Sida Evaluation 96/39

Sri Lankan – Swedish Research Cooperation

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Table of Contents

Executive Summary

The Purpose

The purpose of the evaluation is to assess to which extent SAREC's research programme for Sri Lanka has achieved its objectives as given in the terms of reference; to create and maintain a sustainable research capacity in areas of particular relevance to the country and to promote collaboration between scientific institutions in Sri Lanka and Sweden. Also the effectiveness of the organisational and administrative arrangements have been examined.

Background

A review of the national research organisation in Sri Lanka including a survey of the various projects receiving support from SAREC over the period 1987-1994 had been prepared by the Sri Lanka Centre for Development Studies (the Marga Institute). The Marga report has served as a basis for the evaluation providing a national perspective on the recent history of science in Sri Lanka.

Site visits and discussions

To assess the SAREC programme in Sri Lanka the evaluators have paid visits to all the ongoing projects, discussed with the project leaders and with staff members and representatives of the universities and research organisations involved.

Initially the Sri Lankan member of the team visited the research institutions in April and May 1996 with the exception of the Tea Research Institute and the University of Ruhuna. On the basis of these visits a preliminary report was prepared for the information of the Swedish member and as a basis for the joint site visits in Sweden.

Site visits to the Swedish institutions engaged in SAREC projects in Sri Lanka took place during the week June 3-8. These agencies gave detailed accounts of the projects and in some instances made a presentation of the work done. Successes, failures and problems were freely discussed.

Site visits to the projects in Sri Lanka took place during the period June 26 to July 6. These visits provided an opportunity for the team to check the observations made on the first round of visits by the Sri Lankan member and to fill in gaps and make further inquiries. At this time also the two remaining projects at the Tea Research Institute and the University of Ruhuna were visited. In preparation for the visits a general discussion with the project leaders, the Director-General and Board Members of the Natural Resources, Energy and Science Authority (NARESA) was organised on June 28 in

Colombo. A visit to the Ministry of Science and Technology and to the Swedish Embassy after the site visits provided opportunities to discuss various aspects of the SAREC programme.

A list of people with whom discussions were conducted is given in Appendix 3.

Brief summary of conclusions and recommendations

Most of the SAREC funded projects have helped create and strengthen research capacity to a significant extent. Four of the eight projects have benefited significantly both by the funding and the Swedish collaboration. One project, though tardy in its initial progress, has generated a considerable body of knowledge useful to the country. Two projects which could have enhanced the scientists' access to research information have not progressed adequately but their significance for scientific capacity building requires their continuance but a more effective implementation should be secured. The continuance of one project should be reconsidered.

Most of the projects have linked the country's research to hi-tech facilities and made a significant contribution to scientific education in their respective fields. Collaboration with universities and well established institutions have been more successful in strengthening the research capacity and their sustainability appears assured. The Swedish cooperation in postgraduate training through sandwich courses has been a significant contribution of the programme. The collaboration between the Sri Lankan institutions and their Swedish collaborator has been an enriching experience with just one exception.

Thus on the whole the impression of the SAREC programme is quite favourable. Most of the projects are successful or very successful and meet with the criteria of SAREC. There are, therefore, good reasons to continue the support at the present level in all but a couple of cases. However, it is desirable that the Sri Lankan commitment to the projects be clarified and strengthened to facilitate a gradual transfer of the responsibility for funding to the Sri Lankan authorities.

Discussions and site visits to universities and research institutes have convinced the evaluators that there exist in Sri Lanka institutions with considerable potential in human resources and where staff members and academic leaders are prepared and anxious to assume greater responsibilities. The university system has capacity to absorb additional funding for research. However, a more sophisticated selection procedure is suggested to ensure the most efficient use of limited resources and at the same time adherence to national priorities.

1. Introduction

This report evaluates and discusses SAREC's programme of research funding and cooperation in Sri Lanka. Its main focus is on the latest phase of Swedish - Sri Lankan Research Cooperation 1994-1996, but draws lessons from the earlier periods as well.

The purpose of this report is to assess the extent to which SAREC's research programme has achieved its objectives. It evaluates the extent to which the research projects have served Sri Lanka's scientific priorities, created and maintained a sustainable research capacity, and the relevance of the projects for higher education and research capacity building. It also attempts to assess the effectiveness of the organisational and administrative arrangements and cost-effectiveness of the funding. Since most projects have been a collaboration between Swedish and Sri Lankan research institutions, the report also assesses the strengths and weaknesses of this collaboration.

An important objective of this study is to recommend how Sida should fund research in Sri Lanka taking into account the recent experience of the research collaborations as well as some of the lessons of the earlier experiences. The report discusses future channels of research funding as well as research areas which could be considered in its future policy. The recommendations include specific ones for the projects as well as perspectives for new research funding.

The report is divided broadly into five parts. The first part deals with an assessment of the programme in achieving the overall objectives and purposes of the programme. The second part evaluates the organisational and administrative arrangements and its cost effectiveness. The third part assesses the strengths and

weaknesses of the collaboration. The fourth part deals with the recommendations including suggestions of future structures for research funding and the final part summarises the lessons learned.

It is important to note that the team was not charged with the responsibility of reassessing the scientific merits of the research projects. Accordingly, the team members did not make their own independent evaluation of the scientific successes of each project, but relied on existing assessments and such criteria as citations, published scientific papers, and numbers receiving post-graduate degrees. The utility of the research in its national context was also considered. A brief discussion of evaluation criteria is given in Appendix 2

2. Programme Objectives

SAREC's main objectives in its Sri Lankan - Swedish Research Cooperation are to assist in creating and strengthening research capacity in areas of high relevance and priority to Sri Lanka and to promote research cooperation between institutions of the two countries.

An assessment of the eight on-going research projects under the programme reveals that these objectives have been achieved in varying degrees. In most of the projects there is strong evidence that the Swedish funding and collaboration have created and strengthened research capacity to a significant extent with regard to staff development, training of scientists and laboratory facilities. The molecular biology and gene technology programme at the University of Colombo is the most successful example of this cooperation. It was a new creation and it is unlikely that the Faculty of Medicine would have been able to establish this laboratory if not for the funding, technical assistance and scientific collaboration of this programme. Similarly the research capacity building in Electrical Engineering and Biochemical Pest Control at the University of

Peradeniya and in Marine Science at NARA and the University of Ruhuna has succeeded owing to the research collaboration, provision of equipment and funding. These four projects leave no doubt that there has been a valuable strengthening of research capacity in these fields owing to the SAREC funding. The water buffalo programme is more illustrative of research capacity development owing to the funding rather than collaboration. Given the financial constraints in Sri Lanka for research it is unlikely that these projects would have been able to achieve the kind of capacity building if not for the SAREC support.

Regrettably the two projects which would have greatly enhanced scientists' access to the latest research information have not progressed adequately owing to their slow implementation. We here refer to the scientific infrastructure project and the computerised science and technology information project. Had these projects been implemented more successfully one of the main objectives of SAREC's research cooperation would have been achieved in greater measure.

The projects on Renewal Energy and Energy Efficiency have for various reasons failed to achieve their intended objectives. Lack of adequate communication between the collaborating institutions in Sri Lanka and Sweden, partly due to personality problems and partly due to structural problems, has hampered progress. It is also to be appreciated that slow implementation is waste of resources and does not meet the criteria for cost effectiveness.

The assessment of high relevance or priority in terms of Sri Lanka's development is difficult to determine. There is no single scientific body which determines priorities, and scientific research is conducted under several ministries. (viz. Ministry of Higher Education, Ministry of Agriculture, Ministry of Plantation Industries, Ministry of Science and Technology etc.). Even in a single field like agriculture, research institutes function under several ministries. Furthermore in a context in which there are large areas of research which are in

crying need of funds, technical skills and personnel, it is a difficult task to determine which research projects should have a priority. This is particularly so as the eight research projects are basically a very limited number in relation to the total needs of Sri Lanka's research capacity building. One should bear in mind that there are besides SAREC and national authorities many other actors supporting research in Sri Lanka. The Marga report (chapter 3.3) lists a number of programmes but concludes that it is not possible to assess the funding situation for research in Sri Lanka with any measure of certainty. For the year 1993 it appears that the SAREC contribution represents some five percent of the total amount for research coming from foreign sources. Hence the best one can do is to make sure that the SAREC projects address significant national problems in a way that may give a solution and hopefully an efficient solution to the problem.

Two of the projects, namely the scientific infrastructure project and the computerised science and technology information project would have served a cross section of scientists. These projects are decisively of the kind that have a high relevance to scientific research capacity building. In fact Sri Lankan scientists have consistently complained since the 1960s, and more especially since the 1970s, of inadequate access to the latest research results. Journals had been hard to obtain and library materials have been greatly curtailed owing to financial stringency due to the country's severe foreign exchange problems and the limited funding capacity of the government. In this context these two projects are certainly of the highest relevance and utility for scientific research. They cater, not to a single discipline, but to most disciplines, and would have been a leap forward from the situation of starved research materials, which, apart from its direct impact of weakening the quality of research, has also indirectly contributed to the brain drain which the country has witnessed over the last three decades.

In the case of the other projects, to the extent that they link the country's research to hi-tech research facilities, they have served in filling lacunae which are unlikely to have been filled by the country's own research funding.

Most of the projects have made a contribution to higher education in science. University research in Electrical Engineering, Chemistry, Molecular Biology, Veterinary Science, Marine Biology, inter alia, have benefited from these projects.

The impact of SAREC supported research projects on development is not one which could be directly visible. In the case of the water buffalo programme the fact that an improvement in the stock of buffaloes could have a widespread impact on agricultural development, places this project at a point of high relevance. Components of the marine biology project will have an impact on improving the environment.

In determining the success of these projects it is clear that in the case of the Molecular Biology and Gene Technology Project the international recognition it has received, the large output of research publications and the development of an excellent laboratory facility, which has earned international praise, are factors which indicate a high degree of success. While the successes of the other projects have not been as spectacular, nevertheless the capacity building in several of these projects has been significant. Similarly the laboratory facilities developed in several projects are measures of success. Again the vast amount of research output of the water buffalo programme over a long spell of time has been a success in building a significant information base.

A significant measure of success of these programmes is that they have provided opportunities for post graduate studies both at the Masters and PhD levels. The output of about 15 PhDs and about 40 Masters Degrees, many of which were in

the form of sandwich courses at Swedish universities, is indeed a contribution which is likely to have a continuing impact on research capacity building.

Another positive development of the programme has been the formation of several inter-disciplinary teams for scientific research. This augurs well for continued research in these fields over time. Yet where such teams are not properly based in a research institution their sustainability is in question.

3. Organisational and Administrative Arrangements

In assessing the organisational and administrative arrangements it is necessary to make a distinction between projects which are funded directly by SAREC to universities and projects where the funding is through NARESA.

Most of the directly financed research projects have had a greater degree of success than those funded through NARESA. Certainly the project leaders and researchers are very satisfied with the organisational and administrative arrangements. They have indicated that whatever bottlenecks and problems that may have arisen during the implementation of the projects they have been able to resolve them expeditiously and without an adverse impact on the project implementation.

Unfortunately some projects which have had their funding through NARESA have had difficulties.. Most of the projects which have been funded through NARESA have experienced delays, difficulties in procuring staff and equipment owing to procedural complexities and in some instances perhaps due to inefficiencies. In some projects these difficulties have been sorted out. For instance in one project when it had a difficulty in obtaining funds an arrangement has been made for the funds to be released in two tranches annually thereby minimising delays. In another project, in an earlier phase, an alternate

chairman of the project was from NARESA itself and this enabled a smoother collaboration between NARESA and the project. However most project leaders have expressed a dissatisfaction with channelling funds through NARESA.

The relationship between the Sri Lankan project and the collaborating Swedish institution has been mostly a very rewarding one. With the exception of a single project other project leaders and researchers have found the technical expertise and technical advice extremely useful for the projects and the collaborations have had a distinct impact on the quality of the research.

One of the specific ways in which the collaborative arrangements have been particularly useful has been the device for part of the funding to be retained by the Swedish collaborating agency for equipment. The project has been able to utilise this component in a cost effective manner. In several of the projects, with one exception, the collaborating Swedish agency has been of assistance in purchasing the best equipment owing to their know-how, was able to procure the equipment at a lesser cost owing to greater competitiveness in Sweden and been able to provide the equipment expeditiously. The only exception was where in one of the projects the equipment was considerably delayed and the project team was not even convinced that the equipment was the best. Thus, on the whole there appears to be a strong case for continuing this system especially where a project requires equipment of a sophisticated and hi-tech nature.

None of the project leaders made a complaint that the balance between expenditure in Sri Lanka and in the Swedish collaborating agency was tilted towards the higher expenditures in Sweden.

In the light of the foregoing comments it may be asked as to whether funding through NARESA has had any positive contribution. NARESA considers channelling funds through it as a supervisory role. It boasts of eminent

scientists in different disciplines being part of its structure. Therefore it has argued that a closer monitoring of the projects could be effected by NARESA involvement. However the experience of the projects so funded have not borne evidence of this. In fact the projects which have had a slow progress have been those with a direct NARESA involvement.

Since one of the deficiencies for the development of scientific research capacity has been the low salaries and rewards of public institutions, foreign funded projects should provide a means of overcoming this defect. But this deficiency has persisted in the SAREC projects channelled through government agencies. As a consequence some of the projects have had difficulties to recruit and retain key people.

It appears that the higher the technology level of a project is, the more effective the contribution has been of the Swedish collaborating agency. Where the project was of a less technical nature and was more related to tropical conditions, the efficacy of the collaboration has been less. In one instance certain personality problems, rather than the collaborating institution, have affected the successful collaboration.

In a few instances where non Swedish agencies have been selected the collaboration appears to have been weak. The collaboration between Sri Lankan institutions has hardly worked out. But it is difficult to pass judgement on this because these same projects have in any case been slow in implementation and been the ones with the least success.

4. Strengths and Weaknesses

The strengths and shortcomings of the collaboration is discussed here. The main strengths of the programme of collaboration have been the access to higher

technology and a technology transfer in several scientific fields; the provision of post graduate facilities in Swedish universities; the development of areas of research which may not have been funded nor able to be undertaken in Sri Lanka if not for the collaboration; the development of inter disciplinary teams for research projects and the scientific infrastructure development envisaged in several of the projects. An overall impact of this collaboration could be, not only to develop the scientific capacities but also to retain scientific personnel in Sri Lanka. The overall weaknesses of the project appear to be that the selection process of the projects has not been systematically determined. In three of the projects changes in project leaders appear to have had an initial slowing down of the progress of the project. However, in two of these projects the continuity has been reasonably maintained. The collaboration appears to have had a few elements of weakness in that some of the Swedish institutions have not had specific expertise in some aspects of the projects. The few projects which did not have Swedish institutional collaboration have been less effective in implementation. The interaction and cooperation among Sri Lankan institutions have been weak if not problematic.

The most successful projects appear to be those where new and highest levels of technology were needed. The Swedish collaboration has been particularly useful in such projects. This relates to the access to the latest knowledge and expertise as well as the possibility of the Sri Lankan institutions obtaining the best equipment. The Sri Lankan institutions and researchers have benefited most in the high technology projects. There has been a rich transfer of knowledge and technology in them. The Sri Lankan scientists have benefited by the access to the most sophisticated laboratory techniques available in the Swedish universities without incurring massive costs, which the installation of such laboratory equipment entails.

One of the decisive strengths of the collaboration has been the access to post graduate education for a number of Sri Lankan scientists. As many as about 40 masters degrees and about 15 PhDs would emerge on account of this programme. These graduates are in very specialised fields whose knowledge is applicable to ongoing research in the country. The sandwich courses at both Masters and PhD levels have had the benefit of the students being able to work on projects of Sri Lankan relevance, they had access to the best professional and academic advice and exposure and enabled them to contribute to the Sri Lankan research projects while acquiring this knowledge and qualifications. Owing to this scheme there is a likelihood of a slowing down in the brain drain as the combined degree programmes would tend to make the qualified researchers have a more lasting interest in the Sri Lankan research projects. Besides this not being away for a long spell of time ensures a lesser degree of alienation from the Sri Lankan work-research context.

The Swedish contribution to the development of scientific infrastructure must be viewed in the context of very limited and inadequate funding for research in the country. Most of the projects have been new ones which may not have been undertaken at all, if not for the Swedish funding. Therefore even if these projects would not necessarily qualify as high priority projects in national development, there is little doubt that they are pioneering projects with an impact on useful aspects of national development. The projects, and particularly two of them, could contribute to overall research capacity by the procurement of scientific journals and literature and access to the latest data and scientific research results through electronic media. As mentioned earlier, these projects however have been slow in implementation but their potential significance in contributing to the scientific infrastructure of the country is undeniable.

The weaknesses of the project appear to be related to some aspects of the collaboration and organisational systems. In a few projects some aspects of the

collaboration may have been more effectively done through other institutions. Some of these perhaps from third world countries with similar research experience and expertise. This is particularly so with respect to some of the projects having a tropical context. These components may have benefited had the projects been devised to seek the best institutions elsewhere for collaboration.

The other weaknesses relate to difficulties experienced by Sri Lankan institutions to collaborate with each other. A few personality related problems have hindered some projects while changes in personnel have occurred in a few research projects. These weaknesses are by their very nature difficult to remedy and appear to be inevitable hazards in a programme of this nature.

The projects could have benefited more if the Sri Lankan government or the beneficiary institution had a greater commitment. It appears that on account of these projects receiving foreign funds, the beneficiary institution itself does not give adequate support. This support could be other services, such as adequate space and supplementary resources to further strengthen the project. Instead some part of the project funding is retained by the institution thereby reducing the total amount of financial resources for the project.

Gender participation in the SAREC funded projects have been looked into in some details by the CENWOR study. Therefore our report does not wish to comment in detail on this aspect. Overall it appears to us that there has been a fair degree of gender participation in the research projects, though the country gender biases in research over time have been reflected in them. However we are encouraged that in several projects there has been a leading role played by women scientists. But improvements in participation could be built into future research funding.

5. Recommendations

5.1 Priority Areas

In the selection of research projects there should be greater transparency. While many of the projects are undoubtedly of high relevance for Sri Lanka's scientific development, their selection does not disclose an objective and transparent method of selection. This may have been inevitable in the past but could be remedied in the future. As observed in the earlier sections, the extent of Swedish funding as well as the wide range of scientific needs in Sri Lanka, make it difficult for SAREC funding to support a large number of research projects. Also the Sri Lankan scientific structure, which has been outlined in the study done by MARGA, makes it clear that there is no easy way of identifying research priorities in Sri Lanka. Given these two constraints what appears practical and feasible is for SAREC to make a determination of the areas of research and scientific inquiry it would wish to finance, determine the kind of institutions it would like to support and obtain proposals for research which could be screened and selected by SAREC. To illustrate this proposal we may consider SAREC as wanting to fund projects in medical research, agriculture and engineering. Proposals for research could then be called for in these areas. Sida could also determine the kind of institutions which would be funded, for instance universities or government research institutions or NGOs.

Since there is a lack of prioritisation of research in the country, a foremost function of NARESA should be to take action to generate discussion on this subject with the relevant scientific institutions and scientists to come up with a programme of scientific research in accordance with national priorities. SAREC may consider funding such a programme on the understanding that the output

would be available in a stipulated period of time. We suggest that NARESA be asked to formulate this project on the determination of priorities in scientific research for SAREC funding.

5.2 Institutions and Group Leaders

The survey of Swedish research collaboration in Sri Lanka brings out very clearly the need for careful selection of institutions. The differing performances of the research projects are closely related to the institutional capabilities and the scientific personnel handling them. The selection of institutions are of vital importance particularly with respect to sustainability. Where projects have been located in an institution they have displayed a sustainable character. The impact of projects undertaken by groups of researchers and individuals could be more short-lived. Where the projects have had sub projects the linkages with the main institution have been weak and their performance less satisfactory.

Personality factors have played an important role in the success of the projects. Therefore it is most important that not only the technical capability of the research teams but also their administrative capabilities, inter-active capacities and commitment to the research undertaken are considered in the selection of projects.

The survey of the ongoing research projects bring out fairly clearly that university research has met with more success than projects located outside the academic institutions. There are several factors which have enabled such success. First universities have an already established institutional structure. Secondly, they appear to have committed project leaders and staffing. Thirdly the sustainability of the projects is largely ensured owing to the research staff, the development of their laboratories and equipment and the research capability

that has been developed among the researchers. There is therefore a strong case for a substantial funding of research to universities.

5.3 Sri Lankan Commitment

There appears to be little commitment of the main institutions being funded. The research funding appears to have generated an autonomous character for these projects. Since the funding is from abroad, and perhaps adequate, the Sri Lankan institutions have contributed very little to the projects. In fact in some projects where additional resources were required either in terms of space or maintenance of buildings etc. there has been little or no support forthcoming. This makes one somewhat sceptical of whether the projects are of sufficient priority. One would expect that priority research projects would get some support from the local institutions. Yet it must be understood that research funding in Sri Lanka is extremely inadequate and the dire state of public finances leave the government with little scope for funding research. Given that situation it may be difficult to insist on a principle or partial financial commitment by the Sri Lankan government/institution, but some demonstrative measures of commitment should be pursued. This component should be asked for at the time of making requests for SAREC funding. The selection of the research projects could take into account the extent of commitment of the government institutions or universities in the project.

An official as well as institutional commitment of Sri Lankan institutions should be a criterion for funding projects. It may be somewhat premature to insist on a certain proportion of financial commitment at the current stage of public finances and funding for research in the country. But a medium term perspective should be to give signals that funding beyond a certain year say, 2000, would require commitment of funds by the country and/or institution. Meanwhile the local commitment to the research project could take the form of institutional and personal support. This has been there to some extent in the ongoing projects, but

in several of them there appears to be a lack of adequate commitment by the institutions. In this respect it is worth remarking that the lack of commitment is also shown by the fact that the university administration charges an administration fee for disbursing the funds. Similarly, NARESA appears to retain a proportion of funds for the administration of the projects. These do not reflect a strong commitment on the part of these institutions. It discloses an attitude that SAREC funded projects are somewhat apart from either NARESA's activities or the Universities' research priorities. We strongly recommend that future funding should be on the basis that neither NARESA nor the Universities charge any fee for administration. In the foreseeable future projects for funding should have a specifically stipulated commitment of resources either by way of personnel or facilities, and if possible funding, for consideration of the selection.

5.4 Selection Procedures

If the institutions that are to be selected for funding are determined then it may also be possible for an apex organisation serving the research areas to participate in the initial selection of projects by their priority for the institutions. For instance university research projects may be initially proposed and channelled through the University Grants Commission which overseas all Sri Lankan universities. Such a participation would also ensure that several universities are reasonably served by the Swedish assistance. But in the present Sri Lankan context it is vital that the ultimate decisions for selection of projects be vested at the SAREC end though the Sri Lankan institutions should be encouraged to systematise their requests for research funding. In any event there should be wider consultation in the selection of research projects, than has been in the past.

The other consideration in the selection of research projects would of course be the Swedish institution's collaborative capacity. In fact, the collaborative capacity of the Swedish institutions could be a preliminary consideration in the selection of research areas. It is important for SAREC to determine the Swedish

institutions and universities which could effectively contribute to Sri Lanka's research capacity building. Areas in which Swedish institutions do not have adequate experience and technical capacity could be easily left out. Though where a component of experience is not available it could possibly be worked into the collaborative enterprise by collaboration with a third country institution with experience in the field. This is particularly so with respect to research dealing with tropical climates and vegetation.

5.5 Channelling

Where research projects have not progressed smoothly, bureaucratic delays have often been blamed. Bureaucratic bottlenecks are common experiences in both developed and developing countries. In the Sri Lankan context bureaucratic bottlenecks can be extremely severe and one cannot devise a research funding programme without a realistic awareness of these difficulties. Therefore one principle of Swedish funding should be to select the least bureaucratic systems and the least bureaucratic institutions through which research funds should be channelled. Again we find that where the funds have been allocated to the universities, though bureaucratic delays are not totally absent, the project leaders have been able to resolve any difficulties without serious damage to the progress of their research. A more indirect means of funding university research projects may prove disastrous. In the Sri Lankan context funds initially sent to a particular institution or government organisation may take time to reach the university and in turn some delays between the university and the research project. Where the research project has to keep coaxing the university to obtain the funds from a government institution the effectiveness of quick action is limited. Considering this, it is necessary for the funding to be as direct as possible. Intervening agencies who are unable to contribute any value to the ultimate research objectives can hardly be justified.

We have given careful consideration to the view expressed that all SAREC research funding for Sri Lanka should be channelled through NARESA. We find it extremely difficult to justify such a recommendation in the light of the observations made by project leaders and the progress of the projects coming directly under NARESA. Given the bureaucratic nature of NARESA, the difficulties of all inter institutional collaboration in Sri Lanka and the bureaucratic nature of other institutions as well, it appears that a multi-agency approach is preferable. We therefore suggest that NARESA be more actively involved in the implementation of the computerised science and technology information project as well as the scientific infrastructure project and develop these to a point of excellence whereby the entire scientific community in the country is served satisfactorily. This role is a vital and important one for the scientific development of the country and its successful completion itself requires a dedicated focus.

5.6 New Initiatives

In the selection of research projects it is important that current fashions in research are not made to over-shadow fundamental needs and fundamental areas of research. There are two aspects to this. The first is to ensure that more permanent priorities are looked after rather than research projects being selected on the basis of current interests either in western countries or owing to an international popularity with the subject. The second issue is whether the funding should be entirely confined to applied research projects as in the past. For Sri Lanka to make a significant breakthrough in scientific research capacity it would not be sufficient for its research institutions to be sorely concerned with applied research. The development of fundamental research with particular reference to the basic sciences, i.e. mathematics, physics, chemistry and biology, is a pre-requisite to the development of a scientific capacity. In the next phase of funding, this aspect should be given due consideration with a view to channelling some of the funds for fundamental research. It appears that the Sri

Lankan government itself has been appreciative of this need as witnessed in the establishment of the Institute of Fundamental Studies in Kandy. We are also made to understand that the Report of the Presidential Task Force on Science and Technology makes a similar recommendation. This is also an area in which Swedish institutions could make a decisive contribution towards Sri Lankan science research capacity.

Although SAREC has supported social science research in the past, there are no on-going social science projects at present, though some programmes have a social science component. While it is important that SAREC should support social science projects, such projects should also be designed with the objective of enhancing capacity building. The selection of appropriate social science research institutions for capacity building could be even more problematic than in the natural and physical sciences. Therefore we recommend that SAREC explores the possibilities of such funding and designs a sustainable programme in about two years. In this connection we are made to understand that there is a proposal for the establishment of a Centre of Advanced Studies in Social Sciences and Humanities. SAREC may wish to follow the progress of implementation of this programme and determine whether it is a project which would have a wide and deep impact on the social sciences, enhance research capacity in the social sciences and would be sustainable.

Another approach would be to select a university social science department which requires capacity building and support a post-graduate programme of teaching and research. The Netherlands government has supported such a programme at the University of Colombo. The Dutch have funded the University of Colombo - Institute of Social Science (UC-ISS) project with technical collaboration of the Institute of Social Studies (ISS) in The Hague. The Dutch have also funded the Institute of Policy Studies (IPS) in Colombo also

with technical collaboration of the ISS. A similar programme could be considered for SAREC funding.

The important factors for consideration in such a project is the selection of an appropriate Swedish or third country (perhaps India) collaboration and to ensure that such a project does not service a faculty or institution which is already adequately funded. A good candidate for such a project may well be a newer university outside Colombo.

5.7 International Contacts Fund

The international contacts fund has been a very problematic programme in its implementation. This programme was meant to fund scientists to attend conferences and workshops. Since international travel is much sought after, a programme of this nature is likely to attract much criticism, especially from those who failed to obtain funding. We make our observations being fully aware of this aspect.

In the first instance there does not appear to have been any clear guidelines on how the travel grants should be disbursed. SAREC appears to have expected young scientists, who would not have had funding otherwise to attend conferences and obtain an international exposure, to have been financed by this programme. NARESA, on the other hand, has been of the view that opening the programme to scientists without active participation at a conference, such as the presentation of papers, would open the flood gates. They have therefore imposed a condition that only those invited to present a paper would be granted funds for travel. In addition they have required that such candidates would be only partially funded, i.e. only travel, no subsistence or some part of the required funding. These conditions have effectively shut out the young scientists from participating in this programme. Besides this until recently it appeared that a good proportion of the funds had not been utilized. On the other hand NARESA

now indicated that the allocated funds had been nearly fully utilised. Also scientists complained that the procedures adopted by NARESA were dilatory and often scientists could not attend conferences even when NARESA approved funds as it was only a few days before a conference. While a full investigation into this programme may not be worthwhile at this stage, SAREC could easily do an analysis of those granted funds to assess whether objective criteria, as stipulated by NARESA, have been used to select the candidates. Accountability requires that such an exercise be undertaken.

In the implementation of such a programme in future we suggest the following :

(1) Clear guidelines should be given concerning eligibility and criteria for grants, e.g.

Age; preference given to applicants below 40 years of age
Experience
Type of participation; conferences, workshops, short-term training
Disqualifications; restrictions regarding the number of times a person could use funds
Fields of research

(2) Wide publicity should be given to the programme.

(3) The number of days prior to participation be stipulated and NARESA be required to process such applications within a stipulated period.

(4) Reasons given for rejection of applications should be given.

(5) A quarterly statement of those benefiting from the programme should be sent to SAREC and the Swedish Embassy (Sida) in Colombo.

5.8 Sandwich Programmes

One of the most successful aspects of the research collaboration has been the training of a number of scientists through post graduate sandwich courses. Sandwich programmes have not only increased the number of post graduate degree holders, but also perhaps stemmed the brain drain and enhanced the research staff of the universities. The sandwich courses have been very useful because they have provided an avenue for researchers to obtain their training

with a foreign exposure but still retaining their research projects and interests in Sri Lanka. Besides this, PhD level training abroad has itself been a cause for Sri Lanka's brain drain. This arises out of the fact that overseas PhD programmes take a long period of stay and research abroad, often 6 to 7 years. Such a long period of stay is one which the Sri Lankan institutions can ill afford to release their staff to. Once released the researchers are likely to get alienated from their country situation and develop personal problems which make their return difficult. Also the research projects they undertook abroad may have less relevance in Sri Lanka. All these factors could lead to a frustration among scientific researchers on their return. They then tend to seek greener pastures abroad. Therefore the Swedish programme for the training of Masters and PhD Degrees on a sandwich basis is an extremely useful contribution and should form an important component of the future research projects to be funded.

While the advantages of sandwich courses for post graduate studies are evident, there is a danger that such courses may be tailored to suit Sri Lankan requirements to an extent which compromises the standards of these degrees. This must be avoided at all costs. If there is a reduction in standards, quite apart from the fact that the Sri Lankan institutions would lose by such reduced standards, it would have a damaging effect on the perception of Swedish academic standards. The sandwich degree courses should therefore be of equivalent standards as what would be available at Swedish universities.

In this connection the current practice of a student spending about six months in Sweden may not be entirely satisfactory. When a student has to spend only a short period there is proportionally a greater loss of time due to the dislocation of residence. Therefore it may be preferable for students to extend the initial period in Sweden to a full academic year.

5.9 Swedish Procurement of Equipment

In terms of flexibility and procedures to enable smooth functioning of research projects the team observed that several of the projects which had a component of their funding retained with the Swedish collaborator for machinery and equipment were very satisfied with the equipment that they had received. They were of the view that the purchase of machinery in Sweden was most cost effective with the least delay and the best selection of equipment. With one exception they felt that this method contributed significantly to the project's success. This method of funding the purchase of equipment may seem contrary to the principle of enhancing research capacity in the Sri Lankan institutions. While it could be argued that the Sri Lankan institutions should develop a capacity to select the appropriate equipment and purchase these in the most cost effective manner and adequate servicing of equipment has to be obtained in Sri Lanka, the smallness of Sri Lanka's market for scientific equipment, problems associated with the ordering of such equipment and exchange control and delays in remittance of funds make it difficult for the research institutions to import the equipment they need expeditiously. Delays on account of this can itself be a cause of slowness in research progress. Therefore where necessary this system of purchasing equipment through the Swedish collaborating institution may be retained. But some method by which some of that responsibility is transferred over time to the Sri Lankan institution is desirable.

5.10 Duty and Defence Levy

An aspect that has affected the funding of the research projects has been a misunderstanding or improper implementation of the waiver of customs duties on equipment imported to the country. Several instances were brought to our notice where the customs charges have required payment of duties, despite the clear indication in the Agreement that imports would not attract customs duties. The problem has been resolved somewhat by the research institutions paying the duties in order to clear the equipment safely and expeditiously in the

expectation that they would be reimbursed in due course. This has in effect resulted in the funds available to the project being less at least initially. We suggest that the Swedish Embassy in Colombo gets a clearer mandate to enable them to intervene in such matters and ensure that no duties have to be paid. This may require action not merely at the Embassy level but at the level of implementation where the Dept of Customs should be notified of this fact.

There has also been instances where the Defence Levy has been charged on imports. Here again it has been due to this new duty not being covered by the original Agreement. Once again this should be sorted out administratively.

5.11 The Individual Programmes

Appendix 1 contains a more detailed survey of the individual projects providing the basis for the conclusions reported in this section.

We are of the view that the Water Buffalo Programme is at a stage of completion of its research and the SAREC involvement could conclude with the current phase. Any funds unspent under this programme may be allocated for the next phase of the programme to disseminate the findings of the research project.

The Marine Science Programme has been successful and has contributed much to the research capacity building in this field. We suggest the continuation of this programme but some of the components coming within it being re-formulated. The Marine Biology research at the Ruhuna University is illustrative of the possibility of SAREC contributing to research capacity building. We suggest that this programme be formulated as a separate project for funding with a view of making the Department of Fisheries Biology of the University of Ruhuna the national centre of excellence for this field. It is the only university in Sri Lanka with such a department and its relevance is beyond question. It is also located in an area which has a tradition and current

occupation in fisheries. With the imminent prospect of NARESA itself establishing a regional research station near the University, there is a strong possibility of a link which would have beneficial symbiotic gains. Therefore we suggest that this programme at the University of Ruhuna be strengthened in the next phase.

We are not satisfied with the progress of the prawn fishing component and suggest that this be dropped but in view of the earlier suggestion, prawn fishery research could be included in the University of Ruhuna project.

The Molecular Biology and Gene Technology Programme, the Biochemical Pest Control Project and the research capacity building in Electrical Engineering have been successful in building capacity in the respective areas in producing a number of university graduates and their sustainability appears assured. We therefore recommend that these programmes be continued but envisage a gradual increase in the commitment on the part of the Sri Lankan host institutions.

We have not been satisfied with several aspects of the Renewable Energy and Energy Efficiency Project. This has partly been due to an unsatisfactory collaboration with the Swedish Institution owing to personality factors rather than institutional deficiencies. Also SLEMA's collaboration may not produce the kind of sustainability which could have been expected had such a programme been located in a firmer institution or university. We therefore suggest that this programme be wound down. This programme's component relating to Solar Energy Development for Tea Drying has also progressed very little. Considering the number of problems it has faced and continues to face and the lack of commitment we witnessed, we cannot recommend its continuation.

5.12 Embassy Role

We are also of the view that with the unification of SAREC and Sida under a single Agency, the Embassy of Sweden (Sida) in Colombo could play a more important role in monitoring the project and in sorting out any problems of implementation. No doubt they are not in a position to take decisions based on scientific criteria nor should they interfere in the implementation of the projects, but they have a positive role to play in ensuring that the original objectives of the programme and guidelines governing aspects of these projects are adhered to and in some instances could facilitate smoother functioning of the projects. In our discussions with the Sida officials they indicated that such a role should be possible.

6. Lessons Learned

From this study of the SAREC projects in Sri Lanka there are a number of general lessons to be learned.

First and foremost we note the relative advantages that projects in a university setting enjoy in a country like Sri Lanka. Apart from a stable institutional base and an existing and extensive scientific infrastructure these projects can draw on a body of students and recent graduates to be associated with the project. This broader setting of a learning environment enhances the prospects for success of the project and at the same time maximises the impact of the project as an instrument for scientific capacity building. We further note that chances are good that a research program established in this way will survive. The cohesion of a university research team is strong compared to the forces that hold a temporary project group without a common institutional base together. Thus to ensure sustainability there is a clear advantage in working with universities. These features were all evident in the projects examined in this survey.

A common lack of institutional ownership characterised almost all the projects in this study. Projects were generally viewed as external to the institution and received little or no support from the host. Rather than supporting a project it is common to charge overhead in one form or another to compensate the institution for perceived expenses related to the project. Unless one can make the host institution adopt the attitude of proud ownership of the projects and a corresponding gradual shared responsibility for the survival and continued funding of them, the projects will always be endangered species. Any SAREC contract for continued support of a project should henceforth have a clause providing for a gradual transfer of responsibility to the host institution.

Many of the research teams we visited were undercritical in size. Through the sandwich programs and with the establishment of a national computerised science and technology information system linked to the global networks there are good chances to overcome the immediate difficulties related to isolation and sparseness in the research milieu. Thus, it is important that more resources be directed towards programs providing for networking. We have in mind training programs of the sandwich type and support for young scientists to attend regional and international conferences and, even better, workshops. Teams which had benefited from programs of this kind showed marked improvement with regard to international visibility and alertness to the developments within their field.

The Sri Lankan experience provides evidence that Swedish research cooperation could contribute most effectively if funding and collaboration are in fields requiring sophisticated technology. Contributions could then be invaluable as research institutions in developing countries often do not have either the required expertise nor access to advanced technology equipment. As found in the Sri Lankan case, such effective two-way collaboration enables a transfer of knowledge, a cost effective initial use of Swedish research equipment for

training purposes and a gradual upgrading of the research capacity in the developing countries in fields otherwise inaccessible to these countries. The introduction of gene technology at the University of Colombo is an example of this.

Where research projects are chosen owing to national priorities in the recipient country it may occur that there is no Swedish institution with sufficient expertise in the field. It is then important to find collaborators from another country with the necessary expertise. This applies particularly to projects which are particular to tropical climates. In some cases the expertise and the necessary technology may be available in another developing country in the region. In those cases it would desirable to encourage and support collaboration within the region. Such linkages, apart from providing the required expertise, may also be both cost effective and of mutual advantage to both countries.

7. Concluding Remarks

After the completion of the evaluation we have reached the conclusion that SAREC funds on the whole have been well spent in accordance with the main objectives and in a cost effective manner. As indicated in our recommendations there are minor adjustments to be made in the procedures for selecting new projects, but we have found that the existing scientific base in Sri Lanka is still in great need of support in order to take full advantage of its human potential. Additional external support over a period of at least five to ten years and a firm commitment from the Sri Lankan government for a gradual increase in its support of research and higher education could reduce the current waste of human minds and help the nation achieve greater prosperity. We feel that SAREC is in an excellent position to assist in making this happen.

ABBREVIATIONS

IFS	-	Institute of Fundamental Studies
IPICS	-	International Programme in Chemical Sciences
IPS	-	Institute of Policy Studies, Colombo
KTH	-	Royal Institute of Technology
MARGA	-	Marga - Sri Lankan Institute of Development Studies
NARA	-	National Aquatic Research Agency
NARESA	-	Natural Resources Energy and Science Authority of Sri Lanka
SAREC	-	Swedish Agency for Research Cooperation
Sida	-	Swedish International Development Agency
SLEMA	-	Sri Lanka Energy Managers Association
UC-ISS	-	University of Colombo - Institute of Social Studies
TRI	-	Tea Research Institute

APPENDIX 1: Reports on the Projects.

1. Water Buffalo Programme

The antecedents of the water buffalo programme go back to 1980 when SAREC sponsored a workshop on the water buffalo. The research programme was envisaged in 1981 and the project commenced in 1982/83. Therefore this programme is one of the oldest and longest collaborative projects of SAREC.

It appears that the progress of the programme was somewhat tardy in the earlier years, but has gained in momentum more recently. The fruits of nearly one and a half decades research was presented at a regional workshop in Colombo in December 1995. The project has now reached the dissemination of information stage.

The collaboration with the Swedish University of Agricultural Sciences has been useful particularly in the stock improvement aspects. Other aspects of the programme have benefited by the SAREC funding of equipment, vehicles and the training of research personnel. The programme has also received funding from other international agencies for specific aspects.

The funding of the project is through NARESA. According to the project team the NARESA administration of the project worked well during the first phase, when there was regular interaction between the project team and NARESA. The project had a NARESA officer as alternate chairman and this device took care of any difficulties. There appears to have been a breakdown of communication and understanding between the project team and NARESA in the second phase, when the arrangements of an alternate chairman lapsed and there was no regular meetings with NARESA. Several instances of delays in obtaining money for the imprest, vehicles and computers were cited as obstacles to the progress of the project.

Nevertheless the programme has been impressive in its results. It has developed basic information on nutrition, low cost feeding material, fertility and reproduction data. A programme for the improvement of stock by cross-breeding etc., and a nutrition brick has been developed. It has produced 40 research publications: about 45 efforts in communicating research; 8 PhDs and 17 Masters Degrees; 10 other researchers/research assistants; and 2 research farms. In 1995 the project commenced a Water Buffalo Information Dissemination Programme. The project is expected to establish a Buffalo Information Centre and focus on an Extension Programme. A book on Buffalo Production, a handbook on husbandry procedure, the preparation of training materials and extension information leaflets are envisaged.

The programme has succeeded in developing a significant amount of research on an important aspect of farming in Sri Lanka which had little systematic and scientific study. The involvement of a number of researchers from several disciplines, the output of research publications, extension material and developing a body of scientists specializing in this field are important contributions. Owing to these factors and an interest in the Ministry of Agriculture in furthering this work, there is a good prospect of sustaining the work done with some minimal funding. The SAREC funds unspent may be allocated for the next phase which could be financed by Sri Lankan agencies and some other foreign sources of funding.

2. NARA Project : Marine Science Programme

The project appears to have been selected primarily owing to an interest of the University of Stockholm. This interest had been conveyed to NARESA which had a close personal link with NARA. Consequently the marine science programme was financed with SAREC assistance.

The collaboration with the Stockholm University and the Institute of Fresh Water Research, particularly in providing post graduate training for several researchers at the Masters and PhD levels, has been very useful in increasing technical capacity. In addition to this several other researchers have also obtained research experience and funding for a programme for post graduate degrees at the Ruhuna University and Colombo University. This enhancement of research capability in Marine Science, Oceanography and Environmental disciplines has been an important contribution of the project.

The project has improved research facilities at NARA, established the Kalpitiya and Weligama Research Stations, provided equipment such as boats, engines, diving and laboratory equipment and literature. NARA's knowledge of coral reefs, fish stocks and environmental data have been enhanced significantly and a coastal management centre has been founded. The project has enabled NARA to establish links with International Research Institutes and NARA scientists have participated actively at international conferences in Panama, Indonesia and Miami, Florida, USA These conferences have had programmes dedicated to themes on Sri Lankan coral reefs.

A number of scientific publications have emanated from the project research, including a special issue of AMBIO (a journal of the Royal Swedish Academy of Sciences) devoted to Sri Lanka's research and capacity building for coastal management.

The collaboration with the Swedish Institutions is considered extremely useful in the fields of oceanography and coral reefs, but have been limited in fisheries. Perhaps the fisheries component would have benefited had there been collaboration from another institution with a specialised interest in tropical

fisheries. Swedish scientists have benefited from the collaboration and gained knowledge and experience in a different coastal and marine environment.
In this project too the provision of certain funds for the project to the collaborating institutions in Sweden has facilitated obtaining research equipment and other requisites. This method of funding some aspects of the project appears to have eliminated delays and difficulties that may have arisen had these funds been made available through NARESA.

The administrative arrangements through NARESA has had several problems. Initially the disbursement of funds on the basis of approvals for particular items was unsatisfactory. A more satisfactory arrangement has been developed about two years ago when it was decided that the project funds for the year be released in two instalments. This has worked more satisfactorily. There are however some delays in obtaining the funds from NARESA owing to NARESA itself having to obtain the funds from the Treasury. But these delays have not been serious constraints to the implementation of the project according to the Project Director. Yet, there is no reason why funds should not be given directly to NARA rather than channelled through NARESA. At present, NARA implements several other foreign funded projects directly and the management at NARA, which is itself a government agency, is of the view that the funds should come directly to NARA. There are however several difficulties arising out of the fact that NARESA as well as NARA require salaries and other conditions of the project to conform with Govt/NARA/NARESA salary scales and other conditions applicable to these institutions. Consequently NARA has found it difficult to obtain quality research staff especially as university salary scales are higher, the project employment is temporary and there is a shortage of technically qualified persons. These difficulties have been mitigated to some extent by NARA being able to absorb those recruited to the project so far and by the opportunities for the researchers to do post graduate studies. A more

satisfactory solution to this problem of staffing would be to consider the project as distinct and separate from NARA to enable it to have the flexibility of paying market rates of remuneration and some perquisites which would be attractive. However as this could lead to some conflict with respect to NARA's other staff who would still remain on government salary scales, it is vital that a rational and viable system is developed.

Some of the constraints experienced by the project have been the lack of vehicles, especially as the project requires considerable travel. With the limited number of vehicles available with NARA, it has been necessary for project work to be done by the hire of vehicles which has been more costly and considered less satisfactory by the project leader.

The environmental and natural resources project in the North Western Province, (i.e. the Puttalam Lagoon and Mundel Lake) is considered one of the more successful projects, particularly owing to the interest and actions of the North Western Provincial Council. The project could be strengthened by concentrating on the aspects which require more scientific inputs, getting the assistance of a specialist tropical fisheries collaborator and improving the research capacity at Ruhuna University. The research link with the Sri Jayawardenapura University appears to be weak and lacking in focus. This underscores the need to ensure that any subsidiary and related research projects should be more systematically integrated into the main project.

The funding of research at the Fisheries Biology Department of the Ruhuna University has achieved impressive results in capacity building. It is a case study of a pioneering, dedicated and committed young research scientist building a research facility with many impediments and difficulties. Since this is the only fisheries biology department of a university in Sri Lanka and is located appropriately in the Southern fisheries coast of Sri Lanka, SAREC

should consider enhancing funding for this project with a view to making it a centre of excellence in fisheries. This proposal gains further justification by the fact that NARA itself will be establishing a regional research station in South Sri Lanka in close proximity to the Ruhuna University. A useful symbiotic relationship could be of mutual benefit to both institutions.

There is considerable interest in this area of environmental protection, but the sustainability of the capacity that has been built will depend on the availability of funds. Therefore the funding of a follow up programme by SAREC is considered useful.

3. Molecular Biology and Gene Technology Programme

This programme appears to have been one of the most successful collaborative research projects. The research laboratory that has been developed, the breakthrough in research, the number of learned articles that have been published, the participation of researchers at international conferences and the output of 18 MScs and 5 PhDs on a sandwich programme are among the achievements of this project.

The establishment of a Molecular Biology and Gene Technology Laboratory was the result of a policy decision on the part of the Vice-Chancellor of the University of Colombo. The project leader was requested to accept the responsibility for the implementation. The genesis of the programme goes back to 1979 when the Faculty of Medicine of the Colombo University began a cooperation with the International Programme in Chemical Science (IPICS). It has been a pioneering task and one which was difficult to establish owing to medical personnel themselves not being available for research in this field, despite the usefulness of the research for the Medical Faculty. Therefore researchers have been obtained from among biologists interested in this field.

The physical facility available in terms of space has been extremely limited but innovative methods have enabled the researchers to use the limited space effectively.

The collaboration with the Department of Medical Genetics of the Bio-Medical Centre of Uppsala University has been a very productive one. The access to the best research facilities in Sweden, the transfer of technology and transmission of the latest developments in the field from Uppsala to Colombo have been significant contributions. The small laboratory established in the Faculty of Medicine is claimed to be the best in the region and comparable to the best in the world. The contributions of the researchers at international conferences, the participation of foreign researchers at this laboratory and the recognition it has attained from WHO are proud achievements.

Like in the biochemical pest control project this project has also benefited by the possibility of obtaining laboratory equipment and technical advice from Uppsala. This facility has enabled the laboratory to obtain the best equipment at competitive prices and continuous servicing of the equipment. The project has also benefited from a major component of funds being retained by IPICS and used for supply of highly perishable molecular biologicals and spare parts. It is advisable to retain this system. The flexibility of the collaboration, with the main concern being the quality of research and research output, has been a facilitating factor. There has not been any concern over detailed administrative matters. The funding through the University of Colombo has been free of bottlenecks and bureaucratic difficulties.

The deficiencies of the project are the lack of physical space which the University has been unable to provide. This is perhaps indicative of an inadequate commitment of the University and authorities in Colombo to back up this programme with local resources. The financial contribution of the

Colombo University has also been very minimal. This poses a serious problem to its sustainability, for in the event of SAREC assistance drying up the programme might come to a grinding halt after a short period. The equipment and laboratory facilities could perhaps last another five years but without continuous funding, either from the Sri Lankan government or SAREC, the research capacity would be seriously jeopardised. There are at present possibilities of obtaining funds from international agencies for specific aspects of expansion of the project.

A minor but not insignificant problem has been the requirement that the defence levy be paid on the imported laboratory equipment. Quite apart from the financial losses to the project funding there is an anxiety that this could be an irritant to the Swedish authorities, as the Swedish public would not approve to any funding going into defence. Furthermore, the taxation of the grant for research is tantamount to Sri Lankan authorities reducing the funding of the programme.

This project requires to be funded for several years. However, in programming the funding it would be useful to dove-tail other foreign funding as well as secure a firmer commitment from the University of Colombo.

4. Biochemical Pest Control Project

The selection of the project appears to have been mainly determined by the interests of the researcher, his initiative in finding a collaborative institution in Sweden and SAREC support. The development of environmental friendly control of six pests affecting agricultural crops could be most useful to the country.

The project is located at the Department of Chemistry, University of Peradeniya, but has collaboration with the Institute of Fundamental Studies (IFS) Kandy and the Tea Research Institute (TRI). The funding/administration is directly through the University and not through NARESA, though progress reports are submitted to NARESA. The organisational and administrative arrangements appear to have worked out well. Whenever some difficulties have arisen the project leader has been able to resolve these with the University authorities as he is on the spot and able to personally intervene.

The collaboration with the Swedish University of Agricultural Sciences Uppsala, IPICS and KTH (Dept of Chemistry) has been beneficial for the following reasons :

(1) One of the specific ways by which the project has benefited is the procurement of equipment through the collaborating institution in Sweden. This has enabled the best equipment to be identified, competitive prices obtained and better servicing of equipment. The procedure for obtaining the equipment has been minimised by these means. There has also been a saving of cost by eliminating Sri Lankan requirements like opening of Letters of Credit, up-front conversion of funds, costs of exchange conversion. The quality of the equipment, its price and speed of obtaining has been facilitated by this procedure.

(2) A second advantage of the collaboration has been the access to scientific information and literature through the Swedish collaborating institutions. Consequently the researchers have been able to obtain the most recent research findings. This is most important in a context of very limited availability of the latest scientific literature and the current availability of scientific information through electronic media. The Department has obtained 5 journals.

(3) Where laboratory facilities are inadequate, the tests have been done in Uppsala and hence the project has had access to the best laboratory services. The training in techniques have included Bioassay (SUAS) synthesis and separation techniques at KTH and carbohydrate studies.

(4) The project has had access to expert advice, especially in some particular areas such as steroids.

(5) Young students have benefited by working in Sweden and gained practical experience at the Swedish University of Agricultural Sciences (SUAS) Uppsala.

(6) The senior researcher has benefited by interaction with researchers in Uppsala.

The project has enhanced the research capability of the Department of Chemistry in several ways. The equipment for the project will continue to be useful to the University for another 10 years. Five students have been registered for PhD studies and 3 for the MPhil programme, and the scientific knowledge gained would have a cumulative impact on the research capability of the Department well beyond the confines of the project. There have been a few scientific papers.

The application of the research at the Tea Research institute has not commenced in any significant manner. The project has obtained some biological material from the TRI, but problems at the TRI have not been conducive to steady progress of this aspect of the project. The collaboration with IFS has proved mutually beneficial.

For a project which commenced in 1994/95 the progress and promise is very good. Further funding of this project will enhance research and teaching capacity in Chemistry at the University of Peradeniya.

5. Renewable Energy and Energy Efficiency

This project appears to have been adopted without adequate discussion and examination of the original proposal. The original proposal had 4 components - data base, thermal comfort, lighting and development of an energy code - all of which are not fully funded or technically supported in the on-going project. Consequently the project lacks funds for some components and these have been adapted or undertaken with supplementary financing. The project also has an additional component relating to solar energy for tea drying which was not envisaged in the original proposal of SLEMA. This latter project is not directly related to the research undertaken by the Sri Lanka Energy Managers Association (SLEMA) and is the responsibility of the Tea Research Institute.

SLEMA's collaboration with the Dept of Energy Technology of the Royal Institute of Technology (KTH) has not been very fruitful. The deficiencies in the collaboration are :

(1) SLEMA researchers have not had a very useful technical collaboration. This is partly attributed to personality factors of the KTH's project leader, his expertise and interest being in only some aspects of the project and organisational deficiencies. Some of these defects have been remedied to some extent by the involvement of other faculty members of KTH. Yet this has been a limited contribution as they do not have a formal role and responsibility in the project.

(2) Unlike in other projects the provision for the equipment to be purchased by the Swedish collaborator has not worked effectively. The main problems cited have been that the equipment has not been the best available and that there have been inordinate delays in obtaining the equipment. This has hampered the progress of the project. Here again intervention of another researcher from KTH has helped to mitigate the problem.

(3) The technical input is considered rather minimal and in some components the collaboration is not considered effective. Again the selection of the appropriate institution and more importantly the choice of persons for collaboration have been the significant factor.

(4) The student pursuing the PhD has also not been particularly enamoured by the training received at KTH. The MPhil researcher has found the University of Moratuwa very satisfactory but has not been able to obtain much access to literature through the collaboration. His participation in a course at AIT in Bangkok was useful.

(5) There has been a severe lack of communication among the researchers and KTH. The instances cited are unbelievable lapses.

The project team has not had any real difficulties in their dealings with NARESA.

The main contributions of the project would include the development of an Energy Code for Sri Lankan buildings. The project has also developed an inter-disciplinary team which may continue to undertake research after this project is completed. The background studies for the project, the output of two post graduates in the field and the expected research papers are the contributions of the project.

The project has enabled the development of an adaptive research project which could have a continuing impact and may be sustained if the UDA, Central Environmental Fund (CEF), private industries and the Ceylon Electricity Board (CEB) get interested in the output of the project. All these agencies have been brought together in the SLEMA project team. Yet the project lacks an institutional backing, which could have ensured its sustainability.

This project is not likely to build capacity to any significant extent owing to it not being a programme of an institution. Even if the same researchers participated in the project, it would have built capacity if it was located in an electrical engineering department of a university. Further, such location may have enhanced university-industry collaboration.

With respect to the renewable energy project for the solar drying of tea, the progress has been minimal. This is partly due to an administrative disruption at the TRI and partly due to TRI's project leader not being able to work with NARESA. We are also made to understand that much of the technology to be developed may be already available in neighbouring India. Considering all these factors it is difficult to recommend a continuation of this project.

6. Research Capacity Building in Electrical Engineering

The lack of a critical mass of researchers, inadequate equipment and lack of professional satisfaction have been the main reasons for the inability of the Department of Electrical Engineering to develop an adequate electrical engineering research capacity. This project appears to have made a significant contribution towards enhancing the research capability of the Department of Electrical Engineering at the University of Peradeniya. Without the technical assistance provided by the project, the required funds for research equipment, technical advice and funds for training of faculty members would not have been

forthcoming. The Department of Electrical Engineering has been strengthened significantly by the project.

This project is funded through the university and funds are not channelled through NARESA. The change in project leader did not hamper the progress of the project. The project has had no difficulties in its administration and the collaboration with the Royal Institute of Technology (KTH) has worked very effectively. The Department is very pleased with the equipment that has been provided and the sandwich course for the training of PhD and MPhil students. Their exposure at KTH has been an advantage. The only deficiency we could observe was that the students' period of stay in Stockholm may be somewhat short. Perhaps these students should spend a full academic year. The students are very content with their study at KTH. The courses are well structured.

There is a fair certainty of sustainability of the project owing to the output of the graduates and the development of the critical mass of electrical engineers. The project has also assisted the development of a linkage with industry and particularly the Ceylon Electricity Board (CEB). Further, the graduates of the Department have adequate employment opportunities and this would itself be a factor influencing the sustainability of the project. It is an example of a project without administrative difficulties, effective collaboration and capacity building.

7. Computerised Science and Technology Information

This project is of considerable significance to the scientific community as it is expected to provide them with CD-ROM based literature. NARESA is expected to be a hub or centre of information by supplying information from their CD-ROM data bases to scientists and scientific institutions. The project provides funding for computers, CD-ROM data bases, training and other equipment.

The implementation of the programme has been very tardy. The technical cooperation for the project was from CINTEC. NARESA attributes the delay entirely to CINTEC. Procedural requirements have made it difficult for CINTEC to provide the services. The collaboration between these two agencies appear to have been quite problematic and consequently the programme has suffered.

The experience of the project is illustrative of the fact that scientific projects like these cannot be implemented expeditiously within the framework of government rules, regulations, salary scales, methods of remuneration and procedures. Time lost in this project could be costly and there may be even cost-overruns as a consequence.

This project did not have a Swedish collaborator. In the light of the experience of the other projects, it appears that the project could have been implemented more expeditiously had a Swedish institution been responsible for the specifications and if the equipment was purchased by them and sent over to the project.

The facility is now in place and NARESA has obtained the services of a consultant to assist the implementation. Poor telephone lines, high cost of CD-ROMs and copyright restrictions are among the impediments for a more effective development and utilisation of this project.

NARESA should be supported to enhance this facility and a structured programme of linking the facility to scientific institutions and personnel should be mapped out.

8. Scientific Infrastructure

This project attempts to remedy some of the critical areas which have affected the effective research capacity of Sri Lankan scientists. Financial constraints and

particularly foreign exchange restrictions have over time curtailed the acquisition of scientific journals and other materials essential for keeping scientists abreast of recent research. University libraries have been starved of the most recent materials and scientists often complain of a lack of current research materials for their work. This project which financed the purchase of international scientific journals and data bases in CD ROMs could contribute significantly to improving the country's research environment. The libraries at the Universities in Peradeniya and Colombo were selected as modes of information for serving the other libraries. The project also envisaged the transmission of materials to the University of Jaffna Library.

The University of Peradeniya has been able to update its collection of journals especially in Medicine, Science and Engineering through the acquisition programme. It has also been possible to micro film the library collection of rare books and take effective measures to ensure that the library materials would be secure from terrorist attacks, like the one which destroyed the library collection at the Central Bank of Sri Lanka. While these aspects of the programme have been implemented and has contributed to the updating and upgrading of library materials, the purchase of data bases in CD ROM form and electronic methods of search and retrieval of information have not progressed adequately. It does appear that there has been inadequate collaboration with the international science programme. The assistance given by the International African Institute in London also appears to have been very minimal.

The programme does not appear to have suffered from administrative difficulties though the NARESA administrative cost reduced the available finances. The training component of only SEK 75,000 for 1994/95 for each University at Peradeniya and Colombo appears to have been inadequate to support the programme. This item has been further reduced to SEK 12,500 per University in 1995/96. Books have been dispatched to Jaffna but the University of Peradeniya has no confirmation of the receipt of these. The programme appears to be in dire

need of a scientific back up to enable it to implement the modern systems of data bases. Once again the progress of this programme underscores the need for effective technical collaboration for projects which require high scientific knowledge. The pace of implementation of the programme has been slow.

There are misgivings that the facility in Peradeniya could serve other universities effectively. This is due to poor telephone connections, power cuts and a scientific culture lacking in professional collaboration among universities. Some de-centralisation of facilities may be justified. Yet, in a small country like Sri Lanka, it would be very costly and wasteful to replicate facilities in several institutions. The objective should be to develop centres of excellence in particular subject areas and establish effective linkages. The likely improvements in telecommunication facilities should assist in making this programme effective. A 3 - 5 year structured programme for the improvement of scientific infrastructure should be developed with a net-work of participatory institutions.

APPENDIX 2: Evaluation Criteria

SAREC's main objectives in funding projects in Sri Lanka are very general in scope, namely

- to assist in the creation and strengthening of research capacity in Sri Lanka

- to promote research work of high relevance to the development of Sri Lanka

- to promote research cooperation between Sri Lankan and Swedish institutions

The key words here are research capacity and relevance to the national development. In assessing the individual projects special attention has been directed towards these aspects.

Research capacity encompasses several components; staff and leadership, student training, laboratory facilities and access to front-line research in the field elsewhere. Indicators for assessing achievements with regard to research capacity are number of papers published in reputed and refereed scientific journals, citations in the international literature, number of postgraduate degrees, international contacts including invitations to deliver invited talks at international conferences etc. However, most of these indicators have an implicit bias. Only research of relatively high quality as measured by international standards will receive attention in quality-conscientious scientific journals. In addition, the international literature is strongly biased towards problems of immediate interest to the industrialised world, and it is difficult to attract attention and recognition for research directed towards problems of relevance primarily to the developing countries. However, whenever applicable the indicators have been used to judge the degree to which a project has contributed to the creation and strengthening of research capacity. In this context it has been noted that the contracts for the projects lack specifications of operational goals to be fulfilled.

To assess the relevance of a project for the national development there are two questions to be answered. Firstly, is the problem for which the project is seeking an answer of high relevance and priority in the national strategy for development. Secondly, if successful will the project provide a solution to the problem. It is noted that there is no well defined national priority list for research as part of a development plan for Sri Lanka. Still, it is quite clear that one can distinguish areas in great need of research to overcome important and

immediate problems of development. A more crucial aspect is to judge to what extent a project may possibly provide a solution.

The ultimate assessment of a project must incorporate a balanced judgement on quality and relevance. A project well positioned in the front line of international research may merit support even if it is not immediately relevant to a national problem. It may raise the general standard of research and education in the country and serve as a valuable benchmark for other research activities. Similarly, for a project of high relevance to a local problem one must require a competent staff but not necessarily world leading experts. A project that strikes a reasonable balance between quality and relevance is often optimal with regard to the objectives of SAREC.

During the site visits the evaluation team saw the research facilities and met the research staff, were provided with an account of the progress of the projects, lists of publications and in some instances the publications. The project leaders were asked to enumerate any difficulties with the funding agency or bottlenecks in implementing the research programme. They were asked about the nature of their collaborations and if they had encountered any specific problems in this area. Several project leaders made presentations of their research findings and provided statistical data on their accomplishments.

APPENDIX 3: People Interviewed

A list of persons interviewed as part of the evaluation process.

1. General issues

The evaluation team met the following persons, inter alia, and discussed issues pertaining to the individual projects as well as broader issues on scientific research

Professor Priyani E. Soysa, Director-General, NARESA
Dr. Upali Pilapitiya, Member of the Board, NARESA
Professor Nandadasa Kodagoda, Member of the Board, NARESA
Professor Charles Dahanayake, Member of the Board, NARESA
Professor Tissa Vitharne, Advisor, Ministry of Science & Technology, Member of the Presidential Task Force on Science & Technology,
Mr. J. Karunasinghe, NARESA
Mr. N. Amaradasa, NARESA
Professor Senaka Bandaranayake, Director, Post-graduate Institute of Archeology, Member of the Presidential Task Force on Science and Technology
Professor Kirthi Tennekoon, Director of the Institute of Fundamental Studies, Member of the Presidential Tack Force on Sciene and Technology,
Professor Rune Liminga, International Science Programmes, University of Uppsala

SAREC/Sida

Dr. Rolf Carlman, Director, SAREC
Mrs. Berit Olsson,
Dr. Afzal Sher,
Mrs. Ann-Mari Fallenius, Director, Department for Evaluation
Mr. Klas Markensten, Director, Department for Asia
Mr. Ola Hallgren,
Mr. Ronny Duell, Programme Assistant for Sri Lanka

2. The Water Buffalo Project

Dr. B.M.A.O. Perera, Project Leader
Dr. J.A. de S. Siriwardene
Dr. D.H.A. Subasinghe
Dr. A. Wanasinghe

3. The Marine Biology Project

Mr. Henry Gunawardena, Chairman, NARA
Dr. Pauline Dayaratne, Project Leader, NARA
Dr. Ruchira Cumaratunge, Department of Fisheries Biology, University of Ruhuna
Postgraduate students and research assistants, Department of Fisheries Biology, University of Ruhuna
Professor Olof Lindén, Department of Zoology, Stockholm University
Mr. Håkan Wickström, Institute of Freshwater Research, National Board of Fisheries
Dr. Lars Rydberg, Department of Oceanography, University of Göteborg

4. The Biochemical Pest Control Project

Dr. V. Kumar, Project Leader, University of Peradeniya
Dr. Savithri Kumar, University of Peradeniya
Professor Jan Petersson, Institute of Entomology, Swedish University of Agricultural Sciences, Uppsala

5. The Molecular Biology and Gene Technology Project

Professor Eric H. Karunanyake, Project Leader, University of Colombo
Mrs. Nalini Jayasekera, Collaborator on Filariasis
Research Assistants

6. The Project on Renewable Energy

Mr. Sharvantha Fernando, Project Leader
Mr. L. Ranasinghe
Dr. Ziyard Mohamed, Tea Research Institute, Talawekelle
Dr. Wester Modder, Director, The Tea Research Institute
Dr. Börje Mundt, Department of Energy Technology, Royal Institute of Technology, Stockholm

7. The Electrical Engineering Project

Dr. J. Ekanayake, Project Leader, University of Peradeniya
Dr. K. Walagama, University of Peradeniya
Dr. V. Muthukumaraswamy, University of Peradeniya
Mr. Manjula Fernando, Research Student
Ms. Nathani Sellathurai, Research Student
Mr. Sanath Alahakoon, Research Student
Professor Stanislaus Gubanski, Royal Institute of Technology
Professor Chandir Sadaragani, Royal Institute of Technology
Professor Roland Eeriksson, Royal Institute of Technology

8. The Library Project

Mr. N.T.S.A. Senadeera, Librarian, University of Peradeniya

9. The IT Project for Computerised Science Information

Mrs. D. Talagala, Director of Information, NARESA
Mr. Kevin Hall, Consultant
Professor Samaranayake, Director of CINTEC

10. The Swedish Embassy in Colombo

Ms. Kristina Marelius, Deputy Head of Mission, First Secretary
Mr. Johan Nordquist, SIDA

TERMS OF REFERENCE FOR A STUDY OF THE SRI LANKAN-SWEDISH RESEARCH COOPERATION

1. Background

SAREC's main objectives in providing support to Sri Lanka under the bilateral research cooperation agreement are:

1. To assist in the creation and strengthening of research capacity in Sri Lanka;

2. To promote research work of high relevance to the development of Sri Lanka; and

3. To promote research cooperation between Sri Lankan and Swedish institutions.

SAREC´s research cooperation with Sri Lanka began in 1976. The total support, up to and including 1995/96, amounts to SEK about 70 million, out of which SEK 16.2 million have been granted for the current agreement period of 1994/95-1995/96. SAREC´s current major counterpart for the cooperation is the Natural Resources, Energy and Science Authority of Sri Lanka (NARESA) which also acts as a national research council. About half of SAREC´s funds for Sri Lanka are channelled through NARESA whereas the rest is provided to university institutions directly by signing with them sub-agreements. Currently eight programmes/projects are being supported of which four were launched during 1994/95; four of these projects are administered by NARESA. Annex 1 provides a brief summary together with the names of the cooperating institutions and project leaders of all the ongoing projects covered by the current bilateral agreement.

In accordance with its usual practice, SAREC periodically evaluates the programmes it supports. A deep study of SAREC´s support to Sri Lanka was published in a SAREC report in 1986. Thereafter, three projects were evaluated during 1987-1988 by independent evaluators. While approving the current two-years grant to Sri Lanka, SAREC´s Board also decided that the bilateral cooperation with Sri Lanka be evaluated during 1994/95. The report from this evaluation will serve as a background document for decision by SAREC´s Board regarding future support on a long-term, probably 3-years, basis.

2. SAREC´s Mode of Operation in Sri Lanka

Suitable research projects are selected in consultation with either all or some of the following: NARESA, Sri Lankan Association of Sciences (SLAAS), University Grants Commission (UGC), Ministry of Science and Technology and prominent research organisations and researchers. The projects are based at a university or a governmental laboratory. In most cases, one or more collaborating institutions in Sweden or a third country are identified to act as counterparts for the cooperation.

In addition to dealing with specific scientific research problems, postgraduate training at M.Sc. and Ph.D levels is frequently integrated into the research projects. This training may be arranged as "sandwich" programs; i.e., periods of training and field and/or laboratory research at the home institution alternated with training and laboratory work at the collaborating institution. Within the framework of a research project, support is also given for purchase of equipment, spare parts, consumables, etc., and for salaries/stipends for technicians or postgraduate students connected to the projects. Financial support may also be given for arrangement of courses, symposia and workshops.

3. Terms of Reference

3.1 General

The overall purpose of the evaluation is to analyse the following questions in relation to the objectives of SAREC. The discussion should focus on the overall cooperation and any study of individual projects should be seen as an input to the overriding questions.

3.1.1 Is SAREC supporting programmes/projects in Sri Lanka in accordance with the SAREC´s main objectives and the Sri Lankan priorities?
3.1.2 Are the organisational and administrative arrangements efficient and supportive of the research cooperation?
3.1.3 Has the support been successful in creating and maintaining sustainable research capacity in Sri Lanka?
3.1.4 Has the support been cost effective?

As part of the process of evaluating the above-mentioned questions, the evaluators shall present a description and analysis of:

3.1.5 The research structure in Sri Lanka, including the structures and roles of NARESA, SLAAS, UGC, universities and the national research institutes as well as the connection and interaction between them.

3.1.6 The role of the ministries involved in promoting research and the funds, both domestic and external, available for research.

3.1.7 The role of the SAREC supported research in the country and a review of the strengths and weaknesses.

Items 3.1.5 and 3.1.6 mentioned above will constitute mainly an updating of the 1986 SAREC documentation titled Sri Lanka, Development of scientific research and SAREC´s support 1976-1986 by Dr Carl Gustaf Thornström and will be carried out by MARGA Institute to provide statistical and baseline data for carrying out the analytical work of evaluation.

3.2 Specific

The evaluators shall visit and discuss with all the Sri Lankan project leaders as well as their counterparts in Sweden of the currently ongoing programmes and of the programmes which have been concluded during the last agreement period. Besides the project leaders, the evaluators may also discuss with whoever the evaluators find suitable for extracting important information. The team may also like to contact other external donors supporting higher education and research in Sri Lanka (NARESA and UGC should be able to supply information regarding which donors are active in a significant way in Sri Lanka). The discussion should focus on the choice of the projects for support from the country´s priority point of view, the administration of the projects (including channelling of funds) with special regard to the efficiency of the different ways of administration and the dissemination of research results.

The team will be briefed by SAREC in Stockholm and arrangements will be made to meet with all the Swedish counterparts of the projects in Sweden before departing for Sri Lanka. The team will meet NARESA, Department of External Resources, Ministry of Finance, Ministry of Science and Technology, SLAAS, UGC and all the Sri Lankan project leaders in Sri Lanka.

NARESA has demanded that all projects supported by SAREC in Sri Lanka should be coordinated and administered by NARESA. The evaluation team should look into the advantages and disadvantages of such a mode of operation compared to the current practice and make recommendations.

In light of their findings, the evaluators shall elaborate on:

3.2.1 Relevance of the projects selected for SAREC´s support to higher education in particular, and the development of the country in general. The sustainability of the research environments after the end of SAREC´s support.

3.2.2 Research capacity building through SAREC supported projects. The importance and effect of SAREC´s support on alleviating brain drain in Sri Lanka.

3.2.3 Cost effectiveness of the various components of the research cooperation.

3.2.4 Strengths and shortcomings of involvement of Swedish institutions in research projects.

3.2.5 A comparative evaluation of channelling SAREC´s support and administering research projects through one and several agencies.

3.2.6 Recommendations regarding improvements in the Sri Lankan-Swedish research collaboration.

3.2.7 Recommendations regarding the future structure and content of Sri Lanka-Swedish research collaboration.

5. Duration and Reporting

The evaluation will be carried out by a team of two persons, each person expected to devote about 6 weeks to the assignment.

The team will present a draft report in English to Sida not later than 30th April 1996. The report should not exceed 40 double-spaced typed pages. A final report will be presented no later than 4 weeks after the consultants have received Sida´s comments on the draft report. The final report will be delivered on paper as well as on diskette (preferably in Word Perfect 5.1 or 5.2 for IBM). It should begin with an executive summary of not more than 4 pages and close with a section containing the evaluators´ conclusions and recommendations, in particular on Sida´s future support to Sri Lanka for research cooperation.

6. Remuneration and Travel Costs

These are set out on the accompanying Letter of Agreement.

Encl: Annex-1. SAREC Supported Bilateral Cooperation with Sri Lanka during 1992/93- 93/94 and 1994/95-1995/96: Project Abstracts and Budgets.

Sida Evaluations - 1995/96

95/1 Educação Ambiental em Moçambique. Kajsa Pehrsson
Department for Democracy and Social Development

95/2 Agitators, Incubators, Advisers - What Roles for the EPUs? Joel Samoff
Department for Research Cooperation

95/3 Swedish African Museum Programme (SAMP). Leo Kenny, Beata Kasale
Department for Democracy and Social Development

95/4 Evaluation of the Establishing of the Bank of Namibia 1990-1995. Jon A. Solheim, Peter Winai
Department for Democracy and Social Development

96/1 The Beira-Gothenburg Twinning Programme. Arne Heileman, Lennart Peck
The report is also available in Portuguese
Department for Democracy and Social Development

96/2 Debt Management. (Kenya) Kari Nars
Department for Democracy and Social Development

96/3 Telecommunications - A Swedish Contribution to Development. Lars Rylander, Ulf Rundin et al
Department for Infrastructure and Economic Cooperation

96/4 Biotechnology Project: Applied Biocatalysis. Karl Schügerl
Department for Research Cooperation

96/5 Democratic Development and Human Rights in Ethiopia. Christian Åhlund
Department for East and West Africa

96/6 Estruturação do Sistema Nacional de Gestão de Recursos Humanos. Júlio Nabais, Eva-Marie Skogsberg, Louise Helling
Department for Democracy and Social Development

96/7 Avaliação do Apoio Sueco ao Sector da Educação na Guiné Bissau 1992-1996. Marcella Ballara, Sinesio Bacchetto, Ahmed Dawelbeit, Julieta M Barbosa, Börje Wallberg
Department for Democracy and Social Development

96/8 Konvertering av rysk militärindustri. Maria Lindqvist, Göran Reitberger, Börje Svensson
Department for Central and Eastern Europe

96/9 Building Research Capacity in Ethiopia. E W Thulstrup, M Fekadu, A Negewo
Department for Research Cooperation

96/10 Rural village water supply programme - Botswana. Jan Valdelin, David Browne, Elsie Alexander, Kristina Boman, Marie Grönvall, Imelda Molokomme, Gunnar Settergren
Department for Natural Resources and the Environment

96/11 UNICEF's programme for water and sanitation in central America - Facing new challenges and opportunities. Jan Valdelin, Charlotta Adelstål, Ron Sawyer, Rosa Núnes, Xiomara del Torres, Daniel Gubler
Department for Natural Resources and the Environment

96/12 Cooperative Environment Programme - Asian Institute of Technology/Sida, 1993-1996. Thomas Malmqvist, Börje Wallberg
Department for Democracy and Social Development

96/13 Forest Sector Development Programme - Lithuania-Sweden. Mårten Bendz
Department for Central and Eastern Europe

96/14 Twinning Progammes With Local Authorities in Poland, Estonia, Latvia and Lithuania.
Håkan Falk, Börje Wallberg
Department for Central and Eastern Europe

96/15 Swedish Support to the Forestry Sector in Latvia. Kurt Boström
Department for Central and Eastern Europe

96/16 Swedish Support to Botswana Railways. Brian Green, Peter Law
Department for Infrastructure and Economic Cooperation

96/17 Cooperation between the Swedish County Administration Boards and the Baltic Countries. Lennart C G Almqvist
Department for Central and Eastern Europe

96/18 Swedish - Malaysian Research Cooperation on Tropical Rain Forest Management. T C Whitmore
Department for Research Cooperation, SAREC

96/19 Sida/SAREC Supported Collaborative Programme for Biomedical Research Training in Central America. Alberto Nieto
Department for Research Cooperation, SAREC

96/20 The Swedish Fisheries Programme in Guinea Bissau, 1977-1995. Tom Alberts, Christer Alexanderson
Department for Natural Resources and the Environment

96/21 The Electricity Sector in Mozambique, Support to the Sector By Norway and Sweden. Bo Andreasson, Steinar Grongstad, Vidkunn Hveding, Ralph Kårhammar
Department for Infrastructure and Economic Cooperation

96/22 Svenskt stöd till Vänortssamarbete med Polen, Estland, Lettland och Littauen. Håkan Falk, Börje Wallberg
Department for Central and Eastern Europe

96/23 Water Supply System in Dodota - Ethiopia. Bror Olsson, Judith Narrowe, Negatu Asfaw, Eneye Tefera, Amsalu Negussie
Department for Natural Resources and the Environment

96/24 Cadastral and Mapping Support to the Land Reform Programme in Estonia. Ian Brook
Department for Central and Eastern Europe

96/25 National Soil and Water Conservation Programme - Kenya. Mary Tiffen, Raymond Purcell, Francis Gichuki, Charles Gachene, John Gatheru
Department for Natural Resources and the Environment

96/26 Soil and Water Conservation Research Project at Kari, Muguga - Kenya. Kamugisha, JR, Semu, E
Department for Natural Resources and the Environment

96/27 Sida Support to the Education Sector in Ethiopia 1992-1995. Jan Valdelin, Michael Wort, Ingrid Christensson, Gudrun Cederblad
Department for Democracy and Social Development

96/28 Strategic Business Alliances in Costa Rica. Mats Helander
Department for Infrastructure and Economic Cooperation

96/29 Support to the Land Reform in Lithuania. Ian Brook, Christer Ragnar
Department for Central and Eastern Europe

96/30 Support to the Land Reform in Latvia. Ian Brook, Christer Ragnar
Department for Central and Eastern Europe

96/31 Support to the Road Sector in Estonia. Anders Markstedt
Department for Central and Eastern Europe

96/32 Support to the Road Sector in Latvia. Anders Markstedt
Department for Central and Eastern Europe

96/33 Support to the Road Sector in Lithuania. Anders Markstedt
Department for Central and Eastern Europe

96/34 Support to the Maritime Sector in Latvia. Nils Bruzelius
Department for Central and Eastern Europe

96/35 Sida/SAREC's Marine Science Programs. Jan Rudengren, Per Brinck, Brian Davy
Department for Research Cooperation, SAREC

96/36 Support to the Development of Civil Aviation Administration in the Baltic States. Johan Svenningsson
Department for Central and Eastern Europe

96/37 The Opening of the two Road Sectors in Angola. C H Eriksson, G Möller
Department for Infrastructure and Economic Cooperation

96/38 Statistikproduktion i Nordvästra Ryssland. Lennart Grenstedt
Department for Central and Eastern Europe

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