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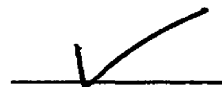
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RURAL REFORESTATION PROJECTS IN

TOUROUA, NORTHERN CAMEROON

by

Brian J. App

B.S. SUNY Geneseo, 1995

presented in partial fulfillment of the requirements

for the degree of

Master of Science

The University of Montana

2004

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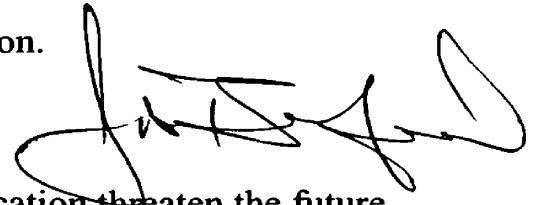
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Resource Conservation

Rural Reforestation Projects in Touroua, Northern Cameroon.

Advisor: James Burchfield



In the arid north of Cameroon, deforestation and desertification threaten the future productive land base of the population. In the North Province of Cameroon, agricultural expansion, wood extraction, and infrastructure expansion due to underlying demographic, economic, institutional factors drive these threats. To combat these trends, both in Cameroon and elsewhere in Africa, several organizations, both governmental and non-governmental, have engaged in reforestation efforts.

As a Peace Corps Volunteer in the rural village of Touroua, in the north of Cameroon, I was engaged in several small-scale rural reforestation efforts throughout the community. In this document I examine four of these projects, evaluate their success, and draw from them the factors that influenced their outcomes. I then organize these factors into the major constraints faced by reforestation projects and the keys for their success.

Through this examination, I find the greatest constraints of rural reforestation projects in the region to be: 1- Livestock, 2- Misalignment of Costs and benefits, 3- Land / Tree Tenure, 4-Limited resources, 5- Lack of Rule Compliance / Enforcement, and 6- Climate. Likewise, I find the keys to success, which I have called the Touroua Model, to be: 1- Participant Benefit, 2- Leadership / Responsibility, 3- Location, and 4- Maintenance.

The Touroua Model puts forth four keys for effective and successful rural reforestation projects. While all of the components are important, I find participant benefits and strong leadership to be the most critical factors. Furthermore, although I offer keys to project success, it is important to recognize that the outcomes of projects are determined by numerous factors and should not be seen as reducible to a simple model. However, keys and challenges such as those presented in this paper can help to guide new projects, as well as to examine the outcomes of past and present projects. It is my hope that this document will prove useful to those that are involved in similar projects, and it may help them to maximize their chances of success.

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INTRODUCTION

At the intersection of West and Central Africa lies the nation of Cameroon. It was in this nation of 16.5 million people (US Department of State 2003), best known for its soccer team and “killer lake¹,” that I spent 27 months working with local communities in the environmental and agricultural sectors.

From September 2000 to December 2002, I lived and worked in a rural village in Northern Cameroon called Touroua, where I helped to initiate and work on several tree-planting projects. In these efforts I always worked with another Peace Corps Volunteer, Karin Vermilye, who also happens to be my wife. However, for clarity’s sake and to avoid ambiguities I will document my experiences and assessments in the first person singular, knowing that Karin was always my partner.

During my time in Touroua, I both saw and heard of the destruction of the region’s remaining forests. I remember one day while walking around the village, a man who I did not know approached me. When I told him of my work and where I was from, he told me, “*We Africans suffer, we have it so much harder than those in the west,*” and after a pause he added ominously, “*the desert will take over soon.*” The effects of this deforestation, most notably desertification and the loss of arable soil, were well known to the government and NGOs working in the region. As a Peace Corps Volunteer, I was involved in efforts aimed at preserving the arable land, and reforesting the area at the community level.

¹ On August 21, 1986 Lake Nyos released a toxic gas that killed over 1,700 people in one night. (DeLancey and Mokeba 1990)

In its 2003 *State of the World's Forests*, the Food and Agriculture Organization estimates that without fundamental change, forests in Africa will continue to be marked by environmental deterioration, land degradation, a loss of forest cover, and desertification. These trends are seen in the North of Cameroon, and were an impetus to my work.

Deforestation

The principle need for reforestation in Touroua stems from the loss of trees in the area. According to many researchers, underlying forces in tropical regions drive the proximate factors of deforestation (Geist and Lambin 2002; Rowe et al. 1992; Cerna 1992; and others). The Mayor of Touroua often expressed his concern for two villages in The Rural Community of Touroua, Borongo and Boundang, which he observed to be facing severe deforestation pressures. In these villages, as well as others in the region, proximate factors driven by underlying forces drive deforestation.

Proximate Factors

Of the proximate factors driving deforestation identified by Geist and Lambin (2002) in their study on the causes of tropical deforestation, the three that are most prominent in Touroua are: Agricultural expansion, wood extraction, and infrastructure expansion.

Around the world, agricultural expansion has been found to be a common factor in almost all cases of deforestation (FAO 2003). In Cameroon, it has been estimated that half of the forest cover has been lost to agricultural expansion in recent decades (Bikié et al. 2003). As observed in Touroua, the land is cleared of vegetation, including trees, to prepare it for cultivation. This has led to deforestation in areas where the populations

are expanding, or where new villages are founded. Yet as stated by Anderson (1987 p. 10), “bringing more land under cultivation is as necessary as food production itself and, given the reality of population growth, it is difficult to see how it can be avoided.”

A second major factor of deforestation in Touroua is wood extraction, which is primarily used for cooking. The high level of fuelwood consumption has been cited as a major factor of deforestation in the region (Odihi 2003). This “fuelwood crisis” is well known and discussed in the literature of Africa and much of the Tropics (Anderson 1987, Brechin 1997, Olson 1999, and others). In 1994, Njiti and Sharpe estimated that 70% of Cameroonians depended wholly on wood for cooking, while another 20% partially relied on it. In Touroua, my observations suggest that these estimates (for the country at large) are much too low for the North. In fact, the only household in Touroua that I observed not using fuelwood was my own. Reliance on fuelwood, combined with a tenure system that discourages investments and sustainable use of the land base (as will be discussed later), has led to the reduction of this resource base.

Realizing the severity of this factor, the Ministry of Forests & Environment (MINEF) in Touroua made efforts to regulate the cutting and selling of fuelwood in the area. Officially, wild trees belong to the state, and it is illegal for people to cut them (Olson 1999). However, this is little acknowledged in practice, and efforts to regulate wood extraction met with strong opposition.

In one incident in Touroua, a man who was working with the MINEF Delegate was assaulted at the weekly market. At Touroua’s weekly market, there are vendors who sell wood for home cooking. On this particular day, the MINEF worker inquired into the origins of the wood being sold. He was told in no uncertain terms to “mind his own

business.” When he refused to leave the matter alone, he was attacked and forced to leave the market area. Although his wounds were not severe, the confrontation showed the deep-seated feelings over regulations and the rights of resource use.

A third factor contributing to deforestation in Touroua is infrastructure expansion, in the form of road building. A new road was built in the late 1990’s running northwest from Touroua into a previously uninhabited region. This road neither connects to another road nor leads to an area for resource extraction. Therefore, although I could not confirm the official reason for the construction of the road, I speculate it was built for the express purpose of populating the area, a practice encouraged by the government. Since that time people have moved into the area, new villages have been founded, and land has been cleared for agriculture. With the clearing of the land itself, and the increased pressure on the resource base, trees are being lost in the area. New villages such as Boundang, which were founded with the construction of new roads, have become sites of deforestation in the Touroua community.

Underlying Factors

Due to social, economic, political and environmental forces in the region, trees are being cut down without regeneration (Boffa 1999). Of the underlying factors driving deforestation identified by Geist and Lambin (2002) in their study on the causes of tropical deforestation, the three that are most prominent in Touroua are: demographic, economic, and institutional.

Examining demographic factors, in-migration, and to a lesser degree internal population growth, were identified as underlying factors by Geist and Lambin (2002) in 47% of the cases that they examined in Africa. This finding holds true for the region of

Touroua where, in addition to internal population growth, recent years have seen the immigration of many people from Cameroon's most populated province, the Far North (Dounias et al. 2002; Logo & Bikié 2003), to the North Province and into villages such as Touroua. This immigration has helped to fuel an estimated 5.1% annual population growth rate for the province, whose population stands at about 1.3 million (MINPAT as quoted in Mayaka 2001).

In a 2001 study of the Bénoué park complex in Cameroon's North province, T. B. Mayaka found that the search for cropping land was the main reason for migration to the area in 93.7% of the cases. When immigrants arrive in Touroua, the traditional chief (known locally as the Lamido) generally grants them parcels of land. This is consistent with the practices of the Fulani chiefdoms in the North of Cameroon, where land disposal is in the realm of the traditional chief (Olson 1999).

Although trees have traditionally been incorporated into the agricultural systems in the Sudano-Sahelian region, these systems have become less viable with increased populations and land pressure (Peace Corps Cameroon 2000). In Figure 1 you can see a field in the village of Borongo that has been cleared of trees and burned in preparation for farming. In the background you can see the edge of the forest, which is being continually pushed back.

Figure 1- A field near Borongo at the forest edge, cleared of trees and burned



While population pressures are certain to drive agricultural expansion, some researchers warn, “the relationships between population dynamics and resource degradation are much too complex to support reductionist generalizations about cause and effect” (Wardell et al. 2003). Economic factors, such as poverty, also underlie the deforestation in the region.

Poor farmers with no resource entitlements contribute to frontier colonization, and the clearing of new land (Geist and Lambin 2002). Furthermore, the rural poor generally rely heavily on forests to provide both subsistence and income generating items (Rowe et al. 1992). In Northern Cameroon, poverty acts synergistically with the demographic factors discussed above, moving poor rural farmers to new areas in a search for land.

Furthermore, the powerful cotton company of the north (SODECOTON, which will be discussed below) works with local chiefs to encourage migration into the region in order to increase their base of cotton farming. In fact, the North province currently accounts for over 50% of the national production of cotton (Mayaka, 2002). Therefore, in addition to the lure of new land for poor farmers, there is the additional incentive of an organized trade in a cash crop.

Finally, institutional factors underlie the forces of deforestation. Geist and Lambin (2002) found that over three quarters of the deforestation cases that they examined were driven, in part, by institutional factors. These factors included land and economic development policies, subsidies for land-based activities, as well as tenure arrangements.

As mentioned above, traditional rulers would encourage immigrants into their regions to participate in the cotton industry. Traditional tenure systems in the area allow these leaders to “accumulate wealth and power” from migration through the collection of land taxes, thereby encouraging their support of immigration (Mayaka 2002, p. 2009).

Furthermore, undefined property rights and open access to forest resources, both of which apply to the case of Northern Cameroon, are institutional factors that contribute to deforestation (Rowe et al., 1992). The tenure systems and property rights that underlie this issue will be discussed in more detail later in the paper.

Reforestation

There are two basic types of benefits to be had from reforestation projects: those that go to the society at large, and those that go to the individual. The following sections will enumerate specific benefits that can be gained by reforestation projects in Touroua.

Societal Benefits

The first societal benefit to be gained from reforestation is the preservation of the land, including protection of watersheds and wildlife habitat, as well as general holistic environmental values. Reforestation can help to counterbalance the deforestation in the region, and pass on an environment as rich as the current one to the next generation. This benefit not only helps the present society as a whole, but future generations as well.

Similarly, another societal concern is the protection of the productivity of the land, and the fight against desertification. While this may be considered an individual benefit, given the uncertain land tenure (to be discussed later) and the long-term nature of natural processes, it should be considered more of a societal benefit. In Touroua, I often heard about desertification and the loss of arable land from government workers and how planting trees to prevent soil erosion helps. Reforestation to combat desertification was a real and recognized benefit in Touroua.

According to the UN, desertification poses its greatest threat in Africa, two-thirds of which is either desert or arid-land. Since the idea was first popularized, desertification has been linked with deforestation. While the 1973 drought in the African Sahel focused international attention on desertification, the causal link between deforestation and drought has been difficult to prove in the region (Basset & Crummey 2003). Nevertheless, desertification remains a well-publicized threat in the Sahel, including the village of Touroua.

On one occasion, a young man came to my house and announced, “*I am in Les Amis de la Nature² and I want to fight desertification.*” As it turns out, he was a student from

² A high school Club: Friends of Nature

the high school in Garoua (The North Province capital) who was home in Touroua for break. In his club they had spoken of the importance of planting trees and fighting desertification. Before the end of classes the club's members agreed to do something in their villages when they returned there for break.

The social benefits of protecting the land, by preventing erosion and improving the soil, help the long-term productivity of the land. This long-term effect works to ensure that the population can continue to feed itself and to continue to have farming as a viable mode of generating revenue.

Individual Benefits

While the degree to which benefits are accrued by individuals depends, in part, on the ownership of the trees, reforestation can hold many benefits for the individual, as long as the people in the area have access to trees. The rural people of sub-Saharan Africa depend on the forests for a myriad of well-documented uses, including those of subsistence, economic, social and cultural values (Olson 1999). I will not detail them all here, but will mention those most common in Touroua.

In his 1999 dissertation, Stephen Olson conducted many polls and interviews of the people in and around Guidar, a city in the north province of Cameroon, on land tenure and trees. He found that "all groups listed small timber, fuelwood, fruit and medicine most frequently for uses of trees." Furthermore, he found that wild trees were generally used for "fuelwood, shade, fruit, poles, medicine, ornamental purposes and amenity." His findings are in line with the discussions that I had with people in Touroua.

Olson also found that trees play an important role in Guidar society, and recommended that these roles should be taken into account by management groups for land use plans (1999). In Touroua, trees also played a significant role, with certain trees having important cultural values. For example, the Baobab (*Adansonia digitata*) was considered by many to be sacred as it represented the spirits of the ancestors, and would not be cut down. I often wondered if the large presence of baobabs in Touroua, compared to other species, was due to its sacred value which prevented it from being cut down with the other trees.

Furthermore, the nomadic herders in the region (the Mbororo) were reputed to have great knowledge of trees. I was witness to this knowledge while compiling a tree identification book for the Peace Corps. Walking outside the village with a friend who was knowledgeable in trees, we reached a point where all the most common trees had been identified. There were trees left, but neither he nor I (with the help of a Sahelian tree book) could identify them. However, we then saw a group of cattle accompanied by a few Mbororo herders heading our way. My friend told me that they should be able to help, and asked them to identify the trees. Sure enough, they were able to identify and differentiate the similar looking trees that had remained for us unknown. Using my book to translate the Fulani names, I was able to confirm their identifications with closer scrutiny.

My intention with these stories is to show that many of Touroua's people know trees, and appreciate their value. When I had meetings with new groups of people in the village, I would always ask, "What are trees good for?" At these meetings, of usually between 10 and 50 people, I invariably heard "shade" as the first response. After shade,

fruit was the most frequently described use, followed by wood. Generally, trees were not a “hard sell” in Touroua, as people well knew their value. As I made my way through the village with trees strapped to the back of my bicycle, I was constantly regaled by cries of, “Can I have a tree?” and “Give me one!”

One day while walking around Touroua a teacher from a small surrounding village approached me. Knowing that I was the American who was connected with trees, he told me that he wanted fruit trees for his school so that his students could have shade. *“I like trees, they are like people, you need to care for them,”* he told me. Though it was too late for the current season, I assured him that we could plan a project for the next year. This typical exchange shows that people in Touroua know the value of trees, and like many people around the world, show affection for them. This is not to say that people will not cut down trees, but that it is not difficult getting people to agree, in principle, to plant them.

The benefits of trees for shade, fruit and construction materials were well known. Indeed, with the local market selling both fruit and wood, these items had a recognized and standard economic value. However, the benefits of fodder and soil fertility were less recognized. Although fodder was understood as a benefit, most people kept only a few animals that wandered freely to graze for their food.

While the improvement of soil fertility is a benefit for the individual farmer, due to several factors it is generally unconvincing to most people in the area. Firstly, the benefits to be had from the improvement of soil fertility take years to be realized. Secondly, once realized these benefits are difficult to measure and need to take into account the area lost to crops by the planting of the trees. Finally, due to insecure land

tenure, farmers fear that if the soil is improved too much local chiefs will confiscate the land for their personal use.

Given these needs for and benefits from reforestation projects in the region, it seemed that those I was to undertake would easily gain the support of the local community and succeed, to a large degree, in their goals. Unfortunately, I was unprepared for the difficulties that these projects would face. As it turned out, for reasons that will be detailed later, planting trees that would survive was a difficult endeavor. The amount of work necessary for planting, protecting, and maintaining each tree was more than I expected, and in many cases more than was practical.

From all of the reforestation interventions that I was involved with, I have chosen four to examine in detail. In choosing projects, I eliminated those that were not related to public spaces. I did this for two primary reasons. Firstly, in my own experience and in the testimony of my fellow Peace Corps Volunteers, it was too difficult to convince people to plant trees in their fields as part of a standard agroforestry intervention. This difficulty is most easily explained by the tradeoffs demanded between agriculture and trees when planting on the farms, and the lack of ownership of trees and land due to insecure tenure systems.

Planting trees on the farm takes planting space away from crops, and the trees use valuable water, while blocking needed sunlight. Furthermore, labor is taken away from the crops to be spent on the trees at the critical beginning of the cropping season. Although the benefits to soil fertility may outweigh these constraints and produce greater yields, it is uncertain and requires tradeoffs of land, resources and labor. In general, the

demands on agriculture are often perceived as too great for individual farmers to invest the space and labor to plant trees on their farms (Adesina et al. 2000).

The second reason for choosing public spaces is the great effort required to carryout successful tree plantings in the area. Given the efforts that are required to plant and maintain trees in the region, I reasoned that the projects that were in public spaces would be the most likely to succeed, since they could garner greater resources. In theory, public spaces benefit everyone, to a degree, and could therefore elicit the participation necessary for the projects. However, with such factors as the high degree of poverty in the region forcing people to be most concerned with food and money for short-term survival, and the benefits from public projects being available to people not participating in the projects, this reasoning may have been overly optimistic.

One encounter in particular stands out as an example of why I chose to concentrate on public spaces. While having a conversation with a local official about a community tree-planting project, we happened to pass by his farm. He pointed out all of the trees on the farm that were inhibiting the growth of his crops, "*Trees are no good for the farm,*" he told me, "*...I will cut all of them.*" This was from an educated man who both knew that I was involved with the planting of trees in association with agriculture, and was indeed interested in tree planting. After I reiterated how some of the trees on his field, especially the thorny acacias, were good for his soil and long-term productivity, he retorted, "*Keep the thorns? I can eat the fruit and leaves of the Baobab, but I cannot eat thorns. I will cut down all of the trees!*" This exchange illustrates the conflict that tree planting has with agriculture, and that the costs and tradeoffs are well recognized in Touroua.

Of the public projects I was involved in, I chose four that represented multiple variables of influence and a range of success: 1- The Market, 2- The Outdoor Festival Mosque, 3- Wouro Kessoum, and 4- The School. Although different, the projects were not so dissimilar that they could not be readily compared and examined for their commonalities and contributing factors. The relative location of these projects can be seen in Appendix A- Touroua Project Map. In this paper I describe these four projects in detail, drawing on information from notes, Peace Corps reports, and photos taken while the projects were ongoing. The details of these projects are primarily qualitative in nature, relying on the descriptions and comments of those involved.

Although I will give some quantitative data in the form of estimated survival rates, the uncontrolled nature of the multiple participants in the projects, which took place simultaneously, precluded my taking detailed measurements for a more formal evaluation. These participants ranged from the authorities that approved the projects and those who carried them out, to those who acted against the projects' success.

I examine the projects for the factors contributing to their "success" or "failure." For this evaluation, I define success in terms of how many trees survived during my period of observation. Unfortunately, the long-term nature of reforestation projects, and the relatively short time period (2 years) of documentation limits the evaluation. However, if a tree survives the first two years, its greatest danger of mortality has passed, since it has likely become well established and attained a height that puts it past the need for protection from livestock. Therefore, I feel that such a tree has a reasonable chance to survive and prosper, and can be considered a success. With this framework, I will

compare the projects for their success and examine the similar and different factors that contributed to their outcomes.

Due to the importance of maintaining a viable long-term resource base in the region, I feel that it is critical to learn all we can about efforts designed to secure it. Rural reforestation is one such effort, and must be further scrutinized if we want to maximize its benefits. In this paper I closely examine rural reforestation projects in the region of Northern Cameroon, draw lessons from them, and articulate an approach that may help to further the chances of success for similar projects in the future.

BACKGROUND

In this section I provide the context for the projects to be described. I examine the institutional, social and ecological issues for Cameroon and Touroua, as well as the procedure for carrying out reforestation projects in the area.

Institutional

Cameroon was founded as a republic in 1960 from a former French colony, and was joined in 1961 by areas formerly under British control. Due to this history, Cameroon has two official languages: French and English. However, in practice English is only spoken in the two provinces formerly under British control, while French dominates the other eight. There is a strong central government that is dominated by the president. Nevertheless, traditional rulers are still powerful in some areas, and exercise certain functions of, and receive stipends from, the national government (US Department of State 2003). The North of Cameroon is one such area where the traditional leaders, who are called *Lamidos*, are quite powerful. This region is

predominately populated by Islamic people, the area having largely been conquered by the Muslim Fulani people by the early 1800s (DeLancey and Mokeba 1990). The powerful Lamidos of the North hold both religious and civic roles in their communities.

The village of Touroua is part of the Rural Community of Touroua, for which it is the administrative center. The Rural Community of Touroua covers an area of 1,070 km² with over 30 villages and 5 Mbororo encampments (DPGT 1999). The vegetation consists primarily of savannah trees and tall grasses, with brown tones dominating the landscape till the rains transform them to green (RCOT 2000).

As an administrative center, Touroua hosts a variety of governmental institutions. The highest-ranking official is the Chef du District (District Head), whose area of authority includes the Rural Community of Touroua. The Chef du District is an official appointed by the national government, and as such was not originally from the village of Touroua. Given that most people never leave the province, much less visit the distant capitol, this powerful figure with his far away backers is not generally turned to by the local population.

However, people often go to the Mayor of the Rural Community of Touroua when they have problems, and his office largely concerns itself with these matters. Mayor is an elected post and as such is usually occupied by someone from the community. The Office of the Mayor is charged with most of the day-to-day operations of the village, and is staffed with various functionaries. One of these functionaries is the Secretary General, who is charged, among other responsibilities, with the operation of the market. It was in this capacity that I was involved with the Secretary General for the Market Project that will be discussed later in the paper.

A third institutional figure in Touroua is the powerful traditional ruler, known as the Lamido. The authority of the Lamido extends past the Rural Community of Touroua into Nigeria. As both a civic and religious leader, the people hold the Lamido in a position of great authority and respect.

Touroua has an office for the Ministry of Agriculture (MINAGRI), which was sporadically occupied during my time in Touroua with a number of officials. Among these officials were Zonal Extension Workers, who helped to provide information on agricultural techniques to the local populations.

In 2002, Touroua received a Delegate from the Ministry of Forest and Environment (MINEF). In charge of the forests and forestry activities, reforestation projects fell within his jurisdiction (Peace Corps Cameroon 2000). Therefore, I often dealt with this delegate in the 2002 projects.

While I do not wish to criticize the delegate of the post, there are a few comments on the agency's capacity that should be mentioned. First of all, the MINEF delegate for Touroua had neither an office nor a mode of transportation with which to conduct his affairs. Secondly, in technical matters he lacked training in basic forestry methods. In contrast, as a Peace Corps Volunteer, I was taught standard forestry techniques from Cameroonian experts (some of whom worked for Cameroonian governmental agencies such as the Institute of Agricultural Research and Development).

For example, during a planting at the market, I was disturbed to see the delegate skip two important steps in the standard planting process (loosening the soil at the bottom of the hole, and cutting "J" roots). The fact that the delegate did not follow the

standard planting techniques suggests a lack of training for officials and a lack of communication between governmental agencies.

A survey of Government officials in the land management sector of Guidar, a North province city, supports this assessment. The survey found that officials felt that they did not have the tools to properly carryout their jobs, and suffered from a lack of material necessities (vehicles, and proper offices) as well as up-to-date training on technical issues (Olson 1999).

In addition to governmental agencies, SODECOTON, a partially state owned business run jointly by Cameroon and France, plays a large institutional role in the North of Cameroon. The main goal of SODECOTON is the promotion of cotton cultivation in Northern Cameroon (Mayaka 2001). As the only crop with organized trade channels in the region, most of the farmers in Touroua depend on it for generating their cash income (Dounias et al. 2002). Furthermore, SODECOTON is largely responsible for maintaining the only road that connects Touroua to the rest of the country. However, along with the rainy season floods, people blame the large SODECOTON trucks for destroying the roads while taking the year's cotton crop to their processing centers.

In a conversation with a government worker about SODECOTON, he told me that it was a monopoly, as it was the only source of cottonseeds and the only company that bought the cotton in the area. He went on to say that since most farmers are poor, they have to buy the seeds and fertilizer on credit from the company, and pay them off with their harvest. Expressing the widespread conflicted feelings about the company, he added, "*SODECOTON sells seeds, fertilizers and other supplies at an inflated price and buys the*

final crop at deflated prices. Yet, they also help build roads here, do agricultural extension animations, and help with schools, wells, etc. So, what does one do?'

The main NGO that works in Touroua is Développement Paysannal et Gestion de Terroirs³ (DPGT), which is managed in connection with SODECOTON. DPGT principally deals with land use issues, including farmer grazer conflict. However, DPGT does not maintain a permanent presence in Touroua, and only visits occasionally to conduct meetings. Nevertheless, both SODECOTON and DPGT play a larger role in the less remote villages in the North of Cameroon where, among other activities, they form farmer groups and organize local tree nurseries.

A further institutional detail that should be mentioned, as it affects the way that people make decisions, is the corruption that pervades many aspects of Cameroonian life. In both 1998 and 1999, Cameroon was ranked as the most corrupt nation in the world, according to the annual survey conducted by Transparency International. Although Cameroon's rank has improved since those years, it is still listed as among the most corrupt nations (Transparency International 2003). Furthermore, according to the US Department of State (2003), "the judiciary is frequently corrupt, inefficient, and subject to political influence."

Corruption leads to a lack of trust in officials and can affect the social acceptability of a project. In Cameroon people often have a distrust of government institutions. In Touroua, I often heard people complain of officials embezzling money meant for projects and how "they are all corrupt." One official confided in me that money for the people often disappears before it reaches the local level. "*Basically, everyone*

³ In English: Peasant Land Use and Development

steals a small piece until there is nothing left,” he said. Indeed, it was generally accepted that projects should be budgeted at several times their costs if there was to be hope of completion. When there is a lack of trust, people often believe that their interests will not be taken into account, and the social acceptability of a project may be hampered (Kakoyannis et al. 2001).

A final institutional detail is the role of the system of land and tree tenure in the region. In Cameroon as a whole, and especially within the Northern Provinces, there are two separate systems of tenure that affect the people: Customary systems and national legal standards. However, neither system is favorable to the rural communities, as the former places authority in the hands of local leaders, and the latter in the hands of governmental officials.

“The lack of an equitable system of natural resource tenure for local communities in Cameroon engenders oppression and perpetuates their degraded status. The present legal system is being slowly applied and is creating additional confusion” (Egbe 2002, p.70). Despite the 1974 legislation that requires the registration of land, by 2002 less than three percent of rural lands were registered (Egbe 2002).

In Touroua, the Lamido is in control of the land, and divides it among the people in the village. Traditionally, under this system the Lamido collects rent for land given in this fashion (Olson 1999). Furthermore, the residents in Touroua experience land tenure that is insecure, and they fear that the Lamido can take their land from them if he wishes. This system puts people’s emphasis on short-term benefits, since they are unsure if they will be able to reap long-term benefits from any investments in the land. For example, in conversations with farmers on the subject of agroforestry interventions and improving

the quality of the soil in their fields, they several times expressed the concern that if their land became too productive, the Lamido might take it away from them.

Concerning the national legal framework, the 1994 forestry law nationalized all forest resources, including wild trees on privately owned land, with few exceptions. Nationally, this law and others are violated on a daily basis (Egbe 2002), and the village of Touroua is no different. Nevertheless, the two separate systems being simultaneously in force give the tenure situation great uncertainty. These tenure issues, along with their effects on the local population's views regarding environmental interventions, will be discussed in greater detail in the literature review section.

Social

The region popularly referred to as the North is composed of Cameroon's three northernmost provinces: the Far North, the North and the Adamoua (DeLancey and Mokeba 1990). Less economically developed than Cameroon as a whole, nearly all the population of the North engages in either farming or grazing. The Economics and Planning Ministry (MINEP) characterized the relationship between these farmers and grazers as one of "weak coexistence." The region is home to a large semi-nomadic pastoral population, and it is not unusual for a herdsman to guide his charges into a cultivated field and stand by and watch as the crops are being ravaged (Njiti & Sharpe 1994).

Farming in the North is extensive and uses rudimentary equipment. The major crops are millet (*Pennisetum typhoides*), sorghum (*Sorghum bicolor*), corn (*Zea mays*), peanuts (*Arachis hypogea*), cowpeas (*Vigna unguiculata*) as well as a variety of local legumes. Cotton

(*Gossypium hirsutum*) and rice (*Oryza sativa*) are the principle cash crops cultivated in the area (MINEF as quoted in Tchamba 1996).

The people of Touroua are from many different ethnic groups including: *Peul*, *Moundang*, *Bainawa*, *Toupouri*, *Namdji*, *Matakam*, *Guiziga*, *Bata*, *Haoussa*, *Knouri*, and *Bornois (Kolé)*. The principle activity of the population is farming, followed by animal husbandry. Additionally, being located five kilometers from the Faro River that divides Cameroon from Nigeria, some people are involved with fishing and cross border commerce (RCOT 2000).

Although the official language of the province is French, most of the population of Touroua does not speak it. The most common language is Fulfuldé (a.k.a. *Peul* or *Fulani*), which acts as a trading language throughout the North. Most of the population speaks Fulfuldé in addition to one or two other local languages with *Hausa*, *Guidar*, *Toupouri*, and *Guizga* being common.

When I first arrived in Touroua, a government official from the Ministry of Agriculture told me what he felt were the five greatest challenges facing the people of the village: 1- A lack of education, since many parents don't send their children to school, and there is no schooling above primary available. 2- The conflict between farmers and grazers. 3- The government's policy of placing immigrants from the Far North province in the North province without planning how much land is required for each person. 4- Traditional land tenure systems where people don't own the land they farm. 5- Farmers cultivate fields too close to the river, since the soil is rich there, but then the river floods and the farmers lose their crops.

Although he was speaking about the general challenges facing the people, many of these factors are the same as those affecting reforestation efforts. As previously discussed, immigration helps to drive deforestation, while insecure tenure discourages reforestation. Furthermore, education has the potential to alleviate practices detrimental to the environment by offering alternatives and pointing out the long-term consequences of actions.

Regarding reforestation, the keeping of livestock in the area poses the greatest challenge. Livestock, mainly cattle, goats, sheep, and chickens, are numerous in Touroua. Furthermore, the animal husbandry that takes place in the area is mostly traditional, where the animals are left to roam about the village more or less unsupervised. In addition to searching for something to eat, cattle threaten tree-planting projects, by scratching themselves against the protections. This loosens the protections, allowing goats and sheep to enter and eat the trees, as well as people to easily gather the loose sticks. The challenge to reforestation efforts presented by livestock is examined in detail later in the paper.

Ecological

Ecologically, Cameroon is quite diverse with the dry grasslands of the North, the rainforests in the east, and the coastal region in the west. Despite these regional differences, 73% of the active workforce engaged in the same principle activity of farming (Njiti and Sharpe 1994). However, with only 30% of the land deemed arable by the Ministry of Agriculture, and with the population growing at an estimated 2.9% per year, land use presents a great challenge (US Department of State 2003). In their study of the land usage in Cameroon, Njiti and Sharpe (1994) used a goal-programming

approach to calculate the optimal usage of the land. According to their study, land in Cameroon had become a limiting factor in 1991, and there was the potential for catastrophe in the agricultural sector.

In the North, the climate is semi-arid and hot, with at least a seven-month dry period (US Department of State 2003) and an annual rainfall ranging approximately from 600-1200mm (Dounias et al. 2002; Peace Corps Cameroon 2000). The vegetation in the North is principally associated with the Sudano-Sahelian zone that runs across the northern part of West Africa. This area is the country's most ecologically sensitive, with barren soils constituting 25-30% of the land area (Njiti & Sharpe 1994).

Farmers in the North have only a short season of highly variable rains in which to plant. Soil erosion and livestock production are cited as the major challenges to agriculture (Njiti & Sharpe 1994). Additionally, with the abundance of protected areas in the zone, conflicts with wildlife, especially elephants, have become more common adding further pressure to the already beleaguered farmers (Tchamba 1996).

In the Village of Touroua, the Baobab (*Adansonia digitata*) is the most common indigenous tree and the Neem (*Azadirachta indica*) is the most common exotic. The Neem has been widely planted in villages in the North, including Touroua, due to its drought resistance, and quick growth rate (Maydell 1990). Other trees commonly seen in the village include Red Mahogany (*Khaya senegalensis*), Yellow Cassia (*Cassia siamea*) and Eucalyptus (*Eucalyptus camaldulensis*). Additionally, fruit trees such as the Mango (*Mangifera indica*) and the Lemon (*Citrus limonus*) are often found within the walls of village compounds.

Environmental factors in the region make reforestation projects difficult. Conditions of unreliable and often insufficient rainfall, in combination with extremely high daily temperatures can easily dry out and kill new trees (Drijver 1991). Furthermore, these conditions put similar pressure on people's fields, drawing their attention from reforestation efforts.

Reforestation Procedure

To further establish the context for the projects to be examined, it is necessary to describe the general procedure that I followed in carrying them out. These procedures start from the time of the first idea, and last till the trees become established. Although the demarcation might be somewhat arbitrary, I have divided the procedure into three phases for the ease of project examination: Inception, Planting and Maintenance. Each of these phases was critical for the projects, and needs to be considered.

The Inception phase is the creation of the specific project. This is when the first idea for the project is formed and discussed. In this phase the issues range from the specific logistical questions of where the project is to be located and what species are to be used, to the general social questions of who controls, manages and benefits from the project. These issues affect both the short-term success and the long-term sustainability of the project, and should be carefully considered.

Given the significance of these decisions, it is important to have a solid framework for making them. One such framework is proposed by Miller et al. (1994) in their book *Rural Resource Management*, which asks six questions for each decision: 1- What is the decision to be made? 2- On what criteria will I base my decision? 3- What

alternative courses of action exist? 4- What is the expected effect of each alternative on each criterion? 5- Which alternative is best? and 6- How can this alternative be put into action? (p. 91)

The Planting phase is the period from when the seeds are planted, to when the trees are out-planted. In general, this is the time that the trees spend in a nursery. Most of the trees used in the Touroua projects were from nurseries established for that particular project. Since trees were not commercially available locally, it was necessary to start projects with nurseries. The species planted depended on the nature of the project and the seeds available. I provided some of the seeds, through the Peace Corps, while others were gathered locally. For the projects to be discussed, I recommended only that multiple species be used, as to avoid a monoculture that would be susceptible to disease or insect outbreak.

The establishment and maintenance of nurseries in Northern Cameroon is time, labor and material intensive. Specifically, nurseries require a water source, protection from livestock and pests, shade from the sun and general maintenance to assure that these needs are continually being met (Peace Corps Cameroon 2002).

The final part of this phase is when the trees are outplanted in the field. This is ideally done as soon as the rains become reliable, so as to give the trees as much time as possible to establish themselves before the onset of the next dry season. While this is generally the beginning of April, the rains in the region are highly variable (Dounias et al. 2002). Inconsistent rain makes it difficult to know when to outplant trees, as you want to wait until the rains are falling consistently. However, if you wait too long to plant, the tree may not have enough time to establish itself before the onset of the dry season.

The time when the project moves from the planting to maintenance phase is critical, and unfortunately is also when people have the least amount of spare time due to agricultural conflicts. For the better part of the year, there is little farming to do and people have the time to invest in tree nurseries. However, with the beginning of the rains, people are occupied full time with the planting and weeding of their fields. Furthermore, the period of the first rains also brings strong seasonal winds that cause the widespread destruction of walls and huts in the village. As seen in Figure 2, broken walls are often repaired with thatch until the more costly and time consuming process of rebuilding it with earthen bricks can be started. Therefore, people often need to spend their time in the care of their fields and the reconstruction of their compounds during this period.

Figure 2- A wall knocked down by wind and rain, and then patched



For example, there were several occasions where I showed up to a meeting after a large rain, only to have nobody arrive. On the first of these occasions, I waited while the

women and children nervously laughed and looked at me. Eventually, someone worked up the courage to tell me that all of the men were in the fields (*“you see...it rained last night...”*). Although I still showed up for meetings after a good rain, I was never again surprised when nobody showed up.

The Maintenance phase is the period after the trees have been outplanted, and includes the protection of the trees. Tree protection is the most material intensive phase of tree plantings, and normally requires a large amount of wood to surround the tree for discouraging browsing. The general rule is, “the more and the thornier the branches, the better.” It should be noted that most of the wood that was used for tree protections in these projects was taken from the abundant neem trees around the village, that are fast growing and coppice well.

The browsing pressure in Touroua is great, with people keeping cattle, sheep and goats. Furthermore, there is a large population of nomadic herders in the region, the Mbororo, who drive large herds of cattle through and around Touroua. Livestock seek out the trees to eat, and the protections to scratch against. In Figure 3, we see an ewe searching for a way into the tree protection, while her young stand by, perhaps taking the lesson in. In Figure 4, we see a protection that has been partially broken, most likely by scratching cattle. This tree is now open for livestock to eat, and the wood has become more easily available for a person to take for their home use. This demonstrates that the maintenance of the trees is a continual process requiring the fixing and/or replacing of protections that are damaged or lost if the tree is to be truly protected.

Figure 3- Sheep eying a new tree through a protection



Figure 4- A partially destroyed protection



Finally, maintenance includes occasionally examining the trees to see if they are damaged, dry or have some other problem. Being vigilant and “keeping an eye” on the trees discourages the damage by both animals and people. Although examination of the trees is not a necessity, as trees planted with protections at the right time theoretically have all they need, it increases the likelihood that an individual tree will survive.

METHODS

For this paper, I primarily used information gathered during my time spent in Touroua. This information includes participant observation and interviews, Peace Corps reports, and photos taken while the projects were ongoing. The details of these projects are primarily qualitative and observational in nature, relying on the descriptions and comments of those involved.

In *Qualitative Research & Evaluation Methods*, Michael Quinn Patton (2002) states qualitative observation data includes:

Fieldwork descriptions of activities, behaviors, actions, conversations, interpersonal interactions, organizational or community processes, or any other observable human experience. Data consists of field notes: rich, detailed descriptions, including the context within which the observations were made. (p.4)

Furthermore, Patton goes on to explain that there can be no separation between the process of observing and the information gathered. In the case of my research, I engaged in full participant observation where I was observing activities and participating in them (Patton 2002).

Examining the timing of the projects, Wouro Kessoum was initiated after a presentation in March of 2001. Both the Market and the Outdoor Festival Mosque projects were initiated through meetings with local officials in June of 2001. The school project was initiated through contact with a local schoolteacher in October of 2001. Although all of these projects were monitored throughout 2001-2002, the school project did not physically begin till February of 2002, the same time when the Outdoor Festival Mosque project ended without a renewed effort.

While ongoing, I visited each project at least one time per week. Generally, I had a schedule whereby I would visit each of the projects on the same day of each week. However, when there was major work at a particular site, I would be there for several days in a row. While at the sites, I would talk to the project participants and observe the trees. In the beginning of each project, this meant visiting the nurseries, while after outplanting this entailed visiting the project site. However, in the course of everyday life in the village when I passed by the project sites, especially the market, I would examine the trees and note changes and what needed to be done.

It should be noted that all of the projects used their own nurseries created specifically for them, except for the 2001 Market Project. For that project, some of the trees planted were from my private nursery, where I grew trees both to supplement projects and to experiment with different techniques and species.

Although more quantitative data would have been useful, in terms of exact numbers of tree mortality and rate of growth, I did not record them. This was due in part to the uncontrolled nature of the projects, with multiple participants (both known and unknown), and in part to a lack of foresight into how the projects were going to be

examined. However, given my straightforward measure of success of trees remaining alive, I feel that visual observation and approximate percentages are sufficient to carry out my analysis.

It was in the course of walking and/or biking to these project sites that I often had interactions with the people of Touroua recounted in this paper. Although I did not conduct formal interviews, people loved to stop me to talk. Inevitably, the topic of conversation would turn to, “What are you doing here?,” giving me the opportunity to talk about my work and get people’s impressions of trees and tree planting.

Additionally, in the course of my work I came in contact with many government officials. These contacts lead to many of the comments that I present below from “government officials.” Some of these officials are identified by their organization, while others are left without identification. I made these decisions based on the formality of the conversation and how the opinions related to the general opinions held by the person’s organization. For example, if the opinions of a delegate were different from the accepted views of their ministry, they were identified simply as an official.

In a final note on the information that I gathered in Touroua, I was undeniably involved with the projects that are to be described. It would be very difficult for me to remove myself from these projects and to guess how they would have gone in my absence. Indeed, as one of their primary initiators, they very likely would not have occurred at all if I had not been there. Nevertheless, I was only filling a role that another might have played. Whether it is another Peace Corps Volunteer, an NGO worker, or a MINEF delegate, there are multiple parties that could potentially have taken my place in

Touroua or a similar village. Given the local conditions to be discussed later, I feel that my involvement was not only valid, but perhaps also necessary for such efforts.

In order to build a context in which I could examine the projects conducted in Touroua, I undertook a literature review. I examined literature relevant to rural reforestation, project participant behavior and land tenure. For this, I looked for information on the general theories, as well as that which was most relevant to the North of Cameroon. However, due to limited results for Northern Cameroon, I expanded my search outwards to include the whole of Africa. It was my feeling that these topics would provide me with: 1- a solid background on the region, 2- reforestation approaches to compare with those I took in my projects, and 3- a framework to analyze project success and failure.

LITERATURE REVIEW

In this literature review, I will examine three issues relevant to reforestation in the north of Cameroon: reforestation approaches, stakeholder participation and land tenure.

Reforestation Approaches

Many organizations, both governmental and non-governmental, have been involved in rural reforestation projects. Each of these organizations has an approach to and philosophy of reforestation projects. It is not my intention to give a detailed survey of these organizations and approaches, as such an endeavor would be a work unto itself. However, in order to better judge the projects that I will be discussing, and to put them in a larger context, I would like to present a general overview of some of these approaches taken by organizations involved with rural reforestation.

The first approach I would like to mention is the project approach, which has been employed by the World Bank. In his book *Planting Trees in the Developing World*, Steven Brechin (1997) describes the project approach of the World Bank for reforestation projects as considering “a project sound when the expected total economic benefits derived from the project exceed the expected total costs and when the project is arranged in a manner fiscally prudent for both lender and borrower” (p. 43). Brechin goes on to critique the World Bank’s projects, which were intended as rural development, as bypassing their intended beneficiaries. These projects, especially during the 1970’s and 1980’s, often became industrial forestry that benefited the government, urban populations and the rural rich. While there have been some improvements and acknowledgement of shortcomings by the bank itself, the performance and appropriateness of its projects remains poor (Brechin 1997).

In the 1970’s, as the poor results of many forestry projects became widely known, there was a shift in the international community towards forms of forestry more responsive to local needs (Fisher 1995). Exemplifying this trend, the US Congress legislated the “New Directions” of international aid between 1973 and 1975 that emphasized the poor majority of developing nations in their development initiatives, instead of favoring the urban elite (Horowitz and Painter 1986).

A second approach to rural reforestation programs may be called facilitation. In this approach, organizations host meetings and act as storehouses of information and knowledge. FAO Forestry has exemplified this function, by helping to coordinate efforts between governments and international and local forestry organizations. However, the success of this approach relies on the relationship of the groups involved

(Brechin 1997). Furthermore, while information gathered by international organizations in studies throughout the world can be useful, it may not be suitable for the new region where it is to be applied. Factors from social acceptability to the selection of the species may not be appropriate for the new site.

Nevertheless, the information brought to the project, if well applied with the cooperation of a local group with local knowledge, can offer a strong base for reforestation efforts. Additionally, the use of local organizations, as opposed to creating new ones or bringing new ones into a new area, is almost always more successful in attracting local participation (Little 1994). Facilitating existing organizations may provide critical aid in reforestation projects and help them to succeed. However, it adds a layer of bureaucracy that may slow the project's progress.

Another approach for rural reforestation is Community Based Conservation. In his 1994 article *The Link Between Local Participation and Improved Conservation: A Review of Issues and Experiences* Peter Little defined Community Based Conservation as:

Local, voluntary initiatives involving a minimum of several households in which at least one of the outcomes of local management practices is either the maintenance of the habitats, the preservation of species, or the conservation of certain critical resources and another outcome is improvement of social and economic welfare (p. 348).

This approach relies on the “vested interest, ownership, and sense of pride and belonging” that local communities have with their environment (Western 1994, p. 504). Furthermore, in CBC sustained conservation of local resources requires only that the

“local stake in conservation becomes somewhat greater than in the previous resource-use patterns deemed inimical to conservation” (Bromley 1994, p. 429).

Although this approach is usually associated with the protection of endangered ecosystems and species, a holistic view of CBC shows its value in both conserving existing trees, and planting new ones. I have included it here as an alternative to the programs that outside organizations bring to rural villages.

The community forests found throughout West and Central Africa provide an example of locally managed reforestation projects. In Cameroon, forest legislation was passed in the early 1994 providing for co-management and community forests. Since these efforts have begun, there have been both obstacles and signs of encouragement. Although it is too early to properly evaluate these programs, early appraisals indicate that things are moving in the right direction, and that with enough local and international support, substantial progress can be made. (Brown & Schreckenber 2001, p.1).

In 1982, the National Office for Forest Development (ONADEF) started a reforestation project in the North of Cameroon. The greatest challenge encountered was the question of, “Who owns the trees and who will take care of them?” Acknowledging the importance of benefits for local people in reforestation projects, ONADEF changed the focus from community forests to individual initiatives. Although the program changed to better respond to local needs, funding shortages limited the project’s scope and in many areas ended the program (Peace Corps Cameroon 2003, p.13).

A final approach to rural reforestation is agroforestry, also known as the farm forestry approach. In his book *The Economics of Afforestation: A Case Study in Africa*, Dennis Anderson describes this approach as “the planting and maintenance or

restoration of trees in farming areas-- on farm boundaries, in villages and hamlets, near dwellings, in copses, in village woodlots, and in watersheds and shelterbelts” (p. 1). This approach can help to increase soil fertility and prevent soil erosion, while providing income and resources to those who participate (ICRAF 2004). Agronomists and rural development agents have reported that the small-scale farmers who make up about 90% of the agricultural community in Cameroon have low productivity, due in part to environmental degradation (Molua in press).

Farm Forestry projects benefit reforestation efforts with higher potential planting rates (with the large number of farmers available) and less public expenditure (farmers working for their own benefit). Working for their benefit, the farmers need fewer inputs for their fields, can improve their soil, and feed their livestock. Although this approach has great potential, it needs to be widely supported to be successful. In one program in Northern Nigeria (Arid Zone Afforestation Program 1978-1984) over 50 million seedlings were distributed free of charge for people to plant over a five year period. However, by the end it was estimated that less than five percent of the seedlings survived (Anderson 1987). The main challenge to successful implementation of agroforestry is how to make the benefits tangible for the farmers involved (Boffa 1999).

Agroforestry is promoted by many organizations throughout Africa, including the International Center for Research in Agroforestry (ICRAF), headquartered in Nairobi, Kenya, which works towards “mitigating tropical deforestation, land depletion and rural poverty through improved agroforestry systems” (ICRAF 2004). Through extensive studies in Africa, and around the world, ICRAF has produced voluminous information

on both the best agroforestry management techniques, as well as the adoption of agroforestry by rural populations.

One organization that has benefited from much of ICRAF's research is the U.S. Peace Corps, which works cooperatively with the Cameroonian government and several of its agencies (including the Institute of Agricultural Research and Development (IRAD); MINAGRI and MINEF) on agroforestry projects. While the projects that I review in this paper are not (strictly speaking) agroforestry, I was an agroforestry extension agent for the U.S. Peace Corps while they were on going.

While agroforestry holds great potential for the area, it was my experience in the north of Cameroon that most people were unwilling to participate in agroforestry interventions. Many researchers have attempted to identify the characteristics of both successful agroforestry interventions and those of populations that embrace them. Since many of these factors are similar to those involved in the projects that this paper examines, they bear further examination here.

In a study in southwest Cameroon, Adesina et al. (2000) identified several constraints to the adoption of agroforestry techniques including: Inappropriate property regime, high labor costs, long gestation between tree establishment and accrual of benefits, below ground competition between trees and the crops, and the shading effect of trees (p. 256). Additionally, they concluded that low agroforestry adoption would persist as long as the traditional system required less labor and land was relatively abundant (Adesina et al. 2000).

While these factors are undoubtedly important, some researchers have found that agroforestry adoption can be explained by factors dealing less directly with agriculture.

Scherr (1995) outlines three popular hypotheses about agroforestry adoption: Induced innovation, livelihood strategies, and risk management. Briefly, 'induced innovation' posits that decreasing available land necessitates agricultural intensification and technical innovations (such as agroforestry). 'Livelihood strategies' theorizes that variations in technology adoption can be explained by differing household objectives and available resources which change over the life of the household. 'Risk management' explains adoption as farmers being reluctant to try innovations that are risky (due to their being unfamiliar) and therefore recommends incorporating them gradually and with modifications that reduce the risk of their use (Scherr 1995).

Other researchers have found that the ability of general theories to explain agroforestry adoption is decreased by their failure to take into account the specific factors of a particular site, and the complexity of both social and ecological systems. In this view, adoption needs to be examined through the complex system of interactions between social, economic, and environmental factors with historic events and trends in particular locations (Belsky 1993, Walters et al. 1999). In one example of a local factor for tree adoption in the Sahel, Bonkougou found that people were unwilling to plant trees since they thought it would be assuming the role played by God, although this mode of thought is said to be changing (ICRAF 2000).

Finally, agroforestry can be explained in economic terms, or its ability to "put money in farmer's pockets." Although it has the goals of "providing food security, enhancing soil fertility, conserving soil and water, as well as increasing fodder and fuelwood production" it must be economically beneficial in the medium-term to be

sustainable. “Profitability is a necessary but not sufficient condition of sustainability” for the adoption of agroforestry systems (Sanchez 1995, p. 26).

Despite their various views, I do not believe that these theories are at odds with one another. Instead, their diversity represents the complexity to be found in rural environmental interventions, where social, cultural, economic and environmental factors meet. While I will not be supporting any one particular agroforestry theory to describe the Touroua reforestation projects, I will use aspects from many of them in my analysis.

Stakeholder Participation

I define stakeholders as those elements in a population that stand to be affected by a proposed project. The basic question that I feel needs to be addressed by rural reforestation projects is, “What is at stake for the participants?” This includes not only what is at risk with inaction, but also what can be gained by participation. However, before discussing the balancing of risks and benefits, there are other factors that affect decision-making and acceptance of projects that should be examined.

In his seminal work *Man, Mind and Land: A Theory of Resource Use*, Walter Firey identified three factors that must be met if a practice is to be feasible in a certain area. A practice must be physically possible, culturally adoptable, and economically gainful (1960). Since rural reforestation projects in Northern Cameroon are undoubtedly physically possible (though perhaps difficult), I will move first to discuss their social acceptability.

In more recent literature, cultural adoptability has been discussed in terms of social acceptability. Social acceptability can be seen as the condition that results from a positive judgment comparing the perceived reality to an alternative one (Shindler et al.

2002). To determine which practices are socially acceptable, it is critical to determine how the population judges and forms its opinions about them. These judgments may be complex and include situational, spatial and social aspects. Some of these factors include the perceived risk of a venture, the level of knowledge of the population, and the relationship between the population and the project supporters (Kakoyannis et al. 2001).

Although the actual risk of a project is an economic concern, the perception of risk is a social one. This disconnect is often related to the level of knowledge in a population. If they do not have or understand the “facts” of the project, their perception of risk may be higher or lower than the actual risk involved (Kakoyannis et al. 2001). This case is especially relevant to Northern Cameroon where there is a high differential of formal education between officials (governmental and non-governmental) and the general village population. In fact with over 260 local languages in the country, it was quite possible that these groups do not even speak the same language (Peace Corps Cameroon 2000).

A project is economically viable when the benefits of a project outweigh its costs. Furthermore, not only should the benefits outweigh the costs, they should do so in a greater magnitude than any other alternatives (Shindler et al. 2002). However, for stakeholders in environmental interventions, many of the benefits are social, while many of the costs are private (Kleindorfer 1999).

Being largely social, the costs of people’s behavior are often underestimated by individuals in a community for several reasons. Firstly, people are disinclined to accept problems that have no immediate or obvious relationship with their activities. In Northern Cameroon this most directly represents the relation between clearing a field of

trees, without replacing them, and the problem of desertification. Furthermore, even if people do see and accept their role in a larger problem, they often feel that their own contribution is insignificant (Kleindorfer 1999). While this may be damaging from a societal viewpoint, the behaviors of the individuals who act in a destructive manner to maximize short-term gains are rational, given a tenure system that does not reward long-term investments in the land.

Additionally, under bounded rationality individuals may fail to register large-scale problems as significant, when they have many problems of their own (Kleindorfer 1999). Discussing the people around Waza National Park in Northern Cameroon in 1999, C.A. Drijver states that:

They face almost all the problems of the Southern Sahel. Examples are a lack of reliable drinking water, unreliable rainfall which, in addition, is often insufficient, poor soils, scarce vegetation, few market opportunities and the lack of infrastructure and governmental services, resulting in low quality food, which is frequently insufficient too, lack of cash and a great number of health problems (p. 133-4)

Although the people of Touroua may not suffer from all of these problems simultaneously, they all exist in the community.

Furthermore, individuals often display the “Opportunity Cost Effect” where immediate tangible costs are given a higher weight in decision-making than the costs of forgone benefits from not participating in an effort. Moreover, individuals frequently show aversions to tradeoffs since they may deal with multiple and different factors that are difficult to compare (Kleindorfer 1999). However, since the role of economic incentives is now widely accepted in community-based projects, reforestation projects

must closely examine how to bring benefits, not only to the community as a whole, but to the individual participants (Little 1994).

Even if a project meets the physical, social, and economic requirements, the community may not support it without sufficient diffusion of the idea. In his book *The Diffusion of Innovations*, Everett Rogers (2003) discusses the process that an innovation must go through to be adopted by a population. He defines an innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (p. 12).

Examining an innovation’s suitability for adoption, Rogers cites relative advantage, compatibility, complexity, trialability, and observability as the key components (2003). While relative advantage (economically gainful) and compatibility (socially acceptable) are similar to the factors identified by Firey, complexity, trialability and observability deserve to be more closely mentioned. Complexity is the degree to which an innovation is considered difficult to understand and use. Trialability is where an innovation may be experimented with on a limited basis, so that if it does not prove successful, there was not too great of an investment lost. Observability is the degree to which an innovation is visible to others, thereby allowing successes to be seen and emulated (Rogers 2003).

Furthermore, Rogers puts forth several factors that affect the speed with which innovations are spread. One such factor is “the degree to which a pair of individuals who communicate are similar” or homophily (p. 305). Although a high degree of homophily accelerates the spread of innovations between those individuals, it slows innovations introduced from the outside (Rogers 2003). In the case of Touroua, the vast

majority of the population is highly homophilous, being engaged in the same profession, and having mainly the same goals and concerns. However, the high number of ethnic groups and languages in Touroua may lower the level of homophily. Nevertheless, most people share at least one language, and I never heard of tension between the different ethnic groups. This being said, innovations introduced by outside forces, such as a development worker or a government delegate (seen as being sent from the distant capital) are more difficult to spread.

Another factor described by Rogers is the role of opinion leadership. An individual who “is able to influence other individuals’ attitudes or overt behavior informally in a desired way with relative frequency” is considered to be an opinion leader (p. 27). Opinion leaders are generally more educated and have more contact with outside influences, than the population at large. If an opinion leader supports an innovation or project, it will spread more quickly. However, if the innovation supported is too far outside of the population’s norms, it may hurt the standing of the opinion leader (Rogers 2003).

Land Tenure

The final issue relevant to reforestation in the north of Cameroon is land tenure. Many rural reforestation projects, especially those with an agroforestry approach, encourage the planting of trees on private land to receive private benefits, including the long-term protection of an asset such as farmland. However, without secure tenure, the incentive to invest in the long-term health of the land is undermined.

The first issues to address are, “What is land tenure?” and “Which aspects of tenure are most relevant to discussions of reforestation?” In 1988, Bruce and Fortmann

defined tenure as the “rights to use land, trees, and their products in certain ways and sometimes exclude others from use” (p. 1). These rights can be held on a state, community or individual level. Furthermore, different parties can hold varying aspects of tenure over the same piece of land. They enumerate four aspects of tenure that are particularly relevant to environmental interventions:

First, the tenure of the land and trees affects the surrounding ecosystems. Second, access to land and forest resources under different tenure schemes affects the standard of living of people who depend on them for resources. Third, rules of tenure affect the preservation, protection, and planting of trees. Finally, the prevailing system of tenure determines the beneficiaries and victims of forest policies and forestry projects and sets the framework for conflict over benefits (p. 3).

Establishing clear rights and benefits to resources for rural populations has been highlighted by many studies as being necessary for enlisting participation in land-improving activities such as planting trees (Peterson & Sandhövel 2001, Walters et al. 1999, Bruce & Fortmann 1988, and others). However, this is not to say that ownership is required, as other factors such as access to benefits may be more important than the actual ownership (Fisher 1995). More than affecting land-improving activities, secure tenure can make parties responsible for their destructive behavior as well. Bromley (1994) found that if “property rights are unclear or perverse, then human action that degrades the environment will proceed without any mechanism for making the responsible party bear the costs of such behavior” (p. 432).

Of more particular importance to reforestation projects is tree tenure, a sub-set of the more general land tenure rights. Like overall land tenure, tree tenure consists of

various rights that may be exercised by different individuals or groups over the same trees. According to Fortmann (1988) tree tenure is comprised of four main components: “The right to own or inherit, the right to plant, the right to use, and the right of disposal” (p. 17). These rights can be both customary and legal, and may differ regarding subsistence and commercial use (Fortmann 1988).

In Cameroon, the national government has statutes that are in force throughout the country. However, the government also recognizes the rights of the traditional chiefs, and maintains their system of land rights at a de facto level. This merging of traditional and state land policies has been hampered by corruption in both systems (Olson 1999), leading to a situation where there are conflicting rules in place, and people act as if the laws are non-existent (Egbe 2002). Therefore, both national legal standards and customary traditions need to be explored for an understanding of tenure in northern Cameroon.

Examining national legal standards, Cameroon introduced compulsory land registration in 1974 to give legal title to those who held customary title to their land. However, this law has primarily benefited the educated elites and city dwellers that have used it to gain legal titles, while more than 97% of rural lands remains untitled (Egbe 2002). Rigorous conditions, bureaucratic complexity, slow procedures, and widespread corruption as well as challenges presented by rural illiteracy make the process of registering land difficult (Logo & Bikié 2003). Many rural landowners find it less costly and problematic to keep their holdings under customary arrangements (Olson 1999).

The forest legislation of 1981 divides all forestland into three categories: State forests, private forests, and natural domain forests. State forests include national parks

and reserves, private forests are those planted by owners on their legally titled land, while the nationally controlled natural domain includes everything else (Olson 1999). Given the previously stated low levels of legally titled land, this gives the state virtual control of all forestland. Furthermore, in 1994 a new forestry law “nationalized all forest resources, with the exception of local council and privately planted forests, but including orchards, agricultural plantations, fallow land, wooded land adjoining an agricultural farm, and pastoral and agroforestry facilities” (Egbe 2002, p. 66).

Nevertheless, the 1994 law expanded tree tenure rights to local populations by granting them access to harvest trees from unprotected forests for domestic cooking and building needs. However, justification and approval of this use is supposed to be made to forestry officials prior to use (Egbe 2002). All wild trees are considered to be state property, and to clear land for agricultural purposes farmers must have the permission of MINEF, who normally requires large trees to be left in the field with the farmers usually permitted only to trim them (Olson 1999). Examining the tree tenure system in Cameroon, Egbe (2002) reports “a poorly conceived tree tenure system is undoubtedly a major factor inhibiting participation in the management of trees, agroforestry, reforestation, regeneration programs, and the sustainable management of natural resources as a whole” (p. 67).

Examining customary land tenure, we find two main ways relevant to Cameroon by which a person can obtain customary rights to a piece of land. Firstly, as in much of sub-Saharan Africa, land can be occupied through the act of clearing the bush and readying it for production. Secondly, land can be obtained through the permission traditional chief in the area (Olson 1999).

With the Islamic *Fulani* expansion in the 18th century into the North of Cameroon, all of the land was divided into *lamidats*, the control of which was vested in the Lamidos to be disposed of at their discretion. This system is still in-force in Northern Cameroon, and the Lamido collects rent for the land distributed in this manner. Examining this system, Olson (1999) found that a large number of respondents in his survey complained that these traditional taxes were too high, and some said that the traditional chief had taken back their land. Furthermore, other researchers have criticized the traditional tenure in the area as discriminatory towards women, with male authorities wielding excessive power (Egbe 2002).

Examining customary tree tenure, farmers in the North have de facto control of trees on their land, and may do with them as they wish. Furthermore, it is generally agreed that residents can use the products from local forests provided that they do so in a responsible manner. However, these traditions are at odds with the formal legal statutes described above, and often lead to confusion of the populations over their rights and the implications of planting and cutting trees both on their land and in community areas (Olson 1999).

Nevertheless, there are some instances in which the people of the North have traditionally planted trees. Firstly, some plant trees in their fields to demarcate their lands and further their claims to it. Secondly, in the tradition of the *Fulani* some plant trees (especially fruit trees) in their compounds for household consumption (Olson 1999).

In Touroua, a person requiring a piece of land makes a request to the Lamido, who may then grant rights to an area in “the bush” that needs to be cleared for

agricultural use. Although the person can maintain control of the land in perpetuity, if the Lamido wants to take it back, it is within his rights. Coupled with the fact that from a national law perspective, people can neither own wild trees on their land nor take any action relating to trees without the recommendations and consultation of government agencies, and that the vast majority of farmers do not register their land with the government, I feel it is fair to say that the people of Touroua have land rights that are both “unclear and perverse.” This combination of insecure traditional and official tenure systems undermines incentives for long-term land improvements and protection, including efforts in agroforestry and general tree planting.

FINDINGS: REFORESTATION IN TOUROUA

In this section I present four projects that I was involved with in Touroua. While these projects present a wide range of variables, they have sufficient similarities for comparison. The analysis of these projects, including their evaluation, constraints and keys to their level of success will be examined in the discussion.

The Market

The Market Project was undertaken from April 2000 to the end of 2002 (see Appendix B for a map of the market). When I asked people about trees, they would inevitably tell me that they were good for shade. Since the market area was the center of daily activity in Touroua, with the taxi station, shops, a small mosque, as well as the market itself, it was a natural place to plant trees for public benefit.

In the recent past, there had been tree-planting projects in the market that had some success. Since the year 1995, as I was told by the Secretary General of Touroua

(the official who, among other things was responsible for the market), the Mayor's Office had planted trees there. Although there were large sections of the market open to the sun, young neem trees were seen scattered about the market. However, the Secretary General was frustrated with what he considered to be the disappointing results, blaming the people of Touroua for being "mean" (ripping up trees) and "irresponsible" (allowing livestock to wander), causing the failure of many of the plantings. He was fond of saying that "*the people here are stupid and thieves*" and that they engage in vandalism "*just to be mean.*" Indeed, these sentiments were echoed by Alphonse, a man who worked with the community on tree planting projects, who said "*the people here are animals,*" and, "*they don't appreciate trees.*"

Despite the Secretary General's frustrations, it seemed that the market had seen some success, and deserved to be built upon. After discussions with the Mayor of Touroua in 2001, we agreed to plant some more trees in the market. The Mayor felt that the market was the perfect place to plant trees since it would show the people of Touroua the benefits of tree planting, and would provide a good for the whole community in the form of shade and a more pleasant place of commerce.

Trees for this project in 2001 were raised both in my personal nursery, and that of the Mayor. The plantings were carried out in small batches from early July to the end of August totaling about twenty-five trees by the end. At first, trees were poorly protected and several needed to be replaced. However, as the need for protection became more obvious, and we built our skills, the market trees were better protected. Therefore the final number of twenty-five trees actually reflects a total of about 33 planted tree seedlings.

Half of the tree plantings were conducted with the Secretary General (See Figure 5- left), and half were done with whoever could be rounded up at the market to help, usually local children (See Figure 6). However, getting the trees protected was more difficult, and when I asked who would build the protection, the Secretary General would usually reply, “*there are kids to do that.*”

Figure 5- The Secretary General (L.) & MINEF Delegate (R.) planting trees in the market



Figure 6- Planting trees in the market with the help of local kids



The last batch of trees from 2001 was finally protected in October after I told the Secretary General that I would not plant more trees without protecting them, and would not protect them myself. Later that same day, the Secretary General loaded up the community vehicle with branches and workers, and protected all of the remaining trees in the market area. Although all of the trees were protected by the end of the rainy season, many had been left for some time open to livestock without protection. In the end, about one quarter of the trees from the 2001 planting survived into the next year.

In 2002, both the Secretary General and the Mayor were interested in doing another tree planting project in the market. However, the nursery establishment did not go as smoothly as the year before. In 2001, the community nursery was at the house of the Mayor, where his family cared for it. For this new nursery, the mayor wanted it to be at his office, with the Secretary General in charge. Furthermore, I decided that I did not want to use trees from my own nursery, as this practice was not sustainable.

At a meeting to set up the nursery, the Secretary General stated that the office did not have the needed resources. He felt that I should provide money so they could pay someone to do the labor. I told him that there was a well near the office, several people that worked there, as well as money allotted in the village administrative budget for reforestation projects. This discussion started in the middle of March and lasted for three weeks.

In the middle of this period, the new Préfet (Senior Divisional Officer) from Garoua had visited Touroua and emphasized the need to plant trees, and said that the community could do it without additional funds. He felt that the community should be able to find the labor and materials, as there were trees and plenty of people in the

village, and pointed out that there was already money allotted in the community budget for reforestation.

Eventually, feeling that he lacked the necessary commitment to the project, I told the Secretary General that the Mayor and the Préfet wanted a nursery, and if we did one it would be the community's nursery, not my own. Furthermore, I stated that although I wanted to help, if he didn't want my help that I would leave the project to him alone. After that, it was decided that the office could somehow manage and finance the nursery, in which 300 trees were established and prospered.

In May of 2002, the Ministry of Forests and Environment (MINEF) sent a delegate to Touroua. The new Forest Delegate took over the tree planting projects from the Secretary General (See Figure 5- Right). Earlier the Secretary General told me that he was done planting trees, that the people stole most of the trees in the market and took the wood from tree protections to cook with. *"No more! I won't plant anymore for these people. I am done with this work!"* he said. However, I felt that the market had been fairly successful, with approximately a quarter of the 2001 trees that were protected in the market showing good growth, generally attaining heights of about one meter. So it was with the MINEF Delegate that I continued the project.

This year, before we outplanted, a meeting was held at the market explaining the project and the importance of keeping livestock under control. Although elections had seen the installation of a new Mayor, the project was supported by the new administration, a representative of which organized the meeting.

During a meeting with the involved participants (The Mayor, The MINEF Delegate, The Local Nursery Man, and Peace Corps Volunteers) we decided that it

would be best to give the responsibility for protecting the trees to the vendors who would benefit from the trees. On July 27, 2002 with the MINEF Delegate and the crowd that gathered, we planted over 30 trees in the market. Accordingly, on the day of the planting and the following day (the day of the weekly market) the new plan was explained to the vendors who were generally responsive to the idea. On top of the initial protection, many trees were watered and their protections up kept by the vendors. Additionally, certain trees were planted at the special request of vendors, and trees in more “common areas” were protected by the community workers.

The market of Touroua was held each Sunday, with people from many of the surrounding villages arriving to buy and sell. Generally, vendors who had stalls at the market were there for Sunday only. However, there was a contingent of permanent establishments that were occupied each day at the market, including restaurants, general boutiques, vegetable stands and tailor shops, which were located at the market’s periphery.

By the end of 2002, about three quarters of the newly planted trees were well established, with six from the previous year large enough to remove their protections since the goats and sheep could no longer reach their lowermost leaves (located at X1-X4 in Appendix B- The market map, these trees will be addressed in more detail later in the discussion section).

Outdoor Festival Mosque

On the edge of the village of Touroua is the *salliquieré*, an area that I have called the “Outdoor Festival Mosque.” Situated by the main road entering the village, it consists of a large open area delineated by a short wall three cinder blocks high, with

neither roof nor shade. For Islamic festivals, usually three times per year (The beginning and end of Ramadan, and Tabaski known locally as La Fête du Mouton), the Muslim men from Touroua and the surrounding villages gather in the area for the Morning Prayer. Figure 7 shows the area empty (top) and populated for La Fête du Mouton (bottom). The area is large enough to hold the several thousand men who arrive for such occasions.

Figure 7- (Top) The Outdoor Festival Mosque, (Bottom) La Fête du Mouton



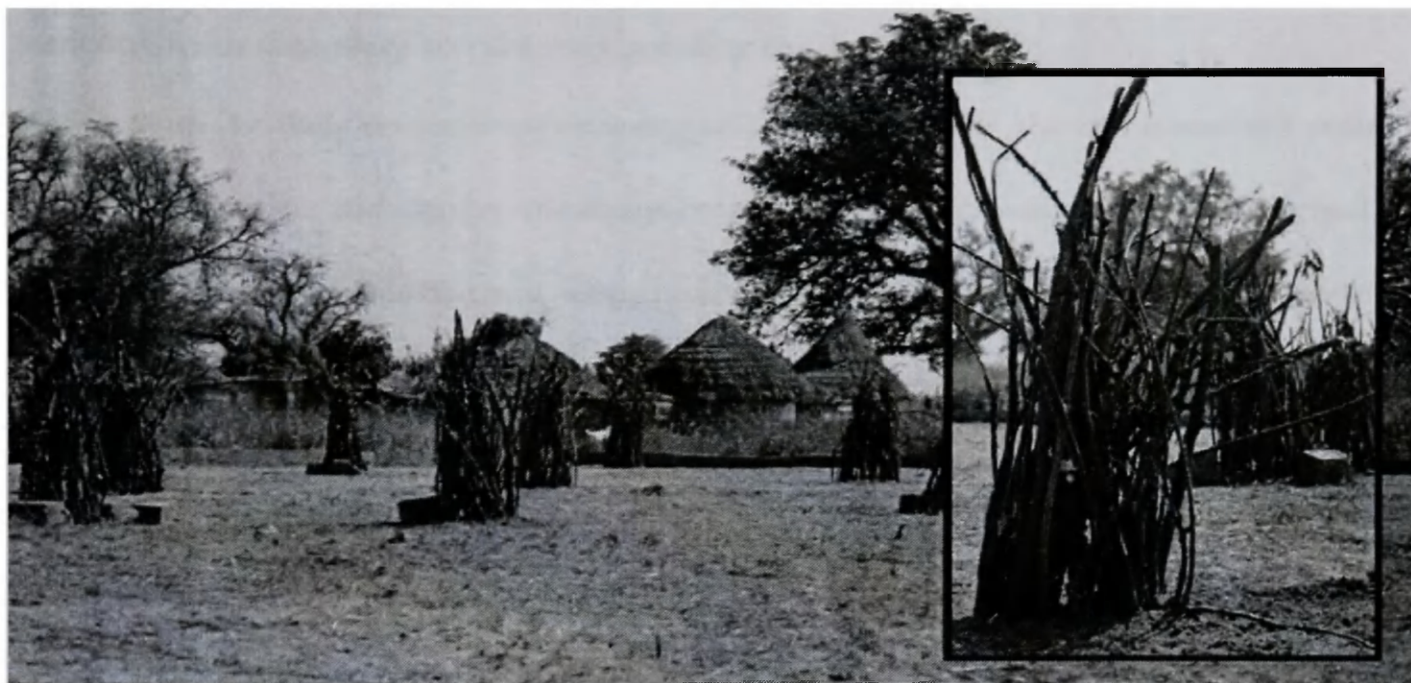
In 2001, the Mayor told me that he had discussed the prospect of planting trees in the area with the Lamido, the traditional chief and religious leader in Touroua. They felt that trees would make the area cooler and more picturesque. Having viewed all of the men gathered there in full sun, I could easily see the benefits of the trees. They had carried out a planting the year before, in an extension of market planting efforts, but no trees remained.

I agreed to help and planned on how to proceed with the Mayor, who had conversations with the Lamido. In these meetings we decided which species of trees to plant and who would do the work. In the end, we agreed that the Lamido would provide the wood and labor necessary to plant and protect the trees, with the mayor's office and my self providing support and expertise.

Being an open area in the rainy season, the Outdoor Festival Mosque was overgrown with weeds that needed to be cleared before planting. In a waiting game to clear the weeds for planting, the rainy season was nearing its end. Since I refused to do the work in less than a collaborative effort, many valuable rainy days passed without trees being planted. As the Lamido wielded great influence in the village, I was uncertain why he could not send people to do the work as planned. However, as discussed above, most people were engaged with work on their farms during this period, and perhaps could not spare the time for a public project.

Finally, at the end of August, some of the Lamido's men cleared the weeds and we began to plant. Within the next two weeks, a total of twenty-five trees were planted and protected in the area. Although the Lamido's men had protected all of the trees with good-sized protections, the bundles of wood were not tied together and were therefore in danger of falling apart. This danger can be clearly seen in the inset of Figure 8, where branches are starting to fall apart. We discussed the need to take this final step, and I was told that it would soon be done.

Figure 8- The Outdoor Festival Mosque with protected trees, with close-up inset



Despite a late start, the untied protections, and the end of the rainy season, by the middle of November, more than three-quarters of the trees were healthy. However, the protections were yet to be tied, and with less and less green to eat, the pressure from livestock increased daily.

After months of watching the protections become unbundled, in February I purchased some string and with the help of about 30 school children on recess near the area, tied the protections. Although I had some reservations about doing the work without those who had supported the idea, the trees had only four more months to go until the next rainy season. I felt that the good to be had from a successful and highly visible demonstration plot would outweigh the potential dangers to the sustainability of the project.

I discussed the protections with the mayor, and said that they only needed to be occasionally monitored to give them a good chance to become permanently established.

Nevertheless, I said that I would no longer do work there since it was necessary for someone from the village to take responsibility for the project.

With the daily temperatures soaring to 115° Fahrenheit, the sun rotted the string after a few months, and one by one the protections came unbound. As this happened, animals broke in and ate the trees, while people gathered the fallen wood for their home cooking fires. Although it was difficult for me to watch, I did nothing as trees disappeared until there were none left by the 2002 rainy season.

Wouro Kessoum

The village of Wouro Kessoum is located on the main road to Touroua, almost contiguous with the larger village. Literally, Wouro Kessoum means “new village” (in Fulfuldé), although it is long established and is one of the larger villages in the Rural Community of Touroua (Rebout 1999). In this village in 2001, I worked with a local group on a tree-planting project to line the main road.

After introductory public meetings in Wouro Kessoum, the people said that they were interested in establishing a community nursery. About 50 people attended the meetings on the nursery, although about 10 were mainly involved with the actual work. The nursery was established at the beginning of March, at the house of the Djaouro (a village leader in the administration of the Lamido). The participants chose an enclosed area of banana trees for the nursery’s site, as it would provide shade and protection, and was next to the well where it could be watered along with the bananas.

With very little encouragement, the nursery was established and prospered. I visited several times during the dry season with little to note in the way of problems. As the rains came, the Djaouro asked me to do a planting demonstration so that the

residents could learn to properly plant their trees. After the demonstration in early July, emphasizing the importance of protection, the Djaouro told me that they were now prepared to plant. Since these were farmers, I was not surprised at how easily they took to the project, and by the minimal guidance that was required.

The following year, they again asked me to help establish a nursery in Wouro Kessoum. When I inquired after the trees from the previous year, they told me that it was a sad story. The Djaouro had given all of the trees to people to plant in front of their homes, along the road. Regrettably, they were not well enough protected and animals had eaten almost all of them. However, they told me that they now knew the importance of protection and would take an extra effort to do it right for the next batch. It should be noted that the people of Wouro Kessoum did protect the trees, but they underestimated the tenacity and ingenuity of hungry livestock.

Feeling that hard lessons might be good for motivation, I was encouraged about the prospects of a new project with Wouro Kessoum. The 2002 project started well, with a nursery of about 100 polypots established in the same spot as the previous year. However, although their nursery was well established in April, it was almost gone by mid May. The nursery's decline was due to chickens entering the enclosure and eating the new trees.

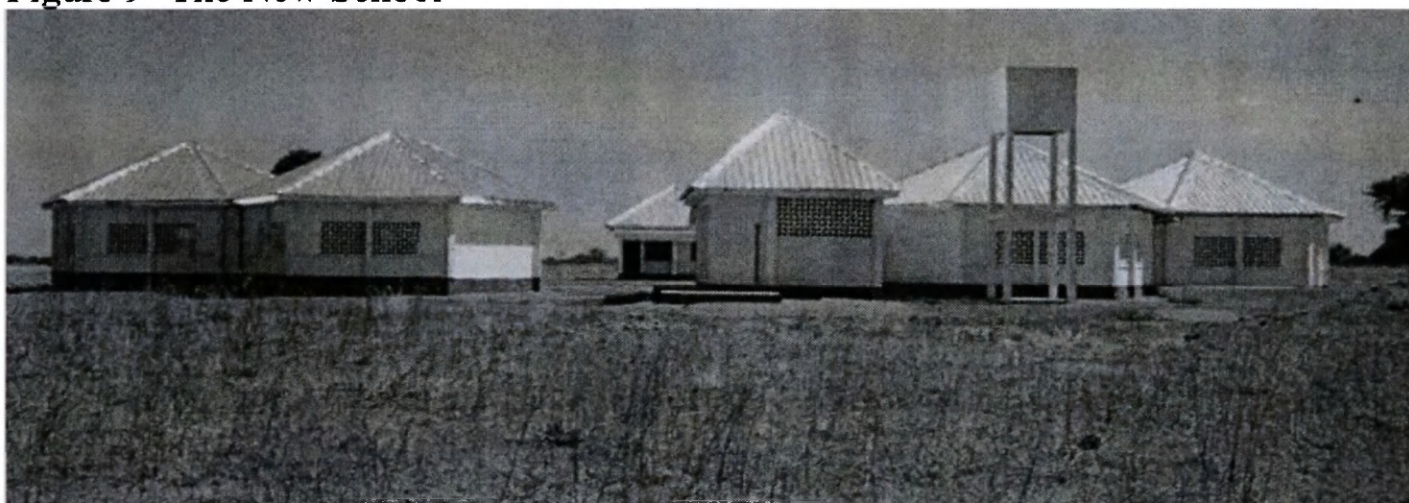
Since it was not too late for a second attempt, the polypots were reseeded. However, by the beginning of June there was little growth (new or old). As it turned out, the wells had run dry since the rainy season was late, and valuable water could not be spared for the nursery. Without the trees for the project, the 2002 tree planting did not

proceed in Wouro Kessoum. By the end of 2002, there was little evidence that there was ever a project in the area.

The School

In 2000, a new school was built in Touroua (See Figure 9). This school consisted of eight separate classrooms arranged around a central courtyard. The school was located at the sparsely populated northeast edge of the village, by a main path to one of Touroua's principle cultivation areas.

Figure 9- The New School



In 2002, the new school officially opened for the students of Touroua. However, upon opening it became obvious that the old, deteriorating school had one advantage: lots of trees. A large group of Neem trees had been planted some years earlier to give shade to the old school. The closely packed grove provided shade for the schoolchildren, and considerably lowered the ambient temperature on hot days.

In October of 2001 a local schoolteacher, Harissou, approached me saying that he wanted to start a nursery for his class. By February of 2002, the idea had grown to include the entire school. Discussing the project with the Director of the school, we determined that it could hold several benefits for the school. Firstly, the new trees

would offer shade to the schoolchildren, who often stayed by the buildings for the scant relief their slim shadows provided. Secondly, the trees could demarcate the school boundaries. This boundary would improve the appearance of the school, notify farmers that they should not farm there, as well as give shade to spectators at the soccer field. Thirdly, we would construct a windbreak to protect the school buildings. Finally, we would be teaching both a skill and an environmental ethic to the school children, which we all felt to be one of the most important aspects of the project.

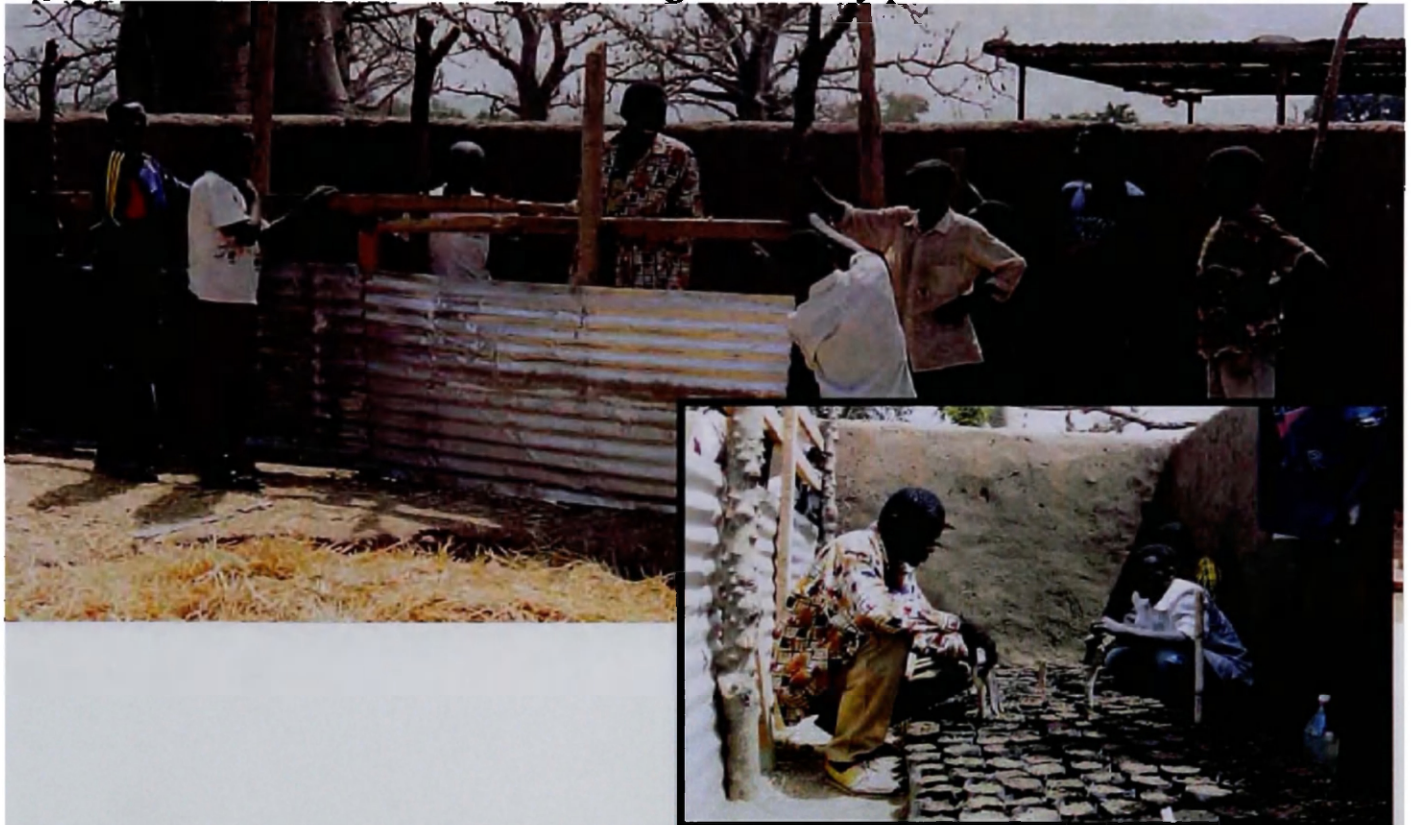
Although the classrooms were barely two years old, their roofs had begun to come apart with the arrival of the Harmattan, strong seasonal dry winds which come off the Sahara (Shantz and Marbut 1971). Without trees to protect them, it seemed that the roofs would be destroyed within a few years.

In the end, we decided to plant two rows of trees in a semi circle around the school, on the side of the prevailing winds as a windbreak, as well as lines of trees bordering the whole of the school's property. Originally, we had planned to have the nursery at the school, but the lack of water (a well was dug later that year) as well as the fear of vandalism (nobody lived there) forced us to move the nursery to the compound of the school's director. By mid-February with the efforts of many school children and teachers, the school had an established nursery of about 300 polypots. When one of the teachers complained that his students were being taken from class to work in the nursery, Harissou told him, "*This is real education, and besides, the director said I could have as many students as I needed.*"

The nursery was protected and shaded with materials from students, teachers, and the grove of Neem trees by the old school. The protection, pictured in Figure 10,

needed to be strong since the director kept cattle in his compound. However, the director donated tin that was left over from his house construction to fortify it.

Figure 10- Harissou and students building the nursery protection



In 2001 I had conducted a nursery preparation session at which Harissou was present, where he was quite interested and motivated to learn all that he could. Therefore, as the nursery was being constructed, I was able to play a support role instead of a more prominent leadership role. This role was in line with the philosophy of the Peace Corps and helped to build hope for long-term sustainability of the project.

By the end of March, the school's nursery was doing well. In fact, many polypots needed to have trees removed, since many were reseeded out of fear that they were not growing, and had two or more seedlings growing in them. Although it may have been unnecessary to reseed, it was encouraging to see that many people were truly concerned with the project, and wanted it to succeed. Although everyone seemed to genuinely

support the project, some of the enthusiasm might be explained by the visit of the Préfet to Touroua. As mentioned above, he had emphasized the benefits of trees at a meeting of community leaders. At that point in the meeting, the Superintendent of the schools stood up and proudly spoke of the school project, which everyone agreed was a worthy endeavor.

By mid-May, many of the school's trees were ready to plant. However, as mentioned in the Wouro Kessoum example, the rains were late in coming. Although some of the students prepared the holes for the trees, they could not be planted until there was a steady rainfall. This presented a particular problem for the school, as the students would be finished with class in the beginning of June.

Figure 11- M. Hammond protecting trees with schoolgirls & schoolboys with a cart full of young trees



As it turned out, the rains finally seemed reliable by the last week of school and with final exams we were only able to take one day to do a school planting. On the last

day of school, we loaded up a cart with some trees (See Figure 11) and brought them to the school, where all of the students and teachers participated in outplanting. It was a productive and festive day, but in the end only 30 trees could be planted and protected. At this point we were faced with a decision, of what to do with the over 200 trees that were left.

The Director wanted to plant the trees and protect them in September, when the students returned. He reasoned that during the rainy season there would not be too much pressure on the trees from livestock. Harissou wanted to continue planting with the teachers and whatever students could be rounded up, to increase the chance of establishment before the long dry season. In the end, we decided to incorporate both options as a compromise.

Since we felt that the windbreak was the most important aspect of the project, we worked on completing that task as a priority. Although Harissou was the lone teacher to work during the break, some schoolchildren could always be found, and by mid-July we had planted and protected the windbreak. By the time that we stopped working, to await the commencement of classes in September, we had planted and protected over 120 trees.

Although more than half of the trees survived the break, many were lost during that period. Animals breached some protections, those passing by stole some wood, and others disappeared entirely (vandalism, theft or some other explanation we had no way of knowing). Most of the losses were on the row of trees demarcating the school property that abutted the well-trod path towards many cultivated fields.

During the break, I would usually pass by the school every few days to do some routine maintenance. Before an absence of three weeks during this period, I expressed concern to the MINEF Delegate that since I was leaving Touroua, this would not be done. However, he assured me that he would take my place saying, “*I will go every day to check on the project.*”

Despite the setbacks posed by the break, planting proceeded upon the commencement of the new school year. Although planting in September was unusual (it was the end of the rainy season), the nursery was well tended and the seedlings were in good condition. All told, of 300 trees from the nursery over two-thirds were alive and protected by October 2002.

In my absence, while I was attending a conference in the capital, the teachers and the director decided to make the project into a practical course at the school. In addition to lessons on the importance of trees and how to plant and protect them, the students were assigned trees for which they were responsible to water and protect.

The effects of making students responsible for individual trees (two students per tree) were immediate and profound. Many students built elaborate protections that were better at deterring livestock than anything I had previously seen. The time and effort invested by the students can be seen in the example of the protection shown in Figure 12. Additionally, the watering was copious, and it seemed that the dangers of the late planting had been overcome. Many students attached their names to the trees and eagerly showed them off. One unexpected problem was that some students would disappear during break to search for material to better protect their trees, and return late for their formal lessons.

Figure 12- A student tree protection



Speaking to the Director in November 2002 about my imminent departure, he told me of his plans to continue the school tree-planting project. *“The animals and people are terrible, destroying the trees. We still have a lot of work to do to protect them,”* he said. When I told him that another volunteer would arrive to replace me, and would help in the work, he replied, *“That’s good, but now that you have shown us how to do it, we can continue to work on our own.”*

DISCUSSION

This discussion is organized into three parts. In the first part, I evaluate the success of each of the projects outlined in the findings section. The second part discusses the major constraints of rural reforestation projects in the North of Cameroon,

drawing examples from Touroua's projects. The final part presents the Touroua Model, a model for rural reforestation projects in the North of Cameroon that enumerates the key factors for success, again drawing examples from the projects.

Evaluations

As previously stated, I define success in terms of how many trees survived during my period of observation, reasoning that trees that have survived the first two years have passed their most difficult stage, and are likely to survive. Although I will evaluate the success of each project, the specific factors that help to explain the outcomes will be evaluated in the constraints and model sections that follow. I will also offer a prediction of the project's future based on inclusion and the state of the project at the end of 2002.

The Market Evaluation

Examining the Market for tree survival rate, we find that it was fairly successful. Comparatively, the second year was more successful than the first year, with a higher rate of survival. In 2002 approximately three quarters of the trees survived, as compared to approximately one quarter survival rate in 2001. By the end of 2002, the majority of the trees in the market were well established, with about six large enough to have their protections removed. These six were all located on the market's edge by permanent market establishments (X1-X4 in Appendix B), and will be examined in detail in the location section of the Touroua Model keys in the final section of the discussion.

The potential for the project in the future seems good. With the second year being more successful and inclusive, there is a good base to build upon. If the trees continue to grow in the market, I believe more vendors will request trees to be planted by their stalls. Furthermore, the MINEF Delegate in the village expressed interest in

continuing the work, the community office has experience tending a nursery, and a local commercial tree nursery that was established in 2002. With the key inclusion of benefits for the vendors, and an established institutional base for tree planting, there is a reasonable expectation that the project will be continued in future years.

Outdoor Festival Mosque Evaluation

The Outdoor Festival Mosque project was by almost any standard unsuccessful. By the end of 2002, with no surviving trees, there was no evidence that there was ever a project in the area. Furthermore, there was likely the memory of something there, which had obviously failed.

The potential for the future of this project can be seen in the lack of attempt in 2002. The prominent location of this project gave it a high observability, which in this case was detrimental. Since there was no success in 2001 and no attempt in 2002, I see no reason to believe that this project will continue in the future.

Wouro Kessoum Evaluation

By the standard of tree survival, the project in Wouro Kessoum was unsuccessful. By the end of 2002 there little evidence that the project had ever taken place. Yet, because the trees were distributed to the general population to plant, I cannot be sure that there were no survivors. While the general plan was to line the road, some people might have planted the trees elsewhere.

As for the future potential of the project, I believe that the people in the village became interested in tree planting and may be likely to attempt it again. Of the many meetings held in the village to discuss the project, most were well attended with as many as 50 people attending. It was at these meetings where the people asked to initiate a tree

project in 2001, and to try again in 2002. The population was involved in all phases of the project, choosing what trees to plant, and where to plant them. Although I was the initiator of the project, I acted primarily in a supervisory role throughout, as the people took the responsibility for the work. However, with the 2002 failure due to factors out of their control (the late rains and the dry wells), I am unsure if they would be more or less encouraged to attempt the project again than if the failure was due to controllable factors.

The School Evaluation

With two-thirds of the trees alive at the end of 2002, the school project was a success. Although half did not survive the break, fatalities were largely replanted, and were well maintained. By the end of 2002, there were about 200 trees alive and protected, with some almost large enough for their protections to be removed. Indeed by 2003, protections were removed and lower branches were cut back from the many trees that were two meters or more tall, to keep them out of the reach of goats and sheep that might damage the trunk while eating the lower branches (H. Charles, personal communication, November 5, 2003).

With the ideas, efforts and support of many parties, from the school administration, local and national governmental institutions (Office of the Mayor, the Ministry of Forests, the Préfet), and the Peace Corps, to the school children themselves, I believe that the project has good potential to be continued and expanded. With a large number of teachers and schoolchildren being closely involved in every phase, the skills necessary to continue the project are widespread. Additionally, Harissou and the director both expressed to me their intention to continue the work. As previously quoted, the

director said, “*we can continue to work on our own.*” Indeed, in 2003 the school carried out a new phase where they planted and protected 150 new trees (H. Charles, personal communication, November 5, 2003).

Constraints

Numerous constraints affect rural reforestation projects in Touroua. Although these constraints are directly related to the keys to success, it is beneficial to discuss them, in general and as encountered in the projects, to provide the context for the keys. As shown in Table 1, the five major constraints that I have identified are: 1- Livestock, 2- Misalignment of Costs and Benefits, 3- Land/Tree Tenure, 4-Limited Resources, 5- Lack of Rule Compliance / Enforcement, and 6- Climate.

Table 1- Constraints of Rural Reforestation Projects

Constraints	Description
Livestock	Presents the greatest threat to projects (eating and trampling trees) and necessitates construction of protections
Misalignment of Costs and Benefits	Those who bear the costs are not those who reap the benefits
Land/Tree Tenure	Insecure tenure acts as a disincentive to long-term land investments
Limited Resources	Critical time for projects conflicts with farm activities, and resources (water, wood and labor) are used elsewhere
Lack of Rule Compliance / Enforcement	Infraction of rules regarding livestock and vandalism go unheeded and unpunished, thereby encouraging the behavior.
Climate	Hot and dry climate with unreliable rains makes tree survival difficult

Livestock

The first major issue is the challenge imposed by the area’s livestock. Livestock, mainly cattle, goats, sheep, and chickens are numerous in Touroua. Furthermore, the animal husbandry that takes place in the area is mostly traditional, where the animals roam about the village more or less unsupervised. In addition to searching for

something to eat, cattle threaten tree-planting projects, as they are attracted to the trees to scratch themselves against the protections. Thus loosened, goats and sheep can enter to eat the trees, and people can gather the loose sticks.

Since livestock present a danger to newly planted fields as well as trees, there are rules in place that dictate when animals need to be restrained. This period usually starts at the beginning of the rainy season, when the main crops as well as trees are planted, and lasts till the fields are harvested. When the proper time arrives, the Lamido sends a crier through the village announcing that all livestock must be tied up. Additionally, announcements in the local language are made over the radio describing the same proscription.

However, this rule is often ignored or half-heartedly obeyed. During the period of the proscription it is a common sight to see livestock wandering about the village trailing the clumps of grass to which they were tied, as is pictured in Figure 13.

Examining Figure 14, we see a bull attached to a somewhat precarious pile of rocks. Such cases bring into doubt whether many people truly attempt to restrain their animals when choosing an anchor. Nevertheless, some do tether their livestock to substantial anchors, thereby reducing the pressure on trees and fields. The issue of non-compliance will be further discussed below, in the lack of rule compliance / enforcement section.

While livestock is undoubtedly a major constraint, it is exceedingly hard to deal with for two main reasons. Firstly, animal husbandry holds a long standing place in the traditions and culture of the area. Although this practice has been modernized to some degree, it remains largely traditional with many of its practitioners belonging to the nomadic Mbororo people (RCOT 2000). The Mbororo do not live for long periods of

time in one area and have been noted as being more resistant to change than their counterparts who have settled in villages (Davis 1995). This mobility presents a problem in the logistics of how to advise them of new grazing boundaries and related regulations. Given this longstanding history, including the role of nomadic herders, it is difficult to modify traditional practices to accommodate reforestation projects.

Figure 13- Roaming sheep trailed by a clump of “restraining” grass



Figure 14- A bull attached to some rocks



The second factor that makes livestock a difficult issue to deal with is that it is, to a large degree, a proximate result of larger driving forces. Poverty, a harsh climate, and a lack of resources may leave herders with little options past allowing their charges free access to whatever nourishment they can find. Furthermore, it can be argued that people do not control their livestock simply because they have no incentives to do so. Finally, it can be difficult to track down herders who do damage crops, since they may move on before the damage is noticed. Therefore, efforts to control livestock on strictly “livestock” level do not address the underlying causes that perpetuate the problem.

Despite the fact that conflict with livestock may be a proximate factor that is difficult to overcome, it is the most visible and direct threat to reforestation projects. Therefore, it is important to view it as a major constraint and attempt to deal with it when undertaking a reforestation project. Although tailored attempts to control livestock for specific projects may not change the underlying causes for the livestock challenge as a whole, they are essential.

Misalignment of Costs and Benefits

A second constraint of reforestation efforts is the misalignment of the costs and benefits. Basically, trees are a common good (when not planted inside a private compound), as anyone can use their shade, take in their beauty, or utilize their other benefits, while their planting and maintenance are usually a private cost, with someone having to do the labor.

In the 2001 Market Project, the Community leaders and I viewed the market project as a public works, which would benefit the community as a whole, and help to educate the population on the benefits of tree planting. We may have relied too heavily

on a sense of public commitment in motivating the cooperation of individuals to maintain and protect the trees. In 2002, efforts were made to relate each tree planted to a particular person who could benefit from it.

At first glance, the Outdoor Festival Mosque project appeared to have great benefits for the community. In a predominately Muslim area, this project would benefit those who came to Touroua to celebrate Islamic festivals, including thousands from both Touroua and the surrounding communities. However, since there were only three times per year that it was used (The beginning and end of Ramadan, and Tabaski known locally as La Fête du Mouton) what was the benefit the other 362 days of the year? Evaluating the effort necessary to plant, protect, and upkeep the trees, it seems likely that it is too much for the benefits received.

Furthermore, the neighborhood closest to the project area was a Christian one. As in much of northern Cameroon, the neighborhoods were settled in groupings of ethnic and religious conclaves. Although there were good relations between the religious groups in Touroua, it would be unreasonable to expect that the Christian minority would be interested in maintaining a project designed to benefit the Muslim majority. In this case the benefits of shade and a picturesque place in which to worship went to the village's Muslims, while the costs for protecting and maintaining the site fell by default to the Christians who lived nearby.

Land/ Tree Tenure

The insecure nature of the land and tree tenure in the region has been previously discussed in the paper. However, as it represents a challenge to successful reforestation projects, it should again be mentioned here. This general lack of a secure land and tree

tenure in Touroua is a disincentive for the people of the area to invest in their land by planting trees.

Farmers of Touroua often articulated their trepidation about investing labor and time in tree planting to improve soil quality on land that they were unsure would be theirs in the future. More than once, I heard farmers express their concern that if they improved their land, and it became too productive, it would be taken away from them. This was one of the principle reasons that I chose to concentrate on projects in public areas where the tenure is more secure. Identifying the areas with the most secure tenure and/or the greatest sense of ownership will be discussed in the Touroua Model section below.

Limited Resources

A fourth challenge for projects is the limited resources available to do the work. As the people are primarily farmers, conflicts of time, labor and resources needed for agriculture present a serious challenge to participation in reforestation projects. As mentioned in the background section, the rainy season, when most of the work for reforestation projects needs to be done, is when people have the most work to do. People are likely to be involved in tending their fields and repairing their compounds, and may not have the time to invest in reforestation projects.

In the case of the projects of Touroua, community resources may have been spread too thin with simultaneous projects. For example, the Mayor's resources of labor and materials that could have been used for the Outdoor Festival Mosque may have been diluted by the efforts put into the market project.

Wouro Kessoum in 2002 offers another example where limited resources were spread too thin. Due to events beyond the control of the people of the village, water had become too valuable to use for the nursery, causing the abandonment of the project. Although the people wanted to have a successful nursery, when the well ran dry it was an easy decision to stop watering it. When water for cooking, bathing and other essential uses has to be carried from distant water sources, watering the nursery is a low priority.

Finally, the technology and materials for the protection of the trees was limited. Through their efforts, the schoolchildren showed both the need for and examples of tree protection innovations. While the lack of existing know-how at the local level can be overcome through experimentation, the materials with which to work are limited. Most durable materials that could be used to keep out the livestock find their use in other household necessities. For example, wood was available to use, but the number and location of the existing trees, coupled with the high demand for fuelwood by most households, made this source somewhat problematic.

Lack of Rule Compliance / Enforcement

A fifth challenge faced by rural reforestation projects is the lack of rule compliance and enforcement. In the case of reforestation projects, this challenge manifests itself as vandalism and disregard for livestock regulations.

As previously stated in the Market Project description, the Secretary General and Alphonse (a local tree expert) were discouraged by what they claimed was vandalism when recently planted tree seedlings “disappeared.” The people here are “animals” and “mean” they told me. However, I did not truly believe it. “Why would someone do such a thing?,” I asked myself in disbelief. Although I did not condone it, I could

understand petty theft of wood for home use. People were poor and we were expending resources to protect trees. While this was a dishonest and shortsighted way to look at it, it was understandable. But to kill trees just to be mean, I could not understand.

Whether this was just vandalism, as the people that I spoke with felt, or was due to an underlying motive to counter efforts at tree planting that I could not uncover, I do not know.

Eventually, I was faced with this challenge at the project sites. Several times at the School, I came across protections with no tree inside, which did not appear to have been breached by livestock. I could not explain the vanishing of the tree by anything but a human hand. Indeed, I had on one occasion found a dried out, uneaten, and quite dead seedling just a few feet from the protection in which it was previously housed. The school was the location of the most persistent theft of wood and seedlings. However, other than replanting, nothing was done about it. I don't even think that the thought of reporting it crossed anyone's mind. Whether this was because "justice" often came with a price tag, or because it was "just petty theft and vandalism" I am not sure. While this problem did not cause significant mortality in the projects, it evidenced a general lack of rule compliance that was more threatening in other areas.

The most serious problem of the lack of rule compliance is the disregard for livestock regulations. The rule on when to restrain livestock has two main effects on tree protection. Firstly, it allows those who see livestock where they shouldn't be to take the offending animal to the authorities, thereby limiting their free browsing of the trees. Unfortunately for reforestation efforts, it also gives people an excuse not to protect newly planted trees, since they feel all the animals should be tied up. However, in

practice animals are rarely reported, which only goes to reinforce the belief that it is not necessary to secure them. Furthermore, the damage is most often done when there is nobody around to report it.

On one occasion, I spoke with the MINEF Delegate as he was planting trees by the side of the road. While I maintained that the trees needed to be protected, he felt it unnecessary since all the livestock were supposed to be tied up. *“But they aren’t all tied up,”* I said and counted a bunch roaming free. *“But they are supposed to be,”* he said. *“But goats that are supposed to be tied can still eat trees,”* I said, *“and during the dry season they don’t have to be tied up and then the trees are the only green around, so they will really need protection!”* Although he understood that what I said was true, he continued to plant trees along the road and the passing livestock soon ate them. However, since he could put down each tree that was planted in his official reports, it is possible that the number of trees planted meant more to him than the survival of those trees.

More than just compliance, there was a lack of enforcement of the regulations. On only one occasion did I see or hear of officials confiscating an offending animal at a project site. After planting some trees in the market, I was speaking with the mayor about when they would be protected. *“Tomorrow,”* he answered, and I replied, *“That may be too late, look, there is a goat there right now looking for something to eat!”* With a clap of his hands, he called on some of his workers to catch and detain the goat, as pictured in Figure 15. However, had I not been there to point out his transgression, I am sure that the goat would have continued in his activities unhindered by official elements.

Figure 15- A roaming goat is “arrested” in the market



The lack of enforcement of these regulations tacitly approves a lack of compliance. Additionally, this problem extends past reforestation projects, as people’s fields are often invaded and devastated. People were known to sleep in their fields to protect them from animals that should have been restrained or at least supervised. However, since people rarely see it happen, and distrust authority due to widespread corruption, these events largely go reported only to friends and relatives.

Climate

A final challenge faced by rural reforestation projects in the North of Cameroon is the climate. With unreliable and often insufficient rainfall, in combination with extremely high daily temperatures the conditions for growing trees are difficult (Drijver 1991).

Inconsistent rain makes it difficult to know when to outplant trees. Ideally, you wait until the rains are falling consistently. However, if you wait too long, the trees may not have enough time to establish themselves before the onset of the dry season. On one occasion in 2002 while discussing a tree-planting project, the MINEF Delegate summed up the village's frustration saying, "*I want to work, but I am waiting for the rains.*" Furthermore, at times during the rainy season when the rains seem stable, they cease to fall. With no rain and soaring temperatures, trees can quickly dry out and die.

The harsh climate also makes forage scarce for the abundant livestock in the area. Consequently, young trees within the reach of these animals are subject to heavy pressure from browsing. This pressure is especially intense during the long dry season, when most other vegetation is dried out, but the young tree seedlings remain green.

Touroua Model

Beginning this work, I looked into issues of social acceptability and the diffusion of innovations, as I thought they would be the most important factors in determining the outcomes of rural reforestation projects. While the theories of Walter Firey (1960) and Everett Rogers (2003) were relevant, through the analysis of my projects it became apparent that other factors better explained the outcomes.

Of these factors, I have selected the four that seem to be the most necessary to have a successful rural reforestation project in the North of Cameroon. Of the four, the first three are underlying factors that drive successful reforestation projects, while the fourth can result from the other three in a proximate fashion. Nevertheless, due to the importance of maintenance I have included it as a fourth, though less important, factor in what I have named the Touroua model, shown in Table 2. The four Touroua model

factors are: 1- Participant Benefit, 2- Leadership/ Responsibility, 3- Location, and 4- Maintenance. (See Table 3 in the conclusion for an examination how the Touroua model meets the constraints previously mentioned.)

Table 2- The Touroua Model: Keys to Project Success

Key	Description
Participant Benefit	Benefits that go to those who participate are incentives to work for project success
Leadership/ Responsibility	Leadership and responsibility provide necessary oversight and follow through for projects
Location	Includes multiple variables (tenure security, proximity to water, presence of people, presence of livestock) that greatly affect project viability
Maintenance	Without upkeep, well executed projects may fall apart

While I have found these factors to be the most significant in my projects, I do not want to present them as definitive model to follow for reforestation projects. Rather, I present them as keys that can help to guide projects to make them more successful. It is important to note that no single factor controls the fate of a project. Rather, it is the synergistic interaction between these, and other, factors that ultimately lead to a project's final outcome. Nevertheless, I have found these factors to be the most important, and feel that close attention to them can greatly increase a projects chance of success.

Participant Benefit

The first key factor is that of participant benefit. This is to say that there is a good alignment of costs and benefits, where those who participate in a project receive benefits from their efforts. As mentioned in the reforestation program undertaken in Northern Cameroon by ONADEF, the questions of "Who owns the trees" and "Who will take care of them?" were important (Peace Corps Cameroon 2000). This is not to say that rural reforestation projects should necessarily give ownership of the trees to the

local populations, but that there need to be incentives for the people to participate in and maintain reforestation projects.

Examining the cases, we find that participant benefit plays the highest importance in the outcomes of the projects. Of the two most successful cases, both showed strong personal benefits to the participants, going a long way in explaining why they were as successful as they were.

While the 2001 market project depended on the public's motivation for a public good (as a communal area, the market played an important part in the life of the village where shade was widely acknowledged as beneficial), the 2002 extended direct benefits to participants. In 2002 the vendors and others who worked by the market were involved in the process and given responsibility for specific tree maintenance. In addition, trees were planted at the request of particular vendors, on the conditions that they were responsible for their protection and upkeep.

By associating a tree with a particular person near their place of work, the public good of a shady market was combined with the private benefit of having a shady stall. Although all would still benefit, the vendor would benefit most of all from a tree's success. Not only would it be more pleasant to sit under a shady tree, but also it could be more inviting to customers to linger and purchase goods. While most of the stalls had thatched roofs, they required yearly upkeep and were less efficient than trees at blocking the full days changing angles of rays. In requesting his tree (X5 in Appendix B), the proprietor of the "Omelet Shack" expressed his hope that with a tree he and his customers could sit in front of his establishment, as opposed to a short distance away near the taxi station.

The School Project also showed a good alignment of benefits to those who bore the costs, with multiple benefits going to the participants. The physical needs at the school of shade for the students, wind protection for the classrooms, and demarcation for the fields were obvious and all the parties involved agreed on the benefits trees would bring. Students, teachers and the school administration all benefited from the project, and all played active roles.

However, the physical benefits of demarcation, shade and protection, were not the only ones gained by the project. The less tangible benefits of education and environmental ethics were also received through the work on the project. From conversations with the teachers, especially Harissou, I know that these benefits were quite important, and were among the motivating factors for doing the project in the first place. While working on the project, Harissou was fond of telling his students, *“This is for you, a true education. You are planting trees for the town and for your little brothers and sisters.”* Although this appeal to altruism may not have been sufficient to motivate the schoolchildren, they enjoyed participating in the project, which was probably all the benefits they required for their motivation.

Furthermore, much like the vendors in the market, the students were given responsibility for the maintenance of particular trees at the school. As discussed above, they reacted to this responsibility by constructing elaborate protections and watering the trees daily. I feel that in a poor area such as Touroua, where the children do not have many of their own things, the adoption of a personal tree was especially meaningful and a highly motivating factor. Furthermore, students had fun carrying out the project. Replacing rote French or mathematics lessons, the students were outside engaged in a

wide range of less structured activity. Although not all the students wanted to be out in the hot sun, I know that many enjoyed it and dragged their feet in returning to the classrooms.

In the two cases that were unsuccessful, there was little personal benefit for those who participated. In Wouro Kessoum, trees that were planted along the road held no more benefit for the individuals that did the work on them than for the public at large. Likewise, in the outdoor festival mosque there were no benefits to those who participated, past a share of the public benefit of shade and amenity. Although there were other factors involved in all of the projects, the presence or absence of personal benefits appears as a principle explanatory factor in all four of the cases, and may be considered as the most important element.

Leadership/ Responsibility

Another important factor in the success of reforestation projects is the element of leadership. Strong Leadership affects many of the factors of reforestation projects and has the potential to greatly alter a project's outcome. For example, leadership can affect the perception of benefits by clarifying the incentives to people who may participate. Likewise, strong leaders can mobilize community resources, from the funding of projects to encouraging maintenance and protection of planted trees, and increase the community support for an intervention.

While strong leaders take responsibility for a project, it is not necessary for all who are responsible to be leaders. By being responsible for a part of a project, a person can perform many of the functions that are fulfilled by good leadership. By example and

determination, those taking roles of both leadership and/or responsibility can motivate the other people involved to help ensure project success.

A major factor in the success of the school project was the function of leadership performed by the teacher Harissou. From project inception to “completion,” Harissou was a driving force behind the project. He took responsibility and organized people behind the effort, while emphasizing the social and educational benefits of what we were doing. He led by example, mobilized the available resources, and worked harder than anyone. It is hard to overestimate the importance of his taking responsibility, especially in organizing the maintenance of the project after planting, when the trees were at their greatest danger of being lost. By being responsible for the project Harissou provided the necessary follow-through for its success. Although the school’s location made the project more difficult, it was able to overcome those difficulties with strong leadership that organized the increased efforts required.

Another example of the importance of responsibility can be seen in the Market Project. In 2001, there was nobody who was truly responsible for the market trees in the critical maintenance phase. While I was partially responsible for the inception and planting phase of the project, in the interest of local sustainability I could not be alone in taking an active role in the maintenance phase of the project. The other responsible person for the project was the Secretary General from the Office of the Mayor. However, as he was a busy official with many duties, and since he felt that “the people” should watch out for the trees, he was little involved in the project during the maintenance phase, and was therefore not truly responsible.

However, in 2002 there was a shift towards emphasizing personal benefit to the vendors. This shift gave the vendors not only benefits, but the responsibility for individual trees, and in turn the project. Before planting we held a community meeting, calling on the people at the market to be responsible for the trees being planted. In this way, the trees were planted for specific vendors who were then charged with the responsibility for their maintenance. With the amount of work required to maintain the trees, this shift in the responsibility was key in obtaining the needed labor.

Furthermore, a good leader can help to overcome the constraints posed by lax rule compliance and enforcement. Although there is little that can be done when there is nobody around to see an infraction, a leader can report what he or she sees. On one occasion at the school, pictured in Figure 16, Harissou had the schoolchildren catch some goats that were roaming in the school area. As it turned out, they did not have to be taken to the authorities, as the owner arrived asking for their release. This was done on the condition that they would be restrained in the future. Whether or not this was carried out, the threat of capture and fines made people think twice about their compliance with regulations around the school.

Finally, we should mention a case that had a strong potential for strong leadership that was unsuccessful. In the outdoor festival mosque project, the Lamido was one of the responsible parties and as a powerful local leader should have been able to easily provide leadership. However, his actual role was unclear as it was played out behind the scenes.

Due to local customs and traditions, it would have been unacceptable for the Lamido to participate in physical hands-on activity, even if he was so inclined.

Furthermore, there is a tradition of agreeing to requests as a matter of course, without a true sense of obligation. This is to say that while the Lamido had said he would send people to do the work, this may not have taken place. While the potential for leadership was high, it is unclear whether or not it was exerted to overcome the constraints that were present.

Location

Location is the most important logistical decision to be made about a project, as it has far reaching effects. Although myriad factors are affected by location, I have chosen four that are of prime importance to discuss in detail: tenure security, livestock, the presence of people, and the availability of water. While the importance of some of these factors may seem both obvious and intuitive, I have seen, heard and participated in projects that failed to take them into account, leading to their failure.

Tenure Security

The importance of secure tenure for investments in land has been previously discussed. Although the general status of tenure in the region is unfavorable to reforestation projects, there are particular locations that can be more advantageous.

Examining the projects in Touroua, the school project was situated in an area with a high degree of tenure security. In this case, the property was officially demarcated and legally owned by the community of Touroua. Therefore, any investments made to improve the school area should benefit the school in years to come, with both permanent buildings and legal title. When Harissou told the schoolchildren that they were planting trees for their “little brothers and sisters” he could be fairly certain that this was indeed the case.

However, in areas without a high degree of tenure security, a sense of ownership can act as a replacement for the actual tenure of the area. In the market, for example, investments in the land are expected to benefit the market in the future. Although vendors could change, they generally stayed in the same stall year after year. Furthermore, if their rights are challenged, with high social standing (relative to the majority poor farmers) and year round access to income they are in a good position to defend their rights.

While the legal standing and security for individual vendors is unknown to me, I observed the same vendors week after week throughout the two years in Touroua. Furthermore, the market had certain areas with permanent establishments, allowing for a more secure sense of tenure. As previously noted, the trees planted near these establishments were the ones that were the most successful. This may have been due to the more secure tenure of the establishments giving the vendors within a feeling of ownership over the trees planted nearby. Although the actual tenure of the market is questionable, the sense of ownership that comes with the building of permanent establishments may give the proprietors the incentive to invest in the land, an incentive which is usually reserved for secure tenure.

In the overall view, village tradition keeps the market area in the same place year after year. Since the market serves as the center of village activities, an increase in the number of trees benefits community members as well as vendors in both the present and the future. We can feel secure that the market of Touroua will remain in the same location and many of the same vendors will continue to occupy the same stands.

Figure 16- Schoolboys capture a roaming goat



Livestock

As discussed above, livestock are by far the greatest threat to trees planted in Northern Cameroon. The location of a project greatly affects the pressure that livestock will exert on it. For example, the Outdoor Festival Mosque is located along the main road leading into the village. It is down this road that large herds of cattle are driven on their way to and from market.

These cattle are usually in large groups and “controlled” by only a few herders. These circumstances make it very difficult to keep all the cattle away from “roadside attractions.” I often passed by the project area and saw it filled with cattle, either passing through, or grazing and scratching. Although sheep and goats can be destructive to trees, nothing matches the devastating capacity of a herd of cattle, which the location of the project guaranteed would be in frequent and close proximity. Similarly, on a

different section of this same road were the principle planting sites for the Wouro Kessoum project that was also devastated by livestock.

Likewise, due to the location of the school at the northwest edge of the village in a large area of open space, many people grazed their animals at and around the project area. This threat to the school area is shown in Figure 17, where cows are in the background, with no supervision to speak of. However, when school was in session there was a large presence of people and abundant supervision to counter much of the livestock threat.

Figure 17- Harissou protects a tree with roaming cattle in the background



Presence of People

Another factor dictated by the location of a project is the presence of people. The presence of people at a project site has many effects. Firstly, people can stop the damage caused by livestock if they are there to see it occur. Secondly, trees are more easily maintained if people are already spending time in the project area. Thirdly, the presence of people familiarizes them with the project, and (hopefully) makes them more

likely to support it. In the long-term, by locating a project near people you raise its observability, thereby increasing the likelihood of support and adoption by the population (Rogers 2003).

For example, even on non-market days the market was the one place in town where you could always find people. The presence of people allowed for a more efficient upkeep of the trees, and more vigilance in regard to watching for animals. People “keeping an eye” on the project reduced the pressure from both livestock and people passing by and taking wood. Many times the proprietor of the “omelet shack” told me that he saw animals trying to eat some trees, and he chased them away. Furthermore, people would keep me informed about the goings-on in the highly visible market project, i.e. “A tree needs to be replaced,” or “I saw many goats in the market today!”

Of the trees that grew the fastest in the market, all were located on the edge of the market, near a permanent establishment. The map of the market (Appendix B) represents the tallest trees that were planted in the market project as X1-X4 (X4 represents a group of 3). These trees were the best maintained in the market, having people around to “look after” them daily.

On the other hand, being near the edge of town, the Outdoor Festival Mosque was not an area where people were likely to congregate (excepting festival days). As a result, there was nobody around to watch over the project, to keep livestock out, and to make repairs to the protections. Without the presence of people the project was at the mercy of the elements, animals, and the whim of those who passed by.

The school was located at the northwest edge of the village in a sparsely populated area, along a main path to cultivated fields. Although during school hours there was a heavy presence of people, there was little supervision during the night and school breaks. With a row of trees (and protections) beside the path to many people's farms, the temptation to take a few branches from the protections was encountered daily. During the aforementioned periods of little supervision, many people gave in to this temptation, leaving more work for the return of the students. However, during the period of occupation, the presence of people largely countered the threats.

A final aspect of the presence of people is the benefits accrued by the people there. Simply put, without people at a project site, there is nobody to enjoy the benefits that are produced. While general environmental benefits may be gained in an area devoid of a high presence of people, the individual benefits that really motivate people to support and participate in projects are lost. In all, without a presence of people it is harder to gain support for a project, harder to start and maintain it, and it loses many of the benefits that make it worthwhile in the first place.

Water

A final important aspect of location is the project site's proximity to a water source. In theory if trees are planted at the beginning of the rainy season, they do not have to be watered and should be well enough established by the end of the rains to survive the dry season. Nevertheless, the close proximity of a water source can be a great aid in the success of a tree planting.

Examining the conditions of a few particularly successful trees (that had grown to self-supporting stature) in the market, we find that water was a common denominator.

Outside the small mosque by the market was a tree that had grown to over three meters in height in little over a year. Being located by the mosque, not only were people often near (arriving five times daily for prayer), but in accordance with Muslim ritualistic cleansing before prayer, the people would wash their hands, face, and feet next to it, allowing excess water to enter the ground and be drawn up by the tree. Seen in Figure 18, and represented by X1 on the Appendix B map, the tree was over three meters tall by October 2002. Likewise, a tree of similar stature was located outside one of the restaurant stalls in the market that was open daily (X2). Not only was the proprietor of the store always around, but numerous dishes were washed by the tree giving it abundant water.

Figure 18- The tall tree near the market mosque



Figure 19- Digging a well at the school



Another project where the location of water was crucial was at the school. When the project was first planned, there was no water at the school. Although there was a water system at the school, it was only operational during the break. This system gathered water from rainfall into an underground cistern that could then be pumped to a water tower for school use. Unfortunately, by the time enough rain had been gathered, school was out, and when the students returned, the cistern was largely dry. However, during the school year while the nursery was growing, the teachers got together and dug a well as pictured in Figure 19. Although the well was not necessarily for the trees, it proved indispensable when all the trees could not be planted before the school year ended.

As previously described, most trees were planted at the beginning of the following school year when the rains were ending. If these trees were not watered, and

they could not have been watered without a well, they would not have been able to survive the dry season. Although the well was not necessary as the project was originally conceived, in the end it was indispensable. The close proximity of a water source made the project more flexible and gave it the options it needed to be successful.

Maintenance

The final factor that the Touroua model offers for successful reforestation projects in the North of Cameroon is maintenance. Although this factor is important, it does not hold the importance of participant benefit, leadership, or location which can all affect multiple factors related to reforestation projects. While maintenance may be more realistically be viewed as a proximate factor resulting from the consideration of the other factors (e.g. if there are sufficient benefits, the people will maintain the project), I include it as a full key factor as a reminder that projects are ongoing and to ignore maintenance can be disastrous for a project.

As discussed in the background section, the most important part of the maintenance phase is the construction and upkeep of tree protections. Whether they are elaborate like those constructed by the schoolchildren, simple such as the “teepee” style, or utilizing alternative materials such as millet stalks, it is important that they are kept in functioning order (See Figure 20, for some different styles of tree protections).

Figure 20- Tree protections: Small- Student's (top) & Teepees; Large- Millet Stalks



As seen most vividly in the Outdoor Festival Mosque project, a well executed planting and protection may come to nothing if it is not well maintained. In this case, the trees were becoming established, the protections were in place, and needed only to be re-tied and strengthened to have functioned. However, as I described, this was not done and the project lost all of the trees that had been planted and protected.

Similarly, the 2001 Wouro Kessoum project failed due to a lack of maintenance. Presumably, not all of the trees were destroyed in the same night and therefore measures could have been taken to better maintain those that remained after it became clear that there were losses. Even if all were destroyed in short order, I had seen many trees recover after defoliation. After being eaten, if given water and protection, there was a good chance that Wouro Kessoum's trees could have survived.

CONCLUSIONS

Numerous studies have been carried out asking the question, “what makes for a successful environmental intervention?” such as rural reforestation. Researchers have found a wide range of explanations, sometimes contradicting, and sometimes adding layers of complexity to an answer. For example, in a 1993 study Belsky finds that the reasons why individual farmers ultimately do or do not use agroforestry practices- or other land uses, for that matter- need to be evaluated on the basis of social and ecological conditions within particular locales and at particular historical periods, rather than on abstract theories about relationships between land use practices and the rural poor (p. 139).

With this in mind, I offer this paper and the concomitant model to help to identify and explain the current factors affecting reforestation efforts in the north of Cameroon.

Although the projects themselves had mixed results in terms of success, overall I feel that their examination is encouraging for the prospects of rural reforestation in the region, as they have all provided valuable information on which to base further efforts. While I have shown that there are certain conditions under which these projects are quite difficult, there are others where there is a good chance for success. Therefore, I feel that while such programs are not an exclusive answer to the reforestation efforts, they can be a valuable part in an overall strategy.

Although the results of any one small-scale project may not be great, in terms of the amount of land reforested, if many such projects are undertaken, their aggregate effect has the potential to be large. Even if this aggregate effect is not large, given the

tough conditions that reforestation efforts face in the region, perhaps it is the best that can be achieved.

The Touroua model presented above was formed from both the cases that I presented, as well as the relevant literature. It does not offer a blueprint for successful rural reforestation projects in Northern Cameroon, but rather establishes guideposts towards creating them. Since there are too many variables in natural and cultural systems, it would be foolish to attempt a rigid set of guidelines. However, I feel confident from my experiences to offer a few statements regarding the recommendations.

Firstly, for a project to be successful there needs to be real benefits to the people involved. These benefits should be easily recognized, and provide motivation for the participants to see the project through successfully. While this factor seems obvious and is well documented, projects that ignore the importance of benefits are also well documented.

Secondly, without someone from the rural area of a proposed project willing to take responsibility, that project is doomed to failure. The responsibility taken by a development worker or a government official is not sustainable, as both are only visiting an area, even if it is for a period of a few years. Nevertheless, it is perhaps necessary given the conditions that currently exist to have such a worker in the village to initiate and supervise projects. However, by clarifying participant benefits from a project, “outside” leaders can encourage local people to take responsibility for a project.

While the presence of outside agents seems unavoidable in the present, these workers should be seen as a temporary solution and work towards local leadership and

capacity building. For a project to be successful, someone in the community must be responsible for a project, and be able to direct resources and efforts where needed to a dynamic project with changing circumstances.

A third statement that can be applied to all such cases is that location is the most important logistical decision that will be made about such projects. With all of the related issues of location (tenure, livestock, the presence of people, and water) there are some areas that are well suited for rural reforestation projects, and some areas where such projects have little hope of ever being successful.

For example, the combination of abundant supervision and a water source is ideal for the successful growth of trees. Although this may seem obvious, it would be beneficial to examine the village for spots where similar conditions exist for successful projects. These conditions were met in the example of the school, while in session, and the market, near the small mosque and certain restaurants. These conditions existed elsewhere in Touroua, and could have been exploited for further successful projects. One such site was the taxi station, where there was a water pump, and people were always around getting water and waiting for a taxi. These conditions undoubtedly exist in many villages throughout the North of Cameroon, and should be exploited for rural reforestation projects.

Alternatively, areas with little human presence or water, and abundant livestock passing may never be successful. In such conditions the costs of maintenance are simply too high for a project to be successful. These conditions were seen in the Outdoor Festival Mosque and Wouro Kessoum projects that came to naught in the end. Furthermore, a project to line the road into Touroua (that was not examined) met with

no success. This project was attempted in at least three consecutive years with nothing to show. Lining the road into a village was common in the North of Cameroon, and was seen as the mark of a prosperous village. However, this was usually seen along main roads with active commerce and vehicular traffic. The conditions in Touroua were such that this project required an effort too great to be feasible.

Furthermore, in citing a project planners should search for an area with either tenure security or a strong sense of ownership. The former is seen in the school project, where the land is formally demarcated and titled, while the latter is seen in the case of the market. This is not to say that planners should only look in these two areas, but to search for areas where tenure conditions are similar. For example, for secure tenure projects could be investigated around the official governmental structures found in many villages. For a strong sense of ownership, small household projects should be investigated.

Simply put, to increase the chances of success for potential reforestation projects in the region, planners should focus on areas where benefits are tangible and can be easily recognized by individuals. These conditions are most readily met by small-scale projects in and around the compound. In this situation, people would likely have a strong sense of owning the trees and therefore be more likely to care for and protect them. In my experience, while it was difficult to convince people to start a project in their fields, they were always willing to take a fruit tree to plant in their family compound. Not only do households offer favorable conditions for projects, if successful, they may act as starting points in the village for larger projects to be attempted.

Table 3- Constraints and The Touroua Model: Keys to Project Success

Constraints	Keys that meet these constraints
Livestock	Leadership/ Responsibility- mobilize people to counter livestock damage Location- Choosing a spot with limited exposure to livestock Maintenance- Upkeep of protections to repair livestock damage
Misalignment of Costs and Benefits	Participant Benefit- Insuring that those who participate in the work, benefit from it
Land/Tree Tenure	Location- Choosing the spot with the most secure tenure and/or sense of ownership
Limited Resources	Location- Make the best use of limited resources by properly citing the project (near water, wood, people etc.) Participant Benefit- Make the project worth the use of limited resources to the participants
Lack of Rule Compliance / Enforcement	Leadership/ Responsibility- enforce the rules through vigilance and reporting Location- Choosing a spot with people to socially enforce compliance Maintenance- Fix damage and replant if needed Participant Benefit- Giving people an interest in seeing regulations followed
Climate	Leadership/ Responsibility- keep the project on schedule (proper planting times) and mobilize people to counter climatic problems (fix wind torn protections, or water dried trees) Location- Cite the project near a water source to counter desiccation

Table 3 shows how the constraints of rural reforestation projects in the region are met by the key factors of the Touroua model. I feel confident in saying that projects that consider all four of the key factors of this model stand a good chance of success, while projects that ignore any of these factors greatly reduce their hope for success. The odds for project success are decreased with each of the secondary factors not addressed, and are extremely low if the primary factors are ignored. Nevertheless, with both the keys and constraints presented in this paper I want to emphasize that there are no simple answers that lead to successful reforestation projects. Projects are affected by small-scale local decisions, such as choosing a favorable site, as well as large-scale regional factors, such as land and tree tenure security.

I have attempted to break down the factors of the Touroua model into general terms that can be applied to the greatest extent possible. However, the more the conditions change from those in Touroua, the less applicable the model may be. The North of Cameroon is a region where the culture and ecology are uniform enough for these recommendations to be applicable. Expanding further, the degree to which the northern part of West Africa is similar to Northern Cameroon, the recommendations can be applied.

The elements that are most important to the applicability of the model are dry savannah conditions, widespread animal husbandry, and a predominately traditional Muslim culture. Where these elements are similar, I believe that the model is highly applicable. Although I feel that the recommendations are general enough to be useful in a wide range of rural reforestation efforts, it requires a closer scrutiny the more that conditions are dissimilar to those of Northern Cameroon.

I believe that there is a need for further research in the area of rural reforestation. First of all, my research was limited by the time frame that I was in the region. Although two years may be a long enough time for most aspects of these projects, it is in the long-term that their success will be truly measured. Therefore, I see the need for some long-term evaluations of such projects in the region. Furthermore, the replication of these projects is necessary to confirm the results, and strengthen the power of its recommendations.

Additionally, there are several issues related to the project that need to be further researched for a greater understanding of similar projects. Issues such as the relationship of livestock to successful reforestation and the possibilities for its improvement should

be investigated. Furthermore, factors that would interest rural populations in reforestation efforts should be examined. The changing nature of both the traditional and state mandated tenure systems also bears further examination. Finally, the disregard of rules, as seen by ignored forestry laws and non-compliance to regulations for restraining livestock, should be studied for ways to increase compliance.

Due to the importance of the maintenance of a viable long-term resource base in the region, I feel that it is critical to learn all we can about efforts designed to secure it. Rural reforestation is one such effort, and I hope that the information I have provided may help to further the chances for the success of these projects in the future.

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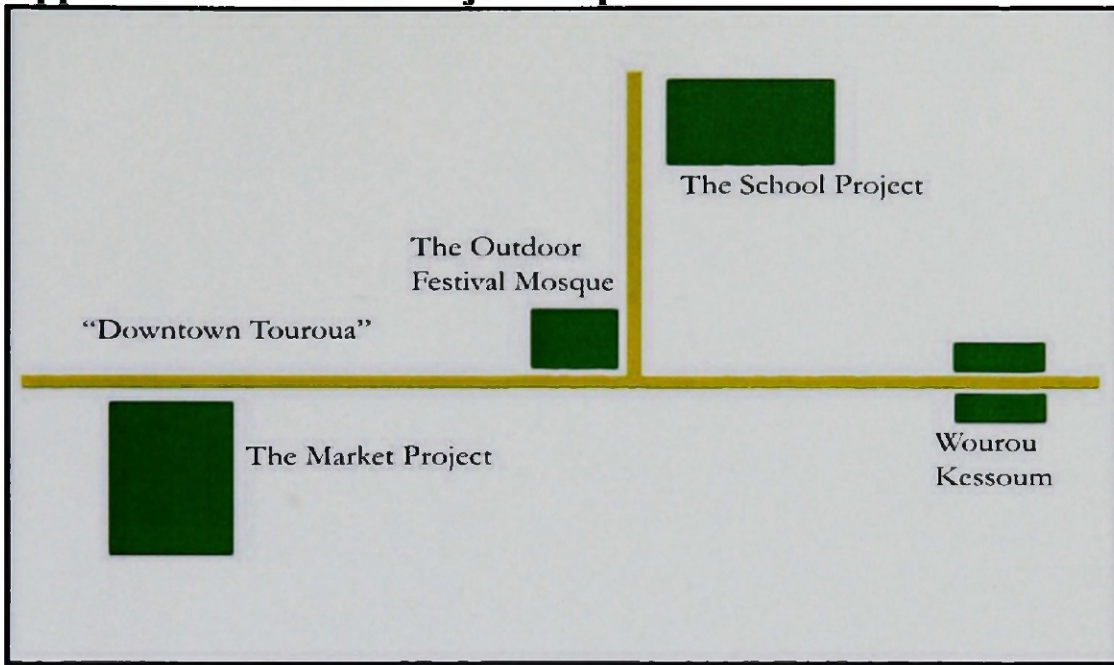
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APPENDICES

Appendix A- Touroua Project Map



Appendix B- Map of the Market

