

National Soil and Water Conservation Programme

Kenya

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Resources and the
Environment**

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**Sida Evaluation 96/25
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Appendix A

Term of Reference

Acronyms

A in A	Appropriation in Aid
AEZ	Agro-ecological zone
AIE	Authority to incur expenditure
ASAL	Arid and Semi-Arid Lands
CC	Catchment Committee
DAO	District Agricultural Officer
DAREP	Drylands Agricultural Research and Extension Programme
DPT	Divisional Planning Team
DSCO	District Soil Conservation Officer
DivSCO	Divisional Soil Conservation Officer
FEW	Frontline Extension Worker: Technical Assistant, MoALDM
FEP	Fertilizer Extension Project
FURP	Fertilizer Utilization Research Project
FYM	Farm Yard Manure
GoK	Government of Kenya
GTZ	Gesellschaft für Technische Zusammenarbeit
HH	Household
HQ	Headquarters
IFAD	International Fund for Agricultural Development
IIED	International Institute for Environment and Development
KARI	Kenya Agricultural Research Institute
KEFRI	Kenya Forestry Research Institute
KENGO	Kenya Energy and Environment Organisation
KWAP	Kenya Woodfuel and Agroforestry Programme (NGO)
LH	Lower Highland (AEZ)
LM	Lower Midland (AEZ)
LTP	Land Treatment Plan (for a catchment)
MENR	Ministry of Environment and Natural Resources
MIDP	Machakos Integrated Development Programme
MoALDM	Ministry of Agriculture, Livestock Development and Marketing
MLRRWD	Ministry of Land Reclamation, Regional and Water Development
MoPW	Ministry of Public Works
NARL	National Agricultural Research Laboratories
NEAP	National Environmental Action Plan
NEP	National Extension Programme
NGO	Non Governmental Organisation
ODI	Overseas Development Institute, London
PDA	Provincial Director of Agriculture
PRA	Participatory Rural Appraisal
PSCO	Provincial Soil Conservation Officer
NGO	Non-Governmental Agency
NSWCB	National Soil and Water Conservation Branch
RBDA	River Basin Development Authority
RRA	Rapid Rural Appraisal
RSCU	Regional Soil Conservation Unit
SCA	Soil Conservation Assistant
Sida	Swedish International Development Cooperation Agency
SIDA	Swedish International Development Agency (former name)
SMS	Subject Matter Specialist (within MoALDM)
SWC	Soil and Water Conservation
SWCB	Soil and Water Conservation Branch, MoALDM
TA	Technical Assistance
TARDA	Tana and Athi River Development Authority

TOR	Terms of Reference
T & V	Training and Visit extension method
UM	Upper Midland (AEZ)

Currencies

K£	Kenya Pound (= Ksh 20)
Ksh	Kenya shilling
SEK	Swedish Kroner

Average exchange rates for December 1995 were as follows:

US\$1 = SEK 6.63

US\$1 = Ksh 55.8

SEK 1 = Ksh 8.4 approximately

Executive Summary

Historical background

The National Soil and Water Conservation Programme began on an experimental basis in pilot areas in 1974. It spread to Divisions within the high potential areas of Kenya, leaving the semi-arid and arid lands (ASALs) mainly to special district integrated development programmes. Initially it worked through the normal frontline agricultural extension worker, but when a Training and Visit extension system (T&V) was introduced in the mid-1980s, relegating soil and conservation to a very minor place, the programme developed a Catchment approach, working in selected catchments through a Divisional Soil Conservation Officer (DivSCO) and two frontline workers given special training and allowances as Soil Conservation Assistants (SCAs). At the same time it introduced a more participatory approach, working with and through an elected Catchment Committee, and giving farmers more choice in conservation methods. The Catchment approach meant a substantial increase in staffing and costs. These were again increased in 1992, when the programme expanded to take over soil conservation work in the ASALs, as the integrated District programmes had terminated. It now has officers in all divisions of all districts. The programme has had frequent and favourable evaluations, the one preceding the present one being in 1992, which signalled a re-orientation towards a more comprehensive land husbandry approach, including improvements to soil productivity as well as soil and water conservation.

District findings

The 1996 Evaluation Team visited 18 catchments in 6 Districts, covering a range of agro-ecological situations and with varying population density and land scarcity (Table 2.4). Half were worked on 3-4 years earlier, and half in the last 1-2 years. We found catchments tended to be clustered near each other and near to roads. In most catchments conservation work had been carried out to a good standard, and in most older catchments the farmers had maintained or increased improvements initiated at the time of catchment work. However in areas of low population density, with free grazing, improvements such as fanya juu, trashlines and grass strips disappeared after very few years (e.g. parts of Kilifi and Baringo - Table 2.5). Disposal of excess water from roads and non-farm areas remained a major problem, although some farmers were harvesting the runoff. In general, the quality of conservation was higher in AEZ 4 (semi-arid) in Embu than in Kilifi, Siaya and Baringo districts, and higher in AEZ 2-3 (high potential farming areas) in Embu than in Baringo, Vihiga and Siaya. We took Embu to be typical of the very intensive, commercialised farming of the densely populated areas of Eastern and Central Provinces. The high potential areas of western Kenya are equally densely populated, but farming is less intensive, with more reliance on off-farm income earned by men (and some women) who are often working far from their families. This results in less concern for soil improvement.

Despite conservation efforts, declining soil fertility remained a problem particularly since farmers are less able to buy inorganic fertiliser due to disrupted marketing in the last few years. Farmers use many and various means of maintaining fertility, which may not be fully appreciated by staff. Most farmers make substantial use of manure, particularly in high density areas where cattle are zero-grazed. However, often the manure supply is insufficient. While manure, compost, tree litter etc are important for soil structure and some nutrients, many Kenyan soils are phosphorus-deficient. Phosphorus can only be concentrated to a limited extent, at the cost of substantial labour input, from vegetative matter and manure which derive from phosphorus deficient soils. Many farmers therefore use inorganic fertilisers when they can afford it, but it was very worrying to find that in some areas local extension messages were completely inadequate, recommending types of fertiliser which on the local soils could lead to increased N-deficiency and acidification, and associated P-fixation. It was found that in most catchments SWCP staff had recommended increased use of manure, fertiliser and compost, but the fertiliser recommendation was not specific. Farmer problems, farmer methods, extension recommendations and research recommendations are compared and contrasted in Table 2-3.

Although there was a strong farmer interest in trees on their own farms, communally managed catchment nurseries were generally poor.

It was difficult to estimate farmer costs. Estimates from data given to us by farmers and by research at Embu suggest a range of K£180 - K£300 per hectare for fanya juu, depending on soil conditions and slope, and K£50

per hectare for grass strips. This includes their labour costs. Almost all farmers interviewed, male and female, appeared convinced of substantial benefit from their soil conservation and improvement work, in terms of higher output and higher cash receipts. This was particularly the case when the measures had enabled the introduction of a new crop, such as napier (for sale, or used to generate increased income from milk).

Training and educative programmes had generally been fulfilled as planned, and in the few cases that we could test, had enabled those attending to improve their work or their farm. Most farmers met had attended, and enjoyed field days. Committee members had good recollection of what they had learnt. In most areas women were taking an active role on the Committees, often being Secretary or Treasurer, but there were some exceptions, particularly in larger catchments and areas with larger farms.

The Participatory Rural Appraisal approach had not been used on the catchments we visited, though the more recent ones appeared to have been launched with some form of local problem review, a public meeting, and a committee election. Officers who had participated in PRAs had found the experience very useful and educative.

The District planning, monitoring and management system appeared generally to be functioning well. A common fault was the absence of follow-up after catchment work was terminated. What had been achieved was not recorded in the catchment book, and in most places, there was not a proper handover to the local frontline worker. However, some Districts recognised this to be important, and took steps to involve the FEW in the work. Total District budget cost to government per hectare conserved in 1994/5 varied from a high of K£215 in Baringo to a low of K£49 in Vihiga (Table 2.6). District Officers everywhere reported transport maintenance and the age of motor-cycles to be major problems.

Generally, co-ordination with other members of the Ministry was poor, even where other specialists, such as Livestock Production Officers, could usefully have been involved. Strangely, it was often better with Forestry, and with local NGOs, than with Ministry colleagues. However, the District Agricultural Officer was generally supportive; in many cases the SWC budget forms an important percentage of the total resources available to his staff. This leads to some tensions. Co-ordination with Ministry of Public Works over roads and with the Water Engineer over water development appeared to be absent or problematic. Road run-off onto farms, and road gullying, remain a serious problem which was infrequently mentioned in catchment reports, yet, as the Clerk to Embu County Council observed: "Our soil and water go by road to the river".

National performance 1992/95

Kenya has been reviewing its agricultural policy but soil and water conservation and the improvement of soil fertility are still regarded as fundamental. Sida remains supportive of natural resource sustainability, and poverty alleviation, through integrated, participative, area-focused programmes.

In view of the long continuance of the programme it is necessary to try to ascertain the proportion of farms that have already been touched by the programme. This exercise was initiated by Branch headquarters in 1995, but not completed. Nevertheless, the SWCB's own figures, which need refinement, suggest less than 10 years work remains in many Districts. The economic value of conservation, and growing land scarcity, mean that many farmers are undertaking conservation completely on their own initiative. In some Districts we visited the DSCO also estimated that some 60% of necessary conservation had been done, particularly in high potential areas. There are still knowledge gaps and requirements for water conservation, particularly in ASALs, and for soil productivity improvement generally.

During the review period headquarters staff were slightly reduced from 12 to 10, but DSCOs increased from 47 to 55, DivSCOs from 220 to 280 and SCAs from 445 to 570. This was partly because of expansion into ASAL areas, but also because of the creation of new Districts and Divisions. Reporting of training activities did not adequately differentiate between key persons such as staff and catchment committee members, and others, and in 1994/5 the introduction of separate reporting of the numbers of women attending District courses and field days led to some confused numbers. Nevertheless, it seems in general that planned training activities achieved their target numbers, and that women farmers were well represented.

Participatory Rural Appraisals held are not reported in national Annual Reports.

In 4 sampled provinces only 35% of motor cycles were operational. The position is also bad for vehicles, although figures are not available.

While routine planning and monitoring was mainly well carried out, the examples given on PRA and training show that the relatively new activities associated with catchment planning and the participation of the community have not been integrated into routine formats. The heavy burden of headquarters touring involved in the present system of technical and financial monitoring as well as being costly in transport and allowances, (see below), affected ability to reflect on strategic objectives. Preparations for the next planning phase were made without adequate consideration of resource constraints.

The evaluators were unable to carry out a national cost-benefit analysis because of the continued lack of an adequate system of impact monitoring, to ascertain farmers costs and benefits in different agro-ecological zones, already noted by previous evaluations. Analysis is also hampered because there are other actors in land improvement besides the programme. However, most available evidence suggest strongly positive returns to the farmer and probably to society (Table 3.17). Quantitative data on soil loss and erosion trends is likewise unavailable.

On the government cost side it is noteworthy that in real terms money available for operating costs declined by 32% between 1992/3 and 1994/5, mainly due to inflation and exchange rate changes. Sida continues to provide 95% of operating costs. The GoK contribution comes mainly in the form of staff salary costs and office accommodation, which in 1994/5 were estimated to represent about 48% of total costs. The total budget, including these GoK costs, amounted to K£11,015,000 for 1995/6 (Table 3.15). Within operating costs, it is notable that transport costs and staff allowances for duty travel have risen from 29% to 35% during the period (Table 3.16). The Branch is to be congratulated on the way in which it has improved efficiency and maintained its programme despite the substantial fall in its budget in real terms.

Conclusions and policy recommendations

The evaluation team feel that a reasonable strategic objective for a programme that has received aid over twenty years is to become sustainable from national human and financial resources. This is all the more necessary given the policy climate affecting donors. The economic situation of Kenya means that only a smaller programme could be sustained from internal resources. However, since the Branch has already attained a large part of its objectives, and has built up skilled staff and a favourable climate amongst opinion leaders, its programme can be reduced while still attaining priority objectives. It is recommended that Swedish aid be phased out over 5 - 7 years, to give time for the necessary reorientation.

This reorientation must be based on rigorous prioritisation of activities, according to needs assessment for specific areas and specific activities. It is recommended that in the high potential areas where more than 60% of farms already have conservation measures, the Branch switches to a focal area approach in conjunction with other specialist officers of the MoALDM and other Ministries, as this is a more appropriate way of tackling land husbandry as part of the farmer's total farming system and needs. In lower potential areas with a settled and expanding farm population, the catchment approach should be retained, with modifications. In low population density areas where fallows are long and domestic livestock are not confined, improvements are short-lived, and the programme should be withdrawn until such time as farming systems change. It should also be withdrawn from pastoral areas where costs are high, and sound technologies are not well established. Detailed recommendations follow on the functioning of various elements in the programme under this changed strategy. It is argued that the revised strategy will be in line with Sida's poverty focus, its participatory requirements and its focus on local development in specific areas. It is also in line with GoK's policy of cost sharing and increased reliance on self-help. It is also argued that the Branch is already sufficiently conscious of gender issues where these affect the programme, and that Kenyan women have a better educational level and a higher status than in other parts of east Africa, which enables them to take good advantage of the programme.

1 The National Soil and Water Conservation Programme, 1974-1992

1.1 The development of the programme

Soil conservation was a major concern of the colonial agricultural service. Its forceful implementation made it unpopular, and many farmers abandoned it in the run up to independence. While soil conservation remained on the agenda of Agricultural Officers at District level and of the then inadequately educated Technical Assistants and Junior Technical Assistants* or Frontline Extension Workers (FEWs) operating at Locational level, the main priority of the Ministry of Agriculture became the resettlement of former white farms. In the early 1970s the Government of Kenya (GoK) became again concerned with the issue and, as a result, Sida agreed to provide both technical assistance (TA) and finance.

Dr. Carl Wenner was appointed as Senior Adviser in the Ministry of Agriculture in 1974. He carried out studies in four pilot areas in 1975, where farmers had continued with terracing under their own initiative, in order to find acceptable and appropriate technologies for extension elsewhere. In 1977 President Kenyatta declared soil conservation should start in 30 Districts, Sida having promised to make a tenfold increase in its funding (Eriksson, 1992). In preparation, Swedish TA was increased within the Ministry of Agriculture and there was a massive training programme, which by 1979 had reached 325 officers and 1279 FEWs (SIDA, 1979). A major achievement of lasting influence was the preparation of a soil conservation manual which is only now being updated. While this emphasised *fanya juu* terraces (in which the soil excavated from a ditch is thrown uphill, forming a bench over time) and cut-offs, it also contained reference to biological measures. By this time the Soil Conservation Branch was operating in 6 provinces and 33 Districts (not all funded by Sida). The 1979 Evaluation recommended the appointment of District Soil Conservation Officers (DSCOs) since the officer then responsible, the District Land and Farm Management Officer, was becoming overloaded. The programme then operated by holding barazas and paying for works on 'demonstration farms' to which others were invited in 1 - 10 pilot areas per district. It also paid labourers to dig cut-off drains, since it was felt that this was of communal rather than private benefit, and also created employment. Tools were distributed as an incentive to conserve. Swedish support was directed to Agro-ecological Zones (AEZ) 1-3 as the main productive agricultural areas. The programme had made a District by District assessment of farms and hectares needing conservation, and it was anticipated that at least eight years was needed to achieve a good conservation standard. At this stage the programme was operating through the normal extension channels of the Ministry and the general FEW. In 1981/2 the Soil Conservation Programme was transferred from Project Management and Evaluation Division to Land Resources Development Division and became the Soil and Water Conservation Branch (SWCB). Sweden provided SEK 5 million in that year and in addition, the cost of Swedish experts.

During the 1970s Kenya was afflicted by a series of droughts which refocused attention on the drought-prone areas, and other donors began to come in to support integrated programmes in what became known as the ASALs (Arid and Semi-Arid Lands). The first of these was the Machakos Integrated Development Project (MIDP) in 1978, supported by the European Economic Community, soon followed by other similar District programmes. Already by 1982 these were operating in parts of Kitui, Baringo and Narok supported by various donors while others were in an advanced planning stage (SIDA, 1982). Most of these included a soil conservation component. In 1981 the Permanent Presidential Commission on Soil Conservation and Afforestation was established, giving new political emphasis and propaganda support. The droughts created a need for food-for-work programmes, managed in many cases through the Churches and also bringing in a host of other NGOs. Quite few of these programmes were also directed to soil conservation. The droughts also revitalised farmers' own interest in water conservation, which is an important benefit of the *fanya juu* type of terrace. Two aerial surveys in Machakos District, in 1981 and 1985, showed an average increase per year of 8,500 km of terraces, of which about 18% had had Sida support (in the high potential northern part of the District), about 24% had

* These staff will be referred to in this Report as Front-line Extension Workers, FEWs, in order to distinguish them from expatriate Technical Assistance (TA).

had support from MIDP, and 13% had had support from the Catholic Diocese (Tiffen et al. 1994: 197-8). Most of the remaining 45% had been carried out by farmers from their own resources, without the support of advice, payments, or tools.

This shows the difficulty of evaluating the specific benefit of the Sida funded elements in the programme. There are many actors in soil conservation, including the farmers themselves, and it is impossible to separate out the contribution of each. The training of chiefs and other important leaders whose support is needed at location level, the training of teachers and support to youth activities, were incorporated early into the programme, and have created a widespread awareness of the importance of soil and water conservation. The diffused effect of this has undoubtedly been great, but almost impossible to quantify.

The 1982 evaluation recommended that Sida support be moved out of the areas where ASAL programmes were operating, although the Branch itself remained responsible for the training of agricultural staff, attempting geographical coordination, and giving some guidance on technical matters while watching the results of the experimental methodologies undertaken in the different ASAL districts.

The Joint Kenya-Sweden Review Mission (1985) noted that the introduction of the T & V system of extension under World Bank support to the MoALDM had created a major change in its operating environment. Previously, a major part of the work of FEWs had been soil and water conservation. Under the new system soil and water conservation was initially omitted from the tight round of activities each FEW was to undertake over a fortnight: it was later incorporated as a small element. The FEW operated through a round of visits to 'contact farmers' who were supposed to have followers.

The Branch countered the deficiencies of T & V by developing the Catchment Approach, which was inaugurated in 1987/8. Features were concentration on specific catchments in each Division, mobilisation of the community through a Baraza (public meeting) and the appointment of a Catchment Committee to cooperate with staff. The approach remained initially top-down but this changed over time. The 1988 review recommended the addition of Rapid Rural Appraisal techniques, the better to identify farmer problems, and the election of committees. Methods of Rapid Rural Appraisal (RRA) were introduced to identify the local farming system and local needs, and, after 1991, with guidance from IIED, Participatory Rural Appraisal (PRA), in order to involve the community still more fully. The Branch became committed to an approach which emphasised the farmers' right to choose their preferred methods of conservation. RRA also introduced the simplification of farm plans to a simple sketch, in preference to the use of topographical maps.

The 1985 report also made the first mention of the need to improve the cut-off element in the programme, where payments had led to the digging of drains, sometimes carelessly, in inappropriate places. These payments were ended in the late 1980s in most districts.

The Joint Kenya-Sweden Review Mission (1988) recommended the doubling of Headquarters staff to 13. The Catchment approach led to the need to staff all operational Divisions with a DivSCO, supported by two FEWs given special training and withdrawn from normal duties. These will be referred to as Soil Conservation Assistants (SCAs), who together with the DivSCO form the Divisional Planning Team (DPT) responsible for work in three catchments per year. The reporting and monitoring system was further tightened, so that the adherence to Annual Work Plans built up from the Divisional to the National level could be closely supervised. As most of the ASAL programmes had by then halted, the Branch also took complete charge of work there, starting in the 1992-3 financial year. The result was an expansion of staff directly involved in the Branch to the present level of over 900, as reported in Chapter 3, and a substantial rise in its funding from both Sida and GoK sources.

1.2 The organisation of the Report

1.2.1 Terms of Reference

The terms of reference were very comprehensive but were summarised as follows:

"The purpose of the evaluation is to assess the effectiveness and relevance of the National Soil and Water Conservation Programme in the context of the agricultural systems of the country, the production trends, the environmental situation as well as agricultural policy and organisational set-up within MoALDM.

On the basis of the evaluation the mission shall also appraise the tentative proposal for future activities prepared by the SWCB."

1.2.2 The methodology adopted

The Overseas Development Institute (ODI) proposed to do this by two main methods:

An analysis of documentation available at the Sida headquarters in Stockholm and at the National Soil and Water Conservation Branch headquarters in Nairobi to review the history of the programme and particularly its performance since 1992, in conjunction with interviews with the headquarters staff.

Visits to five sample Districts for discussions with the District and Divisional officers responsible for implementation on the ground, with the District Agricultural Officer and his other staff responsible for the overall agricultural development within the District and with the staff of other Ministries or organisations with whom the SWCB cooperated in carrying out its mandate.

Within each District the team would visit catchments where the Branch had worked in the past few years, in order to make observations and to interview farmers on the impact of its work.

As shown in Chapter 2, on arrival this programme was modified to include visits to 6 districts.

After returning to Nairobi the team summarised the results of the District surveys. These are recorded in Chapter 2, together with the main implications that the team derived from them. The team then completed its survey of the national documentation on activities throughout Kenya provided by the Branch from its excellent system of monitoring and reporting progress, and through its planning and other workshops. The Branch also provided the evaluations carried out on components of its programme which it had commissioned in order to develop its own planning. The results of this study are set out in Chapter 3. The document "Future Perspectives of the National Soil and Water Programme: A Concept Paper", and the report of a Planning Workshop held in November 1995 set out the Branch's vision of its future, with supporting arguments. This vision is reviewed in Chapter 4, against the background of the national economic situation and the policies of the aid agencies giving support to Kenya. As a result the team came up with an alternative strategy aimed at making the work of the Branch affordable from Kenyan resources within 5 - 7 years, while still achieving its mandate of conserving the soil and water on which so much of Kenya's prosperity depends. This alternative vision is set out in Chapter 4, for the consideration of the Branch and of Sida.

2 Performance in sample districts

2.1 The District sample and the socio-economic background

2.1.1 Purpose of the District sample

ODI proposed to carry out the study of the impact of the programme through investigations in 5 Districts, to cover different agro-ecological zones, and different farming and marketing systems. The Branch had tentatively selected 5 districts. While Embu had been selected as a good performing District with both high potential and ASAL areas, the other 4 districts had been chosen because of special problems to which the Branch was seeking answers. These were:

- Kilifi - a poorly performing district with tenurial and socio-cultural problems
- Baringo - mainly ASAL, but with 3 poor rainy seasons per year, where there had been a variety of projects and programmes and problems of coordinating policies and actions
- Uasin Gishu - a former white settled area where large-scale farms had been subdivided and fertility was believed to be falling
- Siaya - a poorly performing District with socio-cultural problems, and where there had also been financial mismanagement.

The team felt there was a danger that this sample might not do justice to the Branch's performance in those areas where most of the population live. It was therefore agreed to add

- Vihiga - a densely settled Western district which would contrast in some respects to the high potential areas of Embu.

To make time for this, it was agreed that the team would divide, with 2 members visiting Siaya for 1 day and 3 going to Uasin Gishu for 1 day. Investigations in these two districts were therefore necessarily briefer than in the other 4 districts where 4 or 5 team members were able to spend 2 days each.

In each Province, the team asked the Provincial Director of Agriculture (PDA) and the Provincial Soil Conservation Officer (PSCO) to rank the 4 principal Districts being visited, in terms of agricultural potential and conservation performance. The results were as follows:

- Kilifi - middle ranking amongst Coastal Province Districts on both productivity and conservation performance.
- Embu - of the present 11 Districts, Embu ranked second in productivity to Meru, and around fifth in terms of soil conservation, being behind the four Ukambani districts.
- Baringo - in terms of performance, its ASAL areas are doing quite well compared with ASAL areas of other districts - and most of Rift Valley is ASAL.
- Vihiga - possibly slightly below average, being behind Bungoma and Busia, somewhat below Kakamega, but better than Mount Elgon.

In each District, the team endeavoured to visit two catchments in the high potential areas, and two in ASAL. Usually, one of each pair was worked on in 1991/2 or 1992/3, the aim being to see whether the measures promoted had been abandoned, maintained or expanded by the farmers. We also enquired into the costs and benefits that the farmer had experienced. The second in each pair was one of the catchments planned for 1995/6. Here, the objective was partly to see what an untreated catchment in the same ecological area looked like, in order to see, by comparison with treated ones, the difference that the programme had made. We also tried to note if the choice seemed justified in terms of need, or whether the programme was now working in areas where the intensive concentration of resources implied by the catchment approach was no longer justified. We examined whether the DPT was by 1995/6 making a different approach to communities, using more participative methods

in preparation, and emphasising cultural as well as structural methods of soil conservation, as recommended in the 1992 evaluation.

Table 2.1 shows the selected Districts, Divisions, and Locations, their agro-ecological zone, their population density, the catchments visited and the year. District teams had sometimes made arrangements for visits to certain catchments. Where possible we substituted catchments which met our criteria, but we accepted the planned visits if notice of cancellation could not be given to staff and committees.

2.1.2 Limitations to the sample and to the visits

Table 2.1 illustrates that we did not visit the densely populated and intensively farmed Central Province. We have to take the high potential areas of Embu as being representative of these areas. Neither did we visit Districts which are mainly pastoral. The ASAL areas seen were mainly in AEZ 4, or the better parts of AEZ 5. However, in Kilifi, lower Embu and parts of Baringo we were able to see the difficulties of the programme in areas with a low population density, an orientation towards livestock, and free range grazing. The Kilifi population density figures in Table 2-2 are deceptive, as divisions have areas of very high population near the coast, but low densities inland.

It will also be appreciated that in 1 or 2 day visits to Districts, in which at least half a day was taken up by visits to Provincial and District Officers, we only had time to spend a maximum of 2 and a minimum of .5 hours actually in the catchment. We gave most time to the older catchments. Travel, visits to Divisional staff and research institutions and the lunch for the team and staff kindly arranged on one of the days accounted for the rest of the time. To maximise the usefulness of limited time, the team generally split after a brief introductory ceremony in each catchment. Mary Tiffen interviewed some Committee members and talked to some adjacent farmers. As Committee members tended to be amongst the most innovative and sometimes largest farmers, Francis Gichuki, Ray Purcell and Charles Gachene took short transects in different directions, to make observations and to interview farmers at random. John Gatheru interviewed staff, teachers and farmers to obtain information on the dissemination of information and the impact of training courses. We acknowledge that the sample seen was small, insufficiently randomised, and that the interviews, in which we often needed staff as interpreters, were likely to be biased towards what farmers perceived as the kind of answer staff would appreciate. Our observations are impressionistic, but as each of us was bringing in considerable experience, we nevertheless feel we were able to derive something of value from them.

2.1.3 Effects of changes in the marketing environment, 1992-6, on soil and water conservation

The period under review covers the beginning of liberalisation and increasing difficulties in some of the parastatals formerly responsible for marketing. This has affected the incentives and activities of farmers.

- **Inputs** The price of fertiliser and fuel have risen substantially. Farmers are showing a tendency to reduce fertiliser inputs and to increase their use of manure and compost. Farmers accustomed to using tractors in Uasin Gishu are at least considering reducing crop activities in favour of livestock enterprises.
- **Maize and other food crops** Liberalisation means that maize flows more easily between areas with comparative advantage in its production to urban consumers and agricultural areas that specialise on other crops. Its price is strongly affected by weather conditions, being generally high in 1993 when harvests were very poor, and falling thereafter. Because of cheaper maize, farmers in Embu are purchasing more, and growing more beans, for which the price has risen. Uasin Gishu represents Districts which normally provide a surplus for sale to other districts. This is still the case, but as noted, maize is becoming less attractive. Farmers know they can no longer rely on the National Cereals Production Board to buy. The Marketing Officer noted that the three major traders were offering different prices. Farmers have to judge the value of their time and some prefer the trader with lower prices but no queue. Marketing Officers have difficulty in sampling rural markets and monitoring private traders so they have difficulty in saying exactly what is happening.

The wheat market in Uasin Gishu has not changed much since the parastatal concerned is operating quite efficiently.

Table 2-1 Catchments visited: Districts, AEZ and Population Density

Catchment	District	Division	Location	Implemented	AEZ	Density
Fumbini	Kilifi	Bahari		91/92	L4	196
Kidundu				95/96	L4	
Bonje		Kaloleni		91/92	L5	171
Ivondo	Embu	Gachoka	Kiambere	91/92	LM5	32
Kanothi			Kianjiru	95/96	LM4	
Mutira		Manyatta		91/92	UM2	509
Mirundi			Gaturi South	95/96	UM2	385
Oinopsis	Baringo	Tengaes	Cheberen	95/96	UM4	38
Cheberen			Cheberen	91/92	UM4	38
Kasisit		Kabartonjo	Katiorin	91/92	LH2	158
Ongoro	Siaya	Boro		95/96	LM2	263
Ushu		Yala		93/94	LM1	302
Ukaya						
Sugoi	Uasin Gishu	Soy	Sugoi	93/94	UM4	115
Rukuimi		Ainabkoi	Tarakwa	92/93	LH3	157
Hamasana	Vihiga	Vihiga		93/94	UM1	841
Ikumba			Central Maragoli	91/92	UM1	1448
Waluka		Emuhoya	East Bunyororo	93/94	UM1	1061
Emukola		Luanda	Emukalo	94/95	UM1	959

Source: Evaluation Team visit; Jaetzold and Schmitdt 1983 for AEZ; Population Census 1989 for population density

Bean prices were also noted as up in Vihiga, but there the blame was put on disease diminishing supply.

Kilifi, Vihiga and Baringo all normally import food. Food crops are grown for local subsistence, not sale. There had been no noticeable trend to increased imports or to increased need for famine relief supplies, except in 1993.

- **Cash crops** In the higher potential areas, coffee prices have risen in the last two years, attracting farmers back to this crop. Tea prices and marketing have been generally stable, and in some tea areas road programmes have improved access to the factories and led to higher grades. Horticultural crops and fruits are expanding in Embu, but the market is more limited in the west. However, papaya prices and demand are rising in Vihiga, where there is a small processing plant. Coconuts, supplying a variety of small industries, and the illegal but profitable palm wine, remain very attractive in Kilifi, but cashew nut prices

have been declining, and trees have not been replanted. The large number of old trees yield less, and a processing factory closed because of inadequate throughput, resulting in a further market decline. In drier areas cotton has remained unattractive due to late payment or nonpayment by the Cotton Marketing Board, and the closure of some ginneries. In lower Embu *miraa* prices are very attractive.

- **Dairying** Due to the troubles in Kenya Co-operative Creameries, formerly the major buyer, farmers are selling most of their milk to local towns or local rural consumers. Marketing officers are unable to verify rural farmgate prices, but know that urban prices have risen substantially. Farmers selling milk direct get a regular monthly income from the consumer, instead of uncertainty over when and if they will be paid. The attraction of the dairy income means farmers are keen to plant napier grass, which increases the supply of milk, and they also become more interested in fodder trees. More are turning to zero-grazing, which increases the supply and quality of manure.

Factors pushing conservation independent of the efforts of the SWCB have therefore been the changes in dairying and the rising price of coffee, normally planted on terraces. These both affect the high potential areas. Lower potential areas suffered more of a setback in the 1993 bad rains, and have, probably, lower prices now for maize, and a bad market for cotton. They have less incentive and means for investments in land improvement. In general, disruption to marketing has hampered farmer investment in the last few years; it is to be hoped the situation will improve as the private sector develops.

2.1.4 Population density, land tenure, market access and soil conservation

Table 2.1 shows the great variation in density in the areas visited. Generally speaking, the densely populated high potential areas ($>300/\text{km}^2$) have mostly evolved to a situation where individual rights in every piece of land are recognised either by a registered title, or by official boundary demarcation. In the few exceptions, farm boundaries are so well-known and respected that farmers can confidently invest in land improvement, and buy and sell. There is, however, a distinction between the Eastern and Central Provinces on the one hand and Western and Nyanza Provinces on the other. The former have good access to large urban and international markets and all land is intensively used. Almost all land is cultivated twice a year, or is under permanent tree crops. Cattle are kept for dairying, and zero grazing is general. Animals are fed on crop residues, cultivated fodder and some purchased inputs, and little land is under pasture. In the west, despite equally high population densities, even small farms have some land under grass, where a zebu cow is tethered and some crop land may be rested one season. This lack of intensity may be due to difficulty in marketing high value crops due to distance from large urban centres and airports. Farming is for subsistence, and cash is derived from local non-farm employment or from remittances by educated and employed offspring and/or absent husbands. Partly to increase the chances of having a successful child, families tend to be large and the area has not shifted to the preference for smaller families now evident in Central and Eastern Provinces (Tiffen, 1985).

Ever smaller farm sizes are causing migration from the higher areas into the AEZ 4 and better parts of AEZ 5, where population density is increasing rapidly. In many of these areas there was until recently plenty of land for free grazing. Farmers, local or immigrant, are now beginning to stake their claims to particular grazing areas, either as individuals or as villages. In some areas it is already expected that owners keep their animals only on their own land, and permission is needed to graze on other people's crop residues or grazing areas. In some of these areas demarcation and titling is taking place as a way of sorting out claims; in the process, the more powerful families tend to win large areas, while others are left with small farms (Diana Hunt - personal communication in regard to lower Embu). Shifting farms to new areas and long fallows are becoming impossible, and farmers are having to seek alternative means of maintaining fertility. The process impels people towards conservation measures, since they have to make the best of what they have got, rather than relying on new land. Better control of animals means that conservation works are not damaged by stock.

Uasin Gishu is a special case, since it was a formerly white settled area. All land is titled, but some of the companies and cooperatives which purchased it have since subdivided land to individual holders. Farm size varies from 1 - 10,000 acres. Average density is low for a District that is mainly AEZ 1, 2 and 3, with only 20% in AEZ 4. Most farmers retain a largish proportion of their farm under pasture, where the animals graze freely. They also graze the crop residues. Some farmers rotate their land, growing maize for two to three years before

resting it as pasture, and opening part of the pasture as a new maize area. Soil conservation structures put in to serve the large white settler farms are valued, and the presence of a cutoff is said to increase land values, but structures can easily be damaged during the rotation to pasture, and by animals grazing the stubble.

Kilifi District is also unusual. A belt one mile from the coast is Crown Land, now mostly occupied by hotels, industries and related services. These provide employment to many men. The next nine miles was also formerly Sultan of Oman territory, and there are absentee Arab land owners, with squatters on their land. After 12 years squatters have the right to stay, but there are uncertainties, and pressures from outsiders seeking to buy, and this can inhibit investments in soil improvements. Due to a still low population density, farming is not intensive. Many farmers have a large area of tree crops and grazing round their homestead, combined with a small area of annual crops which may be shifted round the pasture. Livestock wander freely, damaging any structures or trashlines that may have been installed. The main arable farm is at a distance, where they can continue shifting cultivation. Extensive methods are more profitable than intensive ones when labour is scarce. Beyond 10 miles is the former Trust land, mostly undemarcated. This is mainly arid land suited to livestock, very sparsely settled. The District contains 3 large-scale arable enterprises and several large scale ranches, which do not need government conservation services.

In general, soil conservation structures are most likely to be installed and maintained when farming has become intensive, tenure is secure, and animals controlled. Where cultivation is impermanent, so are trashlines, grass strips and terraces.

2.1.5 Rainfall

Figure 1.1 presents the rainfall data for Timboroa (Uasin Gishu District), Kandenge (Siaya District) and Perkerra (Baringo District) rainfall stations. These data are used to illustrate the rainfall regime for selected areas.

General observations are:

- 1992 and 1993 received above normal rainfall in the months of January and February.
- Annual rainfall for the period 1992/94 was higher than the long term mean.
- Rainfall was poorly distributed during the short and long rains growing season.

Data obtained from the crop situation reports in Embu District indicated that:

- During the 92 and 93 short rain seasons, there was a favourable soil moisture regime and reasonable crop yields were attained.
- 1994 rains in Embu District were poorly distributed, with high runoff resulting in Manyatta Division, and up to 85% crop failure in Kiambere and Makima areas which are in AEZs LM3 and IL5.

Data obtained from the crop situation reports in Kilifi District indicated that:

- in 1995 there was 50% maize crop failure in most parts of the district and that drought-tolerant crops such as sorghum and cassava were doing well. Early planted crop was worse hit due to an early season dry spell. Farmers in the catchment areas visit in Kilifi district indicated that they experience crop failure 3 out of every 5 years and that crops growing in water concentration areas (eg along the trash line or fanya juu terrace) performed better in years of reasonable rainfall.

The Evaluation Team tried to take these rainfall conditions into account in assessing the level of conservation and productivity seen.

2.2 District agricultural staff

District agricultural staff is here assessed in terms of their capabilities to undertake soil and water conservation activities in a sustainable manner.

Most agricultural officers have a basic training in agriculture which includes soil and water conservation. District Agricultural Officers (DAOs) showed keen appreciation of the nature and extent of soil resource degradation and need for proper water management in their respective districts. Good DAOs provide a supportive environment for their staff, and encourage cooperation and sharing of resources which is not always strictly according to the book. The DAO appreciates the substantial operational budget brought in by SWCB, but knows that its use is monitored. Although his SMS (Subject Matter Specialists) could contribute to the SWCB programme we observed that some of them felt they were not being made use of, and in some cases there was some resentment of the better level of resources available to SWCB.

SWCB specialist posts at district and divisional level are generally filled, although there are vacancies particularly in new administrative units. They are assisted by two Soil Conservation Assistants per Division, who in most cases have attended some in-service training courses in soil and water conservation. The staffing constraints identified were:

- transfers, resignations, retirements, deaths, etc. Usually the financial incentives provided by the programme attracts officers from the general extension to fill the gaps. However in Rift Valley Province there are many incomplete DPTs, particularly in the new districts or divisions. PSCO-Rift Valley Province reported that 50% of the officers trained between 1989 and 95 are no longer serving in the area of Soil and water conservation. This has training implications and in the short-run affects the quality of work.
- Staff assigned to DPT receive induction training and there is a general understanding that the DAO will allow these officers to continue serving DPT for at least 4 years. In some cases, DAO has transferred DPT members to perform other duties. Such transfers create difficulties maintaining trained staff in place (see section below).
- Most Soil Conservation Specialists are general agriculture graduates who needed, and received, the training provided by the project to equip them with the skills needed for the erosion, fertility management and socio-economic issues which they face in the field, but a few had missed out.

Although the team met the occasional inadequate officer and could see the results sometimes of an inadequate officer in the recent past, the general calibre of the staff was very good, they appeared keen and knowledgeable, and some were also innovative and inventive in their management approach. Past training has paid off.

2.3 Catchment choice

At the district level the selection of catchments was said to be based mainly on farmers' request for assistance, and the technical need for soil and water conservation, but other factors are also present. In the districts visited it was observed that:

- Catchments are generally clustered within five kilometres radius and are in some cases contiguous.
- Catchments are within one kilometre from the main road.
- Catchments are not evenly distributed around the district. For example in Baringo District, catchments are concentrated along the Kabartonjo-Kabarnet-Marigat main road and along Kabarnet-Tenges-Eldama Ravine main road, leaving vast areas in Marigat, Koros, Nginyang unattended.

Figure 2.2 shows catchments chosen in Siaya District, 1992/3 - 1995/6.

Figure 2.1 Rainfall at selected stations for the review period
Kadenge (Siaya District)

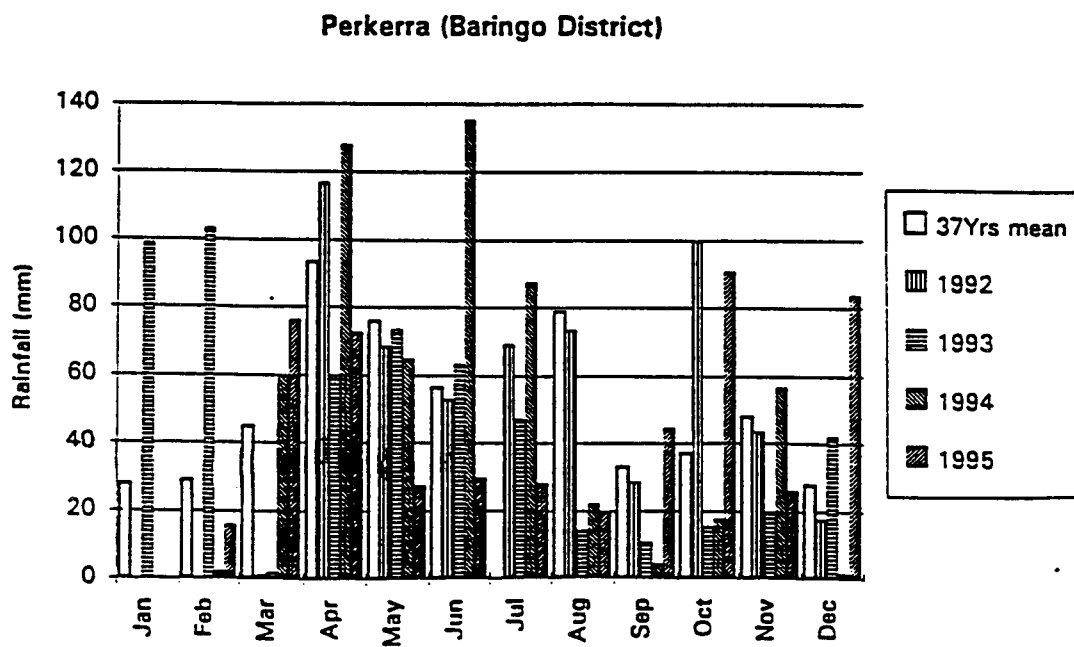
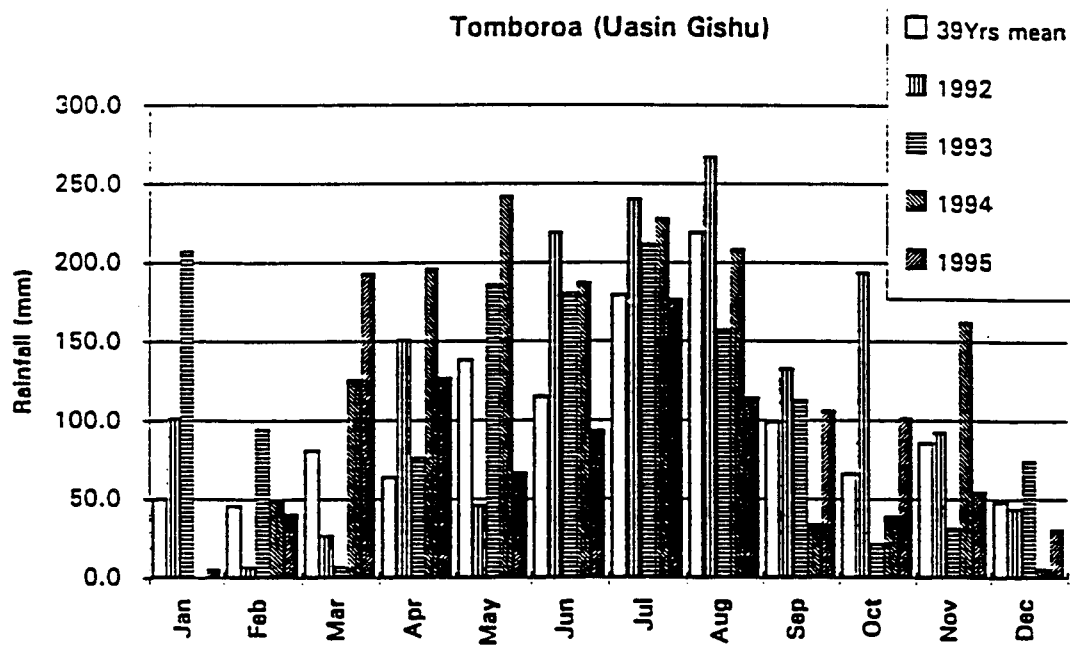
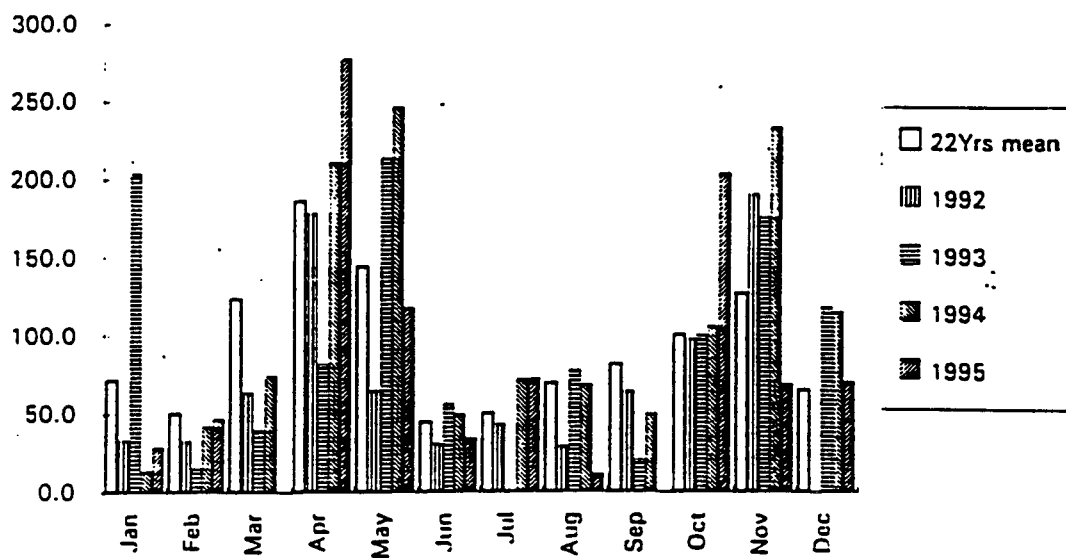
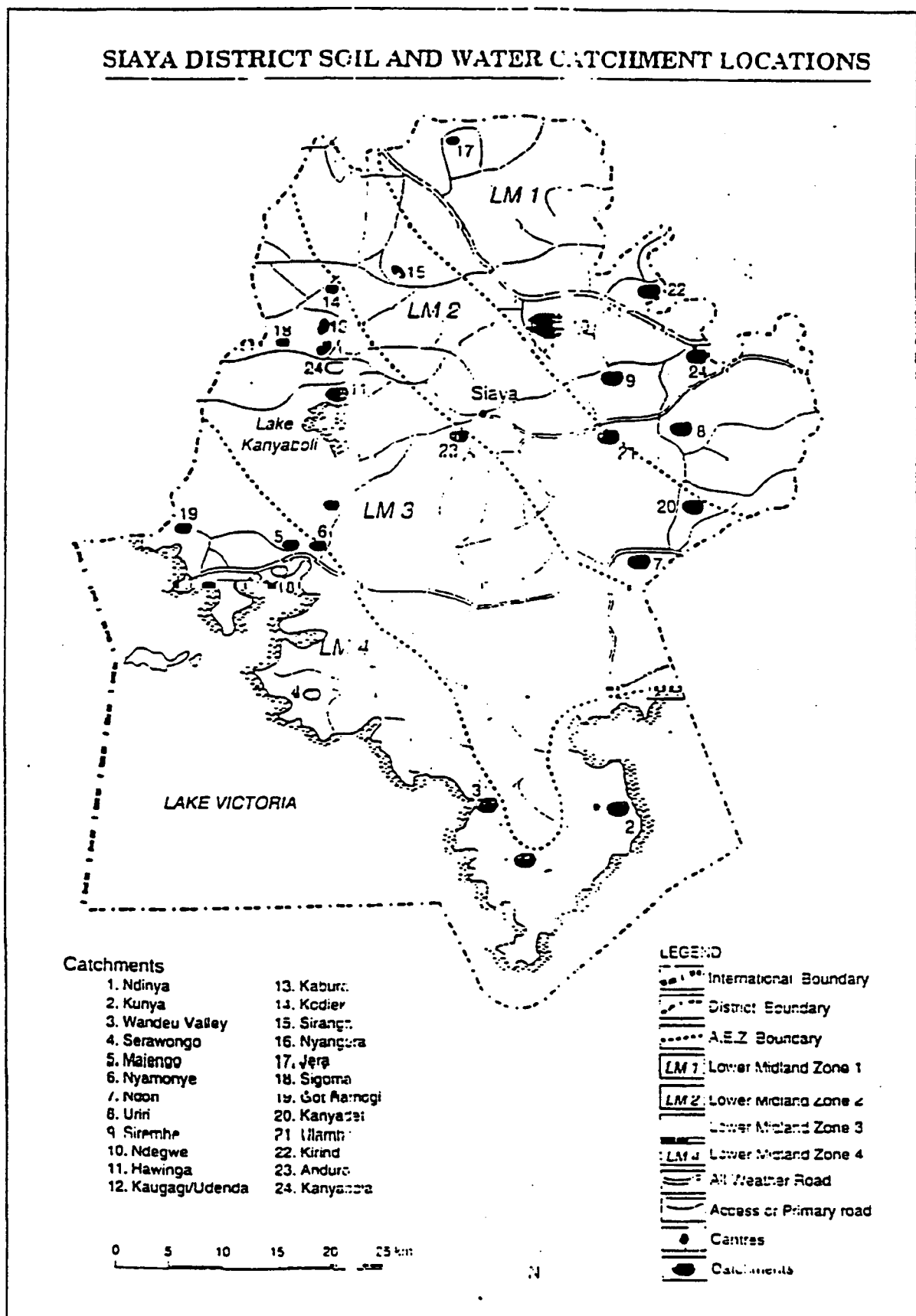


Figure 2.2 Catchments in Siaya District



Accessibility seemed to play a greater role in the selection than staff acknowledge. The criteria of farmer request leads to adjacent catchments being selected since neighbouring farmers request assistance. This may be creating an attitude of dependence on government rather than on self-reliance. The present approach does not maximise the number of people reached by the conservation messages nor tackle the widespread serious soil degradation found in some areas. In high potential areas the obligation to choose 3 catchments per division leads to some catchments with quite a good level of existing conservation to be chosen.

2.4 Physical achievements compared with planned achievement

2.4.1 Quantities

Annual reports show varying level of achievement compared to the plan. In most cases the recent level of achievement is over 70%. This often represents an improvement which is very creditable given the reduced level of real resources being provided. While we have no reason to doubt the figures reported, we could not establish how they were arrived at. The DPTs had no specific record on the work undertaken at each farm. It was found impracticable for the Evaluation Team to quantify the work done at catchment level. Random checks of the proposed conservation works at farm level were undertaken and in most cases evidence of the conservation work undertaken during the catchment period was found. In one case, waterways and riverbank protection reported to have been undertaken had not been done.

Due to the large number of farms and conservation works being undertaken, it is difficult to quantify and verify figures reported by DPTs. We therefore propose that the catchment books should be updated by the DPTs during each visit. Additional information to be included in the update would include the farms visited, record of the progress the farmer had made in implementing the Land Treatment Plans (LTPs) and an assessment of the quality of work. This information would form the basis for random checks by the DSCO (District Soil Conservation Officer), PSCO (Provincial Soil Conservation Officer) and the monitoring and evaluation team from Nairobi. It would also serve as the basis to establish the level of accomplishments. The danger is that the present system, based on guesstimates, may not have credibility, although, as shown below, we think there is a very real level of achievement.

2.4.2 Appropriateness of conservation measures

Assessment of the appropriateness of a conservation measure was based on technical requirements and farmers' preferences. Fanya juu, retention ditches and grass strips are the most commonly used soil conservation measures. These measures were in most cases used where they were technically suitable. However, in some cases we found farmers using fanya juu terraces where grass strips would have sufficed. Sometimes the farmer had preferred fanya juu because of its low maintenance requirements and because its benefits are perceived sooner with grass strips. In some cases farmers reported they had not enough labour to construct a recommended fanya juu, in a place where a napier grass strip would have been technically adequate and lead to a formation of a fanya juu terrace over a number of years. In such cases there should be follow-up from Catchment Committees or the FEW to suggest the less labour-intensive alternative.

Most of the retention ditches and cut off drains were used to control water damage. Few farmers were taking advantage of the improved soil moisture regime around the retention ditches/cut off drains to grow some crops.

It was noted that in between conservation structures, soil movement and runoff was still taking place. This was mainly due to poor tillage practices (hand hoeing up and down the slope) and poor ground cover particularly during the peak rain period.

2.4.3 Quality of the conservation measures

The quality of conservation measures was higher in AEZ 4 in Embu than in Kilifi, Siaya and Baringo districts and higher in AEZ 2-3 in Embu than Baringo and Vihiga districts. In the same catchment areas there was noticeable difference in quality of conservation measures. This was attributed to the farmers' level of commitment to farming and his/her dependency on the farm as the source of livelihood. In general, the quality

of conservation measures was highest where the farmers were practising intensive cultivation and had a higher perceivable benefit.

In Siaya District we found some terraces intended as fanya juu were being constructed poorly - soil thrown on the lower side or too far from the ditch and terrace laid on a 3% slope rather than on the contour.

2.4.4 Sustainability of the improvements

The Evaluation Team paid particular attention to catchments completed in 1991/2, in order to see whether the conservation work then undertaken was still in place, or better still, had been expanded. Absence of maintenance and abandonment of structures would imply a negative return to the Government's investment. It is satisfactory to report that generally, the works had either been maintained, or improved and added to, as shown in Table 2.2.

The catchment approach was frequently commended to us because it led to a visible and measurable improvements. SWCB also endeavours to set up catchment conservation programmes which are sustainable. The following observations were made in assessing sustainability of catchment activities.

- PRA forms a good basis for community mobilisation, identification of priorities, assessment of the status of soil erosion and conservation and for formulating required interventions but it was not always carried out (see 2.11.1 and Table 2.5).
- Catchment Committees (CCs) play an important role in mobilising the communities, assisting in laying out land treatment plans and promoting interaction between the farming community and the extension officers and DPTs. Most of their members were literate, fairly knowledgeable on soil conservation options and on laying land treatment plans.
- DPTs (Divisional Planning Teams consisting of Divisional Soil Conservation Officer and two Technical Assistants) provide 3-6 months input in preparing farm plans and LTPs and assist the farmers in implementing LTP. (This input is sometimes constrained by lack of transport and delays in disbursement of field allowances). They note existing structures and from this the degree of existing conservation can be assessed. During the implementation period the level of conservation rises by between 10 and 40%. This is a commendable achievement considering that farmers have other priorities.
- The local FEW takes over the catchment at the end of the implementation year and continues to provide assistance in implementation of LTPs. DPTs and DSCOs also provide technical assistance on request. In most case there is no official handing-over report prepared, the DPT just hands over the catchment book. This can create problems for FEWs who were not fully involved in the catchment implementation activities. The level of conservation was reported to rise by 10-20% in the first year depending on how active the catchment committee is.
- The level of conservation is highest during the implementation year and declines in subsequent years due to reduced impetus from SWCB, most of the critical work having been done in the first or second year, reduced level of activities of CCs and changes in farmers priorities.
- Where land users are adequately mobilised and fully appreciate the benefits of soil and water conservation they continue implementing LTPs even on their own. Where this is not the case, as seen in Kilifi, the LTPs implemented are not maintained and are completely destroyed in 3-4 years.
- Sustainability of soil and water conservation depends partly on the level of conservation before catchment implementation and at the end of the catchment implementation year. An existing high level of implementation indicates land users are reaping the benefits and will be motivated to expand on the work and/or maintain existing works under the stimulus given by the catchment. They will also continue to develop afterwards.

From these observations the following conclusions can be made

Table 2-2 Land-use and conservation achievements over time

Catchment Characteristics		Major Land uses		Conservation level		Ground slope %	
Name	District	Division	Area (ha)	No of Farm	Pre-cal ¹	End Cal ¹	End 95 ²
Tumbini	Kilifi	Bahari			30	45	50
Kidundu							3 to 35
Bonje		Kaloleni					10
Ivondo	Embu	Gachoka	100	41	20	40	40
Kanothi					40	60	80
Mutira		Manyatta	216		50	60	80
Mirundi							5 to 40
Oinopsis	Baringo	Tenges					50
Cheberen					10	3	2
Kasisit		Kabartonjo	91	202	30	45	65
Ongoro	Siaya	Boro					20
Ushaha/Ukaya		Yala	105	32	30	50	70
Sugoi	Uasin Gishu	Soy					4 to 10
Rukuimi		Ainabkoi					
Ilamasana	Vihiga	Vihiga	80	140	40	70	80
Ikumba							5 to 40
Waluka		Emuhoya	100	225	50	60	70
Imukola		Luanda	90	175	50	65	70
							5 to 15

Notes: Pre-cat = Pre catchment; End-cat = End catchment; Data in catchment file at DivSO

1. From catchment book

2. Consultant's estimate after field visit.

- Most of the soil and water conservation activities initiated are being sustained by farmers, in some cases with additional help from NGOs, local FEWs, CCs, DPTs and DSCOs.
- Sustainability could be further enhanced if complete land husbandry packages resulting in perceivable yield increases were adopted.
- Handing over to the local FEW should be more orderly, outlining the accomplishments made, the difficult areas and agreement on the technical backstopping that the DPT can provide in subsequent years.

2.5 Water management

2.5.1 Disposal of excess water from roads and non-farm areas

Excess runoff generated from up-slope catchments (roads, farmsteads, bare ground, grazing land) creates a water disposal problem. On most the roads we followed there were signs of varying degree of roadside erosion caused by excess runoff. In Hlamasana catchment, Vihiga District, excess runoff flowing along the road resulted in gully development that covered an area of approximately 4 hectares. DSCOs and Roads Officers interviewed report very limited consultation in addressing the problem of excess roadside runoff. In Vihiga and Embu districts, we were told of incidences where farmers have blocked road culverts in an attempt to reduce the damage caused by excess runoff. The Clerk to Embu County Council observed "Our soil and water go by road to the rivers". This may lead to huge gullies and impassable roads. The cost of repairing such damage could be as high as 5 times that of constructing waterways or retention ditches.

Some farmers in Embu District had appreciated the value of capturing and utilising the excess water to improve soil moisture regimes for their crops, a technique which they had seen used in Machakos and Kitui District. A farmer in Emukola Catchment was trapping the road side runoff and reported that he was reaping substantial benefits from increased crop yields resulting from an improved soil moisture regime and improved soil fertility status due to fine silt particles deposited in his farm.

Where the farmer had been educated in the benefits accruing from the capture, storage and utilisation of road runoff damage is more limited. Further gains can be made by improving the collaboration between the Roads Officers, Soil Conservation Officers and the affected farmers.

2.5.2 Water resource development for human and livestock use

SWCB has expanded its scope to include water development activities such as water holes/pans, sub-surface dams, shallow wells and rock catchments. We did not observe many examples. In the one case seen, what was reported to be a sand dam had been constructed as an ordinary dam. It is doubtful whether most DSCOs would have the technical background to undertake these types of water development or have the time to deal with the problems associated with soliciting for technical support from the District Water Engineer's Office. Based on this limited observation, we are inclined to think the simpler technologies associated with spring protection and water harvesting for crop and fodder production are more within the general level of competence of the DSCO.

2.5.3 River bank protection

River bank protection activities were observed in Embu, Vihiga, Baringo and Siaya districts. They involved a combination of farmers' initiatives and technical advice provided by the DPT. Farmers were in general making very productive use of the riverbank areas without any noticeable signs of river bank erosion. There were however a few cases of river bank erosion resulting from inappropriate land use and management.

2.6 Soil fertility maintenance and improvement in sample districts

2.6.1 Where and how badly is loss of fertility affecting yields and production?

The consultant tried to address this question by looking at maize yield data collected in the Districts. In the time available it was not always possible to obtain this. Data available for Kilifi and Embu suggested yields between 1993-5 varied according to rainfall conditions. It might be possible by looking at yield data over time in the different districts to identify trends that would show which districts have an apparent longterm downward trend that might be due to falling fertility. Account would also have to be taken of the recent rise in the price of fertiliser, which means farmers are now buying less. In the absence of such analysis, the consultant relied mainly on observations in the field and interviews with farmers.

2.6.2 Current practices for maintaining soil fertility

The majority of farmers visited indicated that they had soil fertility problems in the farms and were trying different methods of improving soil fertility, as shown in Table 2.3. In all the districts visited, P was the most limiting factor as far as nutrients are concerned. Water stress is limiting in semi-arid areas like Lower Embu, and in some districts, particularly Vihiga, there are special problems due to striga infestation and couch grass (see last column of Table 2.3). Table 2.3 summarises the fertility positions in the 4 districts visited by the Soil Scientist.

Farmers' current practices in the catchments visited are summarised under the heading Farmers Actions. They can be summarised as follows, in a rough order of commonness:

- *FYM (Farm yard manure)*. Most farmers apply FYM (either spread before ploughing or applied in the planting row/hole) in their farms. However, the manure is hardly enough and some farmers buy artificial fertiliser as a supplement. Where zero-grazing is common, as in UM2 areas of Embu, the cow is kept in an unroofed pen and stands on a bed of litter formed from maize stalks, banana stem residues, leaves, weeds, etc. This mixes with the dung and urine and gradually rots down. The pen is emptied each season and the contents transported to the crop land. The adequacy of the manure is related to the ratio between number of cows kept (generally only 1 grade or crossbred animal) and the land planted. Most farms are small, 1 ha or less.

In most of the AEZ 4 and AEZ 5 areas zero-grazing is not practised and animals are only in the pen at night. Some farmers have no animals or few animals and often lose stock due to disease or drought. The quantity available in relation to area cultivated is much less than in Upper Embu. During the day the animals graze the stover, or bush areas if available. Grazing the stover can lead to destruction of soil conservation measures and trampling may adversely affect soil structure, particularly where soils remain soft and moist after harvest. This is evident in Uasin Gishu district. However, there is some benefit from the nutrients contained in urine, and from dung dropped. More use of FYM would seem advisable in view of the soil's physical and chemical properties.

In western Kenya zero-grazing is comparatively rare, and even in densely populated areas like Vihiga and Siaya, a zebu cow is tethered on patches of pasture on the farm during the day, while goats wander. While FYM is used by most farmers, the quantity is less than in Upper Embu. The night pen may not be stocked with residues. It is emptied periodically to a tip nearby, where nutrients may drain away. Farmers apply it, but with less consistent effort than in Embu. As one farmer said, she carries it to the cultivated area a few tens of metres away "when I am not too tired".

In all areas there are some farmers who do not apply manure, due to lack of animals or labour constraints. This is a worrying situation as manure is important in the maintenance of soil fertility and in improving soil structure.

- *Inter-cropping or relay cropping* including a leguminous crop (e.g. maize, cowpeas) is very common.

Table 2-3 Fertility recommendations and farmer practices in 4 Districts

District	Catchment	Soil type	AEZ	Local research Inst.	MoALDM	SWCB	Farmers action	Other problems
Kilifi	Fumhuni	arenosols	CL4	N, P, FYM	DAP	FYM, TLs, AF	F, FYM, RC, TLs	burning of residues
	Mrima wa Kuku	arenosols, vertisols	CL4	N, P, FYM	DAP	FYM, TLs, AF	F, FYM, TLs	as above
	Bonje	vertisols	CL5	N, P	DAP	TLs, AF	TLs	note lack of FYM
Embu	Ivondo	leptosols, luvisols	LM5	N, P, FYM, RC, AF	DAP	AF, FYM	FYM, RC	water stress
	Kanothi	luvisols	LM5	N, P, FYM	DAP	AF, C	DAP, C, F, RC	water stress
	Mutira	nitisols	UM2	N, P, FYM, L, AF	DAP, 20:20:0	FYM	DAP, 20:20:0, 23:23:0, FYM	acidic soils, P-fixation
	Mirundu	nitisols	UM2	N, P, FYM, L, AF	DAP, 20:20:0	FYM	20:20:0, DAP, FYM, CH	as for Mutira above
Uasin Gishu	Sugoi	acrisols, ferralsols	LM4	N, P, FYM, L	DAP, CAN	AF, TLs	TLs, DAP, CRE, RP	plough pan, water stress, burning of residues, P-fixation
	Rukuini	phaeozems	LH3	N, P, L	DAP	TLs, FYM	TLs, DAP, IC, CRO	burning of residues, acidity, P-fixation
Vihiga	Ikumba	ferralsols	UM1	P, FYM, AF	DAP, CAN	AF, FYM	AF, FYM, DAP, CAN, Urea, 20:20:0, 17:17:0	acidity, P-fixation, striga, couch grass
	Emanda	acrisols	UM1	P, FYM, AF	DAP, CAN	FYM	Urea	as above for Ikumba
	Waluka	acrisols, ferralsols	UM1	P, FYM, AF	DAP	AF, FYM	FYM, RC, CAN	as for Ikumba and Emanda
	Emukola	acrisols, ferralsols	UM1	P, FYM, AF	DAP	FYM	FYM, C	as above for Waluka

Key: N-nitrogen, P - phosphorous, FYM - farm yard manure, RC - relay cropping, TLs - trashlines, AF - agroforestry, F - fallowing, L - Lime, C - compost, CRE - crop residues, CRO - crop rotation, CH - coffee husks, IC - intercropping, RP - rotating with pasture.

- *Inorganic fertilisers.* Application of inorganic fertiliser is done by those farmers who can afford to buy it. This is applied to cash crops and horticultural crops. Maize is a second order priority in most areas, except where it is also a cash crop, as in Uasin Gishu. However, in Upper Embu fertiliser is commonly used on maize. According to one of the farmers from Mutira catchment, manure is applied to make the soil "fertile" and inorganic fertiliser has to be added to make the crop "grow". Maize performs poorly if planted with manure alone and "this is a waste of time". This is an indication that the soils have almost been completely depleted of plant nutrients. FURP findings confirm this while farmers are using a wide range of fertilisers to alleviate this problem. Most probably the FYM is of poor quality if fodder is grown from the same soils and this may explain lack of response to FYM. Most of the farmers in the neighbourhood are also using artificial fertilisers. DAP, 23:23:0 and 20:20:0 are the most commonly used. Application of fertilisers in addition to FYM should be one of the seasonal messages for Mirundu and Mutira catchments.

In general there seem to be no specific recommendation on the right type of fertiliser to be used. The type used depends on the availability at that particular time when it is required. Some farmers, especially in Vihiga district, are using urea which is an acidifying fertiliser. The soils in the district are already acidic and this will thus aggravate soil reaction.

- *Agroforestry for fertility building.* Trees like *Grevillea robusta* are very popular with farmers in Embu and are also becoming popular in western areas. In Vihiga most farms have *sesbania* trees (indigenous) which are used for soil fertility improvement as well as fuel wood. This has also been recommended by soil and water conservation staff. In Kilifi *casuarina* is becoming popular as it is valuable for poles. However, the most common trees there are the tree crops, such as coconut, cashew, and mango.
- *Bush fallowing or rotation between pasture and crops.* Bush fallowing is used extensively in the sparsely populated Kilifi district. Although we did not see the main field areas, which are far from the homestead, farmers said they would cultivate a field for perhaps 4-5 years, then leave it to revert to bush for 5-10, before reopening it for cultivation. Since there is plenty of grazing land, crop residues are not valued and often burnt before land preparation, which leads to loss of nutrients and destruction of any trashlines installed the previous season. Therefore the latter do not build up into terraces. In most areas of AEZ 4 population density is higher and even short fallows have become less common, though there, and even in parts of Western Kenya, some land may be rested for one season.

On large farms, with a high proportion of grazing land to crop land, at least some farmers (2 out of 3 questioned in Sugoi) rotate between maize and pasture. Maize is cultivated for 2-3 years, then the area reverts to pasture and a new crop area is opened in the old pasture. The period under pasture varies according to the percentage of the farm under pasture. This practice has not been given the investigation it deserves to quantify its extent and benefits.

- *Compost.* Some farmers have started making compost. This is especially in Embu district where farmers own very few animals. However there is lack of proper procedure for making compost.
- *Crop residues as mulch, or for incorporation in the soil.* Maize stover is the most common source of mulch. It is sometimes also incorporated in the soil where it is not needed for livestock.

2.6.3 The failure to capitalise on research

The national FURP has had 70 experimental sites in different AEZs. Its recommendations for the soil type and AEZ of the catchment is shown in Table 2.3. Recommendations which derive from locally based research stations are also shown. In Embu District fertiliser trials were conducted from 1985 to 1994 at three sites, namely Kavutiri (UM1), Gachoka (UM3) and Embu Agricultural Research Centre (UM2). The experiments tested crop response to nitrogen (N), phosphorus (P), FYM and other site specific treatment such as lime and potassium. Significant responses to FYM, P and N fertilisers application were obtained. Bulrush millet responded best to farmyard manure with an average yield increase of 830 kg/ha with 5 t/ha FYM application. (FURP, 1994). The main constraint to food crop production at Kavutiri site is the strong soil acidity. Thus reasonable crop yields will only be obtained if the soil is limed first. This is an expensive undertaking for many of the farmers. At

Embu Research Station, maize responded to both N and P while intercropping was also recommended. Embu has also a Agroforestry programme which is producing findings not yet always tried out on farmers' farms, and not yet available to field extension staff.

Research work by KEFRI/KARI/ICRAF at Maseno in Vihiga District shows that tithonia diversiflora and lantana camara have high potential of supplying P into the soil. These shrubs are common in Vihiga district where soils lack P and the farmers should be encouraged to use them. Organisations like KIOF (Kenya Institute for Organic Farming and OMM (Organic Matter Management) are promoting their use as compost in some areas of Kenya but the work has not yet entered into local extension messages. Without the addition of phosphorus, crops yields are bound to be low. Maize that received phosphorus yielded 3-4 times more than maize that did not receive this nutrient (ICRAF staff, personal communications). Probably this explains why a wide range of fertilisers have been used in the district irrespective of what has been recommended by FURP and extension staff. Farmers who cannot afford basal fertilisers use FYM and CAN or Urea for topdressing. The latter in particular is acidic and very vulnerable to leaching and hence should not be used. Farmers use it as it is readily available from the sugarcane growing areas and probably got at a cheaper price.

In the Uasin Gishu District, fertiliser experiments were carried out at 2 sites, namely Moi Teachers Training College (LH3) and Turbo(UM4). At both sites, maize exhibited a strong response to nitrogen. The yield potential at this site is rather high. 75 kg/ha of nitrogen is the recommended fertiliser rate. The effect of phosphorus seemed to have become stronger after some years of intensive cropping. A strong response to FYM was also recorded. Farmers are complaining about declining yields and the fact that extension staff are advising DAP may be a contributory factor. It may lead to N-deficiency and acidification. Response to N and liming was observed by FURP (Table 2-3). In the same area soil and water conservation staff were advising agroforestry. It was observed that farmers let their animals graze the stubble after harvest. Farmers had not been warned this would lead to loss of tree seedling.

The appropriate research-based recommendation for the catchments visited are shown in Table 2.3. These recommendations do not seem to have reached agricultural extension staff, whose recommendations are shown under the head MoA. The recommendations made by the DPTs as recorded in catchment books are shown under the head SWCB. The most common practices observed are shown in the last column. It is clear that there are major gaps in the chain from research station to extension to the farm, that farmers are receiving conflicting messages from different sources, some of which may be actively harmful, and that farmers' current practices are inadequately known to both research and extension staff, leading to an inability to evaluate the merits of the current practice and to test and develop incremental improvements to it which would be within the farmers' reach. The only exception to this is the DAREP programme at Embu which in the last two years has carried out extensive surveys of farmer practice and is using the old Dryland Agricultural Research Programme sites as a base for farmer evaluation of, and trial of, alternative crop varieties, cultural practices, tools etc (various unpublished DAREP reports).

2.6.4 Current recommendations and needed further developments

There has been an improvement in the way fertility issues are handled at Catchment level and it was noted that most Catchment books now carry Seasonal Extension Messages on cultural methods, crop diversification, manure or fertiliser use, etc. The main issue is whether these recommendations are always the best available and how well they may be followed up by an FEW who may be receiving an alternative message in his monthly DoA training session.

The last column in Table 2.3 shows that some farmers have striga and couch grass problems which are scarcely being addressed by either research or extension. However SWCB is to be congratulated that its ASAL programmes are addressing means of alleviating the water stress which is frequently experienced in these areas.

2.7 Agro-forestry nurseries and grass bulking plots

In all areas the team noted a strong farmer interest in trees. The DPTs have helped to stimulate this but there are many other factors involved including good market demand for tree products. The interest preceded the

catchment activity, to the extent that there were almost always private nurseries supplying demand, as well as various active NGOs. Within catchments, the recommended tree seedlings planted on farms usually survived, though there were cases of loss of young trees through drought, and in areas where animals were uncontrolled, of animal damage. In most areas farmers obtained grass either from their own or from neighbour's farms. Every catchment nursery and grass planting plot observed was in poor condition. The Evaluation Team concluded that group management was, as is frequently the case, proving more difficult and inefficient than individual management.

The effort put into nursery management by SWCB seem inadequately rewarded, and DISCOs often identified this as a low priority area (see below, District priorities). This programme element might be dropped. Tree seedlings would still be available from other farmers, private nurseries and the many NGOs active in this area.

2.8 Farmer costs per ha treated

Cost of conservation to the farmer varied from farmer to farmer and catchment to catchment, depending on the level of conservation, quality of work, source of labour, soil workability and depth and wage rates. Average casual labour costs cited to us by officials ranged from 45-70 Ksh/day plus lunch; the 45 was for a very short day in Baringo. An average figure to include food is probably 90 ksh/day. This can be used to value both family labour, and the labour the farmer hires. In practice, hired labour is often paid by the task.

It was not possible in the time available to take measurements accurately and probe answers thoroughly. However, some illustrative costs are given here. Costs as estimated from more thorough surveys are given in Chapter 4.

Fanya juu are popular in the hilly areas of AEZ 2 and 3. The most frequently cited length of construction in a day in Vihiga and Embu amongst farmers interviewed was 15 metres per worker per day. A hectare would require about 600 metres/ha when the slope is 12-15%, about 900 metres/ha when the slope is 25%. The lower figure implies 40 man-days/ha or K£180/ha. A further Ksh 1000 for grass planting brings total costs to K£230/ha. In addition to initial construction costs, most farmers find that they have to maintain the structures after each rainy season. It was most commonly said in interviews that each fanya juu maintenance took half the time of the original construction: with two per year annual maintenance costs are about the same as initial construction costs. Holmberg (1985) found maintenance costs were 30 man-days/ha.

In Lower Embu, which is AEZ 4/5, recent research has shown farmer labour costs are about 10 SEK/metre for fanya juu or about K£300 ksh/ha. Grass planting cost SEK 1.5/metre, or about K£ 50/ha (Personal communication, Barrack Okoba, DAREP/KARI, Embu).

2.9 Estimated effects on yields and value of output

2.9.1 Yields

Almost all farmers interviewed, both men and women, appeared convinced of substantial benefit from their soil conservation work. In the lower areas this was particularly marked for maize: farmers often reported a trebling of yields: +200%. In bad rainfall years they reported they now got something, when before they got nothing. In Uasin Gishu a farmer using tractors and fertiliser and getting one crop per year also reported a gain in yield of 200%. This is in an area where farmers can use cheap conservation measures such as grass strips and unploughed strips. In the higher areas the gain, while substantial, was less; yield increases were reported as +50-75% when there had been no apparent change in the input regime, greater if they had also started using manure or fertiliser. The higher percentage gain in lower areas is due to increased water retention; in higher areas where rainfall is normally adequate for crop needs the gain is only from better top soil retention along with the nutrients which the farmer incorporates.

In the higher areas a strong benefit was felt from the increased napier supply associated with terraces. This was said to raise milk yields, in one case by 75%. Other farmers were making a new income by selling napier, if

they had no livestock themselves. In some cases, farmers had been prompted to change to zero-grazing, thus increasing their manure supply. One farmer reported banana production from a small area had risen from 5 to 20 bunches per month - she attributed this to less soil movement, and therefore less damage to roots by moles; there was also less lodging.

2.9.2 Value of output

Our survey was inadequate to provide monetary values to the increased output, but it was clear that farmers who had experienced an increase in yields, or who had been able to add a new crop, were satisfied that they were getting a good monetary return. Incremental gross margins, taking into account the extra costs of weeding and harvesting associated with improved productivity, and any change made in the input regime, are of course less than the value of the increased product output, but farmers seemed convinced they were positive.

2.10 Training and extension

2.10.1 Methods adopted for the evaluation

Training and extension work were evaluated by examining the annual reports for the three years 1992/3-1994/5, discussions with officers, and by interviews in the field with farmers, DPT members, general extension FEWs and teachers. Success can be measured in terms of achievement of planned targets, and by the impact which the training has on the actions of the target group.

Table 2.4 shows planned targets and achievements for four out of the five districts visited (Kilifi, Embu, Baringo and Uasin Gishu). District level training can be subdivided into four main areas: training aimed at enhancing staff capabilities (FEW retraining); training aimed at creating awareness of the importance of soil and water conservation, particularly amongst the young and community leaders (school teachers, 4K Club members in primary schools and Young Farmers Clubs in secondary schools), chiefs/sub-chiefs, leaders, including women group leaders); training aimed at facilitating catchment implementation (Catchment Committee members and Nursery Management) and finally, training which reaches farmers beyond the catchments (Field days).

2.10.2 Staff Training

- Target achievement

Table 2.4 suggests that this was given priority in 1992/3 and 1993/4. In the latter year more FEWs were trained than planned. Perhaps because the necessary effort had been made, achievement then dropped in 1994/5.

- Impact

There was evidence of good effect in DPT training through improvements over the years in the numbers of catchment farms completed, and in the quality of catchment book documentation in most districts. However, in a poorly performing Division in Siaya, neither of the DPT SCAs, one in soil and water conservation for four years, had received special SWC training. In the newer catchments there was evidence of increased emphasis on soil fertility messages (recommendations to add farmyard manure, row planting, reduction of trash burning, increased use of biological control, and agro-forestry).

- Liaison between DPT and general extension staff

The DPTs have become subject matter specialists and many officers thought the programme would suffer if they were merged with the general extension service. They were more effective because

- the general FEW does not get the same support for transport and accommodation in the field
- they are better motivated because of their better support and allowances
- they have more access to specialised training and training materials
- the general FEW has many other responsibilities

Inquiry showed that most general FEWs get some training in soil and water conservation during their monthly training sessions, from the DSCO and DivSCOs. This training is important, since the general FEW

becomes responsible for follow-up in the years after the catchment is implemented. Sometimes the general FEW is either not interested, or too busy, to do this well, as was evident from some of the older catchments visited. However, the handover is smooth in cases where the NEP FEW regards the members of the catchment committee as one of his/her contact groups. In Embu a general FEW indicated he worked with 2 former catchments and 3 other groups, per week. In some areas, particularly ASAL areas and new Districts, shortage of staff means there is no FEW to take over. In Baringo liaison seems to be improving.

In Uasin Gishu liaison is particularly well coordinated. The DSCO takes the availability of a FEW into account in choosing catchments, and after the initial work, a DPT and a FEW work together on farm plans and layout. This gives the FEW on-the-job training and a feeling of responsibility for follow up. Another good example of co-ordination was in a Division of Siaya, where the PRA teams were constituted from the FEWs. It appeared that the District Extension Coordinator was not well aware of this, but he agreed it could have a beneficial training impact on the FEWs, since they became more aware of farmers' problems and knowledge, and learnt a better way of interacting with them.

Some Districts, for example Uasin Gishu, have made a special effort to ensure their DPTs get PRA training and exposure, either through courses, or by training-on-the-job with experienced DSCOs and DivSCOs. In Vihiga, a new district in 1991, available staff were poorly trained and a special effort was made to bring them up, with the DSCO feels, an impact on improved achievement rates. Here both the DPT and FEW confirmed that they got training every year, in 3 day sessions. Training-on-the-job was achieved by including the FEW in the catchment laying-out, and in PRAs.

In some districts high staff turnover creates an impact problem. Thus, PSCO had held a two week course for DPTs in Baringo in 1993, but a new course was necessary in 1995-6 because by then only 1 DivSCO survived from those previously trained.

2.10.3 Creating awareness amongst the young and the leaders

The Rural Youth Officer is responsible for most of the 4K Club programmes, working through General Extension. SWCB staff participate in training teachers, as Table 2.4 shows. The soil and water conservation staff make additional efforts in the schools of catchment areas. In catchments visited, most schools had been involved, and their farms had been conserved. In some cases they had nurseries. In one, this failed during the school holidays.

Districts varied in the priority given to training Chiefs and Assistant Chiefs. In some it was felt these were a stable group, who had already been made aware. In others, it was felt important still to target these, because of staff turnover, or new staff in new Divisions and Locations. Baringo was an area where these were targeted in 1994/5. In general it appeared that the impact of past training was good. Chiefs and Assistant Chiefs were in most areas very supportive of the programme, and were frequently actively involved with the Catchment Committees or initial barazas. In one or two places there were problems of cooperation.

Table 2.4 shows that targets were achieved or in many cases exceeded in courses for men and women leaders. In the short time available it was not possible to investigate what categories of people benefited, nor to identify the impact of these.

2.10.4 Training for catchment purposes

Districts achieved their targets in training Catchment Committee members. Committee members interviewed had obviously benefited; they could give details on the training received. Impact is further discussed in 2.11 below.

Training in nursery management was sometimes incorporated into the Committee programme.

2.10.5 General farmer training

Field Days are being very properly used and were a means of transmitting both soil conservation and agro-forestry messages to the farmers. Usually the Field Days are in a catchment area. Numbers visiting rose

Table 2-4 Training targets and achievements in Districts visited

Target group	1992/93			1993/94			1994/95		
	Planned	Achieved	%	Planned	Achieved	%	Planned	Achieved	%
FEW re-training	135	102	76	135	137	101	105	57	54
School teachers	270	55	20	90	142	158	110	51	46
4K club members	1,520	120	8	1,040	1,455	140	920	1,139	124
Young farmers	1,250	30	2	950	283	30	955	708	79
Farmers field days	20,000	12,445	62	18,000	15,909	88	10,170	15,643	153
Chiefs/Sub-chiefs	110	0	0	95	15	16	100	50	50
Leadership/women group leaders	395	469	119	761	1,060	139	408	642	157
Catchment committee members	340	340	100	450	416	92	470	525	111
Nursery management	104	20	19	70	53	76			154

substantially in 1993/4 and 1994/5 (see Table 2.4). Impact was good. Most farmers visited indicated they had attended at least one field day in their area, and could show some measures which they had adopted as a result. They also got information by other methods, such as listening to the radio, or visiting neighbouring farmers who had already adopted a practice. The relatively small number of farmers, mainly committee members, who had been able to visit another District and talk to other farmers who practised conservation methods, or grew crops or raised livestock differently, had found this extremely valuable. In at least one case we could confirm that the returning Committee member (male) had transmitted information to others, including the use of the improved *jiko* stove which he rightly thought would interest women in his area (information from 2 women committee members in Vihiga).

2.11 Participation and gender issues

2.11.1 Use of PRA approach

The catchment approach as introduced in 1987/88 was initially top-down in style. In 1989 a training exercise in Rapid Rural Appraisal was held, and catchment preparation began to include transects and some interviews to collect information from farmers. A national workshop in Participatory Rural Appraisal, which involves establishing priorities with farmers, and planning solutions with them, was held in 1991. From there some officers were able to carry the training down to Provincial level, and to organise courses for DSCOs and DivSCOs. The process was uneven: for example, the DSCO Baringo from 1988 to March 1993 had only RRA training, which he passed on to his DPTs. The PSCO organised a course in PRA in 1993, but due to a high staff

turnover, knowledge of the methodology was still most inadequate in 1994/5 and a new training course was organised early in the 1995/6 year. Table 2.5 shows the number of catchments launched with a PRA in 1994/5.

Table 2-5 Number of PRAs held in sample Districts in 1994/5

District:	Kilifi	Embu	Baringo	Siaya	Uasin Gishu	Vihiga
Total catchments	12	15	Missing	12	12	15
PRA held	6	6		0?	9	3

Source: District Annual Reports

The PRAs varied in depth. In Kilifi a team of 5, including the DPT and a locational FEW and officers from 2 other Departments if available, spend 1 day in preparation, 1 day on the PRA and one day on report writing, the launch baraza and electing a committee. In Uasin Gishu the team is normally six and drawn from several departments and NGOs. Here 4 days is spent, with 2 days on data collection and discussion in the field.

PRAs are also conducted by other organisations and the knowledge drawn from them may be shared in workshops etc. Thus, the DAO Kilifi had a report on PRAs carried out in the Kilifi Integrated Development Programme; in Vihiga SWCB works with KWAP.

The advantages of PRAs can be summarised as increasing the ability of the community to come together to solve its own problems; in getting more commitment to soil conservation; and in teaching officers to respect local knowledge and abilities and to interact with people rather than simply instructing them. There was clear evidence of this latter effect amongst the officers who had participated. Several officers are convinced of the benefits of the PRA approach and thought them very worth the little cost (in Kilifi about Ksh 2000, mainly for lunches, plus fuel; in Uasin Gishu about 100 Ksh per participant per day).

It was more difficult to obtain evidence on whether PRAs had helped communities to solve their problems, partly because many of the catchments we examined had either been worked on before the PRA approach had been introduced c 1992, or had not been one of those who had one since. In the older catchments many farmers we interviewed said they had first heard about the catchment activity when someone appeared to lay out structures on their farm. Officers who had participated felt the PRA had shown people which problems they could solve themselves if they came together, and how to contact government officers or other agencies for help where this was necessary. However, there are other channels for this kind of contact. In more than one case, when we asked how the catchment had started, we were told that people had wanted one, and had put it up through the Sub-Location Development Committee, through which the DivSCO can be reached. There was some evidence that when good Catchment Committees were formed, they outlasted the year of implementation and in some cases had extended their activities.

The disadvantages of PRA are that it may create unreasonable expectations, particularly as farmers are asked to identify their priority problems. In many cases it is found that health, livestock disease, and drinking water rank first, with problems related to soil coming perhaps 5th-7th in the list. Some officers make great efforts to steer people towards solutions to their own priorities, perhaps by helping them approach the appropriate department. In other cases they are able to secure support for soil and water conservation by showing how a high ranking problem such as inadequate food supply could be solved by better soil and water conservation, or that napier grass and fodder trees would improve livestock health.

A second disadvantage is that while PRAs can be exciting and stimulating to officers the first or second time, if they carry out several in similar environments they may find the work becoming 'tedious' as one FEW expressed it. This may be partly because in some Districts officers have problems finding willing members of

staff from other Departments, although in Uasin Gishu we were told this could be overcome if adequate notice was given.

2.11.2 Committee functioning

Most often, when asked how a catchment had started, farmers said they had attended a baraza at which a committee had been elected. The number of people who had attended the baraza varied: in some cases it seemed to have been large, in others a relatively restricted group. In the latter case an unrepresentative Committee could be elected. We found at least one case where farmers had later decided to elect a new committee, and another where the small numbers initially attending had not only formed the Committee, but also received 3 tools each. Not unnaturally this created dissension and discontent, and farmers who had later joined in the expectation of getting tools later broke away (though some continued with conservation on their own account).

Committee formation does not necessarily lead to group work on conservation. In most areas the conservation work is undertaken by the household concerned. People may, however, work in teams where the work is very heavy, as in making stone terraces in some of the AEZ 4 areas. In other places the Committee may form a team, to which neighbours are also invited, to help people who have been unable to conserve for reasons like ill health or age. They may also call in the chief if they feel the person is unreasonably refusing, and we did find a few people who said they maintained their terraces because they feared the government!

2.11.3 Gender issues

The proportion of women on the Committee was mentioned in 4 of the 5 Annual Reports seen. For Uasin Gishu it was not mentioned. In Embu and Vihiga it was generally 3 - 5, but the information was sometimes absent. In Siaya it was more commonly 2 - 4, if mentioned, but there was one committee with 6. The page was missing from the Baringo report, but from interviews in the field it appears that in the semi-arid areas where population is scattered and the catchments are large it is normal practice for the several small villages in the area each to have a village group (often pre-existing) which then sends its chairman (normally male) to the main catchment committee. It must be stressed this is exceptional; most catchments are small, and the committee is elected by one general meeting which chooses from both sexes. In Uasin Gishu (in many ways also an exceptional area because of its large farms) we were told by the men that men did the digging so it was appropriate they should be on the Committee. It is normal in all areas for the Chairman to be a man, but there were several cases, we found, where the Secretary or Treasurer was a woman. Looking at Committee minutes, it was apparent that women spoke up and participated freely. The high representation of women in Kilifi is creditable as this is an area where women are expected to defer silently to men. In western Kenya women normally play a smaller role in leadership than men, but, with many men away, they nevertheless appear on the committee. Talking to some all male committees in Baringo and Uasin Gishu, they agreed that women were taking part in the work, but they felt that it was better for them to have their own group, for example to take care of the nursery, rather than to be on the main Committee. In fact, it is this process that has started the increased role of women in Central and Eastern Kenya; women formed their own self-help groups, and in the process threw up leaders and demonstrated capabilities which made them accepted alongside men as local leaders. This is now happening in Vihiga also, where a young woman said she felt there was no gender discrimination: she had been appointed Treasurer. In Western Kenya there is a strong cultural tradition of different gender roles, but it is beginning to be affected by schooling and the influence of churches.

The Evaluation Team noticed that although almost all SWCB conservation officers met were male, women were well represented as heads of other sections of the Department of Agriculture at District level and in the Department of Forestry. As in other countries, it would seem that women do not opt for an engineering career, but are more attracted to the biological and social sciences.

On the farms, women who farmed without a resident husband appeared able to make most decisions, although they might depend on a husband for money to pay hired labour, and had to consult him before doing any work that might impinge on farm boundaries (for example, whether to have a structure there). Within the farm, women interviewed often said they had initiated a terrace or other improvement. In the west, planting trees is still a male prerogative, or at least requires male consent, partly because trees traditionally marked boundaries. However, it is becoming acceptable for women to plant shrubs!

DAREP surveys in Embu and Meru (Sutherland et al, 1993) show that while men are regarded as in control of large livestock and *miraa* sales, they often consult their wives. Similarly, women are in charge of food crop sales, but a husband may intervene if he thinks she is endangering food security. Cooperation within a family is more normal than conflict and domination, though as everywhere, there are exceptions.

2.11.4 Other social groups

In the time available it was not possible to see how different social groups such as the poor or the elderly were affected by the conservation programme. One can only say that at least some committees were aware of their special needs.

2.11.5 Educational levels

The team's visits to farmers and committee members reinforced evidence from the census and from special surveys that show that educational levels amongst Kenyan farmers are rising. Many farmers we met could understand English, even if they did not feel at ease speaking it. Committee minutes showed good literacy and general competence in organising work. This was so in both highland and lowland areas. Kilifi seemed to have the lowest educational standard.

2.12 Liaison with other Ministries, NGOs and other organisations

As observed above, liaison with the Ministry of Education and teachers appeared good. Liaison with the Department of Forestry appeared good; its officials often participated, for example, in PRAs. Unfortunately, liaison within the MoALDM with livestock officers often appeared less close. In some cases catchment work was suffering because livestock officers had not been brought in to advise on animal control (Uasin Gishu, Kilifi). In general, Crop and Input officers who might have been able to give good advice on cultural methods, fertiliser use, etc did not seem to have been involved, except sometimes informally, and were rarely mentioned in the context of PRAs.

Co-operation with the Ministry of Public Works was often said to be difficult. Where contractors worked on a stretch of road, they often let the water drain out dangerously on to farm land. Where rural access roads were built by communal labour there was less problem, since the FEW and DPT, if present, were able to advise them. There appeared to be no contact with County Councils in Districts where the County Councils are still able to do some work on unclassified rural roads.

In many Districts the programme is working in close co-operation with an NGO or with a programme financed by another Aid Agency. Thus in Embu officers had provided some technical input and committee training for the Food for Work terracing carried out in Gachoka Division in 1994 by the NGO, Plan International. All concerned agree there was an acute food shortage at the time and that since food for work was necessary as relief, it was good to use this to increase food production capacity through soil and water conservation. SWCB has catchments in the same areas, which the Evaluation Team visited. Since there is need for much labour-intensive work, especially on stone terraces, each has supplemented the efforts of the other, the only difficulty being to distinguish the impact of each separately. Farmers seemed to realise that the Plan International payments were exceptional, and that normally they should do the work voluntarily for their own benefit.

In Baringo the difficulty of a different approach taken by an NGO had been solved by giving the Freedom from Hunger Council to work in soil and water conservation in the three northern Pokot divisions. Here, the Council expected farmers to make a financial contribution to the hire of machinery for water pans, etc, while SWCB did not. In other cases, this type of problem is reversed, where an NGO gives more assistance or payments for work than does SWCB. Baringo has also other donor-funded projects; a new one is JAMABA, funded by the Netherlands. This is so far working only in a few communities but will expand. Their choice of location is approved by the DEC, so SWCB knows where they work, and does not duplicate activities. Liaison could be better: it was observed that the officials at JAMABA did not know where the soil and water conservation catchments were, nor that soil and water conservation has long adopted the community-based approach which JAMABA thinks is its own hall-mark. Other programmes in this area include World Vision in the Kerio Valley

and World Food Programmes giving food for work for tree planting, rural access roads and some soil and water conservation.

Baringo has also had problems with different approaches taken by projects funded by different agencies. The Baringo ASAL Programme continued payments for soil and water conservation until 1992/3, although at a reduced level. In the Chemeron dam area payments for work were made till 1991/2, from GoK funds. There is therefore special difficulty in creating farmer self-reliance.

Other programmes include a land husbandry project combined with a marketing element which the British Overseas Development Administration is supporting in Busia, Kakamega, Vihiga, Kirinyaga and Nyeri. It is working with relatively few groups at the moment and the DSCO did not specifically mention it although SC staff have given technical advice in some instances. It expects to expand to cover about 100 groups.

NGOs and other agencies are particularly active in agro-forestry (see further in Chapter 3). In Vihiga there is close collaboration with KWAP. KWAP (Kenya Woodfuel and Agroforestry Programme) began work in Kakamega in 1985 with research on fuel wood species and extension methodologies, but from 1988 moved into trees for various purposes. They are now working with SWCB in the same catchments, joining in the PRAs with the government staff. In Baringo both the National Dairy Project and the Kenya Finland Project overlap with soil and water conservation in giving out fodder grasses and trees.

NGOs are not active in all Districts equally. They were not mentioned, for example, in Kilifi.

DSCOs appear well aware of ICRAF work in their areas, and make visits to, or take farmers to the stations at Embu and Maseno. In one case, Embu high potential farmers had been taken to visit the ICRAF station at Katumani in Machakos, where they found some of the trees unsuited to their area. More appropriate species could have been demonstrated nearer to them at Embu. At the Divisional level there is co-operation with the DAREP programme in Lower Embu.

In most Districts DSCOs felt large-scale commercial farmers were already undertaking adequate conservation. In some cases, these expected free advice as a government service, and this was given. In others, they were willing to facilitate a visit by providing fuel and allowances.

2.13 The district level planning, monitoring and management system

2.13.1 The planning and implementation cycle

There is a transparent and widely understood planning and management system underpinning district soil and water conservation activities. Planning activity is based on the principle that DPTs should plan for actions that can be accomplished in one year. In the densely populated high potential areas, a DPT would be expected to work in three catchments involving approximately 600 farms.

The planning cycle follows the following pattern:

August: DivSCOs/DPTs liaise with local leaders often using the Locational and Divisional Development Committees to identify catchments for implementation during the following financial year. Work plans and financial estimates are prepared for the year based on 2-4 catchments depending on the area.

The financial allocation is received by late July or early August for the implementation of the current year's catchment plans.

September-October: DSCOs compile the district work plans and budgets for submission for the following year. These are submitted to Provincial offices by the end of October. The main cost items are for transport (fuel and repairs), allowances (nights out and lunches at government rates), and training of soil conservation committee members and farmer field days.

DPTs carry out PRAs or barazas and lay outs, and initiate the work of farm level implementation of land treatment plans (the individual farm plans for the catchment).

November: PSCOs hold meetings with DSCOs to review and modify the work plan proposals and budgets. In some instances, Provincial Water and Irrigation Engineers are involved in the review. During the third and fourth weeks, HQ carried out reviews of provincial proposals at the provincial level. These reviews include DAOs and the PDA.

December-June: The follow-on work of catchment plan implementation is continued. In some instances, initial meetings and lay out for catchments not carried out earlier in the financial year are completed.

2.13.2 Reporting, monitoring and supervision

Monthly records of implementation progress are submitted by the DPTs to the DSCOs. The information in these records is used for the preparation of the semi-annual and annual reports provided by the DSCOs to HQ. Reporting formats are provided by HQ. The formats used for reporting by the DSCOs encompass reports on technical soil and water conservation measures, seedling production, training and tool programmes, vehicle operation and fund utilisation.

Monitoring at district level is carried out through a process of supervisory field visits by DSCOs to check on the preparation of the catchment documentation and on the pace of on-farm implementation of the catchment plans. DSCOs would be expected to visit each of the catchments during the PRA and lay out period, with a further follow up visit during the period of land treatment plan implementation. In one instance (Eastern), DSCOs have been recommended by the PSCO to visit each catchment four times per year.

The monitoring and supervisory process is reinforced by supporting visits by the PSCOs and HQ branch staff. For example, HQ teams visit each of the approximately 60 districts once per financial year. The Branch considers the knowledge gained from the district visits to be critical in managing annual planning and budgeting discussions.

2.13.3 Monitoring and management issues

In general, the reporting and monitoring system provides a comprehensive set of indicators for monitoring progress of physical implementation of the main activities of the programme. The semi-annual reporting involves a comparison of planned with actual performance for all main activities. In general, Districts submit their semi-annual and annual reports to Province and Branch HQ within two months of the end of the reporting period though in a small number of instances, there are delays beyond this. Overall, the system of written reports and field supervision visits creates a reasonable degree of accountability on the part of implementing staff. Compared to other sections of MoALDM, staff motivation in SWCB is high due to the relatively good availability of resources leading to the prompt payment of salaries and allowances, and reasonable availability of transport.

Weaknesses in the system which need to be addressed are:

- while the monitoring system works well in terms of reporting on physical progress, no impact monitoring data is collected and reported. This issue will be further addressed in Chapter 3;
- at the catchment and sub-location level, neither the catchment file nor the catchment extension book are amended at the end of the DPT implementation period to show farm by farm implementation status at the time of transfer to the local extension FEW;
- uncompleted catchments are not further reported on beyond the DPT period, being subsumed in the general category "Rest of the District";

- under present arrangements, farm soil conservation activities carried out through the general extension programme (Rest of the District) are not monitored by the SWCB system. Some spot checking and quality control of these activities should perhaps be incorporated into the SWCB monitoring and evaluation function;
- the blanket guideline for each Division to work with three catchments per year may have negative repercussions, particularly in the ASAL areas. It may lead to choice of non-optimal sites in order to reduce time spent on travel; and to inadequate implementation procedures e.g. excluding the PRA from the planning process in order to save time;
- it should be ensured that supervisory visits to individual catchments by PSCOs and HQ staff are arranged randomly in order to avoid visits being "steered" to the best performing catchment sites;
- the heavy round of district touring by HQ staff may leave insufficient time for problem analysis and policy development.
- the soil and water catchment planning exercise is an opportunity for broader based, more collaborative inter-disciplinary planning at the village level which is not taken advantage of at the moment.

2.14 SWCB District budget allocations and costs

2.14.1 Budget allocations and management

Table 2.6 presents district agricultural budget allocations for 1994/95 for five of the districts visited during the evaluation. It shows the significant role of SWCB allocations in relation to total agricultural funds availability for the Districts. During the current financial year 1995/96, SWCB expenditures have become more important than suggested in the table due to the withholding of funds by some donors. As a result of a freezing of IFAD funding which has been in force for the last eight months, districts affected such as Kilifi, Vihiga and Siaya have received no funding releases for major parts of their budgets, including those for general extension.

In such circumstances, on-stream sources of finance such as that for SWCB come under pressure for deployment for other purposes. No evidence of extensive misuse of SWCB funds was found in this context during the evaluation field visits, apart from some sharing of fuel budgets between sections. In the case of Vihiga district, there was an apparent agreement and commitment by the DAO and DSCO to ensure that fuel sharing that involved drawing on SWCB funds would not be allowed to affect adversely the operation of SWCB activities. Reimbursement in kind was expected to take place as soon as IFAD funding was resumed.

2.14.2 Government soil and water conservation costs

A cost effectiveness comparison for the districts visited has been attempted based on estimates of the average costs per farm and hectare conserved. This has been done in Table 2.6 by dividing total soil and water conservation operational (mainly transport, travel allowances, stationery, nurseries and district training) and staff costs (DSCO, DivSCO and soil and water conservation FEWs) for each district by numbers of farms and area conserved. "Farms conserved" here refers to both farms conserved under the catchment approach and through the general extension service. Due to lack of disaggregated financial data, the unit cost estimate of farms conserved is not adjusted for activities performed in ASAL areas.

With 11 and 9 divisions respectively, soil and water conservation staff costs in Baringo and Siaya (over K£100,000 in each case) are almost double those in the other districts which had only 5 Divisions each in 1994/95. Since the numbers of farms treated are generally lower in the high staff cost districts, staff costs per farm conserved in Baringo and Siaya are 2 to 5 times higher than elsewhere.

District government budget operating costs for soil and water conservation vary much less than staff costs across the five districts for which data are presented, ranging from a low of K£50,650 in Vihiga to a high of K£69,544 in Baringo.

Table 2-6 Government costs per ha and per catchment, Kenya £s, 1994/5

	Kilifi	Embu	Baringo	Siaya	Vihiga
District Agricultural Budget					
Development	436115	182630	156073	77672	
Recurrent (GOK)	31817	132535	92414	271800	
Total	467932	315165	248487	349472	
Of which:					
SWC programme	54288	61364	69544	53250	50650
SWC %	12	19	28	15	
SWC Staff Costs	57600	57600	109100	104200	54500
No. of farms conserved	753	1437	966	823	2129
Hectares conserved	1068	2286	*3482	1769	804
Operating budget cost per farm conserved	72	43	72	65	24
Operating budget cost per ha conserved	51	27	19	30	62
Staff cost per farm conserved	76	40	113	126	25
Staff cost per ha conserved	54	25	31	59	68
Total District Budget Cost per farm conserved	148	83	215	191	49
Total District Budget Cost per hectare conserved	105	47	50	89	130

Source: DAOs for budget allocations, 1994/95 Annual Reports for farms and hectares conserved, 1995/6 Branch Workplan for staff numbers.

* Appears to be an overestimate.

The least departmental cost SWCB operations are to be found in Embu and Vihiga. The lowest cost per farm conserved is K£49 in Vihiga followed by Embu at K£83. For Kilifi, Baringo and Siaya, district government costs per farm conserved are in the range K£148-K£215. The lowest cost per hectare conserved is K£47 in Embu (Baringo is ignored since the hectareage conserved figure appears to be an overestimate). The highest cost per hectare conserved is in Vihiga where SWCB in 1994/5 was carried out on farm units of average size 0.4 ha. These estimates do not take account of district differences in the level of conservation measures which already exist prior to the Branch soil and water conservation effort.

2.15 District priorities under a constrained budget scenario

District officers generally had difficulty in estimating how much of the necessary conservation work remained to be done. It was generally agreed that areas under tea, sugar and large farms did not need the Branch's services. In high potential areas some officers thought about 60% of the necessary work had been done.

When asked what the priorities would be if the budget had to be reduced officers gave the answers shown in Table 2.7. It will be noted that priorities varied, but that mobility for staff and training for farmers, so that they

When asked what the priorities would be if the budget had to be reduced officers gave the answers shown in Table 2.7. It will be noted that priorities varied, but that mobility for staff and training for farmers, so that they were both motivated, and able to do conservation themselves, were everywhere stressed. In regard to other types of training, different districts had different needs. In areas such as Embu and Baringo which had a range of AEZ, priority between AEZ differed. Embu is more typical of large areas of Central and Eastern Province where large parts of the high potential areas are already quite well conserved. Baringo has a special problem because the severe gullies in low-lying areas are a product of high run-off volumes in the highland, which in this case are not quickly channelled into a stabilised natural waterway.

2.16 Implications of district findings

It is pleasing to report that the quality of work is improving, and that due to past efforts, in many areas soil conservation technology is widely known and accepted, to the extent that it is becoming a self-spreading innovation. However, the strong implication of the District findings are that priority areas of work vary from District to District and that this should be taken into account in designing strategies for the next phase. Standard guidelines for all districts are not appropriate.

General issues are:

- the need to consider population density, farming systems, animal control and farm and grazing land tenure in the choice of areas to work, in order to ensure that work done is maintained and productive of benefit to the farmer. Experience has shown that conservation is not sustained in areas of shifting cultivation and free grazing.
- there needs to be more attention to utilising water from cutoffs even in high potential areas.
- more attention is needed to roads
- not much is being done in the field of water development for domestic use, and there is some doubt as to whether staff have the necessary expertise
- river bank cultivation guidelines may need reform; good farmer practice in this area should be noted and propagated.
- farmers are already well acquainted with trees; a general extension approach may be more appropriate than special work in a field in which there are already many actors. Young trees are unlikely to survive in areas with uncontrolled animals.
- there is insufficient use of expertise available from other SMS within the Department. This leads, for example, to a failure to make the best recommendations on fertility maintenance, or to address problems of animal management. Related to this is the need to improve communication with the FEW, although some Districts are involving him/her more successfully than others. The soil and water catchment planning exercise provides an opportunity for broader based, more collaborative inter-disciplinary planning at the village level which is not being taken advantage of at the moment.
- there are still very broken links in the chain supposed to exist between research at main stations, on-farm trials and FEWs and the farmer. Output of relevant research recommendations from the stations has been disappointing.
- in many parts of Kenya women participate fully in leadership, and this includes Catchment Committees. Women have a slightly more subordinate position in relation to men in some Districts, especially in the west of Kenya and in Coastal Province. This means they have to await male decisions in respect to trees, which may sometimes delay activities. However, in general there is good cooperation between the genders and even when formal decision making is made by the man, in practice the husband and wife consult. Where the husband is absent the woman may experience a labour shortage in coping with farm

Table 2-7 Priorities under a constrained budget

District or Province	Component	Geographical areas
Kilifi	Adequate transport essential. Cut programme in size rather than take out elements.	
Embu	Staff mobility essential. Training and awareness creation most important so that people do it for themselves. Cut training of chiefs and FEWs as staff now stable.	Concentrate on AEZ 4, parts of AEZ 3 and 5. Little benefit in AEZ 5 & 6. Less need in AEZ 1-3.
Baringo	Support farmer training so they can do it themselves. Give staff mobility to supervise. Develop better water harvesting techniques. Do 2 instead of 3 catchments and work only with cooperative farmers who will influence others. Training important for FEWs, chiefs, CCs, the young. Cut out nursery training.	Concentrate on highlands because they cause the degradation below.* Do only areas with a FEW
Uasin Gishu	Training for farmers. Take farmers on tours to see horror areas and good areas. Maintain transport for training and supervision.	
Nyanza Province	Set different priorities according to area needs: Maintain mobility and farmer training everywhere. Cut soil conservation works and tools. Budgets for vehicle and building maintenance already too tight.	Semi-arid areas: water harvesting In both high potential and semi-arid soil fertility improvement.
Western Province	Maintain transport. Training: 1. Staff. 2. Farmers. 3. Schools. Specialised tools for special areas.	

Source: Evaluation Team interviews.

* See text.

activities. However, in the west the farms are so small this is generally not a severe problem. Many such women do get remittances from their husbands and rely on these for cash, which explains why they do not exploit the full commercial potential of their farm. The consultant thinks that changes in the relationship between the genders are taking place under the influence of education and the churches, and that the Soil and Water Conservation Branch is already taking adequate notice of gender constraints where these exist.

3 NSWCB's National Performance 1992/95

3.1 The policy context

3.1.1 Government of Kenya policy

GoK continues to give priority emphasis to the sustainable management of the environment, and to the maintenance and improvement of the productive capacity of agricultural land. According to a recent natural resources sector assessment commissioned by Sida (Swedforest International/Naturbruk 1995), there is a *"common understanding now...that environment and development are interlinked and cannot be viewed separately...The Government of Kenya has shown great awareness. A number of actions have been, and are being taken, to counteract the on-going degradation of the environment and to ensure that development does not undermine the environmental needs of present and future generations"*.

The Kenya National Environmental Action Plan (NEAP) was published in 1994, closely following the publication of the Seventh Development Plan. Both documents express concern for the deteriorating state of the environment, and hence the need for its preservation and protection. The Plan presents a gloomy diagnosis of the 1980s, as a lost decade of accelerated deforestation, desertification, soil degradation, depletion of mineral and wildlife resources, diminishment of biodiversity, and escalating industrial pollution. In the Plan, GoK makes a permanent commitment to sustainable development which is further elaborated in the NEAP. The Plan proposes the building of capacity to assess and anticipate the impact of development on the environment. The NEAP proposes strategies (described in Swedforest International/Naturbruk 1995) to embed the environmental dimension into mainstream planning and implementation by:

- strengthening the legislative framework,
- providing incentives and penalties,
- putting economic valuation on standing, unexploited resources,
- institutionalising impact assessment,
- creating an autonomous body for coordination and monitoring,
- involving local communities in the management of natural resources,
- providing training and awareness raising,
- undertaking research,
- maintaining and creating designated protected areas,
- addressing the causes of desertification and mitigating the effects of drought,
- formulating a comprehensive land use and human settlement policy,
- building an environmental education and information system.

At the technical level of MoALDM, policy thinking has continued to evolve and latest ideas are reflected in a recent draft perspective paper prepared by SWCB. The paper proposes to broaden the definition of soil conservation and thereby the mandate of the SWCB to cover *"land husbandry activities and techniques to maintain both the physical and socio economic environment for a sound production of food, livestock, wood and other products based on the sustainable use of land, species and ecosystems"* (Soil and Water Branch Sept. 1995). The prominence given to the term *"land husbandry"* is meant to emphasise that sustained conservation is process rather than treatment based. The practical implication of this is to give greater emphasis to soil fertility in the activities of the NSWCB.

Implementation strategies envisaged for the future NSWCB in the perspective paper are:

- continued use of the integrated catchment and PRA approaches as the local level planning and implementation method. The community would be the focus of planning, decision making, implementation and monitoring and evaluation;
- the adoption of a multidisciplinary approach with regular visits in line with the NEP,
- collaboration with research and others such as NGOs operating in the same subject area;

- education and training to continue as important tools increasing the awareness of sustainable farming and the adoption of site specific technology adoption;
- use of the mass media in public awareness campaigns.

3.1.2 Sida natural resource sector policy in Kenya

The overriding aim of Swedish support to the renewable natural resources sector in Kenya is to "*contribute to building Kenyan capacity to manage and develop the natural resources sustainably*" (Swedforest op.cit.). The recent Sida natural resources sector analysis ranked possible areas of Swedish participation by a set of criteria which included Swedish policies and comparative advantage, other donor support, economic growth, social equity, potential sustainability and impact. Out of an original list of 36 subject areas identified by the NEAP, food security (including agriculture) and soil conservation emerged as 5th and 6th on the list of priorities. Important approaches for Kenyan/Swedish support strategies were seen to be:

- institution building
- building human resources through environmental education
- public participation

The sector study reviewed the issue of the appropriate focus on high/medium potential, semi-arid and arid lands. It found that poverty considerations require continued attention to the high potential areas since it is here that most poor people live and where the poverty incidence is highest according to the Kenya Poverty Assessment Study recently published by the World Bank.

The study recognises that semi-arid lands are subject to in-migration from high potential areas, and that agro-pastoral systems are being replaced by more sedentary farming systems. Generally, incoming land use practices are not conducive to the more marginal areas. The study considers that research and development outputs are inadequate and there is a great need to intensify work in both these areas. It notes that many donors are supporting activities in the semi-arid areas.

Its review of arid area development efforts concludes that few have been successful. More recently, research on pastoral land-use systems has started though it is likely to be 5 to 10 years before the technical base is available to allow fruitful development work. The needs of the three broad agro-ecological zones are summarised in the study as follows:

Figure 3.1 Development prospects in different regions

High/medium potential	Research	<i>Development</i>
Semi-arid	<i>Research</i>	<i>Development</i>
Arid	<i>Research</i>	Development

The recommendations made by the Sida sector study relating to the NSWCB focus on innovation of "holistic" approaches at the local or grass roots level. Specific approaches suggested are:

- pilot development programmes that are area-focused e.g. in one or several Divisions, incorporating a wide range of issues that are prioritised by the local community e.g. health, water, land husbandry;
- action research i.e. participatory research identified by land users as useful and necessary and designed to generate innovative technologies which are appropriate and affordable;
- more attention to support local innovation and entrepreneurship such as greater local access to credit for the poor generally and women in particular.

Poverty alleviation remains a strong emphasis for Sida supported programmes.

3.2 Review of programme technical performance 1992/93-1994/95

3.2.1 How much conservation work still remains?

Soil and water conservation achievements as recorded by the Branch are presented in Table 3.1. While the level of achievement remains high, numbers of farms terraced peaked in 1991/2 and decreased thereafter. It is not clear whether the reduction in number of farms terraced implies a corresponding reduction in the area conserved. Decline in number of farms conserved may be due to:

- financial, transport and staff shortage constraints experienced by SWCB;
- poor state of the economy, affecting the resources available to the farmer and the incentive to invest in land improvement (see 2.1.3); and
- the fact that most of the urgent conservation work has already been done and farmers feel they can afford to slacken.

We note that 30-50% of the terraced farms are outside the catchment areas. This high level of achievement is attributed to general extension messages, the farmers' perceived economic gains from conservation, the influence of the catchment approach on neighbouring farmers and other donor and NGO projects.

Table 3-1 Conservation trends, 1988-95

Activity	88/9	89/90	90/1	91/2	92/3	93/4	94/5
Terraced farms, catchment							44804
Terraced farms, non-catchment							35555
Terraced farms, total	59456	70218	92468	97655	86597	82989	80359
Cut off Drains	489	1028	831	579	630	743	544
Waterways	37	99	122	51	65	65	112
No. gullies controlled	2382	1252	2725	1397	214	2734	1740
Rehabilitated sites, no.	183	180	387	804	1634	214	
River Bank Protection, no.		3372	3633	1781	1412	1889	4643

The level of achievement for other activities varies from year to year based on the plan and the requirements of the areas worked on.

In an attempt to establish the current level of conservation, and the time required to complete the necessary work. SWCB initiated a needs assessment exercise in July 1995. This exercise involves determination at divisional level of the total area, total number of farms, total area conserved, number of farms conserved, area in need of conservation, farms in need of conservation and the time required to complete soil and water conservation. This exercise appears to have stalled and should be resumed, expanded in scope to incorporate additional information

that would provide a basis for adopting different strategies for different areas and for making financial and human resources allocation in the future. There appears to be some peculiarities in the quality of data which should be addressed (e.g. in Machakos and Baringo). An analysis of available data confirms our field observations that conservation needs are different from area to area and hence the need to review the allocation of human and financial resources to meet requirements. Table 3.2 presents the time required to complete the necessary conservation works based on the preliminary work on needs assessment.

Table 3-2 Time required to complete the necessary work, by District

Time in years	Districts
< 10 yrs	Muranga, Meru, Vihiga, Nyandarua, Nyeri, Makueni, Embu, Isiolo, Kajiado, Kitui, Trans Nzoia, Nandi, Keiyo, Mombasa, Kirinyaga
10-20 yrs	Kilifi, Thika, Bomet, Kiambu, Kericho, West Pokot, Busia, Kakamega, Transmara, Lamu, Taita Taveta, Tana River
20-30 yrs	Nakuru, Nyambene, Bungoma, Baringo
> 30 yrs	Homa Bay, Laikipia, Uasin Gishu, Tharaka-Nithi

Source: NSCWCP, 1995. Conservation Status. (Report under preparation).

It should, however, be noted that the status reported above is in respect to on-farm conservation measures and does not assess work in terms of increasing land productivity by alleviating soil fertility constraints.

3.2.2 Improving the knowledge base through research

The 1992 evaluation mission noted the knowledge gaps and recommended development of further expertise on water harvesting through intensified research and subsequent field adaptations and on soil husbandry through additional research and adaptive trials in different agricultural areas on cultivation practices, vegetative covering, mulching and green manuring.

Research on some land husbandry aspects was taken up through collaborative initiatives involving KARI, KEFRI, ICRAF and SWCB (see Table 3.3). During the field visits we were impressed by the scientific aspects of KARI/KEFRI/ICRAF collaboration but noted that as yet there are no results ready for farm adoption. The collaboration seemed to be driven more by the scientists rather than addressing specific questions raised by SWCB.

Promising technologies in water harvesting have been identified (Mwarasomba and Mutunga, 1995) and adaptive research and on-farm trials are undertaken by the University of Nairobi, Laikipia Research Programme, KARI-Kaumani, KARI-Perkerra, DAREP, SWCB, NGOs and by farmers. Widespread promotion of water harvesting technologies by extension workers is constrained by:

- Lack of conclusive research findings that extension officers and researchers would be willing to pass on to the farmers. No long term research trials have been set-up (DAREP is, however, an exception to this as they have 8 years, data but its reports are not widely available). Researchers are reluctant to disseminate findings which they feel have not been sufficiently thoroughly tested.
- Research tends to concentrate on alleviating water constraints rather than alleviating both water and fertility constraints.
- No forum exists for the exchange of ideas, experiences and skills. This leads to duplication of efforts and repetition of mistakes made by others.

Farmers are doing a commendable job of experimenting with conservation techniques they have seen applied elsewhere. Their experiences are well documented in DAREP reports and by Mwarasomba and Mutunga (1995).

Table 3-3 Research collaboration initiatives

Collaboration	Priority activities
SWCB-KARI	Diagnostics of catchments and on-farm research Manure management - Evaluation and utilisation of manures and their integration with inorganic fertilisers in small farms Improvement in quantity and quality of fodder grown on terraces Impact of soil and water conservation measures on soil productivity on steep sloping lands
KARI-KEFRI-ICRAF (Embu)	Agroforestry for fertility maintenance Agroforestry for erosion control
KARI-KEFRI-ICRAF (Maseno)	Improving soil fertility Increasing supply of wood products Increasing supply of good quality fodder Improving multipurpose trees Forging links with extension and farmers

Recommendations on on-farm trials, research co-ordination mechanisms and commissioned research will be found in Chapter 4.

3.2.3 Too much or too little water?

Rainfall in Kenya is such that there is frequently either too much water or too little water. The challenge is to prevent or cure water damage on the one hand and to alleviate water constraints to plant production or improve water supply situation on the other.

- Control and use of road side runoff

Roadside and footpath runoff has been identified as the main causes of gullies and a major contributor of sediments in the river systems. MoPW has in response to this challenge developed, in consultation with the Soil and Water Conservation Branch and affected land owners, strategies for minimising the damage (MoPW, 1992). Minor roads programme officers have been trained on technologies and approaches for controlling roadside runoff and these topics are incorporated in the Minor Roads Program training curriculum. When constructing new roads, they provide mitre drains and culverts at reasonable spacing to ensure that the accumulated flow rate and volume can be handled by the disposal system. While this may be done during new road construction, road repairs and in particular maintenance of roadside drainage to ensure safe disposal of excess water are rarely done. Some farm access roads are not made by MoPW but by community action. As a result many roads still receive high volumes of uncontrolled roadside runoff which leads to gully formation on and off the road.

Considerable effort has been made by farmers in some semi-arid areas to control and use productively on their farms most of the roadside runoff, thereby contributing to the reduction of roadside erosion. Official advice in the past was that farmers should dispose of excess water through a waterway constructed along the common boundary. This was impracticable, particularly in areas with high population densities, and the farmers opted to manage their excess water by diverting it into retention ditches. As noted in Chapter 2, it seems that DPTs give rather limited attention to assisting farmers in laying out and improving farm roads in the catchment areas and there are still serious cases of roadside erosion and gully formation.

It is the view of the Evaluation Team that roadside runoff continues to be a major cause of soil erosion, particularly in high rainfall areas, and that it offers opportunities for water harvesting in semi-arid areas. Recommendations follow in Chapter 4.

- River bank protection

River bank protection is a joint responsibility of the MoALDM and the Ministry of Land Reclamation, Regional and Water Development. There are no common strategies and meaningful collaboration between the two ministries on this issue. In an effort to control encroachment of farming along the river banks, the MoALDM instituted river pegging to clearly demarcate areas prohibited for cultivation, and established posts of River Scouts to advise the farmers on river bank utilisation, allowing farmers to grow perennial crops such as arrowroot, napier grass, bananas, etc. These posts were later abolished. In theory the duties were taken over by local TA, but in practice the area is neglected.

- Alleviating water constraints: Accomplishments of ASAL section

Accomplishments of the ASAL section of the Branch fall into two categories, water development for domestic and livestock use and water harvesting for plant production. They are presented in Table 3.4 for the period 1993-5.

Water conservation in ASAL is a relatively new activity in the Branch. The initial impetus was mainly directed at water development and rehabilitation of denuded sites. We note with approval that the Branch is now shifting its emphasis to water harvesting for plant production. Considering the challenges presented by water harvesting for plant production, shortage of adequately trained staff to handle water development issues, and we endorse this shift. It is likely that it will give a higher ratio of benefits to costs, since water development for human and livestock use is expensive in relation to the number of beneficiaries. However, the budgeted amounts for different types of water development are not given in current Branch reports

Table 3-4 Water developments: Planned and Achieved

Activity	93/94 achievements	94/95 achievements	95/96 planned
Water pans	16	37	8
Water pan/hole	91	71	21
Shallow wells		63	45
Spring protection		86	40
Rock catchment	3	10	10
Rehabilitation sites (Ha)	20	100	110
Contour bunds (Ha)			263
Water spreading bunds (Ha)			87
Basins (Ha)		431	104
V-shaped bunds (Ha)		119	105
Trapezoidal bunds (Ha)		19	18
Semi-circular (Ha)			94

- The way forward

1. The potential for improving crop yields and reducing climatic risk in semi-arid areas through water harvesting is high considering that as much as 60% of the rain water can be lost to runoff. Assisting farmers to tap this potential would alleviate poverty of the rural land uses in semi-arid areas by increasing crop production, food security and incomes.
2. Water harvesting technologies have been widely adopted by farmers in Machakos, Kitui, Taita Taveta, Laikipia and Baringo districts and SWCB has endeavoured to use this experience to promote water conservation (Mwarasomba and Mutunga, 1995). This activity deserves high priority in terms of funding, training personnel, and demonstrations and intensified on-farm trials in which farmers, extension staff and researchers collaborate.
3. Water is the main factor limiting productivity of ASALs and water conservation initiatives have in the past been viewed as an end in themselves rather than a means to improve production. Water conservation should be an integral component of better land husbandry for improved crop production.

4. Water control, storage and use issues cut across agro-ecological boundaries. In high potential areas, with good markets, land is so precious farmers would like to use every square metre. The traditional way of disposal of excess water into artificial waterways is not acceptable and alternative ways of making the water useful or leading it off safely have to be found. Often similar techniques can be used to those in ASAL areas, using the water for crops that are water-hungry, and the Branch should therefore develop expertise in water management to deal with water control, conservation and efficient use in both areas. SWC staff with an engineering background should be given further training in design of structure for efficient water control, storage and use.
5. The ASAL section of the Branch has made commendable progress in providing guidelines aimed at improving the quality and promoting sustainability of water conservation structures. These measures include development of a checklist on the procedure to follow in investigations, design and implementation, promotion of technical panels to evaluate the quality of the implementation proposals presented for funding and technical training. National, provincial and district panels are used to screen the proposals and their members include engineers from MoALDM, MoPW and MLRRWD, public health officers with experience in domestic water supply, range management specialists and NGO representatives with community mobilisation experience. The district, provincial and national panels are chaired by DSCO, PSCO and Head, SWCB respectively. The panels should be monitored to assess how effective they are particularly in terms of technical competence and experience, objectivity, biases and special interests.

3.2.4 Soil conservation tools

Soil conservation tools are supplied as part of an incentive package to the catchment members. The tools

Table 3-5 Procurement of hand tools

Item	92/93	93/94	94/95	95/96
Axes	510	0	0	0
Crowbars	510	400	350	300
Plain jembes or shovels	65,000	55,000	45,000	40,000
Pangas	3,500	1,000	1,000	1,000
Wheel barrows	50	200	200	200

Source: SWCB Plan of operations 93/94-95/96

distributed include plain jembes, fork jembes, shovels, pangas, mattocks, crowbars, axes, pickaxes, sledge hammers, caps, tee shirts, head scarfs, rucksacks. According to a report on the evaluation of the tools programme, the tools play an important role in promoting soil and water conservation particularly in areas where farmers are poor, special tools are required, soil is very hard for traditional tillage tools, group work on non-farm land is required and they recommended continuing to give them after work had commenced (Agricultural and Rural Development Consultancy, 1994). However, the farmers, committee members and SWCB staff we talked to had different views of the role of tools in enhancing soil and water conservation activities. Views expressed include:

1. Tools serve as an incentive when they are issued before the work starts, because then they facilitate it
2. Tools are necessary for undertaking conservation works on public lands such as controlling gullies, roadside runoff, constructing farm roads, group nurseries, etc
3. Tools serve as a reward for the good work done and hence motivate some farmers to work hard.
4. Tools can create dissension particularly when they are seen to be personal properties of some of the group members (though NSWCB's present policy of giving them to the Committee rather than to individuals has alleviated this).

5. Tools such as jembes are not necessary particularly when dealing with communities that are already cultivating.
6. In special cases the soils are very hard and when dealing with resource-poor farmers, tools should be provided.
7. Tools arrive too late to be of any use in the catchment implementation.
8. Sub-division of districts has meant that the same land area receives more tools than before.
9. Under a reduced budget scenario, tools would have a low priority.

Table 3-6 Distribution of hand tools

	Plain Jembe			Mattocks		
	93/94	94/95	95/96	93/94	94/95	95/96
Kiambu	720	720	255	20	20	25
Thika		180	275			27
Nyeri	1,100	600	300	0	21	30
Taita Taveta	360	467	170	8		17
Isiolo	260	150	90	0	38	8
Machakos	420	180	230	10	24	22
Makueni	391	190	175	13	26	15
Meru	190	230	330	25		31
Nyambene	-	320	405	-		39
Tharaka Nithi	190	300	240	8		22
Garissa	370	260	305	5		32
Kisii	1020	450	660	30		66
Nyamira	420		270	10		27
Nakuru	1950	270	651	26		53
Kilifi	800	200	215	0		20
Headquarters			1744			256

Source: SWCB 93/94 Annual Report; 94/95 Annual Report; and 95/96 Work Plan

Note: Only plain jembes and mattocks figures are reported as approximately equal numbers of plain jembes, fork jembes, shovels and of pangas, mattocks, crow bars, axes, pick axes, sledge hammers are issued in each districts.

Analysis of the procurement of hand tools shows that the number of tools procured has decreased over the years (see Table 3.5). The Evaluation Team notes that tools are issued to every district in the country but not in equal numbers (see Table 3.6) and no criteria have been documented on guidelines on the distribution of tools among the districts. We strongly feel that the tools should be distributed according to the needs of the districts evaluated on the basis of a criterion that is transparent.

SWCB should review its tools policy and a recommendation is made accordingly in Chapter 4.

3.2.5 Maintenance and improvement of soil fertility

Serious concern with soil fertility problems in Kenya began in the 1920s and continues now. For the last few years, crop production has continued to decline and this has been largely attributed to poor nutrient status of the soil, although there has been no analysis of other contributing factors such as rainfall and the poor economic environment.

Although there has been lack of analysis of where and why yields have declined, the fact that most Kenyan soils suffer from inherent low fertility, further depressed by losses of plant nutrients through leaching, soil loss and runoff and continuous mining of nutrients through crop harvesting is an undoubted element in the problem. In response to falling fertility, demand for inorganic fertilisers continues to be high, but in recent circumstances, many small scale farmers cannot afford to buy it. It is for this reason that extension and research workers are exploring affordable technologies to enhance soil fertility. KARI and other government research has looked at the use of inorganic (especially P and N) and organic fertilisers together to improve soil fertility and hence crop production while other organisations, including ICRAF and many NGOs, are looking at organic methods only.

Work on soil fertility evaluation by Fertiliser Use Recommendation Project (FURP 1988) covering a wide range of AEZs shows that most of the soils are low in P, have low to moderately levels of %N and %C and that most are high in K. This explains why most of the fertilisers used by both small and large scale farmers in the country largely contain N and P e.g. DAP, TSP, SSP, CAN and 20:20:0. Unfortunately, most of the major soil types in Kenya (e.g. ferralsols, acrisols and andosols) are known to be P-fixing. The FURP project was started in 1985 and of the 70 trial sites conducted in the country, about 70% are located in the Kenyan highlands (FURP, 1988) and they represent major AEZs and soil types. Preliminary results are available at National Agricultural Research Laboratories (NARL), KARI, Nairobi (FURP, 1994). In addition to inorganic fertilisers, each of the 70 FURP sites had plots where FYM had been applied. Observations in some of the sites indicated no response to inorganic fertilisers yet some had a significant yield increase with application of FYM (e.g. Nabwire, 1994). It has already been observed in Chapter 2 that these results are not feeding through to Extension and the farmers and that in some cases the wrong fertiliser is being used for local conditions, sometimes with very damaging results.

It must be remembered that where soils are deficient in certain nutrients or trace elements, so is the fodder grown on it. What enters the animal deficient, comes out deficient. Hence in many areas it is appropriate to remedy deficiencies by using the appropriate inorganic fertiliser, or rock phosphate. While composting certain types of tree leaf can concentrate what P there is, it is a labour-intensive method of acquiring the necessary levels, and tends to add considerably to the burden on women. However, they may be willing to take this option if fertiliser is expensive or inaccessible.

The use of manure to improve soil fertility has other long-term benefits e.g. that of improving soil structure. Most of the small scale farmers especially those with zero-grazing make use of FYM to enhance soil fertility. These farmers are mostly found in the high potential areas of Kenya. Where insufficient amounts of FYM are available, this may be supplemented by mineral fertilisers which are normally applied in small doses. Farmers could manage their manure better. Few roof the boma and a lot of nutrients are lost through leaching and volatilisation. The reasons they do not have a roof are not known but should be investigated. Others apply FYM when it is not fully decomposed. In areas with mixed farming, availability of manure for the smallholder cropping enterprises is a major problem. The FURP report points out that none of the available reports reviewed have a detailed account of manuring practices such as application rates, methods of application, time between applications or data on the quality of the manure used. In addition, the work of Omolo and Mbegera (1995) indicates that there is lack of teaching guides and manuals on proper utilisation and management of organic fertilizers. In recognition of this problem, SWCB had asked KARI at one time to give advice on the qualities of different types of animal manures and the best method of making it, but this has not yet been received.

In areas where farmers have enough crop residue, some of it is left as mulch. This is especially practised in Trans Nzoia and Uasin Gishu districts where much of the maize stover is left in the field to improve soil fertility. Work on a nitisol at NARL (Qureshi, 1987) showed that incorporating maize residues increased the contents of soil available K, Ca, Mg, P, OC and total N. However, incorporating plant residues in the soil depressed grain yields in the first 3 years, the decrease being greater in the first year (12%) which was reduced (4%) by the 3rd year. In later years, increases in grain yields were obtained, averaging from 2.9-10%.

Currently there are many governmental and NGOs promoting agroforestry practices in most parts of the country while other measures are relatively neglected. Of the several organisations visited by Omolo and Mbegera, (1995), more than 75% are involved in promoting AF activities. e.g. MoALDM, MENR, MOE, KEFRI, ICRAF, KARI, KENGO, KWAP, CAP, MAD, RSCU, Plan International and CARE Kenya. Traditional agroforestry practices have been in existence for many years on most farms. The tree species grown have

multiple uses and among them is that of enhancing soil fertility using *grevillea*, *sesbania*, *calliandra* and *leucaena* and other species. Research tends to focus on alley cropping, while most farmers prefer to plant trees along boundaries or terrace edges. Lekasi et al (1992) found that incorporating residue of *Acacia mearnsii* prunings (at the rate of 0, 1, 2, 4 and 8 tons/ha) to a soil depth of 15cm consistently offered greater returns. The optimal return of maize yield occurred at 2.5 tons/ha. The multitudinous efforts in the agroforestry field leads to a recommendation for reduced effort in SWCB in Chapter 4.

Tillage methods such as tied ridging, minimum tillage, mulching, conventional tillage and contour furrows have an indirect or direct effect on soil fertility. In Coast Province, most farmers use tools ("kaserima") which tend to harden the soil as the plough depth is very shallow. This results in accelerated soil erosion. In other places, e.g. Vihiga district, tillage operations are not carried out in good time due to the problem of couch grass which takes a lot of time to eradicate. This may require special tools. It is noted that information is not available on which kind of tillage belong to which soil type or kind of farming systems. However, it is clear that most small scale farmers use hand tillage while others use oxen and donkeys.

Currently the NSWCB has broadened its activities to include soil fertility improvement and good land husbandry. This is reflected in the seasonal extension messages, as noted in Chapter 2. The problem lies in the vagueness of the recommendations, the failure of research to take into account farmer practices and needs, and the failures of extension to take advantage of research recommendations related to the needs of particular types of soil.

In addition to retaining water where it is needed, soil conservation measures should also aim at minimising plant nutrient losses through runoff and soil loss. Losses of plant nutrients can be high if effective soil conservation measures are not put into place. Gachene (1995) observed that the soil washed from the plots was 247% to 936% richer in P than the original soil and that changes in soil pH, %C and %N were significantly correlated with cumulative soil loss (r values of 0.77**, 0.59** and 0.71**, n=20 respectively). Gachene further observed that there was a decline in maize grain and above-ground dry matter yields of 214kg/ha and 1135kg/ha per cm of soil loss for the first 2.5cm of topsoil. In the field we found farmers who reported the benefits they had received from better retention of productive topsoil.

This impact of soil conservation measures is not well documented. Soil samples for fertility analysis could be taken in selected sites within the catchment before and after treatment. The analysis of soil samples from such farms will assist the programme to give better advice to farmers. This was recommended during the last review mission, but it does not seem to have been taken up.

There is still a wide gap between research, extension and the farmer. The last review recommended intensified farm trial collaboration with the general extension service. This is still quite far from being accomplished. Some research observed at Maseno, for example, involved impractical rotation between maize and a tree crop to restore fertility, that would have reduced farmer income over a three year period. Experiments were being conducted on rented farm land, but with no evaluation by the farmer.

3.2.6 Staffing expansion

Table 3.7 shows the staff position in SWCB during 1993/94 and 1994/95.

It will be noted that as districts have continued to increase in numbers, increased staff have been employed, increasing the burden on GoK recurrent revenue. Nevertheless there are already staff shortages which means some DivSCO and SCAs combine two duties, as shown in Table 3-7.

3.2.7 General training activities

This consists of courses organised by headquarters, provinces and districts using work plans.

- Headquarters Training

Headquarters courses were organised by section coordinators for developing technical competence among the soil conservation officers in the field. Participatory rural appraisal courses and exercises were carried out as

Table 3-7 Staff of the SWCB, 1993/4 - 1994/5

	1992/93	1993/94	1994/95
Headquarters: Kenyans			
Expatriate Advisers	12	12	10
	2	2	2
PSCO	7	7	7
DSCO	47	50 *	55
DivSCO	220 (short fall 16)	270 (short fall 16)	280 (60 doing other duties as well)
SCAs	445 (short fall 27)	551 (short fall 29)	570 (86 doing other duties as well)

* including 4 new districts.

Table 3-8 Courses organised by Headquarters staff

Type of Course	Target of Course	Number of Participants		
		92-3	93-4	94-5
Soil Conservation	Teacher Training	32	-	-
Communication TOT	DSCOs, DivSCOs	30	59	24
Soil Conservation	Managers of Approved Prov. Children Officers	27	-	-
Soil Conservation	Farm Managers & District Children Officers	30	-	-
Soil Conservation National Seminar	DSCOs DivSCOs	78	28	48
Participatory Rural Appraisal (PRA)	SWC, PSCOs, DSCOs	30	-	*43
Agroforestry	Forest Officers, DSCOs, DivSCOs, Crop Officers	**32	60	52
Water Harvesting	DSCOs, DivSCOs	30	60	-
Soil & Water Management ASAL	PSCOs, DSCOs	-	-	28
Soil Conservation	Secondary School Inspectors	-	28	-

Note: * Nordic PRA including range officers.

** Only Foresters, DSCO, DivSCO while others include home economics and crops officers.

training exercises, often including officers from different ministries but with teams headed by PSCOs and DSCOs. Table 3.8 summarises achievements. The courses covered areas related to SWC or Agroforestry and some of them have had positive effect on DSCOs/DivSCO especially on PRA and LTP. The training of trainers courses have had an effect also but more is needed in this area to promote a smooth transfer from special SWC

activities to normal NEP at all levels through improved communication. It is also important to establish criteria for training at each level and clearly indicate how much training originates from headquarters and for whom. This also applies to the provincial training described below.

- Provincial Training

The provinces organised the following courses:-

- Professional Group Meetings
- Educational Inspectors
- PRA/RRA
- Catchment Planning
- Provincial ASAL Seminars
- Field Days
- Leadership II
- Catchment Assessment
- Agroforestry Seminars.

Professional group meetings are very important when SMS get together to review technical innovations.

Table 3-9 Provincial training

Target group	1992/93			1993/94			1994/95		
	Plan	Ach	%	Plan	Ach	%	Plan	Ach	%
Professional Group Meeting	-	-	-	155	73	47	117	118	100.8
Education Inspectors	180	105	58.3	168	136	80.9	170	44	25.8
PRA/RRA Catchment Planing	240	182	75.8	250	188	75	160	228	142.5
Provincial ASAL Seminars	174	90	51.7	90	117	130	140	124	88.5
Provincial Field Days	15,500	4,500	29	10,000	5,200	52	4,000	4,300	107.5
Other Gov. Officers	208	42	20	120	53	44	160	35	21.8
Leadership II	330	137	41	150	90	60	310	35	11.2
Catchment Assessment	-	-	-	245	169	68.9	0	161	161
Agroforestry Seminars	-	-	-	110	30	27.2	138	30	21.7

adoptions etc and should be vigorously supported. It is implied in the last section that more attention should be given to the latest research findings at these seminars.

- Provincial seminars of one week duration were carried out in Coast, North Eastern and Western Provinces for DivSCOs and other departments in the MoALDM though the target was overshoot in 1994/95.
- Catchment planning for DPTs was carried out in each year by PSCOs for updating the planning teams on new developments and had good response during the three years under review by achieving 75% for two years. The reduced target in 1994/95 was surpassed. The DPTs' performance has shown some improvement at the field level as observed during the field visit.

- Government officers, courses meant to create awareness on SWC among Government of Kenya officers from other ministries such as Transport, Energy, Environment and Natural Resources, with a duration of 3 days, were held during the period under review. Only two provinces held them each year for alternative years. The necessity of this component needs review.
- Target achievement in leadership training rose from 41.8% in 1992/93 to 60% in 1993/94 but then dropped to 11.2% in 1994/5. We hope this reflects a needs assessment and a falling requirement for this type of course. Education inspectors training met 25% of target in 1994/95. It would be more effective to try to influence curriculum development in favour of good land husbandry than to try to train inspectors whose job is to see that it is adhered to.
- Field days are very good extension methods but many provinces do not hold them. We think they should be left to districts, with the option of inviting PSCO/PDAs to attend as guests.

- Courses Conducted by Districts

These are reported under 8 heads, as shown in Table 3-10. The classifications are not clear, and in some cases, key people such as the SCAs who carry out catchment planning, and the Catchment Committee members, are included with others. The classifications need to be revised to reflect the current way the programme works, so that it is easier to see whether key groups have been reached in training programmes. The figures for 1994/5 are particularly difficult to interpret because for the first time, women participants were separately enumerated. The footnote at the bottom of Table 5 in the Annual Report for 1994/5 implies that totals achieved are given, with the number of females shown in brackets. However, in the commentary on target achievement, it appears that in at least some of the classifications, the bracketed and unbracketed numbers were added, which implies that the unbracketed number was males only. In selecting which numbers to give in Table 3.10 we have been guided by the percentages of target achievement given in the commentary on Table 5 in the 1994/5 Annual Report. Procedures need to be checked before officers compile their next annual reports.

- FEW retraining. Target achievement was high in the first two years and declined during the third year. This one week course included catchment planning but it is not clear whether the target group were general FEW who were to become SCAs, or whether it was for the general FEW.
- Chiefs' training needs to be reviewed due to numbers already trained as compared to the existing numbers of chiefs.
- The Youth programs and its supporting agriculture and patron-teachers has had good target achievement except in 1994/5. The consultant agrees this is an important area of work.
- Leadership I courses are for catchment committee members, innovative farmers and leaders of women's groups. They often include visits to catchments inside or outside the District.
- Farmers' days remain popular. The figure for 1994/ is unclear as the number of women participants appears to exceed the total number of visitors. Farmers' visits to other districts to see and discuss catchment treatment by their colleagues should be emphasised in future. **This recommendation is amplified in Chapter 4.**

- Women's participation in District courses.

This element, as noted above, was a new feature of the reporting system. Our interpretation of the figures given is that women formed 21% of the FEW retraining, 30% of teachers and 0% of chief's. In the case of chiefs this probably reflects the proportion of women in this position. In the case of FEWs and teachers, the proportion of women attenders may also reflect unwillingness or inability to attend courses addition to professional work and home duties, or a low proportion of women FEWs interested in catchment work, or of teachers who have specialised in agriculture. However, women seem to have formed 56% of participants in leadership I, 58% of nursery management, and to be well represented in 4K Clubs and young farmers clubs. They form over half of field day visitors. It is good to see that women not only do most work on the farm, but also probably form

Table 3-10 District Training

Target group	1992/93			1993/94			1994/95		
	Planned	Achieved	%	Planned	Achieved	%	Planned	Achieved	%
New FEWs	124	0	0	-	-	-	-	-	-
FEWs-retraining	1,368	1,127	83	1,430	1,134	79	1,309	783	60
Chiefs	1,012	529	53	782	576	74	922	435	47
Teachers	2,836	1,819	64	2,538	1,874	74	1,654	618	38
Leadership II	2,117	305	14	-	-	-	-	-	-
Leadership I	10,937	11,158	109	11,063	11,848	107	12,289	11,848	96
4K club/ Young farmers	20,688	14,158	68	11,465 5,480	12,751 4,538	112 83	10,650 8,160	9,973 4,517	94 55
Nursery Management	-	-	-	1,259	860	68	1,013	621	48
Farmers' Days	180,079	167,082	93	173,590	137,725	79	137,710	137,120	99

* Numbers in report probably mistaken. See text.

the majority participants in training offered to farmers.

3.2.8 Formal staff training and study tours

Formal training is summarised in Table 3.11. In addition, about one M.Sc student per year was sent for training in UK.

Table 3-11 Academic courses for staff

Course	1992/93	1993/94	1994/95	Venue
Bachelor of Science	1	2 (3 years)	5 (4 years)	JKUCAT
Bachelor of Science	4	-	7 (4 years)	Egerton
Diploma Course	7	-	4 (2 years)	Bukura
Agroforestry	1 (1 month)	1 (6 weeks)	1	ICRAF
Agroforestry		1 (6 weeks)		Kengo
Land use planning	2			Malawi

Study tours are organised as part of in-service training for staff. The 7th international soil conservation conference held in Australia in 1992 was attended by 3 officers. In 1993/94 25 soil conservation officers toured the Northern part of Tanzania for 2 weeks. In 1994/95 the following places were toured: Tanzania 2 officers, India 12 for conference and 2 for PRA clinics; Lesotho 10 officers study tour; 12 toured Zambia. 1 for working

in Thailand and 1 attended the Sida regional advisory committee in Eritrea. While tours and conferences can and do influence the improvement and redirection of SWC/Agroforestry policy, if funds become short, it may be necessary to send fewer officers and to make formal arrangements for those who go to disseminate what they learn to colleagues.

3.2.9 Participatory rural appraisals and the catchment approach

In none of the Annual Reports for the period under review is there a summary of PRA activities undertaken in the catchment launching process. A Catchment Implementation Assessment exercise held in 4 Provinces was reported in the 1993/4 Annual Report. It noted several deficiencies in catchment implementation (p. 9), including the fact that few DPTs carried out PRAs. No follow-up action on the result of this workshop was reported in the 1994/5 report, which mentions PRA only in connection with training activities. This is to give it little importance, in spite of the fact that officers at national level appear convinced of the benefits of the process, a view that is shared by many DSCOs (Chapter 2).

Several recent articles have been written by IIED staff who have had a brief to assist in training staff and developing the techniques involved. These articles find that the PRA has been a factor in accounting for high levels of achievement in catchment activities (e.g. Thompson, 1995). However, this assessment is based on a small sample of catchments (6) and other possible explanatory factors for the different achievement levels are not tested - for example, level of existing conservation, AEZ, market access, educational levels, etc.

Although the case made has not been convincingly proven, the experience of the many officers who have taken part leads to the conclusion that

- PRA is an effective method of actively involving the community, and getting its commitment to and understanding of the programme
- it has a beneficial educational effect on the staff who take part, making them more effective in their approach to farmers because they have a greater respect for the farmers' technologies and knowledge, and because they have learnt to listen and to observe rather than relying on what may be out-of-date texts and attitudes passed on from one generation of civil servants to the next.

We therefore recommend that PRA continues to be used, and that it be reported on, so that headquarters is aware if Districts are slipping back to less labour-intensive methods of catchment launching, such as making a skimpy area survey and then holding a baraza which may or may not be attended by a majority of the de facto household heads - including therein the women who are managing household activities in the temporary or permanent absence of their husband. Those responsible for monitoring should make a point of asking to see the latest PRA reports - which need not be typed up, and can be adequately presented in manuscript. The Evaluation Team always requested to see PRA reports but few were found.

3.2.10 Transport

The current transport fleet for the programme is presented in Table 3.12.

Of these vehicles, 16 are at HQ, 13 at Provincial level and 63 at District level. In addition, there are 321 motorcycles for use in the Divisions. Table 3.13 shows the state of the motorcycles in 1995. In the Provinces listed only 35% were operational, the position being particularly bad in North Eastern, which can be assumed to have most difficulty in obtaining spares.

The district visits carried out by the team confirmed that the proportion of transport fleet not operational is substantial, being reported as 40% of vehicles and 20% of motor cycles in one district. Universally, at all levels of the NSWCB, transport is cited as the number one constraint and priority for resources. This need is acutely felt at Divisional level where catchment planning exercises have come to be carried out on the basis of daily commuting, rather than by overnighting in the site area.

As with the T and V system being operated by the general extension service, the DPT catchment approach to soil and water conservation is transport-intensive and high cost. As noted in the Financial Section below.

Table 3-12 Transport fleet, 1993/4 and 1994/5

	Suzuki	Land Rover	Minibus	Peugeot 504	Land Cruiser	Bus	Troopers	Lorries
1993/4	13	42	7	4	15	3	1	2
1994/5	13	45	7	4	17	3	1	1

Source: SWCB Annual Reports

Table 3-13 Operational status of motor cycles

	Coast	Eastern	North Eastern	Rift Valley
On road	30	51	21	34
Off road awaiting repairs	50	40	62	33
Grounded/boarded	20	9	18	33

Source: Mutanga (1995)

transport operating costs (which include transport repairs) have risen to 25% of the programme's Sida-funded operational budget. If all travel and transport related costs are combined (i.e. transport operating, travel and accommodation, transport hire, vehicle replacement, motor cycle purchase), these constituted 40% of the Sida-funded operating budget in 1994/95. Even at this level, large sections of the transport fleet are not operational as noted above.

In the case of motor cycles, the suggestion has been made that a scheme be established to allow Divisional officers to purchase motor cycles in order to improve the level of machine care and maintenance. This possibility has been worked on for the past two years in the context of NEP II, but no solution has been found. Machines that have been assessed to have completed their economically useful life could be boarded and sold off with priority to SWCB divisional officers.

The question arises as to how far programme implementation should continue to be based on a system that assumes that transport is infinitely available. The strategic proposals put forward by the mission to withdraw intensive DPT catchment planning from areas which have already achieved a certain threshold of conservation, would reduce transport requirements in those areas. Other transport cost-saving proposals are made (see Supervision) for the devolution of supervision from HQ to provinces.

3.3 Programme organisation, planning, monitoring and management

3.3.1 Strategic objectives

The overall goal of the NSWCB has been most recently defined at the November 1995 programme planning workshop (Particip GmbH, November 1995) to be the promotion of improved land husbandry practices by farmers and pastoralists.

3.3.2 Functions

The technical purposes or functions of the NSWCP (and SWC Branch) identified at the November 1995 planning workshop were to encourage:

- practices for soil and water conservation and improved soil management to enhance soil productivity.
- increased, as well as diversified, production and use of trees and tree products.
- effective control of run-off from physical infrastructure (roads/schools/shops) in the areas affecting the catchments.
- the use of tools and simple technologies for conservation, production, processing and marketing of agricultural products within selected catchment areas.

The workshop decided in the course of its deliberations to incorporate the last component into the first. The Evaluation Team considers the second could also be incorporated in the first.

3.3.3. Organisation

The present organisation of the MoALDM is steeply hierarchical. The SWCB is four organisational layers away from the Permanent Secretary, the senior civil servant and chief policy and decision maker in the Ministry. The Head of the Branch reports to the head of the Agricultural Engineering Division which contains four other branches (the status of one, AgroForestry, being revised). The head of Agricultural Engineering Division reports to Land and Crop Development Services, headed by a Deputy Director, and who is paralleled by a Deputy Director for Extension and Training Services. In turn, he reports to the Director of Agriculture who reports to the Permanent Secretary.

We provide no diagram of the present organisational structure of the Ministry because it is currently subject to a major strategic review which is aimed at rationalising the overall functions and organisational shape of the Ministry with a view to identifying and concentrating the Ministry's efforts on core functions. More than eighty existing Ministry functions have been identified. It is anticipated that around half of these will be phased out or privatised, but that SWC will be retained as a core public service function (Director of Agriculture personal communication). The proposals for organisational restructuring are not yet available, but it is to be hoped that rationalisation will lead to some delayering and broadening of the institutional framework in order to shorten lines of reporting and command.

The current organisational framework of the Soil and Water Conservation Branch (see Figure 3.2 below) broadly reflects its technical functions through three sections for ASAL, agroforestry, planning and extension. Technical functions are serviced by separate training and socioeconomic sections. The latter has been added since the last evaluation since 1992. The status of the agroforestry section has been the subject of considerable discussion during the past year. In view of the perceived need for the section to forge extensive external institutional linkages, proposals have been made by the Agricultural Engineering Division to raise its status from "Section" to "Branch" level. However, the rationale of the restructuring exercise is to diminish the number of operational reporting units and the proposal has not been implemented.

An apparent anomaly in the present organisational structure of the department is that the service functions of planning, monitoring and evaluation are merged into the main technical section responsible for non-ASAL soil and water conservation. Historically this has been the most important technical section of the Branch and the closer integration of technical and management functions was a reasonable development. It is recommended that the service functions of planning, M&E, and socioeconomic are combined into one section which backstops all technical sections equally. In practice, this is already happening. The organisational adjustment would, therefore, mainly be one of formalising this in the organisational structure of the Branch. The recommended new structure is elaborated in Chapter 4.

Organisational rationalisation of the technical sections of the Branch is also recommended. Water management for both semi-arid and high potential areas should be the responsibility of one section. Soil conservation, agroforestry and fodder production would be handled by a Soil Management Section. It will be noted that this

Figure 3.2 Present organisation

Head - SWCB				
Socio-Economic	Planning and Extension	Training	Agroforestry	ASAL
Socio-economic aspects	Soil and water conservation Planning, M&E, Extension Land use	Staff training Schools	Extension Nurseries	Extension Water conservation

reduces the current level of staffing and importance given to agro-forestry. Justification for this is given in Chapter 4.

3.3.4 Planning

NSWCB planning is based on an interlinking combination of long, medium and short range planning measures. Recommendations of the 1992 Evaluation Mission to establish strategy formulation workshops have been adopted in 1995. A perspective document has been recently prepared by the Branch with the intention of providing a long range strategic level planning framework for the NSWCB. The specific proposals of the perspective document are addressed in the relevant technical sections of this chapter and in chapter 4.

Medium-term operational planning for NSWCB is carried out through a three year Plan of Operations, the latest of which is for the period 1993/4-1995/6. This document describes the programme objectives, strategies and activities envisaged for the period, backed up by sections on management and staffing arrangements, and proposed resource requirements presented in the form of annual budgets. The proposed budgets are based on anticipated allocations from Sida, and expected Swedish Krona to Kenya Shilling exchange rates. The preparation of the medium-term Plan of Operations against the resource constraint imposed by the programmed Sida allocations provides a sound approach to the planning of the medium-term programme.

Annual forward planning is carried out within the frame of the medium-term Plan of Operations, and is undertaken through Annual Work Plans which provide details of implementation targets by district for the various programme activities. The Branch Annual Work Plan is constructed from the District Annual Work Plans which are submitted to HQ, through the PSCOs, as described in the District Chapter. As with the Plan of Operations, the District Work Plan proposals are also prepared against the anticipated level of resources available, as advised by the Branch HQ. The provision of a resource constraint, against which activities can be planned at the district level and below, is a positive feature of the existing planning system.

It is not clear that there has been adequate response by the SWCB at the strategy level to changing achievement and resource circumstances. This may be in part due to the lack of intellectual investment in this area by HQ staff as result of intensive field supervision programmes. Strategic programming activities including a workshop and the production of the perspective document have been initiated in 1995. However, the process does not appear to have asked fundamental questions about project design, for example:

- how to respond to static/declining resource situation (budget, staff, transport) i.e. questions of whether to spread or concentrate by focusing SWC efforts geographically, by AEZ, by target group, by activity etc. This should link in with analysis of what activities are still priority, what no longer needed.
- the limited use of PRA and the possibilities for its expansion,
- more use of catchment plans as centre pivot for broader based, interdisciplinary, locally focused planning.
 - possible inappropriateness of blanket rules such as the 3 catchments per division guideline.

The Evaluation Team strongly advocates the continued use of resource constrained planning methods in order to focus attention on priorities. This approach, although already used in short term planning, was

dropped for the November programming workshop. Implications of a tightening resource base are fully developed in Chapter 4, which sets out a revised strategy.

3.3.5 Reporting, monitoring and supervision

- **Reporting**

A process for routine reporting is well embedded in the SWCB management system. Standard formats are used. From the bottom up, this process consists of:

- monthly reports from DPTs at Divisional level to DSCOs at District level.
- using information from the monthly reports to prepare semi-annual and annual district reports from the DSCOs to Branch HQ. The reports cover progress on the targets and actual implementation of soil and water conservation measures including those in the ASAL, seedling production and tree planting, training and tool programmes, vehicle operations and funds utilisation, transport and staffing.
- compiling the results of the district annual and semi-annual reports into the Branch Annual and Semi-Annual Reports with a similar content structure.

To be useful for management purposes, activity reporting needs to be prompt so that remedial response to problems identified can follow quickly. A sample review of report submission for 1994/5 for the six districts visited during the evaluation indicates that most district reports are received at HQ within two months of the year end. This is considered to be the latest acceptable date for effective programme management. Classifications need to be revised from time to time to reflect changes in the importance of various activities, as already noted in regard to training.

- **Technical Monitoring**

SWCB should be commended for the improvements that it has made in technical monitoring of its activities. They have improved the format and frequency of reporting, increased the number of trips made to follow-up field activities, offered critical review of the district and divisional progress reports, concentrated activities within the catchment for ease of verification, encouraged proper documentation and better planning. Evaluation of certain activities by consultants has also enriched their programmes. Improvements are however required in the following areas:

Verification of the data reported - under the current reporting system it is difficult to verify the quantity of work done particularly in the 'rest of the district'. Work done in the catchment and 'rest of the district' should be made verifiable by ensuring a regular update of the status of conservation book, indicating which LTPs that have been implemented, where, when and by whom the work was done.

Documentation of technical faults - Although the Evaluation Team saw some incidences of poor quality of the work, such information did not appear in the follow-up reports. The Headquarters, Provincial and District supervision teams should be encouraged to report on such cases so that other DPTs can learn from these mistakes. This would also contribute in staff appraisal for further training and promotion.

Avoid guided tours - The supervision team should avoid pre-planned guided tours and select catchments and farms to visit at random during the monitoring exercise.

Continued monitoring of the performance of catchments - Under the current reporting system, past catchment work is reported as part of "rest of district". There is a case for following up the catchment reporting for at least 3 years so that difficult cases can be picked up and worked on.

Monitoring checklist - SWCB has developed a monitoring checklist which includes performance of conservation works, transport facilities and financial issues. A technical monitoring check list should be developed to guide monitoring staff and ensure that a thorough assessment of the quality of work is done. This is particularly necessary when an agro-forester makes technical appraisal of the structural works or a water harvesting specialist makes technical appraisal of agro-forestry. Experiences from such follow-up activities should be discussed at the next planning workshops and incorporated in the training courses.

Monitoring for impact assessment - When dealing with farmers that have not fully perceived the benefits of conservation, it may be necessary to demonstrate the benefits of conservation. Such data could include demonstration trials results, use of erosion pins to document quantity of soil lost, yield monitoring in farms with recommended land husbandry practices and those without. This data is available in some catchments; it could be noted so that it can be used in organised farmer to farmer visits.

- **Impact Monitoring and Evaluation**

Impact monitoring continues to be seen by the Branch and by successive evaluation teams as vital to effective evaluation of the activities of the NSWCB and its cost-effectiveness. It is necessary in order that the Branch has convincing data to defend its activities when priorities are decided within MoALDM and nationally, and it is also necessary from the point of view of donors who need to justify aid programmes to their taxpayers. It would assist the RSCU in commending aspects of the programme to other governments in the region. However, to date little progress has been made. What has been done is summarised in Table 3.16 and discussed in section 3.5.2.

Two local agricultural economists were recruited during 1994 and 1995 to the new socioeconomic section (one is at present on long term postgraduate training). They have done valuable work in PRA training and in evaluating farmer technologies, as has already been commented on. A TA adviser has been provided since the end of 1994. Staffing discontinuities and existing work loads are blamed by the Branch for the failure to introduce an impact monitoring system.

The evaluation team recommends that an impact monitoring system be given priority and be established in 1996, combining a set of technical and socioeconomic indicators. Given budgetary and staff constraints, the system should be designed to be simple and low cost. Suggested design features are given in Annex 2. Given budgetary constraints, and the fact that it is needed for donor and regional as well as internal purposes, separate funding might be sought for it, so that the normal programme does not suffer. It is not absolutely essential for the practical continuance of the programme, since Kenyan farmers would not use its data, but would be more convinced by practical information and demonstrations coming from similar farmers in similar situations. This they are already obtaining, and suggestions are made in Chapter 4 for further ways to assist them to make their own assessments.

- **Supervision**

The present management arrangements of the NSWCB are characterised by a high level of supervision being carried out by HQ personnel. HQ teams visit two thirds of the more than 60 districts once per year. The advantage of this is that HQ officers are relatively well informed about the field level situation, and that progress monitoring and supervision is well understood and accepted. The knowledge gained by HQ staff is extremely useful in managing annual planning and budget discussions.

The disadvantages are that the heavy schedule of supervisory visits leaves insufficient time for problem analysis and policy development. One of the reasons quoted for the failure to mount impact monitoring was the difficulty in arranging planning sessions for this new activity because of absence of officers in the field. While high levels of HQ supervision and technical backstopping are appropriate during the introductory phases of new activities, it should be possible to reduce supervisory inputs once the activities are well established. HQ activities would then focus on analysis of monitoring information, problem analysis and solutions emanating from this, and associated or innovatory policy development.

The evaluation team supports the recommendation of the 1992 evaluation that there be some devolution of management supervision to the provinces. This implies strengthening the provincial level capability in those provinces. Depending on the numbers of districts in each province, the solution here may be to consider deploying HQ staff to the three large provinces (Rift Valley, Eastern and Coast) which at present are only staffed by one officer.

Problem solving, technical support visits would be the backbone of senior level supervision. The focus of HQ and provincial supervision would be on those districts identified as underperforming through the technical reporting and monitoring process. Quality control visits to other districts would still be required but on a less frequent basis. Other measures relate to introducing an element of unpredictability into the supervision process. For example, a proportion of supervisory visits made by supervising officers at all levels should be unannounced. General supervision should be made on the basis of random selection of divisions and catchments in order to avoid the "steering" of visits to the most favourable sites.

3.3.6 Links with other MoALDM activities and outside institutions

- **Agroforestry activities**

At present, the Branch has many collaborators in the private sector. However, most NGOs, religious organisations, and donor agencies who overlap with the Branch in land husbandry activities have in the recent past focused on agroforestry. Many are doing a good job - KWAP was noted, for example, in Chapter 2. Many others start nurseries and give out tree seedlings. The Department of Forestry also collaborates in this area, training of SWC staff and distributing a lot of trees per year from their own tree nurseries. Other agroforestry links are with ICRAF, KARI and KEFRI though they did not yield very many messages.

- **Soil and water conservation activities**

Most NGOs involved in soil and water conservation do not have the technical capacity that SWCB has. DSCOs and DPTs should interact with these organisations to ensure that they pass on any technical skills and that they get information on the quantity of work achieved using NGO's initiative and where it is undertaken so as to get a true picture of the status of conservation. By working together wherever possible and having regular consultations, they may get closer to harmonising soil and water conservation strategies and approach and promote complementarities rather than duplication of efforts.

- **Linkages with other MoALDM activities**

Although DSCOs participate in the monthly training sessions for FEWs, collaboration with other SMS is still insufficiently developed, given the importance of collaborating with livestock production and crop development in land husbandry. Recommendations to secure a more integrated approach to the farmer, giving him/her the benefit of the full range of SMS, are set out in Chapter 4.

- **Linkages with the Ministry of Education and Ministry of Cooperatives**

While MoALDM did not implement the recommendation of the last evaluation mission on delegating more work to the Ministry of Education, we found that the PSCOs, DSCO, and the rural youth officers indicated that there is a good collaboration between the two ministries at the moment and a very clear division of labour. The Ministry of Education would like to become the main administrator (of funds) for 4K club development (school approach) which the teachers are already doing as patrons, while the MoALDM would remain the subject matter specialists and continue to provide technical materials on SWC among other areas such as crop production, livestock production etc. At the moment the MoALDM is fulfilling this role through such materials as SWC calendars, booklets, cooking the 4K way, nutritional manual for home economics and several handbooks on crops and horticulture etc. There is need to prepare the ground work better by including them in the project budget showing what could go directly to MOE and what would remain with MoALDM (as in NEP where some funds are passed on to KARI for financing linkages).

This mission agrees with the Branch that it is not necessary to involve the Ministry of Cooperatives, as suggested by the 1992 evaluators

- **Commercial organisations and large farms**

Agricultural-based commercial firms such as Kenya Breweries and parastatals like the Pyrethrum Board, Kenya Tea Development Authority get SWC messages from their own staff whose background training is in agriculture. The NSWCB provides advice on request to large farms. It should be paid for instead of being provided free.

3.4 Programme budget, costs and financial management

3.4.1 Programme budget and costs 1992/93 - 1995/96

According to the 1995/96 Printed Budget Estimates (unrevised), total budgetary allocations on the agriculture sector through MoALDM in 1995/96 are planned to be K£154.6 million (up from K£80 million in 1992/93) representing 1.6% of total government budgetary expenditures (down from 2.6% in 1992/93). The NSWCB constitutes 3.2% of the MoALDM Development Budget and 2.8% of the Recurrent Budget.

Table 3.14 below presents financial allocations for the NSWCB from 1992/93 to the present. Operating cost allocations for NSWCB have declined by 25% in nominal terms between 1993/4 and the current financial year, mainly as a result of the appreciation of the shilling. In real terms (i.e. after adjusting for inflation), resources available to the Programme for operational purposes have declined by 50% since 1992/93. In the three year period between the financial years 1992/93 and 1994/95, the budget declined by 32% in real terms. This is shown by the line in Table 3.14 giving constant 1992/3 prices. Activities as measured by the numbers of conserved farms declined by only 7% over the same period. Clearly the reduction in resources has induced considerable efficiency improvements in the programme.

GoK's contribution to total programme costs in the current financial year 1995/96 is 48% after taking into account the costs of salaries of local personnel and an imputed cost for office accommodation and storage. Based on actual allocations (as distinct from budget estimates), while GoK's contribution to operating costs through the recurrent budget has increased over the last three years, Sida continues to provide 95% of operating costs. Actual GoK allocations are considerably lower than the allocations in the printed budget estimates. The budgetary sustainability of the programme i.e. the ability of the programme to be sustained by local resources in the long run continues to be a major issue. There is no evidence that the GoK budget situation will improve sufficiently to permit it to take over, or even increase substantially, the present levels of operating costs in the foreseeable future. An agreement that GoK would raise its operating cost contribution to the World Bank supported NEP II project from 10% to 40% in December 1995 has not been implemented due to budget constraints.

Table 3-14 NSWCB Budget allocations, K£'000

	1992/93	1993/94	1994/95	1995/96
Operating costs				
D10 (Sida) ¹	2989.3	2926.1	3118.5	3000.0
AIA (Sida) ²	2790.0	5091.5	4115.0	3517.0
R10 (GoK) ³	n.a.	n.a.	176.3	314.0
Subtotal	5779.3	8017.6	7409.8	6031.0
Subtotal in 1992/3 prices ⁴	5779.3	5344.0	3952.0	2924.0
Salaries(GoK)				3134.0
Other (GoK) ⁵				1850.0
Total costs⁶				11015.0

Source: NSWCP Annual Reports for 1992/3-1994/5, Work Plan and SWCB for 1995/96.

¹ Disbursed through the GoK Development Budget.

² Aid in Appropriation, disbursed through special account.

³ Disbursed through GoK Recurrent Budget, 1994/5 figure is allocation, 1995/6 is as per the year's Work Plan.

⁴ Assuming 50%, 25%, and 10% inflation in 1993/4, 1994/5, 1995/6 respectively.

⁵ Estimate for office accommodation and storage supplied by SWCB.

⁶ The Table does not include the costs of Swedish expatriate personnel.

Analysis of the utilisation of project costs during 1992/3-1994/5 shows a fairly regular pattern of programme allocations over the period. The main expenditure items are shown in Table 3.15. The share of mobility costs of transport operation and travel has increased over the period from 29% to 35%. The rising costs of vehicle and motor bike operation are in part due to the ageing of the transport fleet, and also to rising fuel and repair costs.

The figures highlight the need to develop strategies to restrain transportation costs. Training and education/publicity materials comprise 30-36% of annual allocations.

Table 3-15 Percentage shares of operating allocations by head

	1992/3	1993/4	1994/5
Transport operating	19	21	24
Travel and accommodation	10	10	11
Stationery	13	16	16
Training	17	20	16
Plant and equipment purchase	10	11	9
Other	31	22	24
Total	100	100	100

Source: Calculated from NSWCP Annual Work Plans and Budgets

The 1993/4-1995/6 Plan of Operations takes into account the reduction in Sida allocations from SEK 25 million to SEK 15 million annually over the period. The assumption that the Kenyan shilling would decline by around 10% per year against the SEK has, in the event, been subverted by an unexpected appreciation of the Shilling of about 15% during 1993/94. This reduction in shilling purchasing power for the programme has not been significantly compensated by declining inflation.

3.4.2 Financial management

The disbursement basis of the NSWCB is such that Sida is reimbursing and not pre-financing programme expenditures so that the cost of misallocated funds is borne by GoK. It is recommended that as part of the general performance and financial monitoring of the programme, SWCB should give attention to measuring financial outcomes against implementation results.

The main current problem of financial management relates to extensive deviation (up to two thirds of districts affected) in AIE allocations compared to Work Plan/Budget. The latter forms the basis of the formal resource allocation agreement between Sida and GoK. The reasons for these deviations from the Work Plan, which clearly states the allocations for each cost category and each district, are unclear. The Evaluation Team strongly recommends that the financial section of the Ministry adheres to the allocations set down in the Work Plan budget and to the existing rule that AIE allocations should be endorsed by the head of SWCB before these allocations are released. An additional measure would be for the SWCB to check, at the time of fund release, the AIE allocations from a copy of the weekly report sent to the Paymaster General by the MoALDM finance section. The process of finalising the Work Plan and Budget agreement between Sida and GoK should also include representation from the MoALDM finance section as well as from Sida and the Treasury. This is not the case at the moment.

Some minor issues at the district level relating to the control of funds in the event of non-release of funds for other activities are noted in Chapter 2. The most serious difficulty regarding financial management at the district level continues to relate to releases of funds for the programme through the GoK budget. A Task Force consisting of treasury, line ministries and Sida is carrying out a study, in the second half of 1995, of District Treasury Financial Management.

However, in general the situation appears to have improved since the last evaluation in 1992. Most districts reported having access to funds within one month of the official tranche release dates of July 1 and January 1. This means that there is a certain amount of "dead" time in these two months. However, since the delays in releases are predictable, various strategies to adjust to these are possible including leave taking, carrying out

office-based work, retaining a residue of funds from the first tranche to maintain some activities in January, operating fuel and other accounts on credit etc., and indeed a number of these have already been adopted.

The application of different rates of travel allowances within the programme and between programmes and projects, is a potential source of future conflict. Emphasis should be given to regularising these discrepancies on the basis of government regulations. Since the latter provides for full cost reimbursement of legitimate items, no hardship should be incurred.

3.5 Programme benefits

Programme benefits can be assessed in three ways: by formal cost-benefit assessment of the impact of the NSWCB at the national level; by cost-benefit analysis at the farm level; and by estimating the improvements in the reduction of soil loss and the availability of water resources.

3.5.1 Cost benefit analysis at national level

This is not possible for two reasons. Firstly, an appropriate set of data which identifies productivity changes attributable to the programme does not exist, due to the absence of impact monitoring on which we have already commented. Once established and expanded, impact monitoring would provide the basis for differential AFZ-based cost-benefit assessments to be carried out.

A number of quantitative (or partially quantitative) evaluation studies have been carried out but these are limited in number, analytical scope and areas covered. Out of nine studies reviewed, three were carried out using the same sample of farmers. Nevertheless, as these studies provide the only quantitative estimates available, they have been reviewed by this evaluation study, and the results are shown in Table 3.16. They provide an indication of the impacts of soil and water conservation at farm, catchment and district level. Fuller details are provided in Annex 2.

A second reason for the difficulty in evaluating the impact of the Branch's work is that it is only one of the actors in the situation. A new understanding of the central influences that drive farmer investments in soil and water conservation is starting to emerge. A ground breaking case study of soil erosion in Machakos (Tiffen et al, 1994) concluded that demographic, economic and institutional factors had combined to create an environment where farmer investments in on-farm improvements were profitable. The study found that continuing population growth, in association with market development, and individualised land tenure had generated new technologies which had supported both increased productivity and improved conservation of land and water resources. The inference of this paradigm is that government interventions of themselves are not sufficient to establish sustainable developments in soil and water conservation. Government support will in fact only reap an economic return at a point where private returns to farmers are realisable. Government support to terracing has been given outside the programme as well as within; for example, terracing was made compulsory for coffee farmers from the 1950s.

The high incidence of soil and water conservation observed during the district field visits cannot simply be the result of exhortation, be it from government or elsewhere. Rather the awareness of the monetary benefits of soil and water conservation practices, and the skills to carry them out, are extensively embedded in those areas where the majority of the country's population resides. To this the Branch has contributed.

One estimate of the Branch contribution could be based on the cumulative number of farms which had been totally or partially conserved under the programme during its 21 year life. This had reached nearly 1.2 million by 1994/95. The total number of smallholder farms in the country is around 3 million (Kenya Agricultural Growth Strategy, Ministry of Agriculture, Livestock Development and Marketing, September 1995). On this basis, 40% of all farms in the country have participated in programme activities.

It should be noted that there are some anomalies in the data. The Branch's Annual Reports for the period prior to 1987/88 are not available so estimates prior to this are somewhat weak and in some cases appear to be exaggerated. The other qualification is that numbers of conserved farms for the period since 1987/88 are a combination of both catchment and 'Rest of District', which, as already said, is not so well checked by the

Table 3-16 Summary of impact study results

Author	District	Sample size	AEZ	Impact of Soil Conservation on:		
				Food Crop Yields	Farmer Returns	Economic Returns
Holmberg 1985	Kitui	81	Semi-arid	+ve	+ve	+ve
Figueiredo 1986	Machakos	52	UM2 UM4	-ve +ve		
Holmgren et al. 1987	Machakos	46	UM2-4	0 to +ve	0	..
Lindgren 1988	Machakos	46	UM2-4	+ve	+ve	+ve
Hedfors 1991	Nandi	?	HP	+ve	+ve	+ve
Ekbom 1992	Trans Nzoia	80	HP		+ve	+ve
SWCB 1993	Bungoma			+ve		
	West Pokot			+ve		
	Trans Nzoia			+ve & -ve		
	Nyeri			+ve		
	Kakamega			-ve		
	Kirinyaga			+ve		
Ekbom 1995	Muranga		HP		-ve in 1st 3 years, +ve to intermediate SC measures thereafter	
Mwarasomba et al 1995	ASAL		ASAL	+ve	+ve	

Note: +ve = positive; -ve = negative

Source: Consultant's review - See Annex 2

programme and which may include farms worked on by other organisations. There will also be some double counting, since some farms covered during the earlier extension-oriented phase of the programme will have been revisited during the catchment approach. Farms assisted may therefore be nearer to 30% than 40%.

Nevertheless, to have succeeded in assisting 30-40% of all the farms in the country with their soil and water conservation efforts is a considerable achievement and a measure of the impact of the NSWCB. Furthermore, there are indications that the catchment approach which provides participating farmers with practical help for the laying out of terraces etc has had a positive impact on farmer attitudes towards MoALDM and its extension services.

3.5.2 Impact evaluation studies - farm level results

Some limited indication of returns to soil and water conservation practices is shown by nine studies which were carried out between 1981 and 1995. The main features and results are summarised in Table 3.16. Sample sizes recorded ranged from 46 to 81. Three of the study sites were characterised as being in high potential areas, two were related to semi-arid areas, and three sites contained both high and medium potential areas. One failed to describe the agro-ecological zones in which its assessments were carried out.

Five of the studies found firm positive private and social returns to soil and water conservation investments. These covered both high and medium (semi-arid) situations. Two studies found no impact on yields and farmer returns. And one study found positive farmer returns after three years but no short term impact.

The SWCB study of six catchments, which was based on rapid rural appraisal rather than sample survey techniques, found positive catchment programme impacts on yields in four of the catchments, a mixture of positive (on large farms) and negative (on small farms) impacts in one catchment, and zero yield impact in the sixth. Thus, the majority of the studies found positive impact which confirms the views of farmers we interviewed (chapter 2).

3.5.3 Impact on soil loss and erosion

There are inadequate data to measure the impact of NSWCB on soil loss reduction and yield increases. This could only be done by comparing data at two points in time. This may be possible with a further search for material. Data exists showing the suspended sediment loads of major rivers (MoWD, 1982). This is given in Annex 3. This provides indicative values of the status of soil loss in some catchments. Data of this nature can be used to identify which catchments and segments of catchment are contributing most to sediment loads, and therefore, it could help to define priority areas for soil and water conservation. (Other criteria would also be needed, such as competence to deal with the problem, and costs and benefits, since in some cases it might be identified that much of the sediment was coming off pastoral land which is difficult and expensive to conserve. In other cases, high priority might be justified, because the sedimentation in question was affecting a dam providing valued drinking water, irrigation or electricity). If sediment loads are, or have been, monitored over time it should provide information on areas of improvement or of continuing loss. Further research is needed to identify available information and to see what use can be made of it.

3.5.4 Impact on water supply and watertables

There is inadequate data that could be used to assess the impact of the NSWCB on water supply and water tables, but some farmers highlighted this. For example, Mr Amdayi, a farmer in Kasisit Catchment in Kabartonjo Division of Baringo District reported that he has conserved over 90% of the rainwater that falls on this land in the form of in situ moisture conservation (mulching), retention ditches and fanya juu terraces. As a result of such intensive water conservation exercise, the groundwater rose and he dug a shallow well at the lower end of his farm. He reported that the groundwater in the well has been rising and therefore concluded that he had more groundwater resources than he was utilising using the well and decided to construct a fish pond. The fish pond is expected to receive some water contribution from surface runoff.

3.6 Recommendations and conclusions

Some recommendations and conclusions from the national data examined in this chapter have been highlighted. However, the main recommendations, which draw also upon our conclusions from the field work reported in Chapter 2, are presented in Chapter 4.

4 Conclusions and Policy Recommendations

These recommendations were presented and discussed with senior Branch staff at a workshop in Nairobi on 5th February 1996, revised to take account of an important improvement then suggested, and re-presented to a larger workshop on 6th February. Subsequent to that the team reflected on the workshop discussions, and on written comments received from the Branch and a verbal comment from the Swedish Embassy. As a result the recommendations were amplified at some points, and slightly modified at others, but their basic thrust remains unchanged. The Evaluation Team were gratified to find that the analysis of the likely future resource base, and the desirability of having as a goal a programme that could be sustained from Kenyan resources, were largely accepted. It is hoped that a good basis for discussion between Sida and GoK has been provided. The Evaluation Team would like to express its admiration for the quality and professionalism of Branch staff, and its confidence in their ability to meet the challenges the future brings.

4.1 The likely resource environment in the next few years

The conclusion from the policy context review in Chapter 3 is that the availability of finance in the next five years is likely to remain extremely constrained. Although many donors (including Sida) and the government of Kenya remain supportive of environmentally-focused programmes which aim at conserving natural resources it must be recognised that:

- the Government of Kenya is facing an extremely limited revenue resource base. This is partly due to world market factors and the depressed economies being experienced in developed countries, partly to internal events which have deterred tourists and lowered revenue from this source, and partly to still unresolved problems and holdups in the process of freeing up and privatising marketing. For this reason the GoK may have problems in maintaining even its present level of support to the programme in terms of staff and building costs, and a small proportion of operating costs etc, even though SWC has been ranked as a priority core activity within the MoALDM.
- due to economic problems in the home countries many aid agencies, including Sida, are having to prioritise projects within a reduced budget. There is also a factor of donor fatigue, in that aid has been given for many years to some countries without evident sign that projects and programmes will eventually become sustainable out of the recipient country's own human and financial resources.
- Because of the view taken of the Kenyan political situation, Kenya has slipped downward in donor ranking of priority countries for their aid programmes. Agencies are also facing increased demands for aid from the former communist countries.
- In so far as they continue to support better natural resource management in Kenya, many donor agencies are moving away from support at the national level to support at the District or local level, in order to foster self-sustaining, self-reliant developments there. In Sida the current recommendation in SWC is for "*Pilot' development programmes that are area-focused, ... in one or several divisions, incorporating a wide range of issues that are prioritized by local people, e.g health, water, land husbandry*" (Swedforest 1995:45). The British and Dutch Aid agencies are moving in the same direction, and both are supporting locally-focused projects which include a strong land husbandry element (British) or a research-extension-farmer linkage (Dutch) which will be taking place in the next 5 years in Western Kenya and on which they are liaising with the MoALDM. The World Bank is also adopting a similar approach in relation to the more arid districts.

WE CONCLUDE THAT THE BRANCH SHOULD CONTINUE ITS STRATEGIC PLANNING BY INCORPORATING A REALISTIC RESOURCE CONSTRAINT INTO ITS PROJECT PLANNING MATRIX. THIS WILL IMMEDIATELY MAKE CLEAR THE NECESSITY OF PRIORITISING SUB-OBJECTIVES AND ACTIVITIES. THE BRANCH SHOULD CONTINUE TO PLAN AGAINST PROGRAMMED ALLOCATIONS PROVIDED BY SIDA.

The Branch is, of course, free to seek support from other donors if Swedish aid diminishes, but in the absence of firm promises, it should take a realistic view of the likelihood of success. It would be disastrous to face the future without any contingency plan to deal with a reduced resource level.

WE FURTHER RECOMMEND THAT, PROVIDED THE BRANCH HAS PRODUCED A REALISTIC PROGRAMME BASED ON A SCALING DOWN OF ACTIVITIES TO A MORE SUSTAINABLE LEVEL, SIDA PHASING OUT OF SUPPORT SHOULD TAKE PLACE OVER 5 - 7 YEARS, IMPLYING AN ANNUAL REDUCTION IN REAL RESOURCES OF THE ORDER OF 15 - 20%. THE BRANCH HAS ALREADY PROVED CAPABLE OF ADAPTING TO THIS LEVEL OF REDUCTION. IN THE NEXT PHASE THIS WILL IMPLY A STRATEGIC SHIFT OF RESOURCES IN ADDITION TO THE EFFICIENCY GAINS ALREADY ACHIEVED WITH THE OVERALL GOAL OF ACHIEVING AN AFFORDABLE PROGRAMME WHICH CAN BE FINANCED FROM KENYAN RESOURCES WHILE STILL MEETING KENYAN PRIORITY NEEDS.

One possible exception to the reduced grant level, in the transport area, will be considered below.

4.2 Strategic objectives

We think it reasonable that a strategic objective for a programme that has had external support for more than 20 years should be to become sustainable from internal human and financial resources. The objective of aid is to enable countries more quickly to become capable of self-reliant development, not to foster dependency. If a programme has developed to a point where it is too expensive to expect local resources to be able to support it in the foreseeable future there comes a time when the right strategy is to cut it down to a size that can be maintained. This involves prioritisation of its activities.

This view has already been expressed. We recall two of the recommendations from the 1992 evaluation which bear upon this issue:

- *Set strategic objectives for attainment by 1995, 2000*
- *Reduce level of external and GoK support after 1995/6 through reduced need for Technical Assistance, devolution to general extension and Ministry of Education and economies in transport, stationery, staff training*

We develop the theme of strategic objectives further. Objectives must be related to need, and needs change over time and place.

4.2.1 Soil and water conservation

SWCB commenced a very useful needs assessment exercise in July 1995 in attempting to quantify how much of the necessary soil conservation had already been achieved, District by District, and how much remained to be achieved (i.e. was still needed). This exercise appears to have been abandoned but should be resumed. At the moment there are gaps in the table, peculiarities in the results for certain Districts (e.g. Machakos, Baringo), and the basis for the calculation of achievement and of hectareage still to be covered remains unclear. For example, have areas that do not need conservation, such as tea areas, or large farms that can take care of their own need, been excluded? Has account been taken in the achieved cover of the unrecorded expansion of conservation by individual farmers? (See, for example, the Machakos data given in Chapter 2). Are programmes undertaken by other agencies and NGOs included (past work such as the Plan International work in Gachoka Division and current and future work for which British, Dutch or other agency support has already been pledged). WE STRONGLY RECOMMEND THAT THIS EXERCISE BE CONTINUED AND THE METHODOLOGY FOR IT BE FURTHER DISCUSSED AND REFINED.

The Evaluation Team's own impression is that, due in major part to the success of the programme, but also due to the fact that conservation has a real economic benefit to the farmer so that he/she is prepared to devote their own resources to it, in many districts a large part of the necessary work has been achieved. This is supported by the Branch's own assessment in the July 1995 exercise that in quite a number of districts less than 10 years work remains at present rates of accomplishment for 100% conservation - see Table 3.2.

A target of 100% accomplishment is neither realistic nor necessary. There are always going to be some laggard farmers, some farmers with unfortunate circumstances, some areas where conservation does not bring economic benefit and where, therefore, even if undertaken, it will not endure. Many countries would be extremely satisfied if they could attain even 50% coverage in areas of need. Given Kenyan past accomplishments, Kenya might wish to set a higher target of **80% of needed work accomplished**. We emphasise that by world standards this is a high target, and Kenyans may wish to consider further whether it is unrealistic in the context of constrained government resources and the many other areas where those resources are needed.

We would also note that whatever the target, it is not necessary to suppose that the large government resources implied by the catchment approach are everywhere essential to meet it. Where, for example, **60% of farmers have already conserved, partly or fully, their soil and water**, with or without government and NGO assistance, it shows that they have committed their own labour and capital resources to it, and that technological know-how has become well embedded in the system. The forces which have impelled them into conservation (economic benefit, land shortage, etc) will continue, and so, therefore, will conservation. The 80% target will be reached in a reasonable time frame almost without any government assistance. **Therefore, government intervention can be reduced in scale once 60% coverage is achieved.** Normal extension and educational support should be adequate to help weak farmers and newcomers to farming and hasten target achievement.

Note: the principal of having concentrated government support only in the initial phase is in accordance with GoK's policy of cost-sharing and encouragement of self-help.

4.2.2 Soil fertility, land husbandry and the integrated extension approach

The Evaluation Team concurs with the Branch and the 1992 evaluators that a land husbandry approach is required, which takes account of all methods of improving soil productivity - physical, biological and chemical. Increased soil productivity contributes to reduction in erosion, by increasing vegetative cover, while at the same time increasing output and incomes. Soil fertility remains an important problem in many parts of Kenya, and that the Branch has the expertise to contribute to its management, by lessening the movement of productive top soil and the water needed for crop growth, and by measures that improve the soil's structure and plant nutrient content. However, **improvement of soil requires the joint efforts of many SMS: Livestock Production Officers** (management of animals producing manure); **Crops Officers** (best agronomic measures and choice of varieties); **Inputs Officers** (ensuring stockists know which inorganic fertilisers are required in different parts of the District); **Marketing officers** (helping to find outlets for the additional production); **Agricultural Extension officers**, **Forestry Extension officers** (agroforestry and nursery management). Others could be added: **Water Department** might be required to improve access to drinking water, to free up labour for more productive activities. A team approach is essential.

The Branch has in the past been tempted to take over responsibilities of weak government agencies because it has had finance and expertise. In the long run this is not sustainable. The Branch should find ways and means of cooperating with other officers, rather than adding new sections to itself which duplicate functions (see also note on agroforestry below).

4.3 Major features of the recommended revised strategy

4.3.1 Basis of the strategy

A commendable feature of the programme over the last 20 years has been readiness to make major changes in strategy from time to time, in accordance with the lessons of experience (for example, dropping payments), new technologies (for example, the participatory approach), or innovative ideas (for example, the catchment approach). We feel the next strategy change should be based on:

- *Needs assessment* using both a geographic areas and an activity basis, with regular reassessment to accommodate changes in needs

- *Rigorous prioritisation*, considering the needs of specific geographic areas (Districts, Divisions) rather than carrying out a basically similar programme in all areas regardless of need
- *Multiplication effect* to be a criterion for selecting between alternative methods of accomplishing an objective, in order to get the highest possible benefit:cost ratio
- *Defining the core activities* of the Branch as the functions which no other agency is equipped to carry out, and seeking to carry out complementary activities by working with and through MoALDM colleagues or staff of other relevant agencies (governmental or NGO)

4.3.2 Differentiation according to area needs

The programme should not apply basically similar methods in areas where needs, costs and benefits are very different.

RECOMMENDATION:

1. Differentiate between

- a. Areas where more than 60% conservation has already been achieved and where conservation techniques are well-embedded in local practice (mainly the densely settled, intensive agriculture areas of AEZ 1-3, but in some Districts including long-settled areas of AEZ 4). Population density 150+
- b. Areas where population is growing rapidly, necessitating a change from extensive to intensive systems, but where technology is not so well known, soil conditions may be difficult, and farmers may have a lower level of resources (many AEZ 4 areas and the better parts of AEZ 5) - semi-arid rather than arid, and rain-fed agriculture feasible with water conservation techniques. Population density 40-150.
- c. Arid areas where pastoral systems predominate, and only limited irrigated agriculture is possible.
- d. Areas with very low population density, where shifting agriculture is still practised, and animal grazing is uncontrolled and individual tenure has not been established in 50% of the divisional land area.

2. In area a, the programme is to be congratulated on already having achieved its major objectives in relation to soil movement on arable land. The catchment approach should be modified to a focal area approach linked to general extension, aiming to improve soil productivity. By discussion within MoALDM incorporate the particular advantages of the catchment approach into general extension. These advantages are:

- concentration on a focal area where staff activity can easily be monitored and where results can be seen
- the active involvement of the community in the process, giving farmers choice in the measures they adopt on their farms

It is therefore suggested that the District team of SMS agree on one focal area per Division where they will concentrate their attention. Then:

- A PRA is held in the area to identify what are the real problems experienced by the farmers on which they want advice.
- The farmers elect a committee to represent them and to interact with the officers. This becomes the nucleus of a contact group which the FEW incorporates in his round for the next 3 years.
- Having identified the problem, the appropriate members of the SMS team try to find feasible solutions with the farmers and give back up to the FEW. Possible new or modified technologies can be selected for demonstration, on farmers' fields, and with the farmer participating in the management and evaluation.
- The SWC participant in the team gives special attention to farmers who have lagged in soil and water conservation, and discusses with the community the management of run-off from the roads, schools etc.
- Next year senior staff attention is switched to a new focal area, but the FEW continues the programme and continues to have some supervisory attention.

This will result in an integrated extension approach by the best-trained officers in the District, rather than by the FEW alone. The FEW will be supported by a community committee, who, in their training, should be asked to consider how the community could organise special help for the laggards who are often the resource poor, and who include single heads of household who have special labour constraints, as some Committees already do (see 2.11.2). The Social Development Assistants could be involved. By extending the attention to the catchment for 3 years through the FEW and the Committee the laggards will have more chance of completing the work than under the present system, where all assistance is withdrawn at the end of the financial year.

- The staff implications are that only a DSCO is needed, with perhaps a DivSCO (who may share another responsibility such as extension or cover two neighbouring divisions in AEZ 1-3). No DPT is required. The functions of DSCO in these areas are:
- backup to normal extension service particular attention to helping farmers make good use of run-off from roads in focal areas
- particular attention to riverside cultivation, making appropriate recommendations to farmers when there are signs of soil erosion
- involving of teachers and Parents' Committees in focal areas to control run-off from school compounds. Liaison with Social Services and Chiefs to reach self-help groups that might undertake community improvements in this area.
- working closely with the Ministry of Public Works, County Councils and other relevant organisations to improve water control off roads, market areas, etc (which the Branch notes has been included in PPM3).
- continuing to be responsible for whatever awareness training is necessary (see below), providing some input into 4 K club activities, involvement of teachers, schools, etc in focal areas.
- Liaison with any local Regional Research Centre, University or other body that is carrying out relevant research, to encourage them to allow results to be tried out and evaluated by farmers on their own farms, as soon as possible.

Note: this is in harmony with the GoK's policy of an integrated approach to extension mediated through a single FEW backed by SMS - who include those in SWCB. It is also in harmony with Sida's "local level initiative approach" where the Branch already plans a trial phase (Comments, 8/2/96). It includes a focus on the disadvantaged, who will include women lacking family support.

3. In area b, the catchment approach remains advantageous. However, it should

- Be consciously used as a demonstration. Farmers in adjacent areas should be told they will not be getting a catchment, but should come and learn what to do for themselves. Catchment selection should have an additional criteria to the present ones, based on the area to which it will serve as a demonstration. It should not be immediately adjacent to another recently conserved catchment.
- The demonstration area should be integrated with the general extension programme in the area. PRAs are held initially, partly to improve community resourcefulness, partly as a tool to educate the officers from other Departments, who may not have learnt the 'listening' approach to the farmer. The Catchment Committee should be considered as a group, which FEW incorporates into his/her programme (as is already happening in some Districts). Committee training is enlarged as describe below, to include both a poverty focus and the ability to lay out farms and assist neighbouring farmers. Other officers – Crops, Livestock Production, Farm Management, Forestry Extension, etc. should also work there, as in the focal area approach described for area a, so that farmers have the advantage of the full range of specialisms in improving their fertility management and productivity. On-farm trials could also be incorporated. *This programme should not take too much time from the average FEW. He will only be needed for one catchment in his area (due to the catchment dispersal policy outlined above). In other years he will do normal duties. We recommend the Committee be retained as one of his groups for three years.* Training in catchment work for the FEW is considered in below in 4.5.2
- Catchments could be smaller, as they are a demonstration to the surrounding area.

- They can be limited to 1 or 2 per Division, according to its geographic size and needs, to give time for follow-up work in the previous year's catchments.
- The reduction in number and size of catchments should also give more time to officers to organise Field Days for surrounding farmers to visit the new catchment (and nearby older ones). **This will multiply the effect of each catchment.** Farmer to farmer extension should also be encouraged by putting more resources into taking elected farmer leaders from the catchment and neighbouring areas to Districts with similar AEZ which have a higher level of conservation and productivity.
- At HQ and Provincial level continue work on documenting best farmer practice in this type of area, working with research organisations to improve this technology, and arranging field trials with willing farmers. Refine and continue work on farmer costs and benefits for use by Farm Management and for the benefit of literate and numerate farmers.
- Road work as in a. above.
- Training to be re-oriented (see 4.5 below)
- For water development see 4.7 below.
- **Progress towards the target achievement of 60% of needed conservation accomplished should be continuously monitored, so that as Divisions reach it, they can be transferred to the area a strategy.**

In this area it will be necessary to retain a full complement of Divisional staff so that there is still a DPT.

Note: This approach is in harmony both with the integrated extension approach and with Sida's recommended strategy of a local area focus incorporating community planning and involvement. It also gives a degree of poverty focus towards resource poor households including female-headed ones.

4. In area c, withdraw. For the following reasons

- The problem is mainly one of range management and livestock husbandry, where other MoALDM Departments has greater levels of expertise than the SWCB.
- Sida's assessment in its Natural Resource Sector Review is that this area still needs research to find a feasible and effective development strategy. Development should be postponed till we know better what to recommend.
- World Bank programmes in this area are at an advanced planning stage.

5. Area d. The catchment approach with its concentration of resources is also not justified here since it is highly unlikely that any structures put in will be durable. DSCOs and PSCOs should watch these areas to see when they are approaching conditions in b, when the time becomes ripe to give them attention. An indicator will be the abandonment of long fallows and the beginnings of animal confinement to owned land.

6. As now, the Branch may consider that it should not work in Districts (like Kitui) or Divisions that have an alternative programme financed by a donor or NGO which considerably overlaps with its mandate area. An example is the JAMABA project in Baringo, but there are also others. The Branch should seek to extend its considerable expertise in both technical matters and PRA to such agencies, encouraging them in return to finance the associated transport and allowance costs.

The Evaluation team recognises that the Branch has a national mandate and would wish to preserve a presence in all Districts. However almost all districts contain some areas a and b. The SWCB will therefore be represented in almost all Districts, but not in Divisions that are mainly c or d.

The continuance of NEP and IFAD programmes is assumed. In the event that these are discontinued, the outlook is not good for the quality of any kind of extension work, whether of the focal area type recommended in area a, or the follow up recommended for area b. We do not intend to pursue this scenario further, except to note that it would require an even higher degree of resource prioritisation.

4.4 Organisation and management structure

We note that MoALDM is restructuring itself. While recognising that this is not a matter for direct Branch action, we draw attention to the fact that although SWC is regarded as a priority core area, it currently ranks low in the official hierarchy with 5 levels between the Head of the Branch and the Minister. This is a long line for reporting and policy influence.

For the Branch itself our RECOMMENDATIONS are:

1. Reorganise HQ to comprise 2 support sections and 2 technical sections as shown in Figure 4.1

From this follows a need to develop job descriptions for the officers assigned to each section. Suggestions are given in Annex 1.

2. Transfer Agro-forestry to Crops Division

This is our first preference. If this is not acceptable to the Branch and MoALDM, the second option is

Reduce Agro-forestry to 1 person within the Land Husbandry Section, with responsibility to address the issue of how agro-forestry can help maintain soil fertility, water conservation and soil erosion control.

The reasons moving AgroForestry or downgrading it are:

- Most trees produce a commercial product and Crops Division, which already has a Horticultural Section, is the appropriate place for Tree Crops.
- Farmers already value trees for many purposes and only need normal extension support in this field.
- There are already a large number of Aid agencies, NGOs and international research institutions operating in this area (see 3.2.5). The field is overcrowded. If an Agro-forestry person is retained in HQ under the second option above, his/her responsibility should be to feed information on practical methodologies related to soil fertility, water conservation and soil erosion control into the extension system and catchment planning.
- The main interest of SWCB in trees should be their contribution to fertility improvement. However, this should be considered alongside other options for fertility improvement, such as manuring, inorganic fertilisers, etc. Each element needs to be weighed for its economic advantages in a changing economic situation (changes in fertiliser prices, reduced or increased manure availability etc).

3. Strengthen planning capacity

The Branch has good human resource capacity at HQ for analysing its monitoring data to identify problem areas, to react with new strategies to a changing economic or policy environment, and to define and register progress towards its overall goals. The present monitoring and reporting system is basically sound, with a few improvements needed, particularly on problem analysis following receipt of reports and other data.

However, at the moment, as we have already highlighted, there is a lack of strategic objectives, and the planning for the next financing phase has been crammed into the last few months, instead of being an on-going institutionalised process that should have started after the last evaluation. We agree with the Branch that the problem is related to the heavy touring schedule involved in the present monitoring system, which means that officers are away from their desks for a large part of the year. To create more time for planning, problem analysis, policy development and reaction to changed circumstances at HQ it would be necessary to devolve more responsibility for monitoring to the Provincial level. Some HQ training activities could also be

Figure 4-1 Recommended Organisational Structure

Soil and Water Conservation Branch			
Planning and Monitoring Section	Water Management Section	Land Husbandry Section	Education and Extension Section
* Planning * Monitoring * Socio-economics * Supplies and Administration * Personnel management	* Water harvesting * Water control (non-farm areas) * Water development * Legal issues	* Soil conservation * Soil fertility (including Agro-forestry) * Legal issues	* Curriculum development * Media * Short courses * PRA training

transferred. Both were already recommended by the 1992 evaluation. Operationally it means:

- Depending on the number of districts to be covered and the geographic area involved support PSCO with Deputy PSCO. (We suggest 2 officers may not be necessary in Central, Western Province and Nyanza. Western Province and Nyanza PSCOs could plan their work jointly. Central could call on HQ when backup is necessary).
- Fill the additional posts by
 - Redeploying some HQ staff
 - Making a planned effort to spot talent at DSCO level for promotion to PSCO
- Where there are two posts, the Technical Sections of HQ should be represented taking into account the needs of the area. For example, in Rift Valley, Eastern and Coastal Provinces, one PSCO should have expertise in issues relating to water harvesting and the needs of the semi-arid programme, to provide DSCOs with technical backup, and to be especially responsible for technical monitoring and evaluation. The other PSCO might take major responsibility for training and general monitoring.
- PSCOs should spend a week in each District twice a year, and have a check list of things to look for at District and Divisional level, making spotchecks in catchment areas. The latter should be randomly selected by the PSCO, not preselected by the DSCO.
- Reduce HQ touring by at least half, by making randomised checks on all Districts and special visits to those Districts identified as problematic through analysis of the routine reports received.

An example of the need for reaction to changed circumstances is the directive received from the Ministry to cease using hotels for training. This appears to have disrupted some District programmes as some DSCOs floundered while others coped. PSCOs should spot the flounders and the copers. HQ should be able to give quick guidance to the flounders based on the experience of the copers.

An important planning function in developing the programme each year will be to:

- Develop a trigger point at which category b divisions should be shifted to category a, and categories c or d to b; analyse reporting data to see if this is nearly reached, and make the necessary arrangements in good time. Things to check will include:
 - Land tenure changes
 - Population density
 - Availability of appropriate technologies
 - Likely sustainability of impact and the return on investment
 - Type of landowner (large-scale farmers should finance their own improvements; small/poor farmers need more assistance)

- Allocate funds to Districts on basis of needs and type of programme
- Continue to develop the impact monitoring programme on the lines suggested in Annex 2. since this is important for assessment of benefit:cost ratios. Keep the budget low, and as the results will also be useful to neighbouring countries and donors, seek additional resource from RSCU and other sources. Link up with research institutions and universities to carry out the studies. Socio-economics staff to be responsible.

Having considered the revised strategy and the organisational framework and planning capacity that it requires, we now go on to consider programme elements.

4.5 Education and staff training

Institutional and human resource development has been an important strength of Sida-support in the past. However, a new orientation is now required:

- to support an integrated extension approach in the focal areas and catchments, transferring the participatory skills developed by many SWC staff to other officers in MoALDM and appropriate other Ministries, through on-the-job cooperation and collaboration in local workshops and the regular extension programme briefings. Thus, lessons learnt from the catchment approach and the PRA exercises will spread.
- Both the smaller programme suggested for the future, and past success in training, means that much of future need for SWC specialists can be achieved by redeployment of existing staff, with selective, short, retraining if needed. The expansion in initial B.Sc training seen in 1994/5 (Table 3.11) may be difficult to justify in future. Similarly, in view of the high level of awareness already achieved amongst community leaders, the requirement for more work needs careful assessment, along with consideration of cheaper alternatives to direct training.

4.5.1 Staff training

At the moment, staff training is considered as part of the general function of training (including training for farmers and extension workers), awareness creation and extension. We feel it should be rather considered as an element in personnel management and we think this relates to the recommendation of the 1992 Evaluation on staff development. We recommend transferring staff training to a personnel unit within the Planning Section. It will require:

- Development of job descriptions for DSCOs, DivSCOs and DPT members in both a and b areas. Redeployment of staff from area a to vacancies in area b (e.g. in new Districts or Divisions). Establishment of how many have not received adequate training for their functions under the revised strategy. Provision of on-the-job training, (e.g. temporary secondment to understudy an experienced person) backed as necessary by workshops, seminars and academic courses
- Establishment of which HQ staff need further training (e.g. to staff the Land Husbandry section). Where possible, provide on-the-job training, e.g. by short secondment to an existing land husbandry programme. Supplement as necessary by short courses, wherever possible at Kenyan institutions
- We think the Branch has probably already trained sufficient trainers of trainers, as far as methods of presentation are concerned, but in cooperation with the two technical sections, workshops should continue to be organised to keep staff abreast with new technical developments or to discuss changes of strategy and function.

4.5.2 Other training and educational activities

DSCOs identified training and awareness creation as a priority area, although not in the context of the revised strategy that we are now proposing. Nevertheless the Evaluation Team thinks this has continuing importance provided that

- training and educational activities are stringently prioritised according to a needs assessment carried out for each District
- prioritisation is also based on considering how far a direct training activity is necessary or whether a greater multiplication effect and benefit:cost ratio could be attained by institutionalising new knowledge within appropriate training course curricula and media institutions
- reporting classifications are clarified, both as regards totals and sexes (see discussion of District training in section 3.2.7) and to identify better success in regard to key groups such as Catchment Committee members and staff assigned to catchment or focal area development.

The extent to which existing institutions can be used at

- Catchment level
- Diploma level
- Degree level

either to provide rooms and facilities for training, or to provide short courses should also be considered. (The Branch may need a head within its training budget for purchasing in training from these institutions).

Catchment and Focal Area Training

- Always start a catchment or focal area with a PRA, to ensure full community involvement. This follows the recommended Sida focal area integrated approach, since PRA priorities may lead to contact with the Ministry of Water, Public Works, etc. SWC staff will play a lead role in the focal areas in the high potential zone because they can spread their experience.
- Continue Committee training but
 - include an element on organising assistance to poor, old or ill members of the community so that they can share the benefits
 - include practical training in layout (as is already done in many Districts, so that Committee members can lay out for neighbouring farmers
 - include the management of run-off from roads, schools, markets
 - increase literature handouts including simple manuals, in view of the high level of literacy now present amongst farmers
 - as part of the integrated approach, involve the Social Development Assistant where he/she exists
- Develop a guideline on the % of the catchment to be laid out by the DPT and FEW working together, how both can then separate to lay out another % in collaboration with Committee member, and how the remaining % (? 33%) should be laid out by Committee members with occasional supervisory visits by the DPT, who will also record the activity in the Catchment book. This is a method of on-the-job training for both the FEW and the farmers. Note: the degree of continuing supervision by the DPT will depend on steepness of slope and the degree of danger from an incorrectly laid out structure. Not much harm comes from a wrongly laid grass strip, and it is easily correctable.

Training of FEWs

- Ensure curriculum of their initial 2 year course includes the land husbandry and PRA approaches.
- Brief DSCOs on new developments which they should incorporate in the Monthly Training Sessions for FEWs
- Although it is appreciated that the initial course received by the FEW cannot equip him/her adequately for the diverse functions they face, there should not be need for further special residential courses for FEWs in soil and water conservation, given the large numbers already trained and the

ban on recruitment of new staff. As always, needs should be assessed along with previous achievement to establish a District or Provincial programme.

- Farmer Training

- Field Days have been popular and effective and should be continued in conjunction with the catchment approach. Field Days can be held on catchments implemented the previous year. Move Provincial money for this down to the District.
- Increase the programme of farmer visits to other areas. To multiply the effect, make it a condition of going that the person concerned holds a baraza for his/her community on his/her return and demonstrates at least one technology seen on his/her farm.
- Take farmers only to areas in the same AEZ and to visit farmers there whom the local DSCO has identified as having a similar farm size and resource base - not farmers with larger than average farms and larger than average capital.
- Take farmers to the nearest available good district. It will sometimes be justifiable to take them further afield when there is a special technology to be seen, e.g. water harvesting.
- An HQ staff should continue to have responsibility for liaison with the radio and with the AIC (Agricultural Information Centre) to develop appropriate literature, film and videos. He/she should also liaise with NGOs active in this field (KWAP etc) to see what literature is available that would be useful to Catchment Committee members.

- Awareness creation amongst chiefs and local leaders The Branch has already trained 25,000 leaders in the last 3 years and 1000 chiefs. How much more is needed? It may still be necessary in some areas where there is both a high level of new Divisions and Locations, and a Catchment approach, but it is almost certainly not necessary in Area a. The objective of seeing that support continues to be given by new chiefs could more economically be met by getting land husbandry included in Chiefs' induction courses.
- Education As previously recommended, leave this to the Ministry of Education. One member of the Education and Extension Section should have responsibility for liaison with the Ministry and with Teacher Training Institutions to see that soil and water conservation is adequately covered in school and teacher training curricula and that booklets etc already produced in cooperation with the RSCU are disseminated through the school system. (We commend this literature).

4.6 Research-Extension-Farmer trial-Research

The Evaluation Team realises that the Branch has already made considerable effort to secure from KARI a research programme geared to the practical needs of farmers, using technologies that are acceptable in their circumstances. In practice, the only programme we saw that is using participatory methods of researching with farmers, soliciting their evaluation and comments on new or modified technologies, and which is beginning to produce results that can be confidently fed into the Extension system is the UK supported DAREP programme at Embu, whose funding will shortly come to an end.

RECOMMENDATIONS

- The Branch should continue its efforts to get research carried out to the farmer trial and evaluation stage, focusing on improvement to technologies that the farmer is already using such as manure. The Branch is asking the right questions. We hope Sida and other KARI funders will take note of the needs expressed and that the RSCU may be able to fund specific pieces of research that directly address Branch priorities, when KARI is unable to do so.
- Technical staff in the two HQ sections should have explicit responsibility for keeping up with research output (e.g from the FURP programme, ICRAF and the local Universities etc) and seeing

it is fed into the Extension programme. We draw particular attention to the harmful confusions illustrated in Table 2.3. One mechanism could be an annual meeting on a topic of interest, drawn from research institutions and Universities, and attended by PSCOs to ensure rapid feed back.

- **Water Harvesting:** SWC staff and DAREP have already done good work in compiling farmer technologies in this field and organising farmer to farmer visits and evaluations. But much data have only been collected over the last two years and do not represent the full range of rainfall conditions Kenya experiences in a decade. While the work should continue to test the technologies under different rainfall conditions, farmers should be encouraged to see and evaluate promising technologies at an early stage in development, and to try them out, and feed their experience back. In this way good technologies will soon become self-spreading innovations.
- Link farmer trials with farmer visits and field days in catchments or focal areas

4.7 Water development in ASAL

Water-harvesting is the priority. This should be done within the context of crop productivity improvement, taking into account that it may be of limited use to increase water supply at the roots if nutrients remain limiting for food and fodder crops.

Water development activities are costly and their benefits must be rigorously assessed against this. However we recognise that some activities like spring protection are relatively cheap, and that water development for humans and livestock are often the expressed priorities of communities consulted through PRA methods. Where possible, the Branch should, as it already does, involve the Ministry of Water and appropriate NGOs.

4.8 Tools

Tools policy needs review. Most farmers have tools for cultivation that can also be used for many of the conservation recommendations (fanya juu, grass strips, etc). The shift to a more biologically oriented land husbandry approach has reduced the need for tools still further. Most conservation is carried out by particular households on their private farm, and does not involve group work on public land (except if related to schools or road improvement). Farms are often small, so in most areas the volume of work for one household is not great.

RECOMMENDATION:

1. Phase out tools, starting with a major reduction by cutting out pangas, and all types of jembe and wheel barrow.
2. Investigate the case for a limited stock of specialised tools, to be kept by the DivSCO, in Divisions where conditions indicate their necessity (applies to mattocks, crowbars, axes, sledge hammers and may be shovels). If they are necessary, they should be lent at the start.
3. Reward Committees with literature, not tools.

4.9 Technical monitoring

- Data on number of kilometres etc should be made verifiable by updating Catchment books at the end of the Catchment year.
- 'Rest of the District.' This information comes from the Extension service through the FEW. He/she needs a format to record this. The DSCO should spotcheck technical quality. This recommendation

also applies in area a. In area b, record also what is done by major NGOs and other projects to monitor properly progress to the trigger point referred to above.

- At present technical faults are not reported, even in HQ records. DSCOs should be responsible for checking Divisional work, concentrating on technically difficult areas and projects.

4.10 Fertility

We commend the increased attention given to seasonal extension messages in Catchment books. The following improvements can be made:

- Recommendations made on research-extension-farmer linkages apply here. More work is needed on manure manufacture and on types of fodder consumed.
- Phosphate deficiency is a major problem. In phosphate deficient areas the fodder that goes in to an animal at one end and what comes out at the other end are both likely to be phosphate deficient. Recognise that in many cases inorganic fertilisers will complement organic ones, and that the choice of method of improving fertility must lie with the farmer, who can take into account his/her resources of time and money, and the condition of the market.
- Be aware of the research recommendations on type of fertiliser suitable for particular soils and do not make generalised or vague recommendations. Liaise with locally-based research institutions and with Inputs Officers.
- Pay attention to other fertility problems of the farmer, e.g. striga, couch grass. At present these do not get attention in the recorded Seasonal Extension Messages in Catchment books. This is another example of where an integrated focal area approach and collaboration with other SMS is necessary.
- Recommended on-farm trials should include fertility improvement trials including agro-forestry, inorganic and organic fertilisers, separately or in combination, so that farmers can evaluate them

4.11 Roads and public areas

We regard the improvement of drainage off rural roads as a major priority for two reasons. Road run-off is the cause of much of the remaining erosion damage. Secondly, roads are vital in providing access to market. If farmers can sell their output better, they get both the motivation and the means to improve their land. Gullying on the road hampers market access. Run-off also needs to be controlled from other public areas such as schools and market places.

RECOMMENDATION:

- The development of a programme of collaboration with Ministry of Public Works, County Councils etc should have high priority. It should be the main responsibility of one member of the Water Control section at HQ. Work should start immediately to develop a programme and cost it.
- Within catchments and focal areas Branch personnel should give great attention to road and public area run-off, working with community leaders and the committee to improve through self-help the access roads and paths which do not fall within the purview of the Ministry of Public Works.
- Encourage water-harvesting as already detailed.

4.12 Transport needs

We do not forget that DSCOs stressed the need for mobility and emphasised the high cost of motor-cycle maintenance under the present system. The proposed revised strategy will reduce transport requirements. There will be no DPTs in area a. Delegation of more monitoring to Provincial level should allow transport and allowance economies at the national level. However, adequate transport will still be necessary for the efficient conduct of the smaller programme.

When the new transport requirements have been assessed, Sida might consider a special arrangement to address the problem of an ageing fleet and high maintenance costs, in the context of on-going discussions in NEP. It is worth considerable effort to find a better method of ensuring more timely and cheaper maintenance.

4.13 The concept paper and credit

It will be apparent that we have taken a different approach to the Concept Paper since we started with the constraint of limited resources. The one element which we would like to give a warning about is the credit element. We would strongly advise against incorporating this in the programme. Credit programmes have a history of failure particularly in the semi-arid districts. There the erratic climate means that farmers often lose their crop and hence their ability to pay, and credit simply leads them in to debt, and causes the Government to lose its money.

4.14 Poverty focus and gender considerations

Sida requested special consideration of the above, and whilst in the field we made certain that we interviewed women as well as men, both amongst farmers, and amongst committee members. Women interviewed had as favourable a view of the programme as men, reporting positive yield and income benefits.

4.14.1 Poverty focus

Any rural programme for small farmers will be concerned with those with low incomes. In Kenya more than 60% of income accrues to 20% of the population (ODA, 1995) and the fortunate 20% are mainly to be found in urban areas or amongst owners of large-scale farms. Amongst rural people, a 1982 survey found that much the highest average income in the pastoral district of Kajiado, suggesting that those owning large herds of livestock are relatively wealthy (Heyer 1990). The recommended strategy would exclude this group. While a recent World Bank study called attention to the fact that many poor people live in the high potential areas, poverty occurs in both high and low potential areas. In 1991 there was a UNICEF-assisted survey in several districts, including Embu, where it was carried out in two low potential and two high potential divisions. It was found that the percentage of households in the lowest income quintile was 26% and 20% in the two high potential areas (average expenditure Ksh 17,178 and 15,207 respectively, and 16 and 20% in the two low potential divisions (average expenditure Ksh 14,317 and 22,111 respectively) (UNICEF 1992). In the low areas poverty is caused by

- the extreme variability of the climate, causing people to lose their reserves of food and livestock periodically
- the fact that many inhabitants are recent incomers, who need to devote their small resources to developing and furnishing a new homestead, developing a new farm, acquiring livestock etc., in addition to the usual requirements for educating children and maintaining normal activities. As was noted at the workshop on 6.2.1996, this can be a 20 year programme, during which time they are sorely pressed.

The continuation of the catchment approach in AEZ 4 and the better parts of AEZ 5 will assure assistance to these struggling farmers. In particular, by its focus on water conservation, it will enable them to get some crop

even in very bad seasons. The very poorest in Embu depended proportionately more on own consumed crops (65% of income) than did the middle and upper income categories (UNICEF, 1992).

In the high potential areas the focal area approach will (as in catchment areas) focus the community's attention on ways to help farmers suffering from old age, ill health, or the shortage of labour sometimes caused by the absence of a husband.

Soil conservation only directly affects farmers. In one high potential village in Machakos in 1990, community leaders told Mary Tiffen that their society fell into three groups - the rich, mainly businessmen; the middling - the farmers; and the poor - those who worked for farmers. In these areas there are those who have either inherited a farm which is so small that it is barely more than a houseplot and garden, or who are sons or unmarried daughters for whom a living father is unable to provide land. With jobs in urban areas ever harder to find, such people have to resort to becoming a hired labourer, on a permanent or casual basis, on some-one else's farm. The recommended focal area approach in high-potential areas will indirectly help the landless. Improved, diversified and sustainable production, generated by improved farming, creates the jobs that alleviate poverty. Farmers who zero-graze often employ a youth to carry water and food to the cow. Farmers who sell more generate non-farm jobs in processing, marketing and transporting farm products. Farmers who sell more also buy more, creating jobs in workshops producing furnishings, clothing, catering services, etc. These jobs provide opportunities for both men and women.

This indirect approach to job creation is far better than the approach adopted by the NSWCB in the 1970s and 1980s, when it financed hired labour for cutoffs etc with the direct aim of creating jobs (see Chapter 1). That was unsustainable financially, and led to shoddy work in unnecessary places.

The revised strategy therefore meets the poverty alleviation criteria.

4.14.2 Gender focus

As discussed in Chapter 2, a soil and water conservation programme cannot be regarded as the most appropriate vehicle for raising the status of women, or for addressing the needs of women as women, rather than as members of communities and of households. It can be directed to meet the needs of poor women, as a sub-section of poor people.

It should be realised that Kenya differs from some neighbouring East African countries in that the status of women has risen considerably over the last few decades. They have more equal access to education than is the case even in some so-called 'developed countries'. The 1989 Census showed that in the age group 20-24 81% of young men and 74% of young women had reached standard 5-8 of primary school and that 39% of young men and 30% of young women had at least some secondary education. (Girls tend to fall behind more in respect of education above secondary 4, but if they achieve secondary 5, an equal proportion go on to university (25% of both the boys and girls with secondary 5) (Central Bureau of Statistics, 1994).

A second advantage is a history of women's self-help groups going back to the 1950s, which are well integrated into local leadership systems (Tiffen et al, 1994). As noted in Chapter 2, in most Districts we found women participating fully in Catchment Committees, and well represented amongst District Agricultural staff. The need to recruit women to the agricultural service has been recognised and practised in Kenya since the 1950s.

Normally, committees are chosen by a general community meeting, and it then normally contains both men and women, because the community recognises their leadership qualities and experience. The exceptions to women's participation occurred in parts of Baringo and Uasin Gishu. This was partly because catchments there were large, and committees were elected by choosing a representative from each settlement within. Where there is only one representative, it is most likely to be a man. Our recommendation is for smaller catchments, in which a general meeting is more likely to be the electoral mode. In the few areas of Kenya where men still monopolise leadership positions in society staff already try to steer communities to electing some women, but it is doubtful whether they should enforce this, since this smacks of a top-down approach. It can safely be assumed that more women will be elected in backward areas through normal social developments, as women gain recognition through their education and through the organising capability they show in self-help activities.

Almost everywhere in Kenya more than 95% of women aged over 20 are married, and husbands are obliged by custom to provide wives with land to farm (if they own farms). Due to education and other social influences most husbands and wives now share decision-making amicably, even in areas in theory reserved to men. We noticed in the west that men reserve to themselves decisions about tree-planting, particularly where this involves farm boundaries. Again, in most cases, the family reaches an amicable agreement, although the absence of a husband can cause delay. Branch staff seem well aware of this potential problem, and of ways round it.

Concern is frequently expressed for the special disadvantages faced by women who are de facto heads of farming households. The degree of disadvantage depends on a variety of factors; for example, whether the absent husband is dead, has deserted, or is an urban worker contributing regularly to family support; whether the farm is so large it cannot easily be managed when a woman is on her own - in Western Kenya some farms seen were so small as barely to provide full-time occupation for one person; whether the woman has the help of other adult household members and/or older children. This variety of circumstance is best met by asking committees and staff to direct special help to the disadvantaged (who may include some men). In the short time that we had for field interviews it was not possible to go deeply into output issues, let alone the more difficult question of how income is distributed both between households and within households. This can only be done by a special study within the context of the recommended impact evaluations. Existing impact evaluations have not looked at possible differential impact between men and women farmers.

While daily arable activities are done mainly by women (husbands participating more and more nowadays when farming is their main income source), we found that in many places the heavy digging associated with terrace construction is regarded as something which should be done by men. Given that women's time is well occupied by other farm and household activities men should be encouraged to continue taking this responsibility. In areas where a lot of men are working away, women have to undertake the work. On small farms they cope without too much difficulty; in areas where the farms are larger or the work is particularly laborious (areas with hard or stony soils) women already tend to form groups which give mutual assistance by rotating round members' farms. This again is something which staff can and do encourage. Women are probably the majority beneficiaries of training for farmers and local leaders, although, with separate figures for women being given for the first time in 1994/5, there is some confused recording (Section 3.2.7 District Training). The effort made, however, does illustrate staff consciousness that they need if possible to document access to educational opportunities.

We conclude that although, like most Kenyan men, they have limited resources, within the limits that those resources impose, most women in Kenya can manage their affairs and families to their own satisfaction, and participate in community decisions. They have had good access to the education and training which Kenya can offer. Aid agencies do not need to take a paternal (maternal?) attitude to adults who are quite capable of deciding their own roles and preferred activities. In the few areas of difficulty staff are already well aware of special needs, and further general staff training on this issue does not seem a priority. There will always be some hard cases, who may escape even the support network that the extended family generally gives, but policy should be determined by the requirements of the great majority, not the exceptional needs of a small minority.

ANNEXES

1 Outline of responsibilities of Sections if the Branch is restructured

Planning and Monitoring Section

Main goal is to undertake planning and monitoring for improved resource use efficiency and maximisation of benefits in relation to costs

Planning Unit

Main duties and responsibilities

- Strategic planning
- Needs assessment and prioritisation
- Monitor promotion of Divisions between areas a, b, c and d
- Commission impact studies
- Assess PRA needs and likely responses
- Assess staff needs and possible redeployment
- Assess staff quality, for academic training needs and for promotion

Active collaborators

- Planning Division

Monitoring Unit

Main duties and responsibilities

- Prepare guidelines on financial and technical monitoring
- Undertake financial and technical monitoring of all project activities
- Prepare monthly, quarterly and annual reports

Active collaborators

- Funding Agencies
- Monitoring and evaluation section of MoALDM
- Central Bureau of Statistics and District Statistical Officers (who have staff of trained interviewers and a stratified sample of farmers, which could be used for impact and other studies)
- Universities and Research institutes

Soil Management Section

Main duties and responsibilities

- Promote better land husbandry for improved crop, fodder and grass production
- Research liaison

Active collaborators

- Extension Division
- Crops Division
- Livestock Production Division
- Farm Management Division
- Range Management Division
- Forestry Extension
- Research organisations

Water Management Section

Main duties and responsibilities

Contribute towards the alleviation of water constraints for crop production and in the reduction of land degradation resulting from run-off.

Water Harvesting and Control Unit

Main duties and responsibilities

- Reduce land degradation resulting from run-off from non-farm areas
- Promote water harvesting for crop production in both high and low rainfall areas
- Undertake water harvesting demonstration trials in collaboration with researchers, extension officers and farmers.
- Liaise with MoPW and the farmers on safe disposal or capture, storage and use of roadside run-off.
- Provide technical guidelines on structural measures of soil and water conservation
- Liaise with MoLRRWD on the guideline on river bank protection and catchment protection exercises

Active collaborators

- MoPW
- MoLRRWD
- County Councils
- Irrigation and Drainage Branch
- Soil Management Section

Water Development Unit

Main duties and responsibilities

- Improve water availability for domestic and livestock use through construction of simple water conservation structures such as water pans, sand dams, rock catchment and spring protection.
- Develop guidelines on water development
- Approve design and supervise implementation of water development projects

Active collaborators

- MoLRRWD
- Research organisations

Training and Extension Section

Main duties and responsibilities

- Education, awareness creation, farmer training and school liaison

Extension Unit

Main duties and responsibilities

- Guidance to PSCOs and DSCOs on farmer training, training of FEWs and DPTs
- Liaison with the two technical sections to ensure up-to-date research information, tested on-farm, is fed into above training
- Work with the mass media and to produce literature for direct use by the many literate farmers
- Distribution of suitable training manuals produced by Branch or RSCU
- Assess need for and organise short courses/workshops for PSCOs, DSCOs

Active collaborators

- PSCOs and DSCOs
- Technical sections
- Agricultural Information Centre and media
- RSCU

Schools and Public Awareness Unit

Main duties and responsibilities

- Endeavour to institutionalise soil and water conservation principles in training courses and curricula of other Ministries and Institutions

- Chiefs' induction courses
 - Work with Ministry of Education on curricula development for agriculture and on 4 K Clubs, Young Farmers, etc
 - Run courses for Teacher Training College Lecturers in Agriculture
- Organise direct training through short courses only where institutionalisation is not possible

Active collaborators

Office of the President
PPCSCA
Ministry of Education

Short Courses/Workshops Unit (Staff)

Main duties and responsibilities

Liaise with Universities and Diploma institutions on curriculum development in soil and water conservation to improve initial staff training
Organise short courses as required for updating staff, involving staff in planning, etc. either internally, or through Universities and Diploma institutions etc.
Assess need for staff travel to overseas conferences, study tours, etc

Active collaborators

Universities and Training Institutions
Other sections of SWCB
Appropriate departments of MoALDM
RSCU

2 Cost-Benefit Studies of Soil and Water Conservation Projects in Kenya

2.1 Review of existing studies

2.1.1 Evaluation and Economic Appraisal of Soil Conservation in a Pilot Area. L. Hedfors. Soil and Water Conservation Branch. August 1991

The study covered a pilot area of the NSWCP comprising 500 farms occupying an area of 2200 ha with 6600 inhabitants in the Tuloi area of Nandi District. AEZ type and sample size are unspecified. However, the site appears to be in a high potential area. Three hypothetical farm models were compared based on different levels of soil conservation measures. These were the control zero level SWC, present SWC level in the area (trash lines developing into planted terraces), and higher than present SCW (planting of terraces, afforestation on land unsuitable for cultivation). Natural conditions common to all three farm models were a slope of 10-12%, and cultivated area per farm of 1.1 ha. Quantitative estimates were based on farmer interviews.

In the cost-benefit calculations, it was assumed that 50% of the difference in yield was due to SWC, the rest to improved cultivation techniques. Average increase in yields attributable to SWC was 23% for maize, and 43% for beans. This converted to a maize yield increase of 6.6 bags per ha, and a bean yield increase of 2.5 bags per ha. Production benefits from new soil conservation crops (fodder, sugar cane, trees) grown on the terraces and cut-off drains were also factored in. Labour costs were shadow priced at three different levels. Increased maize production was valued at import parity though the adjustment to reflect the shadow exchange rate is unclear.

Private returns on SWC to the farmer was found to be "relatively very high" for both SWC models. Gross margins (GM) due to present SWC increased by roughly 50%, providing a gross margin per extra man-day of Ksh 31 compared to Ksh 7 without SWC. The local casual labour rate was Ksh 7/day. The pay-back period on farmer investment was less than a year. Economic as distinct from financial returns were also found to be positive. On a public investment of Ksh 350,000 (components of public investment not defined) NPV over 20 years at 5% discount rate, depending on shadow labour price assumed, was estimated at Ksh 8-11 million.

2.1.2 Economical Evaluation of Soil Conservation in Kalia Sub-Location, Kitui District. G. Holmberg. Soil and Water Conservation Division. June 1985

An area in the Kitui district covering 791 farms with 1000 ha and 3700 inhabitants was studied. The area was characterised as semi-arid though average annual rainfall was 800-1,000 mm. Slopes were described as "gentle". Quite a lot of conservation work had been done. The main soil conservation structures were cut-off drains and fanya juus. A sample of 81 farmers representing different level of conservation were interviewed, and yield samples were taken from 10 m² field plots. Field data were collected for the October 1983, April and October 1984 crop seasons. The April 1984 season was affected by complete rain failure. Interviews with 65 farmers with and 17 without SWC gave accounted for differences in yields "which seem to depend mainly on soil conservation".

Average yields were 55% higher for maize and 90% for beans on terraced than on non-terraced for the poor rainfall season of October 1983. For the better rainfall October 1984 season, maize yields were 136% higher and for beans 33% higher on terraced than non-terraced. Yields generally increased down slope especially where no SC was present. SC/NT yields used for financial and economic computations were 542/350 kg per ha for maize, and 285/150 kg per ha for beans.

Based on the incremental net value of production attributable to SEC, the study concluded that it was profitable for farmers to do SWC. Using farm models similar to Hedfors, annual farm GMs increased by

Ksh 4,467 or 66% for model 2 over model 1, and by Ksh 6,952 or 104% for model 3. GM per manday increased from Ksh 11.50 to Ksh 16 to Ksh 18 through the three models.

Public investment costs technical assistants, local training and inputs were added into the economic appraisal and recovered over 20 years at a 15% rate of interest. Maize was valued at import parity. The opportunity cost of labour was at the going rate for casual labour despite substantial unemployment. On this basis, economic returns were again found to be favourable.

2.1.3 The Yield of Food Crops on Terraced and non-Terraced Land: A Field Survey of Kenva. A Minor Field Study. P. Figueiredo. International Rural Development Centre, Swedish University of Agricultural Sciences, Uppsala, 1986

A field survey of food crops was carried out in Kangundo Division, Machakos District, between October 1984 and February 1985. The area is characterised as comprising "various agro-ecological zones due mainly to topographical features". Kangundo was one of the first areas where small holder coffee growing was allowed.

52 small farmers were surveyed and their agricultural activities and crops followed during the growing season. The 52 farms were divided into 26 pairs, comprising one terraced farm (T) and one non-terraced (NT). 46% of the farms were in the more fertile coffee growing zone (UM2-3) with annual rainfall around 1000 mm, and 54% in the maize-sunflower zone (UM4) with annual rainfall around 900 mm. Since most farms in the area were at least partly terraced, the comparison was not between whole farms but between terraced and non-terraced land on the farms selected. Farmer fields were visited 7-10 times during the study. No major differences in farm operations were found between NT and T areas except for the higher incidence of the use of manure (28% of T and 16% of NT areas). However, statistical testing failed to show any significant effect of manuring possibly because amounts used were too small.

Crops measured in the survey were maize and beans. 3 plots of 10 m² for each crop were marked out on each farm. Bean yield comparisons were not possible due to lack of sufficient data for statistical analysis. The yields of maize were substantially higher on the terraced areas, being approximately +40% compared to the NTs (1600 kg/ha for T and 1121 kg/ha for NT). In the UM 2-3 zone, yields were 1290 kg/ha for T and 1222 kg/ha for NT, the small difference not being significant. In the dryer UM 4 zone, the mean yield was 1854 kg/ha for T and 1047 kg/ha for NT, a 77% difference and statistically significant at the 1% level. This suggested a positive effect on yields of terracing particularly in the drier areas, but was somewhat "puzzling as this season's rains were abundant". The economic benefits of terracing were not calculated.

2.1.4 Comparisons Between Terraced and Non-Terraced Land in Machakos District. E. Holmgren and G. Johansson. Soil and Water Conservation Branch. 1987.

This study was on soil characteristics and food crop yields was a follow-on to the Figueiredo study and was carried out in the same area of Machakos with basically the same sample of farmers. The survey was carried out between March and August 1987. 46 small farmers were surveyed, their soils investigated and their agricultural activities and operations followed during the growing season. The 46 farmers were divided into 23 pairs, comprising a terraced (T) and a non-terraced (NT) farm. Farmers were interviewed about their farming systems and soil conservation work and were visited ten times in the growing season. Rainfall was below normal for the season and also started later than normal.

The soil samples gave no significant differences between T and NT for C, K, P, N, Mg and pH. The contents of Ca and Na were slightly lower and that of Mn slightly higher on T than on NT. The soil physical parameters showed no difference between T and NT farms.

The study showed only small statistically significant yield differences between T and NT fields. This was attributed to large variations within the groups depending on widely differing inputs and farming methods. Average bean yields were 65% higher on T (544 kg/ha) than on NT, but were only 16% higher at the 95% confidence level. Maize yields, though higher on T (1021 kg/ha) than on NT (769 kg/ha) did not show any statistically significant difference. Gross income per hectare was 2% higher from T than from NT.

Most farmers were aware of the benefits of terracing and most farms were at least partly terraced. The study noted the importance as a limiting factor, advocated tree planting provide an on-farm supply of fuel wood and low labour input conservation methods.

The study concluded that good farming practices were at least as important as terracing in the short term. Such farming practices included crop rotation, good seedbed preparation, proper sowing date, improved seeds, use of fertiliser and manure, and not least proper weeding. Poor soil conservation was found particularly among women living alone with children and was attributed to lack of time, training and resources.

2.1.5 Economic Evaluation of a Soil Conservation Project in Machakos District. A Minor Field Study. B-M Lindgren. International Rural Development Centre. Swedish Agricultural University. Uppsala. 1988.

Yield data was sampled during three seasons on 26 pairs of terraced (T) and non-terraced (NT) areas. The farms were the same as those in the Holmberg and Johansson study, with the exception of the addition of one pair. 73% of the sample were reported to be in medium potential and 27% in high potential zones. The rains for the 1987/8 short rains were reported to have been the worst for a long time.

The study found that the increase in maize yields over the three seasons was 400 kg/ha on T compared with NT, and the corresponding figure for beans was 77 kg. The maize increase was statistically significant at the 95% confidence level. The yield increase for beans was not probably because the number of farms with beans was low.

Private returns to farmers engaging in soil conservation work were found to be attractive. Marginal analysis showed that for every extra manday, the return was Ksh 82, compared with a casual labour wage rate of Ksh 20 manday. 60% of the incremental return was from "soil conservation crops" such as fruit trees and fodder grass planted on terrace.

Unlike the other studies, the analysis included a discounted cash flow cost-benefit analysis on a district wide basis incorporating a comprehensive set of public costs as well as farmer costs. National level costs of training, head office, expatriate personnel costs, and hand tool costs were apportioned to Machakos in proportion to its average share of total budget for the districts. The cost of district staff were also included. The benefit profile included an assumption that without soil conservation, a one percent decrease in yield per annum would take place. The returns from planting grass and trees on the terraces were not included so as to compensate for loss of maize cropping land area to terraces, though this was probably a conservative assumption. Adjustments were made to convert from financial to economic values in the cases of output prices for maize, foreign exchange and labour. Labour for soil conservation construction work appears to have been shadow priced at 50% of the paid rate. Labour for maintenance was assumed to have a zero opportunity cost, on the assertion that it was carried out in the off-season. These assumptions may be overly generous. The economic life of terracing was assumed to be twenty years.

The results of the economic analysis indicated an internal rate of return of 59%. The high rate of return was attributed to simple and labour intensive methods of soil conservation, and overhead costs and costs per district being spread over substantial areas.

2.1.6 Economic Impact Assessment of Implementation Strategies of Soil Conservation - Trans Nzoia. A. Ekbom. February 1992

The purpose of the study was to assess the economic performance of the individual farm versus the catchment approach to the planning and implementation of soil conservation. The former was characterised as being voluntary and carried out on an individual basis, while the latter is compulsory and implemented on a cooperative basis. The study was carried out among a sample of 80 smallholders residing in the high potential Cherangani Hills, on a former large scale settler farm, in Trans Nzoia District. The smallholders were divided equally between two sites, an upper site (A) using the catchment approach, a lower site (B) using the on-farm approach.

The economic analysis indicated increases in productivity for 12% per annum at the catchment site and 8% at the individual farm site. Returns per manday were Ksh 13 and Ksh 8.3 at the two sites respectively. Increased productivity at both sites was linked particularly to investments in fruit production. The on-farm productivity comparison between two years - 1986 and 1990 - indicated that the catchment site farms had increased not only productivity relatively more than at the site of the individual farm approach, but had diversified crop production to a greater extent. The analysis showed that in that particular area, the catchment approach had proved successful at "organising and implementing soil conservation measures in a coherent, cost effective manner". The NPV of investment at both sites was positive at a discount rate of 4%. BC ratios were estimated at 1.75 for the catchment approach and 1.27 for the individual farm approach.

An analysis of welfare changes showed site A to have increased its livestock holdings between 1986-1990, exceeding site B by 30% in real value. This increase was considered to be related to improved agricultural practices. Land price were also found to have reacted positively to the changes in agricultural productivity.

2.1.7 The Impact of the Catchment Approach to Soil and Water Conservation - A Study of 6 Catchments. Soil and Water Conservation Branch. 1993

This study looked at production impact of soil conservation at 6 catchments in Bungoma, West Pokot, Trans Nzoia, Nyeri, Kirinyaga and Kakamega Districts. Production impact was assessed on the basis of effect on yields only. The study took the community as the focus of measuring change and used participatory methods to quantify changes. The results of the impact assessment are summarised as follows:

Siuna-Miruli Catchment, Bungoma District, 1991/2, 262 ha, 147 farms

Changes in Productivity

1. Maize yields up by 125-300%.
2. Milk yields up by 145%.
3. Demand for hired labour increased, labour rates rose from Ksh 5-6/day (1989) to Ksh 20/day (1993), a real doubling after inflation.
4. Land prices showed a real tenfold increase between 1983 and 1993.

Changes in Resource Degradation

1. Terracing increased with number of farms conserved growing from 20% to 90%.
2. Tree planting has increased though total number of natural trees still falling.
3. Springs are now protected.
4. One group nursery run by women, many smaller farm nurseries.

Sinenden Catchment, West Pokot District, 1989/90

Changes in Productivity

1. Crop yields increased.
2. Tree numbers increased.
3. Land value has increased, locally perceived due to conservation.

Changes in Resource Degradation

1. Terraces adopted on more than 90% of farms.
2. Farmers have stopped cultivating river banks and springs, and water points have reappeared.

Muroki Catchment, Trans Nzoia District, 1988/9, 480 ha, 167 farms

Changes in Productivity

1. Significant increase in maize yields on the large farms (>6 ha).
2. Maize yields on small farms (<6 ha) fell.

Changes in Resource Degradation

1. Soil conservation intensified. 92% of farms fully or partially conserved, mainly with biological measures.
2. Erosion fallen from 73 tons to 19 tons per ha.
3. Tree numbers and species diversity increased. One central nursery supplies seedlings run by NGO.
4. Water quality improved.

Gaturia Catchment, Nyeri District, 1990/1, 210 ha, 160 farms

Changes in Productivity

1. Maize yields increased.
2. Increased milk yields and importance of dairy.
3. Coffee yields reduced.
4. Increased fuel wood production

Changes in Resource Degradation

1. Conservation increased from 60% to 80% since catchment approach, mainly grass strips.
2. Gullies controlled.
3. No nurseries in catchment.
4. Increase in manuring, rotation and planting on contour.
5. Fertiliser use dropped rapidly.

Shiakungu Catchment, Kakamega, 1989-90

Changes in Productivity

1. No impact on productivity, crop yields continued to decline.
2. Livestock productivity continued to be low.

Changes in Resource Degradation

1. Crop and animal husbandry practices poor.
2. Environmental degradation worsening.
3. River flows continued to decrease.
4. The only increase in trees was of eucalyptus woodlots.

Getuya Catchment, Kirinyaga District, 1991/2, 100 ha, 50 farms

Changes in Productivity

1. Crop yields increased.
2. Decrease in chemical fertiliser but increase in manure.

Changes in Resource Degradation

1. Increase in number and species of planted trees.
2. General increase in soil conservation.

2.1.8 The Economics of Soil Conservation in Kenya - A Case Study of Maize in Maize Cultivation in Muranga District. A. Ekbom, January 1995

The study presents an economic model which identifies the costs and benefits of three soil conservation strategies for the Kenyan highlands. A modified version of the Universal Soil Loss Equation is used to derive empirically based, area specific estimates of soil loss. Yield effects on maize of soil loss for various slopes and soil conservation measures are assessed. The estimates are used with location specific agronomic and economic data from a small farm survey to identify the profitability of various soil conservation measures.

The results show that differences in soil loss and yields can be substantial depending on slope, slope length and conservation measures. Given three land management scenarios of applying (i) no soil conservation, (ii) intermediate biological conservation, or (iii) intensive physical and biological conservation, the first would be most profitable during the first three years. During the next 6-8 years the intermediate level is preferable economically, whereas the intensive conservation effort thereafter yields highest net benefits. The results are sensitive to the discount rate. Farmers constrained by cash or labour have little possibility to invest in intensive conservation since it implies net loss initially. Limited access to credits and public support forces farmers to deplete their soil capital.

Farmers constrained by cash or labour are referred to the second best alternative, to apply the intermediate, less labour intensive biological measures.

The policy conclusion is that government intervention is justified to support individual farmers in conservation of soil by increased purchase price of crops, credit schemes or soil conservation programmes to alleviate the burdensome initial costs of essential long term investments.

2.1.9 Soil and Water Conservation Technology Development in ASAL - Survey of Positive Experience, L.I. Mwarasomba and K. Mutanga, Soil and Water Conservation Branch, June 1995

This study reviewed and summarised literature on technology development for soil and water conservation in ASAL. It identified technical interventions which have proven to have a productive potential, carried out approximate cost-benefit analysis and reviewed socio-economic considerations. Information from a number of ASAL projects in AEZ IV and V was used. A number of water harvesting techniques were found to have been successful at the trial state, but adoption by farmers was limited. Techniques reviewed included fanya juu terracing, contour bunds, and micro catchments for trees.

Techniques subjected to cost-benefit analysis were normal terraces, enlarged terraces with and without roadside runoff, and basins with runoff. Crop response figures were based on the results of on-farm trials, adjusted for results from semi-structured interviews with farmers who had adopted the measures. The yield response figures for the models used appear to be extremely high, being in the region of 7 to 10 times the control yield. The highest financial returns on a production unit of 1.5 ha over a five year period were found to be to the two runoff models.

Field interviews indicated that water harvesting was not generally a high priority compared to other demands on household labour. One possible explanation offered was the lack of farmer knowledge of water harvesting techniques. It was recommended that extension effort on water harvesting for crop production should be focused on months where there is a low demand for household labour for other activities.

2.2 Design of regular impact studies in future

The following design features, a number of which have been suggested by programme staff, are offered for consideration:

- the system to be based on stratified random selection of catchments by 2 AEZs (high potential and semi-arid), initially starting with 2 catchments per AEZ; and random selection of farmers (5-10% of farmers in catchment),
- baseline information on key indicators to be collected by interview during the catchment planning/PRA exercise,
- the method to involve testing/piloting of farmer self-monitoring i.e. completion of simple indicator records by farmers, supported by half-yearly interviews,
- technical rating of the viability of soil and water conservation structures to follow the Prof. Thomas methodology,
- soil analyses to be made on sampled farms to monitor changes in soil fertility,
- socioeconomic indicators (self-monitored by farmers) to include SWC carried out, HH labour, HH enterprises, new enterprises, production and yields, utilisation of production for subsistence or cash, inputs, input and output prices, HH investments,

- qualitative indicators to be assessed during end of year interviews,
- extraneous factors such as rainfall and markets to be monitored,
- monitoring period to be four years,
- impact monitoring system to be coordinated by DSCOs but implemented (questionnaires introduced to farmers, farmer questionnaire follow up after three months, half yearly interviews carried out, end of year information written up) by District Farm Management and/or Monitoring & Evaluation staff as part of move to broader-based, interdisciplinary catchment planning. It may also be possible to utilise Central Statistical Organisation enumerators at low cost, and this should be investigated. HQ socioeconomic staff to provide intensive support during pilot activities.
- the workload implication for Farm Management Officers would be (assuming 15 farms monitored per catchment) 5-10 days per catchment (August/September as part of PRA/catchment planning to establish baseline, 4-5 days after three months for follow-up to support questionnaire completion by farmers, 5 days after one year to compile end of year information, and 10 days to write up. For the second year, the quarterly follow up could be dropped,
- monitoring officers would receive relevant allowances from the SWCP,
- numbers of monitored catchment sites to be doubled in the second year, with a further possible increase in the third year.

3 Measuring soil loss from suspended sediment loads of major rivers

The data discussed in section 3.5.3 is given below. With further analysis and research it offers possibilities of measuring change in soil loss in particular areas.

Table A3.1: Suspended sediment loads of major rivers

River name	Monitoring station code	Catchment area (km ²)	Mean discharge (m ³ /second)	Suspended sediment load (tons/year)
Nzoia	1DA02	8,417	56.6	212,298
Lusumu	1ED01	1,207	27.9	128,239
Ainamotua	1GB05	606	5.2	28,954
Kapchure	1GB07	129	1.1	2,555
Nyando	1GD01	2,598	17.6	566,362
Luando	1HA10	234	3.0	26,561
Sondu	1JG01	3,287	50.0	107,160
Lelgel	2ED02	108	0.5	799
Perkerra	2EE04	1,334	2.8	390,033
Malewa	2GB01	1,430	3.3	5,637
Bagathi	3AA04	272	1.6	4,456
Kiryra	3BA04	44	0.8	9,124
Ruaraka	3BA10	65	1.1	989
Nairobi	3BA22	75	1.3	2,231
Riara	3BB10	41	0.4	1,474
Ndarugu	3CB05	312	4.4	29,356
Athi	3DA02	5,724	23.6	131,089
Athi	3F02	10,272	33.6	753,627
Athi River (L. Falls)	3HA12	25,203	33.2	2,057,487
Lumi	3J06	451	1.2	9,020
Sagana	4AA01	96	1.1	1,659
Sagana	4AA05	505	5.6	18,845
Sagana	4AC03	282	4.1	8,405
Tana-Sagana	4BC02	2,365	21.0	999,721
Mathioya	4BD01	500	6.6	20,107
Maragua	4BE01	414	11.3	70,797
Chania	4CA02	518	8.2	22,132
Thika	4CB04	316	6.9	53,063
Thiba	4DD01	2,616	33.4	75,167
Tana (G. Falls)	4F01	16,972	184.4	6,098,075
Kazita	4F19	1,702	17.9	82,057
Tana (Garissa)	4G01	32,892	166.0	6,907,451
Naru moru	5BC02	83	0.8	486
Burguret	5BC06	98	1.0	1,130
Nanyuki	5BE20	860	1.8	2,072
Ewaso Ngiro	5E03	15,300	21.6	1,045,035

Source: MoWD, 1992. The Study on the National Water Master Plan - Sectoral Report (B) Hydrology. Nairobi, Kenya.

4 Evaluation Team's Programme

Date	Activity
11/1	9:00 Nairobi. Team assemblies. Meetings at Swedish Embassy and NSWC.B. Document collection and visits preparation.
12/1	Nairobi. As above.
13/1	Nairobi. Visit arrangements and preparatory reading.
14/1	14:15 Leave Jomo Kenyatta International Airport for Mombasa. Night at Mombasa.
15/1	08:30 Courtesy call to PDA Coast Province. 09:00 Leave for Kilifi. Discussions with government officers (DAO, DSCO, MoPW, etc). Night at Kilifi.
16/1	08:00 Visit selected sites and DivSCOs at Bahari and Kaloleni. 20:10 Return Nairobi.
17/1	08:00 Nairobi visits: MoALDM; MoLRRWD; PPCSCA, NES (NEAP), RSCU.
18/1	07:00 Leave for Embu 09:00 Meetings with PDA-Eastern Province and PSCO. 09:30 Meetings with DAO and DSCO, Embu District, collaborating Ministries and departments. Plan International and County Council. Review of available literature on Soil and Water Conservation activities at Provincial and District level. 14:00 Visit KARI Embu.
19/1	08:00 Further consultation with collaborators 10:00 Visit selected sites, DivSCO and DAREP site, Gachoka (low potential area).
20/1	08:00 Visit selected sites and DivSCO, Manyatta Division (high potential area). 14:00 Leave for Nairobi.
21/1	08:00 Nairobi. Visits to offices of collaborating agencies. 16:00 Leave for Nakuru. Night at Nakuru.
22/1	08:30 Nakuru. PDA and PSCO, Rift Valley. 11:00 Leave Nakuru for visits to DivSCO, Tenges Division and sites on route to Kaharet. Night at Kaharet.
23/1	08:00 Discussions with DAO Baringo, DSCO, KWAP and other collaborators. 12:00 Visits to high potential areas of District and DivSCO, Kabaratonjo Division. 16:00 Team divides: some to Eldoret and some to Kakamega.
24/1	08:00 Kakamega group: Discussions with DAO Uasin Gishu, DSCO and collaborators, followed by visits to selected sites and DivSCOs, Soy and Ainkbko Division. Night at Kakamega. 08:00 Eldoret group: Meetings with PDA and PSCO Nyanza and with DAO, DSCO and collaborators, Siaya District, followed by visits to sites. Night at Kakamega.
25/1	08:30 Meetings with PDA and PSCO, Western. 10:00 Meetings with DAO, DSCO and collaborators, Vihiga District. Visits to selected sites and DivSCOs, Vihiga and Emuhoya Divisions.
26/1	08:00 Visits to DivSCO Luanda Divisions and selected sites and to KARI, Maseno. 16:00 Depart for Kisumu Airport. 18:00 Depart for Nairobi.
27/1	Nairobi. Meetings to collect national data; district report writing.
28/1	As above.
29/1	As above.
30/1	As above. Team meeting on district implications.
31/1	National data analysis and report writing.
1/2	As above.
2/2	As above.
3/2	Team meetings on conclusions and recommendations.
4/2	Team meetings on presentations and write up of recommendations.
5/2	Presentation of first draft to SWCB and Sida Nairobi.
6/2	Revisions. Presentation of revised draft to SWCB, Sida Nairobi, MoALDM and other collaborators.
8/2	Team meeting to consider comments by Branch.

5 Persons met

Office or status

SWEDEN

Stockholm

Maria Berlekoff

Department for Natural Resources & Environment

Margaretha Sundgren

Department for Natural Resources & Environment

UNITED KINGDOM

London

International Institute for Environment and Development

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Sustainable Agriculture Development Programme

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J.M. Charo

SCA - Bahari Division, Kilifi District

Karissa Jefwa, Chivatsi Chai, Mae Zero, J. Shikale and other farmers

?

Primary School Headmaster

J. Majimbo

DivSCO - Kaloleni Division, Kilifi District

J. Chigiri

SCA - Kaloleni Division, Kilifi District

M. Kariuki

SCA - Kaloleni Division, Kilifi District

Mrs. Joseph, Charunga Bekwekwe and other farmers, Bonje village

Eastern Province

PDA Eastern Province

J.G. Njuki

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Director of Agriculture

Extension Coordinator

B. G. Mutahi

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Mr Mwanah

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J. M. Matiri

Crops Officer

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P.N. Murungi (Ms)	Ag. District Livestock Development Officer
J.M. Maina	Monitoring and Evaluation Officer
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Joyce K. Kariuki (Ms)	District Physical Planner
S. Matano	Ag. District Forest Officer
	District Development Officer
E.M. Murithi	Clerk to County Council
D. Leteipan (Ms)	Agriculturalist, Plan International, Embu
Gachoka Division	
	DivSCO
Jerica Mwendira Ngundi, Virginia	Nicolas Njeru, and other farmers
N.M. Njeru	Chairman, Kanothi Catchment
(with 8 other Committee members)	
M. Njiro, Mr and Mrs Nguru and other farmers,	Ivondo Catchment
Manyatta Division	
P.G. Njiru	DivSCO
Peter Mtambo	Chairman, Catchment Committee
Julietta Gesuka	Farmer and Committee member
J.G. Mwangi	Assistant Chief, Nembure sub-location
Mrs. C.K. Nyaga	Farmer
Steven Njeru	Chairman, Catchment Committee
Mrs A. Wanjohi	Farmer, Mutisa Catchment
Mrs. Muriuki	Farmer, Mirunda catchment
Rift Valley Province	
K.K. Chepsaigutt	PDA, Rift Valley Province
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B.N. Momanyi	District Agricultural Officer
J.K. Yattich	Extension Coordinator
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G.M. Mailu	District Development Officer
J. M. Obam	Assistant Hydrologist, MoLRRWD
I. Kimani	Geologist, MoLRRWD
J.N. Mutukuh	Programme Officer, JAMABA Project
Mark Nicholson	Adviser, JAMABA Project
Tenges Division	
Mr Mulamba	Divisional Agricultural Extension Officer
M. Keitany	DivSCO
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R. Ruto	Farmer's son, Oinopsis Catchment

Joseph Kiprop	Assistant chief, Cheberem sub-location
Sakuba Kiplongit	Farmer, Cheberem Catchment
J.K. Kinwei	Farmer, Cheberem Catchment
K. Kipkosgei	Farmer, Cheberem Catchment
	Farmer's son, Cheberem Catchment

Kabarnet Division

D. K. A. Mutai	DivSCO, , Baringo District
P.Kemei	Divisional Planning Team
J. Chemjor	Divisional Planning Team
J. Chepiconga	Chairman, Kasisit Catchment
Z. Chepsergon	Treasurer, Kasisit Catchment
M.K. Cheban	Farmer's son, Kasisit Catchment
K. Amdany	Kasisit Catchment

Kabartonjo Division

J.K. Tomvi	DivSCO
L. Totich	Divisional Agricultural Extension Officer
I Kipkebut	Divisional Planning Team TA
W. Cherogong	TA Triminioni
Clara and Martha	Women farmers

Eldama Ravine Division

N. K Tanui	DivSCO
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Uasin Gishu District

G.K. Arap Melli	District Agricultural Officer
W.K. Too	Extension Co-ordinator
PN. Koyi	DSCO
A. Oddhiambo (Mrs)	Marketing Officer
J.T. Kibarak	Fertiliser and Inputs Officer
G.N. Chege (Mrs)	Home Economics Officer
J. Bartonjo (Mrs)	Crop Protection Officer
PN. Oroko	Crops Officer

Soy Division

J.K. Tingaa	Divisional Agricultural Extension Coordinator
K.C. Rono	DivSCO
P.K. Chumba	Soil Conservation Assistant
J.K. Tiony	Soil Conservation Assistant
S. Chumba	Chairman, Sugoi Catchment
D. Saina & B. Kemboy	Committee members, Sugoi Catchment

Anabkoi Division

R.C. Kiptoo	DivSCO
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J.R. Wanyeki	Soil Conservation Assistant
K. Maigua and others	Farmers, Ainabkoi Catchment

Nyanza Province

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J. Mwaniki, PSCO Nyanza Province

Siaya District

C. Omondi E. Shisanya	Acting DAO/DEC DSCO
Boro Division	
F. Ochol, DivSCO K. Otieno, AAI/DPT member A. Ogot. AAI/DPT member	
Yala Division	
W. Ndirangu G. S. Okoth M. O. Otieno S. Otieno-Oluoch M. Olweny (Ms) H. Obango	AOII/DAEO AAI/DPT member AAI/DPT member AAI/DPT member AAI Chairman, Usuha/Ukanya Catchment Committee
Western Province	
T.K. Opiyo J. Imbira L. Kibisu (Mrs)	Ag. PDA PSCO Provincial Crops Officer, Western Province and Acting Agricultural Extension Co-ordinator
KARI, Maseno	
A. Yobterik (Ms) S. Gathumbi B. Jama E. Gacheru (Ms) G. Mwasambu J. Kinyange	Centre Director, KEFRI/KARI/ICRAF Maseno Station Agroforester, KEFRI/KARI/ICRAF Maseno Station KEFRI/KARI/ICRAF Maseno Station KEFRI/KARI/ICRAF Maseno Station KEFRI/KARI/ICRAF Maseno Station KEFRI/KARI/ICRAF Maseno Station
Vihiga District	
J. M. Sewe C.N. Wanjau F. G. Karani B. Kimoro N.M. Momanyi	DAO - Vihiga District DEC DSCO Livestock Extension Coordinator District Livestock Production Officer
F. M. Shisia M.M. Mwai (Mrs) G.N. Bosire P. Ochieko P.G. Ondieki K. Omwenga F. Adoyo (Ms) ? (Ms)	District Officer - Environment District Forest Officer Marketing and Inputs Officer Farm Management Officer Farm Input Officer Irrigation Engineer Kenya Woodfuel and Agroforestry Project, Box 421, Busia Farm Youth Officer
Vihiga Division	
F. Kabumba J. Luhomba Esnes and Janet Kavisi J. Kigodi	DAEO Unit TA Women farmers, Ikumba catchment Farmer, Ikumba catchment
Luanda Division	
B. Sewe Mr Asiema Shem Obeyi Torcas Benje	DAEO DivSCO Secretary, Catchment Committee Woman committee member, Elambe catchment

Teresa, Donita, Mrs Oketch Women farmers

Sabatia Division

K. Macharia DivSCO, DAEO

Chairman, Waluka catchment

S. Otaha Farmer, Waluka catchment

Several other men and women farmers

Emuhaya Division

J. Alwanga DivSCO

C. Kiarie AAI/DPT member

M. Otieno AAI/DPT member

Rosalin & Ester Two women committee members

A. Oketch (Mrs) Woman farmer

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Appendix A

SIDA
Dep for Natural Resources and
Environment
Africa Division
Maria Berlekom

PROMEMORIA

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Donier

1995-09-04

NATUR-1995-0252

TERMS OF REFERENCE FOR AN EXTERNAL EVALUATION OF THE NATIONAL SOIL & WATER CONSERVATION PROGRAMME, KENYA, 1995 (DRAFT III)

1. Background

The National Soil & Water Conservation Programme (NSWCP) within the Kenyan Ministry of Agriculture, Livestock Development & Marketing (MoALDM) was established in 1974. The programme has since expanded from the initial pilot activities in four Districts to presently cover the whole of Kenya.

The main objective of the programme is to promote an increased and sustained agricultural production with minimum soil loss and damage to the environment.

1,4 million farms are reported to have undertaken soil conservation measures as a result of the programme over the years. The emphasis has mainly been on high- and medium potential areas but during the last years efforts have been made to develop suitable practices for semi-arid areas as well.

Since 1987, the NSWCP is using a participatory extension approach, based on community identification and planning of activities together with soil conservation staff. Women are in most areas highly involved in undertaking soil conservation work and are encouraged to actively participate in the local/village programme planning committees so called "catchment committees").

The present agreement is based on the Plan of Operation for 93-94-95/96, and ends in June 1996. For this period a total of SEK 50 million has been allocated by Sweden for the programme. Evaluations have been made every three years, last time in August 1991.

Sweden and Kenya will during 1995/96 take a decision regarding the future nature, scope of activities and funding level for the NSWCP for the coming three year period. The Soil and Water Conservation Branch (SWCB) at MoALDM has therefore prepared a paper suggesting the future direction

2. Purpose of the evaluation

The purpose of the evaluation is to assess the effectiveness and relevance of NSWCP in the context of the agricultural systems in the country, the production trends, the environmental situation as well as agricultural policy and organisational set-up within MoALDM.

On the basis of the evaluation, the mission shall also appraise the tentative proposal for future activities prepared by the SWCB.

3. Main tasks

The evaluation team shall:

a) describe briefly the NSWCP, its goals, main activities, organization, achievements, changes and development since inception,

b) assess the performance and output of the programme in qualitative and quantitative terms since the last evaluation 1992, and in relation to the three year Plan of Operation 93/94-95/96 as well as Annual Workplans,

c) assess the cost-benefit relationship of the programme activities at farm, catchment and national level. (including productivity increases, management of soil fertility and incentives to and motivation of land users to adopt soil & water conservation measures,)

d) assess how the recommendations from the 1992 evaluation have been followed up,

e) assess the relevance of the programme in relation to the main objective (improved production on sustainable basis with minimum soil loss and damage to the environment),

f) assess the present main objective and strategies in relation to 1) the situation in Kenya, and 2) Sida's present priorities and policies (including the overall aim of poverty alleviation, food security etc.),

g) assess the effectiveness of the extension approach used by the programme, including the extent and impact of community participation and the extent different categories of land users (women-men, rich-poor, farmers-pastoralists etc)

h) assess the institutional collaboration within the field of soil & water conservation,

i) evaluate the organisational set-up of the NSWCP at all levels, including assessment of consequences of 1. the planned merger of soil & water conservation staff into the general extension system in Kenya, and 2. the changes brought about as a result of the present Agriculture Sector Review within the MoALDM,

k) assess the internal monitoring and evaluation system, as well as the financial management mechanism of the programme,

l) assess the possible consequences if Sweden would decrease/withdraw support to NSWCP, including Kenyan capacity and interest to continue the activities,

m) review the geographical coverage of NSWCP and give recommendations on future geographical coverage, in relation to needs assessment and cost-efficiency in high- and medium potential areas vs low potential (arid and semi-arid) areas

n) appraise the documents on future scope and activities of the programme prepared by the SWCB, in light of both the above and the conclusions and recommendations of the recently undertaken analysis of the natural resources sector in Kenya made for SIDA.

4. Timing of the evaluation

The evaluation shall take place during four-five weeks in November 1986.

5. The evaluation team

The evaluation team shall consist of three persons and include expertise on the following subject areas:

- rural extension & socio-economic issues
- organisation and management
- land husbandry & soil fertility management
- water resources management in drylands

At least one person should come from the region of Eastern Africa.

SIDA

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The team shall carry out its work through:

- analyzing available written documentation,
- interviews with relevant individuals and institutions,
- field visits.

7. Reporting

A draft report shall be submitted to the SWCB and the Swedish Embassy and discussed during a seminar before the mission leaves Kenya. The final report shall be submitted to SIDA at later than 15 January 1996, after comments from all involved parties.

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Lennart C G Almqvist
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- 96/20 The Swedish Fisheries Programme in Guinea Bissau, 1977-1995.96/20The Swedish Fisheries
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