Livelihoods Without Livestock:

A Study of Community and Household Resource Management in the Village of Andaladranovao, Madagascar

Report of an RRA Case Study
Carried out December 17-22, 1998

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Chapter 1: Introduction to the Study

Context

This RRA case study was carried out in the village of Andaladranovao (*fokontany* of Tsara Fara) by a team from the Malagasy NGO CCD-Namana, working in conjunction with RRA trainer Karen Freudenberger. CCD-Namana is an NGO based in Fianarantsoa, Madagascar that works on community development issues in the Fianar region. Its current work focuses particularly on projects in the town of Ambalavao, and rural development activities in the commune of Ambohimahamasina, where six CCD rural development agents are based.

This particular case study was carried out both to train the CCD staff in RRA and participatory research methods, and to gather information that would inform the work of all the agents working in the zone. The information will be of special and immediate use to Haingo Ranodriamanga who is directly responsible for activities in the *fokontany* of Tsara Fara where the study was carried out.

Logistical support for this study was provided by both CCD-Namana and Feedback Madagascar, an international NGO based in Scotland. Feedback provides both financial and technical support to many of CCD-Namana's activities. Assistance in documenting the results of this study was also received from the Landscape Development Initiative (LDI), which is a USAID funded conservation and development project with an office in Fianarantsoa.

The *fokontany* of Tsara Fara is in many ways a microcosm of the larger issues of development and conservation in the area southeast of Fianarantsoa which is considered to be a "corridor" of particular importance by environmentalists working in Madagascar. The corridor is one of the relatively few areas in the Fianar region where there is still a sizeable area of primary forest. This strip of forest runs south from the National Park of Ranomafana to the Andringitra Park and then continues with one arm to the south and a second to the southeast. The whole corridor, then, is approximately 160 kilometers in length and covers about 260,000 hectares of forest.

The corridor is important both because it provides important natural resources to the villages along its periphery and maintains a habitat for diverse plant and animal species but also because it provides a vital link between two of Madagascar's important national parks. It is now widely recognized that isolated "islands" of conservation (including protected areas such as national parks) which do not allow for the migration of species across ecological zones are unlikely to be successful in the maintenance of biodiversity over the long term. Plant and animal species require access to areas that are sufficiently large and diverse that as climatic and other conditions change, they can migrate to find new niches that satisfy their needs.

Corridors such as the one between Ranomafana and Andringitra are critical to maintaining access to diverse habitats. Yet these corridors are under increasing pressure from both the populations that live alongside them and from outsiders attracted by the bounty of their natural resources. Similar forests covered large parts of the region as recently as 50-100 years ago. With increasing populations and the expansion of agriculture, most of these forests have now been cut and transformed into villages and croplands. The existence of remaining forested areas is largely thanks to the natural protection provided by their relative inaccessibility and higher altitudes.

As populations continue to increase (at a rate that exceeds 2.5% per year in the commune of Ambohimahamasina, for example) and the fertility of land already under cultivation continues its inexorable decline, the motivation becomes greater to move into these remaining forests, or to cut fields higher up the slopes where newly cleared tavy lands are noticeably more fertile than existing tanety. Already, there is significant danger that the corridor will actually be cut through in several places where it has become exceedingly narrow due to pressures from populations on both sides (Betsileo villages moving up on the west side, and Tanala villages moving up on the east). Alarmingly, in areas where the corridor is now at its narrowest, it would take only a few energetic farmers in a few villages to burn and cut a gash across the corridor that would put an entire ecological balance into jeopardy, with implications eventually for the health and well-being of both Ranomafana and Andringitra parks, the plant and animals that live there, and...eventually...the human populations that depend on the natural resources of the zone for their livelihoods.

In order to design interventions that will effectively reduce pressures on the corridor and address the compelling issues of poverty and development confronting villages in this region, agencies such as CCD-Namana, Feedback Madagascar, and LDI have an urgent need for information about the people and agricultural systems of communities in the corridor region. This particular case study focuses especially on poverty alleviation questions because of CCD Namana's orientation as an agency concerned directly with local community development. Future studies by LDI will place greater attention on issues of human-environment interaction. Knowledge generated by these various community level studies, as well as that garnered by others using both quantitative and qualitative methods on a larger scale, will help agencies to make considered strategic choices about the interventions that will be most effective both in (1) maintaining the physical integrity of the corridor and the natural resources which are found there and (2) promoting the economic well-being of communities and individuals who make their livelihoods along its periphery. The objectives for this study, which were fixed by the team before leaving for the field, can be found in Appendix 1 of this report.

Methodology

The fieldwork for this case study took place during a six day period between December 17th and 22nd, 1998. It used Rapid Rural Appraisal (RRA), a qualitative, participatory research method that seeks to gather good quality information from rural communities in short, intensive field studies. The RRA methodology places particular emphasis on understanding local people's perspectives and joining their vast experience and knowledge with that of outside analysts in order to better understand a problem or situation.

Good RRAs employ a range of deliberate and carefully considered strategies to enhance the validity of the information collected. These include systematic attention to reducing biases throughout the study. Attention to bias takes place at multiple levels, including (1) the selection of the team, (2) the choice of tools and techniques to be used to collect information, (3) the selection of respondents, and (4) the general design of the study. Our deliberate attention to each of these issues is briefly noted below.

The Team. The research team was comprised of 5 people of different backgrounds and experience:

Karen Schoonmaker Freudenberger, Team Leader. American socio-economist, specialist in participatory research methods.

Rakotobe Hary Jaona: Merina, rural development specialist

Ranodriamanga Haingo: Merina, specialist in territorial management and agricultural extension

Ramanonjisoa Leon Remi: Betsileo, botanist

Ramonja Olivier Marcel: Betsileo, rural animator and extension specialist

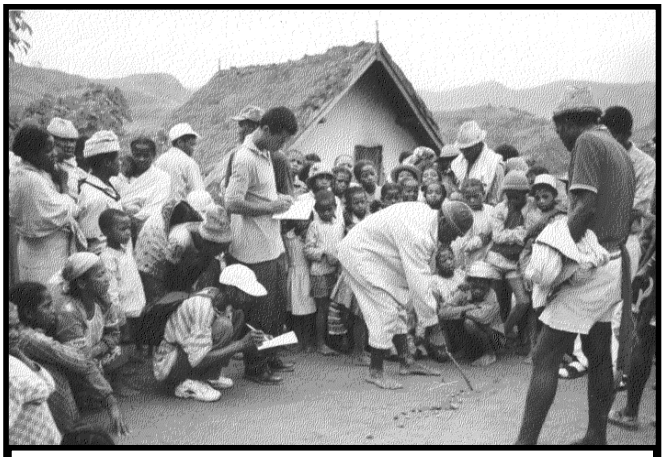
In addition, two other people played important roles in the team:

Fanomezantsoa Rakoto Endor played a critical role as translator for the team leader, and fully contributed to the analysis of information.

Bruno Rabenandrasana focused his energies on logistical matters, thereby freeing up other team members to devote their attentions fully to the collection of information, knowing that their stomachs would be well taken care of.

The Program. The team used a variety of RRA tools and techniques to gather information during their six days of field work. (The full program of field work is contained in Appendix 2 of this report.) The tools used included maps (at both the territory and household scale), transect, Venn Diagram, Historical Matrix, Wealth Ranking, Semi-structured interviews, and Bean quantification. The research looked both at community level issues such as territorial management and village organization and at household level issues. Wealth ranking was used both to understand issues of wealth and poverty in the community, but also to permit the random sampling of families in different wealth categories for detailed household interviews.

In addition to ensuring information from different socio-economic categories, attention was also paid to diversifying the sources of information along other criteria. The participation of women was actively solicited both in group and household interviews, for example, the place of group activities was varied to encourage the participation of different parts of the community, and we developed close relationships with both more senior members of the community as well as younger people including the village school teachers.



A variety of participatory methods (including mapping shown here) were used to gather and cross-check the information

The use of different tools which permitted the examination of issues from a variety of perspectives proved indispensable. The villagers were very reticent to discuss certain topics (such as tavy) with outsiders. Oftentimes it was only by putting together snippets of information collected with a variety of different tools that we were able to gather sufficient information and to overcome biases in the information provided. Similarly, community level activities tended to provide more "normative" information on what was considered socially acceptable behavior, while household level interviews were often more revealing of actual practices.

Before leaving the village, the team conducted a detailed debriefing for the community in which the principal elements of the analysis presented here were discussed with the community and

they were asked for any corrections or additions of information. While numerous corrections of details were provided during this feedback session, the community expressed their strong support for the general findings, thereby reassuring the team that our analysis fairly reflected the realities of this locale.

Implementation of the Study. The team was, from the outset, very cognizant that the validity and richness of information obtained would depend greatly on the quality of the rapport we were able to build with the community, especially given the relative sensitivity of the topics to be addressed (e.g. tavy). We took numerous measures (beginning before the team's arrival in the village with at least two preliminary visits by Haingo to explain and prepare the study) in an effort to reduce suspicions and increase rapport. This included not hurrying the study (staying a full six days in the community), actually living in the village throughout the study, taking care with all protocol activities and repeating on numerous occasions the raison d'être of our visit, interspersing rapport building activities (e.g. a party in which the team shared a pig with village representatives from each quarter) with information gathering, and trying to adapt as much as possible to the villagers' programs and constraints (e.g. no group activities on market day, responding to all the President's requests for protocol visits to the other communities in the *fokontany*, etc.).

In spite of these best efforts we sensed some lingering suspicions up until the very day that we left. We think that these were limited to a small number of families who did not participate in group activities and thus never came to understand what the team was trying to do. One family that was initially selected to be interviewed in the random sample by wealth category declined to participate and a back-up had to be chosen. We cannot say that this did not have an impact on the information gathered (since it undoubtedly did) but we do not think that these lapses alter the general thrust of the arguments presented here.

Chapter II: Introduction to Andaladranovao

Andaladranovao is located approximately 5 kms north of its Commune capital, Anbohimahamasina, in the region of Fianarantsoa. It is an old village with a new name. Founded in the early 1800s at a location not far from where it stands today, it has moved among several near-by sites in the intervening centuries before settling in its present location in approximately 1880. It took its name at this time when the canal servicing the village's rice fields was improved, leading to its name which means "new waterway."

Population and Social Organization

The village is currently part of the *fokontany* of Tsara Fara, a collection of three villages (including also Sahamaina and Ambalavao Manody) all of which have historical linkages to one another[1]. Andaladranovao currently comprises 50 households, all Betsileo and all sharing a common ancestry which can be traced back to one of the four founding clans. There has been no in-migration since the first settler families arrived. The population currently numbers some 260 people. Of these, 101 (39%) are aged ten or under, 49 (19%) are between the ages of 11 and 17, another 101 (39%) are between the ages of 18 and 65, and only 9 people are older than 65 years of age. The combination of high birth rates and early mortality can be clearly seen in these statistics which show that there are as many people in the youngest population decile as there are in the combined five deciles of people between the ages of 18 and 65. The general impact of population growth in this community can also be seen in the historical matrix (page 24) in which the villagers estimated the increase in the number of households in the community. They estimated approximately 15 households in 1948, increasing to some 30 households in 1968, followed by roughly 35 households in 1984, and ending with the 50 households currently occupying the territory.

A Venn Diagram carried out in the village clearly indicated the importance of the *fokontany* in village decisions. Thus, there is a "Chef-Tanana" at the village level, as well as a President (who happens to come from Andaladranovao) at the *fokontany* level. Similarly, the *Ray Amandreny* of Andaladranovao may get together where decisions are made concerning only the village itself, while the larger *Ray Amandreny* from the three villages will gather if there is a decision to be made that concerns the *fokontany* at large. The village elects a *Tohoteny* who is responsible for representing Andaladranovao when decisions are made at the *fokontany* level. Other groups at the village level, such as the *lehibennymahere* (strong young men) and the Women's Group exist primarily to carry out the directives of the *Ray Amendreny* (physical improvements to the village in case of the young men and hospitality and organization of social events in the case of the women). In addition to these more or less traditional structures, two new associations have been recently formed in Andaladranovao, principally in response to CCD Namana's encouragement. The villagers report no particular reason for their being two associations rather than one serving the whole community, explaining only that "we go with those with whom we can agree and get along and work together." We were able to ascertain, however, that membership in the two associations is apparently not determined by family/clan identity.

[1]In the past the *fokontany* was comprised of 20 villages but when the government accorded local populations the right to determine the identity of their *fokontany*, they chose to include only the three villages sharing a common ancestry.

There are also several interest group related committees including a fire committee, a health committee, and a locust committee. These were apparently formed in response to outsider requests and do not play a particularly active role in village life.

Infrastructure

While there is no school or health facility in the village itself, the children of Andaladranovao attend school in the neighboring village of Sahamaina, which services all three villages in the *fokontany*. 54 children from the village attend this school which is only a short walk across the rice fields. Two teachers, both natives of the *fokontany*, are responsible for four classes (with a total of about 200 students) at the school. Similarly, while no health care is available in the village itself, community members have access to health facilities in Ambohimahamasina where there is a dispensary and health worker that serve the population of the Commune. There are also weekly markets each Monday and Thursday at Ambohimahamasina where the residents of the village sell their agricultural produce and artisanal products (including woven cotton lambas, baskets, and mats) and purchase foodstuffs, clothing, and other household supplies.

As with most villages in Madagascar, seasonal accessibility is a problem. The commune capital, Ambohimahamasina is a two to three hour drive from Ambalavao (where the paved road ends) along a bumpy dirt track that becomes a slippery, muddy mess during the rainy season. There are no fewer than 21 bridges between Ambalavao and Ambohimahamasina, many of which are locally constructed of rickety wooden pilings and are as likely as not to wash out during the rains, completely cutting off access to the zone. Shortly after this study took place, one of the bridges washed out. While it was repaired without a long delay, access for the rest of the rainy season was precarious at best. Bush taxis ply the road approximately eight times/week but frequent break downs (especially during the rains) make travel a precarious undertaking.

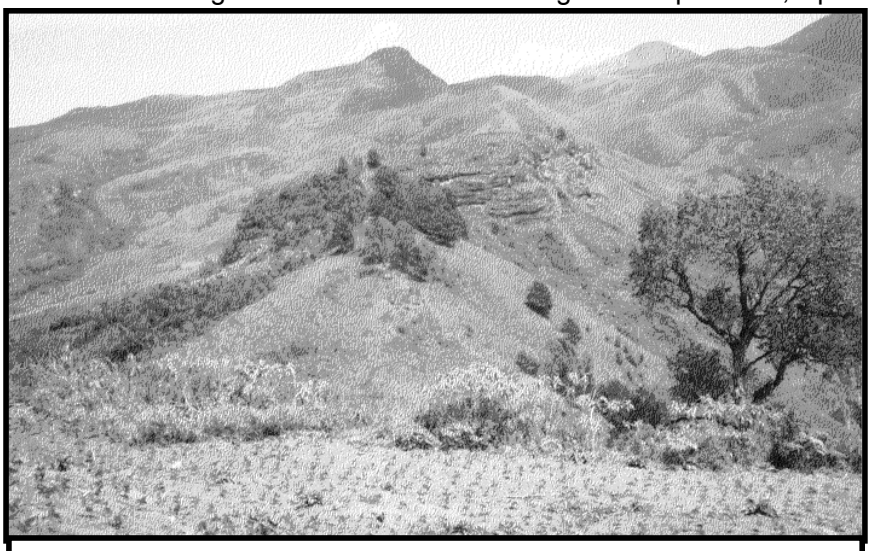
In addition to the general inconvenience to the local population, transport difficulties make development of commercial activities in the zone risky at best. While, in theory, the communities in the area might be able to commercialize certain products from their woodlots (many of which are underexploited), in fact it is hard to imagine how poles, charcoal, or other products might be successfully exported given the current state of the transportation infrastructure.

Chapter III: Community Level Resource Management in the Territory of Andaladranovao

Territorial Boundaries and Land Use Patterns

The boundaries of the territory of Andaladranovao, as well as that of the larger *fokontany* territory are clearly demarcated in the minds of the villagers. Villagers report no changes in their boundaries in recent history (the last fifty years) and neither do they foresee any changes since "those boundaries were fixed by the ancestors." While, as described below, there has been significant tavy expansion by Andaladranovao inhabitants in the interior of their own territory, this expansion stops at the limits of what they define as their boundaries.

So, while the village's territorial boundaries (as they define them) have not changed over the past 50 years, the community's use of space within these territorial limits has seen a dramatic evolution. Until approximately 1956, the village's rice fields were limited to the valley bottom and the forest spilled over the hillsides and down to where it nearly met up with the rice fields on the valley floor. By the second half of the 1950s, as the population of the village outgrew the capacity of the valley to provide rice, the first terraced rice fields were created on nearby hillsides and the forest began to recede in the face of agriculture pressure, a process that has continued at a variable but unrelen-ting pace ever since.



Tavy fields now occupy many of the hilltops surrounding Andaladranovao

Before 1975 the upper hillsides were still largely forested due to strict govern-ment controls on burning for tavy. This changed with the arrival of the Second Republic which elimi-nated all such restric-tions and, in the villagers' percep-tions, even encou-raged the un-restricted expansion of hillside agriculture as the message went out that "it's YOUR land to do what you want with it". Tavy increased dramatically during these years, to the extent that the villagers say that irrigation water declined by roughly 1/3 as nearly all the forest above the irrigation canal were cut down. Rainfed hillside crops include manioc (especially on the most degraded soils), sweet potatoes, corn, and beans. At this time, villagers are well aware that tavy is frowned upon by the government and development agencies (such as CCD-Namana) with whom they work and they were highly reluctant to even admit that they still engage in such practices.

Observation of newly cleared fields suggests, however, that the yields as much as 1 1/2 times higher on new tavy as on older tanety fields continues to motivate annual expansion of tavy fields. Clearing for new tavy fields now takes place on the highest slopes just below the ridge of

hills that line the edge of Andaladranovao's territory. Clearing has not yet advanced to the top of the ridge and is unlikely to do so because villagers have observed that crops do not do well at the higher altitudes. Hence, there remains a narrow band of fairly degraded forest (few large trees or particularly useful species, according to the villagers' own assessment) along the uppermost part of the ridge to the west of the village. Part of the reason for the apparent degradation of this forest is a major fire that villagers report having come over from the other side of the mountain in 1992 or 1993. The fire raged for several months and burned vast areas, further encouraging the villagers (as they explain it) to expand their tavy fields high up the mountainsides.

Thus, while as much as 80% of the Andaladranovao territory was forested in the 1950s, there is currently no significant expanse of natural forest within the village's territorial boundaries. Outside the limits of the village territory, there is still reported to be some primary forest that falls within the boundaries of the *fokontany*. It appears that this forest is largely protected by its inaccessibility, being both remote relative to the villages in the area and protected by natural barriers such as steep cliffs and otherwise inhospitable terrain. We were unable to gather sufficient information on the management of these "*fokontany* forests", as they were described by the villagers, and neither could we tell from their description whether the lands were communally owned by all the villages in the *fokontany* or whether the villagers simply meant that these lands belonged to one of the other villages in the *fokontany*. It would be interesting to follow up further and better understand the distinction between village and *fokontany* lands and the management systems in place for each.

Most Andaladranovao rice production takes place on steeply terraced slopes

Within Andaladranovao's territory, there are approximately seven eucalyptus (with a few pines) groves, planted by the villagers during the colonial period when the establishment of such woodlots was mandatory. According to the villagers, the first eucalyptus woodlot in the territory was thus created under duress. Villagers subsequently saw the utility of having wood for construction readily available and proximate to the village and thus individual families later established woodlots on their own initiative. These woodlots are now collectively held by the descendent families of the people who planted the trees and access for the purpose of cutting trees is restricted to family members. Anyone may, however, use wood for firewood if it has already been cut and is lying on the ground. Typically five to ten households now share in the ownership of such a woodlot. The wood is used primarily for house, fence and other construction purposes.

There is little explicit maintenance of these woodlots, and regeneration takes place by natural processes. The villagers do take care to cut the trees so that new shoots will regenerate, though the practices they use (cutting fairly high up the trunk rather than near ground level) probably do not maximize regrowth. Casual observation of the state of the groves suggests that there is considerable potential to manage these woodlots more productively. Under present circumstances, however, there is probably little incentive to do so since the existing production is sufficient for the villagers' own needs and, as noted above, transport constraints will impede any

efforts at commercialization.

In addition to their family held eucalyptus groves, most households also own fruit trees, including bananas (planted along the waterways), and avocados (restricted in numbers due to taboos against planting avocado trees while one's parents are still alive), plums, litchis, orange, guava, and coffee. Pineapple, ginger, and grapes are also planted in "kitchen" gardens near the village.

Territorial Management

In general, the management of resources at the territorial level (especially rules governing land use, agricultural expansion, etc) seems weak in Andaladranovao. We were able to discern few (if any) policies intended to promote sustainable resource use or collective strategizing over the most productive use of the space that the village calls its own. There are apparently no local restrictions on, for example, the expansion of tavy, and individuals and households thus expand their fields at will subject only to tenure rules (restricting encroachment onto privately held lands, meaning those that were previously cleared by someone else) and the rules of nature (which declare it folly to invest in clearing lands which will not be productive due to their steep slope or high altitude). As one villager described why the highest hillsides have not been cut: "we can't say it's discipline...it's just that things won't grow there." The anarchic expansion of agriculture and the resulting haphazard mottling of fields and fallow across the entire territory is causing certain problems at the moment, especially in the realm of cattle production. While individual farmers rotate crops and fallows in their fields, there is no organized strategy for groups of farmers in one area to follow the same schedule, thereby leaving larger contiguous areas available for pasture. This has serious consequences at the level of the household economy, since access to adequate pastures is a constraint to cattle raising, as we shall see below.

Effective management of community holdings is essential for the optimal management of household resources. One conclusion of this study will be that there is significant room for improvement in the community's management of its territory -- and indeed this may be indispensable if efforts to improve household livelihoods are to succeed.

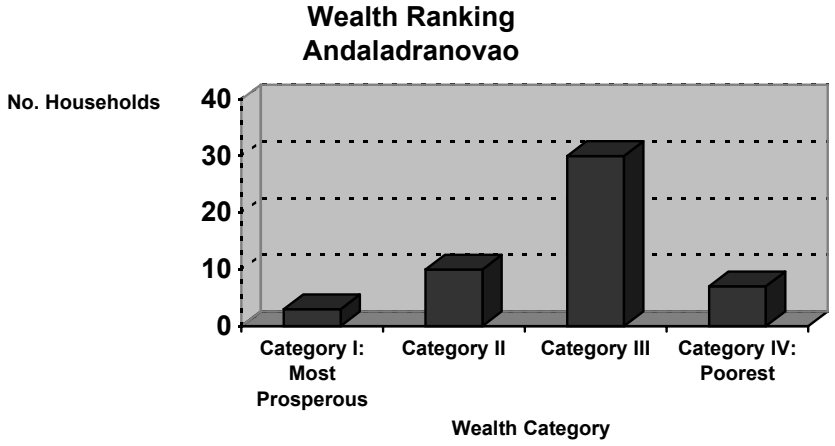
Chapter IV: Management of Family Resources and the Household Livelihood System

While most of the rest of the world would consider ALL of the villagers of Andaladranovao to be poor, there are key socio-economic differences within the village that distinguish families that are relatively better off (and enjoy a significantly more stable and worry free livelihood) from those that are relatively worse off (and live with nearly constant fear about how they will provide for the basic food security of their families). In order to understand household economic strategies, we need first to understand how productive assets vary among families at different levels of prosperity and then to explore the implications for both natural resource management and household wellbeing.

Wealth and Poverty in Andaladranovao

A wealth ranking, carried out by the population of Andaladranovao, and then cross-checked with detailed household interviews of families in two of the four wealth categories (not the richest or the poorest), clearly illuminated the factors that distinguish the relatively prosperous from the absolutely destitute.

A group of villagers divided the 50 households of Andaladranovao into four wealth categories[2] (using their own criteria of wealth and poverty) as illustrated in the following histogram.



Category I (Most Prosperous): Three households (as it turns out, all brothers) comprise the wealthiest group. This group was described as having a "large" number of cattle (ten or more), producing a surplus of rice in addition to their own self-sufficiency, having a nice house, and money.

[2]This wealth ranking was carried out by a mixed group of about 12 villagers who started with a pile of beans representing the 50 households in the villages. These beans were then divided to show families that had comparable levels of wealth, using the participants' own categories to define "wealth." Discussion of the four piles then flushed out the information about each group.

Category II: The second wealth category comprises ten households and was described as having a few cows (less than ten), no surplus rice production (and sometimes not enough to feed their own families well but "at least they eat"), and a house.

Category III: The majority of the village (30 households) falls in the third category which was described as the group "in trouble." The families in this group own no cows, have land but not enough to eat, and have constant worries about meeting their food needs. On the positive side, "everyone at least has a roof."

Category IV (Poorest): The poorest group in the village comprises seven families who are truly destitute. These are families where "there are children but no husbands." In most cases this category represents cases in which divorce has sent the mother back to her parents' village but she has no access to rice fields and is dependent on what she can grow on tanety fields...or get from indulgent relatives.

It was clear from this and subsequent discussions that the critical variable determining whether a household could claim a reasonably secure livelihood or not was their ownership (or lack thereof) of cattle. To put the situation in stark terms: people with quite a few cattle generally follow an upward economic trajectory since they can satisfy their immediate needs and usually generate at least a modest surplus from their agricultural production. This surplus multiplies when loaned out to other rice deficit families at a return of 200-300%. The surplus enables them to invest and further strengthen their productive capacity through the purchase of additional cattle and agricultural equipment such as ploughs, and the employment of farm labor. Unfortunately, as noted above, this relatively optimistic scenario is enjoyed by only three households (out of 50) in the village.

Families who own cattle live in relative prosperity and are generally upwardly mobile

The remaining families find themselves either in (1) a precarious equilibrium, in which they barely manage to cover their recurrent essential needs and have little hope of generating a surplus that would allow them to invest, increase production, and lift themselves into the more secure economic group, or (2) a vicious downward spiral in which annual production shortfalls mean that they borrow rice to feed their families, paying back 2-3 vata for each one that they borrow, with virtually no hope of ever progressing out of their bleak situation.

Within this classification, the population in the first and fourth wealth categories remains fairly stable. The top wealth category has enough of a buffer that, short of a severe catastrophe (which is nevertheless possible, particularly in the case of either a human or bovine epidemic) the households in this group are generally able to recover from minor financial setbacks. Even if they fall onto temporarily hard times, they still retain sufficient capital to resume their upward trajectory when the crisis passes. The fourth group, composed as we have seen largely of divorced women and their children, is the victim of particular circumstances and unlikely to make

any significant progress out of their situation since they rarely have secure land rights and generally also suffer labor shortages, at least as long as their children are young.

To the extent that there is a certain amount of mobility in the wealth ranking, then, it is generally between groups two and three and is almost always linked to the acquisition or loss of cattle. It does sometimes happen that good fortune enables a Group III family to save enough that it can invest in a young bull. Over a number of years, this bull will grow and may be traded in for two young animals. And the family's fortunes, if the animals do not die, may become progressively more secure. This situation is relatively rare, however, as can be seen by the fact that only 20% of the village has managed to make it into Group II.

Much more common is the descent of a Group II family into Group III. Indeed, 2/3 of the families in group III who currently have no cattle and live in perennial food insecurity, did at some time previous have cattle and enjoyed a considerably more prosperous existence. It is the loss of these animals, either to disease or (more commonly) to funeral sacrifices, that plunges these families into perennial economic distress. One third of the households in Group III have never owned cattle.

With this overview of the general economic typology of the community, we now turn to examine in further detail how the households of Andaladranovao secure (or fail to secure in the majority of cases) their basic livelihood requirements.

The Household Economy

Like poor families the world over, the households of Andaladranovao assure their livelihoods with a portfolio of diverse activities. The contributions of even the smallest and apparently inconsequential of these activities may be critical in those families (such as 80% of those in Andaladranovao) who live on the very margins of financial security and have virtually no savings on which to draw in times of hardship. The sale of a mat, a duck, or a few bunches of bananas on market day may determine whether a laboring woman has a blanket to take with her to the maternity when she gives birth (or if she is taken to the maternity at all), whether crucial medicines will be bought for a sick infant, or whether a child will run threadbare or warmly clothed in the chill of winter.

Only a few families produce enough to last them throughout the year; the average paddy holding is about 1 ha.

Rice Production. For most families in the village, the principal element of the livelihood system is rice production, though -- as we shall see below -- only a small fraction of what is produced is actually eaten by the family. Most families have a combination of lowland and terraced rice fields, with irrigation based on one of the several waterways flowing into the territory. A dam on the western slopes aids in water control. Most families cultivate between 1/2 and 2 hectares of paddy, with the average family farming a total of about 1 hectare (frequently

divided into two smaller parcels). Land ownership is not linked to wealth categories (except in the case of the poorest families who are condemned to perpetual poverty because of their lack of rights to rice land) and the poorer families are not necessary those with less land. Indeed, except for Category IV families, access to land was never cited as a constraint by those with production shortfalls. The problem is, rather, low productivity and, in some cases, labor shortages. Both of these problems are particularly acute, as we shall see below, in families that do not own cattle.

Rice is produced using traditional methods. Three varieties are currently in use in the village: *laniera* (harvested in January)*, varilahy* (harvested in March)*,* and *angika* (harvested in April)*.* The minority of farmers who have cattle prepare their fields by "trampling" and the use of animal traction ploughs, while the majority perform this labor by hand. There are four ploughs in the village. Some families that had ploughs in the past (when they were in Category II and had cattle) have since had to sell them in order to meet other obligations, especially those related to funeral rites as noted below. Whenever possible households that do not own a plough try to borrow one but they are usually able to cultivate only a fraction of their fields with this borrowed equipment.

Allocation of the Rice Harvest by a Category II Family

The BR family is among the more prosperous in Andaladranovao, having six cattle. The household has eleven members, three of whom are small children. They cultivate two rice fields (a total of about 60 ares), a tavy field (on which they produce casssava, sweet potatoes, beans, corn and Bambara groundnuts, as well as peaches and grapes) and a tanety (on which they produce cassava, beans, bananas, corn, Bambara groundnuts, sweet potatoes, and peanuts). The tanety field was cleared long ago, by their grandparents, while current family members cleared the tavy field six or seven years ago. They also have 6 turkeys and 2 chickens. It is taboo for the family to raise pigs. The family does not own a plough but was able to borrow one from one of their married children to prepare part of one of the rice fields.

Last year, which they consider to be typical, they produced 22 vata of rice on their two fields. Of these 22 vata:

- 2 vata were used to buy meat when other families sacrificed cattle
- ½ vata was contributed to the church
- 1 vata was used for a festival
- 1 ½ vata was used to cover the costs and traditions associated with the birth of a baby
- 3 vata was used to feed guests who came for other family's funerals
- ½ vata was saved for seed
- 3 ½ vata was used to feed farm workers who prepared their fields
- 1 vata was used to feed workers who transported manure to the fields
- 2 ½ vata was used to feed workers who transplanted the rice
- 6 ½ vata was consumed on a daily basis by the family

In summary, if we look at rice allocation by this family, we find that 5½ of 22 vata (25%) went to various festivals and hospitality. 7 ½ vata (34%) went to cover the costs of production, and 6 ½ vata (30%) entered directly into day to day household consumption. In addition to the rice produced, the family purchased 4 vata of paddy and 200 cups of hulled rice.

Those who have cattle use the manure exclusively on their rice fields, while those without cattle use no fertilization. A few farmers reported trying to put some small quantity of green manure on their rice fields. The optimal fertilization rate reported by farmers is to spread the manure of eight cows (estimated by team members to be appx 3.2 tons) on a one hectare parcel each year. Since the cows spend the night in a corral near the house, manure collects and is later transported to the fields by hand. Some farmers add straw to this in order to make a more nutrient rich "compost." Only the three wealthiest families in the village even approach having enough cattle to fertilize at what they consider to be the optimal rate. Those with fewer cattle use a rationing system in which they divide their fields in half and give as much fertilizer as they have to one side of the

field so as to increase the yields as much as possible on that part of the field. The next year the other half of the field is fertilized, under the theory that the benefits of fertilization last into a second year.

Rice yields vary significantly depending on the amount of fertilization provided to the fields. Based on their own observation and experiences, local farmers estimated that maximum yields for a one hectare parcel that receives adequate manure (the proceeds from eight cattle) are on the order of 55 vata[3] (or 1.6 tons).) A one hectare field that is fertilized with the manure of four cattle produces on the order of 40 vata (1.2 tons) while the same field if unfertilized (as are the vast majority of fields in the village) produces only 20-25 vata, or roughly 3/4 of a ton.

While rice is considered by all to be the cornerstone of both production and food security in Andaladranovao, it is interesting to note that only a relatively small fraction of the rice produced by most families actually goes directly into daily consumption. Those few families who are fully self-sufficient in rice produce enough both to feed their own families, to cover other cultural demands for rice, and may still have a surplus which can be loaned to others as needed. This would be the case, for example of a family that can produce as much as 2 tons of rice on 1 to 1 1/2 hectares of well fertilized rice paddy.

The typical household in Andaladranovao which uses no fertilizer on its fields produces only about 1/3 or 1/2 this much, however, depending on family size and fortunes. While the actual distribution of the harvest varied from family to family, in none of the cases in which we conducted detailed household interviews was as much as half consumed directly by the family. Examples of specific allocations are given in the box above, but in general we observed that the four principal uses of rice in most families were repayment of debt (rice borrowed during the hungry season and repaid at a rate of 2 vata -- or sometimes 3 -- for each vata borrowed), the production costs of rice (principally feeding field workers), ceremonies and hospitality, and daily meal preparation. Other much less significant uses of rice (in terms of the quantity allocated) included tithes to the church and payment of school fees, exchange for meat during funeral sacrifices, and other miscellaneous charges.

Rice yields for families without cattle are less than half that produced by cattle owners

As much as 1/3 of the harvest is used for the production costs of rice. Obviously, a small portion is taken out for seed. In addition, a much larger share goes to compensate (in the form of meals provided to workers) labor that is used for field preparation and transplanting. Typically relatives and neighbors help those in need of labor on their fields on a rotational basis and the host farmer prepares food for those who contribute their labor. Farmers without cattle have

[3] A vata of rice is equal to 30 kgs of paddy.

especially high demands for labor; both richer and poorer farmers recruit labor for transplanting.

Tanety and Tavy Fields. All households in Andaladranovao produce upland crops on tanety and tavy fields that are created along the steep hillsides around the village. These fields are generally smaller than 1 ha in size. Households produce a variety of crops in these fields, including maize, beans, and sweet potatoes, peanuts, and Bambara groundnuts. Typically these crops are rotated and the fields are sometimes left fallow for a year in order to enhance soil fertility. Manioc is often planted in older tanety fields where soil fertility is lower and other crops will no longer produce well. Households reported that manioc is usually consumed by the family, often as an accompaniment to rice during the hungry season when the rice ration declines. Corn also plays an important role as a "hungry season" crop since it may be mixed with rice when there is not enough of the latter, or in severe cases be served without rice. A portion of the corn and bean harvest may also be sold as are fruits (especially bananas, grapes, and *jirofo*). Indeed, for many families these revenues, along with handicrafts, provide the majority of their income. Hence a family might sell bananas each week, earning from 2000 to 5000 francs per market, or sell 30 or 40 cups of corn (at 150 francs a cup).

One significant finding of this study is that there is no apparent correlation between wealth and the expansion of tavy fields in Andaladranovao. That is, one might hope/expect to find that families that are wealthier and can therefore produce enough rice for their subsistence needs might not have to do tavy since their basic requirements are at least provided for. Villagers were definitive in their statements that this is not the case, however, and that all families practice tavy, regardless of their socio-economic standing.

Handicrafts. The production of artisanal crafts is practiced by most of the women of Andaladranovao. Many weave cotton *lambas* in the traditional style of the region or make floor mats and baskets. Women reported that they try to bring something to market each week and can earn a profit of 2-3,000 FMG from the sale of a basket or 5,000 FMG from selling a lamba. In the season when field work is less, they may be able to sell two or three such products at each market.

Women prepare materials for basket and mat construction which is an important component of the family livelihood

The small, more or less regular revenues that come from the sale of both tanety crops and handicrafts are generally used to pay for recurrent household expenses such as soap, oil, clothes, utensils, matches, and condiments.

Other revenues. Income generating opportunities in the immediate area are limited for men. Some head for the coast and try to find work either in the coffee plantations or in trafficking coffee or bananas between the regions. Some families receive occasional remittances from absent family members.

Animal Raising. Most families in Andaladranovao practice some type of small animal husbandry, most often keeping some poultry (chicken, ducks or turkeys). Some families also raise pork, although this is more problematic because of the numerous taboos concerning pigs.

Both poultry and pigs serve as forms of savings and investment for the household. They can be sold if a special need arises that surpasses the revenues earned by selling crops or handicrafts at the local market (such as money to treat a more serious illness or investment in a piece of farming equipment), consumed if the occasion demands, or "traded up" for a larger animal. These smaller animals are often used as stepping stones in the perennial effort to accumulate cattle; one family reported, for example that they were raising turkeys in hopes that once they got six good sized ones they could trade them for a small bull, another kept pigs for the same purpose.

Uses of Cattle. The accumulation of a reputable herd of cattle is the life goal for all Andaladranovao farmers, though, as we have seen above, one that few are likely to achieve. Cattle serve multiple functions, including the social, cultural, and economic. No person in this community will discuss cattle without noting their importance as a measure of success and a purveyor of status, dignity, and respect. Related to their social value is the cultural value they hold because of their importance in funeral rites when according to the Betsileo tradition, one (or more) zebu shall be sacrificed whenever there is a death in the family.

The Painstaking Task of Building a Herd

The BR family described above has owned six bulls for the last three years. For the previous 19 years their herd varied between one and three bulls. The family got their first bull as a wedding present from the bride's father 22 years ago. They sold this bull in order to buy two smaller ones. The young husband was able to earn some money and buy a third bull. But, with two deaths in the family, there were two sacrifices and the herd was back down to one. Fortunately, with the gifts they received at the funeral, they were able to buy one more zébu. But the death of their father reduced the herd once again to one. Their father was a wealthy man, however, and at his death they were able to sell his possessions and get enough money to buy five cattle. This was three years ago and they have been able to maintain the herd at six ever since.

In addition to their socio-cultural value (which cannot be overestimated), cattle have several important functions in the production system, specifically in field preparation and in the provision of manure. In field preparation, cattle are used both to trample the rice fields, thereby breaking up the soil, and also to pull a plough. Both of these tasks require significant human labor input if cattle are not available[4] and families without cattle often find it necessary to call on their neighbors for help with these tasks. As noted above, feeding work parties consumes a significant portion of the harvest, especially for families that do not own cattle. The effects of cattle manure (the only form of soil enrichment that is widely practiced in Andaladranovao), on yields were described under rice production above. We noted that a well fertilized one hectare field produces on the order of 1.8 tons of paddy, while an unfertilized field typically produces no more than 3/4 of a ton. For many families this is the difference between rice self-sufficiency and perennial shortfalls. The villagers report that optimal fertilization rates require the manure from eight cattle (approximately 3 tons) to fertilize a one hectare parcel.

Finally, villagers noted that cattle serve a function as savings and can be sold when hardship strikes the family and cash is desperately needed. In fact, this must be a rather rare occurrence that takes place only in extreme crisis situations since no examples of such sales were cited in any of the families in which we did ten year histories of cattle ownership. This may be, however, because we did not do such interviews with the wealthiest families in the village and it is possible that cattle sales do take place in families that have a larger number of cattle and can afford to

4 Villagers estimate the labor needed for these two tasks at 50 man days per year if cattle are not available.

sell one without putting a major dent in the size of the herd.

Animal husbandry practices. The cattle of Andaladranovao total some 42 heads, nearly half of which are owned by the three wealthiest households. The cattle spend the night in sunken pens close by the family compound. It is from these pits that the manure is collected to be spread on the rice fields. Cattle are owned by the household and even if one person buys a cattle, it becomes part of the household's assets...and thus subject to decisions made by the senior male member of the household. During the day the cattle are driven out to pasture by a man from the household owning the cattle. This task may rotate among different males in the owning family, but it is not conferred on a stranger or delegated to another family. Families (especially those with few males) thus reported surveillance of cattle to be a major use of men's and male youth's time. Cattle are pastured principally on fallow lands in close proximity to the village. As one family described it, "our herders like to come home for lunch." This is an evolution away from prior practice in which, when part of the village territory was still forested. At that time the cattle were left to graze in the forest, with only limited supervision.

One of the more perplexing aspects of cattle management in the village is that almost no families own female cattle. Indeed, out of the 42 zebu in Andaladranovao, only three[5] are cows and these are held by two families. All of the other holdings are exclusively bulls. This means, obviously, that herd size does not increase by natural reproduction. The only way for a household to increase herd size is either (1) to purchase a small zebu from family savings or (2) to trade a larger animal for two smaller ones. A young zebu (of the size typically bought by a villager investing in cattle) costs on the order of 400,000 FMG. In the context of the household economy, where revenues are collected at a rhythm of 1-2,000 FMG per market and most of these revenues are immediately expended for household needs, the accumulation of 400,000 FMG is a monumental undertaking...and largely explains why 3/4 of the households in the village have no cattle at all.

Villagers gave several reasons for their current reluctance to invest in female zebus while noting that in the past herds were divided equally between males and females. (Thus in the historical matrix we note that up until the 1968 time frame herds were mixed, but by 1984 the herds had become exclusively male. The three cows now in the village were purchased in 1990 and are still considered to be "an experiment.") The principal reason for switching to an exclusively male herd composition appears to be related to territorial management and the occupation of space. Specifically, when herds were able to graze extensively in the forests of the territory, both males and females thrived. With the disappearance of the forest (largely since 1974 when the rate of tavy accelerated dramatically), farmers switched to the current system of keeping the cattle in enclosures in the village at night and then driving them to pasture on fallow lands during the day.

According to the villagers, this system (while acceptable to bulls who "do not mind sleeping in their own kaka") is not appropriate for female zebu who "consider it a punishment to be penned up at night and required to stay in the same place." The cows, according to the herders, were not willing to stay on the pasture lands near the village and wanted to go out for three or four days at a time, in search of better pastures. In addition, villagers believe that female cattle

[5] In the month between the time when this research took place and the finalization of this report, six additional cows were purchased by villagers who were struck by the findings of this study as presented in the village restitution meeting. Two of these were bought by the school teacher and one by a village development committee. There are now nine cows in Andaladranovao.

cannot do the heavy field work that the rice fields require. Therefore, families that own only a few cattle want to make sure that all are "able bodied workers." And finally, there are constraints related to reproduction and raising of calves. A young bull can begin working in the fields as young as two years but a female does not begin calving until she is four years old (and, in the meantime is not useful for farm labor). Villagers report that on the coast, cattle give young at three years but "here where it is cold, they wait for four years." And then, to make matters worse, they only bear young once every two or three years. Once there are calves, the problems continue since pasture land close to the village is of poor quality and the territory is perilously steep for driving young calves any distance.

In short, villagers feel that the current husbandry system is not appropriate for raising female cattle and thus all but two families have decided that it is best to raise only males, even though this makes them entirely dependent on the purchase of cattle to increase herd size. This raises a multitude of interesting questions for development agencies in the zone, namely: can the animal husbandry system be adapted so that raising mixed herds becomes once again viable? or (if not) are there other types of cows that might be better able to withstand the conditions that exist in a territory such as Andaladranovao? These questions are taken up in greater detail in the conclusion / recommendations chapter at the end of this report.

Rice straw is saved to feed cattle during the dry season when there is insufficient pasture

Another problem raised by cattle owners was the lack of vaccinations and medications for treating animal sicknesses. Sickness is not the principal cause of cattle mortality as noted below (sacrifice plays a far greater role) but it is nevertheless a concern and, as an issue that can probably be fairly easily addressed even in the short term, is worthy of note. In particular, farmers complained of the problems of *charbon* and *douve de foie*. Both can be easily prevented with appropriate and timely vaccinations. The government livestock service vaccinates against charbon once a year. But to prevent *douve de foie* vaccinations are required every three months and these are only available in Ambalavao, at a cost of approximately 7,500 FMG per vaccination, depending on the size of the animal. Other treatments are carried out locally with medications made of leaves and roots.

There is a perception that cattle disease began at the time that chemical fertilizers were introduced and that the two are somehow linked (thereby serving as an added disincentive to farmers to use fertilizers). While it seems unlikely to the team that there was a direct causal effect by fertilizers on disease (especially since fertilizers have not been used for a long time but the diseases continue), a more likely explanation is that the introduction of both fertilizers and diseases began at roughly the same time. This probably occurred as terraced rice became more common, and tanety expansion and the retreat of the forest meant that cattle were kept in the village, where diseases were spread more easily.

Zebu and funeral sacrifice.

As noted above, one of the primary values of cattle in the household livelihood system is to meet the obligation to sacrifice a zebu when a member of the household dies. The current predominant practice is for the household to sacrifice one animal for each person who dies in the immediate family. However, there are at times pressures for people living in rural areas to provide the sacrificial animal even for more distant family members, and especially for city dwellers who may not have access to cattle. These people sometimes implore their rural relatives to conduct the sacrifice on their behalf even though, as we shall see below, the impact on the family that provides the sacrificial animal may be devastating.

Families that do not have a zebu when there is a death in their family will make every effort possible to obtain one, often borrowing a bull (using their rice fields as collateral) that is then sacrificed for the required ceremonies. They must then come up with the means to pay off the loan, however. As much as

The Economic Decline of the JR Family

JR and his wife are an older couple in Andaladranovao who support a household of six: themselves and four grandchildren (ranging in age from 10 to 16) that they inherited at the death of a brother since they themselves were never able to have children. At one time the JR family was considered to be among the more prosperous of the village. For many years they kept a herd of 6-8 cattle. Their large and well appointed home stands in testimony to this period of prosperity. Their two well manured rice fields produced well during these years and they could harvest as much as 1.5 tons on the combined total of 80 ares. This was enough to feed the family well and sometimes to generate a surplus. They had relatively few worries.

They date the beginning of their problems to 1987 when, in the course of one year, they sacrificed two of the then six zebu in their herd: the first for the death of JR's father and the second when one of his siblings died unexpectedly less than a year later. Now, with only four cattle to provide manure to their fields, they noticed a significant drop in production. Rather than the 45-50 vata they had harvested in the past, they now expected no more than 32 vata, or somewhat less than a ton.

This situation remained fairly stable until 1995 when another zebu was sacrificed due to a death in the family, reducing the herd to only three. A year later, however, they were able to trade one of the larger cattle for two smaller ones, bringing the herd size once again up to four.

An 1998 disaster struck the family. In the course of three months, between January and March, four of the their grandchildren (aged 2, 8, 13, and 15) were stricken dead by unexplained illnesses and died after being treated in Ambohimahamasina or (in one case) the hospital at Ambalavao. The situation was so tragic that the authorities called a government doctor from Fianarantsoa to determine whether a dangerous epidemic was on the rampage in the village but no satisfactory explanation was ever found for the string of untimely deaths.

One after the next, in their unrelenting grief, the family sacrificed their remaining four zebus. JR's family is now cattleless. Their harvest is down to 21 vata (.6 tons) and last year they had a shortfall of four vata, which they borrowed and will have to reimburse with eight at the end of this year's harvest.

half the money to pay back the approximately 400,000 FMG owed for the zebu can be raised from contributions of people who come to the funeral. The remainder is typically paid for by the sale of family assets. In this way, families have been known to lose their agricultural implements, household property such as cooking pots or blankets, other small animals (e.g. poultry and pigs), etc. Villagers reported that in the extreme case, a family might even lose its rice fields for a period of up to ten years in order to repay the debt, a phenomenon which is known to the villagers but, mercifully, has yet to happen in Andaladranovao itself.

Families with no cattle live in constant fear that a death in the family will plunge them into debt. Those with only one or two zebu know that it will not take much misfortune to cast them into the precarious livelihood of families in Category III. But even those with a sizeable number of cattle can, over time, see their livelihoods decimated by a string of deaths and the progressive withering of their herd. Two Group III families with whom we conducted in-depth interviews had at one time been quite secure with six cattle each. Successive misfortunes had brought them to their current state of no cattle, as described in the box above.

An outsider to Andaladranovao can imagine few strategies that could more effectively conspire to keep the population in perpetual poverty than the current practice of funeral sacrifice. On the one hand, virtually any surplus generated in the household economy is destined directly or indirectly[6] to be invested in cattle. Painstakingly, year after year, these tiny surpluses are saved and invested in hopes of eventually getting a zebu, and then eventually trading that zebu for two smaller ones...and so on. It is on these cattle that the productivity of the agricultural production system (at least as it is currently practiced) depends critically -- for labor and, especially, manure. Yet for all but the luckiest few, the painstaking and slow process of investment ends in the inevitable swipe of the sacrificial axe. The practice of zebu sacrifice is a fairly certain guarantee that almost no families will be able to accumulate sufficient cattle to adequately fertilize their fields and almost all are condemned to a vicious circle of inexorable and (for some) deepening poverty.

There are mixed signals about whether this deeply anchored cultural norm is susceptible to any significant change. There is no doubt that any evolution of the system will be slow and that the role (if any) of outsiders will be extremely delicate and demanding of the utmost sensitivity and sophistication. One village woman put the issue in terms as stark as they were absolute: "We can do anything to improve... except change the tradition of killing our cows." And yet, there is evidence that change is already happening. Fifty years ago, it was not unusual to find four or six cattle being sacrificed for a funeral ceremony. Now the maximum in Andaladranovao is one, even for a relatively important person in a relatively well off family. In the past when an important family member died, it was the tradition to take a vata of rice and sprinkle it around his house. This practice has now been abandoned as families try to more carefully husband their limited rice supplies. Some few families are out of necessity now beginning to move to a system in which all the deaths that take place in one year in their household are grouped together and memorialized with a single sacrifice after the harvest when times are not so hard. Hence the maximum that such households can lose is one zebu per year. The villagers are aware (if not entirely approving) that in cities now many families simply buy zebu meat (say 40-50 kgs) rather than actually killing an animal.

One forward looking and progressive member of the village who sees clearly the devastating

[6] A family may invest in turkeys or pigs, but this is with the idea that they will be traded eventually for cattle.

impact of these sacrifices on the local economy believes that things may change, though not quickly and not without a certain amount of socio-cultural upheaval during the transition period. He feels that the biggest psychological hurdle is for someone to be the first to put himself on the line to try an alternative practice, whether it be buying meat, participating in a sacrifice held by a village association on behalf of all the deaths in member families that year, or some other solution. In the thoughtful words of this community member: "The tradition won't be stopped, but it might be corrected. Not erased, but put in the right direction."

Chapter V: Conclusions/Recommendations

The historical matrix carried out by the villagers of Andaladranovao as part of the RRA exercise summarizes many of the general trends discerned in this study. The resulting picture is not terribly optimistic and community members were disquieted by the direction of most of the changes they recorded.

Upon completing the matrix, the participants (a mixed group of about 50 villagers, including men and women, wealthy and poor, young and old) were asked for their observations:

" We're scared. This is worrying. Lots of things are shrinking. Our food is down. Our health is down. Our cows are down...but the people are always more."

"At least our land hasn't changed....and our community solidarity is still there."

"If we got to this situation, it just shows that we don't know what to do....all we can do is work harder at what we know. But that may not be good enough."

"We are worried because we see that if we don't do something, it will continue to get worse!"

"It used to be that the cows were 50 and the people were 15. Now the cows are 16 and the people are 50. This is the opposite of how things should be!"

In short, the collective experience of the community over the last 50 years confirms the general increasing sense of desperation that we note at the household level where all but a few more fortunate families feel trapped in a situation of unrelenting hardship and increasing vulnerability as needs grow and the resources to deal with them decline.

The futility of discussing long term, sustainable development in a community like Andaladranovao without confronting the role that cattle plays in the livelihood system became increasingly evident as this study progressed. Certainly one could come at poverty questions via an entirely different route: population growth and family planning, for example. But as we explored questions of environment, natural resources, and development we found that so many issues were ultimately and intimately linked to the role of cattle in the livelihood system that it became essential to dig deeper in understanding this issue.

Historical Matrix[7]
Andaladranovao

	+/- 50 years ago	1968	1984	Today
Popn of Village (# Households)	••••••••••••••• 15	•••••••••••••••••••• •••••••••• 30	•••••••••••••••••••• ••••••••••••••• 35	•••••••••••••••••••• •••••••••••••••••••• ••••••••••50
Size of Territory	••••••••••••••• 15	••••••••••••••• 15	••••••••••••••• 15	••••••••••••••• 15
Area in Rice Fields	••• 3	••••••• 7	•••••••••• 10	••••••••••••••• 15
Area in Tanety fields	•• 2	•••• 4	•••••• 6	•••••••••••• 12
Forest Area8	•••••••••• 10	•••••••••• 10	•••••••• 8	••••• 5
Number of Cattle	•••••••••••••••••••• •••••••••••••••••••• ••••••••••50	•••••••••••••••••••• •••• 24	•••••••••••••••• 16	•••••••••••••••• 16
Health	•••••••••••••••••••• 20	••••••••••••••••16	•••••••••••• 12	•••••••• 8
Food Security	•••••••••••••••••••• 20	••••••••••••••••••1 8	•••••••••••••• 14	•••••••••• 10
Avail. Of Irrigation Water	•••••••••• 10	•••••••••• 10	•••••• 6	•••••••• 8
Community Solidarity	••••••••••••••• 15	••••••••••••••• 15	•••••••••••••• 14	•••••••••••••• 14

Analysis of the Problem Tree

The problem tree below summarizes the team's analysis of the problems caused by a lack of cattle in the livelihood system of more than 80% of the households in this community. (The same analysis holds true for an additional ten families that could be described as having "insufficient" cattle, though they do have some, making it applicable to some 95% of the households in the village.) This analysis was in the first instance done by the team based on information provided throughout the RRA by community members, but then was also presented back to the villagers for their verification in our final feedback session with them. The top half of the diagram reviews the consequences of insufficient cattle on livelihoods, while the bottom half looks at the multiple causes of the problem.

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7 Historical matrices are carried out to assess general trends in a community in order to come up with appropriate solutions to problems that the community identifies. Most of the variables on the vertical axis were proposed by the RRA team. The participants in the exercise, when asked if there was anything they wanted to add, proposed "community solidarity." The time variables were selected to cover a broad range of time frames, with the specific years being arbitrary choices reflecting specific events that would help the participants remember the era in question. The participants began by placing beans in the first column and the team suggested that they limit the number of beans to 20. On completion of the first column, the respondents moved on to the next column, comparing (for example) the amount of land cultivated in rice in 1968 as opposed to 1948. The specific number of beans (except in the case of population in which the participants chose to use one bean to represent each household) has no significance except to allow comparison of trends over time.

8 Villagers noted that the size of the natural forest has declined more than shown by the beans but has been partly compensated by the plantations of eucalyptus which is why they did not reduce the number of beans too much.

Reviewing the information presented earlier in this report, we note that the Consequences (top half of the diagram) of the lack of cattle is felt in two primary areas:

(1) **agricultural production** where rice yields are extremely low due in large part to the lack of (a) manure and (b) animal traction and

(2) **socio-cultural factors**, namely (a) the sense of social inferiority felt by those who don't have cattle and (b) the problems that arise from not having the necessary cattle to perform ritual sacrifices as required by the traditions of the zone.

With insufficient rice production (Consequence 1 above), many families are obliged to borrow rice to meet their needs, falling into a vicious cycle of indebtedness which makes it virtually impossible to accumulate a surplus needed to invest in agricultural machinery or other inputs that might eventually lift them out of poverty.

But, even if at some point in the family life cycle a household has the good fortune to lift itself up enough to invest in some capital possessions (such as, perhaps, a plough or work animal), they are vulnerable to losing these at any time. Investments in any and all parts of the livelihood system (whether factors of production or consumer goods) are precarious due to the socio-cultural factors discussed in Consequence 2 above since families may at any time and without warning have to decapitalize in order to carry out the sacrifices required by local tradition of the zone. It is this last point that ultimately obliges any development agency wishing to have a long term positive impact on household prosperity to deal with issues of cattle and, more specifically, the question of funeral sacrifice. If they do not, all other interventions risk being futile since the whole system as it operates now conspires to eventually decapitalize a family of whatever surplus they are able to acquire, whether via improved rice or tanety production, improved practice of animal husbandry, etc. The question is not, therefore, **whether** this issue should be addressed but, rather, **how** and **by whom**.

Turning, then, to the causes of insufficient livestock in the livelihood system, we see two principal avenues that are problematic:

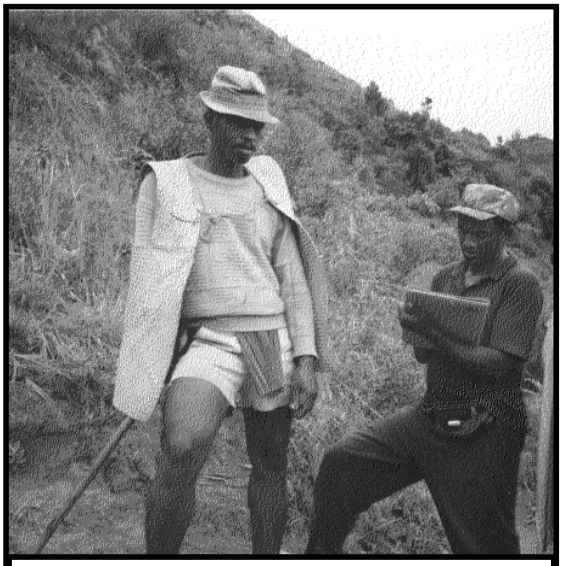
(1) It is very hard to add new cattle to the system given that (a) there is no natural reproduction of the herds since hardly any herds have cows and (b) the purchase of cattle is well beyond the means of most households given the difficulty of meeting even basic needs, not to mention accumulating a surplus.

(2) The mortality rate for cattle is very high given (a) the lack of vaccinations and treatment for disease and (b) the killing of cattle for funeral sacrifice.

Problem tree here

Strategies for Addressing the Problems Identified

This analysis has attempted to show the complexity of these issues as we have heard them from the population of Andaladranovao. The bad news is that there are no magic bullets that will solve these problems and move the population forward with great leaps and strides. It is not simply a question of introducing SRI methods (that could admittedly augment the production of rice but will not solve the problem down the line when the proceeds of that increased production are invested in a zebu that meets an untimely end) or introducing a cereal bank to cut down the need to borrow rice...with a similar end scenario. The solutions will necessarily have to be as sophisticated and as multifaceted, as the problem is complex. The good news is, however, that the problems do not appear (at least in this first analysis) to be intractable ones. That is, there are not any immediately evident insurmountable constraints blocking the path to progress. The path forward may be treacherous at times, but it should be passable.



A farmer discusses land management issues with CCD-Namana staff

Next Steps: the Community Action Plan. In addressing the problems identified in this study, CCD-Namana and the village will want to engage in a participatory planning process that takes up where this research left off. The village has already heard the results of the analysis presented here and, indeed, it has already begun to have an impact as noted above since the population of cows in the village has nearly doubled in the intervening weeks. For their part, CCD, has now had an opportunity to review the development activities that were already in the pipeline for Andaladranovao and surrounding communities in light of this more in-depth analysis of the problem situation. One of their conclusions has been that most of the activities they had planned before carrying out this study (in their Annual Program of Work) address the consequences of the problems identified here, rather than the more fundamental causes. While this does not mean that these activities are inappropriate, it does suggest that if their approach is to be sustainable and result in long-term improvements to livelihoods that they will have to add interventions that focus on the root causes of the problem, rather than merely treating its manifestations.

It would be premature as a result of this study to suggest the specifics of a Community/CCD Action Plan since there was no effort to do in-depth feasibility studies of various options to attack the problems that were identified. In addition, the community needs to be integrally involved in determining how they would like to work in partnership with CCD-Namana to attack this problem.

To build on the momentum that already exists as a result of this first round of intensive study with the village, it is recommended that the planning process begin by looking again at the Problem Tree. This will serve as a review of the work that has already taken place and can offer an additional opportunity for the village to contribute to the analysis. A next step, then, would be to use cards of different colors to begin brainstorming possible solutions and to note activities that might be possible in the shorter (green cards, perhaps), intermediate (blue cards), and longer term (pink cards). Where more information is needed, or additional technical assistance

must be found, this could be indicated by another color of card (yellow, for example).

Finally, detailed planning can begin around those immediate term activities that have been listed on green cards, as well as deciding how information will be gathered as noted on the yellow cards. This should result in a detailed Community Action Plan that outlines the responsibilities that will be taken on by community members and by CCD-Namana, the time frame for the activity, and the specific sequence of events. The following offers an example of the type of activities that might be considered for immediate, intermediate, and longer term actions although, as noted above, these are only given as examples and will have to be flushed out much further with the villagers concerned.

Potential Immediate Term Actions. From CCD's perspective, the most appropriate immediate term actions undertaken are those that (1) can be addressed relatively simply, (2) will show more or less quick results , and (3) will serve to enhance CCD's reputation as a serious partner, and thus give them the credibility needed to work with the population on some of the more complex and sensitive questions that were raised by this study. An example of such an intervention might be to develop a program to provide vaccinations and/or necessary medicines to prevent and treat *douve de foie* or other prevalent cattle diseases in the zone.

Other measures that might begin without delay would be to introduce proven, but inexpensive, technologies to improve rice (and/or tanety) yields since this will help to develop the rapport with the majority of the village that does not own cattle. This might include, for example, composting, use of various types of green manure (e.g. *tefrozia*) on tanety fields, etc.

Potential Intermediate Term Actions. Intermediate term actions will be those that are somewhat more complex and therefore require more planning and preparation on the part of either CCD, the community, or both. Additional research or technical inputs may be required to implement these activities. The time frame for such intermediate term activities may be the next 2-3 years, although solicitation of technical advice can, of course, begin immediately (and be counted among the project's short-term activities).

Intermediate term activity that looks promising in this context is to reintroduce cows into the livestock system, assuming that studies confirm that this can be technically feasible[9]. This might eventually involve a number of activities, including:

Getting technical advice about the best way to keep cows (where they should sleep, how to keep them clean and healthy, etc.)

Getting technical advice about increasing bovine fertility rates and what can reasonably be expected in the context of Andaladranovao.

Considering whether better territorial management strategies might facilitate the management of cattle herds (e.g. developing one part of the territory for improved pastures, setting aside land near the village where calves can be pastured, etc.)

If, after the above studies, it is determined that cows are viable in the situation, then another

[9]An RRA study carried out subsequent to this one in the *fokontany* of Ampatsy (on the corridor northeast of Fianarantsoa) found that Betsileo farmers with herds as small as 3-4 cattle were successfully keeping one cow for reproduction purposes. These cows were dropping calves once every two years and thus allowing farmers to maintain their herd size even while engaging in regular sales of cattle. Farmer to farmer visits to investigate their techniques for stabling and feeding their cows may be useful to the farmers of Andaladranovao.

intermediate term activity might be to establish a cattle credit system to help families build up their herds, and especially to obtain their first cow that they can then use for breeding purposes. This might involve CCD making a loan of a cow to each village household that is interested on a rotating basis, with families paying back this loan with an offspring once their herds are established. An adaptation of systems such as those used by OXFAM to reconstitute herds after droughts and other disasters might provide a model for such a credit program.

Regarding improvements to agricultural production, depending on the success of short-term interventions to increase yields of rice and other crops, there may well be possibilities to introduce more sophisticated interventions designed to increase productivity of both the rice fields and the tanety in the intermediate term.

Potential Interventions in the Longer Term. If any of the aforementioned is to have any sustainable impact over the longer term, at some point the villagers will need to begin reflecting on the implications of funeral sacrifice of cattle and whether there may be alternatives that respect the fundamental purpose of the tradition while conserving the productive assets of their livelihood. There is no question that this is an extremely delicate issue and one that must be addressed with caution and sensitivity. Any precipitous moves by outside organizations such as CCD-Namana will serve only to put the rest of their program in jeopardy as they lose the confidence of the population. If may not even be wise to open discussions on this question in the immediate term, and rather wait until other interventions have begun to have some positive impact and relations between CCD and the community have developed further.

On the other hand, this may be an occasion to put the issue on the agenda, perhaps noting that it can be addressed only in the longer term but will have to be considered if the problem of insufficient cattle in the livelihood system is to be successfully and sustainably resolved. If planning activities use the problem tree that resulted from this RRA to begin thinking through an Action Plan, this will almost inevitably put the question of sacrifice on the agenda, even if it is only to postpone further action into the future.

In the meantime, the project can begin to prepare the ground for these discussions by making note of practices that other communities may have adopted in the face of similar challenges. Ideally, these should be solutions found by other Betsileo rural communities, if such exist[10]. If places are found where, for example, villagers have moved to a systematic practice of only sacrificing one animal per year per family (or better yet, one animal per clan, village association, or village) or have found other entirely different forms of sacrifice which are nevertheless considered satisfactory by the ancestors, then it may eventually be possible to arrange study tours to these villages by key members of the Andaladranovao community.

Eventually, the project and community may want to use the problem tree for monitoring purposes, keeping track in a very public way of the status of cattle in the community. Public records could be maintained, for example, of (1) how many cattle die each year from different causes (whether illness or sacrifice), (2) how many births there are among the Andaladranovao herds, (3) how many families have no cattle, 1-2 cattle, 3-5 cattle, etc.

Andaladranovao provides a compelling illustration of the impact that forest destruction can have on the livelihoods of local communities. One might compare, for example, the increased production that has come out of the tavy and upper tanety fields with the impact to the household economy of the loss of cattle in most families. But, as we have seen here, often the

[10]In the *fokontany* of Ampatsy, as described above, some of the poorer farmers were found to be practicing the purchase of beef meat for funeral sacrifices, rather than killing an animal.

effect on herd size is not felt until considerably later....and may not even be explicitly noted to be the consequence of the forest's retreat. This is perhaps a lesson for other communities that still have forest left to protect. The question now for Andaladranovao is whether they can at least partially restore the balance in their livelihood system that existed when most families were both cultivators and livestock raisers. But, with the changes that have taken place in the natural resource base of the community, this will require villagers to develop new ways of livestock production and, especially, protection.

Appendix 1: Objectives of the Study

Theme: **Better understand the interaction between the population of Andaladranovao and their environment in order to identify the most appropriate development interventions by CCD-Namana**

I. **Profile the village of Andaladranovao**
- -- location
- -- population
- -- history
- -- economy
- -- livelihood systems
- -- social organization

II. **a) Identify the territory of Andaladranovao and its natural resources**

b) Identify the use of natural resources in the territory
- -- what, when, who, how, where, why?

III. **Assess changes in the natural resource base of the territory with particular attention to:**
- **-- land use patterns**
- **-- biodiversity**
- **-- soil fertility**
- **-- water availability**

IV. **Identify the factors that contribute to or retard the degradation of natural resources in the territory.**

V. **Analyze the causes and consequences of the environmental changes identified in objective III above with particular attention to:**

a) the following causal factors: economy, demography, political factors, rules and regulations, areas of local knowledge and ignorance

b) consequences of environmental change on the following: production, food security, economic activities, social organization, perspectives on the future.

VI. **In light of the foregoing analysis, identify the most appropriate activities of CCD-Namana to improve the wellbeing of villagers in the community of Andaladranovao and to encourage their more sustainable use of the natural resources at their disposition.**

Appendix II: RRA Program
Andaladranovao
17-22 December, 1998

When	Activity	With Whom	By Whom
Dec 17	Protocol meeting	mixed group of 60+ people	Team
Dec 17 pm	Participatory Map	Mixed group of 60+ people	Team
Dec 18 am	Transect	6 guides, divided into 3 groups of 2	Team divided into 3 groups of 2
Dec 18 pm	Venn Diagram	Mixed group of 20 people	Team
Dec 18 pm	Wealth Ranking	12 people	Team
Dec 19 am	Protocol Visit	Sahamaina village	Team
Dec 19 am	Household Interview (w map and bean quantification)	Category II family	1/2 Team
Dec 19 am	Household Interview	Category II family	1/2 Team
Dec 19 pm	Household Interview	Category III Family	1/2 Team
Dec 19 pm	Household Interview	Category III Family	1/2 Team
Dec 19 pm	Protocol Visit	Ambalavao Mody Village	1/2 Team
Dec 20 am	SSI	3 cattle owners	1 team member
Dec 20 am	SSI	2 women	1 team member
Dec 20 pm	Historical Matrix	30 people	Team
Dec 21 am	Preliminary Analysis		Team
Dec 21 pm	SSI	Village School Teacher	Team
Dec 21 pm	SSI	Category III Village Man	1 Team member
Dec 21 evening	Party	Hamlet Representatives	Team
Dec 22 am	Village Feedback	60 people	Team
Dec 22 am	Protocol	60 people	Team