.232	0.302	0.084	0.146	-0.202	0.274	-0.038	0.373
Programs/NGOs with focus on agriculture and environment	0.467	0.562	0.346	0.319	0.120	0.576	0.187	0.540
Agroecological potential (cf. unimodal low rainfall)								
_Bimodal low		1.275*				1.282*		1.270*
_Bimodal medium		0.918		0.907		0.943		0.912*
_Bimodal high		0.674		0.309		0.665		0.639
Constant	-1.725	-2.589	0.930	-0.299	0.667	-2.699	1.601	-2.498
Share of communities with conflict (%)	64		10		15		12	
Sample size (# of conflicts reported)	103	103	103	103	103	103	103	103
Likelihood ratio test $\rho = 0$ (p-value)	0.017		0.035		0.048		0.049	

Notes:

¹ High bimodal rainfall dropped due to having very few conflicts on commons.

- ² Tenure and high bimodal rainfall dropped due to perfect prediction of 0.
- ³ Medium bimodal rainfall dropped due having very few conflicts on water.
- ⁴ Medium bimodal rainfall dropped due to perfect prediction of 0.

9. CONCLUSIONS AND POLICY IMPLICATIONS

This study looked at the role and use of the formal and customary institutions in natural resource conflict resolution. Consistent with the findings of Ndegwa (2002) and Ndegwa and Levy (2004) about the effectiveness of the decentralized governance in Uganda, the local government and central government (formal institutions) resolved about 85 percent of the 156 conflicts that occurred in 2002 in the 123 communities covered by this study (Table 5). About 64 percent of these conflicts were over private land boundaries (Table 4). The bimodal high rainfall and high population density areas reported the largest share of communities with this type of conflict.

As for the factors that influence the occurrence of conflicts, areas with severe poverty and high population density, located away from all-weather road and in the bimodal medium rainfall areas are more likely to have conflicts over private land boundaries. These results emphasize the importance of developing more elaborate conflict resolution institutions in such areas. Given the high agricultural potential and high degree of degradation in such areas, there is need for the government to design specific policies and strategies to develop and support both formal and informal institutions to address such conflicts.

Conflicts over access to commons other than water are also likely to occur in communities with lower literacy rate, closer to all-weather roads, high degree of irreversible cropland degradation, and pasture degradation. Communities with high level of poverty and low population density are also likely to have conflicts over water. These are in the northern districts that are currently recovering from long-term civil war and attracting considerable attention from both the central government and the donors. One of the important conclusions that could be drawn from this study is the need to develop water resources and support customary and local government institutions to effectively manage water and other natural resources.

As for the choice of conflict resolution institutions, communities experiencing disputes over private land boundaries, access to water, and other resource-related conflicts were more likely to choose formal institutions than customary institutions to resolve such conflicts. Communities with high population density are also more likely to choose formal institutions than customary institutions to resolve conflicts on private land boundaries and access to water. Similarly, communities closer to all-weather roads are more likely to choose formal institutions to settle disputes over access to commons other than water.

These results demonstrate the effectiveness of the local governments in areas with high market access and high population density. The results underscore the need to support the formal institutions to address increasing natural resource conflicts (Deininger and Castagnini, 2004). The recent abolition of graduated tax and the increasing number of districts have reduced the capacity of the local governments to offer land administration and other services (Green, 2008). Given the effectiveness of the local governments to resolve natural resource conflicts shown in this study, there is a need to enhance their fiscal authority and address their major weaknesses such as their accessibility for the poor. For example, conflict resolution through the formal institutions is inaccessible to poor and

illiterate farmers since this type of arbitration often involves judicial language, paperwork, and long adjudication process that puts the poor and the illiterate at a disadvantage (Means et al., 2002; Sanginga et al., 2007).

Wily (2006) also observed that private land boundary conflicts have increased in areas where land titling has been implemented, which indicates that such conflicts may be a result of the formalization of property rights and the accompanying contradiction between customary and statutory rights. Strategies need to be developed to give legal services the poor and uneducated communities. While these services are being offered by non-governmental organizations and farmer groups such as the Uganda Land Alliance, such NGOs and farmer organizations need to be strengthened and supported to offer similar services. Using the same data set, Nkonya et al. (2008a) also showed that the presence of non-governmental organizations (NGOs) increased the capacity of local governments to enact bylaws on natural resources. Hence, NGOs and other organizations should be supported to increase the capacity of local governments.

Our results also show the effectiveness of the customary institutions in resolving conflicts. Communities that experience conflicts over access to commonly used and owned natural resources other than water are more likely to select customary institutions than formal institutions for resolution. This is consistent with the literature, which shows that customary institutions have a comparative advantage in managing common pool natural resources in communities with fairly uniform socio-cultural characteristics (Poteete and Ostrom, 2004; Toulmin, 2008; Wily, 2006; World Bank, 2003; McAuslan, 2006).

However, customary institutions have weaknesses that need to be taken into account as the government designs policies and strategies to integrate them even more into natural resource conflict management. Customary land tenure systems do not work well in communities with diverse social-cultural characteristics (Poteete and Ostrom, 2004; Toulmin and Quan, 2000; McAuslan, 2006). Hence, special attention should be paid to efforts to integrate the customary institutions in resolving conflicts and land administration in situations where customary land tenure and socio-cultural characteristics are fairly uniform. In addition, making these institutions more transparent and less prone to elite capture as well as enhancing their capacity to deal with newer types of disputes should be part of the strategy to strengthen these mechanisms (Cousins, 1996; Tyler, 1999). Furthermore, there is a need to recognize that addressing these weaknesses of the customary institutions will require genuine consultation among customary leaders, government officials, civil society organizations, and other stakeholders.

The major weakness of this study is the small sample used based on the availability of data and variables included in the survey. This weakens the statistical significance of important variables. Other studies should include larger samples and other variables that were not collected in this study such as ethnicity, the cost of conflict resolution and the perception of the strength and weaknesses of the conflict resolution institutions.

Finally, our results also demonstrate the potential complementarity of the two types of institutions in resolving land conflicts. Such complementarity should be explored and pursued as the government and its development partners design poverty reduction strategies for the northern districts that are currently rebuilding after the conflicts as well as in the context of the increasing natural resource

conflicts across the country. Since both types of institutions have certain advantages and are being used by the communities in various resource-related situations, by working together they could enhance effective and equitable conflict resolution mechanisms and livelihood options for the resource-dependent communities.

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