



Summary: MARP Survey

(Méthode Accélérée de Recherche Participative = Rapid and Participatory Rural Appraisal)

1 August – 10 September 2011

and

Post-MARP-Survey

Summary

Objectives

SuLaMa aims to assess the relationships between ecosystems and their biological diversity and in-situ land management under the impact of growing human population pressure, poverty, lacking capacities and future climate change on the Mahafaly Plateau in south-western Madagascar. The goal is to reconcile biodiversity conservation and economic land management. The objectives of the present survey were to identify desires and problems of the local population, to investigate existing infrastructure, to develop communication, to identify research sites, to identify and involve local stakeholders and to act as a coherent group. For this, an interdisciplinary baseline survey was carried out in the project area following a harmonised methodological approach (MARP: Méthode Accélérée de Recherche Participative = Rapid and Participatory Rural Appraisal).

Methodology

The MARP survey was conducted from 1 August to 10 September 2011. It included a four day training session by MARP expert Karen Freudenberger supported by Hantanirina Pulchérie, two weeks of field work, two weeks of analyses and a final workshop and dissemination of results in Toliara. All PhD-students, several Post-Doctorates and the coordination team in Madagascar, 27 persons in total, participated in the study. The study focused on the determination of target groups, the identification of criteria for the choice of research villages/sites and the detection of possible linkages between Work Packages (WP), i.e. on the interdisciplinary approach of the subprojects. Relevant economic, ecological, socio-cultural aspects as well as those with direct relation to land use management were determined and developed. Through the MARP researchers of all WPs got familiar with qualitative techniques to collect information from local people. First data collection included different aspects (e.g. household characterization, land use and land property rights, use of natural resources) and was carried out by teams consisting of German and Malagasy project members. Four *fokontany* (villages or small administrative units) were selected as case study sites of the survey: Marofijery and Efoetsy in the littoral area west of the Mahafaly Plateau, and Itamboine and Miarentsoa, East of Tsimanampetsotse National Park on the plateau. Data were collected in these villages by two teams (two villages, one in the littoral and one on the plateau per team, one week per village), by means of diverse interview methods like semi-structured interviews, participatory mapping, historical matrices, calendars, etc. Methodological details are available at www.crsprogramquality.org/storage/pubs/me/RRAPRA.pdf.

Results

Brief summaries of the results are provided on the pages 2 - 10. Detailed information can be found in the French version of the MARP-Report. Initiatives to upscale the project and arrive at a comprehensive integration of the various projects in the regional context are described on page 11.

Conclusion

The MARP Survey helped to establish the involvement of the local population and key stakeholders at an early stage of the project, and was a first step to approach local realities and to start dialogue between people and researchers. It formed a basis for the work in the project area, as a visible and comprehensive start of the project in the field and introduced the project and its objective to all local stakeholders. Furthermore, it was also a significant milestone for the communication and mutual understanding between the different workpackages and their specific research aspects.

Subprojects

Work package 2: Agronomy

Agriculture is the basic activity of all families in the four villages and also in the whole region. Villagers rely on subsistence agriculture. Parts of the yield are saved for next years' plantation or sold as an important source of income. The agricultural area has increased at the expense of pastoral area in all four villages over the last decades. This is a consequence of human population growth and the associated increase in food consumption. Furthermore, the relative importance of agriculture compared to livestock breeding seems to have increased, too.

According to the villagers, the main problem for agricultural production is the low amount of rain and its unpredictability. In addition, crickets may severely harm the crops (especially corn), and the fields become less productive over time due to nutrient exhaustion and (possibly linked to that) invading weeds. This was highlighted especially in the two villages in the littoral. The weeds increase the workload and thus the cultivation of a certain area may become non-profitable. As a consequence, these fields are left fallow and new fields are established (see below).

The main crops are cassava, corn and sweet potatoes. These were also named as basic sources for alimentation. Sorghum, millet, different species of lentils and beans, melons, peanuts (only in the two villages on the plateau) and occasionally tomatoes are produced as supplementary crops. There is no real specialisation among the peasants; all families produce a very similar set of crops.

Cassava is of special importance in the region because it is more drought resistant than the other crops and therefore ensures a certain yield also in difficult years with low rainfall. Furthermore, it is easy to conserve and the whole plant can be utilised: the tubers and the leaves for food, the young stems for re-plantation and cattle fodder, and the old stems for firewood. Moreover, the time of harvest does not coincide with those of most other crops, distributing the workload over a larger portion of the year.

The fields do not only serve as areas for food production, but also as a source for medical plants, raw material for other purposes (e.g. inflorescences of wild plants for stuffing pillows) and for alternative sources of alimentation, e.g. wild tubers or berries. Often, single trees remain on the fields; the most abundant species are tamarinds and mango trees (only on the plateau) which offer fruits. Furthermore, the remnants of crops (stems and leaves of corn, sorghum and millet, young stems of cassava, leaves and stems of peanuts) are fed to livestock or sold for that purpose.

The fields are usually polycultures with cassava, corn or sweet potatoes as main crops and other crops planted in between, although occasionally monocultures occur. The fields of one or several families are delimited by hedges which are mainly made of wood debris, cactus (*Opuntia* sp.) and sisal (*Agave sisalana*). These hedges serve as protection against livestock and as a source for the production of goods (sisal) and food for humans and livestock (cactus). Additionally, they indicate property, as the forests and pastures are owned by the community in contrast to most agricultural areas which are private property. In general, the access to communal area for cultivation is free for the villagers.

Due to the high unpredictability of rain and therefore the high unpredictability of yield, the households cultivate the maximum area possible. The surface to be cultivated is limited by the manpower available at the time of workload peaks. In general, the whole family cultivates the fields, including the children and the elderly. Hiring of workers (found more often on the plateau) or polygamy (found more often in the littoral) may increase the area that can be cultivated by one

household. Workload peaks are mainly determined by rainfall, as planting of many crops (corn, sorghum, millet, leguminous plants) starts simultaneously directly after the first rainfall. During the following three to four months, it is necessary to weed and eventually harvest the crops. Usually, rainfall starts between November and January.

The techniques used for agriculture are quite basic, most of the work is done by hand with simple tools like long slim spades or hack-knives. In the two villages on the plateau, the plough is used by some villagers during the first year of culture, but not in the following years. Manure is not used for fertilisation, although livestock breeding plays an important role in the life and economy of the villagers. At least in the two villages on the plateau, burnt remnants of trees are used to fertilise the fields, and the remnants of leguminous crops are left on the fields as mulch.

There are two different modes of cultivation: *teteke* (also termed *hatsake*) and *baibo*. For the *teteke* an area of forest or shrub land is cleared and the trees and shrubs are burnt on the field. The fields established by this practice are very fertile for a short period of time and usually are used for the production of high quantities of corn (if there is enough rain). After a few years, the soil is infertile, and the field is abandoned. *Teteke* fields are usually established far away from the villages and are not fenced by hedges. In contrast to these short-lived *teteke* fields, the *baibo* may be cultivated for some 50 years (like in Miarintsoa) or more. *Baibo* are long-term cultures in the region. The fields are established and used for cultivation of different crops until the fertility diminishes and weeds start to dominate. Then, the fields are left fallow for some years. This eliminates the weeds through natural succession and allows the soil to recover to some extent. Thereafter, the fields are cleared again and the cycle repeats. Eventually, after several of these cycles, the soil is infertile and abandoned or used as pastoral area. The duration of the productive parts of the cycles seem to differ among regions, with 8-15 years in the littoral and more than 50 years without considerable loss of fertility on the plateau.

These practices of cultivation lead to a mosaic-like landscape where *baibos* of different age are intermingled by fallow land in different successional stages and small pastoral areas, structured by hedges at varying stages of development. As the agricultural areas are situated in a belt around the core of the village, this mosaic becomes less and less structured with increasing distance from the village. Eventually, the landscape becomes dominated by pasture.

As there is no considerable input of nutrients onto the fields as virtually no fertilisation takes place from external sources, it is obvious that the present mode of land use degrades the soils over time and leads to a diminished fertility and productivity. It may thus be termed non-sustainable, which is especially evident for the practice of *teteke*, but it is also true for the practice of *baibo*. Whether the lowered productivity is a consequence of depletion of mineral nutrients or also due to a depletion of soil organic material (which increases the water holding capacity of the soil) did not become clear during the MARP. Another open question is whether the performance of weeds is a consequence or a cause for low productivity of the respective fields. However, it has to be stressed that in the perception of the villagers, the fertility of the soils is not a major problem, as there is still enough cultivatable area left and as the main problem remains the unpredictability and low abundance of rain.

Work package 3: Animal husbandry

The possession of livestock, i.e. of goats and sheep but especially of zebu cattle, traditionally plays a key role for the people in south-western Madagascar. The animals do not just provide them with food and, in case of the trek oxen, labour but are also used for cultural ceremonies which are deeply entrenched within the local communities. At the same time, they serve as a kind of financial fallback due to a lack of a banking system and therefore define their owner's social and economic status. The livestock system is dominated by the annual change of wet and dry season, leading to regular shortages in water and food supply. As a response, zebu herds are driven from the littoral towards the savannahs on the eastern part of the Mahafaly Plateau at the beginning of the rainy season. The movements of the transhumance strongly depend on ethnical affiliation and family bonds which still need to be investigated in more detail. Apart from the traditional transhumance, this study also revealed other strategies developed recently as a response to the increasing threat of cattle thieves.

To grow a herd, livestock keepers usually have to start by raising poultry. This can be defined as the people's «small money reserve». After selling these and continuously investing in sheep and goats (favoured over sheep in the study area), this may then be the basis for a further built-up of a large herd of zebu which is considered as the most important domestic animal. While being the most prestigious, the breeding and keeping of zebu is also the most work intensive and risky as the loss of a zebu herd – for example due to droughts, cattle rustling, diseases or simply mismanagement – may lead to a harsh decline in the social ranks which can hardly be compensated for.

Livestock keepers from both sides of the Mahafaly Plateau are facing several problems. In the littoral, the lack of fodder plants during the long dry season in austral winter is the biggest challenge for their herds, especially of zebus. Water, even though salty and in lower quantity, remains available in permanent holes even during the dry season. At the end of this time of the year, the cattle relies almost exclusively on the work intensive supply of additional fodder plants, mainly *Euphorbia stenoclada* and *Opuntia* sp.. As a recent development, these plants are cultivated in private plantations inside and outside the villages. This represents first evidence of a slight intensification of the system. As the first rain falls on the Mahafaly Plateau in late November or December, marking the beginning of the rainy season, most of the herders move with their animals – mostly zebus but also some of the smaller ruminants – towards the richer savannas on the eastern part of the plateau. They follow traditional transhumance routes. After the extension of the park in 2007, most of the routes used for the transhumance are located within the limits of the Tsimanampetsotsa National Park. Herds stay in the east until March or April, depending on the amount of rain, before returning to the littoral pastures.

In contrast to herds from the littoral zone, the herds from the plateau originally did not participate in the transhumance, even though the lack of drinking water during the dry season is even more pronounced on the plateau than in the littoral, forcing the herds to cover large distances to reach the next permanent water holes. In the east, there seems to be enough fodder biomass throughout the year to feed not just the local herds but also the additional ones from the littoral during the rainy season. This was the situation until recently. Today more and more livestock keepers from the Mahafaly Plateau participate with their herds in a «reversed» transhumance towards the coastal zone during the dry season. This is not just the consequence of diminishing rainfall due to climate change but primarily a response to the rising security problems caused by cattle rustling during the last 10 to 20 years with a significant rise in recent times.

In summary, the efforts for livestock keeping has been even aggravated by climate change and the rising insecurity while, at the same time, the size of pasture available is constantly declining due to the

recent and ongoing extension of cultivated areas and – in our study region – of the Tsimanampetsotsa National Park. As a consequence, some livestock keepers – especially on the Mahafaly Plateau – have already abandoned cattle keeping, or at least the labour-intensive raising of zebu cattle, and shifted to alternative income strategies, such as agriculture. But even though its importance might have been reduced during the last years, livestock still remains one of the most formative factors dominating the people’s daily life in this challenging environment.

Work package 4: Natural ecosystems and functions

Western area

The history of the National Park Tsimanampetsotsa in the central survey area goes back to 1927 when a “Natural Reserve” was created with a surface of 17,520 ha to protect the unique biodiversity of southwestern Madagascar. An extension of the protected area to 43,200 ha and an upgrade to the protection status towards “Natural Park” was realized in 1966 which became “National Park” in 2002 (Decret No. 2002-797 establishing the National Park Tsimanampetsotsa). A further extension completed in 2007 resulted in 203,400 ha of protected area. The National Park comprises all ecosystems of the Mahafaly Plateau and thus represents a large portion of the biodiversity of southwestern Madagascar. It is managed by Madagascar National Parks (MNP; ex ANGAP). Further partnerships comprise WWF Madagascar and GIZ. The Park is funded by the Government of Madagascar and several partners (GEF, World Bank, KFW, WWF-Germany). The park is divided into three zones: (i) The core area, where no activities are permitted except for researchers with a special permit, (ii) the zone of controlled occupation (ZOC), an area inhabited by local people before the extension of the park, and (iii) the zone of controlled utilization (ZUC), where local communities are allowed to collect natural resources and practice ancestral rites such as funerals (requires an official authorization from MNP). Local surveillance is provided by Operational Vigilance Committees (CVO) in some *fokontany*. They consist of a team of seven people. Community based associations (COBA) were created and the resources management was transferred to local authorities.

Exploitation of plants focuses mainly on fruit trees and root crops for consumption during periods of drought or harvested as supplements. Several endemic plants species are collected by traditional healers (*ombiasy*) as natural medicine against stomach aches, diarrhea, fever or flu. Certain tree species are used in the construction of houses or coffins; reeds serve for roofs.

Hunting is prohibited in the core area of the National Park and in sacred forests, but is carried out in the surrounding forests where management is transferred. An authorization or license is issued by the COBA. Hunting led to a sharp decline of Guinea fowls and *Tenrec ecaudatus*. Hunting of tenrecs even within the protected area is most pronounced during periods of drought. Despite national and international protection, the radiated tortoise (*Astrochelys radiata*) is collected intensively inside and outside protected areas for local consumption and for the international pet trade. Tortoise collection for illegal exports is most intense in the southern area (community of Itampolo). Protected by a taboo, the tortoises are not exploited by local farmers, but by fishermen from neighbouring areas who collect about two pirogues per week with 50 to 80 tortoises per pirogue and up to three pirogues per day before holidays. Despite the taboo, local farmers would still sell tortoises to fishermen for a low price.

Apart from targeted collection of species, the original ecosystem is mainly threatened by invasive plants, bushfires and livestock grazing. Two plant species native to Latin America (*Opuntia* sp. and *Agave* sp.) are the main invasive plants in the region. Park authorities have initiated minor

programmes for eradication. Bushfires set by local farmers or ranchers are most frequent in the eastern part of the park and destroy native forest. Within the northern part, ecosystems are severely degraded by straying cattle. Though prohibited, cattle owners often graze their zebus and goats inside the national park during the dry season and to protect them from cattle thieves. For conservation and precaution measures, a mixed brigade, including staff from MNP, the Ministry of Forests and Environment and the police, is mobilized in different areas of the park. Regular patrols are conducted monthly for five days. However, most delicts are not detected or prosecuted.

Eastern area

The village of Miaritsoa is surrounded by three isolated forests: Anjembe to the west, Ankazomatehila to the east and Mendoravy to the south and west. The former two are characterized by a high level of degradation due to the lack of management. The forests of Anjembe and Ankazomatehila are primarily used for the collection of firewood, timber and medicinal plants. These resources become scarce as a result of *teteke* and charcoal production despite the interdiction of these practices. Livestock grazing accentuates the degradation by preventing the regeneration of local plants.

The forest Mendoravy is less degraded, forest management was transferred to a COBA in 2006 with members from the villages of Miarintsoa, Itomboina and Behalitany. This forest is exposed to the same forms of utilization, but with a control by the local COBA. Its area is divided into three sectors for use and management:

- *Ala faly* (Sacred forest): a zone of strict protection where no activity is allowed
- *Beravy*: a sacred area where traditional rites are practiced, only the collection of medicinal plants or Hazondolo, a certain tree from which traditional coffins are constructed, is permitted
- *Takolaro*: a zone of controlled utilization (ZUC), permission is given by local COBA.

Authorizations for timber collection form the main income of the COBA. Permits are valid for two months and are issued year round. Trees are requested to construct local houses, wooden oxcarts, planks or coffins. Cutting permits are free for coffin wood in case of death. All other purposes are payable.

The collection of medicinal plants is free, but a permit from the COBA is required. Hunting is practiced in the region and costs a fee of 5000 Ar for the hunt of wild boar or guinea fowl. Since the forest was transferred to the COBA no license was requested from the COBA, but several cases of illegal hunting were recorded. A penalty of 100,000 Ar was established for illegal activities in the forest. However, in five years of existence only two cases of violations have been registered by the COBA officially. Fires are a major threat to local forest and are common in September and October. According to COBA officials, most fires are set by cattle thieves who cross the forest to hide their tracks. Another major threat is *teteke* practiced illegally in the forest. In addition, charcoal pits can be found inside the protected area. Due to *teteke* several plant species, including timber, become increasingly rare. The COBA has a reforestation program to preserve these species. However, professional knowledge and support for this project are still missing.

The COBA has a regular patrol to monitor violations and illegal activities inside the protected forests. The patrol is carried out every 20 days by four members of the association. It takes four days and the rangers are paid between 3000 and 5000 Ariary (for four days), depending on the amount of money

available from the COBA. According to COBA-officials, local people are content with the current management of the forests as timber collection sites are close by. However, except cart manufacturers, most of the people we interviewed in the village of Miarintsoa claimed to ignore the existence of the association. This could result from a lack of communication on behalf of the COBA or it could be a sign for poor public perception of current forest management.

Work package 5: Socio-culture and Governance

Members of the ethnic group Tanalana live in all four studied villages, Marofijeri and Efoetse at the coast as well as Itamboine and Miarentsoa on the plateau. Next to Tanalana, Vezo people live at the coast, whereas members of the ethnic group Mahafaly reside on the plateau.

The villages are governed by both traditional and state authorities. In a *fokontany* the traditional leader (*mpitan-kazomanga*) is the most influential force. He is guard of the holy pale (*hazomanga*) at the same time representing the power of the ancestors. The power of the *mpitan-kazomanga* is handed down to the successor following genealogy and age. Second main important authority in a *fokontany* is the president of the *fokontany* as elected, state representative. Furthermore, clan eldest (*olobé*) and traditional healer (*ombiasy*) hold an important position in the villages.

In all villages there are schools and churches, as well as associations and organizations. To name two important local institutions with respect to natural resource use, there are Comité de Vigilance Opérationnelle (CVO), committees for resource management in the national park as well as Communauté de Base (COBA) and *Vondron'Olona Ifotony* (VOI) for community-based management of areas that serve as buffer zones of the park.

The social standing of the villagers is defined according to property and income. The dominant indicator for classifying income groups is the possession of livestock, in particular the size of the cattle herd. Rich members of the communities, therefore, own a large number of cattle, goats and/or sheep. In contrast to the villages at the coast, in the villages on the plateau tenure of extensive fertile land determines accumulation of wealth. Poor members of the communities do not breed animals; they are engaged in fisheries, commerce or hired labour instead. Disabled or aged persons who were abandoned by their families are considered extremely poor next to those who can not meet their demand for food. Therefore poorer households are more vulnerable than richer households, because they often are not able to comply with their social obligations, as for example the supply of sacrificial animals. However, the social mobility in all villages is very high. This means that rich villagers can impoverish for example by losing a considerable part of their livestock. In contrast, social advancement is possible through heritage or purchase of animals.

Despite differences in social standing, social cohesion of the population is high. This cohesion is maintained by traditional rules. In this respect, taboos (*faly*) and collective agreements of the communities (*dina*) are of great importance. *Faly* is a traditional rule or belief that organises social life and prohibits particular practices, for example the use of natural resources. *Dina* are traditional often oral agreements, for example agriculture and livestock breeding are governed according to these agreements. The *mpitan-kazomanga* makes sure that *faly* and *dina* are both respected. In case of non-respect he imposes punishment. Moreover, people fear the penalty of spirits in consequence of the destruction of their natural habitats, while also addressing demands to them. This procedure is accompanied by a ritual. Again, it is the *mpitan-kazomanga* who is in charge of performing the different rituals. Ceremonies mostly entail the devotement of one or more animals, which applies for

example for the ritual of *titike*. In the two villages on the plateau *titike* is performed in order to find a culprit, which is considered one possible strategy to resolve conflicts. Another way is public debates (*kabary*). The institutional framework of conflict resolution is set by the *mpitan-kazomanga* or the president of the *fokontany*, while village elders (*olobé*) can be consulted. When it comes to decision-making, *olobé* are equally important, because decisions are mostly taken under the supervision of traditional or state authorities.

The same authorities are involved in granting land titles. A new arrival has to ask the president of the *fokontany* and/or the traditional authorities for land. If the land has never been cultivated before, the new arrival can exploit it. Land that is already cultivated has to be bought, unless a direct arrangement with the owner is agreed upon. Generally, lease and loan of land are limited to family members. The purchase of land is however open to anyone who is interested. Other possibilities to get access to land are heritage or marriage.

After marriage the wife generally moves to the husband. Marriages between members of different ethnic groups are possible. In all villages there are monogamous as well as polygamous marriages. The death of a family member is followed by a ceremony that is performed in three phases: After burial the burial ceremony is prepared and then held.

The annual cycle of most inhabitants of all four villages is considerably influenced by temporary work-related migration. It is a regular source of income, especially for those families who do not own livestock or do not want to sell animals. While men are searching for paid labour in nearby towns, for example in Toliara, women stay at home and take care of the household. The temporary work-related migration is predominantly limited to the dry period, because from July to September food is particularly scarce. Furthermore, permanent migration from the villages at the coast to Toliara and Morondava occur. In contrast, the villages on the plateau are destinations of immigrants, from communities at the coast amongst others. The main reason is the favourable condition for agricultural production. For the purpose of economic exchange, immigrants often maintain relations with their regions of origin.

In the villages on the plateau, commerce and trade are of greater importance than in the villages at the coast, because the market of Itamboine attracts salespersons and vendees of the whole region. Almost every family sells agricultural products on the market. Currently insecurity in the villages on the plateau rises, because of increased numbers of cattle rustling by so-called *malaso*.

Work package 6: Economics

In the region, people use complementary strategies of generating staple food, income and savings in order to achieve food and household security. However, a considerable part of the villagers are not able to secure the nutrition of their family throughout the year.

The most common strategy is subsistence agriculture on permanent fields. But a lot of families are not able to produce a stock that lasts till the next harvest period. Due to the varying precipitation, including droughts, agricultural yields are not reliable and even people with fields large enough to yield a surplus can not base food security only on their own production. Thus, at the local market, selling surpluses and buying additional stocks takes place. For purchasing food and other goods cash is required. Therefore, people aim to generate savings that are generally stored in goods and transformed back into cash when needed. For example, liquidity for buying “luxury staple goods” (rice, sugar, oil, coffee) is reached by selling cassava or chicken. Goats or sheep are the typical goods

to be sold in order to buy additional staple food when own production was not successful. In contrast to sheep and goats, a zebu represents a considerable higher saving that allows coping with needs, such as paying the doctor, organizing a ceremony (e.g. a funeral), etc. As in this way almost all people are involved in activities at the local markets, these are of high economic and social importance for the rural life.

Once a household has grown a flock of chicken, some of the animals are sold and the money is invested in a goat or sheep. In the same logic, the acquisition of zebu is the goal after having successfully accumulated a herd of small ruminants. Whether or not a family reaches this level of wealth depends on a number of circumstances, such as no unexpected needs for higher disbursements, no severe droughts, good skills for economic planning.

The preference for investing in zebu is not only culturally driven, but has also economic reasons as prices for small ruminants are subject to higher annual price fluctuations. Besides representing “living money”, cattle play also an important role for different types of social obligations. Cattle also has to be paid, e.g. to the father-in-law before marriage or divorce, or represents fines in the local jurisdiction system (*dina*).

In addition to selling agricultural products and livestock at the local market, some people engage in small wholesale and the highly lucrative speculation on price fluctuations for cassava. Women are running small tea and snack-shops in the village or offer hot dishes on the market.

Other common strategies to provide income are seasonal labour migration, the provision of services or manpower to other villagers, and the production of charcoal. Seasonal labour migration is very important for many households, especially for those without livestock, where the additional income helps to buffer insufficient harvests. Seasonal migration is mainly conducted by men in the dry season when there is little work on the fields. In years with insufficient rain, the stay abroad is extended and the share of migrants increases. Providing its manpower in agriculture or construction is conducted on the one hand by poor people not able to live from subsistence agriculture, on the other hand by young men aiming to generate some savings. On the plateau, transportation services for goods and passengers are offered by nearly all men who can afford at least two zebus and an oxcart. Charcoal is the only major processed good produced in the region and sold in relevant quantities.

A large degree of food and even household security can be achieved by families that are able to diversify their economy and base it on a comparably secure and stable strategy as livestock breeding. The opportunity to invest in livestock or the education of their children again contributes to their household security. Approximately 30-40% of the population lives in households without zebu, goat or sheep. Not keeping zebu, but at least some goats or sheep secures the supplementation of food throughout the year. Families without any livestock normally do not achieve food security, even if they are able to raise chicken. Therefore, the possession of livestock, especially zebu, is the main symbol of wealth in the region. The possession of large agricultural fields and cash money are other symbols for wealth on the plateau. In the littoral, where polygamy seems to be currently more frequent, having many wives and children is an additional status symbol for men. And last but not least, counting with a good relationship with other village members is also considered a symbol for well-being and richness.

Post MARP Survey

A series of additional rapid participatory rural appraisal have been conducted on the Mahafaly plateau after completion of the MARP, in order to broaden the scope of analyses. The same methodology was used, although semi structured interviews were privileged over other tools. These "post-MARP" surveys were conducted in three *fokontany* of the littoral (Ankilibory, Maintilimy and Andrakalily; October 7 to 14) and two *fokontany* of the savannah area (Maroarivo and Antanandava; December 5 to 11, 2011). These surveys mostly confirmed the conclusions of the MARP and provided more details of the functioning, sustainability and performances of local cropping systems. They also enabled to better understand the interaction between Tsimanampetsotse National Park and local farming systems. Subsequently, Jacques Pollini participated in field trips to other WWF projects: the SLM project in the Southern Mahafaly plateau, and the PK32 project in the Masikoro region, north of Toliara. The latter provided the opportunity to conduct semi structured interviews that were of great interest because many Mahafaly people migrate temporarily or permanently to the Masikoro area. Main conclusion are:

- The Masikoro area exemplifies the issue of carbon and biodiversity leakage, because most Mahafaly people migrating to this area are involved in forest clearing.
- The Mahafaly people need to make agreements with local Masikoro people in order to have the "right" to clear forest land. They simply provide labour force and are paid in money or by receiving a share of the harvest for the land they clear and cultivate.
- The Masikoro people usually do not clear forest land themselves because this is very hard work in remote and unsafe places, and because they are busy growing crops on irrigated land or on other fertile soils in the costal plain, where permanent cultivation can be practiced. They demonstrate that permanent cultivation on irrigated land using animal tractions can satisfy subsistence needs. Nevertheless, their economy also benefits from forest clearing (through their arrangements with the Mahafaly people). Further investigation is required to assess the performances of their permanent cropping systems.
- Some Masikoro people join the Mahafaly people in forest clearing because they do not have sufficient irrigated land to cultivate. It seems that the degradation of irrigation infrastructure caused an increase of forest clearing by Masikoro people.
- If other economic opportunities existed, either on the Mahafaly plateau or elsewhere, the labour supply could be reduced significantly. This could lead to an easier enforcement of the ban on forest clearing, and less leakage from the Mahafaly plateau. Such an alternative could be the development of irrigation and animal traction in river beds, where ample water supplies seems to be available a few meters below the surface, and where much fertile soil is not yet cultivated, such as in the Onilahy valley. Mahafaly people, if properly supported, could take advantage of these improvements. WWF is currently supporting the rehabilitation of irrigation canals, which could reduce forest clearing by Masikoro people. The results need to be carefully followed in order to verify these conclusions.

These conclusions illustrate the issue of the appropriate scale of intervention. People are very mobile and ready to adopt new opportunities beyond the scale of single project areas. As a consequence the institutional stakeholders strive to improve communication and exchange of experiences between projects in the region to arrive at a cohesive management and development scheme of the Mahafaly region.