

The SSE-Programme

Project Review of

**The Integrated Agricultural Development Programme,
Central Tigray, Ethiopia**

**Implemented by
REST,
supported by the Development Fund**

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1. Introduction

REST has received Norwegian support through the Development Fund (DF) since the time of the civil war. Until 1993 this support was used for terracing and to organise Bull Service and Community Seed Banks. In 1993 the various activities were merged into an Integrated Agricultural Development Programme with wider thematic involvement, but with geographic coverage limited to ten Woredas (sub-districts) in Central Tigray.

Food security and environmental rehabilitation are overall program objectives.

Specialised reviews of Bull Service, Community Seed Banks, and Credit Schemes have been carried out with Noragric participation in 1991 and in 1995. This time the purpose of the review is to consider the overall agricultural development programme, its appropriateness and possible impact. Field visit took place in October 1997.

At some points in our report we make suggestions about ways of continuation and following up what has already been started. These are not meant as proposed conclusions, but rather as contributions to REST and DF's discussions about further development of this programme.

Background and purpose is further elaborated in Terms of Reference that is attached as Appendix 2.

**Integrated Agricultural Development Programme,
Central Tigray, Ethiopia,
Implemented by The Relief Society of Tigray (REST)**

Report of a review visit in October 1997.

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Summary and conclusions

- 1 The review team visited REST's headquarters in Mekelle, met most of the involved professional staff, consulted miscellaneous project documents, and travelled through areas of field operation in Central Tigray, and met field staff and local authorities, during 13 through 18 October 1997.
- 2 REST's Integrated Agricultural Development Programme in Central Tigray includes
 - environment protection
 - irrigation,
 - community seed banks
 - other crop related activities
 - bull-servicing
 - forage production
 - other livestock related activities
 - credit
 - research and monitoring

According to our terms of reference, we discuss the importance and impact of all of this in relation to overall project objectives of environment rehabilitation and improvement of food security.

- 3 Main contributions to environmental rehabilitation are area closures, reforestation, and stone bunds on cultivated lands. Achievements are impressive in terms of areas covered and impact. Impacts include increased vegetation cover, reduced erosion, improved water regimes, and positive effects on yields on treated agricultural land. For a successful continuation, policies and strategies of community management and use of protected areas may be required.
- 4 The project has constructed (or are constructing) several "microdams" to provide water for irrigation. Also these dams are significant contributions to agricultural productivity and are also profitable investments from an economic point of view.
- 5 Community seed banks provide important services including
 - selection and supply of quality seeds
 - conservation of plant genetic resources
 - seasonal credit
 - helping needy farmers

Economic viability is precarious because too many farmers fail to pay back their loans. This situation is discussed with reference to the kind of services that are provided. Supply of seeds as a seasonal production inputs should, as an objective, be on commercial terms. However, conservation of plant genetic resources, and assistance to needy farmers, should be seen as delivery of a public good, and benefit from public (external) support.

- 6 The bull servicing programme has been of great help during difficult times of war and famines, and has also been important during the transitional period since peace in 1991. A clear parameter of success is a significantly reduced calving interval. However, when situation is becoming more normal, such services may no longer be considered a natural target of donor assistance. Ways of phasing out external support could be privatisation of bull keeping based on service fees, or the organisation of bull keeping cooperative societies.
- 7 The grazing land enrichment plots could be the beginning of transition to a much more productive livestock system based on zero grazing. The start is good and may open for a development with an enormous potential.
- 8 Other started or contemplated livestock projects include dairy production, urea-treatment of straw to improve quality, bee-keeping, and poultry with European or hybrid hens. While all of this has its potentials, we suggest that REST carefully considers what its limited number of professional staff can realistically be involved in. We also point to the suitability of dairy goats rather than dairy cows under very small farm conditions, and the potential of better utilisation of a local feed resource by means of urea-treatment. Finally we have mentioned the risks of certain diseases related to use of European or hybrid hens.
- 9 Certain inputs to the horticultural sector, notably vegetable seeds and fruit tree seedlings, are provided by the project. This can not remain dependent on REST forever and ways of privatising such input supply should be considered.
- 10 Also the credit scheme seems to function well and must be considered a good start of something that has a great development potential.
- 11 REST's Research Unit is adequately staffed, and serves as a kind of "central statistics office". In the absence of other sources of statistical data, this office remains important.
- 12 We notice that ox-ploughing has become a mechanism through which richer farmers can exploit the poor. It may be necessary to consider alternatives. We discuss whether hoe-cultivation or ploughing with donkey or cows could be viable alternatives.
- 13 The area as a whole is still food insecure, and terribly vulnerable in years of crop failure such as in 1997. However, the situation would have been much worse without the development inputs brought by this projects. REST has shown that environmental rehabilitation is possible and that it is also possible to improve agricultural productivity. But the current year of adverse weather conditions have demonstrated that there is still a long way to go. In perspective, the progress seen during this project visit is achieved in a short period. Considering a long history of neglect of the peasant sector, the extreme degradation of land and poverty of its people, the six years since peace in 1991 is a very short time. Those struggling for recovery must be given time. Plans have to be with long term perspectives.

**Integrated Agricultural Development Programme,
Central Tigray, Ethiopia,**

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Report of a review visit in October 1997

1. Project activities funded by the Development Fund (DF)

1.1. Environmental protection

Rangelands in the area are seriously degraded due to overgrazing. In order to address this problem, REST has assisted communities in establishing area closures. The project pays for guards during initial years, but assumes that involved communities later on will take the responsibility for protecting the area closures. Area closures are also enriched by tree plantings.

A total of 9632 km of stone bunds have been constructed in the area closures and on agricultural land. In area closures, stone bunds are mainly constructed with the use of food for work whereas on agricultural land farmers are constructing without any external support. Stone bunds increase infiltration of water and decrease soil erosion.

Area closures have had a clear effect on the vegetation. A sharp difference between areas which are closed and those which are not closed could be observed. Previously rare tree species are now re-appearing. Wildlife in the area closures is also increasing.

Comments and proposals:

In area closures, stone bunds are constructed by the use of food for work. Re-vegetation is achieved mainly by exclusion of grazing animals. Additional effects of stone bunds is probably limited. Grasses are soon established once the area is closed, and grasses very efficiently control soil erosion. Stone bunds speed up the regeneration process, but end result will probably be the same. The cost of establishing stone-bunds are high, and it may be questioned whether construction of stone bunds in area closures can be justified from an economic point of view. It may be better to spend scarce project funds on activities that are more remunerative for the farmers. Stone bunds are more needed on agricultural land. On extremely degraded land on steep slopes, stone bunds can be justified though.

It is not always necessary to plant trees in area closures since re-vegetation occurs spontaneously. However, in some cases supplementary planting may be required. It can be of special importance to plant fodder trees. It is the experience from the Wag project that tree survival is better if the trees are not planted in the first year of establishment of the area closures because run-off will be very high before grasses are established. Supplementary tree planting should therefore take place 2 - 3 years after establishment of the area closures. At that time it will also be easier to judge where supplementary tree planting is required.

The project should give the communities training in the management of area closures. A plan with regard to the management of the area closures should be developed. An example of a sketch of such a plan is outlined in figure 1. The rangeland is divided into three parts. Area 1 is protected for the first 4 years. From the fifth year controlled grazing or a zero grazing system is practised. In area 2, common grazing is allowed in years 1-4, while from year 5-8 it is protected and from the 9th year it is under improved management. Area 3 is used as a traditional grazing area in the first 8 years, thereafter it is under area closures for 4 years and from the 13th under improved management.

	Area 1	Area 2	Area 3
Year 1 - 4	Protected area closure	Common grazing area	Common grazing area
Year 5 - 8	Improved management	Protected area closure	
Year 9 - 12		Improved management	Protected area closure
Year 13 -		Improved management	

Such progressive development of area closures allows all rangelands surrounding the village to be put under improved management within a twelve year period. Such an approach will ensure that the village always has some grazing area and that there is a continuous expansion of land under improved management. The proposed length of the period of complete protection is 4 years. However, if the regeneration process proceeds rapidly, it may be possible that only three years of complete protection is needed. Improved management will imply that there are restrictions on utilisation. The village should reach an agreement with regard to who has the right to utilisation and how fodder and timber materials are to be utilised.

1.2. Irrigation

The project has constructed several microdams. Professional REST staff have carried out or led both feasibility studies, surveying, design and construction. Local farmers participate on a food for work basis. Investment costs for the dams are in the range of 1 to 3 million birr and each of them are capable of irrigating 100- 300 haa of land. On irrigated land 2 to 3 harvests per year can be obtained.

Economically these dams are viable, but siltation pose a long term threat. REST has addressed this problem by establishing

area closures in the watershed of the dams. It remains to be seen if this is sufficient to protect the dams against siltation.

1.3. Crop production

1.3.1. Community Seed Banks

Support to Community Seed Banks is the main crop related activity.

The community seed banks link up to the best local seed selectors, stimulate intensive selection of local seeds, and purchase the best available seeds for lending. Seeds are lent at planting time for the price paid when it was purchased, and borrowers pay back with an interest of 7,5 percent at harvest time (corresponding to an interest of 15 % per year). Loans are granted preferentially to poor households. The seed-bank-capital is supposed to be a revolving fund. When crops fail, however, borrowers may be unable to pay back. This creates difficulties particularly in the most drought prone areas. So far the seed banks have survived by means of regular supply of fresh capital.

These seed bank activities serve four main purposes:

- Selection and supply of quality seeds,
- Conservation of plant genetic resources,
- Seasonal credit,
- Helping needy farmers.

Credit based seed supply should be seen as a commercial activity related to normal farming. Conservation of plant genetic resources is an issue of global importance with strong national interest. Assistance to needy farmers is a social obligation that is usually the responsibility of the government. Thus the seed banks provide services that are partly the private business of involved farmers, and partly a public good.

Community Seed Banks as seed supply facility:

The Community Seed Bank programme has been reviewed by Noragric two times before; in 1991 and in 1995. In the first visit we saw Seed Banks that had been established as a help for survival and crisis management during times of war and famine. During the second visit we discussed the role of

seed banks in a post-war recovery period. Now we see seed-banks that apparently function as permanent institutions in normal times. The persistence of these gene banks may be attributed to the following merits:

- Community Seed Banks provide seasonal credit on non-exploitative terms,
- Community Seed Banks are experienced as better than traditional seed management practices with respect to maintenance and supply of quality seeds of locally important crop varieties,
- Other sources of seeds, such as commercial seed companies and improved seeds distributed through Ministry of Agriculture, are limited with respect to number of species, number of varieties, geographical coverage, and amount of seeds. They also bring seeds that may be of doubtful local adaptation. This formal seed sector therefore does not have the capacity to take over as main external source of seeds for farmers in Central Tigray, neither now nor in the foreseeable future.

Thus the seed banks have survived because they serve important needs that nobody else (for the time being) can serve. Their functions are institutionalised, meaning that activities have become routines. These routines are based on community organisations and at the same time integrated into governmental services (primarily BoA). An appraisal now may include professional quality and developmental potential, but also institutional and economic sustainability. Since the drought of 1997 has underlined both the importance of, and the economic vulnerability of these seed banks, it may be time for a rethinking of economic viability of such institutions. If we distinguish between what could be seen as commercial input supplies on the one hand, and the delivery of a public good on the other, we may approach a more realistic view of economic sustainability.

The community seed banks are perceived as a source of better seeds and have created awareness of the importance of selection in connection with seed saving on the farm. The network of seed banks now covers the whole of the geographic area of REST's Integrated Agricultural Development Programme in Central Tigray, but the capacity of each local seed bank is far below the demand. Direct importance is therefore limited to loan-takers who are identified according to needs. Indirectly, however, there may be an impact on the rest of the community through diffusion of good seeds and through increased intensity and quality of local seed selection.

While the Community Seed Banks are rooted in local communities and in the local knowledge and resource base, they are also well integrated into the local government system. However, the integration into or links to the scientific research organisations is still poor. Since end of the war (1991) the national agricultural research and educational system is established/re-established in Tigray with one research station in Mekelle (Institute of Agricultural Research) and with Mekelle University College of Dryland Agriculture. Both institutions are important scientific centres locally, but they also provide links to the national and international research communities. Both within national institutions and in many international projects there is now increasing interest in “Participatory Plant Breeding”. That means provision of scientific support to farmer driven seeds improvement and supply activities like those of the Community Seed Banks in Tigray. There is potential for further strengthening of the community seed banks through that approach. It is important that the involvement of scientist takes a form that does not undermine community control and community ownership of seed banks and seeds.

Community Seed Banks as instrument of conservation of plant genetic resources:

Conservation of plant genetic resources is one of the stated objectives of Rest’s seed bank programme. Since the seed banks operate at Tabia level, geographic coverage is complete within the project area. This means that there are seed bank committees with knowledge of all varieties that are locally grown all over. When these varieties are subjected to systematic and sustained seed selection, they will be maintained and most likely enhanced and their chance of survival is increased. The seed banks should be recognised for their contribution to the conservation of this extremely valuable resource.

Conservation of plant genetic resources is a global issue that has been stressed in international policy documents such as Agenda 21 (Rio, 1992), and the Leipzig Global Plan of Action for Plant Genetic Resources for Food and Agriculture (FAO, 1996). It is also a national obligation according to the Convention on Biological Diversity (Rio, 1992).

Because of the importance of these genetic resources, and because of the danger of losing much of it in “genetic erosion”, there are international genetic resources conservation programmes. Keeping seeds in gene banks is no longer seen as sufficient and most such conservation programmes also include support to projects that encourage maintenance of landraces through continued cultivation in their areas of origin.

The international interest in conservation programmes in Ethiopia is due to the fact that the country is known to be particularly rich in diversity of many crops, including some crops of world wide economic importance. For the outside world landraces from Ethiopia are interesting as sources of single genes or traits for breeding. For Ethiopia in general and for Tigray in particular, the importance of the landraces is more as source of local adaptation. But for all, the landraces constitute part of the resource base that is going to secure the future of agriculture and food production. In Ethiopia the Biodiversity Institute has the national mandate on biodiversity management. The institute has an excellent gene bank, but also develops national strategies for on-farm conservation.

The Community Seed Banks in Tigray contributes significantly to both national and international conservation objectives. They should be known by the Biodiversity Institute as part of a national effort and be supported by national and international funds for conservation of plant genetic resources. This would be extremely cheap and efficient compared to most external solutions, but also appropriate in the sense that it allows control and ownership to remain where it belongs, in the communities.

Linking up to the national programme could be in the form of a simple reporting system. If a list of landraces (species and names) is included in annual reporting and the list also covers landraces known but not selected by the seed bank, this could be compiled by REST and copied to the Biodiversity Institute. Such a list would provide full information about available plant genetic resources and also warnings about vanishing materials that need to be collected and stored in the gene bank. The seed bank network could also be a source of information (local knowledge) about the landraces and about their merits under changing conditions (i. a. the use of chemical fertilisers). It would be unfair, however, to expect farmers, through interests or seed prices, to cover additional efforts to monitor and conserve genetic resources. The expenses related to such services should be considered a

contribution to a national programme and be covered through external support.

It is important that external support comes in a way that does not function as a “sell out”. This is particularly important if international funds are being used. The case of the Tigrayan seed banks demonstrate the validity of the resolution about “Farmers’ Rights” (FAO, 1987) recognising the rights of those communities that have given the world its heritage of genetic resources through past and present efforts. We assume that the Biodiversity Institute will observe both the national policies and the interests of the communities.

Community Seed Banks as a social security institution:

The Community Seed Banks function as social credit institutions. Loans are granted as seasonal credit with an interest that is so low that it barely covers operational costs (7,5 percent/season). For farmers who need seeds the alternative is private seed or money lenders who charge much higher prices at time of planting and lend on exploitative terms. Providing seeds below market price and lending on interest below the “market interest” could be seen as gifts to the borrowers. Amount of seeds for lending is far below demand, and “beneficiaries” are selected according to social criteria. Needy farmers are chosen. There can be no doubt about the importance of this social security institution. However, it brings unavoidable losses when farmers fail to pay back. It would be unfair and unrealistic to expect communities to cover such losses under the current economic situation in the area. If the seed banks are going to be self-reliant they either have to switch to “commercial terms”²⁵ meaning higher price at planting time and lending to credit-worthy borrowers only, or they will have to seek outside support for the social security component of their lending policy.

Seed Banks and crop failures:

1997 was a bad year with early secession of rains and serious crop losses in Central Tigray. This means that many farmers are unable to pay back their seed loans and that the seed banks will be short of funds for purchase of seeds for lending next season. On the other hand the crop failures have created increased need for seeds for lending. Farmers claim that there are seeds around. There are always some farmers who have managed to harvest enough seeds and are able to sell. But sale would be on exploitative terms and

further weaken those farmers who have experienced the worst crop losses. In this situation the need for the seed bank credit will be almost desperate. Support to such forms of credit will help post famine recovery in the community and it will be a help that is channelled through and handled by responsible local community institutions.

1.3.2. Other crops related activities

REST introduces root crops, mainly sweet potato, but also cassava. Since such crops are not traditionally grown or used in the area, this introduction requires supply of planting materials, awareness and training activities, and programmes for women on processing of root crops for food. There is also some activities related to introduction of fruit trees and vegetable growing. All of this has a considerable potential and seem to be well received and is steadily expanding in the area.

1.4. Animal production

1.4.1. The bull servicing programme

DF has supported the “Bull Servicing-Programme” since the start during the war (1987). At that time such a programme was particularly important because of war and famine situations and the associated loss of livestock. Now the necessity of this programme must be considered according to needs in times of peace and stability.

Central Tigray belongs to the most densely populated parts of the region. Most farms are very small, in the most dense areas less than 0,5 ha. They therefore lack necessary resources to support the needed number of livestock. Priority is given to working oxen (castrated males) which are used for tilling and for threshing, and to cows because of the importance of milk and milk produce in the household and for dairy products for sale (mainly butter). But around one third of the farms don't have a single ploughing ox and next to all farms are unable to keep a bull. The bull keeping is therefore an obvious case for collective services.

The bull servicing project helps local communities buying a selected bull that is placed under the custody of one trusted bull keeper. He is paid 350 birr per year for having and feeding the bull. Bull services are free.

This programme has been of clear advantage. It has enabled all communities to have at least one breeding bull that is selected and well fed. For owners of cows, this means access to a bull, and moreover, to a good bull. Impact is seen in the form of better calving rates and stronger calves. According to REST's records, calving interval is reduced from 4 to 2 years. On the average each bull has fathered 80 calves per year.

This service represents a permanent need and should not be seen as an extraordinary measure in a recovery period only. The programme is already institutionalised and well integrated into the community and government structures. The remaining issue is how to make the bull servicing programme economically self-sustained.

External financial support helps buying the bull and feeding the bull. Community support includes priority access to feed resources from enclosed areas.

If this programme is not going to remain dependent on external support, a service fee could be a possible alternative. If farmers start paying for having their cows serviced, bull-keeping would generate income and could become economically self-sustained. The drought of 1997 makes survival of people as well as of their livestock the primary concern. When this crisis is overcome, however, it may be necessary for REST to start considering ways of making this programme independent on external support, either through community management (i. a. bull-service co-operative societies) or through privatisation as indicated above.

1.4.2. Forage Production

The livestock depends on residues of crop production (i. a. straw), on weeds from fields and grass from roadsides, and on grazing in pasture areas. Both amount and quality of such forages are far below requirements. The overstocking relative to fodder supply has increased pressure on communal grazing lands. The utilisation of those resources has long ago reached its

limits and has assumed destructive levels. Most pasture areas are overgrazed to an extent that they are now almost unproductive.

In such a situation meaningful inputs to the livestock sector must include measures to increase supply and improve quality of fodder. REST has some years ago started with “grazing land enrichment”. That means conversion of open pastures to closed meadows. Fodder grasses are seeded and grazing animals are excluded. Meadows are established and harvested only by sickle, not by the muzzle of the animal. So far this requires the posting (and paying) of a guard at those meadows.

Initiation of such activities had to wait until communities could be convinced and willing to try it out. This was obviously not easy in a situation where lack of grazing land is almost desperate and the experiment would exclude livestock from a badly needed piece of land. However, REST has managed to persuade some communities to participate in such experiments, and now the results of those experiments persuade others. The enriched pastures are obviously much more productive than the common grazing land. The success is now about to create a demand for more of the kind. We can foresee a development towards reduced access to communal grazing land and increased supply of harvested fodder. This will change the livestock system in direction of zero-grazing. This means higher overall productivity, better utilisation of resources, and closer integration of livestock and crop production (utilisation of manure for crops and crop residues for animals). This is going on in the highlands. In lowlands it is less relevant.

REST’s contribution to this development is a success. Communities are picking up the ideas and are likely to carry on under own management.

1.4.3. Other livestock related activities

There are many other avenues to necessary improvements in the livestock sector. There are initial programme plans for various programme components, such as dairy development using local cows and goats in lowlands and cross-breds with jersey cows in highlands. Another idea is improvement of straw quality by urea-treatment.

Since most farms are too small to support milking cows, the use of goats may be the more relevant contribution to milk production for household needs. Dairy development based on cross-bred high yielding cows, may be relevant for fewer farmers, and probably limited to areas near urban markets. Investments in exotic or cross-bred dairy cows does not make sense until the feed supply is (by quantity and quality) no longer the production constraint. In that respect urea-treatment may be a critical contribution. It improves digestibility (and nitrogen content) of low quality roughage (i. a. straw from cereal production) and thereby increases value of crop residues in animal production. Urea is an external input, but this is a moderate expense with a potential of improving utilisation of a local resource. It has been introduced with success in some other developing countries.

REST also brings exotic laying hens. Since local hens have retained some of the natural habit of laying eggs in periods, stopping production for several weeks once there are enough eggs for a batch of chicken, they have limited capacity for commercial egg production. In the exotic breeds the natural regulation of egg production does not function and the eggs come continuously. To take advantage of such abnormalities, it is necessary to introduce much more intensive feeding regimes, and in some areas, also improved animal health care. Experiences in Tigray seem to indicate that the exotic chicken (or hybrids with locals) thrive and produce well. Such egg production may be an opportunity for poor families such as small farms and women headed households. We were told that diseases do not pose great threats to exotic chicken in this area. Since diseases may strike suddenly, and since many areas in Africa have had such bad experiences with exotic chicken, the health issue should be carefully monitored. Precautions to avoid spread of devastating diseases, particularly Newcastle disease, should be considered.

A revival of local bee-keeping is a surprising, but most welcome side-effect of the area-closure programme. Trees and herbs that provide “forage” for bees are again growing on commons around the farm areas. We observe that REST helps farmers taking advantage of this opportunity.

1.5. Credit

REST has established a credit scheme with a capital of 58,9 million birr. Funds are obtained by donations from international partners (21 million birr), contributions from national institutions (23 million birr), and through savings by members of the credit scheme (14,9 million birr). Norwegian Peoples Aid is one of the international donors, but it is not part of the Integrated Rural Development Programme that is supported by the Development Fund. However, the credit scheme is planned eventually to take over funding of many of the current project activities. Last year the credit scheme provided credit for 45 000 farmers. The credit scheme is operating as a body more or less independent on REST.

Farmers take credit with 12.5 percent interest which is 2 percent more than loan in commercial banks. It is, however, impossible for small scale farmers to obtain credit on the terms of the commercial banks. The interest rate in REST credit scheme is decided by Ethiopian authorities. Maximum amount of a loan is 2500 birr, but there are plans to raise this to 5000 birr. There are two types of loans; agricultural input loans which are paid back after harvest 6 months later, and regular loans which are paid back within a one year period. The average recovery rate for the loans has been 97 %.

REST has established credit offices in many small villages. The baito is normally involved in decision on who are credit worthy. The credit groups normally consist of 7 people who mutually guarantee for each other. Every month each member of the credit group pays 2 birr to the group. Innovative member will be the first to receive credit. In addition there is voluntary saving. If individuals deposit money in the credit scheme, they receive an interest rate of 6 percent.

There is a 5 percent deduction from the biggest loan a member takes (group tax). This amount is kept in the group's saving account. 50 percent of the members' contribution will serve as a

collateral for default. The remainder can be used for emergencies subject to consensus decision within the group.

Time did not allow an in-depth study of REST's credit scheme, but it is the opinion of the team that the credit scheme is functioning well. Many beneficiaries are reached in many remote villages, and the credit groups have raised a considerable amount of own capital. It is doubtful that the poorest groups benefit as much as other groups, as the poorest groups are less credit worthy. It can not be expected that a credit scheme partly established on commercial basis will be able to reach the poorest segments of the population. These groups will have to be reached by other means.

The interest rate currently claimed by the credit scheme is probably not enough to cover the real cost of running the scheme. The scheme therefore depends on continuous external support. If the credit scheme is going to be independent on external funding, the interest rate will have to be increased or cost cutting measures will have to be introduced. However, increasing interest rate will make it even more difficult for poor to take credit from the scheme. The team does not know the long-term plans of the credit scheme, but it appears necessary that the credit scheme develops a strategy for becoming more independent on external funding.

1.6. Research & Monitoring

REST established a Research Unit in 1993. The objective is to carry out surveys, and to coordinate specialised research inputs to planning and monitoring. The unit has two professionals, one mathematician with specialisation in computer science, and one graduate from Mekelle Business College with specialisation in statistics.

The unit has facilitated the Baseline Survey of the programme area including socio-economic and farming system studies, and it has started similar baseline

research in Southern Zone woredas which may become future areas of REST operation.

On a regular basis the unit carries out nutritional surveys two times a year and, on ad hoc basis, facilitates specialised studies, involving external experts on particular subject matters, such as crop, livestock, soil, veterinary medicine, etc.

The professional staff of the Research Unit has competence on the design of questionnaires, on systematic data collection, and on statistical processing. Technical competence on subjects of research is provided by other experts in REST or by external experts.

REST also has an Evaluation and Monitoring Unit. That unit studies activities by projects as an internal control. The Research Unit, on the other hand, looks at the situation area-wise in order to provide information about needs, development (change) and impact.

The professionals of the Research Unit have relevant educational background for their assignments. The unit functions as a kind of “central statistics office” providing statistical background data related to REST’s development and relief works. In the absence of official statistics covering these needs, the statistics provided by the unit must be considered useful both for REST, for the local government, and also as information to donors.

1.7. Gender

REST has a Gender and Development Committee concerned with the involvement of women and studies of impact of REST programmes on women. There are problems of recruiting women staff because of general under-representation of female students in the educational system all over Ethiopia. REST is addressing the problem by upgrading junior women staff. Efforts to increase number of female students at Mekelle University College of Dryland Agriculture may help in the future.

1.8. Extension

REST is collaborating with Ministry of Agriculture on agricultural extension. The development agents (DA) train contact farmers which again train follower farmers. This is similar to the World Bank's Training and Visiting System. The weakness with such an approach is that only limited learning takes place. An alternative way of agricultural extension would be through farmers' groups organising testing and development of new approaches to farming. Participants come together and discuss findings and experiences. The role of development agents is to facilitate the process, but not to give precise advice. This allows for better local adaptation of new technology. Such a system of agricultural extension has been introduced with success in other countries. It could be tried in connection with testing of new tillage systems or intensive milk production based on goats.

1.9. Input supply system

The project has assisted in promoting gardening in the area. A wide variety of horticultural crops are currently grown. The project takes the responsibility of providing seeds (bought in Addis). This can cause dependency, and it may be necessary to establish an independent seed supply. The project needs to develop a strategy of phasing out of this activity.

The project sells fruit tree seedlings at a subsidised price. This can be justified at the initial stage of the project for the purpose of introducing fruit production, but also this needs eventually to be phased out. An alternative could be training farmers who could raise fruit tree seedlings for sale.

2. Discussion

2.1. Food security

Food security is improved in areas that have benefited from this project. The agricultural system is becoming more robust and less vulnerability to drought. The following project components have contributed to this improvement:

- * stone-bunds on agricultural land increase retention of water and reduce soil erosion. This increases yields especially in a drought year,
- * area closures now provide a new source of fodder that can be exploited in a difficult year,
- * diversification of agriculture by introduction of gardening (especially sweet potato) makes the area less vulnerable to drought,
- * the credit scheme and the seed banks supply new resources particularly targeted to vulnerable households,
- * the microdams increase supply of water available for irrigation.

However, many families are still very food insecure. This seems especially to be the case with female headed households. These families have no oxen and they need to hire somebody to plough the land. Ox-owners charge up to 75 % of the harvest. Finding alternatives to ox-cultivation could be warranted.

2.2. Food security and the current year of crop failure

A new drought situation has hit parts of Tigray and also most of the other “classical” drought areas of Ethiopia. While many people blame “el nino” and some also discuss whether global heating could have contributed to such adverse variations in climates, we should in the context of this development programme direct attention towards the following fact of life: Precipitation in the drylands of Africa are and has always been extremely unreliable. It is likely to remain so also in the future. Rainfall varies both from year to year and in its distribution within a year. Survival in these areas depends on adaptation to such variations. Basis for traditional coping strategies has been gradually weakened over many decades (reduced farm size, degradation of

the resource base) and people have become more vulnerable, and more dependent on relief assistance whenever a drought situation occurs. One major objective of REST's DF-supported development programme is to reduce vulnerability to drought stress. This difficult year is the time to find out to which degree this has worked.

Activities, such as soil and water conservation both on farmland and on off-farm lands, irrigation, production related programmes on cultivation (quality seeds, crop introductions etc.), and on livestock production, may affect the situation in various ways. In normal years production may increase and thereby improve the economy of the area and facilitate accumulation of economic reserves. In drought stress situations the production system may be more resilient, and more resources (i. a. fodder) may be available from protected non cultivated areas.

Off- and on-farm soil and water conservation has no doubt reduced erosion and gully formation, led to soil accumulation on terrace benches, and thereby improved retention of both nutrients and water. Yields are, in normal years, significantly better on treated lands compared to untreated lands. Furthermore, there are signs of improvement of water regimes; less severe flash floods, prolonged periods with water in ephemeral streams, and higher groundwater tables. The issue now, however, is vulnerability in times of severe drought stress.

Although harvesting was still going on during our field visits, we got the impression that there are variations in yields within drought affected villages. How can we explain that neighbours are differently affected by the drought?

The rainy season normally lasts from June through September. This year the rains stopped after July. We saw fields with severely reduced straw and leaf production and no or almost no grain yields, and fields with seemingly good stands of straw and leaves, but with poor grain filling. A farmer in Mai Kenetal told that he in normal years would plant one donkey-load of barley and harvest ten. This years he expects only four donkey loads from the same land. He explained variations between farms in this way: Since rain stopped early, those who managed to plant first did much better than those who planted late. There are differences according to drought tolerance of crop type, and higher yields on terraced compared to non-terraced fields.

This reflects two basic preconditions for stress tolerance in the production system: (1) The economic status and (2) the technological level of the farm.

Farmers who at the outset are better endowed, are the winners. They have access to ploughing oxen and can exploit the earliest opportunities and get a head start. The poorer farmers have to wait until ploughing oxen can be hired and are generally too late to exploit the rainy season when it is shortened as it was in this year. Has development work during recent years strengthened the economy of the rural areas in such a way that more farmers are in position to exploit early rains? To answer that question it is necessary to carry out an extensive survey. Now we can only make some preliminary assessments. Rural development programmes during recent years have focused on critical constraints to maintenance of the cattle stock (both breeding and fodder), and given priority to poor households, and may have saved some of them from destitution and helped them consolidate their economy. It is reason to believe that this has had an impact on the ability of farmers to cope with this drought. Most probably more farms would have seen complete crop failure if it were not for the development efforts implemented during recent years.

Technology level affects vulnerability to drought stress. Both quality of seeds and measures to conserve soil and water, such as terraces, enhance crop growth under drought stress. This effect was clearly visible many places. It must have helped those farmers who have applied these technology elements.

Development activities during recent years also include construction of microdams and small scale irrigation schemes. With normal rainfall the areas covered can be irrigated continuously and produce three crops a year. This time we saw poor filling of the dams and reduced irrigation opportunities. Still the dams facilitate some irrigation. The presence of those dams is obviously an advantage also in years of drought.

Regeneration of natural vegetation in closed areas has increased standing biomass in extensive areas of communal lands. The contrast to non-protected communal areas which are degraded and almost completely barren, is amazing. In addition to increasing biological productivity of the land, this vegetation also improves infiltration of rainfall and thereby reduces surface run-off and erosion damage on cultivated land below. This year people may benefit from these areas as source of fodder. They will harvest grass for feed to their livestock. Although this will not be enough to carry the entire stock

through to the next rainy season, it will compensate for some of the losses of pastures and crop residues and therefore reduce the fodder crisis. Earlier drought disasters have always lead to severe loss of livestock which in turn has become a major constraint to post drought recovery.

Our overall impression may be summed up in two conclusions: (1) The development programme that has been implemented during recent years works in the sense that it contributes to environmental rehabilitation and to reduced vulnerability to drought, and (2) In spite of impressive achievements so far, much more remains to be done.

Is it at all realistic to expect the area to become food self sufficient and able to cope with drought situations like the one of this year?

Considering the experiences so far, our response to this question would be yes. This, however, must be achieved primarily through strengthening of the economy through production during normal years and through other economic activities. With soil and water conservation treatments of all vulnerable lands, with increased yields from crops and livestock, and with increased biomass in communal lands, all of this achieved during normal years, the area will become more robust in terms of economic strength and ecological resilience. Occasional droughts will reduce yields also in the future, but not as much as before implementation of such improvements, and people's capacity to cope with such situations will be better.

2.3. The tillage system

Traditionally the soil in northern Ethiopia is tilled by the use of oxen. However, as a wealth ranking experienced in the REST project area revealed, many households, particularly many female headed households, have no oxen. These are also the poorest households. Many of them only have chicken. To get their land ploughed, they need to hire a pair of oxen and the man who ploughs get a share of the harvest. The share of the ox-owner varies between regions, but it is common that when the ox-owner both provides seeds and oxen, he will charge 75 % of the harvest. The ox-owner will in addition take the straw. However, as Fekadu Wondimagegn from Mekelle University College writes in the

proceedings “Rural exploratory studies in the central zone of Tigray, Northern, Ethiopia”, the land can also be prepared by the use of hoe, but farmers do not even consider using the hoe. There are a number of problems with the current ox-ploughing system:

- farmers have to pay a high share of the harvest to the ox-owner,
- oxen are kept for ploughing and threshing and for small scale farmers it is expensive to keep animals only for those purposes,
- fodder resources are scarce and it may be better to use those resources for more productive animals, such as milking goats, or for fattening of goats and sheep.

Cultivation by hoe has the following advantages:

- the cultivators will keep all the harvest for themselves,
- they will also keep the straw and can feed it to their own livestock,
- avoiding delay of cultivation by waiting for ox-ploughers who give priority to their own fields, (earlier planting and less exposure of bare soil (cause of erosion) early in the rainy season),
- ploughing generally makes the soil more susceptible to soil erosion,
- the scarce fodder resources can be reserved for more productive animals,
- adoption of technology which can increase yield will be more attractive when cultivators retain all the harvest for themselves.

Labour requirement is a bottleneck with regard to the introduction of hoe cultivation in Ethiopia. Another problem can be weeds.

Introduction of cultivation by hoe may challenge the current power relation in rural Ethiopia. The current system gives the oxen owner a very strong position in the society by being

able to claim a high share of the harvest. This is only possible because there are no known alternatives to oxen cultivation. Introducing cultivation by hoe could also have the effect that ox-owners will have to reduce the share they can claim because that there are alternatives to their service. Interest rates have been reduced from above 100 % before the introduction for the credit scheme to between 30-50 % after the introduction of the credit scheme.

In the past, when land holdings were bigger, population density lower, and when there were few female headed households, and fodder resources were more easily available, ox-ploughing became universally adopted as basic technology element in the cultivation system. Now many households are unable to have their own oxen, but their farms are so small, less than 0,5 haa on average in Tigray, that cultivation by hoe is possible. Hoe cultivation of this size of land is common in other parts of Africa.

The use of hoe or other tillage methods, such as ploughing with cows or donkeys, could be tested with female headed households who do not have access to oxen. These female headed households could be invited to experiment with hoe cultivation on a part of their land. This testing should preferably be undertaken by a group of female headed household who could come together for discussion and sharing of experiences.

Hoe cultivation is better adapted to pulses and cereals crops such as sorghum, maize, barley and wheat, but is less suitable for teff, because this crop requires more tillage of the soil. Planting in rows instead of broadcasting may be recommended in connection with hoe tillage. This will be an advantage, because crops sown in rows are generally less vulnerable to drought compared to crops sown by broadcasting.

Appendix 1: Itinerary

Sunday 12 October	Arrival in Mekelle (from review mission in Rama, Central Tigray).
Monday 13 October	Morning hr.: Received in REST Headquarters by Ato Fisseha Girmay, Head of Planning, and by Ato Kedir Mohammed, Agr. Development Agronomist, and Ato Tsehaye, Head of Soil Conservation. After introductory meeting and discussions the day was used mainly for reviewing documents. TB also had a meeting with Ato Amir Said from Research unit.
Tuesday 14 October	Started on field trip early in the morning. Accompanied by Ato Fisseha, Ato Tsehaye and Ato Kedir. Drove the Tembien road and stopped at Hagera Selam, Keih Tekle, and Mai Kenetal. During the day we saw plots of area closure, enriched grazing land, and discussed/saw local activities such as rural credit, reafforestation, livestock, water supply, river diversions for irrigation, fruit tree and vegetable plantations, and root crops distribution. Spent the night in Adwa.
Wednesday 15 October	Spent the day in and around Mai Kenetal and returned to Adwa at night. Saw and discussed activities related to the entire development programme and interviewed local REST staff and farmers. Also visited sites where dam building was going on.
Thursday 16 October	Drove from Adwa through Enticho and saw various programme activities on the way, at some places including long walk to reach the villages. Returned to Mekelle in the evening.
Friday 17 October	Spent the day at REST Headquarters. Discussions with REST staff. Meeting for discussion of findings and impression in the afternoon. At that meeting the Director of Rest, Ato Tekleweini and Heads of the various units within REST were present.
Saturday 18	OctoberEnd of field work. Jens Aune started on another assignment. Trygve Berg left next morning for Addis Ababa.



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TERMS OF REFERENCE FOR THE REVIEW OF THE AGRICULTURAL REHABILITATION PROJECT OF REST IN TIGRAY AND THE RESEARCH UNIT OF REST

1. Background - Project objectives

The Development Funds (DF), Integrated Agricultural Development Programme in Tigray, is implemented by the Relief Society of Tigray (REST). The project has as the main objective to increase the food security situation and to rehabilitate the natural resource base and became an integrated project in 1993, when several projects were merged into one. The components funded by the DF were then terracing, bull-servicing and seed banks. However the Programme receives funding from a range of international NGOs for similar and other complementing components. In the later years the DF-funded project has been expanded with additional components such as the construction of micro-dams for irrigation and road construction and in 1996 also bee-production and a pilot to develop a milk-production scheme.

The Development Fund has also supported REST in institution strengthening through supporting training opportunities for REST staff and support to baseline and nutrition surveys.

The project management has the recent years reported that the food security situation has improved in the area, the need for food-aid reduced and out-migration has decreased as a result of the improved situation. However, the project management state that there is a need to obtain a more systematic approach in order to assess the impact on the food security situation.

REST is currently developing a strategy on how the different components and activities can become self-sustained and sustainable both in a financial and institutional way. Regarding local institutions, REST wishes build on the local Baito-structure, in addition to develop smaller groups or institutions which have responsibility for the implementation and maintenance of different specified activities. Further REST is examining the option of making the financial management of the projects gradually become the responsibility of the local Credit-Institutions (one of the donors for this project is the Norwegian People's Aid). These Credit-Institutions is thought to eventually become independent credit-institutions, detached from REST.

In 1996 REST established a research unit (funded through a separate project by NORAD in 1997) with the responsibility to undertake base-line surveys and applied research in the project areas. Due to personnel constraints and unclear objectives the progress of the research unit has been slow. The funding of the research unit was in 1997 therefore reduced and Noragric recommended that a review look into the organisation and management of the unit, the overall objectives and potential for collaboration with other research institutions could be developed as complementary to the REST unit.

2. Project Review

Noragric participated with specialised personnel in two evaluations of the projects seed bank component in 1992 and in 1996. However, Noragric has never undertaken an overall review of the project, with all its components, the institutional set-up and the strategies for phasing out external assistance. It has therefore been proposed that such a review be undertaken during Autumn 1997.

3. Issues to be covered

The more detailed issues to be covered would be :

Food security activities

A review of the different activities implemented to improve the food security situation should be undertaken, such as improved agricultural technology, terracing, micro-dams and irrigation, seed and ox-bank.

The rationale and implementation of the recently introduced activities such as bee-hives and milk-production should be assessed.

A discussion on how to assist in improving the assessment of the impact the project activities on food security situation should be done.

Environmental Rehabilitation

A review of the tree-planting, nurseries and terracing activities should be given.

The enclosure areas and the improved fodder areas should be reviewed.

An evaluation of the private nurseries have been undertaken in 1997. The main conclusions and required follow-up should be reviewed.

Focus on Gender

The Programme's focus on gender and the approach chosen on how to reach women in Tigray should be reviewed

Credit systems

A review of the credit systems currently implemented in the IADP should be assessed, this goes for both the seed bank, ox bank and other credit facilities within the project.

Project management and Phasing Out Strategies

The team should obtain an overview of the organisation and management of the IADP, its collaboration with local authorities and the Mekelle Dryland College.

The team should also review the current, Planning and Reporting, Monitoring and Evaluation as well as impact assessment systems.

A review should be done of RESTs strategy for developing self-sustained and sustainable institutions and activities. The connection to RESTs Credit-Programme for this purpose should be discussed. A review of the phasing-out strategy of the project should be undertaken.

RESTs research unit

Noragric should review the organisation and management of the unit, the overall objectives and potential for collaboration with other research institutions could be developed as complementary to the REST unit.

A discussion and clarification of the roles and objectives for the REST research unit has should be done.

4. Scope and methodology

The team will review relevant background documentation such as annual reports and the evaluation report. During its field visit it will discuss with core project staff, the local population and the local authorities.

5. Composition of team

The team will comprise :

Trygve Berg (Team leader)

Jens Aune

Aragay Waktola

6. Timing and deadlines of review work

The field visit will take place in the period 13th October to the 18th October 1997. A debriefing of the teams main conclusions will take place with the project staff before the departure.

The team will write a short report from the review which will be submitted to the Development Fund and REST for comments before final submission to NORAD.

Best regards



Sidsel Grimstad
SSE-Coordinator

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