

FIELD TRIP REPORT

(15th November- 15th December, 2000)

by Ben Okumu

2nd DRAFT SUMMARY

1.0 Introduction

The purpose of this field trip was to meet and confer with the BASIS CRSP team members in Kenya and Madagascar to facilitate and harmonize site specific work schedules, review existing data and survey instruments as well as familiarize with each site's biological and physical details. Five out of six sites were visited namely Siaya/Vihiga, Embu, Baringo, Marsabit (in Kenya) and Vakinkaratra (in Madagascar). This summary consists of three main sections. Section one deals with logistical and administrative matters, section two reports data availability and modeling issues while section three examines the existing dissemination framework of research results in each of the sites. Data availability and modeling issues section is organized under three broad themes; socio-economic and policy issues, animal and crop biology aspects and soil and water management issues. Finer details of the field trip are reported in the field trip notes Report.

2.0 Logistical and administrative matters

The Basis Project aims at “exploring poverty traps and associated resource degradation through policy-oriented empirical analysis and simulation modeling of integrated agroecosystem dynamics and heterogeneous smallholder behavior”. For this to be effectively done, close collaboration with stakeholders operating in the various sites is needed. This field trip aimed at, first, identifying the various institutions (apart from the BASIS partner institutions) whose collaboration will be crucial in the overall success of the project and second, obtaining comments and suggestions of such institutions concerning the planned BASIS CRSP activities. It was also important to ensure that most of the project team members from the partner institutions had a good understanding of the finer details of the project in terms of data requirements and the workload and hence be able to identify areas of concern to enable timely remedies to be sought. The following is a summary of meetings/presentations made in the course of the trip:

1. Thursday November 16, 2000: 8-11 A.M -Meeting with Dr. Keith Shepherd, ICRAF Nairobi:

Issues related to nutrient modeling in the Eastern Africa region were discussed with the aim of identifying the key contact persons/institutions involved in nutrient modeling, the exact nature of work currently being undertaken as well as possible sources of secondary information. Also issues related to institutions with the best capacities for nutrient analysis were discussed. Keith identified Dr. Chris Shisanya, Senior Lecturer, Kenyatta University, Department of Geography, as one of the key people to contact. He also indicated ILRI, KARI, ICRAF, TSBF and Wagenigen University to be the other institutions carrying out extensive nutrient modeling studies in the region. The details are in the field report

2. Friday 17th of November 2000: Meeting with Dr. John McPeak, Dr. Getachew Gebru, Mr. Clement Lenashuru and enumerators Patrick and Eunice, held at GL CRSP Ngambo site in Baringo District:

Discussed the pressing issues of concern related to security in the area, type of additional data to be collected as well as different land management and ownership arrangements. It was agreed that Clement Lenashuru will follow up and provide more information on clan land ownership arrangements and the related security issues. Dr. John McPeak was to contact GTZ office operating in the area to obtain data on soil erosion and runoff experiments as well information on various soil conservation efforts carried out over the years by GTZ. Soil Maps of the area prepared by GTZ were also to be collected by John. Dr. Getachew Gebru agreed to avail data on comprehensive animal dung monitoring carried out for his Phd thesis in Ethiopia. These data was important as it related to animals feed in areas of similar ecological conditions to those experienced in the Northern BASIS CRSP sites of Baringo and Marsabit. K-REP – Kenya Rural Enterprise Program, a new micro finance NGO operating in the area was identified as a possible collaborator.

3. Saturday 18th of November 2000: Meeting with Dr. John McPeak, Dr. Getachew Gebru, Mr. Silas Leruk, Mr. Alex Lenakura and Father Isaiah Eikalo, held at Suguta Mar Mar GL CRSP site.

The meeting was initially scheduled by John to give us an impression of what the Northern Kenya Marsabit site looked like in case conditions couldn't allow us to access the area. It was agreed that a number of references related to security issues in Northern Kenya especially some of Father Eikalos publications including his Masters thesis were to be availed to John who would make the necessary copies for the BASIS CRSP project

4. Monday 20th November, 2000: Meeting with Dr. John McPeak, Dr. Getachew Gebru, Dr. Solomon Desta, and Mr Peter Njeru (FHI) at Dirib Gumbo BASIS and GL CRSP site in Marsabit District.

The meeting identified USAID funded Food for the Hungry International (FHI) project as a possible collaborator and discussed the various activities carried out by other NGOs such as The Christian Childrens' Fund (CCF)- sponsored by the Dutch Government and the Christian Community Services (CCS) - sponsored by the Anglican Church. A number of administrative issues related to security were also raised. It emerged that an NGO forum co-ordinated by the District Commissioner was active and was the one overseeing smooth operation of these development institutions.

Key references identified for Dr. John McPeak to follow up were:

- i) Map 12: Landforms and Soils as well as accompanying map 12 legend

- ii) Map 17: Vegetation (map design;- W. Schutka Giessen and German Agricultural team 1998)
 - iii) Republic of Kenya, Ministry of Livestock Development: Range Management Hand Book of Kenya. Vol. II, 1, Marsabit District, NBI 1991.
 - iv) Range Management Handbook of Kenya. Volume III:
 - Guide to plants tolerant of arid and semi arid conditions
 - A pictorial key to determine stocking rates for goats on dwersperma pasture
 - A field guide to soil erosion and its implications in Northern Kenya
 - a compendium of forage plants for northern Kenya
5. Monday 20th November 2000: Meeting with Dr. John McPeak, Dr. Getachew Gebru, Dr. Solomon Desta and Dr. Timothy Wright (FHI Marsabit Director) Marsabit office.

BASIS CRSP project was introduced and comments and suggestions sought from Dr. Wright. He indicated the need to use the mountain as the unit of analysis and talked of the upcoming Mountainous Region Workshop in early January 2001. The workshop was to draw 50 participants in three categories namely funding, technical and implementing partners. GTZ was identified as an important partner whose participation in BASIS activities in this site would be important. Contacts of key FHI employees are in the main Report.

5. Monday 20th November 2000: Meeting with Dr. John McPeak, Dr. Getachew Gebru, Dr. Solomon Desta and enumerators Isaac Laramo and Julius Korea Leala at Logo Logo site Marsabit District.

A number of issues were discussed in this meeting especially organizations that have worked in the area and which may be excellent sources of secondary data. These were KARI, UNESCO, IPAL (Integrated Project In Arid Lands), KWS (Kenya Wildlife Services), SALTICK and GTZ. A courtesy call to the chiefs and sub chief's offices were made. The chief indicated his willingness to participate in the BASIS CRSP Project but indicated the need for research activities to be undertaken simultaneously with development projects such as construction of small dams for irrigation purposes. The names of individuals to be contacted are in the main report.

6. Wednesday 23rd November 2000: Meeting with Dr. Frank Place, ICRAF – Nairobi.

Dr. Frank Place discussed the various approaches to modeling agroforestry plus other socio-economic issues. He also described the type of existing data and other ongoing research activities in ICRAF that were relevant to the BASIS CRSP project. He indicated a number of Phd students whose work and data would be very helpful when modeling the Western Kenya (Siaya-Vihiga) and Eastern Kenya (Embu) sites. He also referred to the just completed AHI Characterization Study Report as being equally important as a source of data and general information.

7. Thursday 24th – Friday 25th November 2000: Meetings with ICRAF, KEFRI staff in Siaya/Vihiga site.

These series of meeting were held with view to understanding the type of biological and socioeconomic research that has been carried out in this site. It was also important to know the people involved in the research and identify those that will be actively involved in the BASIS project. It emerged that a lot had been done on soils by Dr. Bashir Jama while Dr. Steve Ruigi had carried out a number of studies on tree domestication. A former Cornell University PhD student Frida Mugo was also interviewed and her thesis is to be carefully examined for more information. To understand farmer priorities, problems and future outlook, a farmer was randomly selected in Vihiga district and interviewed to examine key issues to be reflected in the bio-economic model. A meeting with KEFRI regional Director Dr. Odongo increased awareness of the type of work currently being undertaken on forest management in the area. Dr. Odongo also expressed interest in the bio-economic modeling work and indicated that a number of donor and development organizations had already requested him to build such a model to analyze the role of forests in the mixed crop-livestock farming system.

Issues relating to technology dissemination were discussed in a separate meeting with Mr. Quresh. He defined the two methods of scaling up indicating their strengths and weaknesses. Gender issues were discussed with Hellen Nyberg, a PhD student from Lund University, Sweden. It also became clear that the Siaya/Vihiga site had considerable amounts of on-going research on soils and plant biology and hence the need for a follow-up by the Cornell BASIS CRSP team to see whether some of the parameters could be applied in some of the other humid sites in Kenya and Madagascar. Meetings with Dr. Bashir Jama and Dr. Ralph on this would be important.

8. Monday 27th November 2000: Meeting With Dr. Festus Muriithi, Mr David Mbugua, and Mrs. Stella Makokha, KARI HQs.

Discussions were on the specific job description relating to KARI's role in the BASIS CRSP project. This information was required to enable Dr. Muriithi to formalize things with KARI management. Description of the role of other partners as well as issues relating to logistical support were mentioned but not discussed. A separate meeting with Mrs. Stella Makokha, discussed activities of the EPISODE project involving KARI, Norwegian Agricultural University and Wageningen University. The project's activities were similar to those of BASIS CRSP and hence the need for collaboration. A courtesy call to USAID office was arranged with Dr. Muriithi including issues to be discussed. The meeting took place and familiarized the REDSOL USAID officers on BASIS CRSP project activities as well as how the research findings will be disseminated to various stake holders including farmers. USAID Nairobi office then requested to be informed on project progress from time to time.

9. Wednesday 29th November 2000: Meetings with Charles Wambugu, Paul Tuie, farmer Harrison Muriuki and members of Kiwanja Catchment Group, EMBU site.

These meetings were held in the field, first at farmer Harrison's farm and second at Kiwanja Catchment Group tree nursery site. Data sources both primary and secondary were discussed. On station experiments with calliandra tree species were visited. Dr. Festus Murithi and Steve Franzel were identified as the key contact persons in these sites both for research and for administrative and logistical purposes. A number of Phd and Msc students carrying out research on soil conservation, tree adoption and dairy farming were similarly identified. Collaboration with the ILRI/KARI dairy project was deemed necessary.

- 10 Monday 4th – 8th December 2000. Meetings with FOFIFA staff, Dr. Bart Minten (ILO, Project) and USAID Madagascar officials.

The first meeting was held at FOFIFA offices with Jhon Rasambainarivo, introducing the BASIS project. An informal presentation on the Basis pre-proposal was made to clarify the various aspects of the Project to FOFIFA staff. The extent and amount of data required were discussed. Courtesy call meetings at USAID offices were then made, first with David Soroko, Head of the NRM Division and second with Mary Norris, Head of Economic and Policy Analysis Division. Both of them reiterated the need for collaboration with the USAID PAGE Project and also stressed an applied rather than theoretical approach. Mary Norris indicated the need to discuss property rights issues when forging such collaboration and requested to be notified of the USAID BASIS Desk officer in Washington. It was agreed that Dr. Chris Barrett will stop by for further discussion on these issues.

A field visit to Baratambul Tere Tany Project was then made to view the Swiss Soil and Water Conservation experiment site. The aim was to ascertain the possibility of using biophysical parameters generated from data collected at these site in building bio-economic models for Finanarantsoa and Vakinakaratra BASIS CRSP project sites. It was also agreed that FOFIFA (through Jean Fidele) will avail published reports on these experiments to BASIS CRSP for follow-up. Similarly a visit and meeting was made to Anitsirabe BASIS site in Vakinankaratra area to view the area and meet and interview a number of farmers. Again Jean Fidele was to avail more documents on this site. The site (watershed) has been selected by AHI for multiplication and dissemination of new agro-forestry techniques and thus BASIS CRSP needs to collaborate with AHI as well.

Two more meetings were held at the Anitsirabe Ministry of Agriculture (MOA) office and at FOFIFA Regional Station respectively. An MOA official briefed the meeting on MOA's co-ordinating role of all development activities in the area through SRAT and CIRAGRIC Projects and hence the need for BASIS CRSP to work closely with these institutions. The meeting at the FOFIFA regional office dwelt more on briefing the researchers on the planned activities of the BASIS CRSP project and their respective roles. Their response was positive with most expressing the need to be involved in the

modeling exercise in order to gain the relevant skills required to build and run bio-economic models for both policy and technology analysis.

The last two meetings were held in Antananarivo. In one of these meetings, two formal power point presentations were made. One presentation was on the planned activities of the BASIS CRSP Project while the second was an empirical demonstration of the usefulness of a bio-economic model in analysing the impact of various interventions on the sustainability indicators of a specific site. Results in Ginchi Watershed, Ethiopia were presented as a case study. A team of FOFIFA scientists and director, University Professors, development officers from various NGOs and to ILO project representatives attended these presentations.

The Final meeting was a courtesy call to the Deputy director of FOFIFA. The willingness of FOFIFA to work with BASIS CRSP was reiterated and a number of suggestions were made on how this was to be achieved. It was also recommended that BASIS CRSP should consider having more sites in Madagascar and also expand their work into areas outside Fianaratsoa and Vakinankaratra..

2.0 DATA AVAILABILITY AND MODELING ISSUES

2.1 Socio-economic data sets

Considerable amounts of socioeconomic data have been collected in some of the sites. However, their quantity, quality and level of detail tend to vary across the six sites for the obvious reason that the data sets were collected for different purposes and under different circumstances. Bio-economic models require considerable amounts of standardized data. Most of such data relates to human behaviour namely expenditure, consumption, labour or time allocation, risk management, production decisions etc. There are also some household characterization data that seeks to define the farmers' production and consumption environments in terms of farm sizes, production technology for both livestock and crop, ethnicity issues, policy environment and the natural environment (soils, weather and ecology).

For each site, attempts were made to ascertain the type of existing data. But owing to limited time the quality of these data sets could not be verified.

2.1.1 Vihiga/ Siaya site

Data from an ICRAF characterization survey of about 2000 households is available and could be complemented with data from another characterization survey carried out by AHI consultant Dr. Jane Alumira, for the East African highlands. Copies of these surveys are available and can be accessed through Dr. Frank Place. There is also a Cornell PhD study carried out by Dr. Frida Mugo on the role of agroforestry on household welfare improvement in Western Kenya. This study is also available both at Cornell and ICRAF

Nairobi libraries. The 2000 households mentioned above were also monitored and a sample of 120 households were surveyed more comprehensively in terms of expenditure, consumption, sources of income. Consumption data is in terms of types and quantities of food consumed. A 24 hour recall data was collected to determine what each household member consumed over a period of nine days in three periods of the year- once after harvest and twice before harvest. Household wealth levels and their rankings have also been done. Interestingly no data was collected on specific areas under different land use activities although land sizes per household were determined. Adoption studies involving a sample of the 2000 households have also been done and data is similarly available. Another set of data collected by KEFRI in an ex post survey of KEFRI technologies (alley cropping and improved fallow) is with the KEFRI Center Director at Maseno. Net present value data for labour and land under different intervention scenario has also been collected by Dr. Joris De Wolf, of ICRAF. Collection of data on rock phosphate credit has just been completed and is soon to be computerized and cleaned. Another survey carried out to understand farmer group activities involving farmers in Tatro village has generated another set of data. Details of these data were not availed as the people involved in the survey were out of office at the time of this visit. Nutrient monitoring data for a number of specific farms in Siaya and Vihiga districts are also available. Some of the information from these monitoring exercises have been published in reputable journals and are excellent sources of secondary data.

2.1.2 Embu site

A number of household level survey data sets have been collected in Embu mainly by Dr. Festus Muriithi and Dr Steve Franzel. A total of 2600 households have been surveyed in a characterization study conducted by the ILRI/KARI dairy project. Again out of the 2600 households, 160 were surveyed comprehensively in an adoption study. Data on collective action has also been collected. The information was collected from 40 farmer groups selected randomly from 150 groups identified in the characterization study of the area. The second phase of the collective action survey has begun focusing mainly on farmer innovations and marketing issues. A number of masters and PhD students under Dr Frank place's and Dr. Festus Muriithi's supervision have generated considerable amounts of data for the site. The details can be provided by both supervisors. The names of some of the students are mentioned in the field report.

2.1.3 Ngambo site (Baringo).

Household level panel data collection is going on in this site. Around 30 households per location in six locations are involved. This is a comprehensive panel data household survey seeking to determine the various ways households of different wealth endowments respond to risk. The panel is collected every 3 months i.e. quarterly. Repeated surveys occur in the short rains, dry season, long rains and the intervening period between the long and short rains. This is done to capture the effect of seasonality. Baseline survey data has already been collected. The data collected so far is necessary for wealth and risk ranking to determine what is driving the differences across households when coping with the same type of risk. Household consumption data has similarly been collected and

whereas this is not a comprehensive human nutrition study, the information could provide helpful insight into what the peoples' food intake and hence nutrition levels look like. An area of concern (not yet verified) was that quantities consumed were not being recorded.

2.1.4 Dirib Gumbo and Logo logo Marsabit sites

A household level panel data survey similar to the one in Ngambo site in Baringo district, has been completed and copies of the data are with Dr. John McPeak and Dr. Chris Barrett. The data is on household income levels, assets, labour use, basic crops and generally, detailed livestock issues. Much of the data has been computerized and is ready for inspection to ascertain any existing gaps. Apart from these data (collected mainly by Dr. John McPeak under the GL CRSP Project), most of the other surveys conducted in the area had been carried out by a number of masters and PhD students. One such student, Godano Roba, collected a lot of data on agroforestry technologies in the area for his PhD and may soon be publishing a book on water, agroforestry, crops and livestock interactions in the area. Another student, Julie Mobley, an epidemiologist working with Food for Hunger International has excellent nutrition data. These data sets could be availed to BASIS CRSP through Huka Duba, the FHI Human Health Manager. FHI publications especially their Annual Reports were reported to be good sources of supplementary data for this site. The same seemed to be true in Logologo site. Here, a total of 30 households were being surveyed in two locations, Logologo and Kamboi. These are not basis sites but could be viewed as further supplementary data as they target risk coping mechanisms among the pastoralists in Marsabit area.

Work by Ben Campbell, a professor from Boston University, on human health and nutrition of the people in this area i.e. pastoralists of northern Kenya is another source of secondary data. He also carried out a time allocation study for Men, Women and Children in Songa location about 20km east of Dirb Gumbo and Karare site. John McPeak through his enumerator Isaac Laramo would be better placed to follow up on the location of these data.

2.1.4 Anitsirabe (Vakinankaratra) site

Limited time was spent on inspecting these data sets as copies were already with BASIS CRSP PI and FOFIFA co-PI. The data were collected in 1996 in a joint FOFIFA/IFPRI survey. They are detailed household surveys. An AHI researcher, Dr. Anne Stroud has similarly carried out a diagnostic characterization survey for the area. Based on this survey, a report was published that contains a good amount of secondary data. Mr. Jean Fidele of FOFIFA has the exact details of this characterization report.

2.2.1 Livestock, plant biology and soils data sets:

These data sets relate mainly to identification and characterization of various plant species (including crops) in various sites, their uses and nutrient contents, types of

livestock species kept, crop and livestock management systems and information on nutrient flows arising from interactions among these broad categories of flora and fauna.

Most of these data were generated either through on farm or off farm experiments/surveys, expert observations or actual laboratory analysis and measurement. Use of spectrometry GIS technique was also used in one of the sites. Quite understandably, significant disparities were observed in the quality and quantity of biological data collected in various sites visited.

Siaya Vihaga site has a lot of ethno-botanical survey data collected over the last seven years. These are species identification data on existing shrubs, trees and grasses both exotic and indigenous in the farmers' local and/or immediate environment. These plant material were characterized and analyzed with the hope of identifying those species that could be used to boost farm productivity. Experiments involved determination of nutrient contents of each of these plants as well as their decomposition rates. The plants were then ranked in terms of those that had the highest potential in increasing soil fertility either through biomass transfer or through improved fallows. Species ranged from tithonia diversiflora to lantana camara in the biomass transfer category and gratallaria grahamania in the improved fallow category. A full list of different plant species found in the area are listed in the field report under the sub headings of fodder, medicinal, fruits, timber and fertility improving species. Data on effects of different agro-forestry species on the area's soil fertility were similarly collected both on-farm and on-station. Increases in mineralizable nitrogen, phosphorous and potassium in soils due to the three types of interventions (improved fallow, agroforestry and biomass transfer) were hence ascertained. Comprehensive nutrient monitoring data for different categories of farms was done at the farm level.

Soil fertility experiments have been carried out in this site too and an impressive amount of data has been recorded from work by Dr. Bashir Jama on below ground soil nutrient and water uptake competition, soil and water run-off experiments, effects of rock phosphate application on soil fertility improvement and different crop yield responses to different rates of fertilizer application both organic (improved fallow and bio mass composting transfers) and non-organic (chemical fertilizer use). Much of the soil conservation studies in this site have been carried out by the National Agriculture and livestock extension Programme (NALEP). Overall, most of the soil loss experiment results are documented in the East African Agricultural and Forestry journal of November 1999. Details of the article are given in the field report. Data seems to suggest that organic methods could raise yields threefold while their use in combination with modest levels of rock phosphate could achieve these yields at 30 % less the cost of using inorganic sources.

Data on livestock technologies in this site are sparse partly because ICRAF Maseno station does not have a livestock research mandate. Only limited experiments and hence data on use of some agroforestry tree species as animal fodder are available.

In Embu site, much of the biological research is on soil fertility improved through an integrated mixed crop-livestock farming systems. Use of calliandra sp. to raise soil

fertility and increase animal fodder especially for dairy animals has generated substantial amounts of both on farm and on station data. Other experiments on animal forage involve elephant grass and leukinia species. Experiments on use of mulberry trees for fodder and for fruits are also on going.

Soil conservation experiments initiated in 1995 in this site have so far been concluded and some of the data have been used to write reports for publication. Data sets are on variables such as soil and water runoff rates and soil, water and nutrient redistribution. The experiments were carried out on 5x30 plots in 2 replications. Slope was assumed to be constant in these experiments and hence no variation due to changes in terrain have been captured in the existing data sets.

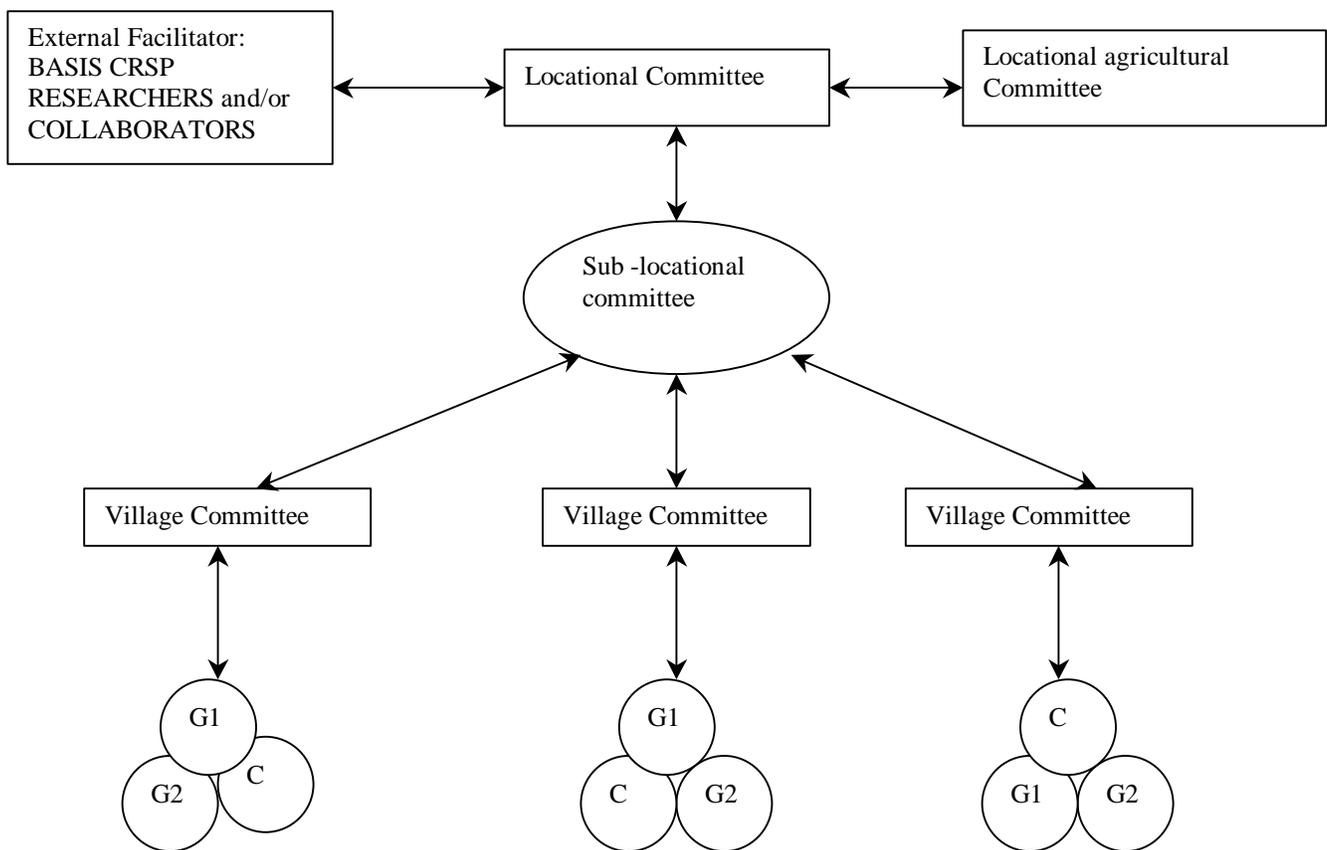
In Ngambo (Baringo site) and Dirib Gumbo (Marsabit) sites, much of the biological livestock crop data were difficult to ascertain. Here there is likely to be a need to set up new experiments to measure most of the biophysical variables. Epidemiological data on livestock have been collected by a number of institutions and hence a number of secondary sources (publications) from institutions such as GTZ, SALTICK, IPAL, KARI, UNESCO and MOA etc will have to be examined to determine exactly which sort of data will have to be collected. Details of some of these secondary sources including individual researchers or experts are listed in the main Field Report. Plant species identification also need to be done. However one of the GL CRSP enumerator, Isaac Laramo, working in Logo logo site has exceptional knowledge of scientific names of these range species can virtually identify them on site. Being a local person he can describe their uses by the local population as well. Details of this type of nomenclature are in the main report. Mr. Laramo's expertise will be required in carrying out species identification in other BASIS CRSP sites. Secondary data for this type of work could be provided by Dr. Matheus Weiss of ICRAF. His father Dr. Eickeherd Weiss carried out extensive work on identification of rangeland species in Marsabit District.

Anitsirabe (Vakinankaratra) site has very limited biophysical data. So far biological data is limited to trials on soil conservation and soil fertility experiments initiated by AHI in 1998. Soil conservation methods being tested are contour lines using different vegetative materials. A more comprehensive biophysical experiment was carried out in Baratambul area located 40 km to the north of Antananarivo by the Tere Tany project funded by the Swiss Government. Data from these experiments are already documented and even published. FOFIFA has copies of the report (Jean Fidele to mail copies). Data collected was mainly on erosion and runoff levels of land under different land management and hence land cover levels. The experiments were carried out both at plot and watershed levels and involving grass covers, grass line contours using Eragrostis grass and eucalyptus covers.

3.0 TECHNOLOGY AND POLICY DISSEMINATION ISSUES

One of the key issues raised by a number of research partners and donor community i.e USAID regional offices in Nairobi and Antananarivo is how results of the BASIS CRSP research project are going to be disseminated (implemented). The project recognizes the importance of tackling these challenges at its inception and the need to involve

stakeholders in identifying the best scaling up approach. The most promising approach likely to be adopted by the BASIS CRSP project is described and displayed below. This approach is basically a community based dissemination strategy that involves an external facilitator (one or all of the BASIS CRSP partner institutions or scientists could play this role). A village level analysis based on the current catchment extension approach adopted by both Kenya and Madagascar MOA extension agents is then followed. Its advantages are that collective action is normally done at village level and is based in most cases on clans or age groups or age sets eg Morans. For such cultural or ethnic based groups, collective action and ties are almost natural. The second reason is that the combined impact of a community on the biophysical environment is better addressed at community rather than individual household level.



However issues related to the market cant be handled at the village level but must be addressed at locational or sub-locational levels. This drives formation of the respective committees. It is members of these committees that are trained in the use of new technologies by the external facilitators. They in turn, train the village level committee members who similarly train group (G1, G2) or clan (C) members. Feed back is gotten by a reversal of the processes. The specifics of this dissemination approach are published in the Development Journal in an article by Amoudou Yang et. al. Steve Franzel has also published an article in the same journal. Mr. Quresh (ICRAF, Maseno office has the

specific Journal volume including year of publication). Policy aspects are automatically integrated in this frame work by making the local chiefs and sub chiefs (i.e. government administrators) patrons of the respective committees. One limitation of this approach, though, is that it is too localized.

4.0 CONCLUSION

Based on the above summary, it is clear that a number of issues need to be followed up. The Malagasy sites require more data collection than either the humid or dry ecology sites in Kenya. Mechanisms of collecting both socio-economic and biological data sets need to be evaluated and where possible data collection needs to begin almost immediately. A brief discussion with Dr. Bart Minten on these issues showed clearly that panel data collection need to begin as early as February 2001 if the same is to be ready for use by mid 2002. To get around the initial BASIS CRSP liquidity problems, ILO project could provide funds to start off these surveys and be reimbursed the same by BASIS CRSP when the project funds start flowing by mid September 2001. Dr. Bart Minten, co-ordinator of the ILO project has accepted this suggestion in principle and is looking forward to discussing it further with Professors Chris Barrett and Jhon Rasambainarivo. A list of all the individuals mentioned in the report together with their addresses and specific activities they are to undertake such as provision of references of secondary data is now being compiled for follow-up. Similarly, a data inventory table has now been compiled and is soon to be mailed to each site to verify whether the data set information indicated is correct. This will give an idea of the amount of data that is yet to be collected and the implications on Project time line.

MEETING WITH KEITH SHEPHERD, ICRAF (November 16th 2000).

PURPOSE:

Evaluate existing biophysical data in the Western and Eastern Kenya research sites of Vihiga/Siaya and Embu respectfully as well as have an expert judgement of nutrient modeling skills in the region. Assess ongoing nutrient modeling work and identify specific institutions, individuals or approaches to be used in the BASIS-CRSP Modeling efforts.

FINDINGS:

The meeting went well with Keith providing information on biophysical modeling efforts in the two sites. A consortium of institutions is already undertaking comprehensive nutrient modeling in Vihiga, Kisii, Kericho and Kiambu districts. The institutions involved are International Livestock Research Institute (ILRI), Wagenigen University (WU), International Centre of Research for Agro-forestry (ICRAF), Kenya Agricultural

Research Institute (KARI) and ICASA. Phillip Thornton and Robert Gaitho are the leading scientists from ILRI while Keith Shepherd and Michael Waithaka are from ICRAF and KARI respectfully. Keith's view is that focus need to be on exported nutrients and hence what is critical is the response of the system to external intervention. It also emerged that modeling nitrogen mineralization in the region has been found to be too complex and hence the suggestion that proxy rather than actual variables be used when analyzing these processes. In short, detailed process modeling is difficult and hence may not be satisfactorily achieved to answer the question such as; how much dung manure is required to increase productivity by such a per cent?

The best research approach used so far is farm nutrient monitoring but the resources available can only enable monitoring of a few representative farms. A larger sample of farms is however needed if the conclusions drawn are to be relevant to most of the region surveyed. There is also need to select farms to be monitored based on the farmer objectives. Larger farms have been observed to focus on dairy objectives while smaller farms tend to be subsistence based with a desperate attempt to find off-farm employment. At the moment ILRI is carrying out studies on dairy farm nutrient recycling. Forage analysis is done by ILRI, Tropical Soil Biology Forum (TSBF) and KARI.

Attention was drawn to Dr. Chris Shisanya's work on Small scale farmer's response to population pressure in Vihiga District, Kenya. This study has a number of important information for anyone interested in nutrient monitoring in the region. Dr Shisanya's address is as follows:

Senior Lecturer, Kenyatta University, Department of Geography, P.O. Box 43844
Nairobi Kenya. Tel. 810901-19 ext. 57321, Fax 606809

Keith also indicated that nutrient monitoring in pastoral communities is ongoing. However there is a need to take a regional approach and identify the various livestock keeping systems first before examining their impact on nutrient flows. In this regard, new methods are required to determine land degradation caused by different livestock management techniques. GIS and specifically spatial characterization of soils using spectrometry are some of the recommended methods. Keith's main research thrust at the moment involves use of these techniques. This is basically a graphical modeling multi-variate technique using diffuse reflectance spectrometry to identify different forms of degradation in the NARL-Lake Victoria Project. The method has helped identify the marginal lands as the main sources of Lake Victoria nutrient loading.

The various laboratory capacities were also assessed to identify the main institution that could be used to carry out cost effective nutrient analyses. It emerged that ICRAF laboratory are capable of carrying out small and simple NPK sample analyses but not intense nutrient analyses as required by animal and human nutritionists. For such ILRI and KARI would be best suited. There was need to control for cross lab differences however when analyzing samples from different countries for comparison purposes.

The following references were highly recommended by Keith as having important data for nutrient modeling in the region:

1. African Highlands Initiative Technical Report Series No. 6. Maintenance and Improvement of Soil Productivity in the Highlands of Ethiopia, Kenya, Madagascar and Uganda.
2. TSBF Annual Reports

**MEETING WITH JOHN McPEAK AND CLEMENT LENASHURU MARIGAT
SITE (November 17th 2000)**

PURPOSE: To understand ongoing data collection exercise in terms of frequency and coverage as well as have a physical impression of the area (physiography, infrastructural setting especially communication and general market access).

LOCATION and PHYSIOGRAPHY: The area lies between Lat. 30 to 36 degrees North and 036 to 031 East..... It is generally flat with deep alluvial soils. Rill erosion is however visible and in some places gullies have developed. The area is bounded by steep mountain sides to the western sides spelling the beginning of Tugen hills (escarpments).

FINDINGS: Data collection is mainly at household level and is aimed at gaining insight into various ways households are responding to risk. Around 30 households in each of the six locations are being monitored. This is basically panel data collected every 3 months i.e. quarterly surveys. The surveys occur in the short rains, dry season and long rains to capture the effect of seasonality. Baseline survey data is already completed and what is going on is the repeated survey as mentioned above. To understand the procedure, I interviewed two enumerators involved in the ongoing survey namely Patrick and Eunice of Ngambo location. Each is monitoring around 15 households distributed in three villages namely Loropil, Ngambo and Sintan. Selection mechanism of the households was random but for each household selected three household members were interviewed namely the HH head, a female member and the elder son(daughter?). Owing to the long sessions taken to collect the information, HH are paid Kshs. 100 per each interview to encourage participation. The survey aims at answering a number of questions namely; Ranking risk- does it have a regressive relationship with household type and endowment? What are HHs doing to cope with unforeseen risk? What is driving the differences across households when coping with the same type of risk? Does market access have an impact on risk? Does education affect risk perception and risk coping mechanisms used?

It was also known, perhaps from the baseline survey, that animal mobility is highly dependent on the location of water-points in the area. These seasonal movements have been spatially documented using a GPS and sketch maps drawn to show animal location at different times of the year and whether they are in satellite or base camps.

Another set of data collected was on household consumption in terms of what is consumed. This was based on a 24 hour recall data and was combined with a 24 hr recall data on each household member's activities. However the quantities consumed were not

documented and hence my suggestion that this be done to give an idea of levels of calorie intake and hence nutritional status of various household members.

Overall, Food availability was observed by the enumerators to be the biggest problem faced by most families in the area. Most of them depend heavily on relief food. There was however no direct death from starvation in the area although poor health was recognized as a direct consequence of inadequate diet and hence could lead to people dying of mild sicknesses. Data on food inter-household transfers has also been collected as well as inter-household cash transfers. The food transfers are categorized as short or long-term.

It also emerged that about 60% of the livestock herds in this area were lost due to the prevailing drought condition in the course of the past two years. It was estimated that it may take at least two years for the livestock herds to replenish to their original numbers. In most HHs, the loss is permanent. Animal diseases are similarly common perhaps due to unrestricted animal movements (i.e. no enforcement of quarantine rules by the government authorities are being done). Cattle foot and mouth disease (FMD) is the most common killer followed by TRIPS and other tick borne disease. Acaricides are available but farmers cant afford them. Veterinary health is mainly private and hence is out of reach of the poor HHs. In most cases, government extension services are non existent and nearest vet services (private) are about 8 km away on the average. Data collected on animal health is mainly animal mortality in terms of age of death and cause of death. In most cases, the cause of death was falls from cliffs as animals tried to reach better pockets of forages in inaccessible areas. Livestock disease was reported to be a major threat to livestock keeping in the area.

Fecal deposits are however not collected in the area for fuel purposes and hence nutrient cycling through livestock is unaffected.

Communal land tenure prevails especially for the pasture lands and communal council of elders manages these resources. The council consists of an age set leader whose word is final in most disputes. Shift to an area for pasture is done through agreements by the clans or tribes. Thus permission must be sort first from the council of elders owning a particular piece of land before another council can graze their animals . Often this procedure is not followed resulting in clan and tribal clashes- a source of substantial insecurity in the area. It was agreed that Lenashuru Clement of Egerton university will provide more information on how the traditional land tenure system works and the general working of community based contracts. It also emerged that one reason of insecurity in the region is the lack of control of clan morans (young warriors) by the council of elders. Government arbitration of disputes was also poor and in most cases biased.

It also emerged that commercial activities through the market are carried out once every month when livestock and poultry are brought to market for sale. Supply of livestock in

the market is highly dependent on the weather. During severe water shortage periods supply of animals is high hence poor prices. There are also some local middlemen who cash in on such misfortune by threatening away any outside buyers willing to pay higher prices. Multiple exchanges of the same animal on the same market day occur with the final buyer paying three times what the initial buyer paid.

Prices for an average cow of about 300-400kg ranges between Kshs 15000 to 17000 while for goats it is Kshs 700 to 900. Other reasons for selling livestock are for school fees or for restocking grain supplies. There is limited banking of money by most households however. This is in spite of mobile banks.

Milk is the main livestock product and is mainly drunk in the home rather than sold for commercial purposes. Goat milk is also significantly consumed.

Kenya Seed Company is currently (in collaboration with Perkerra Irrigation Board) contracting farmers for seed multiplication purposes. Farmers are provided with maize seed, fertilizer and advanced credit to finances all the cultural practices of growing maize with the understanding that they will sell all their produce to the Kenya Seed Company. The pay for output is generally very good and farmers in the area view the venture as being very profitable compared to alternative activities. However, the payments from Kenya seed are through the Irrigation Board known for poor management and delayed payments. Farmers are hence hopeful that future payments will be made directly to them. This may not be easy as the Irrigation Board controls all the maize production through supply of water and hence requires that all contracts with the farmers be made through them including the supply of inputs such as seeds and fertilizer.

K-REP – Kenya Rural Enterprise Program is a new micro finance NGO operating in the area. The NGO introduced low cost shares in the area many of which have been bought by pastoralists and hence this acts as an alternative form of banking. There are no charges involved and farmers can readily cash in their shares by simply selling them off. Moreover the shares earn interest. More information on how the scheme was working can be obtained from the KREP offices or representative in the North Horr area where the scheme is very popular.

Information on the area's meteorology has been collected by the catholic mission in North Horr location.

Questions were also raised on the type and level of land degradation through deforestation and/or soil erosion and the type of conservation efforts being undertaken and whether they were effective. It emerged that an F.A.O programme had been introduced in the area a number of years back and had sensitized people on the need to conserve soils as well as the various soil conservation strategies to be pursued. Major soil conservation practices were building of stone gabions (embankments) across gullies, planting of life hedges mainly cactus across farmer fields or simply adopting proper crop and animal husbandry practices such as cultivating across slopes and planting grass hedges using either elephant grass or eragrostis species.

There is no ongoing agro-forestry activities in the area in spite of the existence of an agro-forestry NGO (RAE - Rehabilitation of Arid Environment). This NGO is reputed to teach farmers land management techniques involving tree planting. Fodder trees introduced sometime back are however visible namely *Prosopis Chilensis* and *Prosopis Juniflora*.

Charcoal burning using indigenous tree species such as *Acacia tortilis*- a very good fodder tree, is common. *Acacia nubica* on the other hand is the most common shrub in the area and is used as fodder for goats. It is similarly used by the local people as an excellent tooth brush.

Salvadora persica – browse material fodder for livestock is also common. The pods are eaten by people. It also doubles as medicine for the stomach – mainly the roots.

Owing to the high scarcity of fodder during the drought, most pastoralists became inventive. They tried to use cactus as forage. They first cut the cactus plant, roasted it partially to remove the thorns then chopped it up into small succulent pieces that were then fed to animals. In this manner, the innovative households managed to save up to 90% of their herds.

An inevitable observation, however, was that herd sizes were declining over time. This could be due to good market access that contributes to quick sale of animals to get ready cash hence no need to keep large herds. It could also be due to declining land area for pasture. More probably, it could be a function of changing lifestyles or a perhaps an increase in animal diseases over time and hence high mortality rates than before

CONCLUSIONS: It is recommended that a more careful inventory of land degradation data be sourced from GTZ offices operating in the area as they have carried out a number of soil erosion, runoff and conservation experiments in the area. Also soil maps should be provided by the same organization. John McPeak agreed to follow up on this.

- It is also recommended that routes that animals commonly follow over the years be mapped up including distances between the satellite camps and base camps and how they have been changing over the years.
- There is need to include more nutritional questions in the questionnaire to give an indication of the quantities of each food type/item consumed rather than just indicating the types of foods consumed.
- Gross margin information is required for each economic activity
- Technical coefficient information is required i.e. how much input per unit of output.
- Labour data for each activity by gender and by age and also any cultural division of labour.

PERSONAL COMMENTS

Generally, people in the area appear to be better off on average with most living in tin roofed houses with radios and bicycles. One however wonders if they wouldn't be better

off given the wonderful communication system and the better infrastructure. Insecurity however appears to be an issue in areas around Marigat Town.

VISIT TO SUGUTA MAR MAR SITE: MARALAL TOWN (18th November 2000)

PHYSIOGRAPHY:

The site is located about 20 km south of Maralal town at an altitude of about 5991 m above sea level. It is generally flat with deep red soils that are sandy loam (not confirmed). The area experiences heavy downpours that are occasional occurring in a short wet season. It also suffers from substantial insecurity due to rampant cattle rustling.

FIELD ASSISTANTS:

1. Silas Leruk
2. Alex Lenakura (Cartoon)

This site was initially chosen to examine communities on the verge of transforming from pastoral lifestyles to sedentary mixed crop farming ones. It however turned out that those communities that appeared to be settling around urban area were the extremely poor who had no means to survive on the range. These were mainly Turkana communities and the landless Rendiles. The site was hence left out of the Kenyan BASIS sites. The interview was however meant to provide some insight into the various ways the extremely poor cope in situations of better market access.

It emerged that about 30 households are currently being interviewed periodically. Almost 75% of these HHs are Turkanas who have fled from their original rural homes in the country sides to escape tribal clashes in Maralal and Baragoi areas. The households (HHs) are located in Vijijis (Villages) about 20 kms outside Maralal town. Most of the HHs have no animals while a few own 2 – 3 heads of livestock. For this reason, most of the HH members work as labourers for the more commercially oriented shop owners in Maralal town (Kikuyus). The HHs are however engaged in limited cropping activities in small gardens growing mainly maize, beans, green vegetables, potatoes and in some cases wheat. They have now been living in these conditions for the last five years. Water remains the main constraint given the low and highly unreliable rainfall. Threat from wildlife (elephants) is also common. Generally, cultivation is with rudimentary equipments (hand hoes) with almost no fertilizer application. There is a poor understanding of proper farming practices as farmers still view crop cultivation as secondary to animal keeping.

Understandably, there is a high dependence on relief food which is grossly inadequate. Malnutrition is high and Kwashorkor is evident among children in these HHs. As expected, prostitution and other social vices are common. This has injected a lot of unreliability in the data collected as many lie in the hope of getting some form of assistance.

In terms of labour allocation, the female HH members are involved in household chores

and serve as maids for about Kshs. 500 (US\$7) a month while boys go to school or work in the few commercial ranches in the area.

A number of NGOs operate in the area. These include The Christian Childrens Fund (CCF) which helps in payment of fees for bright children from poor families. GTZ funded Samburu District Development Programme is another NGO that specializes in building communal dams. So far they have constructed one such dam in Suguta Mar Mar valley for water storage purposes using food for work to attract labour from the community.

In terms of cultural mix, the site has a combination of communities living together. Significant among them are the Kikuyus who are viewed as more progressive and from whom the other communities (Samburu, Rendile and Turkana) are learning the need to be self dependent and sedentary. About 50 kikuyu families are reported to be living in the community. They portray highly progressive strategies of sedentary farming and trading among other sedentary activities. The other communities suffer from infighting due to communal ownership of land. There is very low use of market exchanges and hence much of the production is outside the commercial sector i.e. subsistence oriented production. These communities are also prone to poor health with Malaria being rampant.

Education levels are extremely low although there is a clear positive correlation between education and progress in most households.

In terms of the most effective intervention, irrigation was pointed out as the key to progress in the area followed by education. Loss of herd due to drought is a major setback in the area's attempt to progress. With education comes the need for better integrated group activities. So far this has been an ongoing traditional way of living.

Morans operate in groups that are based on age. Of late, this has been adopted to fit the modern day needs. Thus the morans form groups, contribute money, purchase livestock and take them to markets in Nakuru and Nairobi where they fetch higher prices. The problem is the current cattle rustling which results in confusion as to which group has legitimate animals i.e. not stolen.

The question of insecurity has resulted in some of the communities losing everything and being restricted to live in inappropriate areas resulting in severe land degradation. Thus migratory patterns that used to be effective in ensuring adequate pasture for the animals can no longer be used. The result is loss of livestock and declining productivity. With rising population the result has been more severe than initially envisioned. Ethnic differences have also emerged. The Samburus who are the original settlers in the area are reputed to be highly suspicious of the new comers (Turkana and Kikuyus). They are hence very negative about the new interventions and have been seen to be behind the ethnic clashes- an attempt to forcefully throw out the "intruding" tribes. These have been worsened by politically instigated animosity fueled by most of the local politicians.

East Coast fever is the main animal disease.

CONCLUSION:

The issue of insecurity, poor roads and open instigation by local leaders was a running theme throughout the interview. Most of the information on these sensitive issues was given by Father Isaiah Eikalo of Suguta Catholic Mission (Box 13, Suguta, Kenya, Tel. 0368 2464). He has published a book on this topic that is a major reference by organizations such as the UN and the Human Rights Movements in Kenya. Its title is "The Forgotten People". He may be a contact for further details on these issues.

VISIT TO MARSABIT SITES (DERIB NGAMBO AND LOG LOGO SITES) (20th November 2000)

Having arrived in Maralal we traveled further north to Marsabit. It became clear that apart from poor roads there was extremely very poor security along the way as one could visibly see abandoned settlements due to insecurity (some of them had been razed to the ground).

Thus apart from the obvious arid conditions (some of the areas receive as low as 150mm per annum) there was a negative impact of communities huddling around urban centers where there was some form of protection.

The following references were identified by John McPeak as containing the relevant biophysical information necessary for bio-economic modeling of these sites:

1. Map 12: Landforms and Soils as well as accompanying map 12 legend
2. Map 17: Vegetation (map design;- W. Schutka Giessen and German Agricultural team 1998).
3. Republic of Kenya, Ministry of Livestock Development: Range Management Handbook of Kenya. Vol. II, 1, Marsabit District, NBI 1991.
4. Range Management Handbook of Kenya. Volume III:
 - 1 Guide to plants tolerant of arid and semi arid conditions
 - 2 A pictorial key to determine stocking rates for goats on dwersperma** pasture
 - 3 A field guide to soil erosion and its implications in Northern Kenya
 - 4 a compendium of forage plants for northern Kenya

MEETING AT DIRIB NGAMBO SITE: (20th November 2000)

Interviewee: Peter Njeru- Agriculturalist, Educationist, Community Development diploma trainee (Egerton University graduate).

The site lies at an altitude of about 6000ft above sea level and receives an annual rainfall of 650mm

This is a very humid site with substantial fertility mainly volcanic humid soils of considerable depth. Food for the Hungry International (FHI) is the main NGO working in

the area. It is funded mainly by USAID's Food Security Project. FHI provides seeds to the farmers mainly maize, beans and sorghum. Farmers pay back the same at the end of the season after they have harvested the respective crops. Composite seeds are given to the farmers. Bad weather has grossly affected the area's productivity over the last two years 1999 and 2000. Main crops grown in the area are maize, beans, cassava, sweet potatoes, pigeon peas, green grams, teff, wheat and miraa.

The area experiences a conflict between crop and livestock activities. The two compete for the limited land. Livestock and wildlife are observed to destroy crops mainly perennials. An intensive mixed crop farming system is practiced with a lot of agroforestry using new tree species such as *gravilea robusta* and *leukenia* for forage purposes. Miraa is the main cash crop planted mainly in gardens around the homesteads and irrigated mainly with water ferried by women from the nearby streams. Soil erosion is however rampant and a campaign by the local community to conserve the soil is one of the ongoing conservation activities. The main soil conservation technique being promoted is terracing. Grass lines are however observed using mainly macari cari grass which double as animal feed as well. Use of chemical fertilizer is very limited due to their high costs. Maize variety planted is Katumani – best suited for the arid areas. Application of manure is carried out by most farmers as chemical fertilizer is unaffordable by most. Animal traction is used in ploughing the land as well as transportation.

Insecurity is a major concern especially for farmers with considerable numbers of livestock. They are forced to construct animal kraals in the middle of their settlements and build their houses around them. This has similarly resulted in communities living together in satellite settlements. At the moment there is a lot of animal raiding especially between the Rendiles and Borans. Land tenure is private but not official i.e. farmers have not been issued with land title deeds. Grazing is mainly on communally owned land on the lower part of Dirib Gambo.

Most communities still consider livestock as being more important than crops and hence given a choice would rather keep animals than grow crops. The Burji community however value crops more than the animals and are the best cultivators in the area. They are also the best traders.

Other development organizations in the area are the Christian Childrens Fund (C.C.F) funded by the Dutch government and the Christian Community Services (Supported by the Anglican Church). The latter specializes in distribution of high quality seeds to farmers. There is also a high reliance on community labour arrangements in the area.

There also exists an NGO forum in the area which co-ordinates all the NGOs in the district. This forum is chaired by the district Commissioner who is also the chairman of the District Development Committee.

FOOD FOR THE HUNGRY INTERNATIONAL (FHI), MEETING. (20th November 2000)

Dr. Timothy Wright.

Started by introducing the plan to have a Mountainous region Workshop with participants from all over the region ranging from Development NGOs, Research organisations, government and government parastatals, Universities and generally all those involved in human health and nutrition activities, crop and livestock production, wood fuel issues and irrigation. This workshop of collaborators will take place on 10th to 12th January 2001 and the groups to be involved will fall in three basic categories

- a) Funding partners
- b) Technical partners
- c) Implementing partners

About 50 participants will be invited.

- There is a general view that there should be a shift from cattle to goat promotion in the arid areas. Over the past years, efforts in livestock promotion have not born much fruit and hence the need for the shift. Moreover funding agencies have not been sensitized to this need.
- It was also felt that mountains should spell the new scope of intervention rather than the households. In this sense co-operation will be very important among a number of institutions namely ICRISAT, FAO, CAFRE. Already a number of scientists (Dr. Michael Klaij) from these institutions have expressed a lot of interest in this new approach. Given the aridity levels of Marsabit district (the rains and hence crops have failed five consecutive times) a change of strategy is long over due. This is supported by rainfall data recorded over the last 30 years (see the table attached).

DATA:

A lot of data has been collected by a number of researchers in the district. The following were mentioned as the best sources so far:

- a) Karen Witzenberg – Dutch University PhD student
- b) Godano Roba – a Gabra PhD student researching on forest reserves in the region. He is reputed to have a lot of data on agro-forestry and is currently preparing to publish a book on water, agroforestry, crops and livestock. There is however need to look at mountain bottom communities as well and determine whether some data has been collected.
- c) Julie Mobley – Epidemiologist working with FHI –has excellent nutrition data
- d) Huka Duba - Has an Msc. From Netherlands. Current FHI human health manager

Apart from data that has been collected by John McPeak there is need to allocate time to go through secondary sources of biophysical data for Marsabit sites. Work done by Matheus Weiss of ICRAF for Marsabit site need to be examined and if possible use his assistance to access the enormous data collected by his father Eickeherd Weiss on the nomenclature of rangeland plants and other species.

At the moment an agricultural programme is being emphasized on the low land with sorghum, pigeon peas as the leading crops rather than maize which has constantly failed. At the moment, people are not significant sorghum consumers but there is a need to

educate them in cooking white sorghum based meals to align their tastes with what the environment can readily offer. Teff consumption is also high but unlike maize, it does well in low rainfall areas requiring a short growing season to mature. Millet is another alternative crop that needs to be examined for intervention.

On the issue of security, it was noted that the mountains in the area are relatively more secure now than in the past couple of years when the strife between the Borans and the Burjis was at its peak. The insecurity in the outlying lowlands around Marsabit has however resulted in most of the animals being kept in the mountains and hence considerable pressure on the limited pasture lands. For the relevant details and statistics reference was made to FHI report (to be passed to John McPeak later). Other published sources of information were the Arid Lands Resource Management Project (ALRMP) which is funded by the World Bank through the Kenya Government Office of the President

CONCLUSION:

GTZ-Government of Kenya should form a task force to implement strategies in this area on a long term basis. All efforts should be made to reduce political interference in development activities.

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Livestock off-take funded DIFAD Project (Department of International Development of
British Government) ODA

MEETING AT LOG LOGO SITE, MARSABIT DISTRICT (20th November 2000)

Enumerators:

1. Isaac Laramo – Community mobilizer
2. James Korea Leala – Health nutritionist

A total of 30 HHs are being surveyed on a quarterly basis from a number of Manyattas in Log Logo and Kamboi locations.

For most of the HHs surveyed, the main activities were livestock keeping and selling of livestock products mainly milk. However due to drought and hence the need to move far in search of pasture i.e. upto 100km away from base camps, it was no longer possible to participate in market exchanges in places such as Kina and Isiolo.

Division of labour in the HH

Livestock keeping involves 6-8 members of the HH mainly Morans (young warriors). Parents and young children remain at home. Movement of animals away from home in search of better pasture results in an acute milk shortage at home and hence people have to look for alternative activities such as firewood selling and food for work. Lactating goats are often left behind when the rest of the herd is moved in search of better pastures. In recent times, HHs are keeping a few camels to provide milk in periods of drought when a whole herd could be wiped out. At times the situation is so desperate that suckling calves have to be killed to reduce pressure on their mothers and hence increases chances of their survival.

Crop farming is limited to kitchen gardening. This is because widespread cultivation over the last five years has been known to be unsuccessful resulting in discouraged crop farmers hence kitchen gardens that can easily be watered from the nearby streams are preferred.

Farming also declined due to the withdrawal of World Vision activities that included provision of farmers with free seeds and free ploughing or land preparation especially in Kamboi village. This together with destruction of crops by elephants (the electric fences build by Kenya wildlife services (KWS) are no longer operational due to power shortages countrywide) have greatly discouraged crop farming. At the moment relief food and GTZ food for work are the only sources of food for most of the HHs. There is also considerable dependence on the wild for food. Thus at the peak of drought people dug out wild manioc for food feeding the remains to livestock to reduce moisture stress. Pods of acacia tortolis were also collected in sacks and sold in the market for Kshs150 per bag (sack). The pods are collected and sold by women mainly.

UNESCO has done some forage analysis in the area as well as KARI under the Integrated Project in Arid Lands (IPAL) and most of this is documented. John McPeak has copies in Syracuse of all their report (see for instance South West Marsabit, 1976-1982). There was also an attempt by UNESCO to arrest degradation in the area but this was not possible and project implementers were greatly disillusioned leading to their withdrawal.

Land degradation

Soil erosion is not a major problem due to the flat terrain. Actually Log Logo lies in an alluvial depression in which most of the rivers in the surrounding mountains drain.

Rainfall is extremely low averaging 350mm per annum. Soils are sandy loam in Log Logo area significantly different from black cotton soils in Kamboi. Soil depth is about 5 – 6 ft. Yields are significantly high in good years when reliable rainfall is experienced. A missionary for instance grew maize in the region and harvested cobs that were the second largest in the country. Pumpkins and watermelons are also very productive in the area. Similarly green vegetables are highly productive and are readily sold in Marsabit town. Livestock and livestock products are however the mainstay of the local population in normal years while small ruminants and camels are quite handy during droughts. About 50 –60 animals are kept by each HH on average.

In Log logo site, rocky outcrops are common and hence mechanization of farm activities may not be easy problem. Use of dung manure is low and in most HHs dung is collected and burnt for sanitary purposes and especially when people are moving to a new Manyatta (temporary residential site). This is also used to control spread of ticks and the related diseases. The measure is taken as the sites could be used again in the future. Tick borne diseases are however common in most of the areas. Common diseases include mastitis, ECF (East Coast Fever), Foot and Mouth, Black Water, Rinderpest and Pulmonary Pneumonia especially in goats. It was observed that research on goats was almost non existent in spite of their importance during difficult periods of the year. Current control measures of most of these diseases include vaccination against CBPP

Forage species in the range include the following:

Indigenous tree sp:

Acacia tortolis, acacia sahel, deficiens melifera, acacia senegal, acacia horrida, acacia Nelutica are the most common tree species in the area.

Acacia senegal has multiple purposes. The gum is sold and used as a perfume, glue while the fruits are eaten as food. A project known as SALTICK (Semi Arid Land Training Livestock Intensification Centres in Kenya) was formulated to examine proper use of range land resources in Kenya. It identified acacia senegal as one of the most useful rangeland species and started training the rangeland pastoralists on how to make the most of it. Demonstration plots were hence set up in Merele station where cohorts of pastoralists were invited and trained. Although the project is no longer functional (it was funded by a number of organization and was headed by Robin Slade) its offices are still open in Isiolo and the documented research findings could be accessed formally.

Other indigenous tree/shrub species are dwarf shrubs such as cordios sinensis, cordia garaf, griatena (which is extremely good as fuel wood source and forage for sheep, goats and camels), oria bicolor (forage), griat vilosa (forage for small ruminants and camels).

Rangeland shrubs observed at the sites in Marsabit include srikomopsis pallida – extremely good for camels, etropium sp., Endigophera spinosa (good forage for camels

during droughts) and *Belipheras linariophoria*. The exact details of these species are documented in a GTZ text report (John McPeak to follow up on this later).

Exotic trees

Parkinsonia species, Neem tree and *Prosobis juliflora* were all introduced by the GTZ project in the area. Most of the exotic trees disseminated to Pastoralists in their Manyatta had low survival rates as people were mobile and hence could not take care of them by watering them during dry spells. Moreover, a tree such as *Prosobis juliflora* was disliked as it tended to outcompete other species including crops by forming aggressive colonies.

Indigenous grass species

Aristida sp. (annual grass), *gyrsapogon plumlosis* (most common grass in the area), *Centurus* sp., *aniapogon* sp., *tetrapogon* sp., *sporobolus* sp. (very common immediately after the short rains), *pennisetum clandestinum*, Rhode grass (found in swampy patches) and *tribulus terrestris* (causes bloat if grazed during the rainy or wet conditions) are the most common grasses in the area. Forage analysis of this species will hence be necessary at a later stage.

CONCLUSIONS

Although considerable research has been done in the area there is an obvious lack of dissemination of the findings to the people. There is hence need to teach the pastoral communities on how to most effectively and sustainably utilize their environment. Apparently, the best way to do this is to have professionals live among the people and participate in peoples' everyday activities advising and demonstrating to them the new methods of utilizing their environment including coping with adverse situations. This may have a double effect- first, it could make the professionals understand the people better and second it could make the pastoralists learn by doing. Monitoring of peoples adoption of new innovations is also effectively done in this manner. Overall, there is need to empower people so that they can continue project activities long after the projects facilitators have left. Participatory rural appraisal is hence highly recommended. Rapid Rural Appraisal on the other hand is too fast for most of the pastoralists to understand what is going on. These conclusion are drawn based on past experiences. PRA was for example carried out targeting community elders and was found to be significantly effective by the Drought Recovery Project implemented by the Ministry of Water and Development. However since livestock is central to peoples livelihoods in the area, there is need to examine various strategies to reduce animal loss during adverse weather conditions such as droughts. Teaching the local communities beneficial herd management strategies is important. GTZ has talked about improving market access through advertisement in the media of livestock prices in various locations. This was partially implemented but failed for the obvious reason that prices were too volatile- changing rapidly from those advertised. Thus by the time pastoralists arrived with their animals at the preferred market sites, prices had already fallen due to over supply. Moreover markets tended to be controlled by forces outside the market. The Burjis, for instance,

hate competition from buyers coming from outside Marsabit district and hence threaten them out of meaningful trade (auctions) or physically chase them out of the market. The government on the other hand does not provide security during such occurrences. The result is a depressed market with highly exploitative middlemen. Kenya Meat Commission (KMC) used to provide good prices and actually competed with the Burji middlemen but has since been phased out leaving the entire market to these middlemen.

Public health:

Ben Campbell, a professor from Boston university has carried out numerous studies on human health and nutrition of the people in the area. He also carried out a time allocation study for men, women and Children in Songa location (about 20 km east of Dirib Gambo and Karare sites).

FHI is the main relief food distribution agent in the area. There has been attempts by Ian Carl to mobilize the community in the construction of two dams in Log Logo and the nearby areas. This is an ongoing activity and so far water is being pumped from the underground using an old windmill. This project is supported by both FHI and EU funds. There is however concern that most development organizations are pulling out of the area without any significant impact on the areas of focus. Thus during the last drought, all people suffered and relied on famine relief food for survival. There was practically no milk for small children and at times they had to survive on dry maize alone. Women empowerment is still low with most wives depending heavily on their husbands in spite of undertaking arduous tasks such as collecting firewood and selling it in Marsabit town (almost 40 km away) to earn some cash. There is no steady source of cash except for Miraa cultivation and trade which is again strictly controlled by the Somalis and requires considerable amounts of water to be grown.

It was hence felt that the most effective way to improve nutrition in the area is not only economically empowering the people with a means of livelihood but also providing education as well. Eating habits have to change as the types of food now available are different from what most parents grew up eating i.e. meat and milk which formed 60 – 80% of their diets. These foods are grossly inadequate hence the need to consume more crop based foodstuffs. There was also a running sentiment among the people that basic research should be accompanied with implementation of development projects for immediate and direct impacts on the peoples' conditions. Moreover, they felt that they have some basic information about how to improve their living conditions but lacked the means to implement even the little they knew.

Personal comments

People are now thinking of diversification as a source of alternative income especially crop farming based on the experience in Songa and Kitarin villages where the irrigation project has improved crop harvests and hence livelihoods. The projects in these two villages are successful due to good management by the local communities and similarly good leadership (namely educated Rendiles -Jonathan Hessie and Daniel Lemoi). The

two wrote a community based project proposal and submitted it through the government to the EEU and were fortunately funded. Spirits in Log logo are high – people feel that with good leadership they could attempt a similar venture. GTZ, FHI and Ministry of Agriculture and Livestock Development were however actively involved in the success of the above ventures. There also appears to have been a strong involvement of local politicians, Omar Gal Galo and Bonaya Godana (Minister of Foreign Affairs) in the procurement of funds and their disbursement to the local communities.

The following is a key contact person in the area. He also has a good understanding of the peoples needs and priorities and hence could be resourceful when documenting the local peoples' behaviour.

Ali I. Kochale, Chief Log Logo Location,
Box 319, Marsabit.

MEETINGS WITH DR. FRANK PLACE AT ICRAF: (21st November 2000)

The main objective of this meeting was to generate rapport with Drs. Frank Place, Brent Swallow and Justine Wangila as well as plan for the Vihiga/Siaya and Embu site visits.

I was tentatively given the following names of Masters and PhD students whose research had generated significant amounts of data.

1. Frida Mugo – Agroforestry (PhD, Cornell University). Her research was mainly in the western Kenya sites
2. Festus Mureithi – Socio-economics (PhD, University of Reading). Research was in the Embu site. Direct. Telephone line 583342, Nairobi Kenya.
3. The following researchers are currently working for KARI and ICRAF in Embu site.
 - Charles Wambugu- Economist - ICRAF
 - George Karanja - Agroforester- KARI
 - James Ouma - Economist - KARI
 - Jane Alumira - Economist - ICRAF consultant- She has carried out an exhaustive HH characterization survey for AHI. It was agreed with Frank that the report should be availed to BASIS upon request

There is also need to form linkages with Department of Remote Sensing and Resource Surveys (DRSRS) formerly known as KREMU which is now handling most of the GIS and remote sensing work in the region i.e. Eastern and Southern Africa.

Dr. Frank Place gave a brief on the type and extent of socio-economic data available as well as how to proceed with the modeling exercise. He indicated the need to identify the variables that would be used to categorize wealth status of households across sites. This was important since different communities tended to use different indicators to determine wealth levels. On agro-forestry, it was important to ascertain which issues should be

modeled explicitly and which ones should be expressed in expert judgement terms. It was also important to determine where the various forage analyses will be done- can KARI or ICRAF do it? Similarly it was important to determine what the scale of analysis was going to be- i.e Watershed, village, region, basin etc.

Data Banks:

Most of the data collected is on monitoring agroforestry interventions. These are not panel data sets. A good foundation data set has been collected covering about 120 HH in Kakamega district. These households are a sample of about 2000 HHs in 20 villages in Kakamega and Siaya districts that are currently being monitored. These are mainly households that have adopted ICRAF technologies. The data is on HH structure, labour allocation, household size and land size. There has been an attempt to rank HHs wealth levels based on a composite wealth index for the 2000 HHs. Different HHs were given different agro-forestry technologies. An attempt is now being made to link the census data information involving the 2000 HHs to the 120 trial farmers.

Of the 120 HHs that have been comprehensively surveyed there was need to categorize them ethnically in order to test whether ethnicity affected the way different technologies were adopted. So far the 120 HHs have been categorized into three wealth classes namely:

- a) Very poor
- b) Wealthy
- c) Very wealthy.

Stratification by adoption of agroforestry technologies was also done under two categories – adoptors and non adopters

Specific aspects of the data collected include expenditure/consumption data, sources of income, and foods consumed in terms of types and quantities. Households were visited three times in a year- one after harvest and two before harvest. A 24 hour recall data was used to determine what the HH members consumed over a period of nine days for each of the three visits in a year. Expenditure was recall data for a period of one month.

So far, a number of parameters have been generated from the consumption data including calorie intake per Adult Equivalent. Similarly the sources of household incomes have been identified and ranked. Livestock and tree related activities rank among the top ten HH income sources.

A second source of data is by students some of whom are mentioned above. One student visited all the 120 HHs to determine the human capital asset in terms of traveling capacity, education, social capital, natural capital (land, trees, livestock) and physical capital (both farm and non farm). No data is available however on areas under different crop activities.

Thus the data falls in four categories;

- 1) off-farm

- 2) on farm
- 3) agricultural and,
- 4) non agricultural

It was observed that villagers developed their own criteria of ranking their own wealth status but this has to be standardized if the same scale is to be used for all households in all the sites both in Kenya and Madagascar.

Frank also indicated the importance of modeling tree productivity in terms of timber, fruits and fuel as well as their service roles namely as sun covers, mulch providers, nitrogen fixation, erosion control and generally nutrient flows improvement.

MEETING AT SIAYA/VIHIGA SITE VISIT (23rd November 2000)

This is a high potential, highly populated humid site located near Yala Town Center. The area has been a pilot site for a number of development projects in the past. It is mainly settled by the Luhyas (vihiga) and Luos in (Siaya). We first visited Sauri village in Sauri sub-location of Siaya district. ICRAF started work in the area in 1990 by carrying out a diagnostic survey which is now published and available in ICRAF library. The project was aimed at introducing ICRAF tree management technologies to the local populations and targeted women and youth groups as dissemination vehicles. These groups had been initially created by CARE International for grass root mobilization of the local communities in development efforts.

The first technology to be introduced was alley cropping using lucina and calliandra tree spp. The main objective was to improve soil fertility and hence land productivity to feed the rapidly increasing population. It was also felt that the intervention would boost supply of fuel wood in the area as well as supply numerous other wood products. In 1993, research shifted to ethno-botanical surveys aimed at determining which existing shrubs and trees in the farmers immediate environment could be used to boost productivity. In this regard, a number of local shrubs/ trees were identified namely *Gravilea* sp., *Tithonia diversiflora* (known locally as Aketch in Luo and Maua Malulu in Luhya), *sipsisium guajava* (guavas) and *Lantana camara*. These species were tested on-station to determine the most effective bio-mass transfer material. *Tithonia* followed by *Lantana* proved to be very effective. But *Lantana Camara* tended to be thorny and rough and hence difficult to work unlike *tithonia*. *Tithonia* bushes were however, relatively scarce in the area. Moreover huge amounts of *tithonia* were required to make adequate compost biomass to apply to a significant area of crops such as maize for one to realize significant positive change in yield levels. There was hence a number of complaints from farmers participating in on-farm trials that *tithonia* biomass was not effective on Maize. It was however more effective when applied on garden crops such as vegetables (sukuma wiki) and beans normally grown in small plots. Soon farmers started using *tithonia* biomass technology on garden crops rather than historical staples such as maize. This was viewed as a farmer driven initiative or technology adaptation.

Nutrition studies have since been carried out to determine the impact of these new technologies on the local population welfare in terms of human health and also see whether peoples eating habits have changed due to improvement in farm productivity for newly introduced crops. Most of these nutrition studies were comprehensive and were carried out on a daily basis. The data is available and should be requested for through Dr. Frank Place (ICRAF, Nairobi).

The second phase of technologies were introduced by ICRAF/KEFRI in 1994 mainly by Dr. Amadou Nyang. He did a screening trial of different legumes that are nitrogen fixing and determined those that could greatly improve nitrogen levels in the soil. In this regard, he identified grotallaria grahamania, tefrosa species and desmodium species as some of the best nitrogen fixing legumes. These were availed to farmers who after several trials preferred grotallaria species. Research efforts at village levels then concentrated on this species for propagation. About 45 farmers were given seeds to try out improved fallows using the legume species in Luero village. Following the success of this trial, the technique has now been spread to other villages. At the moment, 15 villages are now using improved fallows around Yala town location. There is also relay cropping using these new legumes and fallowing is done both in the short and long rain seasons.

In 1997, there was a caterpillar invasion which devastated gratallaria sp in improved fallows. Farmers however discovered that when Gratallaria was grown together with Tefrosa it was unaffected by the caterpillars. Farmers hence started mixing the two and later realized that tefrosia was actually an insecticide. So far, a PhD student (James Kamiri Ndufa) from WYE college is now looking at mixed planting of these legumes and has generated a set of interesting data.

Research has moved a step further and is now looking at how to most effectively generate adequate supply of either seed or plants of high value species for propagation to a wider number of farmers in the region. They have now come up with community owned tree and legumes nurseries. In this manner, they are now introducing high value trees such as mangoes, avocados and tree tomatoes in the region. Farmers owning such community based nurseries are now receiving training in more complicated tree multiplication techniques such as grafting, budding etc.

The above interventions, through improved fallows, biomass transfer composting and agroforestry were observed to significantly raise the N and K levels but did little to improve P levels. Use of rock phosphate easily available in the region was hence necessary to produce results similar to those obtained with conventional, expensive and often unaffordable inorganic fertilizers.

It is hence evident that a lot of biological experiments have been carried out in this site Policy related research has also been carried out in terms of which policies are affecting people in numerous ways. This has been evaluation of the impact of good roads; where roads are poor productivity per unit of land was noted to be low. The local leadership has also been integrated into a cohesive development drive through a committee consisting of

local leaders, chiefs, NGOs, church committees, GOK officers and international and national research organizations such as KARI, KEFRI and ICRAF

The role of livestock in the region is limited mainly due to limited grazing grounds. Average number of animals per HH is around two. Animal theft is so rampant that animals are no longer kept in the open at night but are rather housed. There is a tendency to move towards semi-zero grazing. The main animal diseases are anthrax and foot and mouth. At the moment, the only livestock project is the Kenya-Finland Livestock Project which is geared towards increasing the role of livestock in improving human welfare in the area.

INTERVIEW WITH DR ODONGO, KEFRI REGIONAL DIRECTOR (23rd Nov.00)

KEFRI is concentrating more on natural forest improvements as well as domesticated trees or plantation forestry (farm forestry). KEFRI started work in Siaya site in 1988 when alley cropping was viewed as having the highest potential in improving peoples welfare. However, in 1994, KEFRI abandoned alley cropping as farmers were simply not taking it up. An ex post evaluation survey carried out in 1995 on technologies introduced in 1988 and prior to 1995 showed improved fallow as the most effective intervention that was rapidly being adopted by the local population. KEFRI then reshaped their intervention to concentrate on upper storey trees. These were mainly high value trees aimed at reducing poverty levels through improved soil fertility and high tree productivity or harvests. Funding was increasingly becoming a problem and at one stage the main donor, The World Bank, was not sure whether availing funds to improve roads in the area wasn't a better alternative to spending money on forestry programmes aimed at improving soil fertility. There was hence a need to examine the development issues holistically in-order to generate balanced and sustainable solutions. It was in this regard that the director felt a bio-economic modeling exercise was most beneficial. He also felt that ethnicity was a key issue in determining how technologies are adopted. For instance Central province has labour abundance due to their culture: a 15 year old who has not done any meaningful work the whole day can't be justifiably fed by the parents but will be ostracized by the family and the community in general. This has led to early self dependence that has reduced the dependence burden on most parents. The same does not apply to Luhyas and Luos in western Kenya. Hence labour scarcity is rampant in spite of high populations of able bodied young men. Here, farm work is frowned upon and there is a high preference for white collar jobs that are increasingly becoming difficult to find.

Human health is also an area of concern. Most of the population is infected with malaria, mainly dormant strains hence their productivity is significantly lower than expected. The result is low output, declining food availability, malnutrition, poor health and again low per capita productivity.

One area of intervention that needs examination is provision of social capital through integrated rural development projects emphasizing education and mobilization of rural

populations in meaningful development efforts. So far the director has been requested by a number of donor organizations to develop a bio-economic model to assess how trees could be meaningfully integrated in the crop-livestock farming system.

This is especially important in Vihiga site where land is extremely scarce and hence there is a high opportunity cost for all interventions involving the land.

**INTERVIEW WITH HELLEN NYBERG (Phd. Candidate, Lund Univ., Sweden).
23rd November 2000.**

Hellen is a human geographer who is very interested in land tenure issues especially the formal rights to land and how this affects the way women make decisions regarding agriculture. The study is concentrating on female farmers and their access to land. It is observed that women are marginalized when land rights are enforced yet their responsibilities seem to increase under such situations. The idea is to see how these responsibilities (roles) change across gender as land access changes. It is also believed that access to infrastructure influences land access especially roads, market access to women including access to extension services as well as health care facilities. These factors are hence important.

The study is designed to involve four villages each with different types of market access. Two of the villages are research pilot sites for ICRAF and hence have access to research extension. The other two don't. Similarly, one of the villages is Luo while another is Luhya.

A qualitative approach is used involving 10 to 15 women in each village. In each village categories of women are identified based on:

- a) Marital status
- b) Wealth status
- c) Access to land
- d) Education
- e) Age
- f) External income

Hellen is now examining ways of coming up with an index that reflects all the above six items and then use the index to rank women in the four villages. Under marital status category, she picked randomly households already under survey by ICRAF and hence came up with households that have both female and male HH heads. A village headman was used to pick HHs with varying wealth levels, access to land, education among other variables.

Overall, two villages are in Siaya, one in Vihiga and one in Butere. Their specific names are as follows:

Siaya Site:

1. Sarika B village

2. Uyonga village

Vihiga Site

Elukuyu village

Butere

Eburuli village

Hellen's contacts are:

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- [\\loiuterc](http://loiuterc)

INTERVIEW WITH JULIUS ADUWO-TREE DOMESTICATION RESEARCH TECHNICIAN-ICRAF MASENO OFFICE (23rd November 2000)

Tree domestication starts with germplasm identification and multiplication. Thus germplasm is purchased or collected from mother trees. In Maseno, 30 high value trees were identified by the local farmers. They were trees commonly used to provide timber, fodder, fuel and fruits. In most cases these trees initially grew naturally in pristine forests. The idea is now to grow them on farm as most of the natural forests are now depleted. High value trees are emphasized because land area per HH is declining and hence alternative sources of income have to be sought to supplement income from crop and livestock sources. High value trees improve nutrition of the whole household, provide wood products and indirectly improve soil fertility by acting as wind breaks as well as water erosion controls.

Trees in Maseno area have hence been ranked in terms of composite uses and hence importance. They fall in four categories;

- a) Fodder
- b) Medicinal
- c) Fruits
- d) Timber

These trees are both indigenous and exotic.

Fodder trees include:

- a) Sesbania Sesban
- b) Calliandra sp.
- c) Leucina sp.

Medicinal tree species are:

- a) Trichlea emetica
- b) Prunus africana
- c) Wabugia Ugandensis

- d) *Carisa edulis* (miraa)
- e) *Kigali africana*
- f) Neem trees

Timber trees

- a) *Bitex kinensis*
- b) *Gravilea Robusta*
- c) *Machamia Lutea*
- d) Elgon teak
- e) *Mysopsis emini*

Fruit trees

- a) *Tamarindas Indica*
- b) Improved mangoes (they mature in 4 instead of 10 years)
- c) Improved avocados (they mature in 18 months rather than 3 years)
- d) Improved guavas
- e) Neem trees

Soil fertility improvement trees

- a) *Grotalleria* sp.
- b) *Tefrosia* sp. (roots are highly toxic to moles hence they can be used to reduce mole populations and hence reduce mole damage to other crops such as banana trees)
 - they are also used to catch fish which is a major source of protein for the Luos living around lake Victoria as well as the Luhyas in the neighbourhoods.
 - They are similarly used as herbicides in vegetable and tomato gardens around homesteads

Ongoing collaborative work with farmers in western Kenya include the following

- a) Establishment of seed stands- initially farmers were given tree seeds by ICRAF/KEFRI researcher but now the strategy has changed and farmers are encouraged to establish their own commercial seed stands and tree nurseries for all the trees. ICRAF only facilitates the process by providing multiplication germplasm and polythene bags. They also provide farmer training in grafting and pruning techniques.
- b) Establishment of mother blocks for mangoes and avocados at Kodiaga and Kibos prisons (mother blocks is where the scions are gotten for different cultivars of the same or different tree species).
- c) Participatory domestication of trees by farmers. They are given seeds and then monitored on how they plant and manage trees

At the moment, farmers are very curious about ICRAF technologies and are enthusiastic about new technologies.

INTERVIEW WITH DR. STEVE RUGI- ICRAF SCIENTIST (TREE DOMESTICATION, MASENO STATION) (23rd November 2000)

Currently carrying out diagnostic survey to determine the pertinent causes of soil fertility decline. There is a general lack of income generating opportunities especially tree products including fuel wood. This has resulted in the need to document local tree species and their potential. In this respect, a number of species have been tested.

Maseno station has limited land most of which belongs to veterinary department. Most of the trials were hence on-farm. Biomass transfer was one such trial. Surveys showed that farmers left 25% of their land fallow in the post harvest crop season. Such lands could be improved during such periods to increase their fertility prior to being cultivated for the main crops such as maize in the following crop season. This is the whole idea behind improved natural fallows using local materials.

The best bet materials were those that were easily available in these localities such as tithonia which was ubiquitous and easily utilizable. Tithonia is rich in nutrients and decomposes very quickly. Due to small farm sizes, short duration fallows of 8 months or less were highly preferred by most farmers. Fallows could hence be established in June for a mixed crop of maize and beans i.e. after the second weeding of maize has been done. The material is left on the field after maize and beans are harvested. In January or February of the following year the fallow material is ploughed into the soil and left to decompose. The process is hastened with the onset of the long rains in March and April when maize and beans are planted again.

Improved fallows have been shown to raise yields 2-3 times their usual levels. Tithonia fallows have also been shown to out-compete Urea by adding Potassium to the soil. If tithonia is provided together with rock phosphate, yields are six times their original levels while costs are 30% less than if inorganic fertilizer NPK were used to achieve the same quantities of output. This has prompted researchers to encourage farmers to organize transportation of rock phosphate from South Nyanza and Uganda. Dr. Bashir (soil scientist based at Maseno) has done extensive research on soil fertility trials and is the best person to provide the technical results and coefficients. He has documented much of the results and has generated considerable amounts of data. Unfortunately he was not on station at the time of this interview.

The conventional way for a farmer to increase soil fertility is to transport and apply considerable amounts of rock phosphate at one go. The phosphate can then be available to crops for the next 4-5 years. The problem is that soil fertility improvement is not a direct ICRAF research mandate and hence there are no funds to further this research.

Biomass transfer was found to be less effective in improving productivity as the amount of work involved could not be justified by both the yields and the price of crops under cultivation (i.e. maize and beans). This resulted in farmers limiting the technology to garden crops which had a ready market with relatively higher prices. Overall, improved fallows tended to flourish among farmers with larger farms while biomass transfer was

preferred by farmers with smaller farms. Tithonia is also used as line strips established to reduce erosion on the slopes. Improved fallows suffer from seed production and dissemination and hence the new strategy adopted by ICRAF is to have farmers produce their own seed sources. This is through village committees which are also used as technology dissemination units. Such units are steered by another researcher, Quresh, who specializes in the development dissemination strategies. Farmers are however being discouraged from using seed in their material propagation as they are important nitrogen sinks that should be ploughed under rather than distributed to other farmers as propagation material. Cuttings are hence encouraged. The whole communal organizational structure is based on the farmers traditional communal arrangements where they assist each other based on age groups or family ties. Most researchers however feel that with rapid adoption of the two main materials for improved fallows and biomass transfer there is need to diversify the germplasm to improve their versatility to diseases and pests. So far ICRAF has distributed 8 tones of germplasm in the Maseno site which is now being multiplied through farmer owned commercial nurseries.

Another area of intervention has been establishment of community based credit system that is managed by a group of farmers. At the moment, Mary Nyasimi (ICRAF) is working on this and her findings are soon to be reported in an ICRAF publication.

There are very few improved livestock breeds in the area and most of the animals are bos indicus specifically the African Zebu. At the moment ICRAF Maseno's flagship theme does not include livestock improvement. Most of ICRAF's livestock related agro-forestry technologies are generated and disseminated in Embu. The most important forage tree species introduced, so far, in Western Kenya at the moment is Calliandra and although it is planted in Maseno, the main multiplication site is Malava in Kakamega district. Calliandra was first introduced in Maseno as a hedge row intercrop tree for soil fertility improvement. It however proved to be highly competitive with other crops and hence the practice was discouraged and its role was reduced to provision of biomass for livestock consumption.

Some of the information generated by Dr. Bashir includes the relationship between application of various quantities of biomass on various crops and their respective yield levels for the various regions or soils (i.e. biomass-yield response data). He has also looked at below ground competition of water and nutrient uptake by different activities in different sites.

Soil conservation studies have been carried out by the National Agriculture and Livestock Extension Programme (NALEP)

Dr. Ruigis contacts are:
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DATA AVAILABILITY FOR THE MASENO/VIHIGA SITE (23rd November 2000) :

Type 1 data: this is scientifically designed experimental data on improved fallow trial findings. A total of nine trials were carried out and include Ebukanga , Emabwi and Abuneri in Vihiga district and 4 trials carried out in Siaya district at Okonda farm by the Siaya Institute of Technical Training.

The Abuneri site was used mainly to determine maize yield response to various levels of organic and inorganic fertilizer use. The specific scientist involved was Dr. Kinyangi although the results are with Dr. Bashir.

Soil loss experiment results are documented in the East African Agricultural and Forestry Journal, “Improving and Sustaining the National Soil and Water Resource Base to Meet the challenges of poverty alleviation and Food Security”. Proceedings of Land and Water Management Conference 15-18 November 1999, Nairobi Kenya. (Kinyangi of ICRAF Maseno can avail a copy).

Other data sets relate to biomass yields for the various fallow types as well as checking weed biomass in each site, assessing litterfall i.e leave falling from fallowed species, assessing striga incidences, determination of tree survival counts for various species. Tree phenology data – flowering , fruiting etc. has also been collected.

Soil nutrient levels have also been independently determined in trials by AFRENA. The plot level results were then extrapolated to get farm level figures. Ex-post analysis reports need to be reviewed to see the actual findings.

There has also been weather data collection at various sites in western Kenya

All trials have the same structure i.e. survey over various seasons from 1996-1999 long rains. Soil and plant nutrient yields are also available.

Type 2 data is mainly economic. It includes:

- a) Assessment of labour costs mainly in Emabwi villages
- b) Net present value (NPV) for labour and land under different intervention scenarios (done by Joris De Wolf, Belgian working in ICRAF)
- c) Other data set is with Collins Obonyo – Center Director, KEFRI
- d) Characterization data for all the Siaya/Vihiga sites involving the 2000 HHs is with Ralph. He has also data on livestock counts per HH per annum. There is however no detailed data on livestock except head counts for wealth ranking purposes (See Tina, Ralph or Mary for the specifics).
- e) Ralph has also carried out a nutrition level HH survey since 1999. This sounds as a panel data set collected in the months of January, June and December over the last two years. Consumption data has also been collected but it cant be ascertained

whether this data is part of the nutrition survey data or an independent survey. There is also a mention of expenditure data but unfortunately Ralph is not in the country to verify this (he is currently in Zimbabwe).

- f) Biomass transfer monitoring data for 55 farmers is with Emily
- g) Data on rock phosphate credit has also been collected but again the specifics are with Ralph.
- h) Group level data for Tatro village has just been collected and is yet to be inputted (computerized) and cleaned.
- i) Nutrient monitoring data has also been collected for a number of specific farms in Siaya and Vihiga on an annual basis (the data could be with Dr. Keith Shepherd).

INTERVIEW WITH COMMUNITY ORGANIZATION CO-ORDINATOR, DR QURESH (23rd November 2000)

Community based dissemination strategy involves the use of an external facilitator who in most cases is the researcher. The researcher interacts with a locational committee that is similarly linked to a locational agricultural committee. These are horizontally integrated (refer to the sketch flow chart in the note book).

The above tier is linked vertically to a sub-locational development committees whose members are drawn from village level community committees. Members of these communities are again drawn from youth, women and or clan member groups.

This arrangement is currently in use and is involving 17 villages 10 of which are from Luhya ethnic group in Vihiga and include ebukanga, emabwi and abuneri villages (ebuchinga location). Seven villages are Luo with six in Yala location (Sauri sub location) and one in Anyiko sub location.

A total of 2000HHs in this villages are being monitored in onfarm trials on soil fertility under specific technologies a) improved fallow b) biomass transfer.

Analysis is at village level. Use of contact farmers was seen as masking the impact on the whole community and hence the preference to use the above approach for dissemination of new technologies to the community. Village level analysis is best because it is manageable and allows the impact at the community level to be seen. So far, dissemination aspect was based on a catchment approach preferred by the GOK extension agents. But collective action is ordinarily done at village levels. Moreover, many villages belong to one clan and hence their aggregation could be seen as producing one integrated unit.

Interventions at village level have been dis-aggregated to deal with individual components namely agroforestry, livestock, crops, human health etc some of which are propagated by other development NGOs such as CARE International or the Finnish funded Livestock Development Project (LDP). The latter is managed by the Ministry of Agriculture (MOA).

It was also observed that market issues go beyond the village hence the need to aggregate villages at sub locational and locational levels. This resulted in the formation of three sub locational committees involving members of 27 village committees. These committees now form a crucial link with the development stakeholders in the area that include NGOs GOK, and researchers in ICRAF, KARI, KEFRI etc. The whole organizational structure looks as follows:

At village level, the headman is the patron while the sub-chief and chief are the committee patrons at s/location and locational levels. In this way, the dissemination structure is effectively linked to the government.

The sub locational and locational committee members are constantly trained in technical issues such as seed multiplication, nursery management, tree grafting techniques and soil fertility management issues. They are also trained in non technical issues such as group dynamics and team building, record keeping, leadership skills, monitoring and evaluation and proposal writing. The findings of all these activities is to be published soon in the Development Journal in an article by Amoudou Yang et al. There is an article by Steve Frantzel on the same topic.

The above is one approach of scaling up and has been found to be effective and sustainable. Its key limitation is that it is too localized and hence a second scaling up strategy is under consideration.

SECOND SCALING UP STRATEGY:

This strategy involves identification and involvement of strategic partners, Government Ministries, NGOs/projects/churches operating in the area of interest, Community based organization, umbrella groups (amalgamation), church groups, schools, private industries such as Hortequip (promoting cultivation of french beans), Nzoia Sugar company, input dealers and finally co-operatives of various origins.

Once all these organizations are together a number of ways are designed to reach the farmers at the grass root. These are namely:

- a) T and V which could be replaced by catchment approach
- b) Farmers field schools

A number of working strategies are hence forged namely; formation of satellite villages for training and demonstration. The tool is hence a chart with four components:

- a) Type of organization and what it is doing
- b) How do the farmers practice improved fallows and are there any modification to the technology by the farmers to make it more amenable to their conditions
- c) What are the specifics related to the individual technologies adopted that require immediate attention to increase the effectiveness of these technologies
- d) The type of farmers adopting these technologies, time taken to adopt the technologies and the length of use.

FARMER INTERVIEW IN EBUKANGA VILLAGE VIHIGA DISTRICT (23rd November 2000).

Farmer Name: Timotheo Kwaka:

The farmer has a total farm size of ¼ ha, is married and has two children. He plants agroforestry trees, sugarcane, maize beans and potatoes. His biggest problem is hunger or inadequate supply of food for most of the year. Even the maize planted tends to tassel prematurely, an indication of deficient soil nutrients. He only manages to harvest one 90 kg bag per year. Labour allocation is based on gender hence women weed while men do the ploughing. Soil erosion is rampant on the farm given its steep inclination. Terracing is the main conservation method used by the farmer. It takes 1 full man day to construct one meter length of terrace. A man day starts from 7 am to 3 pm.

The farmer has realized that planting conventional crops is yielding him almost nothing and hence has started trying out new crops such as garden crops (mainly vegetables). The farmer is very knowledgeable about the development projects in area and the new technologies. He is however a grade 3 drop out. He has so far planted all the ICRAF new trees including tithonia but is complaining that the new technologies are taking up much of the scarce land area. The trees are however providing him with an extra source of cash income. Thus he earns Kshs. 300 per avocado tree per six months in the year. The main problem associated with harvesting avocado is transportation to the market. This is a very visible problem as our four wheel drive toyota Hilux could not go all the way to his farm and hence we had to turn back after interviewing him. Price per avocado is again low i.e. one shilling per fruit. The avocado trees take 5yrs to mature and each tree could yield 300 hundred fruits three times a year.

The farmer clearly could break out of his poverty trap if aided with some credit.

Addresses:

Mary Nyasimi, Natural Resource assistant. E-mail- afresmaseno@africaonline.co.ke

Job description:

- characterization of farms
- Impact assessment
- Adoption studies
- Implementation of credit scheme.

MEETING WITH DR. FESTUS MUREITHI, KARI (27th NOVEMBER 2000)

The meeting was aimed at preparing for the meeting with USAID staff the following day. Dr. Mureithi was however called for another meeting to represent his senior on the material day and hence could only spare limited time. A few items of concern were however pointed out namely:

- Need to clarify how the model results will be disseminated for local use

-The specific role of KARI has to be specified to enable Dr. Mureithi to brief KARI management about the project and obtain their full consent to participate fully. Given that KARI has the national agricultural research mandate in Kenya and given that they are already involved in almost all of the four sites, their full collaboration will be essential. There was also some need to specify the specific roles of each of the other collaborators and how the collaboration will be undertaken. These issues were likely to be raised by USAID and hence the need to notify them that the project was just beginning and the specific roles of each institution were still under consideration. The logistics of going to Embu and whom to meet were also discussed, given Dr. Mureithi's long involvement in that particular site.

The rest of the time was usefully utilized in interviewing scientists involved in projects with very close resemblance to the BASIS CRSP project. One of this was the National Resource Management Project based at The National Agricultural Research Laboratories, Nairobi.

INTERVIEW WITH NARL-NRM EPISODE PROJECT MEMBERS (27th November, 2000)

The NRM EPISODE project has three research themes:

- a) Soil fertility improvement
- b) Irrigation and drainage
- c) Crop protection

The EPISODE (Economic Policy Reforms Agricultural Incentives and Soil Degradation) project plans to carry out adoption studies looking at issues such as factors affecting adoption of technologies and evaluation of technologies to determine their economic and biophysical viability. So far, the project has reviewed policies effected between 1980 and 2000. A host of data was also collected to enable policy analysis and included data on prices and time of reform process. Reports have been written in this respect and are available on request. A lot of economic analysis is based on regression analysis using secondary data to determine causal effects relationships. Primary data is now to be collected as from March 2001 to run a SAM-CGE bio-economic model.

The project is currently involving three countries (Kenya, China and Ethiopia) and is run by KARI in partnership with Wageningen University and Norwegian Agricultural University (NORAD). Professor Stein Holden is one of the Co PIs.

VISIT TO EMBU RESEARCH SITE (29th November 2000)

The Embu regional research station is managed by KARI and has the national research mandate to develop and promote medium altitude maize varieties. It is however housing the regional offices of other centres such as KEFRI and ICRAF. The agro-ecology of the area is considered to be a high potential zone with coffee being the main land use activity. It is highly humid with extremely fertile volcanic red soils. The area lies at an altitude of about 1800m above sea level. Population density is high averaging 500

persons per Km squared. Household sizes average 8 persons while average farm sizes are about 1.5 ha per HH. Mixed crop livestock production system is evident with maize and beans being cultivated first for home consumption and second as annual cash crops to complement coffee harvests. Most of the animals kept are cross breeds between the Zebu and the exotic breeds. The main problem at this site is declining soil fertility due to nutrient mining through crop -livestock and soil erosion nutrient uptake and loss respectively. Soil loss is accentuated by the steep landscape. Shortage of forage for livestock is a key problem. Animals are mainly zero grazed and are fed grass harvested as weeds from the surrounding coffee and maize fields. Use of concentrates as well as other nutritional livestock feed supplements is low due to unaffordable prices. Dependence on tree products is high with reliance on single tree type being discouraged.

Steve Frantzel and Festus Mureithi have carried out a number of household level studies especially on adoption of Calliandra species. A total of 2600 HHs have been covered spread in seven districts in central highlands of Kenya namely Meru central, Meru South, Embu, Kirinyaga, Nyeri, Maragua, and Muranga. Much of the characterization work was carried out by an ILRI/KARI dairy project encompassing agroforestry as a forage intervention. Out of the 2600 households, 160 HHs were randomly selected to address calliandra adoption.

For dissemination purposes 150 groups were identified formed by the 2600 HHs. These were groups existing either from previous work carried out by other NGOs operating in the area or under Government of Kenya Ministry of agriculture initiative. Out of these groups 40 were used in a collective action survey. This is still ongoing and focuses on farmer innovation and marketing issues. HH surveys were focussed on survival rates of new tree varieties disseminated to farmers. Some work was also done on land tenure issues but not in detail. Charles Maina Wambugu (ICRAF, Embu station) has the specific details. There are also a number of students both masters and doctoral under Frank Place's supervision who have carried out surveys in this site and hence collected different types of economic data.

Soil conservation issues have been studied (surveyed) by George Karanja as well as Okoba Barak- currently working for his Doctorate at Wagenigen University. Studies on high value trees have similarly been done and both on-farm and on-station data have been collected. Soil sampling to identify soils and their characteristics have been carried out.

The existing personnel in the ICRAF project have wide experience and hence will be very resourceful in linking us to NGOs working in the area. Charles Wambugu for example worked for a number of NGOs, the US peace Corps, Ministry of Agriculture-Nyandarua office before joining ICRAF. The NGO he worked with KWAP (Kenya wood fuel and Agroforestry Programme) was very active in western Kenya and carried out a number of household level studies and thus accumulated good amounts of data. He could hence be our link to accessing this information.

A number of fodder trees have been disseminated in Embu site. These include mulberry bushes.

National soil and water conservation with Napier grass and Calliandra strips experiments have been carried out in Embu research station and the data is available at the station. Experiments have been ongoing for the last five years i.e since 1995.

Measurements include;

- 1) Soil and water runoff
- 2) Soil redistribution
- 3) Water redistribution
- 4) Nutrient redistribution

These experiments have been carried out on 5 x 30m plots in 2 replications.

Intercrops with agroforestry under trial include growing passion fruit plants with Calliandra to provide the necessary support for the climber, increase soil fertility as well as generate forage for zero grazed dairy animals.

The common research ardate is: “More people, less forests, more trees”. Trials with different nitrogen fixation wild plants such as oxalis latifolia are also being tried out.

FARMER INTERVIEW IN EMBU SITE (29th November, 2000)

FARMER NAME: HARRISON MURIUKI

The farmer has been working with ICRAF researchers for a number of years. He has planted calliandra as hedge rows from seeds generated by himself i.e. has his own tree nursery. The farm consists of plots of varying fertility, slope and soil type. The farmer started planting calliandra species in 1992 for the main purpose of soil erosion control and provision of fodder for his dairy animals. At the moment a total of 1000 calliandra trees are planted. Total farm area is 3 acres. He also plants desmodium intortum together with mull berry bushes. Animal dung generated from the zero grazed animal (a cow and calf) is used to generate bio-gas using a very simple and inexpensive technology utilizing polythene bags and pipes. Paul Tuie is the main researcher disseminating this technology among farmers in Embu and hence should be seen for the technical details including the costs, bio-gas yields and impact on the farmers’ welfare so far. The total cost of the bio-gas facility is around Kshs. 3000 or USD 35 equivalent. Composting is also done. Farmer admits observing significant yield increases every time he feeds his animal with a mixture of napier grass and calliandra leaves. This provides a wonderful substitute for the expensive and unaffordable dairy meal that the farmer would otherwise purchase to boost milk production.

Coffee is the main cash crop followed by dairy and macadamia nuts sales.

Soil conservation work by Mr. Okoba currently doing a Phd at Wageningen is utilizing the area as one of his research site. His Phd involves assessing all soil and water conservation technologies both known and unknown in the area to determine their effectiveness and rank them respectively. This will include their associated costs as well.

Most farmers in the area are confronted with steep slopes of over 35% and hence utilize Fanya Juu technique of soil conservation terraces.

INTERVIEW OF A FARMER GROUP IN EMBU SITE (29th November 2000):

This group operates near Runyenjes area. The region is highly mountainous and hence the high demand for trees to control soil erosion on the slope. The group's main activity is operation of a commercial tree nursery. The group is under the chairmanship of Mr. Alois Njohe and is called Kiwanja Catchment Group. The group consists of sixteen members including women and was initiated by Ministry of Agriculture to facilitate catchment level extension services. Some of the group members present during this interview were:

1. Alois Njohe - Chairman
2. Amos Njagi - Secretary
3. Selestine Njeru -Discipline Master
4. Jeremiah Nyaga – Member
5. Silvano Kiringa - Member
6. David Njagi - Member
7. Steven Mureithi – Member

Most of the group members have undergone training in a number of workshops organized by both ICRAF, KARI and Ministry of Agriculture (MOA). Sometime members pull out of the group while at other times new members join. The group is hence a very dynamic association with very enthusiastic members. The group is currently trying out multi-purpose trees including Calliandra and is seen by most development agents as a good approach to scaling up dissemination of research findings. The group is however relatively new (2 year old) but were ranked 5th in National development groups competition. There are about 200 such groups in Embu district and Charles Wambugu (ICRAF) is in charge of their formation and successful management. The groups encourage pooling together of resources. They propagate technologies faster than contact farmer demonstrations. At the moment, the land used by this specific group belongs to the Embu county council.

Most of the groups in the area concentrate on multiplication and selling of *Leucina* tree sp. Kawanja Catchment Group for example made a total of Kshs. 2,700 from sale of such tree seedlings. They have managed to expand their activities to including fish farming and have so far constructed one fish pond and filled it with fingerlings. Interestingly, they use some of the trees species to feed the fish. Later on, the same tree species could be used as bait for fishing. Further expansion of their activities is however limited by lack of cheap credit. One of their planned activities is to come up with a development proposal to solicit for funds. They are also making arrangements to apply for short term credit from the local banks.

Group activities are well organized with a penalty of Kshs 20 being imposed on members who fail to attend and/or participate in group activities. They have a group work time table which has set aside all Wednesday for group work. Group records are well kept by

the group secretary. The group is now planning to open a joint bank account for safe keeping of their proceeds.

Theft of seedlings from the nursery is a worrying problem. Availability of funds (credit) is also an issue of concern. Most of the people in the area are however yet to understand and participate in such group activities.

MEETINGS HELD IN VARIOUS SITES/INDIVIDUALS / ORGANIZATIONS IN THE REPUBLIC OF MADAGASCAR (1st – 8th December, 2000)

The Madagascar trip was well organized by Bart and Jhon. Bart met me shortly upon my arrival in Antananarive on 1st of December 2000. I proceeded to brief him on the actual activities of the project and our expectations of their roles i.e. FOFIFA, MOA and the USAID funded ILO project among other NGOs operating in Fianarantsoa and Vakinkaratra sites. Bart suggested that since a lot of biophysical data was involved it would be important for me to visit a site where biophysical experiments were done. The Terry Tany project had generated most of land degradation data through experiments carried out on farms in Batanmbul area 40 km north of Antananarive. The following tentative work programme was hence drafted and followed during my visit in Madagascar:

Monday 4th December 2000

- Presentation of the BASIS CRSP project activities to FOFIFA/ILO project staff
- Preparation for the USAID Courtesy call visit
- Visit to USAID, Antananarive Local office
 - a) Meeting with David Saroko – Head Natural Resource Management Division
 - b) Meeting with Mary Noris – Head of the Economic and Policy Analysis Division

Tuesday 5th December 2000

- Travel to Batanmbul site to see the Terri Tani Project site working on watershed level biophysical land degradation experiments
- View data collected by IFPRI and INSTAT

Wednesday 6th to Thursday 7th of Decemember 2000

- Visit sites in Vakinankaratra (Ansirabe) area
- Meet FOFIFA and MOA regional staff in Vakinankaratra area; brief them on the project and establish the necessary contact and interest of these researchers

Friday 8th December 2000

Make two formal presentations at FOFIFA HQs to a wide audience involving;

- a) FOFIFA scientists, directors and staff
- b) University lecturers, students and staff
- c) Development workers in USAID Funded NGOs and Projects funded elsewhere

The first presentation was to address:

- 1) The specifics of the BASIS CRSP project in terms of planned activities, role of collaborators and dissemination of results. Research time frame and the related research activities were also to be addressed.
- 2) Respond to questions raised by the potential collaborators and where necessary use their views/suggestions to adjust planned project activities realistically

The second presentation was aimed at:

- 1) Presenting the case study results of the Ginchi Bio-economic model
- 2) Demonstrating to the audience the usefulness of these results and how they are being implemented to impact positively on human welfare.

MEETING WITH BART MINTEN, JHON, AND OTHER FOFIFA STAFF MEMBERS (4th November 2000)

In Attendance:

1. Dr. Bart Minten - Cornell
2. Prof. Rasambainarivo Jhon –FOFIFA
3. Ralison Eliane – FOFIFA
4. Randrianjatovo Jean Fidele- FOFIFA

The aim of the meeting was to make an informal presentation to enlighten those present of the BASIS CRSP project. Basically the presentation utilized slides used in Madison during the wider CRSP meeting attended by Jhon and Chris in November 2000.

Questions raised during and after the presentation concerned the need for considerable amounts of biophysical data sets. It was hence felt that the individual institutions would follow up on the presentation with a quick inventory of existing data sets in order to ascertain the various data gaps that will need to be filled through formal and informal data collection surveys.

Bart also indicated that although INSTAT had collected some amounts of panel data, the data had some seasonality problems. Looking at the time frame of the project we both agreed that data collection in Madagascar needs to start as soon as possible if the same were to be computerized, cleaned and analyzed for use in the bio-economic model under development. The fact that BASIS CRSP project will only receive funds towards the end of 2001 could be circumvented by ILO project funding the surveys to begin as early as February 2001 and getting the funds reimbursed by the BASIS project later in the year when it became liquid. This could be pursued by Chris shortly after my arrival at Cornell and when visiting Madagascar in March 2001.

Time was taken to explain the various research areas that FOFIFA was interested in.

These were;

- a) Economics
- b) Livestock
- c) Rice research
- d) Agronomy research for other crops apart from rice
- e) Forestry and fisheries
- f) Technology development

The English equivalent for the acronym FOFIFA is the National Center for Applied Agricultural Research. FOFIFA is directly under the Ministry of Research and works in collaboration with Ministries of Agriculture, Livestock, Forestry and Environment.

FOFIFA works with other NGOs/ Research institutions as well namely; Landscape Development Initiative (LDI) operating in Fianarantsoa and funded by USAID, CIIFAD – operating in Vakinkaratra and funded by Cornell university, Catholic Relief Services (CRS) – funded by USAID and IFO Project International-(dealing with Livestock issues). These institutions will automatically be part of the BASIS CRSP project collaborators and hence the need to start forging links with them with FOFIFA as the main facilitator.

MEETING WITH DAVID SAROKO, HEAD OF USAID (MADAGASCAR) NRM DIVISION (4th December 2000)

A good amount of time was spent on presenting and explaining the BASIS Project to the USAID staff. David was a bit uncomfortable with the use of the word “poverty traps” as he felt farmers were not yet embroiled in such a vicious circle in a manner that resulted in serious land degradation that in turn resulted in declining yields hence further poverty. The fact that extensification was taking place for instance may not be due to poverty. The question then becomes; is extensification a result of increasing farmers needs with declining suitable land for cultivation or is it due to farmer opportunistic venture i.e. the need to increase their welfare without caring about tomorrow? At the end of the presentation there was a general agreement among the USAID staff (including David) that indeed the Planned BASIS activities were useful to them. They thus indicated USAID Madagascar’s interest to be involved and if possible have access to the results. David also mentioned that a USAID project known as PAGE was doing something very similar to what the BASIS project was doing but not as exhaustive. Thus the policy recommendations made by PAGE addressed mainly the short term issues. But NRM required long term recommendations as well and hence the need for BASIS-CRSP and PAGE to closely work together. It was however noted that USAID was more interested in development oriented issues and hence research that would have maximum impact on the livelihoods of the poor. The key issue however is to determine whether the whole modeling exercise will be a success and hence the need to try it out at a case study level before applying it to a wider region. He also indicated that the approach was too value led yet there were some issues in development work that couldn’t be valued but were equally important. In general however, David was very impressed with the whole project especially the fact that we are also carrying out similar work in Kenyan sites.

MEETING WITH MARY NORIS, USAID HEAD OF ECONOMICS AND POLICY DIVISION, MADAGASCAR OFFICE (4th December 2000)

After meeting David for about two hours we proceeded to meet Mary and basically went through the same BASIS presentation.

Mary expressed her concern about whether what we were planning to do was not a highly theoretical venture with limited practical use. However after answering all her questions she felt the ideas were indeed timely and very relevant too. Nevertheless she felt that the model was fairly complex and wondered whether it was feasible. She also wanted to know whether the model results would ensure that specific issues for a particular location were adequately addressed and whether they could similarly be generalized to other areas with similar conditions. Our answer was affirmative and we used the Ginchi experience to explain away her doubts. She then raised the question of how we were going to ensure that we got the biggest bang for each buck spent. Secondly, how were we going to ensure that the model was accessible to most of the users. These were dissemination issues and hence I referred her to the organizational structure adopted by ICRAF in Western Kenya sites. Like David, Mary noted that USAID was in the process of figuring out a tool to address the issues that such a bio-economic model was addressing. Having raised and received answers to all these question, Mary felt the research was good and indicated that she will get in touch with the Washington office to indicate her views and how such work would fit into the current USAID activities in the region.

It also emerged that there was need to bring out the key issues of property rights in such research and hence determine the exact relationship between land tenure and degradation. Burning issues such as the practice of Tavy have to be modeled with the aim of answering a number of policy questions. For instance, is tavy a justified land use given the dynamic forces driving the economic system both directly through the market and indirectly through land productivity and degradation over time? The question of tavy is pretty sensitive and hence the need to think about it well in advance. What is the extend to which multiple intervention will reduce resource degradation and at the same time achieve acceptable levels of economic prosperity?

FIELD VISIT TO BARATAMBUL TERA TAN PROJECT SITE (5th December 2000)

The aim of this visit was to inspect the site to determine whether data generated by numerous land use experiments carried out here could be meaningfully used as parameters to estimate biophysical parameters necessary in running the bio-economic model for the Fianarantsoa and Vakinkaratra sites.

In this site, the Merile are the main ethnic group (they are also the main settlers in the Malagasy highlands). Their traditional way of carrying or transporting things on their heads was quite interesting. The main staple consumed is rice grown mainly in valley bottoms. Other crops grown in the area include cassava. The main commercial tree is eucalyptus although most of the landscape has been cleared and is prone to excessive

erosion. Onions and tomatoes are similarly cultivated and sold mainly for cash. The roads are poor and almost impassable during the rainy season.

The Swiss established and funded the Terri Tan Project to examine the relationship between soil conservation, agroforestry and soil fertility management. The project chose the Terry Tan watershed to examine these issues. The project involved one village to examine the human needs issues. There were 40 HHs living in this watershed totaling 200 people. The village lies at an altitude of about 1500m above sea level. The main problem in the village was identified as soil erosion and declining soil fertility. Traditional methods of improving soil fertility include composting using either cattle dung or poultry droppings. Most of the livestock kept is mainly oxen followed by wild pigs and poultry.

A number of fruit trees are also grown namely peach and mangoes. Arabica coffee is similarly cultivated. Pineapples are grown around the homesteads and much of the soils in the area are sandy loams.

The Swiss project wound up two years ago leaving the farmers to fend for themselves. The project used to have a small weather station that is now dysfunctional. The data collected over the past years can be accessed through FOFIFA office. Farmers now keep poorly maintained tree nurseries of sesbania sesban. These tree nurseries supply commercial tree seedlings for forage and soil conservation purposes to other farmers in the locality. Farmers have also constructed ponds in the valley bottoms where they practice fish farming and at the same time use the ponds to store water for irrigation during the dry season or when droughts occur. Most of this pond water is used to grow rice and onion crops. Rice yields average 2 tons per ha on the average. Dry season stretches between March and October while wet season occurs between November and March. Terracing is a traditional land conservation technique and has been used to reduce soil erosion in the area.

Farmer interview in the Terri tan watershed Baratambul area (5th December, 2000)

Farmer's name: Joseph Randiamanaliomananana

Total hectareage: 0.2 ha rice land (located in the valley bottom)

2 ha in the valley slopes mainly used for onion and cassava cultivation

3 ha land located outside the watershed perhaps communally owned
giving a total land area of 5.2 ha.

The farmer belongs to a peasant group association called Banjina. The group association is for onion, rice and small beans cultivation. The association uses each member's land in rotation for its activities each year. The group sells the crops cultivated and keeps the money to distribute to members during the lean seasons. The group association thus ameliorates idiosyncratic risk. Women also belong to the association. There are only two such groups in the village. The second group is known as Fanatenan.

Tethering is the main livestock keeping techniques.

Cultivation of rice in the paddy fields involves the following :

In June, land is cultivated either manually or by an ox plough. This particular farmer used a hand hoe as he did not have his own oxen. After three months, the land is ploughed for the second time using an ox plough and then water is allowed to flood the area. Oxen are then used to level the field using a wooden levelling implement. Rice is then transplanted in November. (The rice transplanted is normally planted earlier in October). Weeding is carried out twice between November and February and rice is then harvested between April and May. Once rice is harvested it is carried to the respective homesteads for threshing, winnowing and storage. Rice stubble or hay is similarly stored and fed to livestock during the dry season. In general, women do the transplanting tasks while men do most of the land preparation. Thus the community displays a cultural specialization of labour based on gender. Women do the transplanting mainly because they are better skilled than men. In very rare cases do men transplant rice. Children mainly go to school but during the holiday season they transport the rice to be transplanted to the respective fields and also help out in weeding the rice, Onions and cassavas. They similarly help out in transporting harvested rice to the homesteads.

Livestock is owned by the head of the household mostly the husband and he is the one who takes care of the animals This particular farmer has two cross bred cows and is concurrently preparing his field for rice transplantation and at the same time keeping an eye on the animals. When the animals get unruly, he simply tethers them and then keeps on changing the tethering sites once the grass in each of the sites has been grazed. In the wet season, animals graze on grasses and weeds in the fallow fields while in the dry season they are fed rice stubble stored from the previous year. Animal feed fluctuates with rainfall availability. In years when rainfall is adequate, no forage shortages are experienced. However when rains fail, animal feed scarcity is experienced and farmers are forced to sell some of the animals to reduce loss through starvation. Animals are kept in structures near the homestead. They are shallow dug outs (pits) with two compartments; one for the animals to feed in and the other, normally filled with hay, for animals to sleep in.

For most poor farmers like Joseph, lack of oxen draft during land preparation months is a major constraint. Overall, this translates into late land preparation, late planting, a short plant growth period and hence low yields. The result is less than adequate food supplies. Food insecurity is hence a major problem in most households in the area and generally in the highlands of Madagascar. Rice is very expensive and hence farmers would rather grow it than depend on the market. Other crops such as maize and sweet potatoes are grown to supplement rice as a staple. Crops such as cassava and maize planted on the steep valley sides suffer moisture stress due to thin sandy soils in such areas. There is also a high deficiency of phosphorous in the area due to high acidity levels. This greatly affects the amount of phosphorous available for plant uptake. Cassava is mostly affected

and yields per ha are only 10 tons compared to 20 tons realized in other areas. Yet cassava is the main rain-fed crop in the region.

New technologies have been tried out in the area. These are mainly improved fallows using tefrosia and crotollaria. The main problem is that land has to be left fallow for at least two years for yields to improve significantly. This is often difficult given the immediate and rising demand for food in the area. In some areas, green manure is used while in others, zero tillage is being tried out. These innovations are easier to adopt than improved fallows. For green manure, species such as cassia rotundiflora and arachis pentoi are used.

In terms of market access, this particular farmer has no problem as he can easily rent an oxen cart to transport things from or to the local market. The farmer applies manure and chemical fertilizer to some of his crops (onions and beans). Farm inputs are easily accessed but are too expensive at the local market centres. Most farmers prefer buying these inputs in Antananarive and bearing the transportation costs than purchasing them from the middlemen in their local markets. Other farmers organize themselves in groups mentioned above and either purchase inputs or sale outputs in bulk to benefit from the resulting economies of scale.

In terms of physiography, the area consists of steep slopes and deep valleys typical of the highland zones of Madagascar. Rainfall averages 1300mm per annum. Erosion is a major problem and terraces are widely used to reduce the problem. Over the last 10 years, yields have progressively declined to almost half their initial levels. But much of this decline is due to erratic rainfall patterns rather than erosion. A number of crop failures have hence been experienced and low yields due to moisture stress prevail.

A traditional rice variety is grown by most farmers in spite of existence of a higher yielding varieties. Apparently, these new varieties have not yet been effectively disseminated to farmers in the area. A rain-fed new rice variety grown mainly on the steeper slopes had been introduced earlier but was not adopted by most farmers due to numerous problems.

To boost yields, poultry manure is used when planting rice. Much of such manure is bought in the market or generated on the farm if the farmer has some poultry. Manure is often applied on the off season crops such as onions before the land is used for rice. When no off season crop is possible due to prolonged dry spells, then manure from poultry or cattle is applied directly to rice during transplanting time. Much of the manure application is done by young boys while girls help their mothers in transplanting rice.

Trees grown are mainly for fruits, fuel and forage. They include gravillea robusta, eucalyptus sp. and peach (grown in small orchards around homesteads). Generally there are not many trees in the area (planted or natural). Reforestration has tended to prefer eucalyptus to any other tree species.

Biophysical experiments

Erosion experiments were carried out by the Swiss in collaboration with FOFIFA researchers. 4 plots were used each with different practices available to farmers in the watershed. The average gradient was 20%.

Plot 1: - Had no ground cover and portrayed the situation when farmers do not participate in any land conservation activities. Soil loss was determined to be 500 tons per ha per year

Plot 2 :- This plot had contour lines formed by bracharia grass with maize as the main crop. It also had tefrosia fallow planted in a strip across the bottom part of the plot. Soil loss was determined to be 50 tons per ha per annum.

Plot 3:- This plot used traditional soil conservation techniques in which short fallows using tefrosia are rotated with crops such as maize. Soil loss was observed to be about 150 tons per ha per year.

Plot 4:- This experiment plot was planted with eragrostis sp. grass contour lines that were at least five years old and maize was planted in the areas separating the contour lines. Soil loss was observed to drastically fall to 5 tons per ha in the fifth year and no soil loss at all in the years after. This was because the eragrostis grass effectively formed terraces by enabling soil deposits to occur behind each contour line. This normally occurs after eight years of planting such grass strips.

Erosion levels in the sub watersheds under different land covers were also measured. In the sub-watershed under rainfed crop cultivation, soil loss and water runoff was found to be in the region of 150 tons per ha while in a watershed covered by natural grass interspersed with eucalyptus trees, water run off was high but soil loss was as low as 70 tons per ha.

Details of the above experiments are documented in Tera Tan Project publication and copies can be provided by FOFIFA HQ staff in Antananarive.

FARMER INTERVIEW AND VISIT IN VAKINKARATRA- ANISIRABE SITE (5th December 2000):

The site visited is a watershed consisting of one large valley bottom bounded by steep slopes on either side. All the water falling in the area hence drains out through the river channel in the valley. Main crop grown is rice. Maize, irish potatoes, carrots, cabbages, sweet potatoes and peach trees are the other crops grown. A rough earth road that is often difficult to use during the rainy season links the area to the Antananarive-Ansirabe tarmac road. The area enjoys better market access than most of the surrounding regions due to the linkage to the two major cities in the country. The site lies in a fertile high potential zone and is famous for rice and carrot production country wide. At the moment, it has been selected as one of the AHI sites in Southern Africa.

PEASANT INTERVIEW:

NAME: Rakutumanana

He is aged 65 years and was randomly selected. The farmer has three grown up children who are married and have their own children. He grows irish potatoes, maize, rice, sweet potatoes, beans and soya beans. Most of the crops are grown as intercrops with maize.

In a normal year, the following is the calender of activities:

Rice is the main crop grown using water flowing through man made canals and river channels in the valley. Cultivation of rice entails the following activities;

Land preparation begins in December –January of the crop year. Most of the rice is then transplanted towards the end of January and early or mid-February. 1st ploughing of rice fields is done manually using a traditional hoe (Angadi). It is preferred to use the Angadi rather than the oxen plough as the former gives a better tillage. It takes two men to plough 0.02 ha of fallow land per day using the Angadi. 2nd ploughing is in most cases not carried out. Thus after 1st ploughing the farmer floods the field with water and then levels it using an equipment known as a leveler. For a 0.02 ha plot, it takes one man one hour to complete the task. In most cases, a second leveling is done shortly before rice is transplanted to ensure easier working of the soil during transplanting. Rice transplanting is done mainly by women with men assisting in the leveling tasks. Those HHs with no or inadequate female members over the age of 15 years hire in female laborers at 2500 Malagasy francs. Men involved in the transplanting are normally paid 3000 francs. Between February and April, rice is weeded twice before being harvested in May. Rice harvesting involves cutting the rice and leaving it to dry in the field for a number of days. It is then transported to the respective homesteads by women and children with men claiming that they leave it to them as it is an easier task when compared to their dominant activity of land preparation using the Angadi hoe. Threshing is however done by men.

In May – June, carrots are planted off season on fields other than those used for rice. In July –August land preparation for potato crop is undertaken. These are harvested in September-November.

The steep valley sides are very degraded and were observed to be unsuitable for crop cultivation except afforestation with Eucalyptus tree sp.

The main problem confronted by most farmers in the area is inadequate application of chemical fertilizer due to unaffordable prices. Food is also inadequate for most of the households for two reasons a) land per farm family is too small with a only a small portion being suitable for rice cultivation. This farmer for example has only 0.12 ha out of 1.12 ha that is suitable for rice cultivation. b) Yields per ha are too low.

Group activities in the watershed are organized by the Catholic church. This particular farmer does not belong to any group, probably because of his age. The groups are not

based on religious affiliation. Like elsewhere in the Madagascan highlands, these groups are engaged in farming activities and cultivate members fields in rotation sharing the arising products. At times the produce is sold and the money is shared while some is kept and is distributed as seed to members. A small portion of the proceeds are kept for emergency situations. Other organizations working in the area include FIFAMANOR (public Institution of research and extension). This organization helps farmers by giving them high yielding seed varieties. Farmers have to give back the seed after they have harvested their crops. In some cases FIFAMANOR gives farmers free chemical fertilizers. But this is not common.

Priorities:

Farmers in the area view food security as one single area of priority and although rice can be purchased from the market, they would rather produce it themselves partly because market prices for rice are too high. Nevertheless the area is considered as a rice surplus zone. Asked whether he would rather be given cash money or rice the farmer opted for rice saying that it is only after the family is well fed that money can be used to meet the other pressing needs.

Human nutrition in the village appears to be fine with most children looking healthy although poorly dressed. At the beginning of potato harvest most children suffer from stomach ache for reasons that the farmer can't understand. This is probably the only health problem experienced among children.

Livestock keeping and land conservation activities:

Zero grazing is commonly practiced in this area. Young boys over the age of 10 cut grass on the road sides and in the field and transport the same to their homes to feed the animals. The farmer has two cows and one pig. Children traditionally milk the animals and either they or their mothers sell the milk to the market. The proceeds are however given to the HH head i.e. the father. There are no major livestock problems in the area and for much of the year animal forage is always adequate. Rice stubble is abundant in the dry season and is commonly fed to animals when other forage sources are depleted.

Soils are generally fertile in the valley bottoms and hence they tend to be used for intensive mixed cropping. The valley sides with thin soils are used for grazing. This has inevitably resulted in serious land denudation. Most of the valley sides (uplands) are now bare and a subject of concern. Degradation levels in the area were also exacerbated in the past by open cast mining for precious stones and although farmers were compensated and the land returned to farmers thereafter, it was difficult to reclaim such land. So far, eucalyptus trees have been planted. Soils are red and thin on the valley slopes but deep, black and loamy in the valley bottoms. Other trees grown in the area are peach and bamboo.

INTERVIEW WITH AHI-FOFIFA representative, Ambanimazo village (AHI site), 5th December 2001.

In 1998, the village was used as a site for trials on soil conservation and soil fertility. A diagnostic characterization survey was carried out and a report was written. This is an ICRAF publication written by Anne Straud. Funds were availed in 2000 to manage one watershed of about 200ha. Current activities are preparation of vegetative material for dissemination as contour line construction and also for use in improved fallow trials and for afforestation. For construction of contour lines, bana grass, kizozi graminee and vetiveria are some of the materials currently being multiplied for propagation purposes. Improved fallow material under multiplication in the village include;

- a) Albizzia Falcataria
- b) Acacia dealbata
- c) Vernonia fectoralis
- d) Melia azidazacta

The above species are currently being raised in a communal tree nursery managed by a group of peasants in the village who will sell the material to the rest of the community once a significant amount of propagation material has been generated.

Agroforestry trees are similarly being multiplied for propagation and include eucalyptus and pinus species.

The identified problems in this community are:

- a) Soil fertility decline
- b) Lack of biomass for composting
- c) Scarcity of cash
- d) Rapid population growth
- e) Lack of adequate supply of clean water for human use
- f) Inadequate water for crop and livestock use in some parts of the year.

INTERVIEW WITH MINISTRY OF AGRICULTURE, VAKINKARATRA OFFICE (6th December 2000)

This interview was with Mr. Ramanampamunji- Assistant Chief Director of Agricultural Centre.

He identified the following as the main development areas in Vakinkaratra region

- 1) Ansirabe – HQs or central region
- 2) Petafo – Located in the mid west
- 3) Faratsiho- high altitude
- 4) Antanifotsy-

CIRAGRI is the main MOA project operating in the region. It is involved in extension of technologies as well as support of peasants to use these technologies. The technologies include;

- i) New varieties of rice
- ii) New rice growing husbandry techniques
- iii) Intensification

Other organizations working in the area are

1. TIKO – Promotes Soya bean cultivation
2. FIFAMANOR – Research for potatoes and extension
3. Catholic mission
4. Environment Organization – deals with all matters related to forests and natural resource management

There are many development NGOs working in the area. Support of peasant groups is an ongoing Ministry of Agriculture activity. Some of the groups were formed as far back as 1986 mainly through the Rural Development Operation Project

Problems:

From MOA's point of view, the main problems evident in this area are;

- a) Insufficient land area and hence the need for intensification
- b) Land tenure – at the moment farmers have no clear knowledge of their land entitlement rights hence suffer from all the problems associated with insecure land ownership.
- c) Poor infrastructure especially feeder roads

In the agriculturalists view, the best way to hasten development in the area is through support of peasant groups on technical aspects such as crop and animal husbandry as well as provision of funds through a variety of credit schemes.

At the moment a number of stakeholder meetings are being held in which institutions such as CIRAGRIC, FOFIFA, MOA etc. come together to harmonize their development efforts in the region. MOA through SRAT (Regional Services of Technical activities) project convenes these collaborative meetings.

Soil conservation in the area utilizes two approaches:

- a) Biological methods – agroforestry, mulching, terrace plants
- b) Mechanical methods – water retention activities namely;-
 - i) Protection of water canals
 - ii) Protection of water infiltration in the canals
 - iii) Progressive terracing

Demonstration sites to show farmers the effectiveness of various soil conservation methods have been set up in various places. It was however observed that no soil and

water runoff experiments have been carried out to determine the amount of soil loss in the area.

Data

Various types of data have been collected. These include:

- a) Data on results of demonstration experiments
- b) Data on adoption of new techniques by peasant farmers
- c) Yields of various crops in different regions
- d) Map of soil types in the area and various population densities

The above information especially item d is available in “ATLAS CIRAGRIC, ANTSIRABE, Hariniaina Raveromihaja, May 1996,” Station FOFIFA BP 230 Tel.480-54, 110 Ansirabe. Alternatively, a copy could be found at : Department Recherche Development, BP 1444. Tel. 304-61, Antananarive.

MEETING WITH FOFIFA ANSIRABE REGIONAL STAFF (6th December 2000):

We were briefed by one of the researchers, Ms Bodo Babary (agronomist- plant physiologist) working on beans about the general work carried out at this regional station. Her work entails screening beans to determine tolerance to soil PH and low phosphorous. She is currently developing a decision guide for fertilizer use (organic and inorganic). All her work is on-farm. The guide depends on farmers’ available resources. Hence given his/her endowments, the guide helps the farmer to determine which type and quantity of fertilizer will be most appropriate both technically and economically. The decision guide takes into account the soil types among other parameters. The tool is hence very effective in soil fertility management at farm level.

About 50 farmers have been participating in this study over the last 2 years. It is expected that a complete decision guide will be available for use by most farmers in the region in the next 3 – 4 years. Bodo is also working on a minimum or zero tillage experiment.

After presenting the planned BASIS CRSP project activities, the regional staff raised a number of questions namely, whether the model was capable of taking into account different strategies used by farmers in various sites to cope with their unique problems. They also raised questions on issues related to data requirements, model validation and calibration as well as the level of expertise required to built and run the bio-economic model for Vakinkaratra site.

It was hence agreed that construction of the bio-economic model for this site will be built in a stepwise manner with full participation of the FOFIFA researchers in the area. Names and contacts of these researchers are as follows;

1. Razakamiaramanana – Chief of Anisirabe FOFIFA Regional Research Station, B.P

- 230, Tel. (261-20) 4448054; e-mail: fofifa.abe@dts.mg
or Ambaniandrefana, Ansirabe 110, Madagascar
2. Bodo Rabary – Agronomist and Plant Physiologist on beans and soil fertility management; e-mail: b.rabary@compro.mg
 3. Andriantsimalona R. Dodelys – Plant pathologist and plant breeder at FOFIFA Ansirabe, e-mail: fofifa-abe@dts.mg
 4. Randriamanantsoa Richard – Entomologist, FOFIFA Ansirabe. e-mail: fofifa.abe@dts.mg

WRAP UP MEETING WITH DEPUTY DIRECTOR, FOFIFA, 8TH DECEMBER 2000

In attendance:

1. Prof. Jhon Rasambainarivo
2. Dr. Bart Minten
3. Mrs. (Deputy Director, FOFIFA)
4. Mr. Jafaye (Support services, FOFIFA)

This meeting was held shortly after the FOFIFA presentation of our planned research work. The director expressed her thanks for the presentation and indicated her institution's willingness to participate fully in the planned BASIS CRSP project. They were also happy to learn of my visit to Baratambul and Ansirabe sites. They however were concerned that all research in the country was concentrated in Vakinkaratra and Fianarantsoa areas. They hence requested that BASIS CRSP project considers working in sites outside these area. The link between poverty and land degradation was unquestionable and hence research into ways and means of sustainably curbing and if possible eradicating it through introduction of technologies such as agroforestry.

