Holistic Management™ in Madiama Commune, Mali

A Report on Preliminary Research
Trip Report for July 2003

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Summary

Eighteen days were spent conducting preliminary research in Madiama and Mopti to address two questions: 1) are members of the Madiama commune successfully managing their dryland pastures using Holistic Management™ grazing planning, and 2) can monitoring of dryland pastures by soil analysis, flora analysis and remote sensing be supplemented by gathering data on ecosystem health indicators by community members themselves, thereby further educating decision makers in the community about healthy grazing lands? The specific aims of the research are:

- Analyze current and past resident and transhumant livestock production practices in Madiama commune.
- Assess the use of Holistic Management™ grazing planning in Madiama commune, including successes, constraints, and the impact that production practices are having on the implementation of grazing plans.
- Identify biological monitoring parameters that are easily recognized and monitored by community pasture managers and users, yet provide scientifically valid data for use in a multi-disciplinary grazing land monitoring program.
- Implement and evaluate a trial community-based monitoring program.

The complete research plan is attached to this report. The plan calls for the delivery of the first of three outputs from this research following fieldwork in July. The bulk of this report, by addressing the first two specific aims, is that output: an assessment of Holistic Management™ planned grazing in Madiama, with recommendations for support and/or improvement, and a analysis of Holistic Management™ planned grazing understanding, use and spread in Madiama.

The Holistic Management™ trainings provided to the CCGRN were trainings of trainers, yet evidence has not been found that the CCGRN members have purposefully passed the information and skills they are receiving on to their fellow villagers. The skills and information are passing on in a limited informal manner, however, through the practices of the CCGRN (for example, when a CCGRN member mediates a conflict), through conversations between village members, and through the training of pasture users by the auxiliaries d'Environnement (AE) as they instruct herders on the grazing plans at Torokoro and Siragourou. Managers and decision makers for the two planned grazing sites (AEs, noyeau dur, the CCGRN and IER field staff) are well versed about the structure of the grazing plans and their management. In general, the plans are being successfully carried out. Anomalies observed, such as evidence of animals having been in the wrong parcels, will likely resolve with practice and facilitation from SANREM to address the underlying causes of these problems. Three overall weaknesses have been identified. First, animal impact on the sites can be improved by developing a system whereby herds using the sites can sleep on the site. Second, the decision making structure that has been established for the site leaves little room for flexibility in carrying out the plan, and changing it when necessary. The essence of Holistic Management™ grazing planning is creating the plan, and then monitoring the plan to ensure that the anticipated results are achieved. The plan can change, and often needs to as nature

delivers unanticipated events. Finally, the thousands of animals that cross the commune during the times of entrance and exit of the delta have the potential to be an important tool in applying animal impact where it is most needed on the two sites, or these herds can deliver unplanned animal impact on a greater scale than the cumulative impact delivered by the village herds that are part of the grazing plans. It would be best to work with the CCGRN to incorporate these herds into the grazing plans.

Action items for this research between now and November field time are:

1. Work with IER scientists to develop an electronic database for their biological monitoring data.
2. Communication with Virginia, Washington and Mopti researchers using GIS as a tool to try and incorporate IER's annual biological monitoring data and the proposed participatory monitoring system.
3. Communication with Todd Crane to GPS mark the main cattle trail through Madiama Commune, and to GPS mark the crossing of some herds through the commune in November.
4. Communication with Virginia researchers and Holistic Management™ consultants to discuss the observations made in July of the two grazing planning pastures.
5. Communication with IER scientists to develop a standard system for compiling information available in the notebooks of the IER field staff, noyeau dur and AEs.
6. Communication with SANREM managers to determine if a plan to facilitate the integration of the migrating herds into the grazing plan, and to develop an agreement for allowing sleeping herds on the pastures, can be integrated into upcoming training plans for the CCGRN, and facilitation of a process by with the CCGRN develops a plan for training villagers in conflict resolution and Holistic Management™ .

Additional field work is planned for November 2003 and February 2004.

Background

Madiama Commune, located in the Mopti Region of Mali's Sahel, contains 10 villages with a total population of approximately 8,000, situated on 17,000 hectares of land. Food production within the commune is primarily agricultural, with the majority of land in the commune dedicated to cropping. However, Madiama has two main features which make the commune a classic example of mixed agricultural production in the Malian Sahel. 1. Madiama is home to a mixture of agriculturalists and pastoralists. 2. Madiama is an entry point to the Niger inland delta, an important passage for transhumants, so that thousands of cattle pass through the commune in a bi-annual cycle.

SANREM research in Madiama is focused on improved methods of natural resource management (NRM) within a landscape ecology framework, and the introduction of conflict resolution techniques that support a participatory model of community level NRM. A commune-wide committee, the Committee Communale de Gestion des Resources Naturale (CCGRN), has been formed with the support of SANREM to facilitate people's participation in research and management activities. To guide the process of empowering decision making at the local level, and encourage participation in research and the adoption of successful results, Holistic Management™ has been introduced by the SANREM project. The Holistic Management™ decision making framework helps communities make decisions in a way that encourages participation while ensuring to the best of the group's ability that the resulting decisions are socially, environmentally and economically sound. Within the Holistic Management™ model are also tools for the planning of land use activities.

Pasture management research in Madiama is focused on the use of grazing and animal impact to improve the health of experimental pastures, thereby increasing their carbon sequestration potential. To this end, Holistic Management™ grazing planning has been adopted to help land managers in Madiama. Two villages in Madiama, Torokoro and Siragourou, have dedicated pastures to this research, and the management of these pastures has been integrated into the responsibilities of the CCGRN. The impacts of this improved management on grazing land health is being measured by remote satellite sensing that is ground-truthed using biological monitoring and soil carbon level quantification. Two unanswered questions in this research are, 1) are members of the Madiama commune successfully managing their dryland pastures using Holistic Management™ grazing planning, and 2) can monitoring by soil analysis, flora analysis and remote sensing be supplemented by gathering data on ecosystem health indicators by the community members themselves, thereby further educating decision makers in the community about healthy grazing lands? Research over the next year (July 2003 – May 2004) will be conducted to address these questions. The specific aims of this research are:

- Analyze current and past resident and transhumant livestock production practices in Madiama commune.

- Assess the use of Holistic Management™ grazing planning in Madiama commune, including successes, constraints, and the impact that production practices are having on the implementation of grazing plans.
- Identify biological monitoring parameters that are easily recognized and monitored by community pasture managers and users, yet provide scientifically valid data for use in a multi-disciplinary grazing land monitoring program.
- Implement and evaluate a trial community-based monitoring program.

The planned outcome for 2003 is a report on Holistic Management™ learning and use in Madiama Commune, and how this baseline knowledge of Holistic Management™ is supporting the planned grazing experiments at Torokoro and Siragourou. To this end, this report is a detailed analysis of what is known at this point concerning the first two specific aims. For the second two specific aims, only a summary of activities and results is provided in this report. In the conclusion, action items are suggested in support of the grazing planning research.

Methods Used July 2003

The foundation of Holistic Management™ is the insight provided by four principles, commonly referred to by practitioners as 'key insights'. An understanding of these insights is the basic background that decision makers need to have in order to practice Holistic Management™. Therefore, in assessing the use of Holistic Management™ grazing planning in Madiama, and the underlying learning that has occurred to enable commune members to adopt these grazing planning procedures, focus was placed on assessing community member's understanding of these key insights. Knowledge of other important elements of Holistic Management™ could have also been probed, such as the testing questions or tools, but it was decided that within the limited time available for each interview, exploring knowledge of the four key insights would allow for the deepest probing of basic undestanding. The key insights are (from Savory, 1999):

1. A holistic perspective is essential in management.
2. Environments may be classified on a continuum from nonbrittle to very brittle according to how well humidity is distributed throughout the year and how quickly dead vegetation breaks down.
3. In brittle environments, relatively high numbers of large, herding animals, concentrated and moving as they naturally do in the presence of pack-hunting predators, are vital to maintaining the health of land.
4. In any environment, overgrazing and damage from trampling bear little relationship to the number of animals, but rather to the amount of time plants and soils are exposed to the animals.

It was assumed that there already exists in the commune commonly used and understood methods for 'reading' the health of a pasture, which take the form of normal, day-to-day observations of one's environment. Undoubtedly, these observations differ according to an individual's principal food production activity, either crop or livestock agriculture.

Therefore, in order to implement and evaluate a trial community-based monitoring program, focus was placed on identifying biological monitoring parameters that are commonly recognized by community pasture managers, users, and other members of the commune.

Finally, it was assumed that pastoralists, both resident and transhumant, would have a significant impact on the successful adoption of Holistic Management™ grazing planning in Madiama. Therefore, it was necessary to develop an understanding of livestock production practices in Madiama commune, how those practices support commune members' positive or negative perceptions towards pastoralists and their animals, and how those perceptions impact the planned grazing experiments.

Three basic methods were employed during three weeks of research in July. Over twenty key-person interviews were conducted in Mopti, Djenne and Madiama Commune. These interviews focused on researchers and field staff at the Institut d'Economie Rurale (IER), government extension agents, commune administrators, village chiefs and notables, CCGRN members, herders who use the two grazing planning pastures, and pasture environmental monitors (auxiliaries d'environnement, AE) for Torokoro and Siragourou. Several members of the Conseil Communale participated in the interview of the mayor of Madiama. A list of open ended discussion topics were used to guide and focus these interviews. These topics are provided in the appendices.

Based on information gained from the key-person interviews, a standard survey was developed, and is included in the appendices. The survey was structured to gain information on current livestock holdings, pasture utilization and preference, the frequency of use of the grazing planning sites at Torokoro and Siragourou, commonly recognized indicators of pasture health, and level of understanding of the third and fourth Holistic Management™ key insights. The survey was designed with the input of IER researchers and field staff, then tested and revised twice in Madiama Village with IER field staff. It was then fine tuned by IER researchers. The survey takes 15-30 minutes to administer, and is being carried out by IER field staff during the months of August and September 2003.

Four villages in Madiama Commune were selected for this survey. Torokoro and Siragourou were included because they are home to the two grazing planning sites. The other eight villages in the commune were then considered and evaluated according to the following criteria (in loose order of importance):

- Food production is predominantly agricultural (as is true in the two grazing planning villages)
- Lack of confounding parameters such as intra-village conflict or a history of non-participation in SANREM activities
- Village livestock are routinely pastured on the east side of the commune (as is true in the two grazing planning villages)
- Human and cattle population numbers are similar to those for the two grazing planning villages
- Geographic diversity – villages spread throughout the commune in the sample

No two villages perfectly matched the above criteria. Therefore, all eight villages were discussed by IER field staff and project researchers, and the best fit was decided upon. Toumadiama and Bangassi were chosen to been included in this survey. Key-person interviews of chiefs and CCGRN members focused on these four villages.

Individuals to be interviewed using the standard survey are being chosen randomly according to the following method. The mayor's office keeps an updated list of each 'exploitation' per village for annual tax purposes. An exploitation is a group of households, usually related (father and sons, or brothers), that share farming activities (usually common fields and/or common grain storage units). Each exploitation is responsible for paying a single annual tax to the mayor's office. In each of the four study villages, the exploitations were randomized, and thirty exploitations per village chosen for inclusion in the study. During the months of August and September, the IER Madiama field staff (3 persons) will go to the head of each chosen exploitation, enumerate the heads of family in the exploitation, and then randomly choose one family head for interview. If that head of family is not available, a second head will be randomly chosen. In Siragourou, where there are only 21 exploitations, one head of family will be interviewed in every exploitation. In addition, there are exactly nine exploitations in Siragourou in which it was clear from the mayor's tax lists that there was more than one head of family. Therefore, in those nine exploitations, a second family head will be randomly chosen.

Observations were also made at the two planned grazing sites, with more time being spent at Torokoro than Siragourou. The purpose of these visits was to look at the pasture layout, and the conditions of the pastures. Signs of animal impact and grazing were also noted. At the Torokoro site, some interesting features such as old corrals, large expanses of bare soil, good tree cover and good grass growth were noted and GPS marked for observation throughout the year as the tools of animal impact and grazing are applied to the site.

In addition to these active research methodologies, reports and papers were obtained from SANREM and IER personnel for review. A list of these reports is included in the appendices.

Livestock Production in and around Madiama Commune

There are three distinct types of livestock owners using natural resources in Madiama commune: agriculturalists, Peul 'autochtone' (herders with homes in Madiama), and Peul 'etranger' (herders from outside the commune).

Most farmers who consider themselves agriculturalists rather than pastoralists own livestock. Usually these livestock holdings consist of small ruminants, but there are farmers who own cattle, most often working and/or milking animals. Those who own cattle usually hire a pastoralist, either autochtone or etranger, but most often etranger, to

herd them during the dry season. Each village has one or more pastoralists that serve as their herders, and these pastoralists can change from year to year. During the wet season the cattle are herded for grazing locally outside the village during the day, when not being used for plowing, and are returned to a nearby corral or the household at night. Small ruminants during the dry season are not herded. They roam on their own throughout the commune during the day for grazing, and return on their own to their household at night. During the wet season they are herded by hired pastoralists, who gather animals from households mid-morning, and take them to pasture outside the commune for grazing, returning them to their households before dark.

Every village in the commune has Peul autochtone. Nerekoro, Promani and Nouna are predominantly Peul. These families carry out crop agriculture as well as herding activities. They may herd their own livestock (small and/or large ruminants) locally, or contract to herd the livestock of agriculturalists in Madiama or other regional communes. Some members of the family can also go on transhumance away from the commune, while others stay to carry out cropping activities.

There are also outside pastoralists (Peul etranger) who utilize the dryland pasture and water resources outside, but nearby, Madiama Commune for extended periods of time during the wet season. During the times of entrance and exit into the bourgoutiere of the delta, which is grazed during the dry season, tens of thousands of animals amass on the dryland pastures to the east of the commune. These pastoralists can be contract herders for farmers in Madiama, but most have no relationship with the commune other than lodging rights. These rights are built on a relationship with someone in the commune at whose house they can store their goods, and where they can go to rest on market days.

Within Madiama Commune there are few natural resources available for livestock production. Water is scarce, with most of the deep wells being reserved for human consumption. The wells around Toumadiama are used for livestock watering, and during the wet season there are numerous ponds in the commune. Within the commune, there is a small amount of pasture available to the north of Tatia-Nouna, and between Bangassi and Torokoro. The Siragourou and Torokoro grazing planning pastures are on the eastern edge of the commune, technically in the commune proper but realistically located in the zone d'attente where herds amass and wait to cross the commune for the delta.

Because Madiama is a point of entrance for the bourgoutiere of the Niger inland delta, tens of thousands of transhumant animals cross the commune during the times of entrance and exit of the delta. The timing of these crossings is a tradition that has been regulated since the historic Dîna system (1808-1862). However, it is now the government administrative structure that is responsible for setting these dates. Beginning in October, transhumant herds start to amass on the eastern border of the commune, waiting for a prescribed date to enter the delta bourgoutiere. In early October a meeting is held at the level of the cercle between herders (joro), the technical services, and local administration (prefet and mayors) to decide upon a recommended date for entrance. A meeting is then held in mid-October at the regional level (haute commissaire) to finalize the first date on which animals can enter the delta. The commune mayor then holds a

meeting of village chiefs and herders' representatives to deliver the chosen date. The date of entrance usually falls within October and November, and this is also the date by which farmers have had to harvest their crops to avoid risk of crop damage by the crossing herds. On that date, and within a short period of time afterwards, all of the herds that had amassed at the commune's border cross Madiama and enter the delta. Most herds cross the commune within a day or two. The main crossing route, a corridor established by the government, is from Torokoro to Bangassi to Nouna and then into the delta. Some herds can remain in the region of Nouna for a period of several weeks, where there is a small amount of grazing and water available in a pond. However, few herders choose this option because rice is grown all around this pond and conflict over crop damage is frequent.

Once the herds enter the delta bourgoutiere, they stay there for the dry season. The date of exit from the delta is less firm. Most herds leave around June. In 2003 an actual date of exit was issued by the haute commissaire (regional level) because of the severity of the drought during the preceding year. As a result of the drought, very little grazing was available at the beginning of the 2003 growing season in the dryland pastures. The haute commissaire decided to take this unusual step to emphasize the importance of leaving the delta and to minimize the conflict that would have ensued if herds had lingered so long in the delta that they would have caused crop damage as they crossed the commune too late into the growing season. Large herds were required to leave by 15 July, and milk and working animals by 31 August.

This quick crossing of the commune by the transhumant herds has lead to the decreasing fertility of commune soils. In the past, with less intensive use of land for agriculture in the commune, transhumant herds would linger in the commune for weeks or months, grazing fallow fields and the residues from cropped fields. Most herders today perceive this to be too much of a risk, because there is less room for movement of herds and very high risk of crop damage. Additionally, it is generally believed that in the past the flooded river at the end of the wet season reached to within a kilometer of Madiama. Therefore, herders could linger on crop fields for grazing after the harvest, while watering their animals at the river. Today the flood level of the river seems to be too far away to move the animals between the river and Madiama's fields on a daily basis. This combination of factors has resulted in Madiama's fields receiving very little manure from the passing herds.

The exception is Toumadiama. In this village, there is a relationship remains between villagers and Peul etranger. Families of outside herders have been allocated fields in the village where they can plant crops. Therefore, during the wet season some family members remain in Toumadiama to tend crops, while others enter the delta with the family herd. At harvest time the herds leave the delta and return to Toumadiama, and remain in the village to graze the residues left on the fields. A herding family will remain in Toumadiama as long as its harvest holds out, usually several months and occasionally for the year.

The relationship between agriculturalists and pastoralists in Madiama Commune are generally positive, the result of a long history of co-existence. There are several pressure points that encourage conflict, however. During the time of entrance into the delta there is inevitably damage to crops caused by the passing herds, as all fields are not harvested in time. Technically, herds are not allowed to enter the commune until the entrance date, and farmers must have their fields harvested by that date. However, water resources in the dryland pastures outside the commune are few, and the pastoralists interviewed said that they sometimes have no choice but to cross before the date because there is no water available to their animals. Also, because of rain induced planting delays, farmers may not be able to have their fields harvested by the crossing date. The exit from the delta can also cause conflict, especially when herders have stayed so long in the delta that their animals damage growing crops as they cross the commune.

Traditionally, herders used established paths to avoid crops still standing in the fields at the time of crossing. Most respondents said that those paths have been incorporated into crop fields. The government established a corridor for herds to cross several decades ago. This corridor is a well marked path 50 meters wide. Although this path has been mandated and set aside by the government, it has also been encroached upon by crop fields. This severe reduction in paths for crossing has increased the chances for conflict between agriculturalists and pastoralists over animals that invade fields and destroy unharvested crops.

Livestock production practices in and around Madiama Commune are having an impact on the success of the two grazing planning sites. Positively, there is a long-term traditional relationship between agriculturalists and pastoralists that encourages a high level of tolerance for the close proximity of herds to the commune. The fact that nearly all agriculturalists are livestock owners themselves reinforces the generally agreed upon need for pasture resources in close proximity to the commune, if not in the commune itself. Most people interviewed knew of the grazing planning sites, and found them to be a good idea.

Crop-lands seem to be viewed as subject to the rights of the individual to make decisions over the resource, while pasture seems to be viewed as a common property resource with general rights of access. This means that if an individual can claim an area of land as his to manage, he will make the logical choice of putting crops on that land and reaping the high level of benefit that the crops provide to the individual, especially if that land is in close proximity to where he lives. Thus the encroachment of crop fields on cattle passages within the commune. If an area of land is not claimed by an individual, then anyone has access to the resources on it. It is most logical to maintain such common property as pasture, forested or not, and all community members will feel that they have the right to utilize that pasture, which is seen as a necessary resource for the community to have. This creates a dynamic where the Madiama community is favorable to having dedicated pastures so that their animals will have a place to graze, if only on the outskirts or outside the commune. The rights of outside herders to also access these resources are less favorably looked upon, most likely because of the underlying conflict between

pastoralists and agriculturalists over the right of herders' access to the delta, and the crop damage that occurs as access is obtained.

Because the two test sites are located so close to the agricultural activities of the commune, herders seem reluctant to use the plots during the wet season so as to avoid crop damage. This is more so the case for Siragourou. During the dry season few animals are on the pastures, because the animals are in the bourgoutiere. Therefore, there are few opportunities throughout the year for managers of the pastures to access the large herds of grazing animals that are critical for creating animal impact. The two times that such large herds are available are the dates of entrance and exit from the delta.

Holistic Management™ and the Grazing Planning Experimental Pastures

From 1999 to 2003, seven trainings in Holistic Management™ were held in Madiama Commune. Participants have been a combination of members of the community, the CCGRN, government and extension officials, and IER scientists and field staff. Three trainings provided an introduction to Holistic Management™ and concepts for practitioners, while four focused on setting up of the grazing planning research sites and the skills necessary for their management. In addition, a series of trainings in conflict resolution were held, sometimes dovetailed with the trainings in Holistic Management™ .

Given the variety of people that have participated in these trainings, there are several contexts in which learning about Holistic Management™ may diffuse through Madiama Commune. However, the CCGRN has been the target group for these trainings, and are the most ready source of information and knowledge for the general public concerning Holistic Management™ . Indeed, the trainings were delivered as trainings of trainers for the CCGRN.

The CCGRN members interviewed described a fairly uniform structure for the passing on of information from meetings and trainings to members of their villages. After a training or meeting, each member informs his or her village chief about the gathering. If the project is requesting that the village participate in a research activity, the chief calls a village meeting and the proposal is presented, so that village members can decide if they will participate or not. The two most common examples of this process given by interviewees (chiefs and CCGRN members) were when the villagers were asked if they had an area of pasture that they could put into the planned grazing experiment, and when they were asked to participate in the tethered grazing experiment. Through this process project activities are explained and villagers have the opportunity to decide if they want to participate. However, the passing on of knowledge gained by CCGRN members about the principles of Holistic Management™ does not seem to take place.

When asked why actual knowledge is not passed on, some CCGRN members indicated that they did not think it was the intention of the trainings for them to diffuse their learning down to village members. The president replied that the CCGRN discussed diffusion of knowledge to village members, and decided that they could not do this until

they had received all of their trainings in Holistic Management™ , which he said would happen at the end of 2003. The CCGRN will then enact a plan to work with the village committees to train villagers in Holistic Management™ . Interviewees could not give specificities about this plan. However, the CCGRN has applied for and received funding from the Foundation de France to hire a consultant to help them with communication, an indication that members are aware of the need to pass on the benefits of their training to other villagers, and that the committee will be addressing the issue with this consultant's help.

At this point, it seems that the purposeful passing on of knowledge concerning Holistic Management™ from those trained by SANREM to other people in Madiama has not occurred. However, there is limited evidence that the informal passing on of knowledge through discussions between individual is taking place. In addition, based on understanding shown of the four key insights, members of the CCGRN, the AEs, and, possibly, some members of the commune, have successfully learned and retained over the long-term key elements concerning Holistic Management™ .

Although reports produced by SANREM state that holism and the holistic goal were covered in trainings, no interviewee showed knowledge about holism, that things can be managed as wholes such as families, villages, or an environment, or what a holistic goal is. Few interviewees were able to discuss concepts associated with the brittleness of an environment, although a small number did. Those interviewees that did, explained that places they have visited in Mali were different environmentally not only because of the amount of rainfall that they receive differs, but also because the moisture delivered to each environment is retained to a greater or lesser degree over time in each place. However, in all fairness to the interviewees and their successful retention of concepts related to these first two key insights, the exact translation of the English words 'holism' and 'brittleness' used during the trainings were unknown to the author, and therefore the words the interviewees may have been trained to recognize may not have been used during these interviews.

Many of the interviewees who attended the Holistic Management™ training sessions showed good knowledge concerning the third and fourth key insights. Common answers to a question concerning the impacts that a herd of animals can have on soil included: hooves break capped soil, if a capped soil is broken water can infiltrate and plants can grow, dung and urine fertilize the soil and make plants grow, and animals casually walking in a line over a long period of time will cause trailing. Some respondents also said that large numbers of milling animals will knock down and destroy standing grasses, which is perceived to be a negative impact. This seems to be an important reflection on the annual dominated pastures in this area, and the value of having dry standing grass late in the year even in pastures that have already been grazed. In a place where rainfall is so unpredictable, who would want to knock down hay and make litter when later in the year hungry animals may need to eat that standing hay? Some respondents also said manure was important for the transport of seeds. Several of the outside pastoralists and untrained community members interviewed showed a similar level of knowledge concerning animal impact, while others did not.

Some interviewees who attended the Holistic Management™ trainings sessions also showed good knowledge of the relationship between time and overgrazing. When asked how a pasture becomes overgrazed, they responded that animals eating the same grasses for a long enough period of time (weeks to years) will cause that plants to be overgrazed. These interviewees typically described the appearance of an overgrazed grass as one that is tired, and therefore growing along the ground rather than standing straight up. Interestingly, some interviewees who did not attend the trainings, particularly pastoralists, also described an overgrazed grass as growing along the ground rather than vertically. However, an equal proportion of interviewees, both trained and untrained, responded that if there are too many animals on a pasture it will become overgrazed, without time being a factor. These respondents typically said that an overgrazed plant is short, or eaten off at the growth point at the soil.

There is evidence that knowledge about Holistic Management™ is spreading informally. The Chief of Bangassi discussed information he gained about Holistic Management™ . Cattle from Bangassi are guarded by an outside Peul herder, who utilizes the pasture at Torokoro. Last year the herder reported to him that there was a new system of management at the site, in which animals are moved in a rotation through different pastures. The herder reported that, in his opinion, the system was good because it allowed grasses to re-grow once they had been grazed. However, this interaction reported by the chief has to be viewed in a larger context. Albadia Toure, an IER technician in Madiama, reported that last year Bangassi's herders refused to agree to the grazing plan and stopped using the site. Despite intervention from IER personnel from Mopti and Madiama, who visited the chief and his council to explain the purpose of the experiment at Torokoro and encourage the herders to return to the site, Bangassi's herders did not use the Torokoro site last year. Hamadou Sangare is an outside Peul herder that is currently grazing his animals on the Torokoro site. He accurately described the Torokoro grazing plan, and that the purpose of the plan was to allow grasses to recover after being grazed. He explained that he learned this information from the AE for Torokoro, Adama Fofana. Interestingly, Mr. Sangare is one of the Peul etranger interviewed who correctly described overgrazing as when animals continually graze the same pasture for too long a period of time. Given this limited data, there is reason to believe that villagers and herders are learning about Holistic Management™ through conversations about the experimental pastures, and instructions received from AEs about management of the pastures.

The experimental site at Siragourou is 83 hectares divided into seven parcels through which animals are rotated every 4 days in the wet season, and every 12 in the dry season. The pasture is closely bordered in most places by agricultural fields. Water is available in a large seasonal pond outside parcel one. This pond is surrounded by rice culture, except for a narrow trail by which animals can access the water. The trail is largely bordered by thorn bush. Currently there is one AE for the site, who is also a CCGRN member. The second was recently chosen and therefore did not participate in the Holistic Management™ trainings. He is currently traveling.

The Torokoro site is 95 hectares divided into six parcels through which animals are rotated every 6 days in the wet season, and every 12 in the dry season. Water is available in a mare outside the site. One boundary of the pasture is a transhumance trail for cattle entering or leaving Madiama Commune. This pasture is regularly used by herders from three villages, Bangassi, Paradougou and Torokoro. The pasture is part of over 260 hectares of land set aside for protection by the village for a World Bank Project, Gestion des Resources Naturale (PGRN), that began in 1996. Under this protection the entire site can be grazed, but not be used for agriculture. Two AEs from the village are responsible for management of the site. The AEs work with the long-time village Peul herder, Hamidou Bah, by explaining to him where the animals should be at any particular time. Mr. Bah is then responsible for explaining the plan to any other herders that are on the site.

The management routine seems to be that the AEs visit the sites one to three times a day to give instructions to the herders present and assure that those instructions are being followed. However, it is not clear that the AEs are getting to the sites on a daily basis. Although the exact working and decision making structure is not clear, the following seems to be the general pattern. The AEs make observations of grasses when herds are to enter a new pasture to see if there is enough to maintain the animals, and of trees to make sure no-one is illegally cutting them. If the AEs feel that the grazing plan needs to be changed, they can take the information to the noyeau dur, who, if in agreement, can ask the CCGRN to consider changing the plan. The CCGRN would make this decision in consultation with the IER technicians in Madiama. However, responses during the interviews seemed to indicate that two contradictory dynamics concerning observations of the pastures and decision making for the grazing plan are taking place.

Each level involved in pasture management (AE, noyeau dur, CCGRN and IER technician) reports that they have some responsibility for making observations. However, there is no clear indication of who is responsible for making a decision to change the grazing plan based on the results of these observations. In reality it may be that few observations concerning recovery of the grasses are being made, and no decisions to change the plan are ever taken. This possibility is supported by statements made by some members of the decision making chain that the grazing plan (6 day rotation at Torokoro and 4 day at Siragourou) cannot be changed at all, and some saying that the only change that can be made is to take animals completely off the pastures if it seems that the amount of forage available will not suffice for the amount of days allocated. This is an observation of how much actual forage is available, not of the state of recovery of the grasses.

This possible lack of real observations or decisions for change seems to be supported by the fact that all interviewees in the decision making chain reported that there have not been changes made to the grazing plan since its inception in July 2002. The 2002 rainy season had a severe rainfall deficit. Some interviewees reported that the grazing plan for the two pastures was carried out unchanged during the drought. This supports the dynamic of lack of real observations and/or lack of a real mechanism for changing the grazing plan, because slower or non-growth of grasses on the sites would have

necessitated a change last year. However, some interviewees reported that the plans were entirely abandoned last year because of the drought, and animals left to find forage wherever they could on the sites. What really happened was likely a mixture of both. The plan was faithfully followed for a period of time until the sites appeared denuded of available forage, and then the plan was abandoned.

If it is true that recovery periods are not being observed, and/or changing the grazing plan is thought to be impossible, then what is really being tested on these two sites is a rotational grazing scheme. This highlights the importance of key insight number four in Holistic Management™ planned grazing, in which overgrazing is believed to be a factor of time. When grazed, grasses need time for regrowth before being grazed again. If they are grazed before they have fully recovered, then they will be overgrazed. The danger in overgrazing in brittle environments is that it leads to simplification of the community and contributes to desertification. Each species in a community has a different recovery period, and those recovery periods vary according to available moisture and temperature. In a partial drought recovery periods grow longer. If one sticks to a grazing plan formulated on a median recovery period (as the plans at Torokoro and Siragourou are), then during slow recovery times overgrazing will occur. However, it must be pointed out that though this point is critically important in Holistic Management™ grazing planning, this is only one point within a context of extraordinary learning, coordination and communication that has occurred over the last 18 months in the establishment of the two grazing planning pastures.

In July 2003, the following observations were made of the two pastures. On the Torokoro site there was limited overgrazing, but overgrazing was prevalent immediately off the site, in an area where the village's herder was corralling his animals just outside of parcel one. Because observations were only made in parcels one (grazed under the plan for the first time four days prior to observations) and two (currently being grazed), comparisons between 'grazed' and 'ungrazed' parcels could not be made. On the Siragourou site there was some evidence of overgrazing in the form of a few overgrazed plants here and there in all the parcels observed, even those that had not been grazed according to the plan. Animal impact in the parcels that had been grazed, according to the plan, was significant in both pastures. Annuals are dominant on both pastures.

Interviewees generally agreed that there is more soil cover on the Torokoro site than on the Siragourou site. Biological monitoring transects performed by IER scientists in October 2002 showed 35% and 63% bare ground at the two sites, respectively. However, the general features of the two sites, and evidence of erosion and soil degradation, are similar.

GPS points were taken of the following features at the Torokoro site:

Parcel	Northing	Westing	Comments
1	13 52.112 13 52.118 13 52.113	4 18.713 4 18.720 4 18.723	Circular perimeter of old cattle park used for one month in July

	13 52.109	4 18.718	02 app. 11m diameter. No grass, bare laterite, litter 2.
1	13 52.085 13 52.083 13 52.081 13 52.082	4 18.706 4 18.706 4 18.704 4 18.701	Circular cattle park used Aug-Oct 02. Bare laterite, litter 2.
1	13 52.087	4 18.735	Circular small ruminant park used July 02, app. 3-4m diameter.
1	13 52018	4 18.750	Bare area of erosion pavement, app. 70m x 30m. GPS point taken in middle. Little 1 (manure from recent cattle) and 2 (manure from 2002).
Line of 1 and 2	13 52.085	4 18.780	Small group of trees, capped bare clay and sand.
Line of 1 and 2	13 52.129	4 18.789	Small group of trees. 20% soil cover. Plentiful litter 2, mostly annuals but some seedlings could be perennials, and forbs.
2	13 52.163	4 18.803	Clear capped clay 25m x 13 m
2	13 52.215	4 18.814	Capped clay soil. 30% plant over. Micro-perennials, no overgrazing. Forbes.
Line of 1 and 2	13 52.267	4 18.353	Clear area with brush encroachment 15m x 20m.

Summary: Community-based Monitoring of Grazing Planning Pastures

Interviewees were asked how they measure the health/goodness/quality of a pasture. Responses were:

- Animal weight gain, good milk yield, first calving for heifers at 2 years, a lot of grass, appetizing species, water available. In a poor pasture that is improving, you would see new grass species, and increased milk production.
- The quality of the grass, healthy animals.
- Grass one foot tall, the percent of soil covered by grass, lots of leaves on the trees, presence of small wildlife.
- Height of the grass, abundance of the grass, few bare places, the winds don't blow off the soil, the grasses are appetizing.
- Height of the grasses, many appetizing grasses, appetizing trees, not a lot of hard soil.
- Lots of grass, appetizing grass, animal weight gain, height and color of the grass.
- Quality of grass (there are those that are appetizing when young, but not appetizing after flowering; there are those that are always appetizing), abundance of appetizing grasses, lots of trees with leaves that fertilize the soil; bare gravel soil or bare clay soil is bad, but if light, movable earth is abundant grass will grow; birds need to eat seeds; wild animals like good pasture.
- Filled with grass, lots of trees, lots of bushes, the soil is soft and workable.

Answers consistently included the quality and quantity of forage. Pastoralists usually also mentioned animal performance. Based on these rough ideas about how people in Madiama Commune read the health of a pasture, questions have been included in the August/September survey to gain a more quantitative estimate of the most commonly recognized indicators of pasture health. Groups of questions were developed to identify the most commonly recognized indicator out of four in each of five groups of indicators: grasses, trees, soil, wildlife, livestock performance. These results will be used to develop a simple, participatory system of monitoring for the two grazing planning sites based on the indicators most meaningful to members of Madiama Commune. The purpose is to include those people who use the resources available on the pastures, and are ultimately responsible for their long-term management, in monitoring the changes that should be occurring as a result of grazing planning. The plan is to implement this monitoring system in October.

Action Items and Conclusions

The findings presented in this report are preliminary. More depth needs to be added to the database before coming to firm conclusions about the relationship between outside pastoralists and the commune, exactly how these herders fit into the management of the two planned grazing sites, the spread of Holistic Management™ in Madiama Commune, and the management and decision making structures associated with the two planned grazing sites. Further depth of understanding of pasture management and decision making will be critical to implementation of a participatory monitoring system.

Biological monitoring for the two pastures takes place annually in October. Each monitoring point from 2002 was georeferenced. For the monitoring of change at the ground level, fitting this data into the current GIS-based system of data management for

the two sites would provide interesting additional information to support the remote sensing and soil sampling that is already taking place. Given the GIS capacity at IER, it should be possible for SANREM and IER GIS personnel to work together to integrate this data. In addition, the proposed participatory monitoring to be implemented in October should be integrated into this single monitoring system.

A system of record keeping in notebooks was established for the managers (AEs, noyeau dur and IER field staff) of the two planned grazing sites this year. These notebooks will provide researchers with information about numbers of animals on the two grazing planning sites, observations being made by each group of managers, and any changes made to the plan. A system for systematically gathering the information available in these notebooks would supplement monitoring.

Monitoring of the grazing planning site at Torokoro should be built to take advantage of the natural control established at that site. A little less than half of the PGRN protected area was dedicated by the village for the grazing planning experiment. Therefore, monitoring should also take place in the protected area that is not part of the experiment to see if a difference between the two otherwise similar areas can be measured as a result of the application of planned grazing.

By adding these four monitoring plans (a participatory system of simple monitoring carried out by pasture users and managers, the annual biological monitoring carried out by IER, records of observations and changes made by pasture managers, data from the PGRN protected area outside the pasture in Torokoro) to the research that is occurring on the two grazing planning sites (remote sensing, soil content analysis), a rich picture of change on the pastures may develop. The monitoring system would also be able to detect earlier indicators of change than might be possible with more remote methodologies. The Carbon from Communities project has a three year time span. Given that the first year was spent in building the management foundation for the project in Madiama, and a serious drought occurred in the second, the addition of monitoring plans geared toward catching earlier indicators of change during the remaining year of the project might provide important background information. This background information might argue for continuation of the research based on early change that, according to the theory on which the project was built, would result in more remotely sensed change in the future. For SANREM, involving resource users in the monitoring would provide an avenue for getting information out to end users about the NRM tools being tested.

GPS marking of the main cattle trail through Madiama Commune would also add to the remote mapping of resources in the commune. Todd, the anthropology graduate student currently in Madiama, has indicated an interest in marking this trail, as well as following some herds during the November crossing so as to GPS mark the path of their passage.

In support of the grazing planning experiments, two methods for significantly increasing animal impact on the two sites can be implemented. A plan for incorporating the November and, more importantly, the May/June migrations into the grazing plans should be developed. Large herds of milling animals would significantly change the capped,

bare areas that are so prevalent on both sites. Although the animals that are crossing the commune during the entry and exit times could provide this animal impact, it is understood that there are significant social and cultural barriers to inviting outside herders to drive their animals across the planned grazing sites. However, it seems that it could be done by bringing the AEs, village leaders from Torokoro and Siragourou, the noyeau dur and Peul leaders (including the Nerekoro herders' association) together to form a plan, perhaps with the mediation of SANREM personnel working on Holistic Management™ and conflict resolution. Also, it may be best to try and implement the plan during the more leisurely, and thus easier to control, exit from the delta, when standing hay has less value. However, undoubtedly the herds will cross the sites in November, and their animal impact in just a few days can be greater than the cumulative impact of the village herds that are being used in the grazing plan. Therefore, bringing these decision makers together to at least plan how to direct the moving herds in November would helpful.

Right now, grazing is the main tool being applied to the two sites. The opportunity to apply animal impact, for the most part, is being lost because the herds do not sleep on the site. Manure and urine created from forage on the sites are being exported from the pastures on a nightly basis. Again, there are underlying social and cultural reasons for why animals are not kept on the sites at night, as well as reasons having to do with the research. It is important for the research that the grazing plan is followed as closely as possible, and that herds are not allowed to graze in parcels other than the one designated at any given time. The fear is that if outside herders are left on their own overnight without supervision, their animals will be able to wander wherever they want. However, with the tool of conflict resolution available to the CCGRN, it seems that this can be overcome. Last year Hamidou Bah, the Peul herder for Torokoro, built a corral to house his animals at night on the Torokoro site before being instructed to move off the site. Imagine, for example, an agreement where traditional thorn bush corrals are established on the piece of land in each parcel most in need of hoof action, dung and urine when the herds move into that parcel, and are moved along to the next parcel when the herds move.

At this point it seems that the CCGRN members have been reporting to their villagers about SANREM related research activities, and asking villagers to decide themselves if they will participate in these activities. What doesn't seem to be happening is the training of villagers by the CCGRN in the skills and concepts they have learned, most specifically, in this case, Holistic Management™ . As training reports from SANREM emphasized that the trainings being provided to the CCGRN were trainings of trainers, so that the CCGRN members could then train the members of their community, this seems to need addressing. Perhaps the next training provided to the CCGRN can include the formation of a diffusion plan, as suggested by the CCGRN president, in concert with the CCGRN's work with their new communication consultant.

Action items for this research between now and November field time are:

1. Work with IER scientists to develop an electronic database for their biological monitoring data.

2. Communication with Virginia, Washington and Mopti researchers using GIS as a tool to try and incorporate IER's annual biological monitoring data and the proposed participatory monitoring system.
3. Communication with Todd Crane to GPS mark the main cattle trail through Madiama Commune, and to GPS mark the crossing of some herds through the commune in November.
4. Communication with Virginia researchers and Holistic Management™ consultants to discuss the observations made in July of the two grazing planning pastures.
5. Communication with IER scientists to develop a standard system for compiling information available in the notebooks of the IER field staff, noyeau dur and AEs.
6. Communication with SANREM managers to determine if a plan to facilitate the integration of the migrating herds into the grazing plan, and to develop an agreement on sleeping herds on the pastures, can be integrated into upcoming training plans for the CCGRN, and facilitation of a process by with the CCGRN develops a plan for training villagers in conflict resolution and Holistic Management™ .

Additional field work is planned for November 2003 and February 2004.

Appendix 1 – Discussion Guide for Key-persons Interviews July 2003

General

1. Impressions of the SANREM project.
    a. What have been the benefits and constraints?
    b. How was Holistic Management™ introduced?
    c. How does the information and knowledge given to the CCGRN during trainings get passed on to people in the village?
2. How can one measure the health/goodness/quality of a pasture (grasses, soils, trees, animals, erosion, carrying capacity, animal performance, etc)?
3. What have they heard about the grazing planning sites at Terekoro or Siragourou?
    a. Who informed them?
    b. What have they learned?
    c. What are their impressions?
4. What problems are associated with the grazing planning pastures?
5. What is the relation between pastoralists and the villages?
    a. Who herds village animals, and how?
    b. What resources are available in the village for livestock?
    c. What benefits do livestock bring to the village?
    d. How do the delta crossings affect the village?
    e. What conflicts are encountered?
6. How can a pasture reach a state of being overgrazed? What does an overgrazed grass look like?
7. What are the impacts of herds of animals on soil?
8. Why do different environments respond in different ways to management?
9. What has been learned about managing wholes like families, villages, or a grazing site? What is a holistic goal?

Specifically for Herders

1. Home base
    a. Village and commune
    b. autochtone or etranger
2. Livestock production choices over the past five years
    a. Animal numbers
    b. Map last 5 years of migrations
    c. What resources have they been seeking?
3. Who do they have relations with in and around Madiama, and of what nature?
    a. Other pastoralists – how do pastoralists relate to one another on a pasture
    b. Lodging relations with Madiama
    c. How long do they spend in Madiama
    d. What are the natural resources available in Madiama (water, pasture, salt, browse)
    e. Are they hired herders for someone in Madiama? What is the nature of the relationship (payment, rights)?

Specifically for AEs and Noyeau Dur

1. What is the grazing plan (Torokoro or Siragourou)?
2. What are the objectives for change in the health of the pasture under management?
3. What is the work of the AE? Noyeau dur?
    a. Communication structure
    b. Frequency of pasture visits
4. What kinds of observations is he (AE or noyeau dur) responsible for making on the site?
5. What animals are using the site and when?
    a. Species and numbers
    b. Where do they come from
    c. Type of herder
6. How does the grazing plan get communicated to herders using the site?
7. What happened to the grazing plan last year?

Specifically for Government and Chiefs

1. How are households enumerated for government record keeping?
2. Impressions of the SANREM project
    a. What have been the benefits and constraints?
    b. How was Holistic Management™ introduced?
    c. How does the information given to the CCGRN during trainings get passed on to people in the village?

Appendix 2 - Questionaire for August and October 2003

Date_____Nom de l'enquêteur_____

1.1. Nom Chef de Ménage_____ 1.2. Activité Principale: Agriculteur / Eleveur
1.3. Village_____ 1.4. Quartier_____ 1.5. Ethnie_____
1.6. Nom Chef d'exploitation_____

2. Effectif du Bétail
2.1. Bovins_____ 2.2. Ovins_____ 2.3. Caprins_____ 2.4. Equins_____ 2.5. Asins_____

3. Pâturage utilisé par le ménage
3.1. Où pâturent vos bovins pendant la saison pluvieuse?_____
3.2. Où pâturent vos bovins pendant la saison sèche?_____
3.3. Qui est votre berger des bovins pour la saison pluvieuse? _____ Local / Etranger
La saison sèche?_____ Local / Etranger
3.4. Où pâturent vos petits ruminants pendant la saison pluvieuse?_____
3.5. Où pâturent vos petits ruminants pendant la saison sèche? _____
3.6. Qui est votre berger des petits ruminants pour la saison pluvieuse? _____Local / Etranger
La saison sèche?_____ Local / Etranger

4.1. Arrangez les points suivants dans leur ordre du meilleur pâturage pour les bovines (1 = meilleur, 5 = moins bon):
_____Tige de mil
_____jachre courte (1-2 annes)
_____jachre longue (>2 annes)
_____La brousse
_____Bourgou

4.2. Arrangez les points suivants dans leur ordre du meilleur pâturage pour les petits ruminants (1 = meilleur, 5 = moins bon):
_____Tige de mil
_____jachre courte (1-2 annes)
_____jachre longue (>2 annes)
_____ La brousse
_____Bourgou

5. Les Sites de Torokoro et Siragourou – Remplir le tableau avec les réponses des questions suivantes.
5.1. Est-ce que vos bovins ont pâturé au site de Terekoro cette campagne ou le campagne passée?
5.1.1. Si oui, est-ce que leur performance a été bonne, moyenne ou mauvaise ?
5.2. Est-ce que vos petits ruminants ont pâturé au site de Torokoro cette campagne ou le campagne passée?
5.2.1. Si oui, est-ce que leur performance a été bonne, moyenne ou mauvaise ?
5.3. Est-ce que vos bovins ont pâturé au site de Siragourou cette campagne ou le campagne passée?
5.3.1. Si oui, est-ce que leur performance a été bonne, moyenne ou mauvaise ?
5.4. Est-ce que vos petits ruminants ont pâturé au site de Siragourou cette a campagne ou le campagne passée?
5.4.1. Si oui, est-ce que leur performance a été bonne, moyenne ou mauvaise ?

	Torokoro cette campagne	Torokoro campagne passée	Siragourou cette campagne	Siragourou campagne passée
Bovins	Oui/Non Bonne/Moyenne/Mauvaise	Oui/Non Bonne/Moyenne/Mauvaise	Oui/Non Bonne/Moyenne/Mauvaise	Oui/Non Bonne/Moyenne/Mauvaise
Petits Ruminants	Oui/Non Bonne/Moyenne/Mauvaise	Oui/Non Bonne/Moyenne/Mauvaise	Oui/Non Bonne/Moyenne/Mauvaise	Oui/Non Bonne/Moyenne/Mauvaise

6. Sur les tableaux suivants, quels sont les indicateurs d'un pâturage dans un état de bonne santé.

6.1.1. Tableau 1.

Indicateurs	Très Fort	Moyenne	Moin Fort	Non indicateur
a. Les herbes sont hautes et abondantes				
b. Les herbes sont appétissantes pour les animaux				
c. Les herbes sont de plusieurs espèces (annuelle et vivace, les deux)				
d. Il n'y a pas du surpâturage				

6.1.2. Quel est l'indicateur ci-dessus le plus significatif?_____

6.2.1. Tableau 2.

Indicateurs	Tres Fort	Moyenne	Moin Fort	Non indicateur
a. Les arbres sont divers				
b. Les arbres sont appétissants pour les animaux				
c. Il y a un mélange des arbres et des arbustes				
d. Les arbres ne sont pas coupés				

6.2.2. Quel est l'indicateur ci-dessus le plus significatif?_____

6.3.1. Tableau 3.

Indicateurs	Tres Fort	Moyenne	Moin Fort	Non indicateur
a. Il n'y a pas de glacis				
b. Il n'y a pas d'érosion hydrique				
c. Le sol est couvert par les plantes et de la litière				
d. Le sol garde l'eau pendant long temps				

6.3.2. Quel est l'indicateur ci-dessus le plus significatif?_____

6.4.1. Tableau 4.

Indicateurs	Tres Fort	Moyenne	Moin Fort	Non indicateur
a. Il y a les signes des oiseaux				
b. Il y a les signes des petits animaux sauvages				
c. Il y a les signes des gros animaux sauvages				
d. On peut voir les animaux sauvages dans le pâturage				

6.4.2. Quel est l'indicateur ci-dessus le plus significatif?_____

6.5.1. Tableau 5.

Indicateurs	Tres Fort	Moyenne	Moin Fort	Non indicateur
a. Le bétail prend de l'embonpoint sur le pâturage				
b. Les vaches produisent beaucoup de lait				
c. Le bétail a eu une amélioration de vêlage/agnelage				
d. Le bétail ne tombe pas malade				

6.5.2. Quel est l'indicateur ci-dessus le plus significatif?_____

7. Choisissez la meilleure réponse.

7.1. Dans les pâturages, le surpâturage est causé par qui ?

_____Trop d'animaux qui broutent dans le même endroit

ou

_____Les animaux passent trop de temps dans le même endroit

7.2. Les empreints des sabots des animaux qui cassent le sol peuvent faire quoi sur le sol ?

_____Permettent l'infiltration de l'eau

ou

_____causent l'érosion du sol

Appendix 3
Christine Jost
July 2003 Schedule of Activities

		Plan 1	
Day	**July**	**Place**	**Activity**
Fri	4	Ouagadougou to Bamako	Travel
Sat	5	Bamako	Meetings with Keith Moore and Carla Roncoli
Sun	6	Bamako to Mopti	Travel
Mon	7	Mopti	Meetings IER
Tue	8	Mopti	Meetings IER
Wed	9	Mopti to Djenne	Meetings Djenne
Thu	10	Madiama	Meetings Madiama and pasture observations
Fri	11	Djenne and Madiama	Meetings Djenne and Madiama
Sat	12	Djenne to Mopti	Meetings Madiama
Sun	13	Mopti	
Mon	14	Mopti	Meeting with Ballo
Tue	15	Mopti to Madiama	Interviews Madiama
Wed	16	Madiama	Interviews Madiama
Thu	17	Madiama	Interviews Madiama
Fri	18	Madiama	Interviews Madiama
Sat	19	Madiama	Interviews Madiama
Sun	20	Madiama	Interviews Madiama
Mon	21	Madiama	Develop questionnaire with IER Madiama
Tue	22	Madiama to Mopti	Test questionnaire with IER Madiama
Wed	23	Mopti	Meeting with Ballo, finalize and copy questionnaires
Thu	24	Mopti to Bamako	Drop off questionnaire to IER Madiama
Fri	25	Bamako	
Sat	26	Bamako to U.S.	Meeting with Ozzie and Meriam

Appendix 4

Biological Monitoring Following Holistic Management™ Training in Madiama, Mali

July 2003 – May 2004

Tufts University School of Veterinary Medicine, International Program
Virginia Technical University SANREM CRSP

Research Plan

Duration: 1 Year
Field Work: 3 Weeks July 2003
2 Weeks November 2003
2 Weeks February 2004
Site: Mali, Madiama Commune
Personnel: Christine Jost, DVM, MA, Holistic Management™ Certified Educator
Adama Ballo, IER, Director ESPGRN

Background

Holistic Management™ , with its grazing planning procedures, is a tool that is being used to help land managers in Madiama commune develop and implement grazing plans for the pastures they manage. The incentive for communities in Madiama to plan their grazing is the increased availability of natural resources and decreased environmental degradation that good grazing practices bring. The proposed overall national and global benefit derived from well managed grazing lands is increased carbon sequestration through reversal of the high rate of land degradation taking place in the Sahel today. However, Holistic Management™ is not simply a technical 'fix' that can be applied to a pastoral system that will automatically create healthier pastures. It is a decision making framework that helps communities make decisions that are environmentally, socially and economically sound. It is a different way of making decisions which requires change in its practitioners, and it requires time.

Communities in the Madiama commune have been receiving training in Holistic Management™ over the past four years so that they can better manage their pastures. The impacts of this improved management on grazing land health is being measured by remote satellite sensing that is ground truthed using on the ground biological monitoring and soil carbon level quantification. A this point the unanswered questions in this project are, 1) are members of the Madiama commune managing their dryland pastures using Holistic Management™ grazing planning, and 2) can biological monitoring by soil analysis, flora analysis and remote sensing be supplemented by data gathered using simple ecosystem health indicators gathered by the community members themselves, thereby further educating decision makers in the community about healthy grazing lands?

To address these questions, two hypotheses are proposed in this research:

H1. Villages in the Madiama commune are successfully practicing Holistic Management™ grazing planning.

H2. A scientifically valid method of community-based grazing land biological monitoring can be developed and implemented in Madiama commune that supplements current scientific monitoring activities while directly involving community members in the monitoring, thereby serving to educate community members about healthy grazing lands.

Specific Aims

The following specific aims are proposed to address each hypothesis:

H1. Villagers in the Madiama commune are successfully practicing Holistic Management™ grazing planning.

SA1. Analyze current and past resident and transhumant livestock production practices in Madiama commune.

SA2. Assess the use of Holistic Management™ grazing planning in Madiama commune, including successes, constraints, and the impact that production practices are having on the implementation of grazing plans.

H2. A scientifically valid method of community-based grazing land biological monitoring can be developed and implemented in Madiama commune that supplements current scientific monitoring activities while directly involving community members in the monitoring, thereby serving to educate community members about healthy grazing lands.

SA3. Identify biological monitoring parameters that are easily recognized and monitored by community pasture managers and users, yet provide scientifically valid data for use in a multi-disciplinary grazing land monitoring program.

SA4. Implement and evaluate a trial community-based monitoring program.

Methods

SA1. Analyze current and past resident and transhumant livestock production practices in Madiama commune.

M1. Review Adama Ballo's Madiama livestock production paper for livestock population numbers, residence vs. transhumance, management practices, transhumance patterns and natural resource availability and use.

M2. Focus group interviews, livestock owners in 4 study communities (see SA2, M3 below): livestock production choices over 5 years of project (animal movements, changes in herd size, natural resource availability and use), relation to agricultural practices, and interactions with resident and non-resident pastoralists.
M3. Focus group interviews, herders in 3 Peul predominant communities (Nerekoro, Promani, Tatia-Nouna): livestock production choices over 5 years of project (animal movements, changes in herd size, natural resource availability and use), relation to agricultural practices, interactions with other resident and non-resident pastoralists.
M4. Focus group interviews, non-resident herders: livestock management practices, transhumance patterns, decision making, natural resource availability, agro-pastoral conflict.
M5. Obtain livestock census data for Madiama Commune (resident and transhumant) from the local livestock office (Djenne?).
M6. Obtain PRA maps for 4 study communities, and insert transhumance routes and natural resources used in livestock husbandry.
M7. Obtain a copy of the Mali Charte Pastorale.
M8. Key person interviews, NRMAC committee members, government and community decision makers: familiarity with and implementation of the pastoral code.
M9. GIS study: GPS mark transhumance routes through commune, major commune natural resources, Madiama/delta boundary and delta entry points located in Madiama commune. Collate this information with currently available GIS data (base layers [village location, roads, water courses, toposequence], 2 grazing planning pasture boundaries, water points).

SA2. Assess the use of Holistic Management™ grazing planning in Madiama commune, including successes, constraints, and the impact that production practices are having on the implementation of grazing plans.

M1. Discussions with Virginia Tech and IER personnel concerning training activities, and review of all training reports and documents.
M2. Communication with Ahmed Mohamed Nadif, Jeff Goebel and Sam Bingham concerning training activities and intent.
M3. Structured interviews of villagers in four Bamanan predominant communities in Madiama commune, two involved in planned grazing (Siragourou and Torokoro) and two not (Bangassi and Toumadiama), concerning their knowledge of and involvement in Holistic Management™ planned grazing. The interviews will consist of statistically analyzable questions concerning key concepts in Holistic Management™ grazing planning, level of participation in planned grazing (animal numbers in the scheme, % of family herd in the scheme, # of villagers participating in the scheme and their corresponding # of animals), and level of satisfaction with planned grazing scheme. Interviewees will be men (grazing planning decision makers) chosen to represent 10% (or at least 30 families) of the village population, and the clan composition of the village.
M4. Focus group interviews, women and men in 4 study communities (farmers and pastoralists): introduction to and use of Holistic Management™ grazing planning.

M6. Focus group interviews, non-resident herders (both from other Madiama commune villages or non-resident herders): use of the 2 planned grazing pastures, introduction to and use of Holistic Management™ grazing planning.
M6. Key person interviews, NRMAC committee members: Holistic Management™ trainings and their recollections of learning, knowledge and use of Holistic Management™ planned grazing, results of the exclusions established in Siragourou and Nerekoro 2000-2001, committee plan for the diffusion of Holistic Management™ in Madiama commune, Holistic Management™ use in Madiama commune, constraints, future steps, and impact of the pastoral code on the planned grazing.
M7. Key person interviews, government and community decision makers: knowledge and use of Holistic Management™ planned grazing, Holistic Management™ use in Madiama commune, constraints, future steps, impact of the pastoral code on the planned grazing.
M8. Key person interviews, auxilliare environmental: history of the planned grazing pasture since implementation of grazing plan (August 2002), numbers of and movements animals in the planned grazing scheme, methods of and factors in decision making in the planned grazing, methods and content of communication with animal owners, successes, problems.

SA3. Identify biological monitoring parameters that are easily recognized and monitored by community pasture managers and users, yet provide scientifically valid data for use in a multi-disciplinary grazing land monitoring program.

M1. Structured interviews in 4 communities: biological indicators of pasture health.
M2. Key person interviews, auxilliare environmental: current monitoring activities, progress with new observation notebooks, capacity for increased monitoring.
M3. Key person interviews, IER village based technicians: current monitoring parameters, capacity for increased monitoring.
M4. Detailed analysis of 2002 Holistic Management™ biological monitoring data from 2 planned grazing pastures, including integration with GIS study (geo-referenced biomonitoring points on pasture base layers).

SA4. Implement and evaluate a trial community-based monitoring program.

M1. Develop a description of all monitoring that is currently being carried out on the pastures (local grazing monitoring, GIS, remote sensing, soil sampling).
M1. Narrow list of indicators obtained from SA3, M1 with the participation of key persons and village focus groups on October.
M2. Implement community-based monitoring system in the two grazing planning villages in October with the participation of community volunteers and under the supervision of IER Madiama personnel.
M3. Focus group interviews (March), villagers involved in monitoring: impressions, new knowledge, and confusion.

Research Instruments

1. Structured village survey (30 men x 4 villages = 120 interviews)
2. Focus group interviews in 4 villages (men + women = 8 groups)
3. Focus group interviews resident herders
4. Focus group interviews non-resident herders
5. Key person interviews NRMAC committee members
6. Key person interviews government
7. Key person interviews community decision makers
8. GPS marking of transhumance routes through villages, major village natural resources, Madiama/delta boundary and delta entry points located in Madiama commune
9. Multiple sources of background data and information: IER reports, Virginia Tech reports, reports by Holistic Management™ trainers, village PRAs, 2 planned grazing pastures PRAs, GIS base layers, GPS of water points, GIS study of soil maps, government livestock census, pastoral code, 2002 Holistic Management™ biological monitoring from 2 pastures, UNICEF population stats.

Outputs

Publication on potential community-based biological monitoring parameters for pastures under Holistic Management™ planned grazing in Madiama Commune.

1. The results of a one-year community-based biological monitoring system in villages practicing Holistic Management™ planned grazing in Madiama Commune.
    a. Using the community-based parameters developed in the initial research phase.
    b. Integrated with the monitoring already in place (plant diversity, recovery rate, biomass production [both standing and liter], soil sampling)
    c. Carried out by community members and IER Mopti.

Publication on livestock production in Madiama.

1. Census of resident animals.
2. Census of transhumant animal numbers visiting the area.
3. Detailed description of resident livestock farming practices in the Madiama area.
4. Detailed description of transhumant livestock management patterns in the Madiama area, including mapping with GIS - decision making framework including dates of residence, movement patterns (what drives the transhumance choices, where are they coming from, where do they go), natural resource use, impact on grazing plan scheme.
5. The impact of production patterns in Madiama on Holistic Management™ planned grazing trials in the commune.

Report and/or publication on:

1. An assessment of Holistic Management™ planned grazing in Madiama, with recommendations for support and/or improvement (how much time is needed before we start to see something, how are water rights impacting adoption of planned grazing, what are pasture access rights, how are they impacted by major transhumance routes)
2. An analysis of Holistic Management™ planned grazing understanding, use and spread in Madiama.
    a. What training has occurred, and who
    b. Household understanding and use of Holistic Management™
    c. Community/village use
    d. Commune committee (NRMAC) use and spread (drama groups, meetings?)
    e. Grazing planning and decision making

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