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The adoption of soil conservation practices in Burkina Faso: The role of indigenous knowledge, social structure and institutional support

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The adoption of soil conservation practices in Burkina Faso: The role of indigenous knowledge, social structure and institutional support

by

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DEDICATION

This dissertation is dedicated to my wife, Clarisse, and our children, Olivia, Carine and Murielle.

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CHAPTER 1. INTRODUCTION

Adoption of technological innovations in agriculture has attracted the attention of agricultural scientists because the majority of the population of less developed countries derives its livelihood from agricultural production (Feder et al., 1982). But field studies have revealed that agricultural production in most developing countries of Africa is seriously undermined due to an increasing land degradation by erosion.

This research considers "soil erosion" as the depletion or gnawing away of the African top soils by factors of diverse nature such as runoff water, wind, eroding impact of high population density on land, overgrazing, overcutting trees, brush burning, misguided development programs that have pushed mono-cropping instead of intercropping (Harrison, 1987) or introduction of cash crop economy that has led to an intensive use of the crop land (Reij et al., 1986; Blaikie, 1985; Blaikie and Brookfield, 1987; Richards, 1985).

Harrison (1987) indicates that erosion in African countries reduces soil fertility and cuts plant yields by an estimated 2-3 percent for every 10 tons of soil lost per hectare. Citing a 1984 FAO study, he warns that no less than 130 million hectares could be lost to food production with no conservation measures.

Although some measurement problems still exist, soil erosion seems to be a serious concern in many African countries (Hudson, 1987; Dregne, 1990) particularly in the south of the Sahara. The problem has been perceived for over six decades, and Africa is widely believed to be facing an environmental crisis (Reij et al., 1986). Governmental large-scale efforts mounted to solve the problem have failed despite technically well designed and implemented projects.

Problem Statement and Objectives

Because restraining factors often had been overlooked in past diffusion research, most of agricultural innovations introduced in developing countries have not been successfully adopted by small-scale producers despite the demonstrated higher levels of productivity and calculated economic profitability of these innovations (Sands, 1986). Among the factors that the literature suggests have constrained the adoption of technological solutions proposed to address problems, particularly in Third World rural communities, is the local indigenous knowledge systems or farmer's practices (Warren and Cashman, 1988). In the sub-Saharan country of Burkina Faso, soil erosion has always been a great concern, and the situation is worsening in the northern part of the country. However, early attempts at soil conservation mounted by the European Development Fund in the 1960s have met with limited success (Harrison, 1987), and current efforts to address the problem are often hampered either by longstanding destructive practices in the country such as unrestricted grazing, brush burning to clear the land, and overcutting trees, or by a possible overlap between recommended and indigenous soil conservation practices. Burkinabè farmers, specifically, the Mossi farmers (the Mossi is the major ethnic group in Burkina Faso), have developed and perpetuated their own conservation practices over many years, and cases of particular success either by the individual farmer or a specific village have been reported by newspapers and the literature (Press, 1988; Dabirè, 1989; Reij, 1987; Harrison, 1987; McFarland, Jr., 1989; Younger and Bonkoungou, 1989). As a result, farmers may be slow to adopt new practices which look unfamiliar to them and, by nature, are risky, in the sense that farmers are not always sure whether the new techniques will work better than their traditional practices.

The main purpose of the research is to determine how indigenous knowledge about soil conservation practices influences the adoption of recommended conservation techniques among Burkinabè farmers. The prominent role of indigenous knowledge will be assessed among other subsets of important factors suggested by the adoption/diffusion literature such as structural and institutional factors (Brown, 1981; Freeman et al., 1982; Brady, 1989), farmers' socioeconomic characteristics (Rogers, 1983), perceived attributes of innovations (Fliegel and Kivlin, 1966; Rogers, 1983; Dewees and Hawkes, 1988) and awareness of soil erosion problem (Korsching and Nowak, 1983). The study is conducted within the general theoretical framework of the adoption and diffusion of innovations model.

The specific objectives of the research are to:

1. Determine the extent of the Mossi farmers' knowledge and adoption of soil conservation practices.

Record the Mossi farmers' indigenous soil taxonomies.

Record the Mossi farmers' traditional soil conservation techniques.

Determine the Mossi farmers' current use of soil conservation practices.

2. Determine the factors leading to the Mossi farmers' adoption of soil conservation practices.

Determine the extent to which structural and institutional factors affect adoption behavior among the Mossi farmers.

Determine the relationships between farmers' socioeconomic characteristics and their adoption of recommended conservation practices.

Determine the extent to which the indigenous knowledge concerning soil conservation influences adoption of recommended practices.

Determine the relationships between intervening factors such as knowledge of soil erosion problems, attitudes toward risk and goals in farming, and adoption of recommended conservation practices.

3. State policy implications with respect to future research and diffusion of agricultural innovations in Burkina Faso.

Relevance of the Study

Research on indigenous knowledge about soil conservation among Burkinabè farmers will provide an understanding of farmers' conservation behavior. Alternatively, the diffusion process may even be reversed with respect to the situation at hand by improving existing traditional techniques rather than introducing new ones. Such an approach may be a helpful guide to facilitate future diffusion of agricultural innovations in Burkina Faso.

In addition, introducing indigenous knowledge, defined as the sum of experience and knowledge of a given ethnic group that forms the basis for decision-making in the face of familiar and unfamiliar problems and challenges (Warren and Cashman, 1988), in a diffusion study will be beneficial to the adoption/diffusion model. In a theoretical sense, such an approach will invigorate the adoption/diffusion model, especially at a time when there is no consensus in the current literature whether research on the adoption of soil conservation practices supports the hypotheses of the adoption/diffusion model (Heffernan and Green, 1986). In a practical sense, combining indigenous knowledge with the adoption/diffusion model will lessen the usual problem of appropriateness of technology and its "fit" with the local culture. Incorporating indigenous knowledge in adoption studies will yield valuable information which agricultural scientists can use to either improve existing indigenous agricultural techniques or generate new, more appropriate ones.

The outline of the dissertation is as follows: Chapter 1 introduces the research problem and states the specific objectives.

Chapter 2 reviews the adoption/diffusion literature including some background information on Burkina Faso.

Chapter 3 develops a theory to explain the Mossi farmers' conservation behavior. This chapter also presents the theoretical model and variables, and states the general and specific hypotheses.

Chapter 4 describes the data collection methods including a brief description of the research setting. It also includes an operational measurement of the variables and the statistical analysis.

Chapter 5 reports and analyzes the study findings.

Chapter 6 discusses some implications of the findings, and makes suggestions for future research.

CHAPTER 2. LITERATURE REVIEW ON ADOPTION/DIFFUSION

This chapter begins with some background information on Burkina Faso highlighting its soil erosion problem, then follows with a literature review on adoption/diffusion studies.

Burkina Faso: General Background[1]

Formerly a French colony known as Upper Volta, Burkina Faso is a land-locked country of West Africa, sharing its international borders with six countries: Mali, Niger, Benin, Togo, Ghana, Côte d'Ivoire. Divided up in 30 provinces, Burkina Faso has an area of 274,200 square Km (105,870 square miles) and a population of about nine million people. Along with French, which is the official language, over 60 native languages are spoken in the country. The major ethnic group is the Mossi who make up about two-thirds of the total population. They ruled the region for over eight centuries, establishing five independent kingdoms, of which Ouagadougou was the most powerful. Still today, the Mossi traditional chiefs hold significant power in Burkina Faso. The predominant religion is animism (indigenous beliefs) claiming 65 percent of the population. Islam claims some 25 percent of the population as believers, and 10 percent are Christian. Polygamy is a common practice in Burkina Faso.

[1]The general background information on Burkina Faso is from Frank E. Bair (1989); John Clements (1990-1991) and "Africa South of the Sahara" (1990).

The climate is tropical with two alternating seasons, a rainy season from May to October, and a dry season from November to April. Annual rainfall is between 500 mm (20 inches) and 1,300 mm (51 inches) and lessens from the Southwest to the Northeast. Temperatures are high with a mean temperature of 106^{o} Fahrenheit in March-April.

With a national literacy rate as low as 10 percent, a per capita income of $160 in 1986, a high population density averaging 29 inhabitants per square Km (1985 census), massive migrations to neighboring countries (due to population pressure on land and general poverty of the country), irregular rainfalls, infertile soils and a great deal of political instability (five successful coups d'état since independence in 1960), Burkina Faso bears all the characteristics of a developing country. The economy is primarily agricultural of a subsistence nature, and manufacturing is in a rudimentary stage. More than 80 percent of the working population are farmers or livestock raising nomads. Of the total land area of 27,420,000 hectares, only 10 percent is under actual cultivation, and subsistence farming accounts for 90 percent. Principal crops grown are sorghum, millet, maize, beans, peanuts and rice. They are mostly consumed domestically.

Burkina Faso is not self-sufficient in basic foods. It still imports grain and depends on foreign food aid. Rural development is promoted by the Ministry of Agriculture through decentralized governmental extension services and non-governmental agencies. At the village level, farmers are organized in "Groupements Villageois" (Village Groups) through which development projects are carried out. A traditional system of land tenure (the land belongs to the extended family and access to land is through kinship ties) prevailed up until August 1984 when it was abolished by governmental decree. But the general sense at the village level is that land remains family property.

Tourism is booming in Burkina Faso, despite the country's austere environment. From about 40,000 in 1984, the number of tourist arrivals reached over 70,000 in 1987. The country has appeal to foreigners due to its legendary hospitality.

Soils and Soil Erosion

The soils are generally poor and drought has traditionally been a recurrent problem. Severe droughts with subsequent famines were witnessed between the years 1968 and 1974. In 1973 a drought of an unprecedented severity hit the Sahel and brought a large part of the rural population to the brink of starvation. Ferrugineous tropical soils are well represented on the Mossi plateau (Marchal, 1986), which is characterized by crust-capped hills, glacis and peneplains underlain primarily by granite, but also by birrimian basic rocks (Roose and Piot, 1984). These soils have rather poor structural properties because of lower clay and organic matter content in the surface layers (Perrier, 1987). According to Roose and Piot (1984), cultivated soils on the Mossi plateau of Burkina Faso are of three types: (1) the lithic soils, gravelly on the surface and infertile, they possess low water reserves;

(2) the ferrugineous tropical soils, which are leached, deficient in important nutrients such as nitrogen, phosphorous and potassium, and of low permeability, subject to sheet and gully erosion; (3) the tropical brown vertic soils with swelling clay, which are rich chemically but more difficult to exploit; moreover they are subject to gully erosion and water logging once desiccation cracks close. The common characteristics of these three types of soil are that they are poor in organic matter, their structure is unstable, they are rapidly sealed by rainfall, and they do not retain water as soon as they are overgrazed or cultivated.

Government efforts to modernize the agricultural sector have been hampered not only by unfavorable climatic conditions and inadequate water supplies, but foremost by serious soil erosion that reduces soil fertility. Field studies have revealed an extension of erosion and desertification on the Mossi plateau. Measurements on four sites have shown high levels of runoff ranging from an average of 20 to 40 percent of annual rainfall, 70 percent during heavy storms and a high risk of selective sheet or even gully erosion. Measured on plots (100 to 5,000 m^2) the erosion reaches 50 to 500 Kg/ha/year on savannah with trees, depending on brush burning, 1,000 to 15,000 Kg/ha/year under cultivation, and up to 25 to 35,000 Kg/ha/year on nude soil (Roose, 1989-1990; Roose, 1988; Roose and Piot, 1984; Marchal, 1986). Burkina soils are of low fertility and are then prone to rapid degradation when cultivation is intensified and fallow periods shortened.

And once vegetation has been removed, these soils tend to develop dense surface crusts which reduce moisture infiltration, thereby increasing runoff and erosion as well as the risks of drought (Stoop, 1987). Burkina Faso was among the 12 countries that scored high on Leonard Berry's (U.S. Geographer) land degradation scale, in his 1984 study (Harrison, 1987).

Soil degradation by erosion was perceived by the national government as early as the end of the 1950s. And attempts to address the problem started in the early 1960s in the Yatenga Province (the research setting for this study) (Roose and Piot, 1984). Harrison (1987) describes the initial program as follows:

> Bulldozers covered 120,000 hectares with a network of low soil bunds. There was no involvement of villagers whatsoever: peasants remember only the massive earthmovers trundling uninvited across their land as if alien invaders had landed. There was no explanation of the purpose of the bunds, no training of villagers in how to maintain them . . . Follow-up studies found that most bunds were not maintained at all, and decayed in two or three years (p. 117).

This was a top-down approach that did not associate the target population and, hence, ignored the local indigenous knowledge systems that would have ensured a sustainable project. Such an approach was based on the implicit assumption that the technology was good and should be accepted by the local population. This is well illustrated in the way an environmental agent of Burkina Faso was expressing himself in the early 1960s: "Because peasants don't do anything to protect their land or use loosely traditional practices, it convenes to substitute oneself to the farmers and build antierosive techniques so to create a psychological shock" (Marchal, 1986, p. 174).

As a result, twenty years later the erosion problem is still there, desertification has spread and erosion has increased in the most humid southern zones where there has been a concentration of population, resulting in reduction of vegetative cover, sheet and gully erosion on the glacis and silting of valley bottoms (Roose and Piot, 1984).

More recent attempts to tackle the erosion problem in the 1980s have also failed. New conservation techniques introduced by the extension services have not been fully implemented by farmers because the practices are unfamiliar to them. Also, the national "triple-fight" decreed by the local government against brush burning, overcutting trees and errant animals has been followed with limited success.

It is only in 1982 that Oxford Famine (OXFAM), a Oxford-based charity non-governmental agency, through the Agroforestry Project (PAF) successfully introduced a stone lining technique against soil erosion. The success of the project stems from its farmer-oriented character. The PAF was built upon indigenous knowledge systems, actually working with farmers to improve the traditional stone lining technique they have been using for years (Younger and Bonkoungou, 1989; Reij et al., 1986; Harrison, 1987). This raises the whole question of appropriate technology, " . . . people recognize that technology should not be employed as if it were completely independent from its surroundings" (Frame, 1983, p. 46) or the appropriateness of the adoption/diffusion model as applied within a Third World context where most often the adoption of a new thing is not just an individual decision process. Rather such decision depends on determinant factors such as the local culture, the significant others, the local power structure and environmental uncertainty. This takes us to the review of the adoption and diffusion of innovations literature.

Literature Review

Scholars have been very productive in adoption/diffusion of innovations research, and the total number of diffusion publications has reached 3,085 by 1983 (Rogers, 1983). There is no intention to carry out a comprehensive review of adoption/diffusion studies (which is obviously beyond the scope of this project) but rather to briefly overview the classical diffusion model (Rogers and Shoemaker, 1971) and its applications to agricultural innovations such as resource conservation. Then a criticism of the model will follow, leading to the incorporation of indigenous knowledge on soil classification and conservation.

The overview on the classical diffusion model may be attributed largely to the Rogers' 1983 Diffusion of Innovations which is a comprehensive review of adoption/diffusion studies.

Diffusion is defined as a process by which an innovation (an idea, practice or object perceived as new) is communicated through certain channels over time among the members of a social system (Rogers, 1983, p. 5). In the classical diffusion model, an innovation is generated from an expert source and diffused as a uniform package to potential adopters who either accept it or reject it. It is a linear model of communication from a source to a receiver (Rogers and Shoemaker, 1971). The adoption of a new practice then is largely considered an individual decision process.

The adoption process involves five stages (Bohlen, 1967; Rogers and Shoemaker, 1971):

1. Awareness. The individual knows of the existence of an innovation.
2. Interest. The individual is interested and seeks further information.
3. Evaluation. The individual considers whether or not to adopt the new practice.
4. Trial. On a small-scale basis, the individual will try the new idea.
5. Adoption. The idea is used on a full-scale basis.

Rogers (1983) did develop a five stage adoption process slightly different from the classical model:

1. Knowledge stage. People are exposed to the existence of an innovation and gain some understanding of how it

functions.

2. Persuasion stage. People put themselves in the psychological situation of adoption or rejection of the innovation.
3. Decision stage. Individuals engage in activities that lead to a choice to adopt or reject the innovation.
4. Implementation stage. Innovation is put into use by the potential adopter.
5. Confirmation stage. Individuals seek reinforcement for their innovation decisions, but may reverse their decisions if exposed to conflicting messages about the innovation.

These five stages are ideal types and not all individuals will necessarily go through each one of them as they are ordered. Instead, depending on the perceived characteristics of a given innovation, the individual may skip some stages. For instance, innovations perceived as most rewarding and least risky are accepted most rapidly (Fliegel and Kivlin, 1966).

The literature suggests five major attributes of innovations that correlate with adoption rate:

1. Relative advantage. An innovation is perceived as better than the one it supersedes.
2. Compatibility. An innovation is perceived as consistent with the existing values, and to this respect, refers to the local knowledge systems.
3. Complexity. An innovation is perceived as relatively

difficult to understand and use.

4. Trialability. An innovation may be experimented with on a limited basis.
5. Observability. The results of an innovation are visible to others (Rogers, 1983).

Empirical studies support the idea that differences among innovations are important variables in explaining the diffusion process and adoption rate (Fliegel, 1966; Fliegel and Kivlin, 1966; Fliegel et al., 1968; Bohlen, 1967; Rogers, 1983; Rogers and Shoemaker, 1971; Dewees and Hawkes, 1988).

The classical diffusion model has been used to predict not only the rate of adoption of a given technology but also its socioeconomic impacts within a social system depending upon when an individual adopts an innovation (Rogers and Shoemaker, 1971; Brady, 1989).

Rogers (1983) notes that over time the diffusion pattern within a social system follows a S-shaped cumulative curve. And because not all individuals in a social system adopt an innovation at the same time, they may be classified into adopter categories on the basis of when they first begin using a new idea. In the past diffusion research, the adopter categories have been called such things as "progressists", "hightriers", and "ultra-adopters" for the most innovative individuals, and "drones", "parochials", and "diehards" for the least innovative individuals (Rogers and Shoemaker, 1971; Brady, 1989). The adopter categories are ideal types, conceptualizations based on observations of reality and designed to make comparisons possible. The classification of adopter categories is based upon the innovativeness of individuals. A more recent classification found five adopter categories. "The five adopter categories are exhaustive (except for nonadopters), mutually exclusive, and derived from one classification principle" (Rogers, 1983, p. 247). Those categories are:

1. Innovators (venturesome and cosmopolite).
2. Early adopters (localite, respectable, have leadership).
3. Early majority (they are the "Be not the first nor the last" to adopt).
4. Late majority (they are skeptical and cautious).
5. Laggards (localite and traditional, geared back to the past) (Rogers, 1983).

In terms of the socioeconomic impacts, farmers who adopt first will benefit from "windfall profits" which are special advantages earned by the first adopters of a new idea in a social system (Brady, 1989; Rogers, 1983). Innovators are thus rewarded for being first to adopt a new practice. In terms of their socioeconomic characteristics, the literature suggests that the earlier adopters are usually more educated, more commercially and economically oriented, and have more resources and higher socioeconomic status than later adopters. The socioeconomic characteristics in the diffusion literature are, like the perceived attributes of innovation, important determinants of adoption or nonadoption of a new practice, and this is supported by empirical studies as well

(Chaudhari et al., 1967; Fliegel et al., 1968; Rogers, 1962; Rogers, 1983; Rogers and Shoemaker, 1971; Dewees and Hawkes, 1988).

The adoption/diffusion tradition is based on the assumption that human beings are profit-oriented and seek maximization. With this assumption most diffusion studies until recently focused exclusively on profitable innovations with quick economic return. But recently, the model also has been applied to examine non-economic innovations such as soil conservation practices.

Adoption/Diffusion Applied to Resource Conservation

There is no consensus on the matter of whether or not the diffusion model is applicable to resource conservation (Heffernan and Green, 1986). The issue at times seems to be a matter of definition. Some argue that soil conservation is different in some ways from the technology studied in the past because there is no immediate economic payoff in soil conservation. Most resource-conservation options available to farmers will be seen by them as a nonproductive expenditure (Pampel and Van Es, 1977; Van Es, 1983; 1984). The counterargument is that not all conservation practices are unprofitable (Nowak, 1987), and that soil conservation practices are not different from other types of innovations (Korsching et al., 1983). They are simply types of preventive innovations; that is, practices that individuals adopt in order to avoid the occurrence of some unwanted event in the future (Rogers, 1983).

Some research has shown that the diffusion model is applicable to conservation adoptions (Taylor and Miller, 1978). Personal, social, and economic characteristics for adopters correlate with rates of adoption, and conservation practices tend to follow similar patterns of adoption and diffusion as do other innovations (Korsching et al., 1983; Bultena and Hoiberg, 1983).

Meanwhile, soil erosion is still a concern in the U.S. Despite more than half a century of soil conservation programs by federal, state and private organizations that provide educational programs, technical assistance and financial incentives, there has been only marginal success in the implementation of conservation practices (Korsching, 1984; Heffernan, 1984; Green and Heffernan, 1987).

There is evidence that factors other than the usual socioeconomic characteristics are barriers to full implementation of conservation techniques in the U.S. For instance, awareness of soil erosion as a serious problem is found to affect the use of conservation practices. Due to the "proximity effect" ("the other guy has a problem, I don't"), most farmers deny having erosion problems on their own farms (Korsching and Nowak, 1983). There are also other sociocultural, institutional, structural and economic factors (Korsching, 1984; Benbrook, 1983; Bultena and Hoiberg, 1986; Swanson et al., 1986; Green and Heffernan, 1987) along with environmental and institutional constraints (Heffernan and Green, 1986) that are found to be crucial determinants affecting the use of conservation techniques. In addition, failure in the implementation of conservation practices in the U.S. is due to lack of better coordination between conservation agencies (Nielson, 1986) and lack of flexibility in policy format, which makes adjustment to varying farm conditions difficult (Korsching and Nowak, 1983). The issue of soil and water conservation, as some argue, must be placed within a broader social-political debate for a better understanding of forces encouraging and impeding the use of soil and water conservation practices on U.S. farmlands (Heffernan, 1984).

There is general support for the use of the diffusion model to predict the adoption of environmentally related innovations (Taylor and Miller, 1978). The model however has some serious flaws, and corrective measures need to be introduced.

Limitations and Shortcomings of the Classical Diffusion Model

Formulated originally in the 1940s, the diffusion paradigm has been successful in predicting the adoption and diffusion of agricultural technologies in the U.S. (Rogers, 1983). As exemplary studies, Nowak (1984) mentions the adoption and diffusion of hybrid seed corn in Iowa (Ryan and Gross, 1943), soil testing (Bohlen et al., 1959) and the use of agricultural chemicals (Beal and Rogers, 1960). Diffusion studies proliferated in the 1950s in the U.S. and were expanded to developing nations in the 1960s. But in the 1970s, the diffusion paradigm became the subject of many criticisms (Rogers, 1983).

Two of the major flaws of the classical diffusion model are: (1) its social psychological orientation, focusing solely on individual characteristics, and (2) its implicit assumption that knowledge flows from the top-down, that is, a one-way, trickle-down communication process (Nowak, 1984). These flaws have serious consequences.

By focusing on the personal characteristics, the diffusion paradigm developed the pro-innovation bias (the innovation is an unchanging and uniform package, "good" for everyone), and the individual-blame bias (the individual is at fault for not adopting an innovation and should be blamed for that). In the process, the model not only ignored the institutional context, but also failed to study the consequences of innovation. Within a given social system, the opportunity to adopt a new practice by members of the system is in many cases not equally distributed (Brown, 1981). The adoption of a new technology is largely dependent on social structural effects (Freeman et al., 1982). The individual psychology of the farmer should not become the mechanism by which questions of institutional inequity and impaired access are ignored (Brady, 1989).

By assuming that knowledge flows in a trickle-down fashion, the classical diffusion paradigm perpetuated what could be called the new scientific knowledge bias. Indigenous knowledge systems are not recognized, although traditional practices may be as good or even better than the new technology (Warren, 1989; Jiggins, 1989). This questions the appropriateness of the classical diffusion paradigm (which is culture-bound) as applied within a developing nation's context like Burkina Faso. Many introduced technologies have been rejected by small farmers because they are simply inappropriate for the specific conditions of small-farm systems (Sands, 1986). Small-scale farmers in Africa are conscious of the constraints associated with their farming environments in their efforts to realize their goals of production and conservation of the resource base. The limited effectiveness of existing agricultural development assistance efforts reflects an inadequate understanding of tropical and subtropical environments (Mazur and Titilola, 1992).

There is no universally appropriate development paradigm. However, flexibility of the diffusion model taking into account farmer's practice is essential to make adjustment to varying farming conditions possible. The diffusion paradigm should build upon the local indigenous knowledge systems, that is, from the bottom-up.

The classical diffusion model will then have to be modified to be useful in explaining the adoption and diffusion of conservation practices among Burkinabè farmers. This research, incorporating indigenous knowledge, specifically indigenous soil taxonomy and conservation practices, suggests such a modification. This could be a fruitful contribution to the diffusion model, which still has much to offer.

Indigenous Soil-Classification and Conservation

This section reviews some field studies on indigenous soil classification and conservation.

As a general note, indigenous knowledge seems to be on the cutting edge of any agricultural research today. It is investigated because demonstrated efficient technology has failed in rural communities due to the fact that it did not take into account the preferences, skills and knowledge base of the local society (Warren and Cashman, 1988). Warren (1989) defines indigenous knowledge as "local knowledge," knowledge that is unique to a given culture or society, knowledge that is the information base for decision-making. The indigenous knowledge research puts emphasis on "reversals in learning" (Chambers, 1983) in the sense that we have a lot to learn from farmers, who actually are "professional specialists" (Chambers et al., 1989). Farmers have knowledge about agriculture, treatment of disease, methods to crop fertile and infertile soils, and this knowledge has been perpetuated over centuries (Warren and Cashman, 1988).

For sustainable development then, it is important to draw upon local indigenous knowledge systems (Richards, 1989; Cashman, 1989; Chambers, 1983; Compton, 1989; Gladwin, 1989; Thrupp, 1989; Warren and Cashman, 1988). Such knowledge is pragmatic and useful to the farmer and to the agricultural scientists. This is illustrated by the following review of some field studies on indigenous soil taxonomy and conservation.

Evidence of interest on soil classification goes all the way back to the early Chinese writings and was based primarily upon texture, color and wetness (Harpstead et al., 1988). The African farmer has an extensive knowledge of his soil. Local soil taxonomy is based on soil characteristics as they relate to specific crops and, traditionally, provides the insight and ecological knowledge required for making good use of available agricultural resources (Richards, 1985). Behrens (1989) conducted research on the Shipibo soil classification and land use. He found that eastern Peruvian farmers, within a general class of "mai", use six different terms to classify soils based on the consistency, organic matter and texture. So "mai" may be "soft", "hard", or may leave one's skin "dirty" when wet. "Mai" also may be with "sand", the "true" or "legitimate", and "mai" with "clay". Actually this research on the Shipibo soil taxonomy showed that a cash crop, when it is introduced, disrupts the traditional, well sustained farming systems which fed subsistence farmers for many centuries.

Kerven and Sikana (1988) and Dolva et al. (1988) investigated indigenous soil classification in the Northern Province of Zambia and found that the overall local classification incorporates characteristics such as: texture, consistency, organic matter, physiography, color, drainage, fertility, cultural use, crops that grow well on, crops that fail. The research concludes that farmers in Northern Province distinguish different types of soil, and evaluate different soils primarily according to the usefulness of each type of soil to farmers, particularly soil suitability for different crops. Similar findings have been reported by McMillan (1980) who investigated farmers of Northern Burkina Faso, Osunade (1988) with farmers of Southwestern Nigeria, and Dvorak (1988) with an Indian case.

The field studies reviewed show that farmers classify their soils in terms of their suitability for agricultural production. The scientific soil classification systems which consider the agents and forces that shape the soil and the features that control its behavior (Harpstead et al., 1988) make no allowance for interactions between soil characteristics and management, and are often of limited direct usefulness to farmers (Dvorak, 1988; Tabor, 1980). "Farmers are keenly aware of differences in quality between plots and their perceptions are reflected in their local classification systems" (Dvorak, 1988, p. 1).

The indigenous soil taxonomy is not only useful to the farmer but also could serve as a guiding and complementary tool to scientifically based systems. However, many soil surveys have ignored the indigenous soil classification (Tabor, 1990). But evidence indicates that the soil scientist may gain time if he/she knows the local indigenous soil classification system. For instance, based on investigations in Tabora Region (Tanzania), Acres (1984) indicates that the results of a systematic soil survey can be related to the soil nomenclature used by local farmers and their assessment of soil suitability for cultivation. In addition, the use of local names helps ease the communication between administrators, planners, soil specialists, agriculturalists and farmers.

This review has shown that Third World farmers are very knowledgeable about their soils. They have a pragmatic soil classification from which they developed sound conservation practices that have protected their soil productivity over many years.

As Reij et al. (1986) stated, indigenous African systems are ecologically sound. Soil and water conservation is an integral part of the numerous farming systems of sub-Saharan Africa. Each African system has evolved appropriate soil and water conservation techniques. Among the many successful cases, the following four are particularly notable.

The Mossi of Burkina Faso developed their own traditional remedies to the water problem. Farmers in some areas place lines of stones, roughly along the contours, to slow down the destructive force of run-off. Building upon this traditional stone lining techniques, Oxfam through the Agroforestry Project shows farmers how to align properly the stones with the contour levels, and successfully promoted an indigenous soil conservation technique that has spread quickly to many villages (Younger and BonKoungou, 1989; McFarland, 1989; Harrison, 1987; Reij et al., 1986).

The second case is provided by the Iowa State University 1989 "Grad News and Notes." The report indicates that recent findings by soil scientists at Iowa State suggest that terraces, traditional techniques used in the Colca Valley, Peru, have helped conserve agricultural soils for more than 1,500 years. According to soil scientist Sandor, terraces represent an agricultural system that is ecologically sound, very productive, and based upon an unbroken oral tradition of management practices, potentially useful in much of the world's mountainous areas. An illustration of this is the third case of successful indigenous conservation in the Mandara mountains in Northern Cameroon. The Mandara and Mafa tribes have entirely remodelled the mountainous landscape by extensive terracing (Reij et al., 1986).

The last case to mention is the Dagari rotational bush-fallow system in Burkina Faso. It is one of the many cases where indigenous soil and water conservation within fallow systems was not only adequate in the past, but has been fairly successful in adapting to the 20th century cash crop (groundnut and cotton) introduced by France. Local conservation techniques include contour bunds, stone lining, ridging along the contour, dead barriers, and reforestation with acacia albida, a nitrogen fixing tree (Reij et al., 1986).

The overview shows that small-scale farmers are very knowledgeable about their ecological setting. Such knowledge helps them adapt and survive in a highly constrained environment. In the next chapter is developed the theoretical framework for the study.

CHAPTER 3. THEORY

The main purpose of this chapter is to develop the theoretical framework for the study, including the model predicting farmers' conservation behavior, the variables studied and the hypotheses to be tested.

A theory is a guiding light for the researcher. Theorizing is the process of providing explanations and predictions of social phenomena. Rather empirical than speculative, the theory is a testable attempt to explain a particular phenomenon (Bailey, 1987).

This suggests that the theory should be of a "middle-range."

> Middle-range theory is principally used in sociology to guide empirical inquiry. It is intermediate to general theories of social systems which are too remote from particular classes of social behavior . . . Middle-range theory involves abstractions, of course, but they are close enough to observed data to be incorporated in propositions that permit empirical testing (Merton, 1968, p. 39).

In Merton's view, while grand theory tries to develop an all-encompassing system of concepts à la Parsons (1968), theories of the middle-range are empirically grounded, couched at a lower level of abstraction with clearly defined and operationalized concepts. In the process, there is an interplay between theory and research, otherwise the theory will remain purely speculative, not testable, and the empirical research will remain unsystematic, disjointed and of little utility (Turner, 1986).

Middle-range theories deal with well circumscribed and specific aspect of social phenomena as they can be designated by their labels. As "One speaks of a theory of prices, a germ theory of disease, or a kinetic theory of gases" (Merton, 1968, p. 40), it is reasonable to suggest that combining risk and balance theories may be useful in guiding the study on adoption of soil conservation practices in Burkina Faso.

The adoption/diffusion perspective is more of a method than it is a theory (Buttel, 1984), but it has its roots in several theoretical traditions. Risk and balance theories are tied to the uncertainty or prospect of loss surrounding the innovation and to the role of significant others, respectively.

Risk Theory

In the traditional adoption/diffusion model, the adoption of a new practice largely is considered an individual decision/process. In the Third World context, however, the adoption decision depends largely not only on the influence of other members of the social system, but is also a decision problem under uncertainty (Hiebert, 1974) and risk.

Farmers in developing countries face both uncertainty and risk. They face the uncertainty of irregular rainfall and the risk of crop failure and the probability of loss involved in the adoption of a new practice. Under such conditions, small-scale producers are flexible in their decisions to leave room for a number of contingency strategies

(Ortiz, 1980): they either reject recommended practices based on risk calculations, or they carefully select from the introduced technologies those that are most appropriate for their specific environmental and economic conditions (Sands, 1986). Another option for small scale producers is to maximize security (Johnson, 1971) and minimize risk by diversifying crop production which is a typical risk spreading device (Ruthenberg, 1980). As Reij et al. (1986) observe, a guiding principle in much African farming is risk minimization. This results not only in strategies to ensure survival from season to season, but also in ways of conserving the long term productivity of the soil.

Burkinabè farmers still operate within a predominantly subsistence economy and are expected to be risk averse and conservative as far as their farming systems are concerned. Risk, defined as the probability of loss (Vlek and Stallen, 1980), arises because a farmer, when embarking on any productive activity, is uncertain about the actual outcome. This is particularly so in the tropics, with unreliable rains, possible major pest and disease outbreaks, and widely fluctuating market prices (Ruthenberg, 1985). In the context of subsistence agriculture, risk is an important factor due to its close interrelationship with survival (Wharton, Jr., 1971). A farmer's main objective in avoiding risk is a matter of survival. Crop failure can result in starvation or large debt, or loss of land (Ortiz, 1973).

Attitudes toward risk then are major determinants of the rate of diffusion of new practices among peasants and of the outcome of rural development programs (Moscardi and de Janvry, 1977). The literature suggests that innovations entail in most cases, a subjective risk (the yield is more uncertain with an unfamiliar technique) and, quite often also, objective risks (due to weather variations, pest susceptibility, uncertainty regarding timely availability of crucial inputs, etc. . . .) (Feder et al., 1982).

Farmers' technology choices are based on their subjective probabilities, and when it comes to conservation practices, the perceived risk and uncertainty is even greater because most resource-conservation options will be seen by farmers as a nonproductive expenditure (Van Es, 1983). Even if resource-conservation programs will benefit farmers in the long run, they still need to deal with the investment consideration in the short run (Sharp and Bromley, 1978). Burkinabè farmers, like most Third World farmers, are very sensitive to immediate observable outcomes. So practices which return satisfactions over a long period of time will have low adoption rates due to the short planning horizons of many farmers (Bohlen, 1967). Risk-averse behavior dictates that an individual will be less willing to forego certain short-run returns for uncertain long-run benefits (Setia, 1987).

Risk however is not just related to the possibility of a material loss. Risk also may be social, such as when one creates a dissonance within his/her social milieu by individually adopting a new practice. Risk is tied to balance theory in the sense that one perceives and assesses risk in interaction with significant others. This is particularly so in strongly integrated rural communities characterized by a mechanical solidarity á la Durkheim (1964). For instance, a study of the diffusion of new drugs among physicians found that early adopters were likely to be the most "integrated" only when the innovation item required neither risk nor pervasiveness (Coleman et al., 1957).

Balance Theory

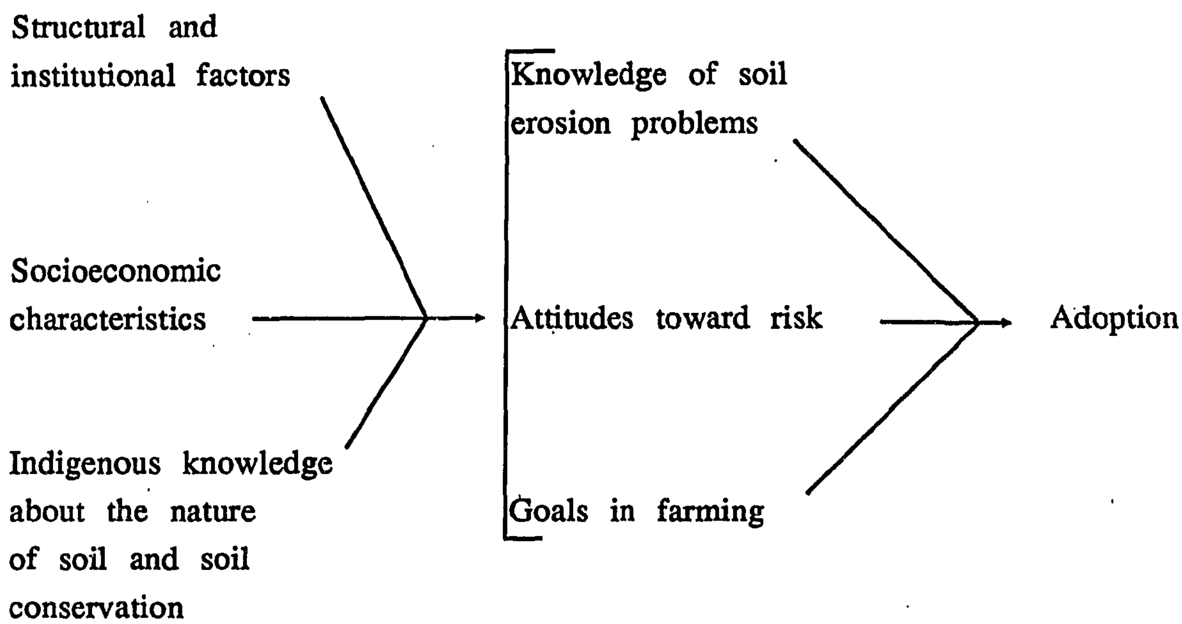
The basic postulate of balance theory is that there exists a need for the socialized human being to establish and maintain stable and consistent orientations toward the self, other person(s) and the non-person object, and that this need motivates a wide range of behavior (Heider, 1946). Balance theory such as set forth by Han (1971) considers a person (P), significant others (O) the innovative item (X) as the three components of the cognitive system. When the individual differs in his/her perception of a newly introduced farm practice from the significant others, a situation producing tension or dissonance occurs. The individual is then expected to modify his/her own perception in order to reestablish the balanced state with other members of the social system. This mechanism determines whether or not an innovation will be adopted by the individual.

Balance theory is useful in explaining the role of significant others in the adoption or rejection of farm practices. Significant others refers to any person or group of people who have particular influence over the individual's acceptance of given social norms (Vander Zanden, 1977). Pressure from significant others calls for conformity and affects individual behavior. Balance theory is tied to the notion of small rural communities characterized by strong family ties, local autonomy, and strong social control. In such a community, a sense of "we-ness" and "our-ness" prevails. The meaning of existence, the individual's perception of reality, his/her aspirations in life, and attitude are defined, shaped, and rigidly controlled by local groups or significant others. Individualism is not encouraged, if not socially disapproved. Ultimately, balance theory is tied to the influence of local groups on individual behavior.

In rural Burkina Faso, for instance, the adoption of a new practice would not be just an individual decision process. Instead, the individual as potential adopter will consult with relatives, friends or neighbors before any final decision. His/her adoption decision depends largely on the influence of other members of the community. Such influence is expected to be even greater when the recommended technology challenges longstanding techniques such as traditional soil conservation practices. In that sense, indigenous knowledge itself may be linked directly to balance theory. Indigenous knowledge appears to be the cornerstone of social integration in the sense that such knowledge has been developed over many centuries in congruence with the local culture. It may be also tied to the idea of subjective risk, that is, that yield is more uncertain with an unfamiliar technique. This leads to the discussion of the theoretical model.

Theoretical Model

The model predicting farmer's conservation behavior is the following:



The model constructed to predict and understand the conservation behavior among Burkinabè farmers is based on three groups of independent variables: (1) structural and institutional factors, (2) socioeconomic characteristics, (3) indigenous knowledge about the nature of soil and soil conservation. The model also contains three intervening variables: (1) knowledge of soil erosion problems, (2) attitudes toward risk, (3) goals in farming. The dependent variable is adoption of soil conservation practices.

The model is a modified classical diffusion model that incorporates indigenous knowledge systems. The rationale for introducing indigenous knowledge in the adoption/diffusion model is two-fold: theoretical, and practical.

Theoretically, introducing indigenous knowledge in the adoption/ diffusion model should enhance its explanatory power. The appropriateness of the adoption/diffusion paradigm for third world countries has been questioned in the literature in the sense that the model does not adequately consider the local culture. Introducing indigenous knowledge in the adoption/diffusion model is to improve the model, and to better explain the adoption of soil conservation practices in Burkina Faso.

Building upon indigenous knowledge will also generate conservation techniques familiar to farmers and compatible with their traditional farming systems. Such an approach not only will minimize risk but will also shift in a positive direction the influence of significant others on the individual decision-process. Thus innovations built upon indigenous knowledge will be better received and more quickly adopted by the local population than new and unfamiliar practices.

The model begins with the independent variables consisting of 1) structural and institutional factors including farmers' access to credit, the influence of significant others, 2) farmers' personal characteristics and 3) their indigenous knowledge of soil. These independent variables are expected to affect at the next stage intervening factors, including 1) farmers' knowledge of soil erosion problems, 2) attitudes toward risk and 3) their individual goals in farming. In turn, the intervening factors are expected to have a direct influence on the adoption rates of soil conservation practices.

Also, the structural and institutional factors are expected to affect farmers' personal characteristics which, in turn, will influence their indigenous knowledge of soil. In addition, farmers' knowledge of soil erosion problems is expected to affect their attitudes toward risk. Ultimately, farmers' attitudes toward risk will influence their goals in farming.

Variables Studied

Independent variables

Structural and institutional factors Structural and institutional factors will include access to credit and influence of significant others.

Access to credit is defined as the ability to obtain a loan by a farmer needing the loan.

Significant others refers to any person or group of people who have influence on the individual adoption behavior. Significant others in this study refers to two main groups (Bangura and Korsching, 1983): (1) the local group, including relatives, spouse(s), neighbors, friends, the village chief and local trader(s), and (2) the nonlocal group, including the CRPA (governmental extension services) and the Six "S" (a non-governmental organization) agents, local authorities such as the Prefect of Department (Mayor) and the High Commissioner of Province (Governor).

Both CRPA and Six "S" work for rural promotion by providing among other services assistance to farmers for implementing soil conservation practices.

Balance theory, as developed earlier, is tied to the local group of significant others.

Socioeconomic characteristics Socioeconomic characteristics will include age, education, individual wealth, exposure to information, and cosmopoliteness.

Age refers to how old the respondent was at the time of the study.

Education refers first to attendance to either regular French school or literacy training in a local language such as Moore, and second to nonfarming occupations that enhance farming skills.

Individual wealth refers to assets including the number of livestock (animals owned), the type and numbers of farm equipment, the number of means of transportation, the number of modern or square houses, (improved houses different from the traditional round hut with the top covered by either sheet-iron or wooden rods joined by mud), and the number of radio sets in the household. Also included in individual wealth are whether the farm size has expanded in the past five years, and the household size, that is, the number of people living in the house during the time of the study. In addition to the material wealth, the local culture evaluates wealth by the number of wives and children one has.

Exposure to information refers to all communication channels to which the farmer is connected.

Cosmopoliteness is perceived by Rogers (1983) as the link with outside the community as opposed to localiteness, which is a confinement within the local community.

Indigenous knowledge Indigenous knowledge concerns the nature of soil and soil conservation, specifically the local soil classification and associated characteristics and traditional farming systems used by farmers.

The basic assumption behind indigenous knowledge about soil is that farmers who are very knowledgeable about their traditional soil conservation practices are less likely to adopt newly introduced conservation techniques. Farmers' pragmatic knowledge about soil conservation and "mystic" perception of soil erosion problems (persistent soil erosion problems may be a sign that the ancestors are not happy with the way things are run in the village) are more likely to diverge from the "scientific" perception of the extension agent.

Intervening variables

Knowledge of soil erosion problems refers to farmer's knowledge of facts indicating erosion problems on his/her cultivated land, farmer's knowledge of the causes of soil erosion and the perceived importance of preventing soil erosion.

Attitudes toward risk refers to whether farmers are willing to take risks when it comes to adopting an innovation.

Goals in farming refers to farmers' personal aspirations as they engage in their farming activities.

Dependent variable

Adoption of conservation practices refers to actual use of the recommended soil conservation techniques. Since the recommended conservation practices studied include both traditional practices farmers were using before receiving any assistance from the extension services, and new conservation techniques, the dependent variable is subdivided into "utilization of traditional or old practices," and "adoption of new practices."

Hypotheses

This section develops the general and specific hypotheses derived from the conceptual model.

All the hypotheses that follow are generated and stated under the guidance of the two middle-range theories of risk and balance, within the general framework of adoption/diffusion.

For convenience the hypotheses are stated using the full dependent variable, "adoption of conservation practices" instead of the subdivided format, that is, "utilization of traditional practices" and "adoption of new practices." But when it comes to report the findings, it will be useful to make such distinction in the sense that differences in the distribution of farmers' utilization of traditional conservation practices and adoption of new conservation practices will show farmers' preference for either group of practices.

General Hypothesis 1

Structural and institutional factors including access to credit and influence of significant others (local and nonlocal groups) will affect the adoption of conservation practices.

Subhypothesis 1 Specific Hypothesis (S.H.):

S.H.1.1 The higher the ability to get a farm loan, the higher the adoption of conservation practices.

S.H.1.2 The stronger the influence of local group, the lower the adoption of conservation practices.

S.H.1.3 The stronger the influence of nonlocal group, the higher the adoption of conservation practices.

General Hypothesis 2

Farmers' socioeconomic characteristics including age, education, individual wealth, exposure to information, and cosmopoliteness will affect the adoption of conservation practices.

Subhypothesis 2

S.H.2.1 The older the farmer, the lower the adoption of conservation practices.

S.H.2.2 The higher the level of education, the higher the adoption of conservation practices.

S.H.2.3 The greater the amount of individual wealth, the higher the adoption of conservation practices.

S.H.2.4 The greater the amount of exposure to information the higher the adoption of conservation practices.

S.H.2.5 The higher the cosmopoliteness the higher the adoption of conservation practices.

General Hypothesis 3

Indigenous knowledge about the nature of soil and soil conservation will influence the adoption of conservation practices.

Subhypothesis 3

S.H.3.1 The higher the amount of indigenous knowledge of soil the lower the adoption of conservation practices.

General Hypothesis 4

Intervening factors including knowledge of soil erosion problems, attitudes toward risk, and goals in farming will influence the adoption of conservation practices.

Subhypothesis 4

S.H.4.1 The higher the amount of knowledge of soil erosion problems, the higher the adoption of conservation practices.

S.H.4.2 The higher the willingness to take risk, the higher the adoption of conservation practices.

S.H.4.3 The higher the goals in farming, the higher the adoption of conservation practices.

General Hypothesis 5

Structural and institutional factors will affect the intervening variables such as knowledge of soil erosion problems, attitudes toward risk, and goals in farming.

Subhypothesis 5

S.H.5.1 The stronger the influence of local group, the lower the knowledge of soil erosion problems.

S.H.5.2 The stronger the influence of local group, the lower the willingness to take risk.

S.H.5.3 The stronger the influence of local group, the lower the goals in farming.

S.H.5.4 The stronger the influence of nonlocal group, the higher the knowledge of soil erosion problems.

S.H.5.5 The stronger the influence of nonlocal group, the higher the willingness to take risk.

S.H.5.6 The stronger the influence of nonlocal group, the higher the goals in farming.

S.H.5.7 The higher the ability to get a farm loan, the higher the willingness to take risk.

S.H.5.8 The higher the ability to get a farm loan, the higher the goals in farming.

General Hypothesis 6

Farmers' socioeconomic characteristics will affect knowledge of soil erosion problems, attitudes toward risk and goals in farming.

Subhypothesis 6

S.H.6.1 The older the farmer the lower the knowledge of soil erosion problems.

S.H.6.2 The older the farmer the lower the willingness to take risk.

S.H.6.3 The older the farmer the lower the goals in farming.

S.H.6.4 The higher the level of education, the higher the knowledge of soil erosion problems.

S.H.6.5 The higher the level of education, the higher the willingness to take risk.

S.H.6.6 The higher the level of education, the higher the goals in farming.

S.H.6.7 The greater the amount of individual wealth, the higher the knowledge of soil erosion problems.

S.H.6.8 The greater the amount of individual wealth, the higher the willingness to take risk.

S.H.6.9 The greater the amount of individual wealth, the higher the goals in farming.

S.H.6.10 The greater the amount of exposure to information, the higher the knowledge of soil erosion problems.

S.H.6.11 The greater the amount of exposure to information, the higher the willingness to take risk.

S.H.6.12 The greater the amount of exposure to information, the higher the goals in farming.

S.H.6.13 The higher the cosmopoliteness, the higher the knowledge of soil erosion problems.

S.H.6.14 The higher the cosmopoliteness, the higher the willingness to take risk.

S.H.6.15 The higher the cosmopoliteness, the higher the goals in farming.

General Hypothesis 7

Indigenous knowledge of soil will affect knowledge of soil erosion problems, attitudes toward risk, and goals in farming.

Subhypothesis 7

S.H.7.1 The higher the amount of indigenous knowledge of soil, the lower the knowledge of soil erosion problems.

S.H.7.2 The higher the amount of indigenous knowledge of soil, the lower the willingness to take risk.

S.H.7.3 The higher the amount of indigenous knowledge of soil, the lower the goals in farming.

CHAPTER 4. METHODOLOGY

This chapter describes the research setting, the study villages, and the sample selection. It includes also a section on operationalization and data analysis. Maps showing the geographical location of the research setting are included in Appendix A.

Research Setting

Data were collected during April and May 1991 in the Yatenga Province, a Moorephone zone, by four extension agents and the principal investigator. Small-scale farmers from two selected villages composed the target population and the individual household head was the unit of analysis. Face-to-face interviews were conducted with 120 male household heads from two villages of Yatenga.

Background of the Area[1]

The Yatenga Province, meaning the "hometown of the Yaadse" (Mossi of Yatenga), is located in the Northwestern part of Burkina Faso. It is 187 Km away from Ouagadougou, the national capital. Yatenga Province has an area of 13,222 square Km, an estimated population of 580,194 people in 1991. With an average population density of over 50 inhabitants per square Km, the Yatenga is the most densely populated area of Burkina Faso. The Mossi (called Yaadse) is

[1]The background information on the Yatenga is provided by the Provincial Five-Year-Development Plan 1991-1995 document.

the principal ethnic group (80 percent of the population). Animism and Islam are the two predominant religions. With the city of Ouahigouya as the Chiefdom (capital) of Province, the Yatenga counts 19 administrative departments and 598 villages. Incomes are low, grain shortages are chronic and this leads to massive migrations of youth to the southwest cities and to neighboring countries at an annual rate of 21.3 percent (Traorè, 1991).

Subsistence farming remains the dominant occupation with millet, sorghum, maize, beans, peanuts and vegetables as the commonly grown crops in the area. The climate is the Sudano-Sahelian type characterized by violent and short rainfalls that do not allow water infiltration and increase erosion. There are two seasons: a dry season from November to April, and a rainy season from May to October. The area is dry and subject to drought and famine. The average annual rainfall is 464 mm. For instance, in 1984, 1985, 1986 and 1987, the Yatenga collected respectively 390 mm, 420 mm, 590 mm and 456 mm of rainfall. Temperatures are very high, reaching 120^0 Fahrenheit in April.

Soils are generally poor and subject to erosion. Harrison (1987) reports that desertification was only beginning in the Yatenga in 1976 and an estimated 15 percent of the total area had been lost by then. Revisited in 1985, it is believed that many villages have lost a third to a half of their cultivable land, including virtually all the plateau and upper slopes, leaving only the flatter valley bottom as land still capable of producing a crop. And now that the rain no longer soaks into the uplands, but washes off in surging sheets and silt-laden torrents, even the valley lands are threatened.

Assessing twenty years of erosion control in Burkina Faso, Marchal (1986) notes also that since 1965 the erosion for the Yatenga was from 2 to 3 tons/ha/year under cultivation, and a maximum of 3.5 tons/ha/year in the canal ways. Marchal (1983) estimates that by 1973, 11 percent of the land surface in central Yatenga had been degradated beyond use, and that amount was growing.

The Yatenga region has a history of overuse of land resources, which has decreased the arable land surface and caused severe degradation of the environment. In the Yatenga, only 30 percent of the total area is under cultivation. Due to population pressure on the land along with overgrazing, fallow periods to restore the soil's productivity have been shortened and nearly eliminated. Continuous cultivation then has led to serious soil erosion (Younger and Bonkoungou, 1989).

With highly erodible lands, the Yatenga has been one of the first provinces in Burkina Faso to benefit from the massive program of soil restoration mounted in the early 1960s by the European Development Fund (Harrison, 1987). But evaluation shows that past efforts by the local government and international organizations to improve the situation have largely met with failure, while traditional methods of adapting to soil erosion have been insufficient (Younger and Bonkoungou, 1989;

Harrison, 1987). To date, the only successful project on soil and water conservation in the area has been the Agroforestry Project (PAF) by the British non-governmental agency, Oxfam. This project promoted a traditional stone lining technique that successfully allows water retention on the fields and increases crop production substantially. But the Project managers are quick to recognize that despite some success, the problem of maintaining and improving soil fertility still persists in the Yatenga Province (Younger and Bonkoungou, 1989).

It is all these factors combined that have led to the selection of the Yatenga as the research setting. This selection has been suggested by the FEER (Water and Rural Equipment Fund) following a consultation with that institution in the Summer (June-July) of 1990. The FEER is the main institution coordinating national efforts for soil and water conservation in Burkina Faso, carried out by decentralized institutions such as the governmental extension services and non-governmental agencies.

Besides the governmental extension services called CRPA, many non-governmental agencies operate in the Yatenga Province of which the Six "S" is the most important.

CRPA

The CRPA's (Regional Centre for Agropastoral Promotion) are governmental extension services. Created in 1966 under the name of ORD (Regional Development Organizations), the CRPA (new name since

May 1988) is part of the national strategy to promote rural development. The CRPA is a decentralized institution of the Ministry of Agriculture with the task of planning and executing development projects at the regional level to meet the basic needs of populations via the improvement of the agricultural practices (Lecaillon and Morrison, 1985; Marchal, 1986). Erosion-control is among the various specific objectives assigned to the CRPA.

Six "S"

Six "S" owes its appellation to the six s-letters that start the French expression "Se Servir de la Saison Sèche en Savane et au Sahel", meaning "The use of the dry season in the savannah and the Sahel". The name Six "S" itself is a doctrine reminding farmers that they can still be productive during the dry season, which is generally perceived in the Sahelian countries as a "dead" season for farmers.

Created in 1976, Six "S" is an international association that has its headquarters in Geneva and its Executive Representation in Ouahigouya (Burkina Faso).

Six "S" promotes rural development through various activities using the local indigenous knowledge systems. Its guiding principles are expressed as follows:

> Développer sans abimer, à partir de ce que le paysan est, de ce qu'il vit, de ce qu'il sait, de ce qu'il sait faire, et de ce qu'il veut (Ouédraogo, undated, p. 8),

which can be roughly translated as "Promote without destroying, on the basis of what the farmer is, what he/she is experiencing, what he/she knows, what he/she can do and what he/she needs".

Among the various rural development activities that Six "S" has on its agenda, erosion control is among the top priorities.

This ends the background information on the Yatenga. It should be noted, however, that the entire Province was plagued by such a severe drought and famine during the data collection period, that it was placed under a national emergency food supply plan. We now turn to the two selected villages.

The Study Villages

To select the two villages, a meeting was held with engineers from both institutions, CRPA and Six "S". Ranawa and Aorèma were selected based on the following criteria:

1. Have highly erodible lands (almost any village in the Yatenga meets this criteria).

2. Be exposed to recommended soil conservation practices.

3. Have the assistance of both CRPA and Six "S".

4. Have fairly large size to provide each a study sample of 60 male household heads.

Ranawa

Ranawa is one of the 50 villages of the Department of Gourcy, located Southeast at 65 Km from Ouahigouya. A 1991 CRPA document reports for Ranawa four neighborhoods and 62 households for a population of 1,283 people.

According to the local population, the foundation of Ranawa goes back as far as over 200 years ago and owes its name to the following story: the first settler in the area notices one day big lion footprints that crossed the village. The name "Raw Naw" (transcribed later Ranawa) literally means "Footprints of a Man". "Man" here refers to the "Lion" which is the symbol of a "brave" or "tough" guy. Then, Ranawa means "Footprints of a tough guy".

A 1990 "Fichier Village" document from CRPA provides the following additional background information on Ranawa: the village has a basic health care center and a nursery. It also has a three-class primary school, four muslim mosques (one mosque in each of the four neighborhoods) and a Koranic school.

The village does not have its own local market, so people buy and sell on the market of Zougo, a neighboring village at 6 Km away.

Ranawa, like any other rural-community in Burkina Faso, has a collective help system called "sisoaaga." It consists of a full day of collective work by members of the community on their neighbors' fields. In return the beneficiary provides foods and drinks (usually the local beer called "raam" brewed from red sorghum).

Although road conditions allow access to Ranawa by automobile, there is no public transportation linking the village to Ouahigouya, the provincial capital.

Aorema

Aorema is one of the 41 villages of the Department of Ouahigouya, located Northeast at 15 Km from Ouahigouya. A 1990 CRPA preliminary research reports for Aorema nine neighborhoods and 74 households for a population of about 2,000 people. Aorema was founded as far back as 276 years ago. The story that gave the name "Aorema" to the village is the following: the first settler came from Youba a neighboring village and got established temporarily in Aorema for agricultural activities. On an enclosure (very rich in organic refuse) abandoned by nomadic shepherds, he grew so much food that he decided to stay. When called up by family members from Youba asking him where he had been, he says: "Aog Reeg ma" (transcribed later Aorema) literally meaning "The enclosure got me". That is how Aorema became the name of the village.

According to the 1990 "Rapport d'enquête" document from CRPA, Aorema has facilities such as a basic health care center, a nursery, a literacy center, a CFJA (center for the training of young farmers), a primary school, and a Koranic school.

Like Ranawa, Aorema does not have its own local market so the population attends the market of Youba, a neighboring village at 5 Km away.

A system of collective help also exists in Aorema. Unlike Ranawa, there is a public transportation service (mini-bus and pick up) connecting Aorema and Ouahigouya. The service, however, is interrupted during rainy periods.

The two study villages are small rural communities characterized by gemeinschaft like relationships (Tönnies, 1957). Subsistence farming is the principal activity with millet, sorghum, maize, beans, peanuts, vegetables as common crops. Consistent with the rest of the Province, the two villages have poor rainfall, poor soils (lateritic and sandy-clay soils for Aorema; sandy-loam and sandy-clay soils for Ranawa) and were subject to severe drought and famine during the data collection. It is from these two villages that a study sample of 120 male household heads (60 household heads per village) was drawn.

Sample Selection

The selection of the study sample was dictated by the local conditions. The general milieu prevailing on the research sites could be described as follows:

First, Burkina Faso, like many other African countries, was going through the multipartyism process. A new constitution was scheduled for vote on June 2, 1991, followed by the presidential election in early

November 1991 and the legislative election in 1992. Over 30 political parties were campaigning throughout the country. In the midst of such intense political activities, there was a great deal of uncertainty about how the research team was going to be welcomed in the villages.

The second element was the famine. Farmers in both villages almost did not harvest anything the preceding season. Under such circumstances, people could have fled the villages. The interviewers had been told that nobody would be found in the villages. Actually, people were there and the research on soil conservation received their full attention. Under such conditions and with respect to the fairly small size of the study villages (62 households for Ranawa and 74 for Aorema), not much latitude existed for random sampling. After consultation, each village was asked to meet and provide 60 male household heads for the interview, assuming the sample would be representative due to the small size of the research sites. This was done and a flexible interview schedule (observing local market days and religious holidays) was set up with the study sample and executed without any problem. Since no random sampling procedure was conducted and nearly all the male heads of households were interviewed, each study village is treated as a case, and the respondents referred to as the study population.

Operationalization

This section describes the measurement of the variables.

Structural and institutional factors

Access to credit, and role of significant others were used to measure structural and institutional factors.

Access to credit (ACCREDIT, X_1) was measured by farmer's ability to get a farm loan. The farmer earned (1) point if he/she has ever needed a farm loan, and (1) extra point if he/she can get such loan when he/she needs it.

Significant others was measured in terms of the influence of several categories of significant others on adoption behavior. The importance of influence from each category of significant others was measured by comparing local group [relatives (RELATIVE, X_2), spouse(s) (SPOUSE,X_3), neighbor(s) (NEIGHBOR, X_4), friend(s) (FRIENDS, X_5), village chief (VILCHIEF, X_6), trader(s) (TRADER,X_7)] and nonlocal group [CRPA's agent (CRPAAGT, X_8), Six "S" agent (SIXSAGT, X_9), Prefect of Department (PREFDEP, X_{10}), and High Commissioner of Province (HGCOM, X_{11})].

The influence from each category of significant others was measured on the three-point scale (1) not important, (2) somewhat important, and (3) very important.

Socioeconomic characteristics

Age, education, individual wealth, exposure to information, and cosmopoliteness were the criteria used to measure socioeconomic characteristics.

Age (AGE, X_{12}) was measured in years, the respondent's age at the time of the study.

Education was measured by farmer's ability to read and write in either French or in Moore (local language), (EDUCATE, X_{13}), and by occupation (OCCUP, X_{14}).

A score of (1) was given to farmers who responded that they can read and write in Moore, and another (1) for those who spent five years or more in "Rural School". "Rural School" was a literacy training in French for young farmers. At least five years of attendance was the minimum time period for the young farmer to acquire the basic skills in reading and writing.

Occupation that enhances farming skills was also used as a measure of education.

A three-point scale was used to measure occupation. A score of (1) for respondents who had no other occupation besides farming, a score of (2) for those who had other occupations along their regular farming activities, and a score of (3) for respondents who had an occupation that enhances farming skills.

A total of 12 occupations had been recorded: blacksmith, trader, weaver, mason, potter, tailor, craftsman, healer, miner, mechanic, manager of the village cereal bank, and Koranic teacher.

Blacksmith, craftsman, mechanic, and manager of the village cereal bank were considered occupations that enhance farming skills.

Individual wealth was measured by asset (ASSET, X_{15}), farm size (FARMSIZE, X_{16}), and household size (HHSIZE, X_{17}).

Asset was measured as the individual material wealth including the number of livestock, the type and numbers of farm equipment, the type and numbers of means of transportation, the number of modern houses, and the number of radio sets.

Based on their estimated price in $U.S., the above items have been plotted on a 12-point scale constructed as follows:

1 = ($0-$30)	5 = ($121-$150)	9 = ($241-$270)
2 = ($31-$60)	6 = ($151-$180)	10 = ($271-$300)
3 = ($61-$90)	7 = ($181-$210)	11 = ($301-$330)
4 = ($91-$120)	8 = ($211-$240)	12 = ($331- +)

The following items fall within each category: (1) sheep, goat and modern houses; (2) radio set; (3) donkey, horse, and "rayonneur" (farm equipment used to draw the sowing lines on the field): (4) bike; (5) cart, and motorcycle; (6) simple plow; (7) multipurpose plow; (12) cow.

Due to the difficulty of measuring actual farm size in rural Burkina Faso, farm size was measured as the likeliness of farm size increase (the labor force or household size has increased, or the farmer has purchased a new farm equipment) in the recent past. On a three-point scale, farmers were asked if their farm size has (1) decreased, (2) stayed the same, or (3) increased in the past five years.

Household size was measured by the number of people in the household at the time of the study. Household size was used to measure individual wealth as appropriate to the local culture.

Exposure to information was measured by the number of memberships in organizations (MEMBORG, X_{18}), participation in community meetings (COMMEETG, X_{19}), and the number of hours per week the farmer listens to the radio (LISRADIO, X_{20}).

Memberships in organizations were measured by a score of (1) for each organization in which the farmer has membership.

Participation in community meetings was measured on a three-point scale based on the frequency such as follows: (1) rarely, (2) often, and (3) every time.

For listening to the radio, a score of (1) was given to respondents for each hour that they spent listening to the radio per week.

Cosmopoliteness was measured by the number of cities visited (CITVISIT, X_{21}), the number of trips to the city (TRIPCITY, X_{22}), and the number of relatives in the city (RELACITY, X_{23}).

Respondents earned a score of (1) per city visited, per trip to the city in their lifetime, and per relative in the city respectively.

Indigenous knowledge of soil

Indigenous knowledge of soil was measured by the number of soil types and associated characteristics (poor-mediocre-good) identified by the farmer (SOILTYPE, X_{24}), the number of plant names identified by the farmer that indicate whether a soil is fertile (INDSFERT, X_{25}), and the number of traditional farming systems used by the farmer (FSYST, X_{26}).

To evaluate the responses on the associated soil characteristics, a community rating was established for each village. When about 20 people out of the 60 household heads interviewed in each village were consistent on a given soil characteristic, this became the basis for evaluating the individual farmer's response.

For soil types, respondents earned (1) point for each type of soil they identified, and (1) extra point for indicating the associated characteristic that matched the following community rating: Zeka (laterite) as "Poor"; Bissri (sand) as "Mediocre"; Bolle (clay) and Baoogo (loam) as "Good".

For soil fertility, farmers earned (1) point for each plant that they named and (1) point for indicating its association with soil fertility based on the following community rating:

Indication that soil is fertile:
1. Pitta (Securidaca longepedunculata)[2]
2. Taanga (Butyrospermum parkii)
3. Bagande (Bauhinia rufescens)

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[2] The botanical names from Maydell (1983).

4. Zaanga (Acacia albida)
5. Toeega (Adansonia digitata)
6. Mugunga (Ziziphus mauritania)

Indication that soil is not fertile:
1. Saaga (Eragrostis tremula)
2. Gaaka (Diospyros mespiliformis)
3. Kuka (Khaya senegalensis)
4. Waongo (Ficus gnaphalocarpa)
5. Kiegelga (Balanites aegyptiaca)
6. Noabga (Sclerocarya birrea)
7. Roaaga (Parkia biglobosa)
8. Suttu (Gardenia ternifolia)
9. Pusga (Tamarindus indica)
10. Wilewiiga (Guiera senegalensis)

For farming systems, a score of (1) was given for each traditional farming system used by the respondent. The following farming systems were considered:

Annual monocropping, consists of one harvest within a year.

Crop rotation, consists of alternating different crops in the same field.

Shifting cultivation, is a land rotation fallowing.

Intercropping, consists of growing two crops (usually) in alternate rows in the same field during the same season.

Mixed cropping, like intercropping, consists of growing two crops (usually) in the same field, the same season, but mixed crops are grown in the same holes throughout the field.

Alley cropping, consists of growing crops between living hedges or hedgerow trees.

Agroforestry, consists of combining crops and trees.

Zai, is an indigenous farming system proper to farmers on the research sites. It consists of digging holes throughout the field. Organic fertilizer is spread in the holes, and seeds are sown in the centre. The zai act as miniature windbreaks and concentrate water around crop roots (Harrison, 1987).

Intervening factors

Knowledge of soil erosion problems was measured by three variables derived from three open-ended questions: a) Erosion problem (EROSPROB, X_{27}), farmers were asked to give the reasons why soil erosion was a problem on their fields. A score of (1) was given for each reason provided by the respondent.

b) Causes of soil erosion (CAUSEROS, X_{28}), farmers were asked to identify the main causes of soil erosion. A score of (1) was given to respondents for each factor they identified as the cause of soil erosion.

c) Importance to prevent soil erosion (PREVEROS, X_{29}), farmers were asked why it is important to prevent soil erosion. Respondents earned (1) point for each reason they identified.

Attitudes toward risk was measured by farmers' willingness to take risk (RISKTAKE, X_{30}). On a two-point scale, respondents were asked to choose between two statement as:

A. (1) You are generally cautious about accepting new ideas.

(2) You are willing to take a few more risks than others to get ahead.

B. (1) You are reluctant to adopt new ways of doing things until you see them working for people around you,

(2) You regard yourself as the kind of person who has a strong desire to try new ideas.

Goals in farming (GOAL, X_{31}) was measured on a three-point scale. Farmers were asked if their main goal in farming was to (1) produce enough food for the family, (2) produce enough food for the family and to sell to make money for buying necessities, and (3) produce enough to increase the farm size and make a profit.

Dependent variable

Adoption was measured by the number of conservation practices each farmer was actually using. The number of conservation practices used by farmers, the adoption score, indicates the level of current use of the recommended conservation practices among the Mossi farmers, not the effectiveness of the practices themselves. A total of eight recommended conservation practices were studied. They are:

Manuring consists of bringing in the field organic fertilizer and other organic refuse generally from animals.

Microcatchment consists of terraces built with dirt throughout the field to slow water runoff. Basically three types can be found: contour microcatchment, "V" microcatchment, or half moon microcatchment.

Stone lining consists of lining stones either around or across the field with respect to the curves of the land. Stone lining slows water runoff and allows infiltration.

Mulching consists of leaving crop residues in the field, or bringing in other materials such as foliage from elsewhere.

Fallow simply consists of letting the cultivated land rest for a certain period of time before using it again.

Living hedge consists of planting shrubs or small trees around the field to keep residues on the plot.

Vegetated strips consists of preserving vegetated strips of about one meter of width following the curves of the land. The interval between two strips depend on the slope, but is usually of 10 meters. Vegetated strips can be also associated with stone lining.

Reforestation consists of planting trees on the steep slopes of the field.

Since the recommended conservation practices include four traditional conservation techniques (manuring, mulching, stone lining, fallow) and four new conservation techniques (microcatchment, living hedge, vegetated strips, reforestation), the dependent variable is subdivided into (USEOLD, X_{32}), and (ADOPTNEW, X_{33}) respectively.

For convenience, "soil conservation practices" is used in the text to refer to the above practices although some are actually soil and water conservation practices.

Data Analysis

The Statistical Package for the Social Sciences is used to analyze the data. Basic characteristics of the study population are described by percentages, ranges, means, medians and standard deviations. Pearson correlation is used to describe the relationships between (1) structural and institutional factors, (2) farmers' socioeconomic characteristics, (3) farmers' indigenous soil knowledge, (4) farmers' knowledge of soil erosion problems, attitudes toward risk, goals in farming, and adoption rates. Pearson correlation is a common statistic for measuring the strength of a relationship between two variables. The strength of a relationship, described by Pearson correlation coefficients, is the degree to which a prediction is correct. The correlation coefficients vary between -1.00 and +1.00, with 0.00 signifying no relationship, or zero percent accuracy in prediction; +1.00 meaning 100 percent accuracy in predicting a positive relationship between the two variables; and -1.00 meaning 100 percent accuracy in predicting a negative relationship between the variables (Bailey, 1987). The minus and plus signs show the direction of the relationship, not its strength. A negative coefficient means that, when one variable is higher in value, the other variable tends to be lower in value. A positive coefficient means that, when one variable is higher, the other variable also tends to be higher (Hedderson, 1987).

A stepwise multiple regression is used to evaluate both the separate effect of each independent variable controlling for the others, and the combined effects of a set of independent variables on the dependent variable.

The stepwise regression procedure drops variables from the model if their contributions are no longer significant at the 0.05 level of statistical significance. To this respect, the stepwise regression procedure is a combination of both the forward entry and backward elimination procedures.

In the forward entry procedure, variables in the block are added to the equation one at a time. At each step, the variable with the smallest probability value or attained significance level is entered if the value is smaller than the 0.05 rejection level of statistical significance.

The backward elimination procedure is the reverse of the forward entry procedure as variables in the block are considered for removal. At each step, the variable with the largest probability value is removed if this value is larger than the 0.05 rejection level of statistical significance (Agresti and Finlay, 1986).

The stepwise multiple regression is used to determine which variables specifically affect the Mossi farmers' adoption of soil conservation practices.

CHAPTER 5. FINDINGS

The main purpose of this chapter is to report the research findings suggested by the specific objectives stated in chapter one, specifically objectives one and two. These objectives are to:

1. Determine the extent of the Mossi farmers' knowledge and adoption of soil conservation practices.

   Record the Mossi farmers' indigenous soil taxonomies.

   Record the Mossi farmers' traditional soil conservation practices.

   Determine the Mossi farmers' current use of soil conservation practices.

2. Determine the factors leading to the Mossi farmers' adoption of soil conservation practices.

   Determine the extent to which structural and institutional factors affect adoption behavior among the Mossi farmers.

   Determine the relationships between farmers' socioeconomic characteristics and their adoption of recommended conservation practices.

   Determine the extent to which indigenous knowledge concerning soil influences adoption of recommended practices.

   Determine the relationships between intervening factors such as knowledge of soil erosion problems, attitudes toward risk, and goals in farming, and adoption of recommended conservation practices. Basic characteristics of the study population are presented in Appendix B.

As indicated earlier, each village is treated as a case study, and to this respect, the findings are reported for each individual case, stressing however the differences and similarities between the two rural communities, Ranawa and Aorema.

Objective 1: Extent of the Mossi Farmers' Knowledge and Adoption of Soil Conservation Practices

The Mossi farmers' indigenous soil taxonomies

To achieve this objective, farmers in each village were asked to name the types of soil that they could identify on their cultivated land. It appears that the Mossi farmers' indigenous soil classification system is based on various soil characteristics such as texture, color, consistency, geographical location, drainage or permeability, and fertility or vegetal cover.

Farmers in the village of Ranawa have identified fifteen types of soil as follows:

Based on texture:

- Zeka (lateritic soil)
- Zi-Kugri (stony soil)
- Rasempuiiga (gravelly soil)
- Biisri (sandy soil)
- Bolle (clay soil)

Based on color:

- Zi-sabille (black soil)
- Zi-miuugu (red soil)
- Zi-peele (white soil)
- Bis-miuugu (red sandy soil)
- Bis-sabille (black sandy soil)

Based on consistency:

- Zi-naare (wet loamy clay soil); "naare" describes the wet-muddy aspect of the soil that makes it easy to cut.
- Dagre (hard clay soil); very hard soil to cultivate when it is dry. "Dagre" describes the "hard" aspect of the type of soil.

Based on geographical location:

- Tanga (mountainous soil); it is an upland soil.
- Baoogo (loamy soil); is located in a low land, usually close to a river.

Based on vegetal cover:

- Kaongo (black soil with a dense growth of bushes as vegetal cover). "Kaongo" expresses the idea of a thick, dark and wooden area. Usually, the farmer cuts the thick bushes, and burns them before sowing.

Farmers in the village of Aorema have identified nearly the same types of soil on their fields. A total of thirteen types of soil were identified as follows:

Based on texture:

- Zeka (lateritic soil)
- Zi-Kugri (stony soil)
- Biisri (sandy soil)
- Bolle (clay soil)

Based on color:

- Zi-sabille (black soil)
- Zi-miuugu (red soil)
- Bis-miuugu (red sandy soil)

Based on consistency:

- Dagre (hard clay soil)
- Zi-bugri (very soft soil, easy to cut); "bugri" means tender.

Based on geographical location:

- Tanga (mountainous soil)
- Baoogo (a loamy low land soil)

Based on permeability:

- Zi-koteka (a clay soil in a low land where water stagnates).

Based on vegetal cover:

- Kaongo (black soil with a dense vegetal cover)

Comparing the two villages, it appears that Zi-koteka (a clay soil with stagnant water), and Zi-bugri (very soft soil) have not been identified by farmers in the village of Ranawa. On the other hand, Rasempuiiga (gravelly soil), Zi-peele (white soil), Bis-sabille (black sandy soil), and Zi-naare (wet loamy clay soil) have not been identified by farmers in the village of Aorema.

Overall, it can be noted that the Mossi farmers' indigenous soil classification system is based on four major types or classes of soil from which are derived certain types of soil. These four classes of soil could be identified as follows: Zi-Kugri (stony soil), Biisri (sandy soil), Bolle (clay soil), and Baoogo (loamy soil). From these four classes of soil identified by farmers in both villages, the different types of soil are derived as follows:

1. Zi-kugri (stony soil)
   - Zeka (lateritic soil)
   - Rasempuiiga (gravelly soil)
   - Tanga (mountainous soil)
   - Zi-miuugu (red soil)

2. Biisri (sandy soil)
   - Bis-miuugu (red sandy soil)
   - Bis-sabille (black sandy soil)
   - Zi-peele (white soil)

3. Bolle (clayey soil)
   - Dagre (hard clay soil)
   - Zi-sabille (black soil)
   - Zi-koteka (clay soil with stagnant water)

4. Baoogo (loamy soil)
   - Zi-bugri (very soft soil)
   - Zi-naare (wet loamy clay soil)
   - Kaongo (black soil with dense vegetal cover)

The results have shown that the different soil types identified by local farmers are based on basic characteristics such as color, texture, consistency, geographical location, drainage, and fertility. To this respect, the Mossi farmers' indigenous soil classification system is consistent with indigenous soil taxonomies elsewhere reported in the literature (Behrens, 1989; Dvorak, 1988; Dolva et al., 1988; Kerven and Sikana, 1988; McMillan, 1980; Osunade, 1988; Acres, 1984).

Also, the Mossi farmers classify soils in terms of cropping potential, that is, the usefulness of the soil or its suitability for a specific crop production. To this regard, Zi-peele (white soil) is a very poor soil found on flat land, on which no crop can be grown. Zi-miuugu (red soil) is a fair soil, located on slopes or on top of a hill, good for millet. Zi-sabille (black soil) is a very rich soil found on low land, good for sorghum. Also Zi-kugri (stony soil) is good for millet, Biisri (sandy soil) is good for peanuts, Bolle (clay soil) and Baoogo (loamy soil) are good for both the red and white sorghum.

Such a pragmatic soil classification allows the Mossi farmers to make an appropriate use of their land, by associating specific crops with specific soil types on which these crops grow particularly well.

The Mossi farmers' traditional soil conservation practices

For this objective, respondents were asked to name any soil conservation practices that they have used before receiving assistance from the extension services or any other governmental or non-governmental institutions. A total of six traditional soil conservation practices were used by farmers in Ranawa as well as in Aorema. The traditional conservation techniques are:

Manuring, consists of bringing in the field organic fertilizer and other organic refuse generally from animals.

Mulching, consists of leaving crop residues in the field, or bringing in other materials such as foliage from elsewhere.

Dead barrier, consists of implanting dead trees around the field.

Contour plowing, consists of plowing around the field following the land contour to slow water runoff.

Stone lining, consists of lining stones either around or across the field with respect to the curves of the land. Stone lining slows water runoff and allows infiltration.

Fallow, simply consists of letting the cultivated land rest for a certain period of time before using it again.

All these techniques share the same major characteristic. They are all (except fallow to some extent) "mechanical" practices, that is, built with materials such as dirt, dead trees, stones, foliage or other organic fertilizer. Although these "mechanical" practices are subject to rapid degradation and require continuous maintenance work, they constitute a vital stage toward the promotion of "biological" techniques such as living hedge, vegetated strips, and reforestation. The "mechanical" structure slows water runoff and allows infiltration, which then allows shrubs and grass to grow as sustainable hedge. The "biological" practices are part of the national long term effort to fight desertification in Burkina Faso. But poor rainfall in the country undermines the promotion of the "biological" conservation techniques on a larger scale.

The Mossi farmers' current use of soil conservation practices

Eight recommended conservation practices were studied. These conservation practices, defined earlier, are the following: manuring, microcatchment, stone lining, mulching, fallow, living hedge, vegetated strips, and reforestation. Table 1 shows the extent of the Mossi farmers' current use of conservation practices. The adoption score indicates the number of the eight recommended conservation practices that farmers have adopted, and the frequency with the corresponding percentage refers to the number of farmers who have adopted the conservation practices.

In Ranawa, overall, farmers have adopted more conservation practices than in Aorema. Fifty-one farmers (85 percent) have adopted between four and six conservation practices, and seven farmers (11.7 percent) have adopted between seven and eight conservation practices.

In Aorema, a total of 47 farmers (78.3 percent) have adopted between four and six conservation practices, while no one has adopted between seven and eight conservation practices.

Table 1. The extent of the Mossi farmers' current use of the eight recommended conservation practices

	Ranawa		Aorema	
Adoption score	Frequency	Percentage	Frequency	Percentage
2	0	0.0	3	5.0
3	2	3.3	10	16.7
4	14	23.3	18	30.0
5	15	25.0	18	30.0
6	22	36.7	11	18.3
7	6	10.0	0	0.0
8	1	1.7	0	0.0
Total	60	100.0	60	100.0

	Ranawa		Aorema	
	Range =	3-8.	Range =	2-6.
	Mean =	5.31.	Mean =	4.40.
	Median =	5.00.	Median =	4.00.
	Standard deviation =	1.09.	Standard deviation =	1.12.

As a package, the recommended conservation practices incorporate four traditional conservation practices (manuring, mulching, stone lining, fallow) and four new conservation practices (microcatchment, living hedge, vegetated strips, reforestation). The following tables present the extent of farmers' current use of either subset of conservation practices and the distribution of farmers' current use of either one.

Figures from Table 2 indicate that overall, farmers in Ranawa have used more traditional conservation practices than in Aorema. Fifty-seven farmers (95 percent) have used between three and four traditional conservation practices, and 35 respondents (58.3 percent) have used all the four traditional conservation practices.

Table 2. The extent of the Mossi farmers' current use of the four traditional conservation practices

Adoption score	Ranawa Frequency	Ranawa Percentage	Aorema Frequency	Aorema Percentage
1	0	0.0	2	3.3
2	3	5.0	20	33.3
3	22	36.7	31	51.7
4	35	58.3	7	11.7
Total	60	100.0	60	100.0
	Range	= 2-4.	Range	= 1-4.
	Mean	= 3.53.	Mean	= 2.71.
	Median	= 4.00.	Median	= 3.00.
	Standard deviation	= 0.59.	Standard deviation	= 0.71.

In Aorema, 38 respondents (63.4 percent) have used between three and four traditional conservation practices. In this group, seven farmers (11.7 percent) have used all the four traditional conservation practices.

From Table 3, it is observed that among the traditional conservation practices, manuring and stone lining were the most used conservation practices among farmers. The level of utilization of these two practices

Table 3. Distribution of the Mossi farmers' current use of the four traditional conservation practices

Traditional	Ranawa		Aorema	
Conservation Practices	Frequency	Percentage	Frequency	Percentage
Manuring	59	98.3	60	100.0
Mulching	48	80.0	14	23.3
Stone lining	59	98.3	58	96.7
Fallow	46	76.7	31	51.7

is nearly the same among farmers in the two rural communities, ranging from 96.7 to 100 percent.

Table 4 presents the extent of current use of the four new conservation practices among the Mossi farmers. It can be seen that farmers have poorly adopted the new conservation practices. Ten farmers (16.7 percent) in Ranawa as well as in Aorema have adopted between three and four of these conservation practices. Most of the farmers have adopted only between one and two new conservation practices. To this respect, there is not much difference in adoption between the two villages, 76.7 and 75 percent respectively.

Table 4. The extent of the Mossi farmers' current use of the four new conservation practices

	Ranawa		Aorema	
Adoption score	Frequency	Percentage	Frequency	Percentage
0	4	6.7	5	8.3
1	16	26.7	19	31.7
2	30	50.0	26	43.3
3	9	15.0	10	16.7
4	1	1.7	0	0.0
Total	60	100.0	60	100.0

Ranawa		Aorema	
Range	= 0-4.	Range	= 0-3.
Mean	= 1.78.	Mean	= 1.68.
Median	= 2.00.	Median	= 2.00.
Standard deviation	= 0.84.	Standard deviation	= 0.85.

Table 5 shows that among the new conservation practices, vegetated strips and reforestation were the most used conservation techniques among farmers.

Comparing traditional and new conservation practices, the findings strongly indicate that overall, the Mossi farmers prefer their traditional conservation practices over the newly introduced techniques. This comparison shows that small-scale producers are more likely to adopt techniques familiar to them and virtually less risky.

Table 5. Distribution of the Mossi farmers' current use of the four new conservation practices

New Conservation Practices	Ranawa		Aorema	
	Frequency	Percentage	Frequency	Percentage
Microcatchment	2	3.3	1	1.7
Living hedge	10	16.7	13	21.7
Vegetated strips	44	73.3	49	81.7
Reforestation	51	85.0	38	63.3

Objective 2: Factors Leading to the Mossi Farmers' Adoption of Soil Conservation Practices

Extent of effect of structural and institutional factors on adoption behavior among the Mossi farmers

General Hypothesis 1: Structural and institutional factors including access to credit, and influence of significant others will affect adoption of conservation practices.

Considering each element of the significant others, a total of 22 specific hypotheses (S.H.1.1; S.H.1.2; S.H.1.3) were tested in each village to determine the extent to which the structural and institutional factors affect adoption behavior among the Mossi farmers. The results are reported for both using old and adopting new practices. The overall Pearson correlations among the variables are included in Appendix C.

Tables 6 and 7 present the correlations between the structural and institutional factors, and adoption of the recommended conservation practices. Two of the 22 hypotheses (ACCREDIT, related to both USEOLD and ADOPTNEW) were supported for Ranawa, while four hypotheses (PREFDEP, HGCOM, ACCREDIT, NEIGHBOR) were supported for Aorema. NEIGHBOR was statistically related to ADOPTNEW in Ranawa at the 0.05 level of significance, but not in the hypothesized direction. Also, SIXSAGT was related to ADOPTNEW for both rural communities, but not in the expected direction (Table 7).

Table 6. Correlations between the structural and institutional factors and USEOLD[a]

Specific Hypothesis	Variable[a]	Ranawa Correlation Coefficient	Ranawa Test Result	Aorema Correlation Coefficient	Aorema Test Result
S.H.1.1	ACCREDIT	.35*	Supported	.20	Not supported
S.H.1.2	RELATIVE	-.06	Not supported	.18	Not supported
	SPOUSE	.06	Not supported	.15	Not supported
	NEIGHBOR	.02	Not supported	.09	Not supported
	FRIENDS	.09	Not supported	-.06	Not supported
	VILCHIEF	.09	Not supported	.18	Not supported
	TRADER	-.06	Not supported	.08	Not supported
S.H.1.3	CRPAAGT	.01	Not supported	.06	Not supported
	SIXSAGT	-.12	Not supported	.07	Not supported
	PREFDEP	.17	Not supported	.33*	Supported
	HGCOM	.08	Not supported	.22*	Supported.

[a]USEOLD = utilization of the traditional practices; ACCREDIT = access to credit; VILCHIEF = village chief; CRPAAGT = CRPA agent; SIXSAGT = Six "S" agent; PREFDEP = Prefect of Department; HGCOM = High Commissioner of Province.

*Significant at 0.05.

To determine which variables specifically affect farmers' adoption behavior, a stepwise multiple regression was performed. In Table 8 presenting the regression of USEOLD on the structural and institutional factors, the Adjusted R^2 or coefficient of multiple determination measures the proportion of the total variation in the dependent variable that is explained by the predictive power of the independent variables. The Adjusted R^2 is corrected for the number of cases, and to this respect, is a better estimate of the population value.

Table 7. Correlations between the structural and institutional factors and ADOPTNEW[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.1.1	ACCREDIT	.38*	Supported	.45*	Supported
S.H.1.2	RELATIVE	.09	Not supported	-.07	Not supported
	SPOUSE	.08	Not supported	-.05	Not supported
	NEIGHBOR	.23*	Not supported	-.32*	Supported
	FRIENDS	-.05	Not supported	-.17	Not supported
	VILCHIEF	-.10	Not supported	-.19	Not supported
	TRADER	-.03	Not supported	-.11	Not supported
S.H.1.3	CRPAAGT	.17	Not supported	.04	Not supported
	SIXSAGT	-.26*	Not supported	-.35*	Not supported
	PREFDEP	.04	Not supported	-.09	Not supported
	HGCOM	-.14	Not supported	-.19	Not supported

[a]ADOPTNEW = adoption of the new practices; ACCREDIT = access to credit; VILCHIEF = village chief; CRPAAGT = CRPA agent; SIXSAGT = Six "S" agent; PREFDEP = Prefect of Department; HGCOM = High Commissioner of Province.

*Significant at 0.05.

Table 8. Regression of USEOLD on the structural and institutional factors

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
ACCREDIT	.11	.11	.35	8.33
Aorema				
PREFDEP	.09	.09	.33	7.52

The R^2 change measures the individual effect of each independent variable on the dependent variable, controlling for the other independent variables.

The beta or standardized regression coefficient measures the number of standard deviations by which the dependent variable changes for one standard deviation change in the independent variable. The larger the absolute value of beta, the greater is the effect on the dependent variable that is produced by a standard deviation change in the independent variable controlling for the other variables.

The observed F-values indicate whether the test is statistically significant. Relatively large values of the F test statistic represent strong evidence against the null hypothesis, the hypothesis actually tested. The results from Tables 8 and 9 show that access to credit and support from local authorities and institutions were important to the Mossi farmers.

In Table 8, ACCREDIT explains 11 percent of the variation in USEOLD for Ranawa, and PREFDEP accounts for nine percent of the variation in Aorema.

Table 9. Regression of ADOPTNEW on the structural and institutional factors

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
ACCREDIT	.13	.13	.38	10.14
SIXSAGT	.18	.05	-.26	7.90
CRPAAGT	.23	.05	.24	7.16
Aorema				
ACCREDIT	.19	.19	.45	15.53
SIXSAGT	.26	.07	-.29	11.83

Figures from Table 9 indicate that ACCREDIT once again has the most effect on the Mossi farmers' adoption behavior. This variable accounts for 13 percent, and 19 percent of the variation in ADOPTNEW for Ranawa, and Aorema respectively. ACCREDIT has a stronger effect on ADOPTNEW among farmers in Aorema (19 percent) than in Ranawa (13 percent).

The second variable to enter the equation was SIXSAGT, explaining five percent of the variation for Ranawa, and seven percent for Aorema. Combined, ACCREDIT and SIXSAGT explain 18 percent of the variation for Ranawa where CRPAAGT accounts for an additional five percent of the variation, and 26 percent for Aorema.

The above results not only point out how important access to credit was to farmers, but also indicate that the institutional support more than the influence from other members of the local community was most determinant in the Mossi farmers' conservation behavior. Expressed in terms of the important role of significant others, the nonlocal group over the local group had the stronger effect on the adoption rates of soil conservation practices.

To this respect, balance theory, tied to the prominent role of the local group in influencing adoption behavior within a gemeinschaft-like community (Tönnies, 1957) is not supported by the findings. The influence of the local group may still prevail in rural Burkina, but is fading to the advantage of the nonlocal group or external institutions and local authority, as the rural communities are increasingly dependent on extracommunity services.

It is observed that SIXSAGT entered the regression equation with negative standardized regression coefficients (beta) on the adoption of new conservation practices for Ranawa (-.26) and Aorema (-.29) (Table 9). These results are consistent with the indigenous legacy advocated by this non-governmental agency.

To some extent, the overall correlation coefficients from Tables 6 and 7 describe similar patterns. The local and nonlocal groups tend to exhibit positive correlation coefficients for the traditional conservation practices, and negative or weak coefficients for the new practices. This is an indication that both the Mossi farmers and the institutions working with them have a positive perception of the traditional conservation practices. The findings are consistent with the recent trend in Burkina Faso toward indigenous knowledge systems.

It is interesting to note however that CRPAAGT (governmental extension services) exhibit positive correlations coefficients for both the traditional and new conservation practices. The coefficients tend to be higher for the new practices than they are for the traditional ones. It is reasonable to think that CRPAAGT, which has been instrumental in the use of the top-down approach in the diffusion of agricultural innovations in Burkina Faso for a quarter of a century, is now divided between its past policies and the general mood today that sustainable rural development is built upon local indigenous knowledge systems.

Relationships between farmers' socioeconomic characteristics and their adoption of recommended conservation practices

General Hypothesis 2: Farmers' socioeconomic characteristics will affect adoption of conservation practices.

To examine the relationships between farmers' socioeconomic characteristics and their adoption of recommended conservation practices, a total of 24 specific hypotheses (synthesized in S.H.2.1 through S.H.2.5) were tested in each village.

Three hypotheses (MEMBORG, HHSIZE, COMMEETG) were supported for Ranawa compare to five hypotheses (FARMSIZE, related to both USEOLD and ADOPTNEW, MEMBORG, COMMEETG, LISRADIO) for Aorema, as shown in Tables 10 and 11.

The regression analysis (Tables 12 and 13) indicates that exposure to information was important in affecting the Mossi farmers' adoption behavior. MEMBORG and COMMEETG were related to USEOLD and ADOPTNEW respectively, for the two villages.

Considering USEOLD in Table 12, MEMBORG explains six percent of the variation for Ranawa, and entered the equation after FARMSIZE (18 percent), explaining an additional five percent of the variation for Aorema.

Table 10. Correlations between farmers' socioeconomic characteristics and USEOLD[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.2.1	AGE	.03	Not supported	-.08	Not supported
S.H.2.2	EDUCATE	.15	Not supported	.12	Not supported
	OCCUP	-.12	Not supported	.07	Not supported
S.H.2.3	ASSET	.16	Not supported	.00	Not supported
	FARMSIZE	.05	Not supported	.44*	Supported
	HHSIZE	.01	Not supported	.13	Not supported
S.H.2.4	MEMBORG	.27*	Supported	.26*	Supported
	COMMEETG	.08	Not supported	.13	Not supported
	LISRADIO	-.08	Not supported	.15	Not supported
S.H.2.5	CITVISIT	-.10	Not supported	.02	Not supported
	TRIPCITY	.03	Not supported	-.11	Not supported
	RELACITY	-.14	Not supported	.03	Not supported

[a]USEOLD = utilization of the traditional practices; OCCUP = occupation; HHSIZE = household size; MEMBORG = memberships in organizations; COMMEETG = participation in community meetings; LISRADIO = listening to the radio; CITVISIT = cities visited; TRIPCITY = trips to the city; RELACITY = relatives in the city.

*Significant at 0.05.

Table 11. Correlations between farmers' socioeconomic characteristics and ADOPTNEW[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.2.1	AGE	.05	Not supported	.01	Not supported
S.H.2.2	EDUCATE	-.08	Not supported	.11	Not supported
	OCCUP	-.10	Not supported	.04	Not supported
S.H.2.3	ASSET	.21	Not supported	.11	Not supported
	FARMSIZE	.01	Not supported	.21*	Supported
	HHSIZE	.22*	Supported	.13	Not supported
S.H.2.4	MEMBORG	.08	Not supported	.00	Not supported
	COMMEETG	.41*	Supported	.29*	Supported
	LISRADIO	-.05	Not supported	.22*	Supported
S.H.2.5	CITVISIT	.03	Not supported	.04	Not supported
	TRIPCITY	.08	Not supported	-.04	Not supported
	RELACITY	-.10	Not supported	.03	Not supported

[a]ADOPTNEW = adoption of the new practices; OCCUP = occupation; HHSIZE = household size; MEMBORG = memberships in organizations; COMMEETG = participation in community meetings; LISRADIO = listening to the radio; CITVISIT = cities visited; TRIPCITY = trips to the city; RELACITY = relatives in the city.

*Significant at 0.05.

Table 12. Regression of USEOLD on farmers' socioeconomic characteristics

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
MEMBORG	.06	.06	.27	4.87
Aorema				
FARMSIZE	.18	.18	.44	14.60
MEMBORG	.23	.05	.23	9.84

Table 13. Regression of ADOPTNEW on farmers' socioeconomic characteristics

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
COMMEETG	.15	.15	.41	12.12
Aorema				
COMMEETG	.07	.07	.29	5.71

Related to ADOPTNEW (Table 13), COMMEETG accounts for 15 percent of the variation for Ranawa and about half that amount (7 percent) for Aorema. Overall, exposure to information had a stronger effect on adoption behavior among farmers in Ranawa than in Aorema.

The overall results from both the correlations and regression tables lend little support to the classical adoption/diffusion model in the sense that a limited number of farmers' personal characteristics correlate with adoption.

EDUCATE was not statistically significant in neither one of the two villages. Due to high illiteracy rates in rural Burkina, the target population was likely homogenous to this respect, so education was less likely to have a determinant effect on farmers' adoption behavior. Also, cosmopoliteness (CITVISIT, TRIPCITY, RELACITY) did not appear to have any effect on the Mossi farmers' conservation behavior.

Extent of effect of indigenous knowledge about soil on adoption of recommended conservation practices

General Hypothesis 3: Indigenous knowledge about soil will influence adoption of conservation practices.

To determine the extent to which indigenous knowledge of soil influences adoption of recommended conversation practices, six specific hypotheses (S.H.3.1) incorporating the variables, SOILTYPE, INDSFERT and FSYST were tested in each rural community.

Both groups of conservation practices are considered in Tables 14 and 15. None of the hypotheses was supported. For Aorema, FSYST and SOILTYPE were statistically related to USEOLD and ADOPTNEW respectively, but not in the expected negative direction.

Table 14. Correlations between indigenous knowledge of soil and USEOLD[a]

Specific Hypothesis	Variable[a]	Ranawa Correlation Coefficient	Ranawa Test Result	Aorema Correlation Coefficient	Aorema Test Result
S.H.3.1	SOILTYPE	.08	Not supported	.06	Not supported
	INDSFERT	-.03	Not supported	-.05	Not supported
	FSYST	.04	Not supported	.23*	Not supported

[a]USEOLD = utilization of the traditional conservation practices; INDSFERT = indication of soil fertility; FSYST = farming systems.
*Significant at 0.05.

In terms of the regression analysis, SOILTYPE accounts for 16 percent of the variation in ADOPTNEW for Aorema (Table 16). None of the variables entered the equation when indigenous knowledge was regressed on USEOLD.

Table 15. Correlations between indigenous knowledge of soil and ADOPTNEW[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.3.1	SOILTYPE	.07	Not supported	.42*	Not supported
	INDSFERT	.01	Not supported	.02	Not supported
	FSYST	-.15	Not supported	-.08	Not supported

[a]ADOPTNEW = adoption of the new practices; INDSFERT = indication of soil fertility; FSYST = farming systems.

*Significant at 0.05.

Table 16. Regression of ADOPTNEW on indigenous knowledge of soil

Variable	Adjusted R^2	R^2 Change	Beta	F
Aorema				
SOILTYPE	.16	.16	.42	12.98

The overall results do not show support for indigenous knowledge of soil as a determinant factor in the Mossi farmers' conservation behavior.

This may be due to inadequate operationalization of the concept of indigenous knowledge.

It is worth noting that most of the publications in the indigenous knowledge literature are from cultural and economic anthropologists, who use ethnomethodology as a method of investigation. Combining observational and experimental methods, ethnomethodology records changes as they occur over time, and to this respect, is an appropriate method for longitudinal studies, interested in process rather than product (Bailey, 1987).

Such an approach is useful in capturing indigenous knowledge which, by definition, is a process, an heritage derived from the everyday life experience of the farmer over time. A measurement problem may then arise when the traditional survey research, an appropriate method for cross-sectional studies, is used to grasp such a process.

Relationships between intervening factors such as knowledge of soil erosion problems, attitudes toward risk, and goals in farming, and adoption of recommended conservation practices

General Hypothesis 4: Intervening factors including knowledge of soil erosion problems, attitudes toward risk, and goals in farming will influence adoption of conservation practices.

A total of 10 specific hypotheses (S.H.4.1 through S.H.4.3) were derived to determine the relationships between the intervening factors and adoption of recommended conservation practices in each one of the two villages.

The correlations between the intervening variables and adoption of soil conservation practices are reported in Tables 17 and 18. Figures from these tables show that three of the 10 hypotheses (GOAL, related

Table 17. Correlations between the intervening factors and USEOLD[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.4.1	EROSPROB	-.10	Not supported	.31*	Supported
	CAUSEROS	-.09	Not supported	.15	Not supported
	PREVEROS	-.04	Not supported	-.22*	Not supported
S.H.4.2	RISKTAKE	-.11	Not supported	.07	Not supported
S.H.4.3	GOAL	.28*	Supported	.08	Not supported

[a]USEOLD = utilization of the traditional practices; EROSPROB = erosion problems; CAUSEROS = causes of soil erosion; PREVEROS = importance of preventing soil erosion; RISKTAKE = farmers' willingness to take risks; GOAL = goals in farming.

*Significant at 0.05.

Table 18. Correlations between the intervening factors and ADOPTNEW[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.4.1	EROSPROB	-.03	Not supported	.10	Not supported
	CAUSEROS	-.18	Not supported	-.11	Not supported
	PREVEROS	-.24*	Not supported	.12	Not supported
S.H.4.2	RISKTAKE	.26*	Supported	.25*	Supported
S.H.4.3	GOAL	.24*	Supported	.22*	Supported

[a]ADOPTNEW = adoption of the new practices; EROSPROB = erosion problems; CAUSEROS = causes of soil erosion; PREVEROS = importance of preventing soil erosion; RISKTAKE = farmers' willingness to take risks; GOAL = goals in farming.

*Significant at 0.05.

to both USEOLD and ADOPTNEW, RISKTAKE) were supported for Ranawa as well as for Aorema (EROSPROB, RISKTAKE, GOAL). PREVEROS was statistically related to USEOLD in Aorema and to ADOPTNEW in Ranawa, but they exhibit negative correlation coefficients that did not describe the expected direction.

In Tables 19 and 20 the regression analysis is presented. GOAL explains six percent of the variation in USEOLD for Ranawa, while EROSPROB accounts for eight percent of the variation for Aorema

Table 19. Regression of USEOLD on the intervening factors

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
GOAL	.06	.06	.28	5.29
Aorema				
EROSPROB	.08	.08	.31	6.39

Table 20. Regression of ADOPTNEW on the intervening factors

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
RISKTAKE	.05	.05	.26	4.50
Aorema				
RISKTAKE	.04	.04	.25	4.04

(Table 19). RISKTAKE explains about the same amount of the variation in ADOPTNEW for Ranawa (5 percent), and Aorema (4 percent), as shown in Table 20.

The results indicate that overall, the intervening factors had little effect on the Mossi farmers' adoption behavior.

As related to risk theory, the findings imply that the Mossi farmers were willing to take risks to get ahead. But RISKTAKE accounts for only five percent and four percent of the variation in ADOPTNEW for Ranawa and Aorema respectively. These figures do not lend a strong support to the conclusion that the Mossi farmers are not risk averse.

In fact, risk was minimized for the following reasons: first, CRPA and Six "S" provide assistance to farmers for soil conservation. Then, no financial cost was involved in the adoption of the eight recommended conservation practices. In addition, most of the conservation techniques were familiar to farmers.

The findings reported so far have concerned the effect of the independent variables and the intervening factors on adoption of recommended conservation practices.

Considered now is the effect of the independent variables on the intervening factors tested by the general hypotheses 5, 6 and 7.

Effect of the Structural and Institutional Factors on the Intervening Variables

General Hypothesis 5: Structural and institutional factors will affect the intervening variables including knowledge of soil erosion problems, attitudes toward risk, and goals in farming.

A total of 52 specific hypotheses (S.H.5.1 through S.H.5.8) were derived to test the effect of the structural and institutional factors on the intervening variables in each village.

The significant others (local and nonlocal groups) had a moderate effect on farmers' specific knowledge of soil erosion problems (EROSPROB, CAUSEROS, PREVEROS).

Tables 21, 22 and 23 show that CRPAAGT (related to both EROSPROB and PREVEROS), PREFDEP, RELATIVE, and SPOUSE were the five hypotheses supported for Aorema. None of the hypotheses was supported for Ranawa, and no variable was found to be statistically related to CAUSEROS (Table 22).

In addition, PREFDEP and HGCOM (related to PREVEROS) were statistically significant in Aorema, but not in the direction hypothesized by balance theory (Table 23).

The regression analysis shows that the local over the nonlocal group had more effect on farmers' knowledge of soil erosion problems. While CRPAAGT (nonlocal group) was the only variable to enter the equation explaining eight percent of the variation in EROSPROB for

Table 21. Correlations between the structural and institutional factors and EROSPROB[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.5.1	RELATIVE	.16	Not supported	.13	Not supported
	SPOUSE	.15	Not supported	.13	Not supported
	NEIGHBOR	.15	Not supported	.19	Not supported
	FRIENDS	-.08	Not supported	.18	Not supported
	VILCHIEF	.12	Not supported	.14	Not supported
	TRADER	-.15	Not supported	.09	Not supported
S.H.5.4	CRPAAGT	-.03	Not supported	.31*	Supported
	SIXSAGT	-.08	Not supported	.16	Not supported
	PREFDEP	-.01	Not supported	.23*	Supported
	HGCOM	-.02	Not supported	.18	Not supported

[a]EROSPROB = erosion problems; VILCHIEF = village chief; CRPAAGT = CRPA agent; SIXSAGT = Six "S" agent; PREFDEP = Prefect of Department; HGCOM = High Commissioner of Province.

*Significant at 0.05.

Table 22. Correlations between the structural and institutional factors and CAUSEROS[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.5.1	RELATIVE	-.11	Not supported	-.03	Not supported
	SPOUSE	.01	Not supported	-.07	Not supported
	NEIGHBOR	-.04	Not supported	.00	Not supported
	FRIENDS	-.15	Not supported	-.14	Not supported
	VILCHIEF	-.03	Not supported	.08	Not supported
	TRADER	.15	Not supported	.01	Not supported
S.H.5.4	CRPAAGT	.15	Not supported	-.07	Not supported
	SIXSAGT	.19	Not supported	-.01	Not supported
	PREFDEP	-.18	Not supported	.03	Not supported
	HGCOM	.05	Not supported	.05	Not supported

[a]CAUSEROS = causes of soil erosion; VILCHIEF = village chief; CRPAAGT = CRPA agent; SIXSAGT = Six "S" agent; PREFDEP = Prefect of Department; HGCOM = High Commissioner of Province.

Aorema (Table 24), RELATIVE, FRIENDS and NEIGHBOR (local group) entered the regression equation in that order accounting for a total of 25 percent of the variation in PREVEROS for the same village (Table 25). It is observed from Table 25 that RELATIVE and

Table 23. Correlations between the structural and institutional factors and PREVEROS[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.5.1	RELATIVE	-.19	Not supported	-.35*	Supported
	SPOUSE	-.19	Not supported	-.31*	Supported
	NEIGHBOR	-.16	Not supported	-.10	Not supported
	FRIENDS	.15	Not supported	.21	Not supported
	VILCHIEF	-.10	Not supported	-.18	Not supported
	TRADER	.16	Not supported	.14	Not supported
S.H.5.4	CRPAAGT	-.07	Not supported	.24*	Supported
	SIXSAGT	-.08	Not supported	-.21	Not supported
	PREFDEP	-.21	Not supported	-.24*	Not supported
	HGCOM	-.17	Not supported	-.26*	Not supported

[a]PREVEROS = importance of preventing soil erosion; VILCHIEF = village chief; CRPAAGT = CRPA agent; SIXSAGT = Six "S" agent; PREFDEP = Prefect of Department; HGCOM = High Commissioner of Province.

*Significant at 0.05.

NEIGHBOR had a negative effect on PREVEROS. Both variables exhibit negative beta values.

As for the effect of the structural and institutional factors on farmers' attitudes toward risk and goals in farming, three hypotheses

Table 24. Regression of EROSPROB on the structural and institutional factors

Variable	Adjusted R^2	R^2 Change	Beta	F
Aorema				
CRPAAGT	.08	.08	.31	6.23

Table 25. Regression of PREVEROS on the structural and institutional factors

Variable	Adjusted R^2	R^2 Change	Beta	F
Aorema				
RELATIVE	.11	.11	-.35	8.29
FRIENDS	.19	.08	.32	8.14
NEIGHBOR	.25	.06	-.25	7.42

(ACCREDIT, related to both RISKTAKE and GOAL, and CRPAAGT) were supported for Ranawa, while four hypotheses (ACCREDIT, related to both RISKTAKE and GOAL, RELATIVE, and SPOUSE) were supported for Aorema (Tables 26 and 27). TRADER was statistically

Table 26. Correlations between the structural and institutional factors and RISKTAKE[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.5.7	ACCREDIT	.29*	Supported	.25*	Supported
S.H.5.2	RELATIVE	.10	Not supported	-.23*	Supported
	SPOUSE	.07	Not supported	-.28*	Supported
	NEIGHBOR	.19	Not supported	-.09	Not supported
	FRIENDS	.00	Not supported	-.01	Not supported
	VILCHIEF	-.04	Not supported	-.12	Not supported
	TRADER	-.11	Not supported	.22*	Not supported
S.H.5.5	CRPAAGT	.03	Not supported	.10	Not supported
	SIXSAGT	-.04	Not supported	-.10	Not supported
	PREFDEP	-.04	Not supported	-.07	Not supported
	HGCOM	-.01	Not supported	-.01	Not supported

[a]RISKTAKE = farmers' willingness to take risks; ACCREDIT = access to credit; VILCHIEF = village chief; CRPAAGT = CRPA agent; SIXSAGT = Six "S" agent; PREFDEP = Prefect of Department; HGCOM = High Commissioner of Province.

*Significant at 0.05.

related to RISKTAKE in Aorema, but not in the expected direction (Table 26).

Based on the results derived from the stepwise regression in Tables 28 and 29, farmers' willingness to take risk and their aspirations in

Table 27. Correlations between the structural and institutional factors and GOAL[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.5.8	ACCREDIT	.26*	Supported	.28*	Supported
S.H.5.3	RELATIVE	.05	Not supported	-.05	Not supported
	SPOUSE	.01	Not supported	-.11	Not supported
	NEIGHBOR	.10	Not supported	-.20	Not supported
	FRIENDS	-.02	Not supported	-.07	Not supported
	VILCHIEF	-.03	Not supported	-.09	Not supported
	TRADER	.08	Not supported	-.17	Not supported
S.H.5.6	CRPAAGT	.29*	Supported	.15	Not supported
	SIXSAGT	-.07	Not supported	.07	Not supported
	PREFDEP	.01	Not supported	.04	Not supported
	HGCOM	-.14	Not supported	-.18	Not supported

[a]GOAL = goals in farming; ACCREDIT = access to credit; VILCHIEF = village chief; CRPAAGT = CRPA agent; SIXSAGT = Six "S" agent; PREFDEP = Prefect of Department; HGCOM = High Commissioner of Province.

*Significant at 0.05.

farming were mostly affected by ACCREDIT. ACCREDIT explains about the same amount of the variation in RISKTAKE for Ranawa (7 percent), and Aorema (5 percent) where SPOUSE, the first variable to enter the equation, accounts for an additional six percent of the

Table 28. Regression of RISKTAKE on the structural and institutional factors

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
ACCREDIT	.07	.07	.29	5.15
Aorema				
SPOUSE	.06	.06	-.28	5.01
ACCREDIT	.11	.05	.25	4.79

Table 29. Regression of GOAL on the structural and institutional factors

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
CRPAAGT	.07	.07	.29	5.41
ACCREDIT	.14	.07	.28	5.61
Aorema				
ACCREDIT	.06	.06	.28	4.86

variation (Table 28). As predicted by balance theory, SPOUSE was statistically related to RISKTAKE with a negative beta value (-.28), describing a risk averse attitude.

In Table 29 also, ACCREDIT accounts for about the same amount of the variation in GOAL for Ranawa (7 percent) and Aorema (6 percent). Moreover, CRPAAGT was the first variable to enter the equation for Ranawa explaining an additional seven percent of the variation. Combined, ACCREDIT and CRPAAGT account for 14 percent of the variation for Ranawa.

Effect of Farmers' Socioeconomic Characteristics on the Intervening Variables

General Hypothesis 6: Farmers' socioeconomic characteristics will affect the intervening variables.

A total of 60 specific hypotheses (S.H.6.1 through S.H.6.15) were derived to test the relationships between farmers' socioeconomic characteristics and the intervening variables in each one of the two rural communities.

It can be seen from Tables 30, 31 and 32 showing the correlations between farmers' socioeconomic characteristics and their knowledge of soil erosion problems that two hypotheses (AGE, and OCCUP) were supported for Ranawa, and three hypotheses (MEMBORG and COMMEETG related to both EROSPROB and PREVEROS) were

Table 30. Correlations between farmers' socioeconomic characteristics and EROSPROB[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.6.1	AGE	-.23*	Supported	-.04	Not supported
S.H.6.4	EDUCATE	.06	Not supported	.04	Not supported
	OCCUP	-.15	Not supported	.13	Not supported
S.H.6.7	ASSET	-.22*	Not supported	-.11	Not supported
	FARMSIZE	.17	Not supported	.20	Not supported
	HHSIZE	-.06	Not supported	-.02	Not supported
S.H.6.10	MEMBORG	.07	Not supported	.40*	Supported
	COMMEETG	-.10	Not supported	.52*	Supported
	LISRADIO	.04	Not supported	.05	Not supported
S.H.6.13	CITVISIT	-.17	Not supported	-.11	Not supported
	TRIPCITY	-.03	Not supported	-.21	Not supported
	RELACITY	.07	Not supported	.04	Not supported

[a]EROSPROB = erosion problems; OCCUP = occupation; HHSIZE = household size; MEMBORG = memberships in organizations; COMMEETG = participation in community meetings; LISRADIO = listening to the radio; CITVISIT = cities visited; TRIPCITY = trips to the city; RELACITY = relatives in the city.

*Significant at 0.05.

Table 31. Correlations between farmers' socioeconomic characteristics and CAUSEROS[a]

Specific Hypothesis	Variable[a]	Ranawa Correlation Coefficient	Ranawa Test Result	Aorema Correlation Coefficient	Aorema Test Result
S.H.6.1	AGE	-.15	Not supported	.08	Not supported
S.H.6.4	EDUCATE	.12	Not supported	-.14	Not supported
	OCCUP	.29*	Supported	.07	Not supported
S.H.6.7	ASSET	-.17	Not supported	-.19	Not supported
	FARMSIZE	-.05	Not supported	.17	Not supported
	HHSIZE	-.10	Not supported	-.23*	Not supported
S.H.6.10	MEMBORG	-.11	Not supported	-.07	Not supported
	COMMEETG	.17	Not supported	-.06	Not supported
	LISRADIO	.15	Not supported	.01	Not supported
S.H.6.13	CITVISIT	-.18	Not supported	.02	Not supported
	TRIPCITY	-.24*	Not supported	.06	Not supported
	RELACITY	.01	Not supported	.00	Not supported

[a]CAUSEROS = causes of soil erosion; OCCUP = occupation; HHSIZE = household size; MEMBORG = memberships in organizations; COMMEETG = participation in community meetings; LISRADIO = listening to the radio; CITVISIT = cities visited; TRIPCITY = trips to the city; RELACITY = relatives in the city.

*Significant at 0.05.

Table 32. Correlations between farmers' socioeconomic characteristics and PREVEROS[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.6.1	AGE	-.16	Not supported	.01	Not supported
S.H.6.4	EDUCATE	.00	Not supported	-.19	Not supported
	OCCUP	.03	Not supported	-.05	Not supported
S.H.6.7	ASSET	-.09	Not supported	.07	Not supported
	FARMSIZE	-.30*	Not supported	.02	Not supported
	HHSIZE	-.22*	Not supported	-.09	Not supported
S.H.6.10	MEMBORG	-.06	Not supported	-.20	Not supported
	COMMEETG	-.09	Not supported	.26*	Supported
	LISRADIO	.11	Not supported	.02	Not supported
S.H.6.13	CITVISIT	.12	Not supported	.10	Not supported
	TRIPCITY	.09	Not supported	.05	Not supported
	RELACITY	-.06	Not supported	-.01	Not supported

[a]PREVEROS = importance of preventing soil erosion; OCCUP = occupation; HHSIZE = household size; MEMBORG = memberships in organizations; COMMEETG = participation in community meetings; LISRADIO = listening to the radio; CITVISIT = cities visited; TRIPCITY = trips to the city; RELACITY = relatives in the city.

*Significant at 0.05.

supported for Aorema.

The variables, ASSET, HHSIZE, FARMSIZE and TRIPCITY were statistically significant, but not in the expected positive direction.

As for AGE, the correlation coefficients from Tables 30, 31, and 32 indicate that younger farmers tend to learn more about soil erosion problems than older farmers. The fact of the matter is that younger farmers are more likely to participate in meetings organized by the extension services and other non-governmental agencies than their older counterparts. This is supported by the negative relationships between AGE and COMMEETG (-.10 and -.17 for Ranawa and Aorema respectively) in Appendix C, presenting the overall Pearson correlations among the variables.

From the regression analysis in Table 33, COMMEETG and MEMBORG entered the equation in that order, explaining all together 35 percent of the variation in EROSPROB for Aorema. From Table 34, it is observed that only OCCUP accounts for seven percent of the variation in CAUSEROS for Ranawa.

Figures from Table 35 show that both FARMSIZE and HHSIZE with negative beta values explain 13 percent of the variation in PREVEROS for Ranawa, while COMMEETG and EDUCATE account for an equal amount of five percent each of the variation in Aorema. EDUCATE did not have a positive effect (beta=-.25) on farmers' perception of the importance of preventing soil erosion (PREVEROS).

Table 33. Regression of EROSPROB on farmers' socioeconomic characteristics

Variable	Adjusted R^2	R^2 Change	Beta	F
Aorema				
COMMEETG	.26	.26	.52	21.55
MEMBORG	.35	.09	.32	16.86

Table 34. Regression of CAUSEROS on farmers' socioeconomic characteristics

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
OCCUP	.07	.07	.29	5.51

Table 35. Regression of PREVEROS on farmers' socioeconomic characteristics

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
FARMSIZE	.08	.08	-.30	5.88
HHSIZE	.13	.05	-.26	5.32
Aorema				
COMMEETG	.05	.05	.26	4.23
EDUCATE	.10	.05	-.25	4.25

With respect to farmers' attitudes toward risk and their aspirations in farming, 24 specific hypotheses were stated. Three hypotheses (ASSET and COMMEETG related to both RISKTAKE and GOAL) were supported for Ranawa against two hypotheses (COMMEETG, related to both RISKTAKE and GOAL) for Aorema (Tables 36 and 37). As the regression analysis shows in Table 38, COMMEETG had more effect on RISKTAKE among farmers in Aorema (20 percent) than in Ranawa (6 percent). The same variable explains an equal amount of six percent of the variation in GOAL for each village (Table 39).

Table 36. Correlations between farmers' socioeconomic characteristics and RISKTAKE[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.6.2	AGE	.01	Not supported	-.11	Not supported
S.H.6.5	EDUCATE	.02	Not supported	.13	Not supported
	OCCUP	-.12	Not supported	.01	Not supported
S.H.6.8	ASSET	.22*	Supported	.01	Not supported
	FARMSIZE	.08	Not supported	.09	Not supported
	HHSIZE	.21	Not supported	.07	Not supported
S.H.6.11	MEMBORG	-.04	Not supported	.20	Not supported
	COMMEETG	.30*	Supported	.46*	Supported
	LISRADIO	.03	Not supported	.03	Not supported
S.H.6.14	CITVISIT	-.13	Not supported	-.03	Not supported
	TRIPCITY	-.30*	Not supported	-.06	Not supported
	RELACITY	-.42*	Not supported	.00	Not supported

[a]RISKTAKE = farmers' willingness to take risks; OCCUP = occupation; HHSIZE = household size; MEMBORG = memberships in organizations; COMMEETG = participation in community meetings; LISRADIO = listening to the radio; CITVISIT = cities visited; TRIPCITY = trips to the city; RELACITY = relatives in the city.

*Significant at 0.05.

Table 37. Correlations between farmers' socioeconomic characteristics and GOAL[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.6.3	AGE	.05	Not supported	-.18	Not supported
S.H.6.6	EDUCATE	.09	Not supported	.17	Not supported
	OCCUP	-.01	Not supported	.04	Not supported
S.H.6.9	ASSET	.16	Not supported	.10	Not supported
	FARMSIZE	-.08	Not supported	-.13	Not supported
	HHSIZE	.12	Not supported	-.02	Not supported
S.H.6.12	MEMBORG	.13	Not supported	.14	Not supported
	COMMEETG	.28*	Supported	.28*	Supported
	LISRADIO	-.02	Not supported	-.01	Not supported
S.H.6.15	CITVISIT	.04	Not supported	-.33*	Not supported
	TRIPCITY	.16	Not supported	-.28*	Not supported
	RELACITY	.13	Not supported	-.22*	Not supported

[a]GOAL = goals in farming; OCCUP = occupation; HHSIZE = household size; MEMBORG = memberships in organizations; COMMEETG = participation in community meetings; LISRADIO = listening to the radio; CITVISIT = cities visited; TRIPCITY = trips to the city; RELACITY = relatives in the city.

*Significant at 0.05.

In sum, participation in community meetings (COMMEETG) had the most effect on farmers' attitudes toward risk, and their aspirations in farming.

ASSET was related to RISKTAKE in Ranawa (Table 36), but did not pass the tolerance criteria in the regression analysis. RELACITY explains up to 17 percent of the variation in RISKTAKE for Ranawa (Table 38), and CITVISIT accounts for nine percent of the variation in GOAL (Table 39) for Aorema, but both exhibit negative standard regression coefficients. Cosmopoliteness did not instill in the Mossi farmers a positive attitude toward risk or raise the level of their goals in farming.

Table 38. Regression of RISKTAKE on farmers' socioeconomic characteristics

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
RELACITY	.17	.17	-.42	12.66
COMMEETG	.23	.06	.27	9.58
Aorema				
COMMEETG	.20	.20	.46	15.95

In sum, as exposure to information was the most determinant personal characteristic in influencing the Mossi farmers' adoption behavior, it also had the strongest effect on the intervening variables.

Farmers gain more knowledge about soil erosion problems by participating in community meetings (COMMEETG) and getting involved in diverse organizations (MEMBORG). It is an interaction process that in turn may positively affect farmers' aspirations in life and their attitudes toward risk, as farmers share and discuss issues or any information related to their farming activities.

Table 39. Regression of GOAL on farmers' socioeconomic characteristics

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
COMMEETG	.06	.06	.28	4.80
Aorema				
CITVISIT	.09	.09	-.33	6.96
COMMEETG	.15	.06	.27	6.19

Effect of Indigenous Knowledge Concerning Soil on the Intervening Variables

General Hypothesis 7: Indigenous knowledge of soil will affect the intervening variables.

To determine the effect of indigenous knowledge on the intervening variables, a total of 15 specific hypotheses (S.H.7.1 through S.H.7.3) were tested in each village.

The overall results indicate a limited effect of indigenous knowledge on the intervening factors, as it was the case for the dependent variable. None of the variables was statistically related to neither EROSPROB, CAUSEROS, nor RISKTAKE in Tables 40, 41 and 43 respectively. The only hypothesis supported was SOILTYPE, related to GOAL for Ranawa (Table 44). FSYST was statistically related to PREVEROS for Ranawa, but not in the hypothesized negative direction (Table 42).

FSYST entered the regression equation as shown in Table 45, explaining 10 percent of the variation in PREVEROS for Ranawa, while SOILTYPE from Table 46 accounts for seven percent of the variation in GOAL for the same village. None of the variables entered the regression equation when EROSPROB, CAUSEROS, and RISKTAKE were regressed on indigenous knowledge. In Aorema, indigenous knowledge did not have any influence on either farmers' knowledge of soil erosion problems, their attitudes toward risk, or their goals in farming.

Table 40. Correlations between indigenous knowledge of soil and EROSPROB[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.7.1	SOILTYPE	-.17	Not supported	.09	Not supported
	INDSFERT	.08	Not supported	-.04	Not supported
	FSYST	-.08	Not supported	.02	Not supported

[a]EROSPROB = erosion problems; INDSFERT = indication of soil fertility; FSYST = farming systems.

Table 41. Correlations between indigenous knowledge of soil and CAUSEROS[a]

Specific Hypothesis	Variable[a]	Ranawa		Aorema	
		Correlation Coefficient	Test Result	Correlation Coefficient	Test Result
S.H.7.1	SOILTYPE	.21	Not supported	-.08	Not supported
	INDSFERT	.15	Not supported	-.07	Not supported
	FSYST	.04	Not supported	-.15	Not supported

[a]CAUSEROS = causes of soil erosion; INDSFERT = indication of soil fertility; FSYST = farming systems.

Table 42. Correlations between indigenous knowledge of soil and PREVEROS[a]

Specific Hypothesis	Variable[a]	Ranawa Correlation Coefficient	Ranawa Test Result	Aorema Correlation Coefficient	Aorema Test Result
S.H.7.1	SOILTYPE	.02	Not supported	-.03	Not supported
	INDSFERT	-.19	Not supported	-.03	Not supported
	FSYST	.34*	Not supported	.10	Not supported

[a]PREVEROS = importance of preventing soil erosion; INDSFERT = indication of soil fertility; FSYST = farming systems.

*Significant at 0.05.

Table 43. Correlations between indigenous knowledge of soil and RISKTAKE[a]

Specific Hypothesis	Variable[a]	Ranawa Correlation Coefficient	Ranawa Test Result	Aorema Correlation Coefficient	Aorema Test Result
S.H.7.2	SOILTYPE	-.17	Not supported	.18	Not supported
	INDSFERT	.18	Not supported	-.02	Not supported
	FSYST	.04	Not supported	.11	Not supported

[a]RISKTAKE = farmers' willingness to take risks; INDSFERT = indication of soil fertility; FSYST = farming systems.

Table 44. Correlations between indigenous knowledge of soil and GOAL[a]

Specific Hypothesis	Variable[a]	Ranawa Correlation Coefficient	Ranawa Test Result	Aorema Correlation Coefficient	Aorema Test Result
S.H.7.3	SOILTYPE	-.29*	Supported	.00	Not supported
	INDSFERT	.03	Not supported	.13	Not supported
	FSYST	.12	Not supported	.13	Not supported

[a]GOAL = goals in farming; INDSFERT = indication of soil fertility; FSYST = farming systems.

*Significant at 0.05.

In the next section, an overall stepwise multiple regression is performed to determine which variables, among the combined independent and intervening factors, specifically affect the Mossi farmers' conservation behavior. The results from the overall regression analysis will indicate whether the conceptual model is supported.

Table 45. Regression of PREVEROS on indigenous knowledge of soil

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
FSYST	.10	.10	.34	7.70

Table 46. Regression of GOAL on indigenous knowledge of soil

Variable	Adjusted R^2	R^2 Change	Beta	F
Ranawa				
SOILTYPE	.07	.07	-.29	5.31

Overall Regression of the Dependent Variable on the Independent and Intervening Variables

By regressing the dependent variable on each one of the three subsets of independent variables (structural and institutional factors, farmers' socioeconomic characteristics, and indigenous knowledge) and the intervening factors in the previous section, a total of seven variables entered the regression equation for village of Ranawa: ACCREDIT, CRPAAGT, SIXSAGT, MEMBORG, COMMEETG, RISKTAKE, and GOAL.

In this section, the dependent variable is regressed on the new set of combined variables. This process will determine which variables, when all factors considered, specifically affect the adoption of recommended soil conservation practices in Burkina Faso.

In Table 47, ACCREDIT was the only one of the seven variables to enter the regression equation, explaining 11 percent of the variation in USEOLD among farmers in Ranawa. The remaining six variables did not enter the equation.

Table 47. Overall regression of USEOLD on the new set of variables in Ranawa

Variable	Adjusted R^2	R^2 Change	Beta	F
ACCREDIT	.11	.11	.35	8.34
COMMEETG		Did not enter		
SIXSAGT		Did not enter		
CRPAAGT		Did not enter		
MEMBORG		Did not enter		
RISKTAKE		Did not enter		
GOAL		Did not enter		

From Table 48 showing the regression of ADOPTNEW, it is observed that three of the seven variables (COMMEETG, SIXSAGT, and ACCREDIT) entered the equation in that order, explaining respectively 16 percent, eight percent, and seven percent of the variation. The three variables together explain 31 percent of the variation in ADOPTNEW.

Table 48. Overall regression of ADOPTNEW on the new set of variables in Ranawa

Variable	Adjusted R^2	R^2 Change	Beta	F
COMMEETG	.16	.16	.42	12.13
SIXSAGT	.24	.08	-.31	10.30
ACCREDIT	.31	.07	.29	9.90
CRPAAGT		Did not enter		
MEMBORG		Did not enter		
RISKTAKE		Did not enter		
GOAL		Did not enter		

In sum, the structural and institutional factors (ACCREDIT, SIXSAGT), and exposure to information (COMMEETG) had the most effect on the Mossi farmers' adoption behavior in Ranawa. None of the indigenous knowledge or intervening variables had any effect on adoption of soil conservation practices.

For the village of Aorema, a new set of nine variables were statistically significant: ACCREDIT, SIXSAGT, PREFDEP, FARMSIZE, MEMBORG, COMMEETG, SOILTYPE, EROSPROB, and RISKTAKE.

The regression of USEOLD in Table 49 shows that three of the nine variables entered the regression equation. The first variable to enter was FARMSIZE, explaining 19 percent of the variation, followed by PREFDEP (9 percent), and MEMBORG (7 percent). Overall the three variables explain 35 percent of the variation in USEOLD among farmers in Aorema.

Table 49. Overall regression of USEOLD on the new set of variables in Aorema

Variable	Adjusted R^2	R^2 Change	Beta	F
FARMSIZE	.19	.19	.45	14.61
PREFDEP	.28	.09	.32	12.28
MEMBORG	.35	.07	.30	11.79
ACCREDIT		Did not enter		
SIXSAGT		Did not enter		
COMMEETG		Did not enter		
SOILTYPE		Did not enter		
EROSPROB		Did not enter		
RISKTAKE		Did not enter		

In Table 50 showing the regression of ADOPTNEW, three variables entered the regression equation in this order: ACCREDIT (20 percent), SOILTYPE (11 percent), and SIXSAGT (5 percent). These three variables together explain 36 percent of the variation in ADOPTNEW in Aorema.

Table 50. Overall regression of ADOPTNEW on the new set of variables in Aorema

Variable	Adjusted R^2	R^2 Change	Beta	F
ACCREDIT	.20	.20	.46	15.54
SOILTYPE	.31	.11	.35	14.07
SIXSAGT	.36	.05	-.25	11.83
FARMSIZE		Did not enter		
MEMBORG		Did not enter		
COMMEETG		Did not enter		
PREFDEP		Did not enter		
EROSPROB		Did not enter		
RISKTAKE		Did not enter		

In addition to the structural and institutional factors (ACCREDIT, PREFDEP, SIXSAGT), and personal characteristics (FARMSIZE, MEMBORG) as determinant variables, indigenous knowledge (SOILTYPE) was important in explaining farmers' conservation behavior in Aorema. None of the intervening factors was significant.

Overall, farm loan, institutional support, and access to information accounted for most of the adoption of soil conservation practices in both rural communities. Indigenous knowledge had a limited effect on adoption. Also, the intervening variables such as farmers' attitudes toward risk and aspirations in farming did not reach tolerance criteria in the regression analysis.

All in all, the findings provide little support to the modified classical adoption/diffusion model, used as the theoretical yardstick for investigating the adoption of soil conservation practices in Burkina Faso.

CHAPTER 6. DISCUSSION AND CONCLUSIONS

In summary, the main purpose of the study was to assess the role of indigenous soil knowledge in influencing the Mossi farmers' conservation behavior. The expected prevalent role of indigenous knowledge was tested among other factors suggested by the adoption/diffusion literature such as structural and institutional factors, farmers' personal characteristics, and intervening factors such as farmers' attitudes toward risk, their aspirations in farming, and their specific knowledge of soil erosion problems.

In fact, a modified adoption/diffusion model was tested, under the guidance of risk and balance theories. These two middle-range theories were suggested by the adoption/diffusion framework. Risk is tied to the uncertainty that surrounds any unfamiliar innovation, and balance theory addresses the role of significant others, within the social system in which the adoption of the innovation occurs. The influence of significant others is expected to be strong in third world rural communities still characterized by gemeinschaft-like relationships.

The study objectives were stated in relation with the subsets of variables contained in the conceptual model, and achieved through the report of the research findings in Chapter 5.

This final chapter will highlight the major points of the findings as they relate to the study objectives, discuss related issues and policy implications, point out the shortcomings of the study, and make suggestions for future research priorities.

Summary

As related to indigenous soil taxonomies, the Mossi farmers classify soil in terms of its suitability for cropping potential. Soil characteristics such as texture, color, consistency, geographical location, permeability, and vegetal cover are associated with specific crops.

With respect to the soil conservation practices, the Mossi farmers have developed over time indigenous soil conservation practices that are ecologically sound and compatible with their farming systems.

In terms of adoption, the findings have shown that overall the level of adoption of soil conservation practices was high among the Mossi farmers. Traditional and new conservation practices, considered, the results strongly indicated that the Mossi farmers prefer their indigenous soil conservation practices over the newly introduced ones.

Considering the effect of the structural and institutional factors on the Mossi farmers' adoption behavior, the overall regression showed that access to credit and support from the local institutions over the influence of other members of the community were the determinant factors. The findings did not support balance theory. Balance theory, tied to the important role of significant others within a gemeinschaft-like community characterized by a strong social cohesion and a complete local autonomy, falls short in explaining the Mossi farmers' adoption behavior. Apparently, Burkina rural communities are increasingly dependent not only on the suburban areas and neighboring countries, but also on governmental and non-governmental development agencies, such as CRPA and SIX "S" respectively.

With regard to the Mossi farmers' personal characteristics as they affect adoption, exposure to information was the most important variable.

For the effect of indigenous knowledge on the adoption of the recommended conservation practices, the results showed that indigenous knowledge had little impact on adoption among the Mossi farmers. This factor was significant in Aorema, explaining 16 percent of the variation in ADOPTNEW, but not in Ranawa.

As for the intervening variables, they did not enter the overall regression equation. So farmers' knowledge of soil erosion problems, their attitudes toward risk, and goals in farming did not have any significant effect on the Mossi farmers' conservation behavior. Although the regression of the dependent variable on the intervening factors alone did show that the Mossi farmers, contrary to risk theory, were willing to take risks, the variable explained a minor percentage of the variation in the adoption of soil conservation practices. The prospect of a possible loss was minimized as the local institutions provide assistance to the target population in building soil conservation practices.

Overall, it is reasonable to conclude that the data showed limited support of the conceptional model tested in the study. The findings however have important policy ramifications, discussed in the next section.

Policy Implications

The first important implication of the findings is that building upon the Mossi farmers' traditional conservation practices has the potential to increase adoption rates of soil conservation practices in Burkina Faso. Also, the local soil taxonomy can be used as a basis for a scientific soil survey and be useful to Burkinabe soil scientists.

The importance of indigenous knowledge seems to be recognized in Burkina Faso, but the service delivery policy of the governmental extension agencies (CRPA) is not totally free from the CRPA's past legacy, the top-down approach. However, successful development projects built upon farmer practice and coordinated by various non-governmental agencies throughout the country had definitely instilled in the nation's mind, Burkinabe policy makers in particular, a favorable attitude toward indigenous farming systems and soil conservation practices.

The second important implication of the study is related to farmers' access to credit. Access to credit is likely to give a boost to not only the adoption of agricultural innovations in Burkina Faso, but also will raise the Burkinabe farmers' aspirations, at least beyond the subsistence level. A flexible farm loan system with affordable interest rates is needed. To this respect, the "Caisse Nationale de Credit Agricole" or farmers' national bank, could stimulate agriculture in Burkina Faso with a more attractive collateral system that makes farm loans accessible to most farmers.

The third implication is related to the institutional support that goes hand in hand with the way the information flows within the village. Farmers need regular contact with the development agent on a personal basis. Not only is the one-on-one contact congruent with the local culture (a farmer contacted at home feels respected and is more receptive to the message) but it also allows everyone to have the same information on the same basis.

In Burkina Faso, development projects are carried out through a "grassroot" organization, called "Groupement Villageois" (GV) or "Village Group." But as Marchal (1986) already pointed out, the GV tends to regroup the most influential people of the village. In addition, everyone does not feel necessarily a member of or bounded by the GV, particularly the lower socioeconomic level households of the village.

As a result, dealing with the GV as representative of the entire village may be misleading, and in terms of policy considerations, results in improving the standard of living of the already well-offs. The resulting consequence is a gap-widening effect between the "Haves" and the "Have Nots." But talking to people one-on-one at their home will make the CRPA's service delivery more effective. This type of approach is of vital importance for soil conservation, particularly where soil erosion is so severe that farmers tend to exhibit a fatalistic attitude. Under such circumstances, the one-on-one contact is an education process and a powerful tool of communication that will help instill in the Mossi farmers a self-confidence that they can win the fight against the encroaching desert.

The final implication of the study is theoretical. As mentioned in Chapter 1, introducing indigenous knowledge in the classical adoption/diffusion model will correct the biases attached to the original formulation of the model. The important implications of the findings suggest that a modified classical adoption/diffusion model incorporating indigenous knowledge systems still has much to offer and could be a valuable theoretical framework for investigating the adoption of agricultural innovations in a third world context like Burkina Faso.

In sum, the study has suggested very important policy implications, but it does also have some shortcomings.

Limitations of the Study

One of the major limitations of the study is the measurement of indigenous knowledge, related to the issue of two competing types of approaches in social science research, ethnomethodology, and the traditional survey research. Ethnomethodology as a research tool records changes as they occur over time. Thus it seems more suitable for investigating indigenous knowledge systems, which is more a process than it is a product.

This raises a concern for rural sociologists. They are expected not just to record social phenomena, but also to perform related statistical analysis in their work, while incorporating into their research cutting edge theories and methods such as indigenous knowledge systems. Raising such methodological issue does not imply advocating a dualistic approach in agricultural research, but suggesting a heuristic combination of both methods. As Bailey (1987, p. 288) put it, "ethnomethodology is not incompatible with traditional methods, but rather fills an important gap left by these methods."

In addition to the above measurement problem of indigenous knowledge, there was a need to reformulate some of the questions asked to farmers. Some questions referred to facts, and to this respect did not show any variation. On awareness of soil erosion problems in Questions 13 and 14 for instance, all farmers recognized that soil erosion was a serious problem on the five levels of geographical location, from the province through the department, the village, the neighborhood down to farmers' cultivated land.

Also, the perceived attributes of innovations such as mentioned in the adoption/diffusion literature were not suitable. The recommended conservation practices did not involve any financial cost (Question 21). In addition, CRPA and Six "S" provide assistance to farmers for soil conservation by educating, training and helping them to build conservation practices (Question 20).

To this respect, both farmers' awareness of soil erosion problems and perceived attributes of innovations initially included in the conceptual model were deleted.

Moreover, the question related to the adoption of soil conservation practices was too complex. Farmers were comfortable indicating which practices they were using, but confused to some degree when asked to indicate on which type of terrain and type of soil they use a given conservation practice. The last portion of the question appeared redundant to farmers in the sense that in an earlier question, they already had provided a detailed description of the soil types and associated characteristics on their cultivated land, including the geographical location, that is, the type of terrain. Other dimensions of the dependent variable such as selective adoption, adaptive adoption, discontinuance, and rejection did not appear to be relevant., so they were not included in the readjusted conceptual model.

Also, farmers were not comfortable when they were asked to identify some other types of soil different from those that they identified on their own fields. Farmers were confident and gave detailed descriptions of the types of soil on their own farms. Identifying other types of soil, however, was perceived as an hypothetical question by the target population.

Finally, the drought and famine conditions may have affected the study. When asked at the end of the interviews what else it was important to talk about, over two-thirds of farmers in both villages (approximately 70 percent of the farmers in both villages) mentioned the severe drought and famine conditions they were experiencing.

Future Research Priorities

The study did not specifically investigate the relationships among the different development agencies providing assistance for soil conservation to farmers in the study villages. The research findings indicated that institutional support was a determining factor in the Mossi farmers' conservation behavior. Most often, however, governmental and non-governmental agencies involved in rural Burkina tend to operate independently, pursuing individual goals as if they were not working for the general welfare of the rural communities. The lack of coordination and cooperation results in a dispersion of resources and time as the different agencies duplicate each other's action. Consequently, such a lack of coordination of activities exposes farmers to conflicting messages which affect their participation in the program, and in turn the effectiveness of the soil conservation program and any other rural development project. Coordination is essential in the sense that a joint effort to intervene will save resources and produce better results, and to this respect, will benefit both the institutions involved and the target population.

Another priority is that the study did not include women. Although they do not have access to land ownership due to gender bias and cultural values, women do most of the work in the fields. At the beginning of each farming season, they do not decide which crop goes on which soil type like their male counterparts, but they do have some influence on the household decision-making process.

To this respect, the first wife plays a key role in the household. She gives advice to her younger "co-spouses" who respectfully call her "mother." She is also in charge in terms of allocating the different domestic tasks to the other wives. In addition, she shares with the household head some family secrets and indigenous knowledge that the others do not. For instance, when the husband performs rituals or customary ceremonies, she is the one seated behind him. Also, her opinion really matters in the husband's decision making in the sense that she is the one the man consults with for any decision affecting the household.

Further investigations on the above issues may yield valuable findings on the adoption of soil conservation practices in Burkina Faso for important policy considerations.

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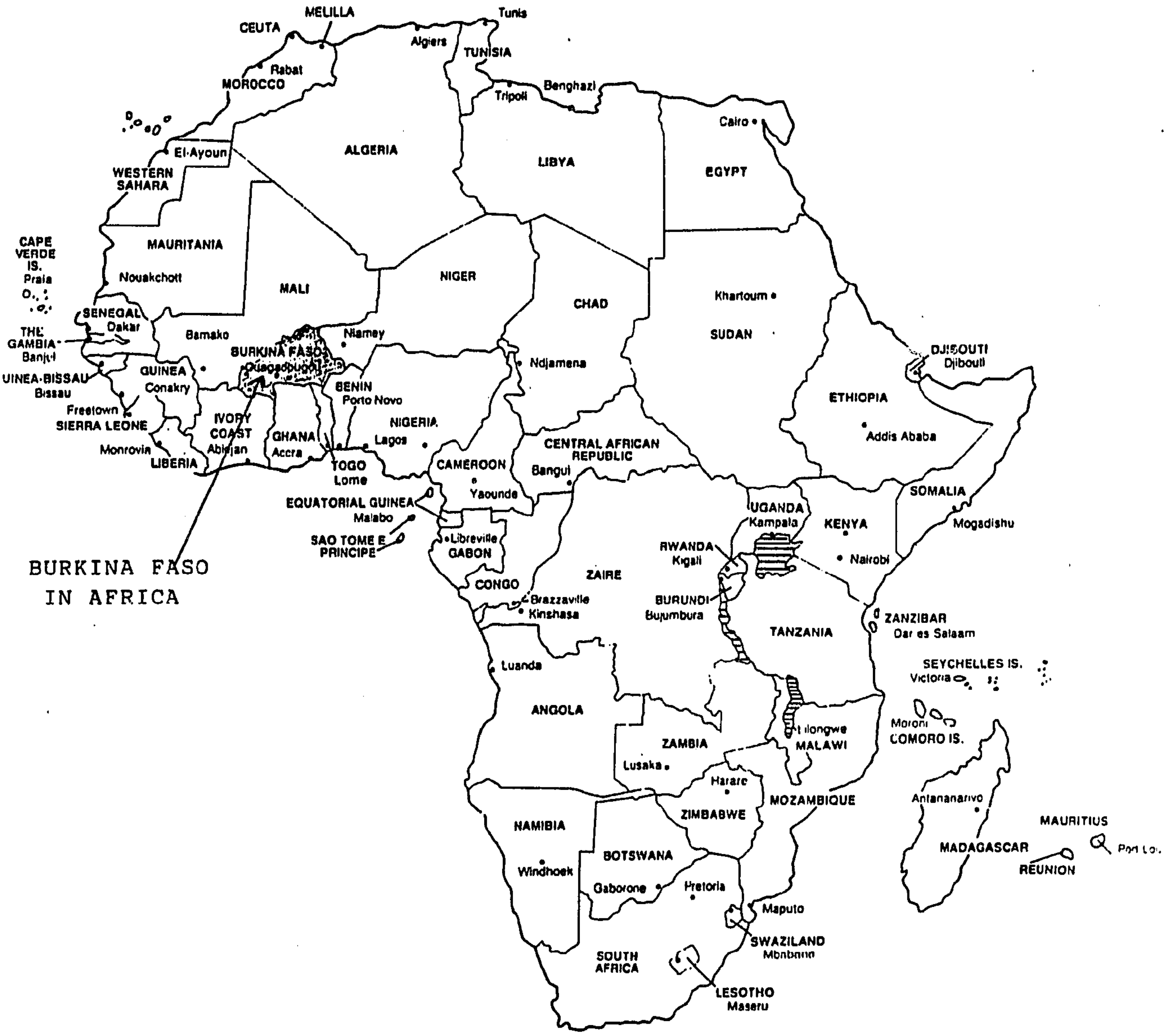
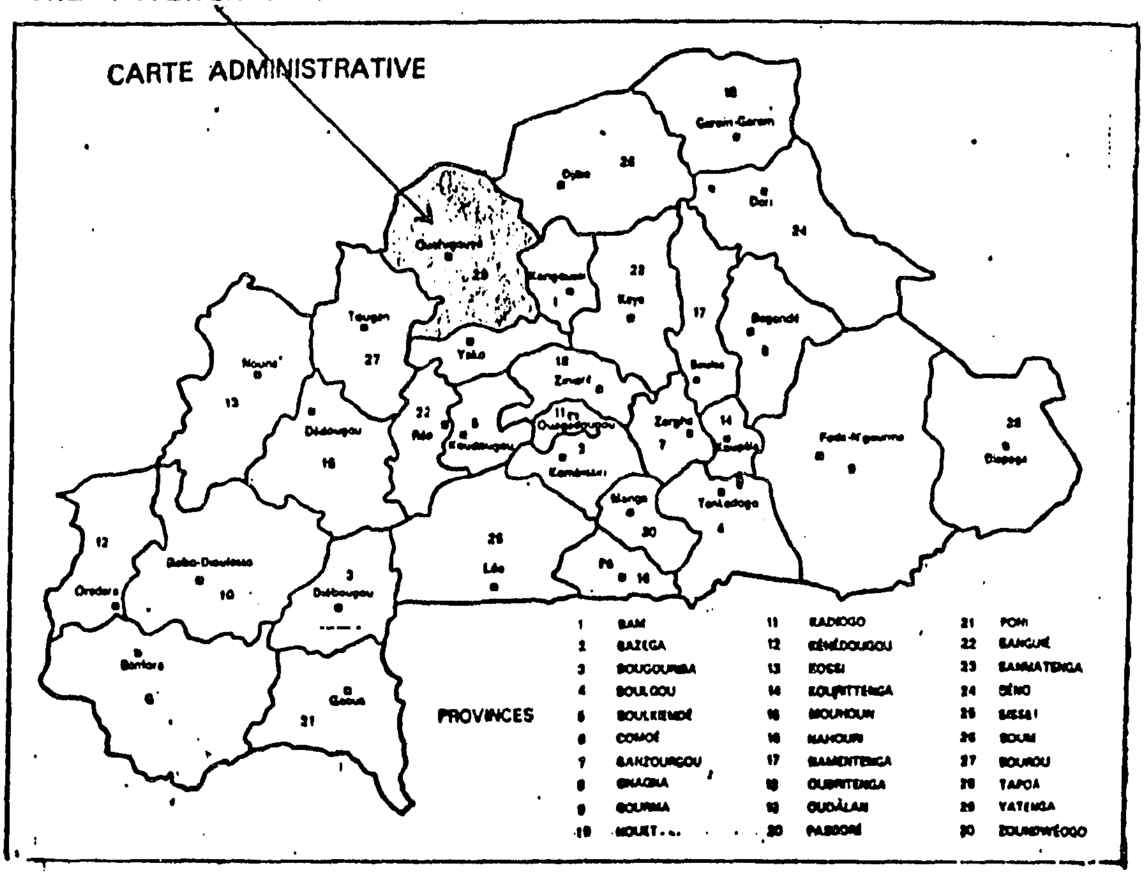
APPENDIX A: MAPS OF THE RESEARCH SETTING

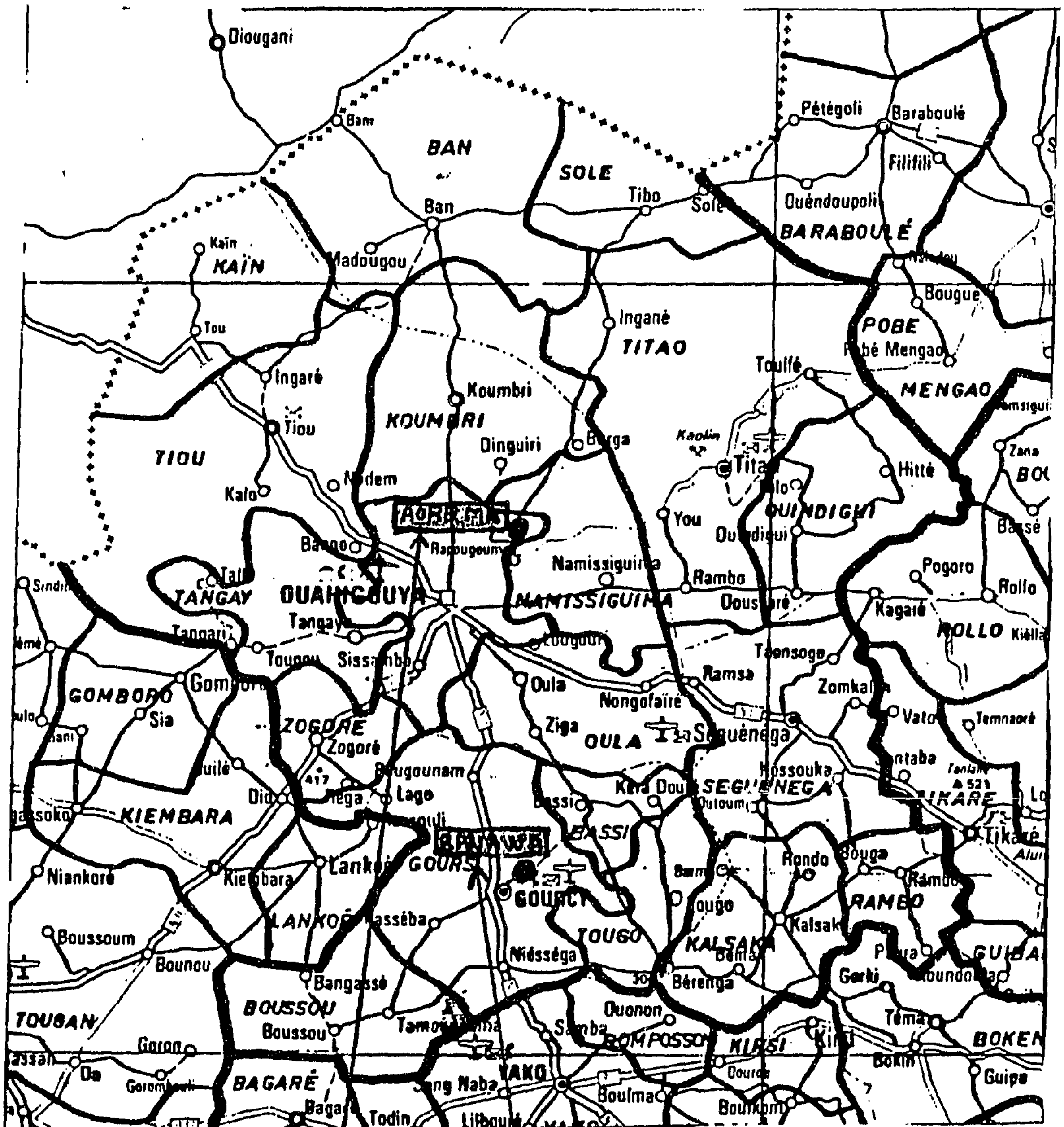


BURKINA FASO
IN AFRICA

THE YATENGA PROVINCE IN BURKINA FASO



(I.G.B.)



(I.G.B.)

THE VILLAGES OF AOREMA AND RANAWA

IN THE YATENGA PROVINCE

APPENDIX B: BASIC CHARACTERISTICS OF THE STUDY POPULATION

Basic characteristics of the study population

	Ranawa				Aorema			
	Range	Mean	Median	Standard Deviation	Range	Mean	Median	Standard Deviation
AGE	22-78	43.25	40.00	14.37	28-85	55.30	56.00	12.32
Years in [a]RS	0-6	0.15	0.00	0.86	0-50	.46	0.00	1.12
Years in [b]AS	0-30	5.98	5.00	6.75	0-16	1.41	0.00	3.35
HHSIZE	2-72	15.78	13.00	11.66	4-58	19.88	16.50	11.69
ASSET	15-186	62.08	48.00	38.04	8-166	49.33	39.50	34.59
LISRADIO	0-35	9.75	7.00	9.22	0-35	10.41	8.00	8.99
CITVISIT	1-4	2.16	2.00	0.64	1-5	2.11	2.00	1.09
TRIPCITY	1-30	8.80	8.50	6.04	1-24	4.90	3.50	5.02
RELACITY	0-26	5.75	4.00	5.36	0-63	8.25	3.00	13.24

[a]RS = Rural School.

[b]AS = Arabic School.

APPENDIX C: OVERALL PEARSON CORRELATIONS

Ranawa

Variables		X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}
X_1	ACCREDIT	1.00													
X_2	RELATIVE	.07	1.00												
X_3	SPOUSE	.11	.75**	1.00											
X_4	NEIGHBOR	.24*	.41**	.45**	1.00										
X_5	FRIENDS	.04	.32**	.46**	.51**	1.00									
X_6	VILCHIEF	-.03	.43**	.47**	.21	.33**	1.00								
X_7	TRADER	-.18	-.12	.02	.11	.11	.10	1.00							
X_8	CRPAAGT	-.08	-.08	-.09	-.22*	-.18	-.10	.07	1.00						
X_9	SIXSAGT	.00	-.29*	-.30**	-.14	-.09	-.13	-.06	.16	1.00					
X_{10}	PREFDEP	.16	.20	.22*	.14	.06	.18	.17	-.14	-.10	1.00				
X_{11}	HGCOM	.08	.33**	.30*	.20	.18	.38**	.15	-.22*	.14	.57**	1.00			
X_{12}	AGE	.00	.10	.07	-.17	.06	.09	-.01	-.01	.04	.11	.14	1.00		
X_{13}	EDUCATE	.00	-.21	-.09	-.14	-.20	-.07	-.02	.13	-.06	.04	.01	-.34**	1.00	
X_{14}	OCCUP	-.14	-.19	-.07	-.10	-.04	-.16	.11	.17	.39**	-.13	-.06	-.10	.23*	1.00
X_{15}	ASSET	.37**	.08	.22*	-.13	.07	.16	-.12	-.19	-.04	.11	.19	.16	-.19	-.25*
X_{16}	FARMSIZE	.05	-.14	.00	-.06	-.13	-.04	.00	.04	.16	.11	-.17	.11	.13	.04
X_{17}	HHSIZE	.25*	.25*	.19	-.01	.02	.22*	-.24*	-.09	-.19	-.02	.08	.43**	-.26**	-.38**
X_{18}	MEMBORG	.18	.19	.12	.16	.03	.44**	-.08	.14	.00	-.02	.02	.10	-.04	-.17
X_{19}	COMMEETG	.25*	-.23*	-.18	.11	-.12	-.20	.19	.23*	.10	.07	-.03	-.10	.08	.04
X_{20}	LISRADIO	-.08	-.08	-.05	.06	-.03	-.01	-.14	-.33**	.09	-.15	.13	-.25*	.15	.20
X_{21}	CITVISIT	-.03	.10*	.21*	.03	.22*	.08	.21	-.04	-.27*	.07	-.07	.02	-.06	-.08
X_{22}	TRIPCITY	-.12	.25*	.24*	.18	.17	.08	.13	.10	-.40**	.10	-.14	.07	-.19	-.07
X_{23}	RELACITY	-.16	-.19	-.27*	-.31**	-.49**	-.32**	.11	.18	.07	.03	-.16	.14	-.06	.12
X_{24}	SOILTYPE	.02	-.30*	-.07	-.16	-.10	.02	-.02	-.07	.15	.05	.12	.07	.05	.03
X_{25}	INDSFERT	.17	.00	.04	-.12	-.23*	.15	-.11	.22*	.23*	.20	.13	-.11	.08	.25*
X_{26}	FSYST	-.04	-.20	-.29*	-.13	-.20	-.15	.18	.15	.03	-.05	-.03	-.21*	.23*	.08
X_{27}	EROSPROB	-.15	.16	.15	.15	-.09	.12	-.15	-.03	-.08	-.01	-.02	-.23*	.06	-.15
X_{28}	CAUSEROS	-.12	-.11	.01	-.04	-.15	-.03	.15	.15	.20	-.18	.05	-.15	.12	.29*
X_{29}	PREVEROS	-.07	-.19	-.19	-.16	.15	-.10	.16	-.07	-.08	-.21	-.17	-.16	.00	.03
X_{30}	RISKTAKE	.29*	.10	.07	.19	.00	-.04	-.11	.03	-.04	-.04	-.01	.01	.02	-.12
X_{31}	GOAL	.26*	.05	.02	.10	-.02	-.03	.08	.29*	-.07	.01	-.14	.05	.09	-.01
X_{32}	USEOLD	.35**	-.06	.06	.02	.09	.09	-.06	.01	-.12	.17	.08	.03	.15	-.12
X_{33}	ADOPTNEW	.38**	.09	.08	.24*	-.05	-.10	-.03	.17	-.26*	.04	-.14	.05	-.08	-.10

*Significant at 0.05.
**Significant at 0.01.

X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24	X25	X26	X27	X28	X29	X30	X31
00																		
23*	1.00																	
19	-.25*	1.00																
13	.04	-.20	1.00															
26**	-.38**	.41**	-.12	1.00														
04	-.17	.03	.11	.01	1.00													
08	.04	.16	-.01	.07	-.19	1.00												
5	.20	.18	-.25*	.19	-.19	.09	1.00											
06	-.08	-.07	.11	.09	-.07	-.10	-.08	1.00										
9	-.07	-.07	.01	-.02	-.09	-.10	-.23*	.58**	1.00									
6	.12	-.05	-.07	-.09	-.13	-.07	-.15	.05	.22*	1.00								
5	.03	.09	.03	.14	-.05	-.10	.16	-.18	-.14	-.05	1.00							
8	.25*	-.01	-.03	-.01	-.07	.12	.06	-.31**	-.24*	.02	.10	1.00						
3*	.08	.00	-.18	-.32**	.12	.11	-.09	-.29*	-.15	.22*	-.17	-.05	1.00					
6	-.15	-.22*	.17	-.06	.07	-.10	.04	-.17	-.03	.07	-.17	.08	-.08	1.00				
2	.29*	-.17	-.05	-.10	-.11	.17	.15	-.18	-.24*	.01	.21	.15	.04	-.14	1.00			
0	.03	-.09	-.30**	-.22*	-.06	-.09	.11	.12	.09	.06	.02	-.19	.34**	-.16	-.16	1.00		
2	-.12	.22*	.08	.22	-.04	.30*	-.03	-.13	-.30**	-.42**	-.17	.18	.04	-.07	.11	-.29*	1.00	
9	-.01	.16	-.08	.12	.13	.28*	-.02	.04	.16	.13	-.29*	.03	.12	-.08	-.14	-.01	.17	1.00
5	-.12	.16	.05	.01	.27*	.08	-.08	-.10	.03	-.14	.08	-.03	.04	-.10	-.09	-.04	-.11	.28**
3	-.10	.21	.01	.22*	.08	.41**	-.05	.03	.08	-.10	.07	.01	-.15	-.03	-.18	-.24*	.26*	.24*

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Variables		X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	X
X_1	ACCREDIT	1.00														
X_2	RELATIVE	-.01	1.00													
X_3	SPOUSE	.01	.87**	1.00												
X_4	NEIGHBOR	-.41**	.35**	.33**	1.00											
X_5	FRIENDS	-.35**	.26*	.31**	.58**	1.00										
X_6	VILCHIEF	-.18	.35**	.17	.36**	.15	1.00									
X_7	TRADER	-.20	-.07	-.22*	.34**	.20	.55**	1.00								
X_8	CRPAAGT	.23*	-.09	-.05	.12	.12	-.19	.13	1.00							
X_9	SIXSAGT	-.16	-.09	-.07	.11	.01	.19	.16	-.22*	1.00						
X_{10}	PREFDEP	.07	.35**	.24*	.28*	.10	.48**	.25*	-.05	.41**	1.00					
X_{11}	HGCOM	-.01	.31**	.19	.31**	.16	.50**	.35**	-.06	.26*	.77**	1.00				
X_{12}	AGE	-.01	.03	.10	.01	-.01	-.19	-.18	.08	-.33**	-.21	-.24*	1.00			
X_{13}	EDUCATE	-.07	.01	-.17	.01	.01	.08	.30*	-.07	.03	.05	.06	-.28*	1.00		
X_{14}	OCCUP	.10	.16	.21*	-.03	-.03	.19	.03	-.13	.12	.29*	.04	.24*	.04	1.00	
X_{15}	ASSET	-.04	.03	.08	-.16	.17	.05	-.03	-.29*	-.12	-.08	.02	.27*	-.02	.10	1.00
X_{16}	FARMSIZE	.20	.09	.15	-.09	-.09	-.28*	-.19	.10	-.24*	.05	.06	-.03	.12	.10	-.07
X_{17}	HHSIZE	.01	.18	.17	.00	.10	.09	-.07	-.28*	-.14	-.02	.03	.04	-.01	-.02	.55
X_{18}	MEMBORG	.19	.10	.08	.06	-.03	.09	.00	.05	-.07	-.16	-.13	-.04	.13	-.01	-.1
X_{19}	COMMEETG	.12	-.38**	-.47**	-.12	.02	.02	.31**	.07	.11	.04	-.04	-.17	.20	.06	.01
X_{20}	LISRADIO	.15	.02	-.05	-.15	.05	.16	.06	-.18	-.07	.05	.05	-.26*	.31**	.17	.17
X_{21}	CITVISIT	.05	.15	.18	-.01	.17	.04	.05	-.17	.01	-.01	.09	-.14	.13	-.11	.07
X_{22}	TRIPCITY	.08	.04	.07	-.11	.04	-.02	.00	-.21	.15	.00	.10	-.15	.05	-.11	-.0
X_{23}	RELACITY	.02	.11	.26*	.15	.09	.10	.01	-.33**	.10	.07	.09	-.06	-.03	.05	.08
X_{24}	SOILTYPE	.19	-.06	-.02	-.09	-.07	.08	.04	-.19	-.17	.15	.08	.13	.15	.25*	.12
X_{25}	INDSFERT	-.08	-.17	-.19	-.13	-.23*	-.13	-.14	-.08	-.25*	-.16	-.07	-.12	.03	-.31**	.03
X_{26}	FSYST	.13	-.13	-.07	.02	.11	.02	.18	.34**	-.01	.06	-.03	.05	-.11	-.13	.08
X_{27}	EROSPROB	.12	.13	.13	.19	.18	.14	.09	.31**	.16	.23*	.18	-.04	.04	.13	-.11
X_{28}	CAUSEROS	-.02	-.03	-.07	.00	-.14	.08	.01	-.07	-.01	.03	.05	.08	-.14	.07	-.19
X_{29}	PREVERO	-.02	-.35**	-.31**	-.10	.21	-.18	.14	.24*	-.21	-.24*	-.26*	.01	-.19	-.05	.07
X_{30}	RISKTAKE	.25*	-.23*	-.28*	-.09	-.01	-.12	.22*	.10	-.10	-.07	-.01	-.11	.13	.01	.01
X_{31}	GOAL	.28*	-.05	-.11	-.20	-.07	-.09	-.17	.15	.07	.04	-.18	-.18	.17	.04	.10
X_{32}	USEOLD	.20	.18	.15	.09	-.06	.19	.08	.06	.07	.33**	.22*	-.08	.12	.07	.00
X_{33}	ADOPTNEW	.45**	-.07	-.05	-.32**	-.17	-.19	-.11	.04	-.35**	-.09	-.19	.01	.11	.04	.11

*Significant at 0.05.
**Significant at 0.01.

:	X_{13}	X_{14}	X_{15}	X_{16}	X_{17}	X_{18}	X_{19}	X_{20}	X_{21}	X_{22}	X_{23}	X_{24}	X_{25}	X_{26}	X_{27}	X_{28}	X_{29}	X_{30}	X_{31}
*	1.00																		
*	.04	1.00																	
*	-.02	.10	1.00																
	.12	.10	-.07	1.00															
	-.01	-.02	.55**	.10	1.00														
	.13	-.01	-.11	.07	.07	1.00													
	.20	.06	.01	.00	-.12	.18	1.00												
*	.31**	.17	.17	.26*	.13	.25*	.22*	1.00											
	.13	-.11	.07	-.07	.12	-.02	-.05	.31**	1.00										
	.05	-.11	-.04	-.09	-.05	-.11	-.11	.24*	.87**	1.00									
	-.03	.05	.08	.02	.14	.11	-.06	.25*	.45**	.42**	1.00								
	.15	.25*	.12	.09	-.03	.10	.30**	.23*	.17	.21	.30**	1.00							
	.03	-.31**	.03	-.11	.14	.16	.10	.02	-.06	-.10	-.04	-.07	1.00						
	-.11	-.13	.08	-.16	.03	.20	.0-3	.03	-.07	-.12	-.29*	-.04	.05	1.00					
	.04	.13	-.11	.20	-.02	.40**	.52**	.05	-.11	-.21	.04	.09	-.04	.02	1.00				
	-.14	.07	-.19	.17	-.23*	-.07	-.06	.01	.02	.06	.00	-.08	-.07	-.15	-.10	1.00			
	-.19	-.05	.07	.02	-.09	-.20	.26*	.02	.10	.05	-.01	-.03	-.03	.10	.04	-.12	1.00		
	.13	.01	.01	.09	.07	.20	.46**	.03	-.03	-.06	.00	.18	-.02	.11	.29*	-.06	.28*	1.00	
	.17	.04	.10	-.13	-.02	.14	.28*	-.01	-.33**	-.28*	-.22*	.00	.13	.13	.13	-.23*	-.09	.19	1.00
	.12	.07	.00	.44**	.13	.26*	.13	.15	.02	-.11	.03	.06	-.05	.23*	.31**	.15	-.22*	.07	.08
	.11	.04	.11	.21*	.13	.00	.29*	.22*	.04	-.04	.03	.42**	.02	-.08	.10	-.11	.12	.25*	.22*

APPENDIX D: QUESTIONNAIRE USED TO GENERATE THE DATA

THE ADOPTION OF SOIL CONSERVATION PRACTICES IN BURKINA FASO: THE ROLE OF INDIGENOUS KNOWLEDGE, SOCIAL STRUCTURE AND INSTITUTIONAL SUPPORT

QUESTIONNAIRE

Good morning/afternoon: I am ______________________________ working for the Ministry of Education. We are currently conducting research on soil conservation practices. We hope to use the information for dissertation research and to help farmers with their farm operations. I would like to talk to you about your problems, needs and opinions on soil conservation. Your participation is voluntary, and you may refuse to answer any questions which you feel are too personal, or stop the interview at any time.

However, please bear in mind that the success of this study depends on the accuracy and completeness of the information we obtain from you and other farmers.

The information you give will be kept confidential and you will remain anonymous. The numerical code in the questionnaire will be used only to identify people who have responded and do not need to receive a follow-up letter. The interview will take approximately one hour. If you have any questions now or during the interview, I will be happy to answer them. We sincerely appreciate your cooperation.

Respondent I.D.#: ________________ Interviewer: ________________

Province: ________________ Department: ________________

Village: ________________ Interview Date: ________________

FIRST, I WOULD LIKE TO ASK SOME QUESTIONS ABOUT YOUR FARM AND FARMING SYSTEMS:

1. What would you say is your main goal in farming? Is it to:

   (INTERVIEWER, CHECK ONE THAT APPLIES.)

   ________ produce enough food for the family?

   ________ produce enough food for the family and to sell to make money for buying necessities?

   ________ produce enough to increase the size of your farm and make a profit?

2. Has the size of your farm increased, decreased, or stayed the same during the past five years? (If increased or decreased) What is the reason for the increase/decrease? (INTERVIEWER, CHECK (X) ONE THAT APPLIES.)

   Increased _____ Reason ________________

   ____

   Decreased _____ ________________

   ____

   Same ________

3. Do you use any of the following farming/cropping systems?

Farming/cropping systems	Yes	No
Annual monocropping	1	2
Crop rotation	1	2
Shifting cultivation (land rotation fallowing)	1	2
Intercropping	1	2
Mixed cropping	1	2
Alley cropping	1	2
Agroforestry	1	2
Others (specify)		
____________	1	2
____________	1	2
____________	1	2

4. Do you own any of the following farm equipment? **(INTERVIEWER, CHECK EQUIPMENT OWNED.)**

Equipment	Number Owned
_______ Simple Plough	________
_______ Multi-purpose plough	________
_______ Cart	________
_______ Mini-tractor	________
Others (specify)	
_______ ________	________
_______ ________	________

5. Do you own any animals?

Yes __1__ No __2__

(If Yes) How many of each of these animals do you own? (INTERVIEWER, CHECK ANIMALS OWNED.)

Animals	Number Owned
_______ Sheep	_______
_______ Goats	_______
_______ Pigs	_______
_______ Cows	_______
_______ Donkeys	_______
_______ Horses	_______
_______ Camels	_______

6. Do you own any of the following means of transportation that are in good working order(INTERVIEWER, CHECK MEANS OF TRANSPORTATION OWNED.)

Means of Transportation	Number owned
_______ Bicycle	_______
_______ Mobylette (motorcycle)	_______
Others (specify)	
_______ _______	_______
_______ _______	_______

7. I am now going to mention some crops that farmers in this region grow. Please tell me if you grew these crops on your farm last year. (If yes) Did you sell any of this crop? (If yes) How much money did you make from selling this crop?

(INTERVIEWER CHECK CROPS GROWN)

Crops	Crops Grown	Estimated gross income from crop (CFA)
Millet	____________	__________________
Sorghum	____________	__________________
Maize (Corn)	____________	__________________
Rice	____________	__________________
Beans	____________	__________________
Cowpeas (Suma)	____________	__________________
Peanuts	____________	__________________
Sesame	____________	__________________
Potatoes	____________	__________________
Sweet potatoes	____________	__________________
Cassava (Manioc)	____________	__________________
Yams	____________	__________________
Vegetables	____________	__________________
Fruit	____________	__________________
Cotton	____________	__________________
Tobacco	____________	__________________

Did you grow any crops which I have not mentioned here? (If yes) Please specify.

__________________	____________	__________________
__________________	____________	__________________
__________________	____________	__________________

8. Thinking about your farming activities, have you ever needed a farm loan?

Yes __1__ No __2__

a) (If yes) Can you get a farm loan when you need it?

Yes __1__ No __2__

b) (If yes) Where can you get a farm loan?

____

____

____

c) (If no) What are the reasons you cannot get a farm loan?

____

____

____

9. Here is a list of farming constraints you may face each season. Could you tell me whether they are not a problem, somewhat a problem, or a serious problem?

Farming constraints	Not a problem	Somewhat a problem	A serious problem
Irregular rainfall	1	2	3
Plant disease	1	2	3
Pests	1	2	3
Weeds	1	2	3
Errant/Wandering animals	1	2	3
Extension service not available	1	2	3
Equipment/Input not available	1	2	3
Not able to get a loan	1	2	3
Labor Shortage	1	2	3
Others (specify)			
______	1	2	3
______	1	2	3
______	1	2	3

NEXT, I WOULD ASK YOU TO TALK ABOUT THE TYPES OF SOILS ON YOUR FARM: [Interviewer, please record local soil names, with associated characteristics such as texture (clay, sand, laterite ...), consistency (soft, hard, dry, humid ...), color, geographical location (low land, uphill, near a lake ...), water retention, smell, taste, richness in organic matter, etc.]

10. a) Can you name the different types of soils on your cultivated land?

    b) What are the characteristics of each type of soil on your farm?

    c) What are the specific crops that grow well on the types of soils on your farm?

Soil types/names	Associated characteristics	Associated crops

11. a) Could you identify some other types of soils different from those that you identified on your own fields? (If yes) what are they, and what are their characteristics?

b) What are the specific crops that grow well on those types of soils?

Soil types/names	Associated characteristics	Associated crops

12. Are there any kinds of grass, shrubs or trees that show whether soil is fertile or not fertile? (**INTERVIEWER, CHECK ONE THAT APPLIES.**)

Kinds of grass, shrub or tree	Indication of soil fertility	Indication of soil infertility
______	______	______
______	______	______
______	______	______
______	______	______
______	______	______
______	______	______
______	______	______
______	______	______

NOW, I WOULD LIKE TO TALK TO YOU ABOUT SOIL EROSION AND SOIL CONSERVATION PRACTICES:

13. We often hear that the Yatenga Province like many other Provinces of Burkina Faso has a serious problem of soil erosion. Do you agree that the Yatenga Province has a soil erosion problem?

Yes __1__ No __2__ Don't Know __3__

14. Do you believe soil erosion is a serious problem in your Department? Your village? Your neighborhood?

a) Department ______ Yes __1__ No __2__ Don't Know __3__

b) Village ______ Yes __1__ No __2__ Don't Know __3__

c) Neighborhood ______ Yes __1__ No __2__ Don't Know __3__

d) Do you feel that soil erosion is a serious problem on some parts of your cultivated land?

Yes __1__ No __2__ Don't Know __3__

(If yes) Why is soil erosion a serious problem on your fields?

____

____

(If no) Why is soil erosion not a serious problem on your fields?

____

____

15. Could you tell me what are the main causes of soil erosion?

____

____

16. Do you think it is important to prevent soil erosion?

Yes __1__ No __2__

Why? ____________________________________

____

17. Are the following agencies working with farmers in your village?

Regional Centre for Agropastoral Promotion (CRPA) Yes __1__ No __2__

The Six "S" (Non-Governmental Agency) Yes __1__ No __2__

18. Are there any other agencies working with farmers in your village?

Yes __1__ (Specify): __________________________

____

No __2__

19. How many times did you contact your CRPA Agent or the Six "S" representative last season for your farming needs? How many times did the CRPA Agent or the Six "S" contact you at your home or on your fields?

	No. of times farmer contacted the agent	No. of times Agent contacted the farmer	Total No. of contacts
CRPA Agent	________	________	________
Six "S" Agent	________	________	________

20. Does the CRPA or Six "S" provide assistance to farmers for soil conservation? Yes __1__ No __2__

(If Yes) Could you tell me the type of support that each agency provides?

a) Does __________ educate farmers for practicing soil conservation?

b) Does __________ provide technical assistance to farmers for soil conservation (such as showing how to build a microcatchment or an absorbing micro-dam, to identify the different curves of the land for efficient stone lining ...)?

c) Does __________ provide financial assistance to farmers for soil conservation?

d) (If the support is financial) Do you have to pay back the financial support from __________?

	Education		Technical assist.		Financial assist.		Pay Back	
	Yes	No	Yes	No	Yes	No	Yes	No
CRPA	__1__	__2__	__1__	__2__	__1__	__2__	__1__	__2__
Six "S"	__1__	__2__	__1__	__2__	__1__	__2__	__1__	__2__
Others (specify):								
________	__1__	__2__	__1__	__2__	__1__	__2__	__1__	__2__
________	__1__	__2__	__1__	__2__	__1__	__2__	__1__	__2__

NEXT, I WOULD LIKE TO ASK ABOUT SOME PRACTICES YOU MAY USE ON YOUR FARM:

21. a) Could you tell me which ones of the following soil conservation practices you use? **(INTERVIEWER, CHECK PRACTICES USED.)**

    b) Did you select any practices because they best fit your farming conditions? (If yes) Which ones are they? **(INTERVIEWER, CHECK.)**

    c) Did you modify any practices to adapt them to your cultivated land? (if yes) Which ones are they? **(INTERVIEWER, CHECK.)**

    d) Did you drop any practices after using them over a period of time? (If yes) Which ones are they. **(INTERVIEWER, CHECK.)**

    e) Is ____________________ compatible with your traditional farming system?

    f) Are the time and labor required for implementing ____________________ worth the effort?

    g) Is there any financial cost in using ____________________? (If yes) Is it worth the cost?

    h) Is the land on which you use ____________________ low (bas fond), flat, gently sloping (at the "foot" of a mountain) or hilly?

    i) What is the soil type on which you use __________________?

Practices (CHECK PRACTICES USED)	Selective adoption	Adaptive adoption	Discontinuance	Compatible with tradition farm system		Time & labor required worth the effort		Practice involves financial cost		Worth the cost	
				Yes	No	Yes	No	Yes	No	Yes	No
____ Manuring	____	____	____	1	2	1	2	1	2	1	2
____ Dead barrier (hedge)	____	____	____	1	2	1	2	1	2	1	2
____ Contour plowing	____	____	____	1	2	1	2	1	2	1	2
____ Microcatchment	____	____	____	1	2	1	2	1	2	1	2
____ Stone lining	____	____	____	1	2	1	2	1	2	1	2
____ Ridges	____	____	____	1	2	1	2	1	2	1	2
____ Gully treatment	____	____	____	1	2	1	2	1	2	1	2
____ Absorbing micro-dam	____	____	____	1	2	1	2	1	2	1	2
____ Mulching	____	____	____	1	2	1	2	1	2	1	2
____ Fallow	____	____	____	1	2	1	2	1	2	1	2
____ Living hedge	____	____	____	1	2	1	2	1	2	1	2
____ Vegetated strips	____	____	____	1	2	1	2	1	2	1	2
____ Reforestation	____	____	____	1	2	1	2	1	2	1	2

Do you use any soil conservation practices which I have not mentioned here? (If yes) Please specify:

____ ____________	____	____	____	1	2	1	2	1	2	1	2
____ ____________	____	____	____	1	2	1	2	1	2	1	2
____ ____________	____	____	____	1	2	1	2	1	2	1	2

Terrain type				Soil type
Low	Flat	Gently Sloping	Hilly	
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________
1	2	3	4	______________

22. a) Did you use any of the above practices before receiving assistance from the CRPA and the Six "S"?

Yes __1__ No __2__

b) (If yes) Which practices did you use?

____

____

____

____

23. Now, with the assistance you receive from both the CRPA and the Six "S", could you tell me,

a) What are the conservation practices that the CRPA proposed to you?

____

____

____

b) What are the conservation practices that the Six "S" proposed to you?

____

____

____

c) Finally, what are the conservation practices recommended to you by the CRPA or the Six "S" that best meet your needs and that you actually implemented on your own fields?

____

____

____

24. Are there other new farming practices you use with the new conservation practices that you have implemented on your fields? Yes __1__ No __2__

(If yes) what are these practices?

____

____

____

25. Which practices do you believe are better, your own traditional conservation practices or the new conservation practices recommended by the CRPA and the Six "S"? **(INTERVIEWER, CHECK ONE THAT APPLIES.)**

a) Own traditional conservation practices are better _____

Why are the own traditional/new conservation practices better?

____

____

____

b) New conservation practices are better __________

26. Which agency (CRPA or Six "S") would you say is doing a better job in meeting your needs for soil conservation? (Check one that applies.)

CRPA _____

Six "S" _____

Neither _____

Why do you say the CRPA/Six "S" is doing a better job in meeting your needs for soil conservation?

____

____

____

27. Do the different agencies that help farmers with soil conservation work well together?

Yes __1__ No __2__ Don't know __3__

(If no) Why? ____

____

28. Now, could you tell me how important each of the following were in making your decision to adopt soil conservation practices? Tell me whether they were not important, somewhat important, or very important. (INTERVIEWER, CIRCLE APPROPRIATE NUMBER.)

	Not important	Somewhat important	Very important
Relatives	1	2	3
Spouse(s)	1	2	3
Neighbor(s)	1	2	3
Friend(s)	1	2	3
Village Chief	1	2	3
Trader(s)	1	2	3
CRPA's Agent	1	2	3
Six "S" Agent	1	2	3
Prefect of Department	1	2	3
High Commissioner of Province	1	2	3
Others (specify)			
____________	1	2	3
____________	1	2	3

29. Have you ever taken part in any of the following events in the past five years, and how often did you participate? **(INTERVIEWER, CHECK EVENT ATTENDED).**

	Event	No. attended
____	Farmer training	________
____	On-farm Trial/Demonstration	________
	Others that farmer can specify:	
____	____________________	________
____	____________________	________

FINALLY, I WOULD LIKE A LITTLE INFORMATION ABOUT YOU AND YOUR HOUSEHOLD:

30. How old are you? __________ (Historical events such as WW II, Proclamation of the Republic, Proclamation of the Independence, Partition of the Country, Reinstoration of the country, etc. will be used as a basis for calculating ages).

31. What is your occupation besides farming (such as blacksmith, trader, healer ...)?

____

32. Have you ever attended French School?

Yes ___1___ No ___2___

(If Yes) How long did you stay in:

Primary School? ______________ years

Secondary School? ______________ years

33. Have you ever been enrolled in a literacy training?

Yes __1__ No __2__

(If Yes) Can you read and write in Moore?

Yes __1__ No __2__

34. Have you ever been to any religious school?

Yes __1__ No __2__

(If Yes) How long did you stay in (Interviewer, check school attended):

________ Arabic School __________________ years

________ Catholic School __________________ years

________ Protestant School __________________ years

NOW, I WOULD LIKE YOU TO CHOOSE BETWEEN TWO STATEMENTS:

35. Would you say that, (INTERVIEWER, CHECK THE ONE THAT APPLIES):

a) _____ You are willing to take a few more risks than others to get ahead? **or**

b) _____ You are generally cautious about accepting new ideas?

Would you say that,

a) _____ You regard yourself as the kind of person who has a strong desire to try new ideas? *or*

b) _____ You are reluctant to adopt new ways of doing things until you see them working for people around you?

36. a) Do you belong to any of the following organizations? (INTERVIEWER, CHECK ALL THAT APPLY.)

Village Group	______
Rotary credit or loan ("tontine")	______
Village Council of elderly	______
Departmental Council (of farmers)	______
Provincial Council (of farmers)	______
Religious groups	______
Others (specify):	
______________	______
______________	______

b) How often do you participate in community meetings?

Never ____ Rarely ____ Often ____ Every time ____

37. a) Do you ever visit any city?

Yes __1__ No __2__

b) (If yes) Which city do you visit and how often do you go there?

City(ies)	Frequency
______________	______
______________	______
______________	______

38. How many relatives do you have in the city? ______

Please specify:

Relatives		Number		City	
	______		______		______
	______		______		______

39. How many people are there in your household including yourself? ________

Please Specify: Household head himself ________

Wives ________

Children (under 7) ________

(seven or older) ________

Others (Specify)

________________ ________

________________ ________

40. Do you own any radios?

Yes __1__ No __2__

(If yes) How many? __________

41. How many hours per week do you listen to the radio? __________

42. a) How many houses do you own? __________

b) How many are modern (or squared) houses? __________

43. What else do you think it is important to talk about?

____

____

____

____

THAT COMPLETES THE INTERVIEW, AND I THANK YOU VERY MUCH FOR YOUR COOPERATION.

APPENDIX E: HUMAN SUBJECTS FORM

Last Name of Principal Investigator Dialla

Checklist for Attachments and Time Schedule

The following are attached (please check):

12. [X] Letter or written statement to subjects indicating clearly:
    a) purpose of the research
    b) the use of any identifier codes (names, #'s), how they will be used, and when they will be removed (see Item 17)
    c) an estimate of time needed for participation in the research and the place
    d) if applicable, location of the research activity
    e) how you will ensure confidentiality
    f) in a longitudinal study, note when and how you will contact subjects later
    g) participation is voluntary; nonparticipation will not affect evaluations of the subject

13. [X] Consent form (if applicable)

14. [X] Letter of approval for research from cooperating organizations or institutions (if applicable)

15. [X] Data-gathering instruments

16. Anticipated dates for contact with subjects:

First Contact 3/15/91 Month / Day / Year

Last Contact 5/31/91 Month / Day / Year

17. If applicable: anticipated date that identifiers will be removed from completed survey instruments and/or audio or visual tapes will be erased:

6/15/91 Month / Day / Year

18. Signature of Departmental Executive Officer: Robert F. Meier | Date: 1-28-91 | Department or Administrative Unit: Sociology

19. Decision of the University Human Subjects Review Committee:

X Project Approved ___ Project Not Approved ___ No Action Required

Patricia M. Keith
Name of Committee Chairperson

2-4-91
Date

Signature of Committee Chairperson

GC-1/90