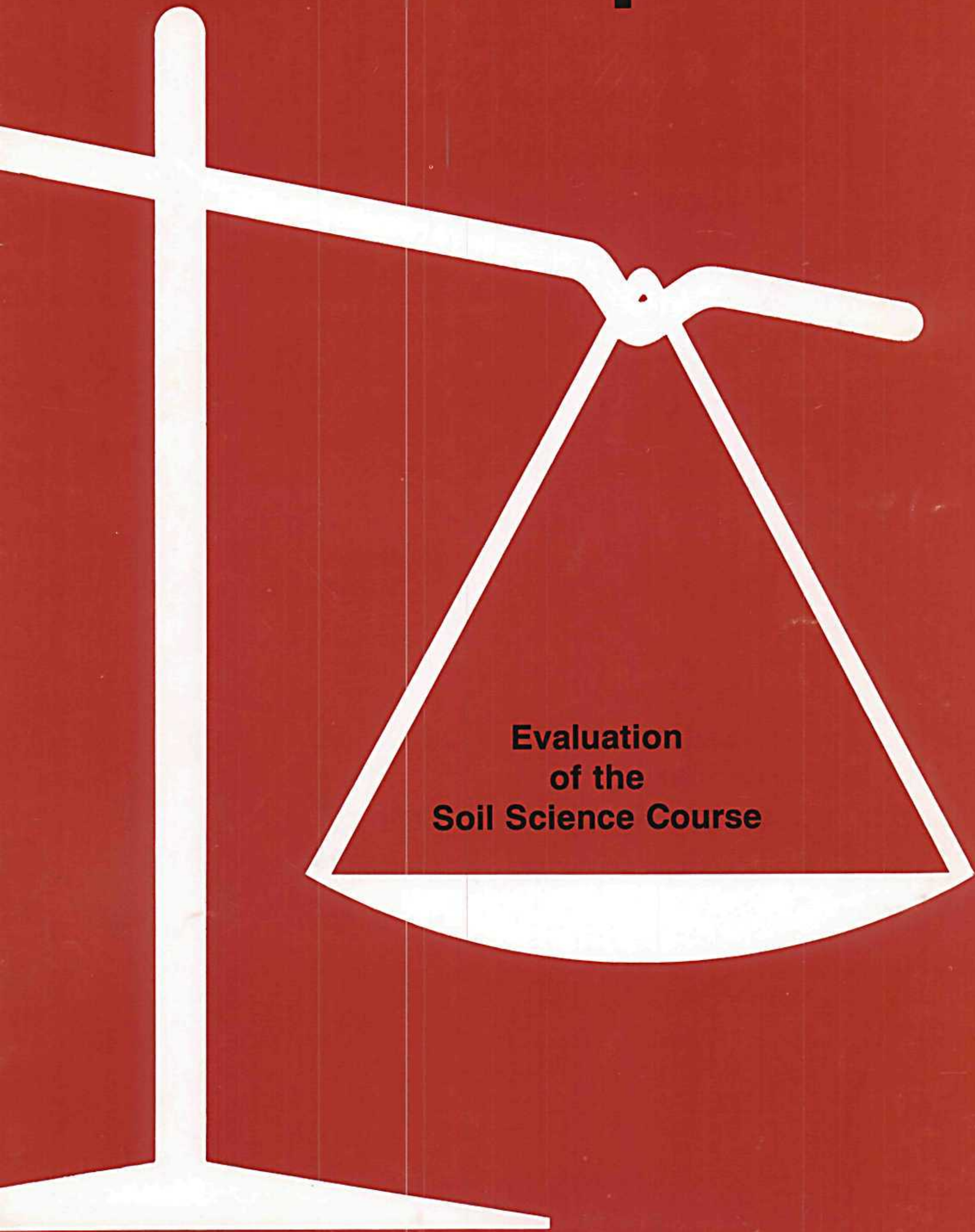




THE ROYAL NORWEGIAN MINISTRY
OF DEVELOPMENT COOPERATION

Evaluation Report 7.88



**Evaluation
of the
Soil Science Course**



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Contents

	Page
Summary	4
1. Introduction: the Scope of the Study	6
2. Description of the Course	7
3. Objectives of the Course	13
4. Training Needs	15
5. Other Courses Available	23
6. Evaluation and Recommendations	26
Appendix	29
1. Terms of Reference	29
2. Itinerary and List of Meetings	32
3. Manpower Situation in Tanzania and Zambia	33
4. Excerpts from Reports on Visits of the Project Coordinator to Tanzania	37
5. Country of Origin of Former Participants	40

Summary

Introduction

The Soils Science course at the Agricultural University of Norway (AUN) at Ås, financed by MDC/NORAD, was set up in 1980. It is of ten months duration, and was primarily intended for participants from Tanzania, Zambia, Kenya and Botswana.

It was originally envisaged that the course would be offered for five years. When that period had almost elapsed, however, it was decided, after some debate, to continue, pending the findings of an independent evaluation. This report - some years later - is the outcome.

Collaboration was formally established with the Department of Soil Science in Tanzania in 1981. The initial agreement, till 1984/85, was extended for a further three years, at which time it was proposed that the situation be reviewed once again. No formal report has been presented from the Tanzanian side, but their views are recorded in this report.

Objectives of the Course

The objectives of the course, on the basis of which it should be evaluated, are as follows:

- Institution-building in certain developing countries.
- General competence-building in soil science in developing countries.

Priority Training Needs

A distinction has to be made between the numbers of persons it would be desirable to train at postgraduate level and the number that the countries themselves forecast as required (taking account of other priorities for training and of constraints such as the budget available for salaries and support costs).

The forecast demand for M.Sc. training in soil science in the next few years is very small in both Zambia (about one per year) and Tanzania (about two per year).

Other Courses Available

A number of other courses in soil science are listed in this report. It is evident that apart from those in Europe (notably in Belgium, Britain and Netherlands) there are courses elsewhere in Africa - notably in Kenya and Zimbabwe - which are designed for a similar purpose.

Summary Evaluation

Institution-building:

This objective has been achieved to only a very limited extent in Zambia. A good deal more has been achieved in Tanzania, where several junior staff members of the Department studied at AUN, and some other support has been provided. In Kenya and Botswana the objective has not been satisfied.

General Competence-building:

Performance is difficult to evaluate since the reduced scope of this study did not enable us to judge the quality of the course at AUN as such. An earlier questionnaire survey does, however, indicate a favourable assessment of the first three years of the course.

General:

Insufficient effort has been made to monitor the rapidly changing situation with regard to agricultural manpower in the main target countries. Their priority needs have changed considerably since the course was set up, and this should have resulted in an earlier review of this course and appropriate action.

Recommendations

The course in Soil Science at AUN should not continue to be offered. Collaboration with, and support to, the Department of Soil Science at Sokoine University of Agriculture (SUA), Tanzania, should continue. Discussions with the Department should take place to establish their own priorities and how AUN might best assist them.

If students, especially from Tanzania and Zambia, wish to study for an M.Sc. in soil science in Norway, this should be arranged as a special option under the umbrella of the new M.Sc. course in Management of Natural Resources and Sustainable Agriculture.

1. Introduction: The Scope of This Study

It was originally envisaged that this study would be rather extensive, including an evaluation of the content of the course, as well as the administering of questionnaires to participants. In response to the Inception Report, however, it was decided by MDC/NORAD that it was appropriate to limit the study to broader issues of policy, e.g. the objectives of the course, and the priority needs of the main target countries.

Thus it is the Terms of Reference for the Inception Report which most accurately define the scope of work for this Final Report. This may be summarised as follows:

- a description and preliminary assessment of the course in terms of its satisfying its intended objectives, and the wider aims of Norwegian aid;
- an outline of alternative training available in East Africa and elsewhere;
- a review of documentation already available regarding the need for training in soil science in East Africa.

On this basis, the study should (to quote the original Terms of Reference)

- evaluate whether it is appropriate to devote resources to the Soil Science course at AUN;
- suggest possible alternative means of achieving the intended objectives of the course.

(See Appendix 1 for further details, including the original Terms of Reference for this evaluation).

2. Description of the Course

Origins

In June 1979, a proposal for a course in soil science was submitted to the authorities at AUN by those at AUN responsible for liaison with MDC/NORAD, Professor O. Aresvik and K. Haugum. It was proposed that the course be offered for five years, preferably designed for countries in East Africa: Tanzania, Zambia, Kenya and Botswana.

Later in the same month, a letter from AUN to NORAD indicated that the proposal had been accepted by the professorial committee at AUN on condition that the course was funded by NORAD.

In a letter dated 5 November 1979, NORAD expressed their willingness to finance such a course over a five year period, starting in August 1980. It was understood that there would be a specific study in East African countries to define the needs.

The original idea for such a course, and the major justification for establishing it, both derived from two particular NORAD activities in East Africa. In Zambia, support was being provided to the Soil Survey Unit, and those who received scholarships for overseas training in connection with this project chose to study in Britain or the Netherlands (there being no suitable course in Norway). In Tanzania, Norway was already giving major assistance to the Faculty of Forestry at Sokoine Agricultural University (formerly University of Dar es Salaam, Faculty of Agriculture) in Morogoro. The Soil Science Department, which had earlier been well-organised and effective, had suffered a serious decline. It was felt that there was a need for training in soils science for Tanzania, and especially to build up the department at Sokoine.

Although tropical soil science is not an area of expertise in which Norway is strong in numerical terms (as is indicated by the difficulty of recruiting suitable personnel for the Soil Survey Unit in Zambia), there was a small number of very experienced individuals who had the necessary imagination and drive to propose and develop the idea, which was then accepted by NORAD as noted above.

The course, of ten months duration, began in 1980/81. In the first year, the overall Coordinator for courses at AUN was Professor Aresvik. In 1981/82 Professor A. Njoes, now Rector of AUN, and the person who took the lead in initiating the course, was Course Coordinator. Dr Bal Ram Singh, who had some years before done postgraduate studies at AUN, was engaged at the outset to carry out a major part of the teaching, and was made Course Coordinator from 1982/3 onwards. In 1985 he took leave of absence to take up a post as Coordinator of the Soil Productivity Research Programme in Zambia and his place as Course Coordinator was taken by Assistant Professor D. Guttormsen, who had already taught on the course for many years.

The number of participants on the course was initially proposed as eight (the optimal number in view of the laboratory facilities) but was set at 14 and then 16, apparently in the interests of cost-effectiveness.

Content and Nature of the Course

The course is, to quote the brochure "aimed at young soil scientists requiring graduate level training for careers in research, teaching, extension, management and regulatory services."

Most of the course consists of formal lecturing and laboratory work, including some field work in the vicinity of the University. The physics, chemistry and microbiology of soils are covered, together with related topics such as soils classification and water engineering. A short course on statistics, experimental design and data processing is also included. In summary, the programme for the course is as follows:

Compulsory Subjects

(2 credit units each, unless specified)

- Soil Physics and Soil Management
- Soil Fertility and Plant Nutrition
- Soil Survey, Classification, and Soil Resources
- Soil Chemical Analysis
- Soil Chemistry
- General Microbiology
- Soil Microbiology
- Soil and Water Engineering
- Statistics (3 credit units)
- Soil Seminar (0.5 credit units)

Non-compulsory Subjects

- Soil and Water Pollution (1 credit unit)
- Radioisotope Techniques in Soil and Plant Research (2 credit units)
- Data Course (1 credit unit)

Although the course at AUN is of ten months duration, leading to the granting of a Diploma, it is seen by those responsible for conducting it as the first year of a two-year M.Sc. - in effect, the theoretical taught component, which, ideally, is to be followed by the preparation of a thesis. In the case of participants from Tanzania this is indeed the pattern, for they return to Tanzania and prepare a thesis which is then examined in collaboration between SUA and AUN. Numerous students have thus completed their M.Sc. (although it typically takes two or three more years).

The possibility has existed for participants from other countries also to complete their M.Sc. in Tanzania, but this in practice caused severe problems, and few chose to do so. In recent years, a few have obtained funds to continue their studies to M.Sc. at AUN. MDC/NORAD have not financed these fellows, but have funded one Ph.D. student from Tanzania to carry out some of his studies at AUN.

Previous Reviews of the Course

The course has never been the subject of a formal independent evaluation. In 1984, the Course Leader, Dr Singh undertook a detailed evaluation of the course, based on questionnaires sent to 41 former students and their heads of department. Two-thirds

of the students replied, and a high proportion of their heads of department. The overall evaluation by both was favourable. (See Section 6 for further details)

At about the same time the future of the course was discussed within the Fellowships Division. A number of problems were identified, of which the main ones may be briefly listed:

- Some fellows, from India and Pakistan for example, were overqualified and wanted a more in-depth course.
- There was too little laboratory work.
- In Morogoro, Tanzania there was a lack of effective guidance, as well as of equipment and chemicals necessary for research. But a proposal was made to provide some support from NORAD to ease these problems.
- Fellows from Zambia and other countries had not found it suitable to go for further studies in Tanzania. In the case of Zambia this was particularly regrettable since this had been seen as a major target group. In fact, few had come to Norway to study; instead a number received finance to study in Britain and Netherlands. In addition, Belgium had begun a staff development programme in this field, including provision of short term staff.

The course was thus seen to be weak in terms of relating to projects in East Africa. As regards other parts of the world, the problem was noted of providing a course to meet the rather varying standards and particular needs of a wide range of different countries.

In summary, it was pointed out that the proposal by AUN was that the course should run for five years. Since this period had now elapsed, it was appropriate to bring the course to a close.

Against this view, a number of counter-arguments were also put forward:

- Norway intends to increase support in agriculture, especially to the poorest countries, and studies in this field can be of value.
- This is a field which is well developed in Norway with prominent professors (Laag and Njoes).
- People in Norway have shown how, despite poor land and climate, resources can be optimally used. And, it is claimed, theory and laboratory routines are the same wherever such studies are undertaken, so that the arctic climate should be no hindrance.
- The activities aimed at East Africa could contribute to building up expertise which would assist in Norway's other supported activities in the longer term.

The practical problems (of equipment and chemicals) noted above can be overcome with a small investment of funds.

- The other study fellows, mainly from Asia, contribute to a broadening of knowledge and cultural contacts. This strengthens the milieu at AUN, and gives a challenge to staff to satisfy their professional and social needs, and to contribute to enriching different soil science institutes in developing countries with which they may at some later date be in closer contact.

- If the soil science course at AUN were closed down this would leave only the Animal Husbandry course; this would have a weakening and unfortunate effect on the milieu.

These, then, were the main considerations in the debate. But no final decision was taken. Instead it was concluded that a more detailed evaluation should be undertaken, and that in the meanwhile the course should be permitted to continue.

Participants

According to the course brochure "candidates from Tanzania, Kenya, Zambia and Botswana have priority to the course, but the course is also, depending on vacancies, open for applicants from other countries."

In fact, the number of applicants from the four main target countries has never been enough to fill the course, so that others have been accepted from all over the world. Indeed the number of applicants has typically not been very high (in relation to the number of places offered) and in 1987/88 applications declined to a low of 25. In 1986/87 the number of applicants was 26. Of those offered places, four did not take them up, so that finally only six of those who applied were excluded.

However, this apparent shortage of applicants need not necessarily be a reflection on the content of the course itself. Invitations to apply for the course are sent out by MDC/NORAD and the procedure for inviting applications is such that those institutions and individuals most suitable do not necessarily receive the information. Rather than targetting, the policy in the past seemed to favour spreading the applications widely over many countries. Another factor is that prospective participants may well prefer to go on courses which give an M.Sc. rather than a Diploma. A number of such courses are available (as noted in Section 5), and in the case of Zambian fellows, for example, these have often appeared more attractive.

Table 1 gives information regarding the countries from which participants have in fact been drawn. It is clear that, apart from Tanzania and Zambia, the range has been very wide. There has not even been concentration in the main partner countries. (Excluding Tanzania and Zambia, the main partner countries accounted for half the participants in the period 1980-84, but only 19% in the last four years).

Few of the participants have been women. This is true also of most of the other Diploma courses in Norway, mainly, it appears, because of the few women who are qualified in such technical fields. In the last two years, for example, only 10% of applicants for the Soil Science course have been women. These were all accepted for the course, but this still brought their participation to only 16% of total.

In summary, four groups of participants may usefully be distinguished: Tanzania, Zambia, Botswana and Kenya, rest of the world. Some general points may be made about the relative merits of the course in relation to these different groups, based largely on the views of those responsible for the course. Further detail is given in Sections 4 and 6.

*Table 1. Country of Origin of Former Participants.
Summary Table*

	1980-84	1984-88	Total
Tanzania	14	14	28
Zambia	3	8	11
Botswana	1	1	2
Kenya	1	1	2
Other partner countries	20	6	26
Other countries	21	34	55
Total (29 countries)	60	64	124

Tanzania:

These constitute the largest single group (22% of total). They are generally high standard, highly motivated students. They return to Sokoine Agricultural University to complete their M.Sc. This typically takes at least two or three years of further work (partly because of various problems beyond their own control). The benefits that this group of fellows have received from the course are noted both by the staff at AUN and the Department at Sokoine University.

Zambia:

These were intended to be a major group, but have not in fact been so - constituting only 9 % of total, (and mainly in the last four years). The merits of this group vary somewhat according to the individual concerned, but there have been various problems. The opportunity for Zambian fellows to complete their M.Sc. in Tanzania has been taken by very few, and with only limited success. The training component of both the MDC/NORAD projects from which participants have been drawn has been poorly planned in the past. Partly as a result of both of these factors, it has proved difficult to find Zambian graduates suitably qualified - and willing - to attend the course.

Botswana and Kenya:

These were also intended as a major group but have never been so - constituting only 3% of the total. Clearly the aim of the course as serving these countries has not been realised.

Rest of the world:

These account for 67% of total. The success of participants depends almost entirely on the individuals concerned. It is notable that no single country has sent more than 7 participants over the 8 years of the course, and there has been very little link with MDC/NORAD projects. According to the report by Dr Singh in 1984, there was not a significant difference in the questionnaires returned by African and Asian participants in terms of their views on the course. There have been reports, however, that in this course, as in some others, fellows from India and Pakistan have considered themselves to be over-qualified. And this may relate to the fact that India has not sent any participants in the last four years.

3. The Objectives of the Course

It is important to state clearly the objectives of the course, and hence the criteria against which its performance should be evaluated. The situation is, in principle at least, complicated by the fact that for the purposes of a fair evaluation of the course it is the policies in force at the relevant time that are important, whereas for the purposes of making recommendations as to the future it is the current policies that matter.

There are broadly three sets of objectives which might be used as the basis for evaluation:

- i. The stated objectives of Norwegian aid as contained in official documents, such as "White Papers" (Stortingsmeldinger).
- ii. The more detailed objectives as set out by the Education and Fellowships Division of MDC/NORAD in their recent policy guidelines.
- iii. A third alternative is to include amongst the objectives others which are thought to have influenced the performance of the course, whether or not they are officially or explicitly stated as objectives.

Before discussing the relative merits of these three alternatives, the relevant objectives in each case may be spelled out.

i. Official Statements of Government Policy

At its most general, the aim of Norwegian development assistance is "To contribute to lasting improvements for people in developing countries: economically, socially and politically". The assistance is to be used to have maximum impact on poor segments of the population, and should not create dependence on continued assistance. A comprehensive "White Paper" (Stortingsmelding no. 36 of 1984-85) identified four priority sectors as part of a strategy to reach the poorest groups. Agriculture, water supply and health were three; education (and particularly basic education) was another.

The present social democratic government recently issued an addendum (Stortingsmelding no. 34 of 1986-87) stressing five priorities: natural resources and environment, economic growth, improvement of living conditions for the poorest, human rights, and peace. Although education was not explicitly mentioned, the present government continues to place an emphasis on this sector.

Bilateral aid is concentrated on a few main cooperating countries. A few sectors, however, are explicitly excepted from this general principle - among them the provision of training fellowships. Another important principle is that aid should be recipient oriented: that is, the starting point should be the needs, plans and priorities of the recipient countries. Also, assistance should be unconditional and untied.

The White Paper of 1984-85 states that, with regard to technical assistance, the priority

is to build up relevant competence in the developing countries, where, in some cases, limited technical and administrative capacity is a major problem. The long term development of competence should, first and foremost, take place in educational institutions in developing countries, and be based on their existing needs. (Stortingsmelding. no 36, page 105). But such training can also take place in Norway or in a third country.

ii. Education and Fellowships Division.

The Education and Fellowships Division of MDC/NORAD has recently prepared guidelines which set out its objectives very clearly. These have, with minor qualifications, been accepted as official MDC/NORAD policy.

The most important single objective is to provide training which most effectively meets the priority needs of the main partner countries themselves.

More specifically, the courses should, as far as possible, be:

- reasonably developing country oriented
- consistent with aid policy priorities
- oriented to women
- linked to Norwegian financed projects and programmes
- aimed at institution-building
- consistent with Norway's special expertise (taking account also of similar courses offered elsewhere).

iii. Other Objectives

Although the main guide for determining priorities in the field of training is the priority needs of the main partner countries, it is apparent that there are other considerations which, rightly or wrongly, have had an influence on major policy decisions in the past - such as the number and topics of courses offered in Norway, and the range of countries invited to send participants.

Thus, in the case of the Soil Science course, it has been argued that the course may, and should, contribute directly to maintaining or developing Norwegian competence in the field of tropical agriculture. This may follow directly: since those involved in teaching the course gain knowledge and establish professional contacts. And it may follow indirectly: since the course brings financial benefits to Noragric (the semi-autonomous body within AUN responsible for conducting the Diploma courses, and for undertaking consultancy assignments), which is thus strengthened in its role as provider of technical expertise to MDC/NORAD.

And the decision as to the range of countries and individuals invited to apply for courses has apparently been influenced by the view from the Ministry of Foreign Affairs. To quote an independent review of Norwegian aid: "The fellowship and scholarship programmes were used outside the priority countries to buy goodwill everywhere in the Third World". (Ref: Stokke, O. "Norwegian Aid: Policy and Performance" in **European Development Assistance**, Vol. 1, EADI/NUPI. 1984)

Each of these might be seen as a legitimate objective, if not of the Division then at least of the Norwegian government more broadly defined. Certainly they have had

some influence, whether favourable or otherwise, on some of the courses. For the purposes of evaluation, however, the question arises whether these should be included as objectives which the course is required to satisfy. In response to the Inception Report, in which this question was raised, MDC/NORAD made it clear that these two objectives should enter the evaluation only insofar as they might have influenced the success of the course.

iv. Conclusion

The general objectives of Norwegian aid, insofar as they relate to this course, have not changed very significantly since the course was set up. Perhaps the main change is the increased emphasis on agriculture (1984/85) and natural resources and the environment (1986/87).

The more specific objectives of Education and Fellowships Division, too, have not greatly changed. The new guidelines are important not so much because they introduce new policies, but rather because they make already existing policies more precise.

(Early in 1988 a brief review of all Diploma courses, financed by MDC/NORAD in Norway, was undertaken to assess how well each of them measured up to the specific objectives set out in the new guidelines. This allowed some comparisons to be drawn between each course. An indication of the merits of the Soil Science course relative to other Diploma courses in Norway can be found in that report. The purpose of the present evaluation, however, is slightly different. And the objectives which it is required to satisfy are both broader and fewer.)

One notable aspect of the guidelines is the emphasis placed on relating courses to Norwegian supported activities, and to institution-building in developing countries. But the Soil Science course was set up on the basis of specific Norwegian activities in two main partner countries, each concerned with institution-building. In this regard, therefore, the objectives as set out in the new guidelines, and those which influenced the course as it was originally conceived, are entirely consistent. It is also evident from the debate in 1984 regarding the future of the course (as summarised above) that all the objectives stated in the new guidelines, except for the orientation towards women, were considered at that time.

With regard to this course, therefore, the basis for evaluation is not significantly affected by the time dimension, for there have not been major changes, over time, in the intended objectives of the course.

In summary, the course should be evaluated (as confirmed by MDC/NORAD in response to the Inception Report) on the basis of two main objectives:

- institution-building, and the development of manpower in certain specific developing countries (notably Tanzania and Zambia), particularly in relation to Norwegian assisted activities.
- general competence building in soil science in developing countries.

4. Training Needs

INTRODUCTION

A brief visit was made to Africa as part of this evaluation. (The itinerary and list of meetings held are given in Appendix 2). The main purpose of this visit was to obtain data on training needs in the field of soil science, particularly in Zambia and Tanzania - the most important target countries for the course. But discussions were also held with personnel, notably at the Soil Survey Unit in Zambia and the Department of Soil Science at Sokoine, which allowed an assessment to be made of the benefits which the Soil Science course had provided. (Some further information was also collected during a subsequent visit to Tanzania by the consultants in connection with another assignment).

Written reports on manpower needs were obtained in both countries. Indeed this is a subject of topical interest throughout the region. There is a Southern African Centre for Cooperation in Agricultural research (SACCAR) which has as one of its aims "promoting a regionally coordinated high-level training programme". And a "Regional Workshop on Training Needs for Agricultural Research in Eastern and Southern Africa" was held in July 1987 in Arusha, Tanzania, sponsored by IITA/IRDC. The Summary Observations and Recommendations of the Workshop include the recommendation that "postgraduate training in agriculture should as far as possible be carried out in the region. Support of external agencies, national governments and IARC's should be mobilized to make this possible." It further proposes that training "on a regional basis should be explored through a meeting of Deans of Faculties of Agriculture and Directors of research in the region." Discussions on this subject have, apparently, already begun.

ZAMBIA

Forecast Training Needs

The largest single employer of soil scientists in Zambia is the Soil Survey Unit (SSU), including its provincial offices. Next in importance is the Soil Productivity Research Programme (SPRP). Both these are supported by MDC/NORAD projects. (The manpower demand from the private sector is negligible at present, and likely to remain so in the medium term at least).

- According to the Manpower Survey of 1982 issued by the Planning Division of the Ministry of Agriculture and Water Development (MAWD), the demand for additional soil Scientists in Zambia, at M.Sc and Ph.D level, for the coming 5 - 10 years was **3 in total**.

- According to the 1985 Report of the Review Mission of the Soil Survey Unit the manpower shortfall within the Unit (gap between persons required and number of Zambians currently in post) was **8 professional staff**.

- The number of individuals from the Soil Survey Unit attending training courses financed by MDC/NORAD in 1987 is **10 at M.Sc level**.

(For more details of these figures see Appendix 3).

There is an enormous discrepancy between the above figures which demands explanation. (They certainly illustrate very clearly the nature and extent of the problem of assessing training needs).

The main reason why the **first** figure is so low is that it is based primarily on the number of established posts available. The report notes that this number increased very little in the period 1972-82, and foresees rather little change in the medium term. The number of posts is to a large extent linked to the recurrent budget available for paying salaries. Thus the effective constraint is ultimately not the number of posts but the cost of employing personnel. (It should be noted that these forecasts include not only MAWD but also the University and private sector).

The **second** figure is higher because the SSU project did not, in effect, take the number of established posts as a constraint. One of the recommendations of the 1981 Evaluation Report was that "permanent posts should be established for Soil Survey personnel within the Ministry of Agriculture and Water Development", but the establishment remained at a level of only 3. Posts for a further 6 were found "with the help of six posts belonging to the Land Use Planning Section of the Land Use Branch" (Review Mission Report, 1985). Even so, the total number of senior staff required, according to the 1985 Review Mission, was 17 (including one Logistics Officer) - nearly twice the number of posts. It is possible to pay the salaries of staff above establishment, if funds can be found, but they do not have the same guarantee of employment.

More important, if the number of established posts in each category is taken as a reflection of government priorities in the allocation of scarce manpower, then it is clear that the SSU project resulted in a distortion of these priorities.

In mitigation it should be noted that the figure of 17 senior staff required is based on the policy of decentralisation. This implied that there should be a competent soil survey unit in each of the nine provinces, each headed by a soil surveyor. But this stated policy was never backed up by the granting of additional posts.

The weaknesses of the SSU project with regard to the training of staff and the "Zambianisation" programme are well documented in earlier reports. Partly in response to such reports, and partly because of the decision by MDC/NORAD to phase out support more rapidly than earlier envisaged (at least with regard to the provision of experts) a crash programme of training on an extraordinarily large scale was initiated. This partly explains why the **third** figure is so high. A total of 22 persons benefitted from MDC/NORAD scholarships during 1987, although only two of these were at AUN. (Further details are given in Appendix 3).

It may be noted here that the figures exclude two who have been financed by other donors to study for Ph.D's abroad. They do, however, include staff of the Soil Survey Unit attending various M.Sc. courses which are not strictly Soil Science - for example two studying Development Studies in England. It appears that the limiting factor was whether a university could be found to accept applicants (who in many cases approached them directly). An extreme example is two technical staff, without undergraduate level education, who were accepted for an M.Sc. course at Aberdeen and were granted scholarships to go.

It should also be noted that only 2 out of 10 studying for M.Sc. in 1987 chose to go to AUN. It is commendable, from the point of view of the freedom of the individuals concerned, that they were given the opportunity to select the course which they preferred. But the fact that the great majority did not choose Norway is surely

significant.

This is a confusing background against which to assess the current need for further training at M.Sc. level in Soil Science. There are three main grounds on which the Manpower Survey forecasts might be called into question.

First, the number of established posts underestimates need - if this is interpreted to mean the numbers of personnel which it is desirable to train and employ. These should not, therefore, be regarded as official estimates of need. The forecast figures do, however, give some indication of the level of effective demand i.e demand which can be afforded in budgetary terms. And the economic situation in Zambia since the Manpower Survey was written in 1982 has deteriorated very considerably. Central Government recurrent expenditure fell by 45% between 1982 and 1984 (ref: "Zambia: Country Study and Norwegian Aid Review"); most of the Ministry of Agriculture and Water Development budget now goes on salaries - leaving far too little for supporting expenditures such as travel, laboratory equipment etc.

Second, it may be argued that soil science should be given higher priority, so that even if there is a severe budget constraint the allocation of this budget between different areas of specialisation could be changed. This may well be the judgment of soil scientists, but unless it is also the stated policy of the Zambian Government such a view should carry little weight. Established posts are some guide, however inadequate, to government priorities - and the total number of posts remains at three.

Third, the Manpower Survey figures make minimum assumptions as to the necessary level of training for each post. The forecasts in the report are, to quote, "fairly low. It has to be stressed that the training required in the survey is considered as a minimum for each post. Thus for posts where only a B.Sc. is thought to be required further training would still be very valuable." But even at B.Sc. level the forecast additional need is only six.

This last point does, however, indicate the importance of analysing training need in qualitative as well as quantitative terms. There are two main issues here: the type of training required and the level. In each case the crucial question is what sort of task the person trained is to undertake.

If the soils scientist is to work primarily in the field, as an extension officer or, more likely, providing technical support to extension officers or directly to individual farmers, then the emphasis in the training should be different from that provided to one who is primarily concerned with pure and applied research, major land evaluation studies etc. And perhaps the training for such personnel should be at B.Sc. rather than M.Sc. or Ph.D level.

During the field visit, arguments from both sides were eloquently expressed. There is no doubt that this is a subject of some controversy. For the purposes of assessing future needs for M.Sc level training in soils science in Zambia, however, the issue does not have to be resolved. On any feasible estimates it seems clear that the Soils Survey Unit will have no demand for some years to come - after the current crash programme is over. The SPRP may have a little - despite the severe budgetary constraint affecting salaries and local costs. Demand from other sources (with the possible exception of the university) will be negligible.

This is a conclusion based on a brief field visit. These findings were, however, set out in the Inception Report sent to the MDC/NORAD office in Zambia who found no fault with them. Although there might be some dispute over detail, **it is hard to see how the forecast demand for training can be more than one per year in the near future.**

Institution-building and Project-related Training

SPRP: According to the Project Coordinator, Dr B. Singh, the SPRP paid little attention to training of Zambians in the early years (although it is included in the Terms of Reference for the project). The situation has now largely been rectified - at least with regard to higher level training. Thus two staff are currently attending the course at AUN, and the Project Coordinator, since he was also the Course Coordinator at AUN, has been able to supervise Zambian students who earlier attended the course at AUN, to allow them to complete M.Sc.'s. In summary, SPRP benefitted little from the course in the past, but this situation appears to have improved.

SSU: Since the SSU project is well documented it is fair to reach a judgment despite the brevity of the field visit. It seems that a detailed training plan should have been prepared at an early date, and followed through, instead of what is a rushed, and perhaps inappropriate, crash programme. It is true that there was a problem of lack of agricultural graduates qualified for M.Sc level training. But this situation could easily have been foreseen. Although MDC/NORAD has financed scholarships for a large number of staff at the SSU, the contribution of the Soil Science course to training and institution-building has been relatively small.

An opportunity was missed to work in cooperation with the University of Zambia (UNZA). For reasons which are not fully apparent, no agreement was reached, when the Soils Science course was originally set up at AUN, for M.Sc.'s to be completed at UNZA as they were in Tanzania. Despite later discussions about possible support from Norway to UNZA, very little has emerged. Thus here too the soil science course at AUN has made no significant contribution.

The Future

In making recommendations for the future, two items of information are relevant. First, MDC/NORAD has recently decided to concentrate their efforts in Zambia very largely in agriculture and related sectors and in the Northern Province. This creates both a need and an opportunity to develop a full training programme in support of these activities. (It should be stressed, however, that the demand may not, indeed probably will not, be large at M.Sc. level).

Second, UNZA, with strong encouragement from the Government, has designed an M.Sc. course in agronomy (with options in soils science). This was offered for the first time this year. Only one application was received. The potential number of applicants was known to be small (perhaps five in total) but it is clear that while offers of scholarships are available for study abroad the prospects of establishing a viable course at UNZA are minimal. (Note: the Soil Science department has a close link with the University of Ghent, Belgium, who provide support, including two members of staff. The possibility has apparently been discussed, in the context of the meeting between SADCC countries referred to above, of encouraging Zambia to specialise in agronomy).

KENYA

A stopover during the field visit allowed time for two very brief meetings in Kenya. From these meetings, two important points emerged. First, despite the need for trained manpower it is becoming difficult for the government to guarantee employment to new graduates. Second, the quality of training available in agriculture at Kenyan Universities is high - including M.Sc level soil science.

TANZANIA

Forecast Training Needs

Although the situation is less extreme than in Zambia, there are similarities. The problem of estimating training need is again complicated by the question of whether this should be based on what can be afforded.

Soil scientists are used mainly by Kilimo (the Ministry of Agriculture) for research and training. (This includes Tanzania Agricultural Research Organization, the National Soils Laboratory in Tanga etc.). Few are used for extension work.

The Department of Soil Science at Sokoine University has been asked to nominate candidates - not only from their own staff but also from other institutions in Tanzania - and an informal quota of five places per year has been offered. The actual number applying has recently been less than this. Indeed, correspondence from the MDC/NORAD office in Dar es Salaam indicates their doubt in recent years whether enough suitable candidates will be nominated. This, together with the fact that applications have almost always been received late and only after continued prompting, may be evidence that the demand for this course is not strong. More reliable evidence, however, may be derived from official manpower forecasts. These are given in Appendix 3, but may be summarised as follows:

- A recent report by the Research and Training Division of Kilimo forecasts the additional demand for soils scientists at M.Sc. level in the period 1986/91 as 5.
- The forthcoming national report on manpower shows the total additional requirement for soil scientists in the period 1986-1991 to be 6.
- A report on training needs which is to form the basis of a second, complementary study to assess the infrastructural requirements for Sokoine Agricultural University gives the following forecast at M.Sc. level:

1988 - 1990	8
1991 - 1995	5
1996 - 2000	1
Total	14

These last figures, by contrast with the first two, are estimates of unconstrained demand, i.e. what would be the demand if this were not limited by shortage of funds. This issue has been the subject of some discussion in Tanzania: whether the appropriate basis for planning is "constrained" or "unconstrained" demand. The details and outcome of the debate are not yet clear. It appears that the figures used for planning purposes will represent a compromise between the two extremes.

The lower figure indicates a demand for only one per year, on average. Even the maximum figure implies a demand for only two per year at M.Sc. level, up until 1995.

Before drawing conclusions for the Soil Science course at AUN, two other points should be noted. First, other donors are also financing postgraduate training in soil science, notably the Netherlands who are providing assistance to the National Soils Laboratory in Tanga, and have in recent years sent two or three each year for postgraduate training at Wageningen.

Second, the figures are open to some of the same objections as those in Zambia. For example, does a training in soils science not qualify someone to be an agronomist (for which the forecast demand is greater)?

This final point cannot easily be resolved, and it raises again the qualitative aspect of training needs. What type of training is most relevant for the soil scientist (or

the agronomist)? Is there a danger that the increased competence gained by M.Sc or even Ph.D level education will be at a short term cost (for the duration of the training) and perhaps a long term cost, if the staff are as a result further removed from the day-to-day problems of the farmer. This last point is controversial, and University staff, for example, may not share the views expressed by some of the donor countries.

Ultimately, however, the guide must be the priority needs of the Tanzanian Government, preferably expressed in official forecasts of manpower need. The impression, on the figures so far available, is that **the demand for training more soil scientists at M.Sc level is at most 2 per year until 1995.**

Institution-building and Project-related Training

From the beginning, the Soils Science course at AUN has been closely linked with the Department of Soil Science at SUA, Morogoro. Apart from this there have been no links with other institutions or Norwegian supported projects in Tanzania.

The establishment of the joint M.Sc. Programme between SUA and AUN was formalised, on the Tanzania side, in a document of May 1981. In that document, the urgent need for trained manpower is noted, and the main objective of the programme is seen as the training of Tanzanians for the research stations and parastatals involved in agricultural production. The intake on the programme is envisaged as 4 - 6 annually. It is proposed that the programme should operate for three years during which the need for continuation would be assessed.

In the Soil Science Department at SUA, there are currently 15 staff in post (none expatriate) of which only four do not have M.Sc (but are in the process of completing them). This is almost the full establishment.

The current staffing position of the Department, compared with the situation in 1977/78, is given in Appendix 3. It is evident that the situation has been completely transformed, as summarised below. Three expatriate staff are no longer in post; the number of local staff at or above Senior Lecturer level has increased from 1 to 9; and the number of Ph.D's held by local staff has increased from 1 to 7. The total number of staff has not increased significantly, but the quality of the staff, as measured by these indicators, has increased enormously.

	1977/78	1987/88*
Expatriates	3	0
Professor, Senior Lecturer	1	9
Other	12	7
Ph.D.	1	7

* including Professor on unpaid leave of absence

It is clear that the course at AUN has made some contribution to this improved staff situation. This has been predominantly at the lower level (Assistant Lecturer and Tutorial Assistant), where five of the staff have attended the course at AUN, and have completed or are in the process of completing their M.Sc's. At Lecturer level or above the staff have their M.Sc.'s from other universities: Reading, U.K; Ghent, Belgium, or U.S.A. Of the senior staff, however, one has a Ph.D. which included studies at AUN.

But it is also clear, and it should be stressed, that the steady improvement in qualifications is relegating not only the Diploma but also the M.Sc to a subsidiary status. It is increasingly the case that academic staff regard a Ph.D as the necessary qualification at this level. This has important implications for Norwegian policy. Where

the institution concerned is a university, institution-building will necessarily be limited in scope if Ph.D. studies are not favoured.

Close contact has been maintained between Sokoine and AUN, largely through regular visits by Dr. Singh to assist in the supervision of students. Excerpts from three of the very clear and useful reports on these visits are included in Appendix 4. A few summary points may be extracted.

General Assessment of the Programme: The department of Soil Science expressed their satisfaction with the collaborative programme, but emphasized the need for frequent mutual discussions and visits from both sides.

Progress of the Students: A number of practical problems were encountered - (undue delay by some of the external examiners in sending the evaluation report; time gap between arrival of students to Morogoro (July) and the onset of rainy season (Feb - March); lack of special chemicals, glassware and small equipment; inadequate transport facilities). These contributed to delays, so that most students took at least two or three years to complete. Nevertheless, the performance of the Tanzanian students was generally good. The performance and behaviour of the foreign students, and particularly weak candidates, was, however, poor and the university decided to discourage them to undertake M.Sc. thesis work at Morogoro.

Training at Ph.D. Level: The department expressed their appreciation for arranging a research programme for one of their staff registered at Dar es Salaam, and requested if such help could be extended to other staff members.

Teaching and Supervisory Assistance from AUN: This was limited, to supervision in some years. Dr Singh was appointed as an external examiner for a period of three years.

Exchange of Teachers: This issue was raised in several reports. The department felt that there was only a one-way flow, and nothing was done about the flow of staff from Tanzania to Norway.

Staff Situation: Over the period this improved substantially (as already noted above).

Future Plans for the Programme: The first phase of the programme ended in July 1984 at AUN and October 1985 at SUA. The department requested that the second phase of the program, ending in July 1987 at AUN and October 1988 at SUA, should be conducted on the same lines. By that time the department would have a reasonable number of trained personnel and be in a position to carry out the whole programme at Morogoro. However, help in some special areas might be required from AUN and NORAD.

Transfer of M.Sc. Programme to Morogoro: A possibility of transferring the whole M.Sc programme to Morogoro from 1988 was discussed in August 1985. Most of the staff members were of the opinion that the research and teaching facilities, both in terms of personnel and equipment, were not at that time adequate to meet the requirements of a full M.Sc. programme. They, however, said that the situation would be assessed after the return of those staff members who are out for their Ph.D. studies and AUN would be communicated. Some help from AUN in special areas of research and teaching was anticipated in the event the whole programme is transferred to Morogoro.

Some of the practical problems identified above have been eased by the provision by MDC/NORAD of a small budget - "NORAD sponsored staff development programme" - which, apart from students' fees, also included purchase of chemicals and equipment (at Tanzania Shillings 5,000 per student in 1986).

During the field visit a meeting was held with the Head of Department of Soil Science at SUA, and informal discussions with some of the staff, including some who had attended the course at AUN. The views of the Head of Department were very largely consistent with the reports just quoted. In summary, the Department of Soil Science at Sokoine has benefitted considerably from the support provided by MDC/NORAD, and more specifically from their link with the course at AUN. The need for M.Sc. training for their staff is now very slight; but they would welcome continued support and collaboration in other forms.

The Future

MDC/NORAD has not in the past been very active in the agricultural sector in Tanzania. If this situation were to change in future a priority area might be soil conservation which is certainly seen as an important issue by government and donors. At present, however, there is no major NORAD/MDC project in Tanzania for which the Soils Science course might be relevant.

The University may revive their own M.Sc. in soils science. This was offered as late as 1980, and is still advertised in the University Prospectus, though not currently available. MDC/NORAD has already provided major support to the Faculty of Forestry, at the university, and the current proposals are for the M.Sc. course in Animal Husbandry to be shifted from AUN to SUA in 1989/90.

Teaching and Supervisory Assistance from AUN. This was provided in supervision in some years. Dr Singh was appointed as an external examiner for a period of three years.

Exchange of Teachers: This issue was raised in several reports. The department felt that there was only a one-way flow, and nothing was done about the flow of staff from Tanzania to Norway.

Staff Situation: Over the period this improved substantially (as a result, noted above).

Future Plans for the Programme: The first phase of the programme ended in July 1984 at AUN and October 1985 at SUA. The department requested that the second phase of the program, ending in July 1987 at AUN and October 1987 at SUA, should be conducted on the same lines. By that time the department would have a considerable number of trained personnel and be in a position to carry out the whole programme at Morogoro. However, help in some special areas might be requested from AUN and NORAD.

Transfer of M.Sc. Programme to Morogoro. A possibility of transferring the whole M.Sc. programme to Morogoro from 1988 was discussed in August 1987. Most of the staff members were of the opinion that the research and teaching facilities, both in terms of personnel and equipment, were not at that time adequate to meet the requirements of a full M.Sc. programme. They, however, said that the situation would be assessed after the return of those staff members who are on leave for P.D. studies and AUN would be recommended. Some help from AUN in special areas of research and teaching was anticipated in the event the whole programme is transferred to Morogoro.

Some of the practical problems identified above have been caused by the provision by MDC/NORAD of a small budget. "NORAD sponsored staff development programme" - which, apart from students' fees, also included purchase of chemicals and equipment, at Tanzania Shillings 5,000 per student in 1980.

5. Other Courses Available

Since the course at AUN is regarded by the organisers as the first year of an M.Sc., as regards both content and level, it is appropriate to compare it with M.Sc. courses elsewhere.

EAST AND SOUTHERN AFRICA

The situation may be briefly summarised as follows:

Botswana:	none.
Kenya:	good postgraduate soil science course.
Tanzania:	until 1980 a course was given; it remains in the prospectus but has not been offered.
Zimbabwe:	good postgraduate soil science course.
Zambia:	postgraduate course in agronomy (with soil science option) offered for the first time in 1987.

EUROPE

There are several postgraduate courses in soil science offered elsewhere in Europe. Three were identified in the Inception Report as particularly relevant to this evaluation: Ghent (Belgium), Reading (Britain) and Wageningen (Netherlands). Summary information on each of these is as follows. (Note: the limited scope of the study did not allow a more detailed assessment of these or the courses in East Africa referred to above).

Ghent, Belgium

The course objective is to provide an academic training in research and modern applications of soil science and to prepare the students for their task in soil surveys, development projects, experimental stations and research in government institutes and universities.

The course is conducted in English. The average intake is 25-30. Over 500 students have attended since 1963, mainly from developing countries. Of these, 120 have come from Africa (including 2 from Botswana, 2 from Kenya, 6 from Tanzania, 6 from Zambia).

Annual Fees: BF 20,000 = NOK 3,500 approx.

Other Costs: BF 390,000 = NOK 67,000 approx. per year (excluding air ticket)

The M.Sc. course takes two years. In the second year students choose one of two orientations: soil genesis and classification or soil physics and chemistry.

Year 1:

General Pedology; Geology of parent materials; Soil morphology and classification I; Physical geography; Regional pedology and soil survey; Soil mineralogy and micropedology; Aerial photographs; Computer Science.

Year 2

Orientation I:

Soil genesis; Land evaluation; Soil mineralogy and micropedology II; Applied biometry; Soil morphology and classification II; Physical geography II; Regional pedology
Research work at the basis for M.Sc. thesis.

Orientation II:

Soil chemistry; Soil physics; Radio-agrology; Soil microbiology.
Research work at the basis of M.Sc. thesis.

Reading, Britain

Two courses are offered: a one-year M.Sc. and a two year M.Agr.Sci. course in soil science.

The courses are conducted in English. The average numbers in recent years have been 13 on the one-year course, and 7 on the two-year course. In 1986/87, of the total 22 students, half were from U.K. and elsewhere in Europe, and 8 from Africa (including 1 from Tanzania).

Annual Fees: 4,915 = NOK 55,000 approx.

Other Costs: 3,300 = NOK 37,000 approx. per year (excluding air ticket)

The M.Sc. course has three options:

Pedology and soil survey (emphasis on soil genesis, principles and practice of soil survey).

Soil chemistry and fertility (especially chemistry of plant nutrients, management of soil fertility, assessment of fertiliser requirements and use of fertilisers, problems of specific soils).

Soil Water Management (emphasis on management of water in rainfed agriculture especially in areas classified as arid or semi-arid).

There is also a dissertation based on a project.

Wageningen, Netherlands

The objective of the course is to provide an academic training with a direct practical relevance to agricultural development for young graduates, researchers at governmental institutions, university teaching staff, extension workers, etc.

The M.Sc. course is conducted in English, and has been offered since 1971. A total of 158 participants from 49 countries have been granted degrees. The number attending in 1987 was 17.

Annual Fees: Dfl. 5,000 = NOK 15,000 approx.

Other Costs: Dfl. 16,000 = NOK 51,000 approx. per year (excluding air ticket)

The M.Sc. (in Soil Science and Water Management) takes two years.

Year 1.

Soil science and water management:

Soil fertility

Land evaluation and agropedology

Agrohydrology

Drainage

Irrigation

Year 2.

Optional subjects - as listed above, including soil and plant analysis

Research and preparation of thesis

6. Evaluation and Recommendations

Summary Evaluation

For the purposes of this evaluation, the objectives of the Soil Science course at AUN have been identified as two:

- institution-building and manpower development in certain specific countries: **Zambia**, **Tanzania**, **Kenya** and **Botswana**.
- general competence building in a wide range of other countries.

As regards the first objective, it may be concluded that it was achieved to only a very limited extent in **Zambia**. The Soil Survey Unit has received very substantial support from Norway in past years, but the training component has been badly planned; and the contribution that the course at AUN has made to this training has been rather slight. Relatively few of the staff have been trained at AUN, and collaboration between the two institutions, apart from this, has also been slight.

In **Tanzania** far more has been achieved in respect of the first objective. A large number of individuals have been trained, and the Soil Science Department at Sokoine University has been strengthened as a result of the collaboration. Not only have several of the junior staff been trained at AUN; there have been regular visits from Norway to assist in supervision and examining of students; and financial support from MDC/NORAD for provision of essential inputs for research - with AUN playing a helpful role as intermediary. There should perhaps have been visits by Tanzanian staff to Norway; but the Department at Sokoine is generally well pleased with the collaboration in the past.

In **Kenya** and **Botswana** the first objective has not been satisfied to any significant extent. Very few participants have come from these countries, and there has been no institution-building. In retrospect it is evident that too little effort was made to assess needs in these countries, and identify suitable collaborating institutions. Indeed, this is a criticism which applies to Tanzania and Zambia also. Although it was understood that a study was to be made at the outset of training needs in the target countries, this was apparently not done in any great detail. And since that time, insufficient effort has been made to monitor the rapidly changing situation with regard to agricultural manpower.

According to official forecasts, the demand for M.Sc. level soil scientists in Zambia and Tanzania in the next five years is very small. (Although figures were not collected for Kenya and Botswana, the situation appears to be rather similar in these two countries; certainly in Botswana if only by virtue of its size). This is not to say that there is not a need for trained manpower, but that within the very severe budgetary constraints facing these countries, this is not a priority.

Expertise in other fields, or at lower levels, may be regarded as more important. And it is essential to maintain a balance in expenditure between salaries and support costs, otherwise the situation arises in which highly trained personnel are able to do very little because of a lack of funds for equipment and transport. The important task of undertaking agricultural research in Africa may well be best served not by training more M.Sc. level students in Norway, but by providing further support to those who are already trained, but who cannot effectively utilise their skills.

As regards the second objective - of general competence-building - performance is more difficult to evaluate. The reduced scope of this study does not enable us to judge the quality of the course at AUN as such. It may, however, be appropriate

to refer to the questionnaires sent out by Dr Singh to participants who attended the course in 1980/81, 1981/82 and 1982/83 - and to their employers.

Two-thirds of the employees responded. No significant difference was found between years, or between African and Asian fellows. The overall impression may be summarised by reference to the responses to two general questions.

To the question "How did the course fulfill your expectations?", 5 participants out of 27 rated it as excellent and none rated it as poor. The average rating, on a scale of 1 to 5, was 3.74. To a similar question "How has the professional competence of your employee been affected by the course?", 4 employers out of 17 rated it as excellent, none as fair or poor, and the average rating was 4.05.

In summary, this indicates a favourable assessment of the first three years of the course (comparable, indeed, to results from similar questionnaires in respect of other Diploma courses in Norway).

In Section 3, two other objectives were identified which, it was thought, might also have influenced the course. One was the objective of maintaining and developing Norwegian expertise in the field of tropical agriculture. It is clear from the debate in 1984 over the possible closure of the course that this was seen, at least by some, as an important aim.

Although Norway has a limited number of individuals of international standing in the field of soil science, it is not an area in which it has a depth of expertise. This is not an easy conclusion to substantiate statistically, but it is relevant to refer to the difficulty encountered in recruiting staff for the Soil Survey Unit in Zambia. (Indeed, in the context of that project, MDC/NORAD noted in a letter that: "We have however for some time been aware that our professional resources on tropical soil science is very limited in Norway. It is therefore very difficult for us to find Norwegians qualified to work in this project.")

However, within the overall aims of Norwegian aid, the increased priority of agriculture, and more specifically natural resources and the environment, must be noted. It is not clear that organising a course such as that in Soil Science is the most effective means of achieving the objective of developing competence in Norway. But in any event, it would seem that the new course in the Management of Natural Resources and Sustainable Agriculture would be more suited to this end. This course is designed for eight target countries, including Zambia, Tanzania, Botswana and Kenya. One year of teaching at AUN is followed by fieldwork in the home country, and writing up back in Norway. The course is much broader in scope than that in Soil Science.

The final objective mentioned, of maintaining good relations with a number of foreign countries, has not demonstrably influenced the course by causing the number of countries sending participants to be increased. It is true that the range of countries from which participants have been drawn has been very wide (and a measure of goodwill may indeed have been earned with these countries), but this is not because of a policy of limiting the intake from main target countries; quite the opposite.

Recommendations

On the basis of the foregoing, the consultants are required to:

- evaluate whether it is appropriate to devote resources to the Soil Science course at AUN;
- suggest possible alternative means of achieving the intended objectives of the course

Agriculture is an important sector for Norwegian aid; but, for reasons noted above, continued support to the Soil Science course at AUN is not the most effective means of allocating resources.

The priority needs of those countries for which the course is primarily intended have, as discussed earlier, changed significantly in recent years. The need, in quantitative terms, for M.Sc. level soils scientists is very small in Zambia and Tanzania, according to official forecasts from those two countries.

And there are other alternative means of achieving the intended objectives of the course. Insofar as its purpose is general competence-building in the field of soil science in developing countries, there are a number of other similar courses available in Africa and in Europe. (The course in Norway does have the advantage over the latter, at least for those coming from Tanzania, that the fieldwork is undertaken in the home country).

Insofar as its purpose is institution-building, this process has already been continuing for some time (at least in the case of SUA, Tanzania) and it is appropriate that it now move into a new phase, based on the current needs as perceived by SUA. If the course is to be transferred to Africa, the obvious place would be SUA. In summary, it is recommended that the course in Soil Science at AUN should not continue to be offered.

Collaboration with, and support to, the Department of Soil Science at Sokoine, Tanzania, should continue. Discussions with the Department should take place to establish their own priorities and how AUN might best assist them.

If students, especially from Tanzania and Zambia, wish to study for an M.Sc. in soil science in Norway, this should be arranged as a special option under the umbrella of the M.Sc. course in Management of Natural Resources and Sustainable Agriculture.

Recommendations

On the basis of the findings, the consultants are required to evaluate whether it is appropriate to devote resources to the Soil Science course at AUN. They suggest possible alternative means of achieving the intended objectives of the course.

Appendix 1

Terms of Reference for this Report

In response to the Inception Report, MDC/NORAD informed the consultants that an extended Phase II of the evaluation would not be needed, and that most of the questions could be addressed on the basis of the Inception Report. It was noted, however, that a certain amount of additional information, primarily of an archival nature, would be required.

The Terms of Reference for this report are, therefore, substantially the same as those of the Inception Report, which were as follows:

The consultants shall prepare an Inception Report after a brief visit by the Team Leader to East Africa (and, if appropriate, FAO Rome). The report will include:

1. A description and preliminary assessment of the course in terms of its satisfying its intended objectives, and the wider aims of Norewegian aid (ref. tasks 3.2.i and 3.2.ii of the full Terms of Reference).
2. An outline of alternative training available in East Africa and elsewhere (ref. task 3.2.vi of the full Terms of Reference).
3. A review of documentation already available regarding the need for training in soil science in East Africa.

Based on the foregoing, the consultants shall submit a detailed work programme for the remainder of the study.

For the purpose of record, the full Terms of Reference of the study as originally envisaged may be given in full. These were as follows:

Terms of Reference for the Evaluation of the International Diploma Course in Soil Science at the Agricultural University of Norway (AUN)

1.0 BACKGROUND

The Diploma Course in Soil Science at AUN has been offered and financed by MDC/NORAD since 1980 with the primary objective of contributing to the building of competence in the field of agriculture in connection with MDC/NORAD's activities in Zambia and other East African countries.

Fellows from Tanzania, Kenya, Botswana and Zambia have been given priority in the course. To the extent that there have been vacant places on the course, fellows from other countries have also participated.

Some participants from East Africa have been promised further studies in their own country or region with the aim of gaining M.Sc degrees. Fellows from Tanzania take these degrees at Sokoine University of Agriculture.

After the course had been running for five years it was thought appropriate that it be reassessed, and arguments in favour and against its continuation were considered by the Education and Fellowships Division. It was concluded that a more detailed study was required to evaluate the course and make suitable proposals for future action.

2.0 OBJECTIVES

The international diploma course at AUN shall be evaluated with regard to its

efficiency, effectiveness and consistency with the overall aims of Norwegian aid.

Thus the study will include:

- an evaluation of the existing arrangements for the organisation and administration of the AUN course.
- an evaluation of the extent to which the course provides appropriate training for those who attend.
- an assessment of the extent to which the course is consistent with the main aims of Norwegian aid, and in particular the objective of benefitting specific countries and groups.

Particular emphasis shall be put on the question of the extent to which the course meets priority needs in those countries for which it is primarily intended.

The consultants shall submit proposals for possible changes where these appear to be required.

3.0 PROJECT DESCRIPTION

3.1 Mode of Work

The methodology will include:

In Norway:

Interviews with staff responsible for administering and conducting the course, and with current participants; questionnaires to participants; observation of training activities; review of available documents relating to the Course (annual reports, budgets, teaching materials, etc.); collection of information concerning similar courses in other countries.

In Zambia and Tanzania:

Interviews with appropriate institutions, and former students, about the effectiveness of the soil science courses at AUN; collection of information about similar courses in East Africa.

In Norway, East Africa and (if appropriate) FAO Rome:

Collection of information regarding priority needs for training in soil science in the cooperating countries in East Africa, based on documentation already available, (or, if this is insufficient, a study undertaken by the consultants themselves).

With regard to questionnaires and interviews, it is important to ensure that the sample is as wide and representative as possible, while limiting the sample size and geographical spread to a practicable scale.

3.2. Tasks to be Undertaken

The Consultants shall:

- i. Briefly outline the aims and objectives of Norwegian aid, and especially those of the Education and Fellowships Division of MDC/NORAD.
- ii. Provide information about the content and nature of the current course, including any major changes since its inception. In particular, the objectives of the course should be specified and examined.
- iii. Assess the extent to which the course strengthens the capacity of participants in

the field of soil science, so as to better equip them for carrying out their duties in their home countries.

This should include an assessment of:

- the course curriculum
- the quality of the teaching materials (lecture notes, exercises, etc.)
- the training and experience of the teaching staff
- the suitability of the teaching methods used.

In addition, the selection of students will be examined, especially addressing the issue of whether the selection of students has reflected the developing countries' need for qualified manpower in the sector.

iv. Assess the adequacy of the arrangements made to assist the participants in adapting to life in Norway.

v. Assess the efficiency of administration of the course, including budgetary aspects.

vi. To the extent that similar courses are offered by other donors, a review and description of these shall be provided. In addition, the consultants will outline what education possibilities in soil science are available today in East African countries.

vii. On the basis of the foregoing, the consultants shall:

- evaluate whether it is appropriate to devote resources to the soil science course at AUN, on the basis of Norway's expertise in this field, and the overall aims of Norwegian aid, and taking account of the benefits of the course as indicated by the extent to which the course meets priority needs in those countries for which it is primarily intended;
- suggest possible alternative means of achieving the intended objectives of the course, including the possibility of transferring it to one of the main cooperating countries in Africa.

Appendix 2.

Itinerary and List of Meetings

Sun 1 Nov	Arrive in Lusaka
Mon 2 Nov	Mr T. Sandkjaer (MDC/NORAD), Dr B. Keller (Planning Division, MAWD) Dr B. Singh (Project Coordinator, SPRP) Dr V. Chinene (Dept of Soil Science, UNZA)
Tue 3 Nov	Mr Mulele (Director, Planning Div, MAWD) Soil Survey Unit, Mt. Makulu (Messrs L. Chileshe, D. Banda*, S. Lubinda*, A. Commissaris, W. Veldkamp, K. McPhillips) Mr T. Sandkjaer (MDC/NORAD)
Wed 4 Nov	Travel to Nairobi via Harare
Thu 5	Nov Dr F. Larsen (FAO) Dr L. Lundgren (Soil Conservation Unit, SIDA) Travel to Dar es Salaam .
Fri 6 Nov	Mr P. Prestgard, Mr O. Kran (MDC/NORAD) Mr T. Hughes (FAO) Dr J. Appiah (Project Planning and Monitoring Bureau, Min. of Agric.) Ms A. van Dyk (Royal Netherlands Embassy) Ms S. Smethurst (British Council)
Sat 7 Nov	Mr Kishimba (Land Use & Soil Conservation, Kilimo) Dr W. Mnyau (Manpower Planning Unit, Kilimo) Dr S. Mweena (Training Division, Kilimo)
Sun 8 Nov	Dar es Salaam
Mon 9 Nov	Sokoine Agricultural University, Dept. of Soil Science. (Dr A. Salema, Head of Department; Messrs P. Mtakwa*, F. Rwehumbiza*, A. Kaaya*, J. Msaky, L. Matemu*) Dr J. Mende (Manpower Planning Unit, Kilimo)
Tue 10 Nov	Travel to Oslo

* Former participant on the soil science course at AUN.

Note: the above itinerary differs slightly from that originally proposed. The cancellation of the Air Tanzania flight from Lusaka to Dar es Salaam resulted in an unplanned stop-over in Nairobi and one day's delay. In view of this, and since good information on training needs was obtained in both Lusaka and Dar es Salaam, the visit to FAO, Rome was abandoned in favour of an extra day in Tanzania.

After submission of the Inception Report, the second stage of the study was deferred until the completion of a review of all the Diploma courses in Norway, by the same consultants. This review included a brief visit to East Africa, during which some additional information on the Soil Science course was collected.

Appendix 3.

Manpower Situation in Zambia and Tanzania

ZAMBIA

Extract from the Manpower Survey, Zambia:

	Ph.D./M.Sc		B.A./B.Sc	
	Soil Science	All Agric.	Soil	All Science
(a) Established Posts	4	88	5	554
(b) Vacancies incl. posts held by expatriates	2	43	4	287
(c) Proposed increase of Staff	1	25	2	157
Additional demand (b + c)	3	68	6	444

Source: Ministry of Agriculture and Water Development, Planning Division. (Gunnar Norrby, Senior Manpower Development Planner). June 1982.

Extract from the report of the 1985 Review Mission, Soil Survey Unit, Zambia:

Zambian and Expatriate Staff Within the Soil Survey Unit by March 1985

Post	In position (Zambia)	Expatriate	Total Required (Zambian)	Shortfall (Zambian)
Senior Soil Surveyor	1	0	1	0
Soil Correlator	0	1	1	1
Land Evaluator	0	1	1	1
Soil Surveyor (Training)	0	1	1	1
Soil Information Systems Officer	0	1	1	1
Soil Chemist	1	1	1	0
Soil Surveyor (National Mapping)	0	1	1	1
Logistics Officer	0	0	1	1
Provincial Soil Surveyors	7	4	9	2
Total *	2	10	17	8

* Excluding laboratory staff, agricultural assistants and others

Details of the Training Programme of the Soil Survey Unit, Zambia:

MDC/NORAD Scholarships During 1987
ZAM 009 Soil Survey Project

	No. of persons	No. of person-months in 1987
M.Sc.		
AUN	2	16
Aberdeen	2	8
Edinburgh	1	3
Norwich	2	24
Ghent	3	9
B.Sc.		
Norwich	1	12
Swaziland	2	17
Zambia	1	+
Diploma		
U.K	3	6+
Holland	2	24
Certificate		
Amsterdam	1	3
Other		
USA	1	4
Kenya	1	1
Total	22	127+

Source: Soil Survey Unit, Zambia

+ the number of months for two of the persons is not specified.

TANZANIA

Extract from Ministry of Agriculture Forecasts:

	Agriculture and Livestock Sector			
	In post June 1979	In post June 1986	required in post June 1991	Additional to be trained 1986/91
M.Sc.				
Soils Science	13	26	31	5
Other	160	284	610	326
Total	173	310	641	331
Ph.D				
Soils Science	4	6	3	2
Other	25	57	85	23
Total	29	63	88	25

Source: United Republic of Tanzania, Ministry of Agriculture, Research and Training Division. July 1986.

(Note: these figures do not include the requirements of the University itself. However, the demand here for more M.Sc.'s is small - see below).

Extract from the summary table of the forthcoming national report on manpower:

Category A: Science
ISCO Code 0-53-50

Occupational Title:		Soil Scientist
1985	Situation	
	Establishment	34
	Citizens	29
	Non-citizens	3
	Total	32
	Vacancies	2
Net Increase in Posts (1986 - 1991)		2
Total additional requirement (1986 - 1991)		6
Total requirement (1986 - 1991)		36

Source: "Employment Situation and Manpower Requirement Estimates by Sector 1986 - 1991". Ministry of Labour and Manpower Development.

Extract from recent report on training needs at graduate and postgraduate level- "unconstrained demand"*.

Additional Demand for Soil Scientists 1988 - 2000

	B.Sc.	M.Sc.	Ph.D.
1988 - 1990	16	8	3
1991 - 1995	13	5	2
1996 - 2000	13	1	1
Total	42	14	6

* The demand if this were not limited by shortage of funds.

Department of Soil Science, Sokoine Agricultural University, Tanzania: Numbers of Staff and Qualifications. 1977/78 and 1987/88

	1977/78	1987/88
Professor	1 expatriate	1 Ph.D. (on unpaid leave of absence)
Asst Professor	1 Ph.D. 2 expatriates	7 Ph.D. 2 M.Sc. (not from AUN; finishing Ph.D.)
Senior Lecturer	0	3 M.Sc. (2 from AUN) 2 B.Sc (soon to finish M.Sc. from AUN)
Lecturer/Asst Lecturer	6 M.Sc. (none from AUN)	1 B.Sc. (doing M.Sc. from AUN)
Tutorial Assistant	6 B.Sc.	
Total	13 (excluding 3 expatriates)	16

Source: "Employment Situation and Manpower Requirement Estimates by Sector 1986 - 1991". Ministry of Labour and Manpower Development.

Extract from recent report on training needs at graduate and postgraduate level - "unconstrained demand".

Additional Demand for Soil Scientists 1988 - 2000

Year	B.Sc.	M.Sc.	Ph.D.
1988 - 1990	16	8	3
1991 - 1995	13	7	2
1996 - 2000	13	1	1
Total	42	16	6

*The demand is for a period not limited by shortage of funds.

Appendix 4.

Excerpts from Reports on Visits to Tanzania by Dr Bal Ram Singh

FIELD VISIT, NOVEMBER - DECEMBER 1982:

General Assessment of the Program

The Department of Soil Science expressed their satisfaction over the present running of the collaborative program. ... They, however, emphasized that frequent mutual discussions and visits from both sides are very essential for its smooth functioning.

After experiencing the performance and behaviour of the foreign students, and particularly weak candidates, the university will discourage to allow them to start M.Sc. thesis work at Morogoro.

Progress Report of the Students:

1980-81 Group:

- 1 Tanzanian - expected to complete M.Sc. soon.
- 3 foreign - 1 absconded, 2 continuing.

1981-82 Group:

- 5 Tanzanians - continuing with minor problems (chemicals and small equipments, repair of the glasshouse, inadequate expenses, repair and maintenance of equipments).

Teaching and Supervisory Assistance from AUN

Assistance for teaching an undergraduate course for about 8 weeks in June - July 1983 ... is no longer required as the department ... expects to get this help from Belgium.

Services of one of the supervisors at AUN, and most likely Mr. Guttormsen will be required to help Miss Urio in her thesis work during July - August 1983.

The undersigned has been appointed as an external examiner for a period of three years. ... This work will, however, be combined with the Coordinator's other duties such as discussions on various problems related with the joint program and the assistance to the students as a supervisor from AUN.

Exchange of Teachers between UDSM and AUN

As in the last report, this aspect was again discussed. The department felt that although flow from AUN to UDSM was somewhat satisfactory, nothing has been done about the flow from UDSM to AUN.

Training at Ph.D. Level

The department expressed their sincere appreciation for arranging a research program for Mr. Semu, a member of staff registered for Ph.D. at Dar es Salaam. ... They further requested if this type of help could be extended to other staff members of the department.

Present Staff Situation and Future Developments

At present there is only one Ph.D. level Tanzanian in the department.

Future Plans for the Program

The first phase of the program ... will complete in July 1984 at AUN and October 1985 at UDSM. The department requested that the second phase of the program, starting from August 1984 and ending in July 1987 at AUN and October 1988 at UDSM, should be conducted on the lines of the phase one program. By that time the department will have a reasonable number of trained personnel and thus will be in a position to carry out the whole program at Morogoro. However, help in some special areas ... may be required from AUN and NORAD.

FIELD VISIT, NOVEMBER - DECEMBER 1983

The Head of the Department of Soil Science, Morogoro, expressed his satisfaction over the progress of the ongoing program.

Progress Report of the Students:

1980-81 Group:

1 foreign - progress delayed

1981-82 Group:

5 Tanzanians - very satisfactory progress

1982 - 83 Group:

3 Tanzanians - progressing with minor problems

Technical Assistance from AUN

An expatriate in soil survey and pedology is appointed ... If, however, he does not turn up, then a person from AUN in this field will be required ... For supervisory work, no assistance from AUN is anticipated in 1984.

Staff Exchange between AUN and Morogoro

They fur

ther emphasised on this aspect and said that up till now there has been only one-way flow, i.e AUN to Morogoro and that the flow from Morogoro to AUN is lacking.

Current Staff Situation and the Future Developments

Three staff members with Ph.D. are presently at the campus. Three more are expected to return to Morogoro in the first half of 1984 after completion of their Ph.D. degrees, thus making a total of six fully qualified staff with Ph.D. In spite of this, the department may not be equipped well with regards to the different disciplines.

Admission of Non-Tanzania Students for M.Sc degree

Both Dean and Head of the Department of Soil Science said that they did not have

very good experience with foreign students. Some of them are not very serious in their studies and others have absconded without telling the faculty.

Future of the Program

The Head of Department will send a formal request to extend the program for another three years, i.e. from -84 to -87 at AUN. Towards the end of 1986, the performance of the program will be evaluated and the planning will be done accordingly.

FIELD VISIT JULY - AUGUST 1985

1980 -81 Group:

1 - M.Sc. awarded in 1983

1981 - 82 Group:

1 - completed in 1984

1 - thesis submitted, results awaited

others - completed theses, due to graduate 1985

1982 - 83 Group:

2 - thesis completed

1 - late starting

1983 - 84 Group:

3 - work progressing smoothly

1984 - 85 Group:

3 - finalising research proposals

Main Hurdles in the early completion of M.Sc. dissertations and some possible solutions

1. Undue delay by some of the external examiners in sending the evaluation report.
2. Time gap between arrival of students to Morogoro (July) and the onset of rainy season (Feb - March)
3. Lack of special chemicals, glassware and small equipment.
4. Inadequate transport facilities.

Transfer of M.Sc. Program to Morogoro

A possibility of transferring the whole M.Sc program to Morogoro from 1988 was discussed. Most of the staff members were of the opinion that the research and teaching facilities, both in terms of personnel and equipment, are not yet adequate to meet the requirements of a full M.Sc. program. They, however, expressed that the situation will be assessed after the return of those staff members who are out for their Ph.D. studies and AUN will be communicated. Some help from AUN in special areas of research and teaching is anticipated in the event the whole program is transferred to Morogoro.

Appendix 5.

Country of Origin of Former Participants

	1980-84	1984/85	85/86	86/87	87/88	Total
Bangladesh	6	-	-	-	1	7*
Botswana	1	-	-	1	-	2*
Brazil	-	-	2	-	-	2
Burma	3	2	-	1	1	7
China	4	1	-	1	1	7
Cuba	-	-	-	1	-	1
Egypt	1	-	-	-	1	2
Ethiopia	1	-	-	-	-	1
Ghana	-	-	1	1	1	3
Honduras	-	1	-	-	-	1
India	7	-	-	-	-	7*
Indonesia	1	-	-	-	-	1
Jamaica	1	1	-	-	-	2
Kenya	1	-	-	1	-	2*
Mauritius	-	1	-	-	-	1
Nepal	-	-	1	-	1	2
Nicaragua	-	-	-	1	-	1
Nigeria	1	1	1	-	1	4
Pakistan	2	2	1	1	-	6*
Philippines	2	1	2	-	-	5
Portugal	1	-	-	-	-	1
Sierra Leone	-	-	-	1	1	2
Sri Lanka	5	-	-	1	-	6*
Sudan	1	-	-	-	1	2
Surinam	-	1	-	-	-	1
Tanzania	14	5	3	2	4	28*
Thailand	4	-	1	1	1	7
Uganda	1	-	1	-	-	2
Zambia	3	-	3	3	2	11*
Total	60	16	16	16	16	124

* main partner countries



