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Chapter 4

AN INSTITUTIONAL ANALYSIS OF LOCAL-LEVEL  
COMMON POOL WOODSTOCK GOVERNANCE AND MANAGEMENT:  
IMPLICATIONS FOR ENVIRONMENTAL POLICY

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## CHAPTER 4

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This chapter uses the Institutional Design and Analysis (IAD) framework<sup>1</sup> to examine a policy problem concerning governance<sup>2</sup> and management<sup>3</sup> of common pool woodstocks in Mali's Fifth Region. The fall of the Malien Second Republic in 1991 posed, among many other issues, the problem of who should take responsibility for controlling access to and use of the country's woodstocks. The essay assesses one solution to that problem now being evolved by a group of thirteen communities south of the Niger River's Inner Delta.

The remainder of the paper contains three sections: an initial discussion of the theoretical and policy issues raised by Woodstock governance and management in Mali; a long middle section on working rules of institutions set up by local resource users for the governance and management of common pool Woodstock resources in Tibouki, a single community within the broader group of villages; and a final section on implications of this case,

and of the institutional arrangements described therein, for policy making in the area of Woodstock governance and management.

#### THEORETICAL AND POLICY ISSUES IN WOODSTOCK GOVERNANCE AND MANAGEMENT

This essay draws on the IAD analytic framework in trying to clarify both the target policy problem, and possible rule-based solutions to it. The IAD framework may be briefly summarized as follows. The analyst begins with a problematic situation— who should govern and manage woodstocks. The next step is to identify the patterns of behavior which lead to the problematic outcomes— destruction of the Woodstock in the absence of effective governance and management.

Those behavior patterns can be considered interactions resulting from efforts by various actors to achieve their preferences in a context shaped by three types of incentives. The first type of incentive is related to the attributes of the goods and services in question— here, the woodstocks of Boré Forest. The second source of incentives derives from the attributes of community. These include the history of the community, its leadership structures, traditions of cooperation or conflict, capacity to resolve disputes, its socio-economic composition, linguistic characteristics, market opportunities, etc. The third source of motivation for human conduct is the attributes of rules.

Once the nature and impact of these three types of motivations on actors' conduct has been clarified, it becomes possible to analyze more precisely what, if anything, can be done to modify those incentives and so influence outcomes in ways that reduce the problematic nature of the original outcome.

The theoretical issue raised by the problem of governing and managing woodstocks is not a new one. It has been a topic of intensive analysis since at least 1968 (Ostrom, 1990: 2-8). Often the woodstocks in question have the characteristics of common pool resources. Simply put, this means two things. First, it is difficult to prevent some set of users from gaining access to such resources. Second, users consume the goods or services those resources produce in a separable manner (Oakerson, 1992: 41-46). In other words, wood that one family burns to cook its supper cannot be used by another family to that or any other end.

#### Common Pool Resources Under Pressure

Since consumption is separable, it may also become rivalrous. If wood stocks are scarce, competition among users for control of those stocks can be predicted. Therein lies a potentially problematic situation. Initially, and as long as supply of the resource exceeds demand, there is no need to control access or use. Since such resources are under utilized, appropriate policies

treat them, in institutional terms, as open access resources, that is, common pool resources subject to no rules regulating access or use.

However, when the supply-demand balance shifts, so does the need for institutional arrangements. Unless appropriate ones are put in place to control both access to and use of what then become regulated, or common property woodstocks, continued unregulated use will degrade and possibly eventually destroy the resource. Each user tries to capture as much of the available stock as possible before it is exhausted. Each is driven by a rational fear that if s/he does not do so, others will. Thus the dilemma of unmanaged or under-managed renewable natural resources arises when demand for a resource exceeds supply and the institutional arrangements for controlling access and use are inadequate.

Woodstocks world-wide have come under pressure in the second half of the 20th century (Richards and Tucker, 1988) in a continuation of trends begun in the 19th century (Tucker and Richards, 1983) and even earlier. Demand has exceeded and then degraded supplies in case after case in underdeveloped and developing countries. To remedy this problem two solutions have typically been proposed: privatization and government control (Ostrom, 1990).<sup>4</sup>

Two Standard Institutional Options for Dealing with  
Woodstock Supply-Demand Imbalance

Underlying the first alternative is an assumption that vesting individuals with ownership of woodstocks will give them a strong interest in managing those private woodstocks for sustained yield because market demand for wood produced will cover costs and allow a profit. In developing countries, this has sometimes proven a realistic assumption, e.g., in parts of Mali (Dennison et al, 1992: 53-68), but unrealistic elsewhere, e.g., other parts of the Sahel (Painter, Sumberg, and Price: 1993). Under this scenario however, creating private property institutions by assumption obviates the need for public arrangements, and for financing the associated costs of organizing and maintaining institutions for collective action.

Underlying the other alternative is an assumption that if privatization is not a feasible alternative, then governments must step in and exert control over access and use of renewables. In theory, politicians, government bureaucrats and technicians will use their power and authority to establish regulations and procedures that will put in place the requirements for sustainable exploitation of the resources.

Not infrequently in developing countries the first alternative, privatization, is impractical, either because the physical attributes of the resource as it occurs within the terrain of a given environment make it difficult

for individuals to control access, or levels of use do not justify investing in establishing and enforcing private property rights.

The second alternative, government control, has turned out to be even more problematic in circumstances where resource users can exercise few if any controls over government officials. This has typically been the case in many developing countries both before and after independence. In such situations government institutions have been deliberately designed to throttle off options for citizen leverage against politicians, bureaucrats and government technicians (Wunsch, 1990: 45). Ostensibly this was done in order to facilitate a forced march towards economic development (Oluwu, 1990: 103-104). In practice all too many officials proceeded to treat renewable resources as their private properties. These officials were not inherently more venal than their fellow citizens; they merely ceded to the temptations created by systems which buffered them against citizen discontent and recourse, and allowed them to act in ways for which they could not be held accountable by their fellow citizens.

Of the two theoretical alternatives, popularized initially by a biologist (Hardin, 1968), the first was ruled out as an option in Mali well before independence by colonial policies that defined tree species as national common property resources. In effect, the choice in French Soudan (the colonial name for Mali) favoring government intervention and regulation was accepted and

reinforced during the era of Malien independence. Important tree species were to be managed by the national forestry service. The less important ones were left to local communities to do with as they wished. Gradually, the larger trees of unprotected species have been depleted, so that by the mid-1970s, the forest service effectively claimed control of a very substantial part of the national Woodstock.

#### Self-Governance: An Option for Addressing Woodstock Supply-Demand Imbalances?

The problematic issue however is whether a third form of Woodstock governance— self-governance- might, in some situations, provide more satisfactory results than either privatization or national government control. Under an assumption of capacity for self-governance, users neither privatize control of the resource when demand exceeds supply nor does a central government agency take over control. Instead, users overcome the threat posed to open access resources when demand exceeds supply by creating their own institutional arrangements to regulate access and use. Users, in other words, self organize with an eye to their long-term interest in conserving the Woodstock through a program of sustainable use.

Successful self-governance in this sense implies that users succeed in overcoming the incentives for abuse of powers inherent in any form of collective (compulsory or non-voluntary) action. Rather than establishing



institutions that allow political officials to dominate the control system at the expense of citizens, institutional arrangements based on principles of self governance allow users to combine control of access to and use of the Woodstock with citizen control of officials. To a significant degree in these cases, officials are accountable.

### Scale Problems in Woodstock

#### Governance and Management

A final theoretical as well as practical issue in this regard concerns the relationship between the scale of renewable natural resource systems such as woodstocks, and appropriate scales for institutional arrangements designed to govern and manage such systems (Thomson, 1991: 8-9). In many developing countries woodstocks have been nationalized. National agencies have been created to manage those woodstocks, and have been given exclusive authority to regulate access and use of such resources. In effect such regulations treat all woodstocks as one, and set the scale for governance and management at the national level.

Against this background scale issues posed in the context of this article are two. First, can smaller-scale alternatives to national-level management offer advantages? Second, must institutional arrangements precisely match the scale of the Woodstock natural system? Materials in this article shed light on both these questions. They provide no definitive answers, but they do indicate

the importance of exploring several alternatives to exclusive national control of woodstocks.

## WORKING RULES OF WOODSTOCK GOVERNANCE

### AND MANAGEMENT IN TIBOUKI, MALI

The fall of the Moussa Traoré regime inadvertently created a situation in which it was possible to experiment with alternatives in the governance and management of the country's renewable resources. Early in the transition to the Third Republic, field foresters came under such popular pressure that they effectively withdrew from rural areas. In the power vacuum created by their absence, some communities sought to reassert their authority over local woodstocks.

The community of Tibouki is one of thirteen communities located either in or adjacent to Boré Forest, a sizeable Woodstock located between Mopti and Douentza south of the Niger River's Inner Delta in Mali's Fifth Region. Before the imposition of Forest Service regulations (about 1972) after independence, when the Forest Service finally disposed of sufficient employees to attempt regulating the forest, these village communities each governed their local part of the larger forest.

After the regime change in 1991, and assisted by staff of the Near East Foundation, a small non-governmental organization, these communities

organized themselves for Woodstock governance and management. Each community, aided by a young Malien lawyer, prepared a list of operational rules designed to allow it to control access and use of its Woodstock. Subsequently these communities formed a federation, which they named Walde Kelka. Its stated purpose was to resolve conflicts concerning Boré woodstocks that could not be settled by the individual communities.

The remainder of this section contains seven sub-sections. The first describes the community's resource base. The second sub-section assesses RNR in terms of their attributes, or characteristics, as economic goods. The third deals with attributes of the community, while the fourth highlights the attributes of the working rules that have been applied at different periods over the last century. The fifth examines the individual and group strategies that people adopted in light of the constraints and opportunities inherent in the attributes of RNR as economic goods, of the community and of the rules-in-use. It also explores the interactions that occurred when these strategies were put into action. The sixth sub-section describes the outcomes in terms of equity, efficiency and sustainability of the community's RNR base. The seventh re-analyzes these data in light of institutional considerations.

#### The Resource: Tibouki's Section of Boré Forest<sup>5</sup>

Tibouki village is located within Boré Forest, south of the Mopti-Douentza road in Mali's Fifth Region (Dennison, Miller, and Thomson,

1992; ARD and NEF, 1993). The Forest occupies most of the area between the road and the Bandiagara Plateau, and is shared by thirteen villages located either within or close to its borders. Tibouki's first residents founded the village atop the Toundoudfere plateau, which rises out of the plain like an island separated from the Bandiagara Plateau to the south. In mid-20th century, a second quarter was constructed at the foot of the plateau, closer to the fields now cultivated on the plain.

Villagers draw the bulk of their subsistence needs, in an arid environment, from an integrated agro-silvo-pastoral production system based on culturing valuable trees, farming millet and sorghum, and coupled with animal husbandry. In the fields closest to the village center numerous baobab (*Adansonia digitata*) and indigenous fruiting trees, particularly *Sclerocarya birrea* and *Lannea macrocarpa*, have been deliberately protected and cultured by villagers. Further from the village, in lands only cleared more recently, *Boscia senegalensis* bushes and the fruit-bearing *Balanites aegyptica* occur in abundance.

Goats are the most numerous local domestic animals, but families with more resources also own cattle. Stock are pastured for part of the year on crop remains left in the fields after the harvest, but get most of their sustenance from grasses and browse they find in the adjacent forest. The village was largely self-sufficient in the past. Since the 1983-85 drought,

which hit Tibouki hard, the output of their production system has not kept pace with residents' demand for food and other products. Families consumed all their grain stores, sold off livestock, and engaged debts to survive.

To cover the food deficit, reconstitute herds and pay off family debts, young men now go on short-term labor migration after the harvest in November, returning usually at the beginning of the next farming season in May-June. Others started, in 1986, harvesting firewood for sale to Mopti wood merchants, who are brought to Tibouki's area of Boré Forest by middlemen from the community of Batouma, located closer to the Douentza-Mopti road. Returns on firewood harvesting are considerable. On the other hand, the external demand for dry firewood is so great that some cutters (probably locals as well as non-residents) are tempted to harvest green trees. If this trend were to continue unchallenged, Tibouki's forest resources could well be exhausted early in the 21st century. What precisely are these resources?

Tibouki's forest is typical of the area,

"except for the high concentration of certain indigenous fruit trees and baobabs. The forest in the plain is flat, with no natural boundaries ~ no major watercourses, hills or land formations ~ though a few water depressions do spot the area. Forest cover is patchy. Densely covered woods alternate with

barren stretches, major species include *Combretum macrocarpa*, *Anogeissus*, *Acacia Senegal*, *Pterocarpus*, and *Grewia bicolor commiphora*, with a few baobab and *Boscia senegalensis*. In the water depressions ronier palms (*Borassus aethiopum*) and a few tamarind (*Tamarindus indica*) are also found" (Dennison et al, 1992: II, 42).

Other uses of the forest include gathering leaves of the baobab (*Adansonia digitata*) and fruits of other trees for use or sale, honey (now much depleted), recreational hunting, and very important, pasturing animals on grass and browse found there. Boré Forest lies astride the transhumance routes followed by herders in the area for centuries as they moved their animals out of the Niger Inner Delta during the rainy season, and returned the herds to the Delta's rich *bourgou* grasses during the ensuing dry season. Specific tracks were laid out through the forest in the early 19th century, when the Macina Fulbe Empire of Sekou Amadou dominated the entire Internal Delta area and surrounding "external" pasture lands. Transhumant herds pasture in Boré forest, in addition to local animals, taken there by herdboys responsible for family livestock.

Harvesting of forest products is labor intensive and carried out with tools locally available. Axes, knives and baskets are used when products - firewood, branches, trees, fruits, leaves, etc. - must be cut or collected. Carts

and trucks, used to transport firewood out of the community, are the sole exceptions to the reliance on local tools. While the market demand for firewood is considerable, the relatively low productivity of harvesting implements helps reduce the effective impact of demand on the forest resource.

#### Forest Resources as Economic Goods

These woodstocks can be classified in two different categories in terms of their attributes as economic goods: field trees easily visible from one or the other of the village quarters, and all the rest where surveillance is more difficult. Note that this section of the analysis emphasizes the characteristics of these resources considered as though they existed without rules. They are presented in this and the next three paragraphs as they exist in nature, without any overlay of rules fixing terms of access and conditions governing harvesting of various products.

The first category of trees and bushes, those subject to easy surveillance, have the attributes or characteristics of private goods when viewed from an economic perspective: it is relatively easy to control access to them, and consumption of their products is separable. Access can be easily controlled because the trees are in plain view and it costs villagers nothing to keep an eye on them as they go about their daily activities in the village. Unauthorized users can be detected and warned off. Consumption is separable

because when one person uses leaves, fruits or wood taken from a tree, those products are no longer available for others to consume.

Villagers who invest in protecting these trees are making relatively safe and certain investments. They can be reasonably certain that no one will steal the fruits of their labor. Since demand exists for the fruit and leaf products of these trees, people have incentives to invest in culturing them. Such investments are both productive and low-risk or secure.

The second category of trees, those located too far from the village for easy (nearly costless) monitoring, have the attributes of common pool goods. In other words, it is comparatively difficult to control access, while consumption of products is separable. This means that investments made by individuals in culturing trees in the forest are risky investments. Trees will probably produce desired products (wood, leaves, fruits), but nothing guarantees that those who invest in culturing them will reap the benefits. Woodcutters may harvest green trees, women may collect fruit and leaves before owners arrive to do so, and local and transhumant herders may prune higher branches during the dry season to put green, vitamin-bearing leaves within reach of their animals.

#### Attributes of Tibouki Community

Tibouki may be characterized as a relatively traditional village inhabited by members of a single ethnic group, the Dogon.<sup>6</sup> The village was



settled in the early 18th century by a small group fleeing from the conflicts that racked the Mande areas further west after the collapse of the Songhai Empire at the end of the 16th century. They established their community atop the plateau, and began to clear and farm fields, culture trees, and otherwise develop an agricultural production system dependent on careful husbanding of available water supplies and tightly adapted to the arid niche in which the village was sited.

Descendants of those first settlers still inhabit Tibouki community, although villagers have since developed a second neighborhood at the foot of the plateau. This occurred about 1950, after French colonization ended the long period of unrest and Tibouki residents felt secure enough to venture down onto the plain, where they cleared and cultivated a new set of fields.

Despite some 250 years of settlement, the village counts only about 500 inhabitants. They are divided into six extended families. Members of all six families live interspersed among each other in both the original quarter atop the plateau and in the new, lower quarter, rather than in distinct, extended-family neighborhoods.

Each extended family is made up of another level of subsidiary units. These units may be either "large" families or small (or nuclear) units. Large families group together two or more brothers, their wives and children. Small families consist of a single male, wife or wives, and their children. Formerly

the extended families operated as large collective production units under the leadership of the eldest active male. More recently, the smaller family units that compose extended families have become more autonomous, carrying out their own production activities.

Decision-making within families is organized on patrilineal, gerontocratic principles, that is, the oldest active male makes and implements decisions and his younger kinsmen follow his directions. If the titular head of a family unit is no longer physically active, the operational head nonetheless consults him about critical production decisions. These included crop cultivation, harvesting and storage operations, livestock sales, choice of a boy within the family to serve as shepherd for family animals, and so on. Women never play this role. Widows' sons or male relatives make those decisions.

Tibouki Dogon were formerly all animists. More recently they have converted to Islam, and now have mosques in both the original upper and new lower quarters of the community. However, conversations suggest strongly that residents have not entirely abandoned their earlier belief system. The magical powers controlled by the oldest males and their sacred objects are still considered to be intact and effective.

The village was originally sited in a remote area, and remains to this day relatively remote from surrounding communities. People travel by foot

fifteen kilometers to the nearest general market at Boré (Dennison et al, 1992: II, 45).

#### Attributes of Rules and Institutions in Tibouki

Local rules and the institutions they compose constitute the foundation for local self-governance.<sup>7</sup> The rules that organize interactions among communities, or with overlapping jurisdictions, also form part of the community's institutions. Since the purpose of the report is to highlight local capacity for self-governance concerning woodstocks, this section explores in detail characteristics of the rules and the incentives they generate. The next section examines the impacts of rules, along with the attributes of Tibouki forest resources and the community itself, in shaping the strategies of individuals and family units within the village, as well as strategies adopted by the village leadership.

#### Tibouki's Constitution

The community leadership consists of five individuals plus one. The additional person is one of two village headmen, both referred to as "chief." One handles political affairs, the other- the "anapie"-- has responsibility for religious matters. Their roles will be described in turn.

#### Political Chief

From the perspective of overlapping jurisdictions (e.g., the national administration) Tibouki has but one village chief. This post was created

during the French colonial administration, at the insistence of colonial officials. The political chief is always drawn from the Delaba family, represents as well the Toloba family who are allied with the Delaba, and heads the council. Four councilors, each representing one of the other four extended families (Assulaba, Soulaba, Kossuba and Kossiba), make up the remainder of the council.

Councilors are selected, when death or incapacity opens a position, by the family that controls the vacated post. They are invited by the other village residents to select someone. Typically the oldest active male is chosen for a life appointment. The same procedures hold for recruitment of village chiefs.

The chief and council members provide leadership within the community. They also represent it in relationships with representatives of overlapping jurisdictions. As villagers conceive it, council members' main internal responsibility is "to monitor community affairs, encourage desirable behavior and discourage undesirable acts."

In external relationships, the chief and council speak for the village. When the head of the "arrondissement" or "cercle" jurisdictions convoke a village representative on public business, the chief responds, accompanied always by one of the councilors.

The de facto village constitution relies on the extended families as major building blocks for intra-village organization. This provides an efficient

mechanism for organization of discussion, governance and communication. Families may select their representatives according to criteria they set for themselves. Typically, advanced age, recognized wisdom and competence dominate as selection criteria. Family members, with the eldest males having the most voice, have a strong incentive to select effective councillors, since the latter mediate their participation in the public affairs of the community.

These recruitment rules use kinship ties to reinforce the responsibility of each representative for the welfare of those he represents. The councillor position rotates predictably through the various units of the extended family but at an unpredictable rate: the timing of an individual's death is uncertain. This system gives each councillor an incentive to govern in the interests of the entire extended family, and discourages him from favoring members of his direct nuclear family. When he dies, the post will likely pass to another nuclear family. If a councillor were to abuse the powers of his office, his own nearest kin might suffer for it after his death at the hands of a new councillor.

#### Religious Chief

The "anapie" is the traditional office of village-wide leadership in Tibouki. The recruitment procedure, roles and powers of the office are summed up below:

While perhaps more important than the administrative chief and his council, it is not overtly political. The eldest man of the

initial five families (Deleba and Toloba considered as one extended family) of the village holds the office of "traditional" chief ... The anapie maintains certain fetishes and performs certain sacrifices — or orders that they be performed ~ and receives the head, skin and liver of animals sacrificed. He also picks the date to begin planting and the date to construct pathways through the fields. He determines when the wall of the waterhole will be rebuilt. In addition to these functions he performs, the anapie holds rights to some individual trees of the species *Lannea macrocarpa* (a valuable fruit-bearing tree). At present, the "anapie" (as well as the village imam [Muslim religious leader]) perform primarily religious functions and rarely mobilize village labor or resources. They neither represent the village to the outside world nor sit on the village council (Dennison et al, 1992: II, 46).

#### Other Elements of Local Self-Governance Capacity

The Tibouki constitution also provides for creation of both intra-village units of governance or special districts, in addition to the structure of the six extended families, to deal with the interests of particular groups and with special issues. A village-wide women's association functions in parallel with the male-dominated village council. A special district for forest governance

and management, discussed in more detail below, has been re-established along traditional lines. The village has also joined in a federated jurisdiction for forest governance and management with a dozen other communities located in and around Boré forest. These examples suggest two points about Tibouki constitutional capabilities as a community:

- \* considerable ability to initiate new institutions to accommodate to new conditions, constraints and opportunities; and
- \* an operational commitment to the constitutional principle that power divided is a good thing, and that checks and balances are essential elements in their system of local governance.

Further justification for these propositions is presented in below.

#### Rules for Collective Decision Making

Collective decisions are taken by the chief, his councilors, often accompanied by elders of each extended family. When someone observes inappropriate behavior, or wants to propose a public investment, the matter is brought up in council. Anyone can propose an issue for public discussion. After debate, a decision is made on the basis of consensus among the council members. The chief and councilors then transmit the decision, each to his own extended family, or in the chief's case, to the Deleba and the Toloba.

Council members also function as a local moot. They hear and try to resolve disputes in which all parties are village members, as well as conflicts

pitting outsiders against Tibouki residents within the village jurisdiction.

Disputes that cannot be resolved locally are appealed to the "arrondissement" for settlement, as they formerly were to the Canton at Boré, before its suppression in 1958 along with all cantonal jurisdictions in Mali.

Village council members can create special commissions when the need arises. Tibouki council in 1992 revived the former special district or jurisdiction for forest governance and management. Until about 1972, when the Malien Forestry Service established a forestry post at Boré Forest, Tibouki like the twelve other villages within the Forest area had a special institution to care for its part of the forest. This local governance unit created a set of rules regulating access to and use of forest products, penalties for rule infractions, a patrolling system to monitor use, apply and enforce rules as necessary, and a dispute resolution mechanism.

During the two decades from 1972 on, with a partial exception during 1987-91, foresters tried to override local rules and impose their interpretation of the Forestry Code. The purpose was to shift control over forest resources from resident communities to field representatives of the national agency. During the five years from 1987 on, foresters in charge of Boré Forest tried to create a system of co-management of the forest. People in neighboring communities played an official role in controlling access to the forest.



Nonetheless, Tibouki people feel their forest suffered considerably from over-exploitation because foresters prevented them from restricting access to it.

In 1992 after the fall of the Moussa Traoré regime and with support from the Near East Foundation, an NGO active in Douentza, Tibouki village council re-established its special district for forest management. After briefly summarizing the constitution of the special district, the next section describes the operational rules governing forest use.

#### Operational Rules Regulating Forest Use

Operational rules regulating access to and use of Tibouki's part of Boré Forest are described in three sections:

- \* constitution of the special district for forest governance and management;
- \* substantive operational rules concerning access to and use of the forest, as well as penalties for infractions; and
- \* procedural operational rules concerning monitoring, application of substantive rules, and resolution of disputes.

#### Constitution of the Woodstock Special District

The constitution of the Tibouki-created special district for forest governance reflects the principle of checks and balances incorporated as a base rule in the constitution of Tibouki village. The management committee, selected after village-wide discussions organized by NEF staff, contains

thirteen members. Of the six extended families, five contributed two members and the last, the Kassouba, contributed three. Each family chose its representatives in accord with its own criteria. All are male, between 25 and 50 years of age, and all cut firewood commercially in the forest. This suggests the general criteria were active males thoroughly familiar with the local firewood production system. One can speculate that family members were seeking individuals both well situated to control the trade, and with a strong incentive to prevent illegal cutting to protect their own interests.

The third individual from the Kassouba family is that family's representative to the village council. Note that the Kassouba provided the councillor, not the Deleba, the family that supplies the Tibouki political headman.

The committee's main role is to monitor forest use and enforce Tibouki village regulations. The rules are set, after public discussion, by the village council and the elders of each extended family. The Kassouba councillors communicates the rules and any changes in them, to committee members. The committee does not make rules. Committee members make major decisions collectively, on a consensual basis. They rely on the Kassouba councillor as their link to the village council. He provides advice and assistance as necessary.

### Substantive Operational Rules

Substantive operational rules fall into three classes: those regulating access, those regulating use of forest products and rules covering penalties for rule infractions. Tibouki rules are clearly at variance with Forest Service rules on a number of points, most particularly on the issue of access. Rules noted below concern almost exclusively trees found in the forest. Trees or fields are subject to other regulations.

Tibouki rules firmly limit access to forest resources. They regulate the uses that can be made of the forest, and control activities of herders on village lands. The base rule on access specifies that non-residents cannot cut wood in the forest without authorization from the village council. The Forest Service rules provide that any Malien who purchases a firewood cutting permit (typically at 6,000 FCFA for the scale of cutting involved here) can harvest wood in non-classified forested areas as they choose.

Villagers as well as outsiders are prohibited from cutting green branches. It is even worse to cut a live tree at ground level because that reduces the likelihood of regeneration. People are not allowed to cut poles or heavier construction logs for sale elsewhere.

Residents can cut and sell firewood as they wish. Residents of neighboring villages who wish to cut firewood in Tibouki's forest are expected to purchase a 1,000 FCFA permit from the village political chief. The price

was deliberately set low by the village council to permit small operators to participate in the trade (Dennison et al, 1992: II, 48). If someone from a neighboring village asks the Tibouki chief for permission to harvest construction wood for his own use, the request is almost always honored. Villagers show him where to cut.

Local rules govern harvesting of fruits and leaves of four local tree species: baobab (or its leaves and bark), *Boscia senegalensis* (edible fruit), *Lannea macrocarpa* (edible fruit and seeds useful for making soap and tanning hides), and *Sclerocarya birrea* (edible fruits). No one can harvest products from the first two until the political chief declares the season open. Individual specimens of *L. macrocarpa* growing on fields belong to Tibouki's religious chief. *S. birrea* fruit can be harvested once it falls to the ground. Within the limits of these rules residents can harvest as much as they want of these products. Non-residents are allowed to harvest only what they can consume immediately, with the exceptions that they can take as many baobab leaves and *B. senegalensis* fruit as they wish.

Transhumant herders are expected to move their animals through Tibouki lands on the cattle track ("gortol") demarcated nearly two centuries ago by the Macina Fulbe regime as part of a region-wide resources governance system. Herders can leave the track to let their animals pasture on grasses and browse on leaves they find in the forest, but they must avoid damaging trees

and crops. Conversely, Tibouki farmers are prohibited from cultivating within the limits of the cattle track. The Tibouki chief grants permission to any resident who wishes to clear land for farming in the forest, on condition that the field not encroach on the cattle track.

Penalties for violating rules vary with the character of the offense and the culprit's reaction. Those who engage in unauthorized harvesting of fruits or leaves lose the products they have collected. Those who illegally cut firewood lose the wood they have cut, and also their axes. They are also fined, usually 2,000 FCFA. Those who resist the amount of the initial fine end up paying 2,500-3,000 FCFA. Herders caught cutting leafy branches for their animals lose their axes and a good animal from their herd, or its equivalent in cash.

Monies collected by the patrols are kept by the committee treasurer until the village council decides what to do with them. Any animals taken from herders are sold in the village for the equivalent of the fine amount, and proceeds are added to the treasury. When enough money is accumulated anyone can propose that it be spent for some public project within the village. In 1992 when locusts threatened local crops, the village council decided collectively to use money from the treasury to purchase insecticides.

Procedural Operational Rules and Dispute Resolution

To carry out monitoring and enforcement activities committee members divide into two, six-person teams. Each team includes one representative of each extended family. This divide and govern strategy enhances communication and discourages bias in committee decisions. Each extended family has at least one representative on the Woodstock special district staff who as necessary can serve as witness and give other family members first-hand accounts of monitoring and dispute resolution activities. Intra-village communication is both rapid and, if families have chosen well, accurate. Since each family is represented on each team, the temptation to make biased or unfair enforcement decisions concerning members of any one of the extended families is sharply reduced by the possibilities of mutual control inherent in this institutional design.

This is important because monitoring activities are intended to control the behavior in the forest of Tibouki residents as well as outsiders. This intent is demonstrated by the organization of monitoring activities. Among themselves team members fix a day when they will patrol over the entire village territory, but particularly in the forest, to detect violations. Team members leave the community at eight o'clock in the morning, form into two groups at a pre-arranged point, meet at noon at another pre-arranged point to exchange information, and again at dusk, to sum up the day's activities.

Before disbanding, they fix the date of the next patrol and that day's meeting points. As committee members keep these decisions secret among themselves the system is obviously designed to catch residents as well as outsiders who violate operational use rules.

Committee members police the forest weekly during the two annual periods of greatest threat. The first occurs just before the rains when transhumant herders move their animals out of the Niger's Inner Delta through Boré Forest past Douentza and onto the Seno plain where they find summer pastures. The second occurs after the harvest when animals are brought back by the same route into the Delta winter pastures. During the remainder of the year patrols are scheduled irregularly.

Patrols also maintain cattle tracks on village lands. Both the transhumant track and the ones leading directly into the village are monitored. As necessary, patrols place sticks to delimit the edges of these tracks. Committee members indicate that, if they could not find a culprit, they would appeal for assistance to the village council. Despite the fact that villagers declare themselves Muslims, council members would use their fetishes to identify and punish the individual by supernatural means.

Members also report that they have no difficulty in mobilizing people to mount the patrols. The consensus among them seems to be that they have been chosen by their families for posts of responsibility and that, if they fulfill

them ably, they will be honored by their fellow villagers. Furthermore they point out that the patrols are not so intense as to prevent them from taking care of their daily activities (farming and cutting firewood).

#### Strategies of Resource Users and Interactions with Monitors

Users of Tibouki forest fall into two classes: residents and non-residents. Unlike the village's farmed areas, which are open, relatively close to the village and easy to observe, it is more difficult to monitor the forested areas. Since controlling access to the forest is less feasible, the temptation is greater for both resident and non-resident forest users to exploit resources found there in violation of the rules. Resident and non-resident wood cutters, herders and leaf and berry gatherers face temptations to harvest out of season, or without permission from local authorities, or to use illicit harvesting methods.

These temptations are reduced by three different methods: clear rules and procedures authorizing harvesting of forest products by legal means; social cohesion within the village; and two forms of monitoring, one human, one supernatural. To remain a village member in good standing, each resident must be seen to abide by the NRGM rules which the village council has established. Social pressure to conform with these rules is considerable, given the tight-knit character of the community.



Unpredictable but relatively regular monitoring of forest use by committee members provides a second considerable deterrent to cheating on the rules. The new patrolling system has restored the risks of being caught, as an individual in violation of the rules, to something like the level under the former local NRGM control system. This amounts to a substantial increase in the risks by comparison with the system operated by the Forest Service, simply because the level of patrolling has greatly intensified from a cursory visit every month or two to regular weekly patrols during peak periods of the year.

Many Tibouki dwellers and outsiders still believe in the occult powers of village leaders to punish violations that would otherwise go unprosecuted. This increases the risks involved in violating local rules, even if one is clever enough to evade detection by human policemen.

The result of these social and rule-based incentives is to reduce greatly the temptations to cheat. Since costs of obtaining legal access to forest resources are relatively low while risks of detection are considerable or, at the supernatural limit, certain, temptations for any users to cheat are much dampened. Since the likelihood that rule violators will rather be caught than get away with something at the expense of others, the temptation to cheat "because everybody does" is practically eliminated. Self-interest, as well as

social cohesion as far as residents are concerned, combine to create a climate fostering respect for local rules.

Committee members confirm that the new monitoring and enforcement system works as well as the old one did before the foresters suppressed it. Members assert that Tibouki people support the system. Residents are regularly informed of the committee's decisions and activities by officers of the village council, to which the committee reports through its designated councillor. Residents of neighboring communities all accept the boundaries of Tibouki forest and Tibouki residents' right to control access and use.

Committee members report they have caught equal numbers of villagers and non-residents violating forest rules. Thus far no one accused of violating Tibouki NRGM rules has refused to pay penalties assessed, though some have at first resisted and ended up paying more. Since patrols have been reinstated, members have noticed a reduction in incidents in which forest resources were damaged and they were unable to catch the culprit.

Interaction with the Forest Service has ceased. No Tibouki villagers have solicited firewood cutting permits since the fall of the Traoré regime in March 1991. Foresters have not even appeared in the community, much less volunteered technical advice. If outsiders come to Tibouki with a permit issued by the Forest Service authorizing them to cut dead wood for sale, patrol members refuse to let them cut.

Outcomes: The Need to Limit Access

Outcomes can be provisionally evaluated - the system is still very new - in terms of efficiency, equity and sustainability of Tibouki forest resources.

The efficiency of the Tibouki system appears quite high. By relying on local people rather than outside, state-paid officials to establish NRGM rules for the forest, and monitor and police application of those rules, major economies are realized. Whatever principled interest in maintaining the country's forest resources individual foresters may have, they can only work as resources guards if they receive salaries and benefits. Local people work for rewards in the form of honor within their families and the village community, and the preservation of the resource which provides them consumption goods and a dry-season income. These economies permit intensification of patrolling to the point where the system begins to bite and have the desired effect.

Because of their greater familiarity with local terrain in and around the forest, and their detailed knowledge of land and forest use patterns, committee members are probably marginally more efficient than foresters in focusing their attention on potential trouble spots within woods and pasture areas.

The equity of the local forest governance and management system appears high as well. Because patrolling as currently organized reduces cheating, opportunities to profit from the forest are available on an equal basis, to all village residents. Outsiders, particularly professional woodcutters who

come from communities beyond the immediate area, probably find the system inequitable because it reduces opportunities open to them under the Forest Service-run system to harvest firewood on village lands. The same holds for herders, both transhumant and local. But the current system merely restores the range of controls formerly exercised at the local level within Tibouki.

In terms of sustainability of Tibouki's base of renewable natural resources, the current system appears to provide clear advantages by comparison with the Forest Service controls. Members of the Tibouki forest NRGM committee state with some vehemence that the Forest Service system merely opened their forest to destruction by outsiders. In their opinion this explains the degraded state of their forest by comparison with that of Pouti, a neighboring Dogon village whose local control system foresters never really managed to suppress.

It is too early to tell if local controls will suffice to preserve the forest as a sustainable source of products which local people need, both to survive in an elemental sense, and to harvest to earn monetary income. In the eyes of local people however the likelihood of that outcome appears much better under the new system than under the previous state-run system.

This tends to confirm the observation that capacity to control access to renewable resources appears a condition necessary for their survival once demand for those resources begins to outstrip supplies. If access can be

controlled, it becomes possible to regulate use in light of the estimated stint, or amount that can be harvested during a year's time from a renewable resource without damaging the resource's capacity to reproduce itself.

#### POLICY IMPLICATIONS FOR WOODSTOCK GOVERNANCE AND MANAGEMENT

What implications can be drawn from the Tibouki case (and others like it)? This section pulls together some concluding observations about the case, then explores its policy implications, and ends with remarks on the value of the institutional analysis and design analytic framework in addressing problems of the sort posed here.

##### Concluding Observations

The Tibouki case chronicles an apparently successful (though still fragile) attempt to change the incentives for human behavior concerning a valuable renewable resource. The major change has been the de facto shift in decision-making authority and power over Tibouki's section of Boré Forest from regional representatives of the national forest agency to the residents of the local community. As a result, capacity to control access to and use of the Woodstock has been provisionally re-centered among resource users.

##### Incentives, User Patterns and Sustainability

This de facto change has re-established conditions favorable for self-governance and management of a common property Woodstock through a set

of institutional arrangements under the control of local people. This institutional change is appropriate since the Woodstock has the characteristics of a common pool resource rather than those of a private good. This development enhances local capacity to make the NRGM institution more responsive to local concerns.

#### Logic of Non-Resident Woodstock "Miners"

Non-resident commercial firewood cutters operate in a "mining mode." Their behavior is strongly driven by market incentives. Under Forest Service rules, they cannot afford to think in terms of maintaining the long term sustainability of Tibouki's forest. Wood cut green, stacked and dried will bring nearly the price of dead wood. Under the Forest Service system, if any one commercial woodcutter reduces his harvesting rate, nothing guarantees that others will do the same. Thus even if he wants to, he cannot afford to act in ways that will sustain the Woodstock resource because others will rapidly harvest what he leaves.

#### Logic of Tibouki Woodcutters

Tibouki woodcutters function within a different logic. They face a range of motivations that include market incentives but other types of incentives as well. While they cut and sell wood, they also eat sauces and consume fruits dishes and drinks prepared by their wives from leaves and berries the latter harvest annually in the forest. Their meals are cooked with

wood taken from the forest. Local woodcutters live in houses built in part with wood taken from the forest. Their animals survive in part by browsing forest vegetation. This range of incentives they face creates a much-longer term perspective on forest management than that held by outside woodcutters, who are typically driven to mine the resource. Thus, other things being equal, there is considerable likelihood that Tibouki people will exercise careful resource stewardship if given the opportunity.

Strengths and Weaknesses of Local Systems for  
Woodstock Governance and Management Systems

Any institutional arrangement has its advantages and disadvantages, whether it takes the form of privatization, national government control or self-governance. Policy determinations inherently involve judgement calls. A review of the pros and cons is indispensable in this case, as in others.

Self Government: Incentives for Good Stewardship

Local governance and management of woodstocks is likely to be more efficient than outside systems would be. Local arrangements often create positive incentives for stewardship that give them a comparative advantage over externally-imposed ones. In the Tibouki case these include:

- \* taking advantage of users' local time and place knowledge about the resource and resource use patterns;

- \* relying on community values to reduce costs of mounting patrols to monitor access and use;
- \* reducing, if not eliminating, lax or tyrannical decisions and abuse of power in applying management rules by careful institutional design of the composition of patrols, e.g., as all families are represented on each, temptations to overlook offenses or to punish individuals from another family more severely are strictly limited;
- \* invoking a back-up occult enforcement system if necessary to deal with violations of local Woodstock governance and management rules;
- \* changing forest resource management rules at very low cost, through decisions made locally by the village council, when local people observe the need to improve the rule system; and
- \* reinforcing community collective interest in Woodstock management by establishing a communal treasury with fines collected for infractions of local Woodstock rules.

A comment is in order on the system by which resources, manpower in this case, are mobilized to maintain patrols and monitor the state of the local Woodstock. The high efficiency and benefits, from the Tibouki perspective, of the patrolling system increases the likelihood of willing compliance with the



need to mobilize manpower to run the patrols. Everyone knows the patrols are effective in reducing illegal use. Each local user thus has an increased incentive to abide by the rules because rule followers are not being "suckers" (E. Ostrom, 1990: 43-44). Individuals' stinting does not leave more for illegal harvesters in this case, but instead ensures the sustainability of the stock. Organizing the patrols through the basic kinship relations within Tibouki strongly increases the likelihood that individual members of the patrol will play their roles effectively.

The decision to mount patrols was taken jointly by the village council members who represent village opinion. This manpower tax does not first leave the village, as do head taxes, with only limited possibility that some of these funds will return later on in the form of public services provided by the national government. Instead, for villagers as individuals and as members of the six major families, the effects of "paying a local tax in labor" in addressing an important local problem are immediate and tangible.

#### Clear Variations in and Possible Weaknesses of Local Systems for Woodstock Governance

Not all of these advantages will accrue to every set of local institutional arrangements for Woodstock management. Belief systems vary, as does the extent of their acceptance by community members and outsiders. The social "architecture" of communities may not lend itself to the kind of balancing of

power that was feasible within the Tibouki de facto constitution and Woodstock monitoring system. Authoritarian, even tyrannical local government systems exist in every country. So do local governance systems fraught with conflict, within which reaching agreement on simple rules may pose insurmountable hurdles.

But while other communities may lack some of Tibouki's advantages, they may enjoy others. Other kinship forms can also lend themselves to creating checks and balances useful in controlling power. Dispersed patterns of residence, unlike the concentrated neighborhoods found in Tibouki, may reduce costs of monitoring by substituting informal for organized surveillance.

Reliance on local institutional arrangements seems a reasonable risk to take in trying to ensure sustainability of forest resources where woodstocks have the attributes of common pool resources. On the other hand, where woodstocks have the dominant character of private goods, it usually makes little sense to treat them as common pool resources (Thomson, 1992). Nothing now guarantees that Tibouki's forest will not eventually be eliminated by excessive harvesting. But odds appear better now than they did in 1991 that the forest will survive to serve succeeding generations of Tibouki residents.

Tibouki Woodstock's Future Role in Meeting Demand for Forest Products

The Tibouki Woodstock may also, if durably subjected to local management, produce enough wood both to satisfy local needs and to meet some of the demand for firewood and construction timbers generated by outsiders in neighboring villages and in the regional centers of Mopti/Sevaré and Douentza. The latter activity would allow the Tibouki part of Boré Forest to continue to serve as a source of revenue for local woodcutters. By the same token, if the Tibouki Woodstock is threatened by overuse or suffers from natural pressures in the form of drought, under local control a new stint can be set and demand throttled back at relatively low cost. By contrast, if the forest is returned to the system of external control organized by the Forest Service, it seems likely that Tibouki woodcutters will be forced to compete with outsiders if they want to capture any of the available supply, and will participate in the destruction of their own Woodstock whether they want to or not.

Scale Problems

Scale problems in Woodstock governance and management merit a final comment. For many reasons, a number of which have been laid out above, it is inappropriate to deal with all woodstocks within a country's boundaries as a single, national-level common pool resource. Instead, treating individual forests as discrete entities appears to make more sense. Once that option is legally available, it may well be appropriate- as Tibouki villagers and

residents of other communities around Boré Forest concluded— to vest the governance and management tasks in smaller units, each of which controls and is responsible for a part of the whole Woodstock. Then, to provide a means to resolve the inevitable disputes and possible problems of general concern to all communities involved in managing a single Woodstock, it seems useful to think in terms of a federated structure that allows people to address the governance and management problems at two different scales.

#### Policy Implications of Tibouki Case

##### for Governance and Management of Local Woodstocks

The major policy implications concern the possibilities for policy makers, whether at the international level in donor organizations or within national (or subnational) governments, to strengthen the enabling environment for such local initiatives. Tibouki represents close to an ideal case of local initiative in the forestry sector in the sense that local people, with minimal outside assistance, rapidly established their own institutional arrangements for Woodstock governance and management (a variant of earlier ones), and then proceeded to control access and use. But other communities, including those with less advantages than Tibouki in this regard, can be encouraged to organize themselves for the same ends by appropriate enabling legislation.

Elements of Enabling Legislation to Encourage Woodstock Governance and Management

The elements of an enabling framework for Woodstock governance and management that can be put in place include at least the following:

- \* authorizing communities to make, modify and suppress rules relevant to regulating access to and use of woodstocks;
- \* authorizing communities to enforce the rules they make for Woodstock governance;
- \* authorizing communities to resolve, in some local moot or court of first instance, disputes arising from application of Woodstock management rules;
- \* authorizing local communities to levy taxes on community members and resource users to finance the costs of Woodstock management (monitoring, rule application, investments in enhancing Woodstock quality, dispute resolution, etc.); and
- \* authorizing citizens to organize new local and supra-local jurisdictions to facilitate Woodstock management.

The facilities such enabling legislation would create should be available to communities to invoke when they judge it useful from their perspective.

Caveats and Risks

Two caveats must be noted. First, an appeals process must be established for those who do not accept decisions of local moots about alleged infractions of local Woodstock management regulations. Second, constitutional guarantees will be necessary to protect the liberties and rights of minorities who have been accustomed to using local woodstocks in the past.

Once population pressure on the resource develops, or market demand escalates, majority groups within communities may find it tempting to exclude some users (resident minorities or strangers who are intermittent users) in order to capture a larger share of the annual increment (or the capital stock) for themselves. Constitutional guarantees are simply another, more fundamental form of legal guarantees. Neither is worth very much if the appeals process, or the path to constitutional litigation, involve high transactions costs.

Risks involved in this approach should not be underestimated. Conflicts must be anticipated, arising both from disagreements among community members and from disputes with outsiders. Since in many cases the resources at stake are considered extremely valuable by parties to these disputes, violence cannot be excluded. It is only logical to anticipate these risks when making policy decisions in the natural resources sector. If government officials cannot accept the unavoidable short-term risks, it may be

better not to initiate devolution programs. On the other hand, failing to devolve authority over woodstocks from national to local (community-level) governments involves other, perhaps more significant risks to the sustainability of the Woodstock resource base.

Offering local communities the opportunity to control their woodstocks involves, in addition to the potential for violence, the possibility that some communities will degrade their remaining forests more rapidly than they might have were outside control systems maintained. Conservation of local forests is, furthermore, entirely compatible with reduction in the biodiversity of those woodstocks. It is certainly appropriate to inform communities of these risks when they request authorization to establish local Woodstock governance and management systems. It must be clear to local people that devolution to local levels of authority to make governance and management decisions carries with it the responsibility of living with the consequences of those decisions. In other words, community members will bear the costs if local woodstocks are destroyed.

Finally, a strong risk exists that, even with judicial and constitutional recourses available to citizens, some- perhaps many— local initiatives to manage woodstocks will occur under local systems of governance that are not particularly democratic. Unless a litmus test can be developed to identify such systems, policy makers should be prepared to live with that risk.

Conclusions: Utility of IAD Framework

This essay has presented an effort to analyze a problematic situation—overuse of a common pool Woodstock— and a communal effort to develop a solution to that problem. It demonstrates the utility of the IAD framework in several ways. The initial focus on a specific policy problem leads the analyst to break down into discrete components the sequence of effect, the problematic situation, and its causes. These are the three sources of incentives that shape the strategies of actors intent on seeking to achieve their preferences. As the actors implement their strategies, they interact and generate outcomes. In this instance, those outcomes now appear quite positive in the sense that a institutional arrangements for a locally workable system of Woodstock governance and management have been operationalized.

The IAD approach encourages the analyst to make explicit the motivations for individuals within a context. It helps categorize incentives into three large, but more manageable groupings, respectively the attributes of goods and services, of communities and of rules or institutions. A thorough IAD analysis will reveal both the nature of those incentives and their relative power in influencing behavior of specific actors. In the Tibouki case, kinship and community structures clearly create strong pressures for a long-term definition of self-interest that encourages the individual to consider family and village welfare in planning strategy.



In addition to its utility in helping to organize a wealth of data, this approach also focuses attention on those sources of incentives more likely subject to manipulation, i.e., rules, and indicates why others— community characteristics and to a lesser extent attributes of goods and services— are less likely points of leverage in changing actors' incentives to encourage more positive behavior.

The combination of the IAD stress on understanding behavior patterns that lead to problematic outcomes, and careful attention to sources of incentives and the extent to which they are subject to modification provides a solid foundation for assessing alternatives open to policy makers. It allows the analyst to think through the impact of formal rules— in this case, legislation to create an enabling framework in support of better Woodstock governance and management by local communities and groups- on the working rules of conduct at the local level, and the risks involved in various policies.

## ENDNOTES

1. This analytic framework, known as the "institutional analysis and development" framework, has been evolved over the past thirty-five years by scholars and practitioners associated with the Workshop in Political Theory and Policy Analysis at Indiana University.

2. Governance is defined here to mean the way power is used to make and implement collective decisions, enforce rules and resolve conflicts. It is a neutral term. Human beings have used and continue to use many systems of governance, ranging from highly authoritarian to highly democratic. As presented by Elinor Ostrom at a U.S. Agency for International Development-sponsored workshop, held in Washington, DC in September 1991, the four basic principles of democratic systems of governance are: "1) balancing power with power at multiple levels; 2) monitoring official performance, and holding officials accountable to citizens by a variety of rule-based mechanisms; 3) accepting conflict as an important indicator of problems, and reliance on fair methods of mediation, deliberation, and adjudication to reach sustainable resolutions; and 4) vesting citizens with enforceable constitutional rights." A democratic system of governance must respect these principles if it is to maintain its capacity to continue solving problems over the long haul.

3. Management as defined here means the processes of combining inputs and transforming them to produce desired outputs.

4. The argument in the next several paragraphs adapts to the Woodstock situation the argument presented by E. Ostrom (1990: 8-13).

5. Research upon which this section is based was conducted during March, 1992 and February, 1993. Funding was provided by the Africa Bureau of USAID and by USAID/Mali, through USAID's Decentralization: Finance and Management Project, Contract N° DHR-5446-Z-00-7033-00.

6. The single exception is a family of Fulbe pastoralists who lost their herd during the 1983-85 drought and have settled near the quarter at the bottom of the hill.

7. Institutions are defined here as sets of rules that influence and organize human behavior. In this sense, the sets of rules that define the terms and conditions of land and renewable resource tenure are institutions. Some institutions are also organizations, for example, public agencies or political parties. Other examples include the congregation of a mosque and the family.

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