Sida Evaluation 97/3

Sida's Assistance to the Environment Protection Training and Research Institute, EPTRI

India

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Department for Natural Resources and the Environment

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EXECUTIVE SUMMARY

The Environmental Protection and Research Institute (EPTRI) was created in the beginning of 1992. Its legal status is that of an "autonomous registered society", which, in contrast to a state authority like the SPCB, allows it to provide services for payment. It is a non-profit organisation and does not pay tax. The EPTRI is an independent organisation but it has strong links to the SPCB, both for historical reasons and owing to the fact that a majority of EPTRI staff at one time or another were SPCB employees.

The EPTRI is managed by a director and, under the director, three joint directors, for training, consultancy, and administration, respectively. The present staff register includes 21 permanent employees, of which 16 are managers or technical professionals. If also contracted personnel are included, the EPTRI has a staff of 61.

The role of the EPTRI

A main effort by the EPTRI during the years since its inception has been training, directed mainly towards the industrial sector. This work has been very successful and earned recognition in wide circles. From the point of view of governmental authorities and the society in general, it is an activity of great value, and it is also highly appreciated within industry.

Indeed, it is important to pursue the line of environmental training in the EPTRI, as it provides an urgent service which is in very limited supply in the country. From the point of view of the EPTRI, it provides the following very important features:

- Identity as a non-profit organisation
- Credibility due to demonstrated knowledge and dedication
- Contacts with markets for the acquisition of consultancy orders

The EPTRI's close relationship with the Andhra Pradesh SPCB is of considerable importance. In the absence of sufficient direct governmental funding, it could be difficult for the EPTRI to survive without this link to the SPCB and, maybe even more important, it would be difficult to maintain its status as a semi-governmental non-profit organisation. Advantages of the link with the Andhra Pradesh SPCB include the following:

- The parastatal status of the EPTRI gives it a natural access to the market of studies and surveys requested by the government and by international development organisations.
- The SPCB is the central permitting authority within the environmental field, with little of its own technical expertise, and it is therefore in constant need of assistance in those areas in which the EPTRI has competence.
- The EPTRI has easy access to environmental data compiled by the SPCB, information which is not readily available to other parties.

- The SPCB and other state organisations can apply directly to the EPTRI regarding services without using the time-consuming governmental tender mechanism.
- Based on its governmental connection, the EPTRI has great credibility, in contrast to the small private consultancies.

EPTRI performance during the 1992-1996

Generally speaking, the project has accomplished important gains in competence and knowledge within the environmental field. The core activity of the project, building environmental expertise within the EPTRI and its dispersion to industry and governmental officers, have been performed in reasonable conformance with the original conceptions. The main achievements are:

- Training was provided to EPTRI personnel by the Swedish consultant and his subconsultants, during 1992-1993 exclusively in India, and since 1994 mainly in Sweden.

- The EPTRI has organised a total of 33 courses in different technical environmental matters during the period September 1992 - August 1996. Between 20 and 30 engineers and scientists from industry and governmental authorities have taken part in each of these courses.

- Altogether five comprehensive environmental manuals have been elaborated in close co-operation between EPTRI personnel and the Swedish consultant.

- About 17.7 million Rs, equivalent to approximately 4.2 million SEK, has been provided by Sida for the acquisition of laboratory equipment, including computers. The laboratory now provides regular services of the following kind:

    * WATER: Potable water and waste water analysis of both routine and special parameters.
    * AIR: Ambient air monitoring and source emission monitoring, analysis and control methods
    * NOISE: Monitoring of noise levels for identified sites, statistical evaluation, validation of data.
    * SOIL: Analysis of soil for physical and chemical parameters.

- The Information Centre of the EPTRI has not been part of the Sida support, but was created around the government-sponsored ENVIS. However, certain purchases of books and periodicals were financed by Sida funds.

The conception of the EPTRI as an organisation that should be closely related to the public sector but also cater to private sector needs by offering training and consulting services has great promise. We consider that the Swedish aid has been well justified in terms of both overall needs, selection of receiving organisation, and the composition of the support program.

The long-term effects of the support to the EPTRI are potentially two-fold. First, a great number of individuals have been exposed to environmental training and will have acquired knowledge and competence to be used in their work. Second, a collective competence, technical resources and management skills have been developed within the EPTRI, which should result in qualified services needed by the society for many years to come. The technical staff have received an appreciable amount of technical-environmental training and are rapidly acquiring experience. They thus represent an important asset to the organisation. As a result of the good working conditions, the turnover of personnel is presently small.

Evaluation of proposal for continued support

The proposed new Sida support is presented in the "Project Plan 1996-2000" as six programmes, representing new skills to be developed. Generally speaking, these six programmes build on the capacities built during Phase 1 and are logical continuations and additions to the earlier programme. The content of the proposal is very extensive and ambitious, but we regard the general approach to be perfectly realistic. However, regarding the details we would like to introduce a number of modifications and clarifications. These are presented in some detail in the main report.

The successful execution of the proposed programmes would definitely establish the EPTRI as a solid and important driving force within the field of environmental services in India. This would be a very major achievement in a country with such an acute environmental situation and, in relation to this, so little environmental competence available.

In designing the Sida support for the period 1996-2000, the following major aspects should be kept in mind:

Technical sustainability: The EPTRI has proceeded well towards establishing solid environmental competence within the organisation. This includes professional capabilities, laboratory and information services, and the different work tools (manuals, field work routines, etc.) that have been developed. Yet the rate of success will depend on a number of factors, as discussed under the following headlines.

Institutional sustainability: The EPTRI organisation has already reached substantial stability. This is based on the good theoretical education of the personnel, the intensive training being provided and a stability gained by the fact that few people leave the organisation.

The EPTRI has a very able management. A major concern is the dependence on the present very dynamic leadership and the risk connected with a possible change on these posts. We propose that Sida use its influence in order to retain this personnel during the next phase of the project.

Commercial sustainability: The EPTRI started out as training institute but cannot survive working only within this narrow sector. The provision of remunerated consulting services is therefore a necessity, both as a source of income and a source of

knowledge and experience of real-life problems. The term "consulting services" should be understood in its broadest meaning, including, for example, smaller or larger technical tasks on behalf of companies, as well as long-term environmental surveys with governmental or international funding. In fact, this latter institutional "market" is of considerable size. Because of the non-profit status of the EPTRI and its close relations with state authorities, this market constitutes a most important commercial - possibility in which the EPTRI has great advantages compared to strictly private consultancies. Well exploited, this situation ought to guarantee the commercial viability of the EPTRI.

Economic and financial sustainability: The EPTRI cannot expect to receive any more than the present contribution of Rs 2 million per year for the coverage of running costs in the future. Furthermore, the income from conducting training courses seldom compensates for the cost involved. Consequently, consultancy work (in its wide sense) will have to be the economic backbone of future EPTRI activities.

Financially, the EPTRI was making a certain loss in the fiscal year 1995/96. In light of this, there are a number of measures that will have to be taken in order to attain a healthy financial situation for the future. These include:

- The productivity of the personnel should be improved.
- Overhead costs should be brought down.
- The ratio between the number of staff that brings in earnings and those only giving support should be increased.
- Investments in instruments and other equipment should be done with great care, so as to achieve the maximum revenue from such acquisitions.
- A mechanism should be found to reserve funds for future replacement and maintenance of equipment, in order to guarantee that quality and standards are upheld.

Based on an awareness about these fundamental financial factors among the EPTRI management, and that the necessary tools for management and control are put in place, the EPTRI has all possibilities of performing well in these respects.

Management issues: The EPTRI is presently managed very much from the top. This is natural in a new organisation, but not necessarily desirable in a growing consulting organisation. In order to introduce modern management procedures, it is proposed that a formal management system, complemented with a financial management system, be implemented. Well adapted to the host organisation, such systems would greatly promote the planning of operations. They will also force the staff to provide appropriate input to the system, which, by use of these data, generates information which aids in planning and decision-making.

In order to keep control of costs, efficiency and the viability of purchases related to support services from the information centre and the laboratory, it would be useful to introduce separate cost-profit centres for these activities. This can be accommodated within the new management/financial system.

The management issues are obviously of prime importance for the future performance of the EPTRI. We propose that these issues be made into a special programme within the Sida support and that they be implemented as soon as possible. Support from Sweden as well as from Indian expertise would be needed. Unlike the six development programmes being proposed, this task is not technical in character and addresses primarily the duties of the EPTRI management. Possibly this activity could be made a responsibility of the Sida-recruited advisor, aided by suitable specialists.

I. BACKGROUND

Sida has assisted the Environment Protection Training and Research Institute (EPTRI) in Hyderabad, India, since its creation in 1992. This support has included the funding of consultancy services as well as equipment at a budgeted cost for 1992-1996 of 15 million SEK. This first phase of the support is now being terminated and a proposal for a continuation (Phase 2) for the period 1996-2000 has been presented by the EPTRI for Sida's consideration.

In order to assess the achievements and results of the first phase of co-operation, and to appraise the draft proposal for continued support, Sida has engaged Swedish Geological AB (SGAB). The evaluating team has consisted of:

Bo Lundberg, SGAB
Bo Carlsson, SGAB and
K.P. Nyati, Confederation of Indian Industry

Fact-finding at the EPTRI took place during the period September 23 - October 4, 1996. The work has been guided by Sida's Terms of Reference of June 25, 1996. Visits have been made to and discussions held with members of the board, the management and the staff of the EPTRI, officers of the Andhra Pradesh State Pollution Control Board (SPCB), other state authorities, heads and researchers of governmental research institutes, managers of private service companies, industry representatives, and NGOs.

II. ENVIRONMENTAL PROTECTION IN INDIA

1. The challenge

India is home to around 950 million people, and while it houses almost 17% of global populations, it occupies only 2.4% of world's land area. Notwithstanding the declining trend, the population growth rate (over 1.8% per year) continues to remain high. It indeed is so high that every year India's population increases by an amount equal to twice that of Sweden.

Although the growth rates of 6.5% in GDP and over 10% in industrial production recorded last year are encouraging, the absolute size of India's GDP (approx. SEK 2100 billion) is just about equal to the combined annual turnover of Ford and General Motors.

While the multiplicity of economic and environmental issues facing India is as daunting as it is complex, the country's capacity to address these twin challenges is rather constrained due to an inadequate financial, infrastructural and technological resource base.

The need to support a growing population and the urgency of expanding industrial and other economic activities are causing the environmental situation to worsen. Inevitably, India has to face the twenty-first century with a full complement of diverse environmental imperatives. A glimpse of what is coming is presented below.

Environmental challenges - a few indicators:

- Largest cattle population in the world - over 500 million.
- Forest cover down to 11.5% from over 26% in 1950.
- Use of fertilisers and chemicals in agriculture up from 2 kg/ha in 1960 to over 80 kg/ha now.
- 70 % of surface water resources polluted.
- Of 3245 cities and towns, less than 1% have sewage treatment facilities.
- No city collects all the sewage it generates and no city treats all the sewage it collects.
- Most major cities have air pollution beyond acceptable limits.
- Nearly 70 % of power production is generated in coal-fired stations.
- Water is becoming scarce. Number of tube-wells are doubling every ten years.
- Over 3 million industries, growth rate over 10%.

2. The environmental scene

Although, there are a multitude of unresolved environmental issues, ranging from local problems such as deforestation, wild life and heritage protection to larger concerns related to the Montreal Protocol, the climate change treaty, the Basel Convention, eco-labelling and other trade related issues, one can say that India is moving forward in

addressing these "green" concerns. This green movement owes its strength to the following:

- growing environmental awareness among the general public
- proliferation of environmental legislation and their improved enforcement
- rising pressure from the judiciary

Public awareness about environmental issues and the desire for a clean, green and safe environment has experienced quantum leaps, especially during the last 10-12 years. This is reflected in the fact that of over 22,000 NGOs in the country today, almost 12,000 of them are active in the environmental cause. It is possible that the infamous Bhopal incident in 1984 spurred this growth in the number of green NGOs.

Environmental awareness has led to a rise in the number of public interest litigation in the courts, and media coverage of the court deliberations and orders has also contributed in no small measure to the heightened environmental awareness.

This notable increase in awareness is collaborated by the findings of the poll conducted by the Gallup International Institute in 1992. The major findings are:

- 51% of people thought that environmental problems facing India are "very serious"
- 21% said that the environment is the number one problem
- 49% were concerned with air pollution, while only 13% who thought water pollution is a major problem
- 10% considered population and its growth a major threat to environmental equilibrium
- 69% of respondents wanted more and tougher laws to deal with polluters.

India today has over 2500 pages of environmental regulations. The Bhopal tragedy highlighted the need for greater legislative and regulatory instruments, not only to prevent environmental disasters, but also control pollution discharges.

Beginning with the Water Pollution Act in 1974, the regulatory framework successively encompassed more and more of environmental domains and elements. As a result, today India has a number of well-written but not very well-implemented or enforced environmental laws. However, it must be mentioned that enforcement has greatly improved due to the accumulation of experience within the State Pollution Control Boards (SPCBs), judicial pressure and, of course, the pressure exerted by NGOs, citizen groups, media and the general public. It is not uncommon these days that the SPCBs are swamped by public complaints and protests. It must, however, be pointed out that this phenomenon for the moment is more pronounced in urban than in rural areas. Major environmental legislation is listed below:

1974: Water Pollution Act
1977: Water Cess Act
1981: Air Pollution Control Act
1986: Environment Protection Act
1989: Hazardous Waste Management Rules
1991: Hazardous Chemicals and Substances Act
1992: Public Liability Insurance Act
1992: Environment Audit (Statement) Rules
1994: Environmental Clearance Rules
1995: National Environmental Tribunal Act

Issues related to safety and the working environment are now better regulated than before, although significant scope for improvement undoubtedly exists. Under the Factories Act, for instance, annual safety audits from professional auditors are now mandatory. Trade unions are more active today, and are increasingly demanding a safe and healthy working environment, instead of compensation or pollution allowance as they did in the past.

The judiciary seems to have become "super-green" and is forcing concern for environment higher up on the corporate agenda. It is also questioning the degree of responsibility with which central, state, regional and local governments, including regulatory bodies like the SPCBs, are discharging their duties to protect the environment.

In order to deal with the increasing number of environmental cases, the Supreme Court - the highest court in India - has reserved one day every week to hear only environmental cases, and has directed the State High Courts to establish "green" benches. Three states have already complied with this directive and others are expected to follow suit soon.

Examples abound where the judiciary has ordered either closure or shifting of the location of polluting industries. Courts are also ordering compensation to be paid by polluting industries to affected parties. A few examples of judicial "green" actions are listed below:

- 1560 industries in Delhi issued closure or shifting orders.
- 60 chemical industries in Ankleshwar Gujrat closed down.
- 746 units near Ahmedabad closed; 540 of them are still closed.
- 900 tanneries in Tamil Nadu closed.
- Over 60 diverse industries and many tanneries issued closure and shifting orders.
- The 'Board' of the UPPCB and some officials suspended by court orders.

Although yet to be implemented, the Parliament has already passed the "National Environmental Tribunal Act". The objective of this Act is to establish "Environment Tribunals" which would look into the kind and magnitude of environmental damage inflicted by the polluters and order them to pay both compensation and damage remediation costs. No complaints are necessary, so the Tribunals can start

investigations against any polluting entity based on newspaper or media reports, or even based on the personal knowledge of Tribunal members.

The environmental scene in general therefore appears to be conditioning the behaviour of corporate, municipal and other polluting entities in favour of environmental protection. At what pace this change in behaviour will happen and with what results has yet to be seen. However, the entire scenario could be described as one of "environmental optimism".

3. Environmental performance within industry

India's industrial base is large and varied, and is fast expanding. The process of economic reforms and liberalisation unleashed by the previous government in 1991 and pursued by the present one is accelerating the expansion of industry and economic activities. Obviously, environmental problems particularly relating to industry are increasingly becoming a subject of great political and environmental debate. Companies such as Enson, Cogentrix, Thapar-Dupont, Sinarmas Paper and others, and developmental projects such as the Konkan Railway, Sardar Sarovar (power and irrigation project), Tehri Dam and Almatte Dam (Andhra Pradesh) have already generated considerable environmental controversy, not only on the issue of their siting but also concerning their environmental suitability.

In any case, 29 categories of industrial and development projects under EPA-86 require prior environmental clearance from the MoEF at the central government level. Even other industrial projects have to seek NOC or Consent-to-establish from the concerned the SPCBs before they may be established. This process is introducing a sense of environmental responsibility in the project proponents already at the time of project planning. The market for environmental goods and services is also receiving a significant stimulus from these raised environmental expectations.

Even otherwise, the existing industry is catching up with the requirements of the environmental regulatory framework, especially because of the focused drive on highly polluting industries launched by almost all the SPCBs. In 1991 The Government of India identified 17 highly polluting industry categories and directed the SPCBs to tighten their regulatory surveillance of them. As a result the compliance rate in these 17 sectors has gone up from less than 25% to over 80%. The compliance rate in other sectors is also picking up, if slowly.

It must be recognised that compliance with environmental regulations is far better in medium and large industries. The small-scale industries, of which India has over 3 million, find it more difficult to comply, due to a variety of factors ranging from poor environmental awareness and lack of funds, space, and technical expertise to geographical dispersion and frequently altered product-mixes. In order to help these small-scale industries, many Common Effluent Treatment Plants (CETPs) have either already been set up, or are in the process of being set up with the assistance of World Bank. The small-scale sector in any case continues to be a major area for future environmental efforts.

Given the international concern for the environment, Indian industry is gearing up to face the challenges, especially those posed by eco-labelling and product safety (banning of PCPs in leather goods, bans on the use of 84 types of dyes and dye-stuffs in textile manufacturing, limiting residual formaldehyde in close-to-skin clothes etc.), as well as the phase-out of ozone-depleting substances according to the Montreal Protocol, and the proposed ban on transboundary movement of recyclables (metal and non-ferrous metal scrap, plastic waste etc.) under the Basel Convention. Industry is also moving towards adopting voluntary initiatives such as ISO-14001, responsible care, environmental reporting, etc.

4. Organisation for environmental control and services

At the national level, the Ministry of Environment and Forests is the key agency to formulate policy and to evolve legislative and regulatory mechanisms to achieve the policy objectives. In doing so, the Central Pollution Control Board (CPCB) serves as a technical advisory body to this ministry. The MoEF also undertakes promotional activities ranging from catalysing general environmental awareness to organising specific need-based seminars, workshops, training programmes etc. But it does so with the help of the PCBs, research and academic institutions, NGOs, industry associations, etc. It also sponsors and funds environmental research and field studies.

In the states, the environmental protection work is co-ordinated by state ministries of environment in more or less the same manner as the MoEF. However, they have greater authority and executive power within their own states. Often the SPCBs are charged with the responsibility of getting activities related to environmental protection implemented. The PCBs, however, are statutory authorities, deriving powers from the environmental laws, and therefore it is their prime responsibility to implement legal provisions and oversee compliance. It may be noted that power to implement various environmental laws has already been devolved by the MoEF to the SPCBs.

As regards water supply, sanitation and municipal services such as sewage, treatment, garbage disposal, greening of urban areas, etc., a number of governmental agencies and municipal corporations are responsible for creation, operation and maintenance of the requisite infrastructure. The most common malady which afflicts them all is paucity of resources, both at state government and local municipal level. Consequently very little gets done to keep the urban environment clean. While most environmental regulations apply to urban authorities as much as they apply to any private or public sector industry, the SPCBs find it difficult to enforce them for these governmental or municipal bodies. It is an area of major challenge and may perhaps remain so, at least in the short term.

Recognising the fact that India has its own special environmental problems that are not amenable to technological solutions that were successfully employed in developed countries, certain environmental research infrastructure is unavoidable. While there is a vast network of research institutions, both under the Council for Scientific and Industrial Research (CSIR), which has 40 such research institutions, 3 of them in Hyderabad, and under different ministries, not all of them deal with environmental

questions. The major institutions who carry out environmental research are listed below:

- NEERI - National Environmental Engineering Research Institute, Nagpur (Maharashtra)
- ITRC - Indian Toxicological Research Centre, Lucknow (UP)
- NIOH - National Institute of Occupational Health, Ahmedabad (Guprat)
- FRI - Forest Research Institute, Dehradun (UP)
- RRLs - Regional Research Laboratories, especially at Bhopal (MP), Bhubaneswar (Orissa)

The NEERI is exclusively dedicated to environmental issues. Other laboratories or institutes occasionally undertake environmental research, especially in the sectors they are dedicated to. For example, the NML (National Metallurgical Laboratory) or the CGCRI (Central Glass and Ceramic Research Institute) sometimes conduct environmental research concerning metallurgical or glass and the ceramics industry, respectively.

Generally speaking these research institutions, including the NEERI, undertake very little training, although the NEERI does quite a lot of consultancy and sometimes even does turnkey jobs.

The environmental consulting market is experiencing a boom, largely because of better enforcement and judicial activism. While it estimated that there are over 300 environmental consulting firms in India (in addition to many individuals), most of them are smaller.

However, there are bigger firms such as Engineers India Ltd (EIL), Metallurgical and Engineering Consultants (MECON), Mahindra Acres, AIC Watson, Paramount Pollution Control, Reva Enviro, etc., which have annual billing in excess of Rs 30 million. Most of these firms operate, with a few exceptions, in the conventional consulting areas listed below:

- EIAs
- Environment audits
- Design and construction of water and air pollution control facilities
- Environmental monitoring
- Contract services for operation and maintenance of pollution control systems
- System-oriented services, such as ISO-14001, environmental management, etc.

It must, however, be noted that some of the research institutions (like the NEERI) and many academic institutions (like the IIT, Bombay; Anna University, Madras etc.) also undertake consultancy jobs. Quite a few of them are very active in seeking such work.

5. Market for environmental services in India and Andhra Pradesh

As was stated earlier, the market for environmental services is growing fast - at an annual rate of over 20%. The indications are that it will grow faster only if the present trend of the judiciary forcing polluters to conform to regulations continues. Given the strength of the NGO movement and general public awareness, there is no reason to believe that this trend will not persist.

It is estimated by the Confederation of Indian Industry (CII) that the current market for environmental services in India is on the order of Rs 2000 million. Should hazardous waste management, industrial solid waste disposal, sewage treatment, municipal solid waste management and related activities intensify, the environmental services market will grow rapidly.

It may be noted that the combined environmental goods and services market at present is already quite significant - approximately Rs 40,000 million to Rs 50,000 million, and is growing at an annual rate of 20-25%. Given the current pace of industrialisation and the growth in the output from the manufacturing sector, environmental market growth prospects are bright. It may be worthwhile here to point out a couple of relevant facts.

- Environmental spending in the country is on the rise. At present India devotes 0.5% of its GDP to environment protection. It used to be just 0.3% of GDP 3-4 years ago.
- Of the total national spending on environment, a major share is borne by industry (over 70%).

As such, the demand for environmental services is much larger from industry (including public sector industrial enterprises) than from government or governmental agencies (including municipal corporations). In any case the market is likely to be more than doubled by the year 2000.

As regards the market in the state of Andhra Pradesh, no primary data is available. However, considering its size and the fact that Andhra Pradesh is the fifth fastest growing state industrially (after Maharashtra, Gujrat, Tamil Nadu and Orissa), it will be reasonable to assume that the demand for environmental services here would at least be 5 - 7% of the national demand. At the current level therefore, it works out to be about Rs 100-150 million. This is a conservative estimate.

6. International aid and development projects

In the environmental field many multilateral and bilateral donor agencies are actively supporting the Indian efforts. The spectrum of their help is very wide, covering forest planting, wild-life preservation, industrial pollution abatement and strengthening of Pollution Control Boards.

It is important to note here that DANIDA is helping the PCBs in Karnataka and Tamil Nadu to establish training facilities - something similar to what SIDA did and will be

doing for the EPTRI. Whether Danida's help would also result in a well-organised institutional set-up like the EPTRI is presently uncertain.

GTZ (Gesellschaft für Technische Zusammenarbeit), the German Agency for Technical Co-operation is directing its efforts to strengthening technical infrastructural (laboratories) and software capabilities of the Punjab, Haryana, Tamil Nadu, Gujrat and Karnataka Pollution Control Boards. It is also exploring the possibility of setting up common hazardous waste management facilities in the State of Karnataka, just as the World Bank is doing in Maharashtra and Gujrat and AusAid (Australia) in Andhra Pradesh.

The World Bank has also been running a water and sanitation programme and the MEIP (Metropolitan Environment Improvement Programme) in and around Mumbai, Maharashtra. On the industrial pollution control front, very substantial aid is to come from the World Bank, especially for the programme of establishing CETPs for the benefit of small enterprises and for strengthening the technical capacity of various PCBs in the country.

NORAD has been contributing significantly to environmental awareness generation specially in Orissa and by involving local NGOs. It is now looking at a wide variety of environmental projects such as urban environment improvement, restoration and preservation of lakes, pollution abatement in small enterprises, watershed management, etc., especially in the states of Rajasthan and Karnataka.

While it is difficult to accommodate the entire account of all that is going on with the help and assistance of various donors in this report, it may be mentioned that USAID, USAEP, OECF (Japan), ODA (UK) and the British Council are also active, in addition to the agencies involved in projects described above.

To sum up, India's environmental problems are of monumental magnitude. Various aid programmes are slowing the growth of the environmental problems, if not addressing them in their entirety.

III. THE EPTRI ORGANISATION

1. History and organisational status

A small group for environmental studies and training was formed within the State Pollution Control Board of Andhra Pradesh (SPCB) as early as 1987. Out of this embryo, the Environmental Protection and Research Institute (EPTRI) was created in the beginning of 1992. Its legal status is that of an "autonomous registered society", which, in contrast to a state authority like the SPCB, allows it to provide services for payment. It is a non-profit organisation and does not pay tax. The EPTRI is an independent organisation but it has strong links to the SPCB, both for historical reasons and owing to the fact that a majority of EPTRI staff at one time or another were SPCB employees. It is supervised by a board of governors and, under this, an executive committee. The board has 19 members, including representatives from the governments of Andhra Pradesh and adjoining states, state authorities, the central government, governmental research institutes, universities, industry and NGOs. The executive committee has five members and is headed by the former Principal Secretary to Government of the Environment, Forest, Science and Technology Department

2. Objectives

The original objective in creating the EPTRI was to set up a training institute for the spread of environmental knowledge and awareness in industry, inside governmental authorities and among the general public. In addition to this role as educator, technical consultancy work has been performed to an ever increasing extent. This dual role of the EPTRI is discussed more in detail in Chapter IV.

3. Staff and organisational set-up

The EPTRI is managed by a director and, under the director, three joint directors, for training, consultancy, and administration, respectively. The organisational chart (Annex 1) is very detailed and has a "deep" structure.

The "staff rules and service regulations" for the EPTRI were approved by the Government of Andhra Pradesh as recently as in May 1996. These rules give detailed directions and constitute the necessary basis for recruitments and formalisation of employment conditions to take place in October-November of this year.

The policy of the EPTRI is to have a limited core of permanent staff, complemented by contracts for set periods. This gives flexibility to adapt to a varying work load, without jeopardising the need for a basic continuity in the organisation. Contracts may be for periods up to five years, depending on the character of activity. Very senior specialists for particular tasks may be hired at a daily fee.

The present staff register includes 21 permanent employees, of which 16 are managers or technical professionals. If contracted personnel are also included, the EPTRI has a staff of 61. An overview of personnel and specialisation is presented in Table 1.

Table 1. EPTRI personnel in 1995/96.

Type of personnel	Number of persons
I. Technical	
(a) Environmental professionals	26
(b) Library & Information professionals	3
(c) Laboratory Services specialists	5
Subtotal (I)	34
II. Non-Technical	
(a) Finance & Administration	10
(b) Support staff (drivers, attendants etc.)	17
Subtotal (II)	27
Grand total (I+II)	61

4. Financing

Financial support for the creation and development of EPTRI has come both from the Government of Andhra Pradesh and from Sida. Regarding operating costs, however, EPTRI has only restricted support from the Government, and thus has to generate the main part through its own training and consultancy activities. For further details, refer to Chapter V.6.

IV. THE ROLE OF THE EPTRI

1. Original objectives

The EPTRI was originally intended to be essentially a training institute. This is reflected in the mission statement of the strategy plan for the period 1993-96 in the following way:

"The EPTRI is established to create Awareness, provide Knowledge and transfer Clean Technology to polluting industries and other serious sources of environmental threat, in order to facilitate economic development within environmentally sustainable limits. The Institute shall educate and source technologies to address and find solutions in preventing deaths due to industrial accidents and environmental damage in water, air and land. It shall offer relevant training, support services and applied research for all concerned, to make Environment Protection cost effective and the only way to a cleaner and healthier life for our children."

The same emphasis on training and promotion of environmental awareness in the society is given in Sida's Terms of Reference for consultancy services of 1992.

However, the strategy plan, in its section on goals, mentions two areas of the EPTRI activities, namely 1) to focus attention on industrial pollution abatement, and 2) to spread environmental awareness. From this starting point, it defines the following main objectives:

- Short-term consultancies
- Industry workshops
- Technical workshops
- TCHPW tertiary training
- Awareness programmes
- Laboratory services
- Research, surveys and development of technology database

The dual role of the EPTRI as both a training institute and a technical consultancy is already apparent in this early document shows that,. We will analyse below, under separate headings, these two roles of the EPTRI, after having given first a short summary of the "business climate" relevant to the organisation.

2. The setting in which the EPTRI is an actor

As presented in Chapter II, the general situation regarding the environment in India is very alarming. The problems are immense and relatively little is done to improve the situation. A major part of industry is not complying with environmental standards and norms, and municipal sewage and waste is seldom treated or deposited in an appropriate way. However, awareness about the problems is growing rapidly, partly as a consequence of influence and pressure from abroad. Some of the courts have also started to take action. In all probability, environmental issues will receive greatly

increased attention during the coming years. In this situation, environmental training and provision of environmental information in all forms is of vital importance.

At present practically no remediation of polluted areas is taking place, although 22 critically polluted areas have already been identified in the country by the Ministry of Environment and Forests (MOEF), Government of India. The State or Provincial Governments, however, are yet to mount similar initiatives (the Ganges Action Plan and Save Taj Plan are exceptions). Nevertheless, there are sporadic efforts by the central and some of the State Governments to restore and preserve the environmental health of certain river stretches, lakes, wetlands, mangrove, forests, bio-reserves, etc.

As regards the industrial sector, both preventive and mitigation activities are driven essentially by environmental regulations. Thus environmental action is virtually restricted to investigations related to obtaining permits, either to establish new industrial or developmental projects or to operate existing industrial units. Enforcement of these environmental regulations, increased public awareness and heightened judicial activism is rapidly expanding the market for environmental goods and services.

In the municipal sector, however, environmental action by and large is "non-action", although some awareness and certain initiatives seem to be emerging as a result of the push from bilateral and multilateral donor agencies.

Environmental knowledge and expertise in India, although confined largely to a few governmental institutions and a limited number of well-run private environmental consulting outfits, is indeed expanding rapidly. While state and parastatal institutions mainly concentrate on research and special investigations, the private firms limit themselves to conventional environmental services such as pollution monitoring, EIAs, design and installation of pollution control facilities etc. The market for environmental services is growing at an annual rate of over 20%. Unfortunately, the quality of environmental services rendered by private consulting firms is very poor; so much so that the reliability and accuracy of the data and information provided by them are often questioned. Even worse is the fact that they are perceived by the SPCBs and NGOs to be distributing fabricated data. In order to bridge this credibility gap, consulting firms from abroad have started establishment of operations in India. More than half-a-dozen of them (from the USA, UK, Australia, etc.) are already active in India. All the same, the services offered by private environmental firms continue to be regarded with suspicion.

Research within the environmental sector and related fields of science in India is carried out by a number of governmental and semi-governmental organisations, which are well staffed and have long traditions within their fields of activity. According to our opinion, there is little room for a small organisation like the EPTRI to develop research capacity and capture funds for such work. This is certainly true for all basic research, while applied research possibly could be motivated in special situations. Furthermore, in such cases a sound financing of the research activities must be available. It should be realised that any un-paid research or development work being planned must be regarded as an investment, and necessarily involves the risk of not being profitable.

The EPTRI, being still a young and vulnerable organisation, should try to minimise such risks.

In the following discussion we will regard all non-training activities as consultancy services. This is in order to simplify the discussion, but also with the purpose of stressing the importance of financial viability in all planning and execution of work.

Laboratory services and field monitoring services should primarily be the means for carrying out good-quality consultancy services. Nevertheless, if such analyses and field measurement surveys can be sold profitably to customers as direct separate services, this should be done and expanded as far as the market allows. In the present market situation, we believe that the analytical services of the chemical laboratory will mainly be of use as support in the different areas of consultancy work.

3. Training activities

As described in Chapter V, a main effort by the EPTRI during the years since its inception has been training, directed mainly towards the industry sector. This work has been very successful and earned recognition in wide circles. From the point of view of governmental authorities and the society in general, it is an activity of great value and it is also highly appreciated within industry. Consequently, there is every reason why the training programmes of the EPTRI should continue and even be intensified.

The training activities have contributed fundamentally to the credibility of the EPTRI as an environmental institute and in this way also serve as a marketing tool for other services. At the same time, training activities of this kind require access to knowledge about "real life" problems and solutions in order not to become academic with little real value. Up to now in the EPTRI's training programmes, most of this practical experience and connection with concrete industrial issues have been provided by Swedish experts and Indian expertise from other institutes. The EPTRI staff is improving in this respect, but a close association with practical consultancy work will be needed to extend the EPTRI's role in education beyond the point of being mainly a co-ordinator.

A major problem, however, is the financing of these activities. Over the years since the beginning of the training programmes in the EPTRI, it has become increasingly clear that training activities are not able to recover any major part of their involved cost from the participating trainees. Thus, from a financial point of view, the training activities have largely depended on government contributions, the Swedish participation and earnings from other services provided by the EPTRI. Due to budgetary constraints, government funds will not be available in the future for this purpose to a sufficient extent. Since Swedish support is being scaled down, the only alternative remaining is to rely on profits made in the field of consulting services, which, fortunately, seems to be a viable alternative (see Chapter V.6).

Nonetheless, it is important to pursue the line of environmental training in the EPTRI, as it provides an urgent service which is in very limited supply in the country. From the

point of view of the EPTRI and its development, it provides the following very important features:

- Identity as a non-profit organisation
- Credibility due to displayed knowledge and dedication
- Contacts with the markets for the acquisition of consultancy orders

4. Consulting services

As mentioned above, we will regard all paid-for work outside the training sector as consulting services. This is regardless of whether the client is a private industry, the SPCB or other governmental customers/funds. It is obvious that the state of Andhra Pradesh is the home market for the EPTRI, but this should not exclude opportunities available from neighbouring states.

The EPTRI's close relations with the Andhra Pradesh SPCB is of considerable importance. In the absence of sufficient direct governmental funding, it could be difficult for the EPTRI to survive without this link to the SPCB and, maybe even more important, the status as a semi-governmental non-profit organisation. Advantages include the following:

- The parastatal status of the EPTRI gives it a natural access to the market of studies and surveys requested by the government and by international development organisations.
- The SPCB is the central permitting authority within the environmental field, with little of its own technical expertise, and it is therefore in constant need of assistance in those areas in which the EPTRI has competence.
- The EPTRI has easy access to environmental data compiled by the SPCB, information which is not readily available to other parties.
- The SPCB and other state organisations can apply directly to the EPTRI regarding services without using the time-consuming governmental tender mechanism.
- Based on its governmental connection, the EPTRI has great credibility, in contrast to the small private consultancies.

The present market situation may not allow the EPTRI to choose and reject among plentiful offers. However, whenever possible, the EPTRI should try to procure work outside the traditional area of "desk studies", and give priority to tasks which involve technical field surveys, monitoring, sampling-analysis-data treatment, etc. Only in this way will the organisation be able to mature into a technically competent all-round environmental consultancy, exploit to the full the laboratory capacity and field monitoring equipment provided by Swedish support, and aid in fulfilling the coming needs of integrated, high-quality environmental services for industry and municipalities.

V. EPTRI PERFORMANCE DURING THE FIRST PHASE OF CO-OPERATION (1992-1996)

1. The Sida support

The agreement regarding Swedish support for creating the EPTRI was signed between India and Sweden in December 1991. The agreement was based on a Draft Work Plan of May 1990 and included the following main points:

- Sweden committed itself to contribute up to 15 million SEK[1] to a 5 year project for the training of Indian professionals in environmental matters and the creation of an environmental protection training centre in Hyderabad, both acts being part of an effort to increase the general environmental awareness of influential groups in the Indian society.

- The Indian Government undertook to make available all other financial and other resources needed for the implementation of the project, and particularly then the construction of new premises for the training centre and covering the operational costs of this centre.

- The project was divided into two phases with the following general content:

  Phase 1 (2.5 years): Swedish expertise would provide training to teaching staff and assist in the planning for the new centre.

  Phase 2 (2.5 years), starting from a fully equipped training centre: Training courses under guidance from Swedish experts.

- The project would have yearly work plans and annual reports.

The technical basis of the project is a Strategy Plan for 1993-1996, including an Operating Plan for the same period, which was presented by the EPTRI in July 1993. Based on this, yearly plans have been prepared. The project formally ended in June 1996, but has been prolonged for the period July-December 1996 in anticipation of a possible continuation of the Sida support for another 5 years period.

Swedish expertise has been provided during the whole period by the consulting firm ÅF-IPK, aided by subconsultants.

Project reports have been issued quarterly. More comprehensive evaluations of the project and its progress have been delivered by Sida's advisor to the project, Bengt Andrén, on two occasions; in October 1993 and in November 1995. We are citing some of his main findings in this presentation, but refer to the reports regarding details.

[1] 1 million SEK was set aside for Sida follow-up of the project.

2. Achievements

Generally speaking, the project has accomplished important gains in competence and awareness within the environmental field. This is despite a slow start-up of activities at the beginning of the project. Furthermore, the construction of the new premises for the EPTRI (office and laboratory buildings) has been seriously delayed and completion is now expected in March 1997. The project in its entirety (1992-1996) has come to be called Phase 1, while Phase 2 implies the proposed continuation (1996-2000). However, the core activity of the project, that is building environmental expertise within the EPTRI and its dispersion to industry and governmental officers, has been performed in reasonable conformance with the original conceptions, if not the initial work plans. The main achievements are summarised below.

a. Training of EPTRI personnel

Training was provided by the Swedish consultant and his subconsultants during 1992-1993 exclusively in India, and since 1994 mainly in Sweden. This latter training was provided in specialised subjects as private tutoring by Swedish experts. The duration of the training has usually been two weeks. A summary of these activities and their purpose is given in Table 2. The training provided has contributed very substantially to the increased competence of the EPTRI, which is illustrated, for example, by the character and number of consulting projects carried out (see Annex 2).

b. Training courses arranged by the EPTRI

The EPTRI has organised a total of 33 courses in different technical environmental matters during the period September 1992 - August 1996. Between 20 and 30 engineers and scientists from industry and governmental authorities have taken part in these courses. While the lecturing during the first two years relied heavily on support by experts from the Swedish consultancy, courses since then have nearly exclusively been run by Indian professionals (see Table 3). Of these local professionals, the EPTRI itself has increased its lecturing participation from 30% in 1992 to 60-70% in 1996. The duration of the courses has generally been between 2 - 5 days, in one exceptional case 24 days. The topics treated have varied considerably, but are all within the areas of industrial pollution or environmental and risk management (see Annex 3)

Table 2. Overview of training of EPTRI personnel

Year	In Sweden (S) In India (I)	Number of personnel	Total days per person
1994	S	4	Sweden Norway (1) 8 2 (2) 8 2 (3) 8 2 (4) 9 2
1994	I	1	10
1995	I	1	15
1996	S	5	Sweden Denmark (1) 8 2 (2) 10 (3) 10 (4) 10 (5) 9
1994	Mr G. Suryanarayana	A. Emissions monitoring B. Industry specific monitoring; Preparation of environmental survey reports	
	Mr K. C. Kutumba Rao	A. Emissions monitoring B. Industry specific monitoring; Preparation of environmental survey reports C. Planning and organisation of environmental labs	
	Mr V. S. Chary	A. Emissions monitoring B. Industry specific monitoring; Preparation of environmental survey reports	
	Mrs Razia Sultana	Biological waste water treatment	
1995	Mrs Razia Sultana	Application of microbiology in waste water treatment	
	Mr K. C. Kutmba Rao	Risk analysis	
	Mr A. Gautham	Biological waste water treatment systems	
	Mr K. Satyanarayana	Air pollution control and monitoring using cement industry as case study	
	Mr G. Suryanarayana	Waste minimisation and waste audit	

c. Elaboration of environmental manuals

Comprehensive environmental manuals have been elaborated in close co-operation between EPTRI personnel and the Swedish consultant. All of the five planned manuals have been completed, including:

1. Application of microbiology in waste water treatment
2. Risk analysis
3. Biological waste water treatment systems
4. Air pollution control and monitoring using cement industry as case study
5. Waste minimisation and waste audit

The manuals represent an excellent basis for further studies, practical consulting work and for running courses in the respective subjects.

Table 3. Training courses organised by the EPTRI

Year	Swedish assistance	No. of courses	Lecturing in %			Revenues from participants '000 Rs[2]
			EPTRI	Other local	Swedish	
1992	Yes	-				
	No	1	30	70		83
1993	Yes	11	5	25	70	510
	No	2	40	60		80
1994	Yes	2	10	15	75	83
	No	6	40	60		832
1995	Yes	-				
	No	3	45	55		398
1996[1]	Yes	5	70	24	6	237
	No	3	60	40		513

[1] up to August
[2] Approximate exchange rate: 1 SEK = 5 Rs

d. The construction of a laboratory

About 17.7 million Rs, equivalent to approximately 4.2 million SEK has been provided by Sida for the acquisition of laboratory equipment, including computers. These purchases have been carried out successively during the years 1993-1995. In the same phased manner, the equipment has been installed, methods and routines introduced, and regular production commenced. The laboratory now provides regular services of the following kind:

WATER: Potable water and waste water analysis of both routine and special parameters.
AIR: Ambient air monitoring and source emission monitoring, analysis and control methods
NOISE: Monitoring of noise levels for identified sites, statistical evaluation, validation of data.
SOIL: Analysis of soil for physical and chemical parameters.

The laboratory has been appointed a "state laboratory", which in itself does not imply any quality control, but shows that there is general confidence for the services on the part of the authorities.

The laboratory provides services mainly to the different projects carried out by the EPTRI (75% of the turnover), but also sells direct services to outside customers (25%). The laboratory personnel also takes part in training activities when this is motivated. The total revenue from the laboratory's services for the fiscal year of 1995, internal and external, was 41,000 Rs, equivalent to about 8000 SEK (see Annex 4). Even if this amount may seem modest in the light of the substantial investment, it nevertheless shows that the laboratory is functional and for some time has been giving regular services.

It is certainly true that many of the services provided by the laboratory could be bought commercially on the open market. However, some of the analytical requirements are so intimately linked with the consultancy work, field investigations and training activities of the EPTRI, that they could hardly be met in another way. The importance of having an integrated laboratory within the EPTRI can be summarised in the following way:

- The laboratory services provide excellent technical, scientific and commercial support in the different activities carried out by the EPTRI.
- The mere existence of a well-equipped laboratory gives prestige and credibility to the whole organisation.
- The existence of analytical competence within the EPTRI inspires and supports in developing general staff knowledge and expertise.

The laboratory obviously has a much larger capacity than what is indicated by the present volume of work produced. The level of utilisation depends to a significant degree on the amount of consultancy and investigation work carried out by the EPTRI, services which are thought to grow substantially in the future. However, in order to put the investment in equipment to good and efficient use, and in order to generate earnings for the EPTRI, the promotion of analytical services directly to customers should also be intensified.

During 1997, considerable efforts will have to go into the move to new premises. The planning for this will have to start now and will need the support of outside specialists. After this move, regular quality control of analytical performance should be established by linkage to other well established laboratories.

e. The EPTRI Information Centre

The Information Centre of the EPTRI has not been part of the Sida support, but was created around the government-sponsored ENVIS programme (for further details refer to Chapter VI.2). However, certain purchases of books and periodicals were financed by Sida funds at a cost of about 720,000 Rs (approximately 200,000 SEK).

3. Effectiveness

It is a well known fact, and has been discussed by us in Chapter II, that the environmental situation in India is one of utmost concern and that a multitude of concrete measures will have to be taken within a wide number of fields. We have also given an overview of Indian competence within the field of environment and discussed the role of the EPTRI (Chapter IV). In light of the extensive needs, the number of active organisations are indeed very few. Any new capacity in the field would therefore be well motivated. The concept of the EPTRI of being closely related to the public sector but also catering to private sector needs by offering training and consulting services, has great promise. We consider that the Swedish aid has been well justified in terms of both overall needs, selection of receiving organisation, and the composition of the support program.

It should be realised, though, that the building-up of a new, well-functioning technical institute of the kind represented by the EPTRI takes time, requires strong efforts and depend on an appropriate funding. A first phase of developing the EPTRI is being successfully terminated, but the organisation is still young and vulnerable. So, in line with what has been proposed by Sida's advisor to the project, we regard a continued support as most desirable and well motivated.

The financial planning and control of the project have been rather basic. This seems to have depended to a large degree on the following factors:

- Work plans have been fairly general and have also frequently been changed
- The co-ordination between the EPTRI and the Swedish consultant has been poor
- Strict accounting principles have been lacking, both regarding project accounting and the EPTRI internal accounting

This matter has been covered comprehensively in the November 1995 report by Sida's advisor, who also designed a proposal for new accounting practices within the EPTRI. Please refer to that report for further details. Governmental financial auditing of the EPTRI has been carried out on an annual basis.

4. Long-term effects, possible impact and sustainability

The long-term effect of the support to the EPTRI are potentially twofold. First, a great number of individuals have been exposed to environmental training and will have acquired knowledge and competence to be used in their work. Second, a collective competence, technical resources and management skills have been developed within the EPTRI, which should result in qualified services needed by the society for many years to come. Future amenities of this kind will, however, depend on how well the EPTRI develops as an organisation. A major concern in this respect is the dependence on the present very dynamic leadership and the risk connected with a possible change in these posts.

The technical staff have received an appreciable amount of technical-environmental training and are rapidly acquiring experience. They thus represent an important asset to the organisation. As a result of the good working conditions, the turnover of personnel is presently small. Furthermore, as a deliberate measure to secure employee stability, the EPTRI has signed 3-years or 5-years contracts with the core personnel and also made such contracts a condition for being selected for training in Sweden. Therefore, the majority of the personnel being trained under the Swedish support continue working for the EPTRI. Naturally, this stability regarding personnel is of vital importance for the development of the EPTRI.

The financial performance and viability of the EPTRI's operations are naturally of fundamental importance for the future. These issues are dealt with at some length in a separate chapter (Chapter V.6).

A long-term activity such as that of improving the environment has perhaps no very immediate link to the question of poverty. However, cleaning up the environment

involves such basic measures as providing clean drinking water, avoiding emissions to the air, restricting and controlling the deposition of toxic waste, etc. These steps would improve living conditions in general, and not least for the poor population, who do not to the same extent have the economic means to protect themselves.

When it comes to gender aspects, environmental issues are fundamentally neutral. However, world-wide, the topic as such tends to attract the interest and dedication of women more than many other technical/scientific issues. Even in the EPTRI, as much as 25% of the personnel on the professional level are women, including two on the senior management level.

5. Efficiency

Generally speaking, the impression is that both the training of Indian personnel and the courses offered by the EPTRI have been carried out in an efficient way. We have met mainly positive opinions in discussions with industry professionals and governmental officers. Likewise, the EPTRI personnel are predominantly content with the training they have received. Certain aspects will, however, be highlighted below as they may serve in guiding further activities.

The initial approach of providing Swedish full-term expertise as well as short-term training through specialists in India, was later changed in favour of the EPTRI professionals being sent to Sweden. This was arranged on the initiative of the EPTRI and relations between this organisation and the Swedish consultancy have periodically been strained (see reports by Sida's advisor).

It is the opinion of EPTRI that the Swedish consultant, while fulfilling the formal stipulations of the contract, showed little interest for the wider context of the project. The Swedish consultant consequently did not function in the advisory capacity as was the original intention. Furthermore, follow-up among the participants in the courses held by Swedish specialists in Hyderabad reveals great variation in the level of competence and suitability of the specialists. Sida staff confirm this finding. At the same time it must be said that all sides are in agreement that a great deal has been achieved in the co-operation between the consultant and EPTRI, and that a co-ordinator, especially assigned by the consultant, has established a climate of close and effective co-operation in the last year.

The training in Sweden was mainly done by seconding a Swedish specialist for about two weeks to exclusively train the Indian counterpart. This personal tutoring usually seems to have worked well, but, not surprisingly, the Indian professionals felt that the training was all too short. Most of them would have preferred a more extensive and formalised training.

In the provision of training, it should be realised that the EPTRI personnel are usually quite theoretically advanced in their field of specialisation. We therefore recommend that training in a future project is adapted to the needs of each individual (within the scope of the EPTRI's requirements), that the possibilities are explored of including Indian professionals more directly in the execution of suitable, concrete development

projects and for longer periods (within industry or research/consulting companies) and that the options offered by the different Sida (formerly BITS) courses be investigated. These things may not always be so easy to achieve, but it could be required that those tending for future consulting support present creative proposals in this respect. Extending the responsibility of Sida's advisor to assist in this matter could also be considered.

6. Financial performance

Financial support from the Government of Andhra Pradesh to the EPTRI has come partly as a lump sum of 15 million Rs (approximately 3 million SEK with today's exchange rate) for the construction of the new premises. Due to the long delays in commencing this work (the reason being extended litigation) this capital has also collected interest on behalf of the EPTRI. Furthermore, the local Government provides the EPTRI with 2 million Rs (approximately 0.4 million SEK) per year for the salaries of core personnel, and there is a commitment to continue this operational support on the present level up to at least the year 2000[2].

For developing laboratory and support infrastructure, as well as expertise and technical capabilities of EPTRI personnel, Sida has provided extensive support since 1992.

Despite the fact that the EPTRI is a very young organisation, its financial performance in terms of income from training, consultancy, laboratory and library services has been improving year by year. Thus, the operational income for the fiscal year 1995/96[3] had practically doubled compared to 1994/95. This evidently exhibits the effectiveness of Sida's contribution to the EPTRI and its capacity to meet the environmental services requested by the world around.

However, along with the growing revenues, the operational expenditures have also been increasing and for that reason we have felt it pertinent to briefly analyse the EPTRI's finances based on the figures of the fiscal year 1995/96 and to do that in the light of the composition of the EPTRI staff.

During the year 1995/96 the EPTRI employed 61 technical and non-technical (supporting staff) persons either on a regular or a contractual basis. The ratio between technical personnel, who bring in earnings to the EPTRI, and support staff (administration and other support) is as low as 1:0.8. Accordingly, in a simple no-loss-profit scenario, each technical personnel will have to bring in earnings to cover his or her own costs as well as the cost of 0.8 support personnel. However, it must be noted that the salary cost of a support person is usually considerably lower than that of an earning professional, in this case Rs 38,000 and Rs 55,000, respectively. Notwithstanding the lower cost of support staff, most well-run private environmental firms in India only engage 0.2-0.3 support staff per earning member. Consequently, we may conclude that the EPTRI's "costume" is too big or, expressed in a more positive

[2] Based on statement by Dr. C. S. Rangachari, Principal Secretary, Environment Forests Science & Technology, GOAP and vice chairman, EPTRI and chairman, Executive Committee, EPTRI.
[3] The Indian fiscal year is from April 1 to March 31.

manner, that the support staff should be able to support several more technical personnel and an appreciably larger volume of consultancy work. To some degree, this latter situation already exists, as about 30% of consultancy work within the EPTRI is carried out by external personnel. This work is executed with support from the EPTRI, but leaves little or no remuneration for this organisation. If, in the future, at least some of this consultancy work could be taken over and carried out by EPTRI personnel, a disadvantage would have been changed into an opportunity.

Table 4. Operational income of the EPTRI for the fiscal year 1995/96.

Activity	Gross Billing/Receipts (Rs '000)
1. Training	969
2. Consultancy	7,200
3. Laboratory/Library services	41
Subtotal	8,210
Grant from Government of Andhra Pradesh	
Subtotal	2,000
GRAND TOTAL	10,210

Looking at the revenues of the EPTRI (Table 4), we see that they amount to more than Rs 10 million, if the annual governmental grant of Rs 2 million is included. The income figure for training is Rs 969,000. However, it includes a sum of Rs 115,000 received from an external agency and paid immediately, meaning that it should be considered as only a book entry, and real earnings through training activities are therefore reduced to Rs 854,000. Considering the fact that training is a main activity within the EPTRI, considerable scope should exist to increase the training activities and by that the earnings. However, for the year 1995/96, the gross training revenue per "earning member" amounts to only Rs 24,000.

The bulk of consultancy revenues comes from governmental and international institutions sources (estimated to be over 80%). The total consultancy earnings are stated as Rs 7,200,000, but include as much as Rs 2,590,000 paid to network organisations and individuals for their services. The real earnings generated by the EPTRI are thus reduced to Rs 4,610,000. Accordingly, the consulting gross revenue per earning member was Rs 136,000. Compared to what private consulting firms are earning in India, there is a potential to boost the per capita consulting earnings of the

EPTRI substantially; a gross billing of Rs 300,000 to 350,000 per earning member is what the average environmental consulting firm achieves today, though the most profitable of them make over Rs 500,000.

Actual revenues from laboratory services are restricted to Rs 41,000, a low figure in relation to the substantial investments (see Chapter V.2.d). It must not be forgotten, though, that the laboratory provides substantial services and strong support to the EPTRI's consultancy projects and that the accounts do not reflect the total value of these. It may be advisable in the future to treat the laboratory as a separate cost/benefit centre with appropriate accounting for the services it renders to the various consultancy projects being undertaken by the EPTRI.

Turning from income to cost, Table 5 exhibits a total cost of operations (including depreciation) of over Rs 12 million. This means a deficit of about Rs 2 million. It is pertinent to point out in this context that the overheads are as high as 115 % of the combined salaries and benefits of all the technical and non-technical staff.

Another concern for the future is the prospect for a considerable increase in governmental salaries which was recently publicised. If realised, the EPTRI would probably have to follow suit and the total cost of operations could rise appreciably.

Investment in equipment and facilities since 1992 are approximately Rs 20 million, a major part of this being Swedish donations. The rate of depreciation employed is according to Indian regulations, that is between 10 % and 20 % depending on the type of investment (write-off periods of 5 to 10 years). The practical signification of depreciation is that of calculating financial results and profits/losses, though it also gives a good indication of the size of investment which will be needed in the long term to keep the EPTRI's arsenal of instruments and equipment up to date. Consequently, amounts corresponding to the yearly depreciation should be reserved and used when appropriate for the necessary substitution and modernisation. This aspect is particularly important in light of the substantial further investments being foreseen for the next few years.

Table 5. EPTRI expenditures during the fiscal year 1995/96. Provisional figures taken from EPTRI books. Note that capital expenditures, such as the purchasing of air conditioners, laboratory equipment, office furniture, vehicles, computers, etc. are not included.

Expenditure head	Amount (Rs '000)
1. Salaries and perks	2,893
2. Rent of office building	500
3. Travel & related expenses	501
4. Overhead costs*	3,433
5. Expenditure towards hired services	2,705
Subtotal	10,032
6. Depreciation	2,300
GRAND TOTAL	12,332

*These overhead costs include only recurring expenses, such as telephone, electricity, newspapers, office maintenance, printing and stationary, vehicle maintenance, petrol, laboratory, computers, etc.

In summary, the EPTRI is presently not a financially viable organisation. For this reason

- it should be sought to improve productivity through the reduction of overheads and support staff in relation to the size of the earning staff. This can be done by reducing the non-earning support staff, restricting the overhead cost, increasing the number of earning members, improving the amount of paid-for services per person, or a combination of these measures, and

- a mechanism should be set up for reserving enough capital to maintain instrumental capacity when, in a few years time, instruments and equipment will have to be upgraded or substituted.

VI. EVALUATION OF THE PROPOSAL FOR CONTINUED SUPPORT

1. Relevance

The EPTRI's proposal for continued Sida support is presented in the "Project Plan 1996-2000". This comprehensive plan presents the general background for the proposal, a summary of the performance during the first phase, project justification, and a technical and financial proposal for continued support. Basic activities for the coming period (1996-2000) would be training (industry workshops and sponsored training) and consultancy services, i.e. the two areas of competence developed during the first phase. It is predicted that these activities will be self-financing. The proposed continued support builds on the competence acquired during Phase 1 and concerns the further development of environmental competence within the EPTRI, based on the transfer of Swedish know-how and technology. The sort of competence being developed is in scarce supply in India and Swedish aid in this area is desirable and should prove meaningful.

2. Proposed continuation of support from Sida

The proposed new Sida support is presented in the "Project Plan 1996-2000" as six programmes, representing new skills to be developed. Generally speaking, these six programmes build on the capacities built during Phase 1 and are logical continuations and additions to the earlier programme. The content of the proposal is very extensive and ambitious, but we regard the general approach to be perfectly realistic. However, regarding the details we would like to introduce a number of modifications and clarifications, as presented further below.

Programme 1. Environmental information management and dissemination

The proposal: The programme suggests two main functions:

- as a support for the training, consultancy and applied research at the EPTRI
- as an information source for environmental quality of the Eastern Ghats

General comments: The training activities at the EPTRI require a well-organised information centre providing the necessary services. The programme is in that sense essentially relevant. Also the consultancy work at the EPTRI will gain from the program, even if consultancy in the long term ought to stand on its own.

The first function in the programme contains work that will support the EPTRI with data and information for the courses and training programmes performed. Furthermore, the function contains the preparation and assembling of literature packages needed on the occasions of execution of the courses and workshops. One observation made is that the produced literature hitherto varies in quality and needs a more professional design. We believe that the quality of literature packages and all other training documents and tools will have to be highly professional with respect to content, design and delivery of the message. In this way the products will better fulfil their purpose and, in addition, will be of great value in the marketing of other EPTRI

services. We also suggest that the skills of EPTRI personnel in lecturing and communication be improved with the help of external expertise.

The second function concerns the compilation, processing and presentation of ecological data in an easily accessible form to be used by authorities in their planning activities and by the EPTRI for giving services. Today this work is restricted to the gathering of data in part of the Eastern Ghats within the ENVIS programme (see programme proposal No. 6). We suggest that this second function be expanded to also include the compilation of environmental information from, for example, consultants reports, which are produced and presented to the State Pollution Control Board (SPCB) in Andhra Pradesh. References of the reports can be created by the EPTRI and the references can easily be stored in a retrieval system at the institute. In this way, a vast amount of very valuable information would be obtainable and could come to effective use, information which now is virtually lost, a situation that leads to many unnecessary repetitions of surveys already carried out. The activity of the EPTRI in this area seems to be well in line with the EPTRI's roll as an information centre.

Specific recommendations: In planning the reinforcement of the information activities, the following suggestions should be kept in mind:

- The information gathering should concentrate on finding, compiling and making available environmental data and information regarding conditions in the state of Andhra Pradesh and immediately adjoining areas.
- The choice of information technique and compass should be carefully adapted to the needs and long-term financing abilities of the EPTRI.
- A critical internal study should be carried out within the EPTRI regarding the type of information required for its activities, including a prioritisation.
- Regarding the access to world-wide ecological and technical reference information, the EPTRI should seek to gain access to existing large databases rather than trying to establish its own.

Programme 2. Laboratory build-up for technology adaptation and specific area research

The proposal: The laboratory supports the EPTRI in its consultancy and training activities. Present facilities need to be reinforced and complemented with additional instruments and support equipment. This strengthening regarding "laboratory hardware" should be matched by an improvement in working methodologies, quality control, efficient management and commercial promotion.

General comments: In spite of the existence in Hyderabad of modern, large laboratories, it is of strategic importance for the development of the EPTRI, as an institute for training and consulting, to have such facilities "in-house". The laboratory services are part of a "system delivery" required by customers.

The laboratory has just begun producing dependable analytical results but is not yet well established. This is also reflected in the financial outcome of activities (see Chapter V.6), which show that present revenues from services given are still too low

to be regarded as acceptable in the long term. Furthermore, the move to new premises during 1997 implies that considerable efforts will have to go into the planning and adaptation to the new physical surroundings. For these reasons, the next year or two will be a period of great strain on management and staff. Only when the laboratory is well established in its new localities and the production and sale of services have reached the necessary level of long-term sustainability, should the introduction of entirely new services be considered. This does not exclude, however, restricted investments that are complementary to the already existing infrastructure being made.

Specific recommendations: The laboratory programme is obviously of great importance to the EPTRI. However, the technical and financial outcome of laboratory activities depend in a decisive manner on the needs and performance of the EPTRI's training and consulting activities. For this reason, the laboratory work is essentially a service facility, primarily for EPTRI projects, but also as analytical services directly to outside customers. The following aspects need attention:

- An appropriate design of the new laboratory is of paramount importance for the efficient and accurate production.
- Strict quality control should be introduced in all analytical and monitoring work. One way of doing this is through exchange of data and standard samples with other laboratories of good standard.
- Purchases within the program should be carefully scrutinised and ranked as to need and cost. The long-term financial viability of such investments must always be kept in mind (see Chapter V.6). Buying certain services from other laboratories should also be considered, if this turns out to be advantageous.
- Field instruments proposed to be bought under this program should be transferred to the Programme No. 5. The reason for this is that instruments should be chosen and employed in connection with field programmes and surveys; this does not exclude the instruments being serviced and administrated by the laboratory.
- Research work should in principle be carried out only when there is outside financing available and if it is clearly in line with the strategy of the EPTRI. Other research, financed by internal resources, should be initiated only after very rigorous evaluation as to technical-scientific feasibility and financial viability. Accordingly, applied research within the field of microbiology should be made the object of critical examination; a viable strategy would probably be to establish close links with the CCMB[4] laboratory, which specialises in such research and has excellent laboratory facilities.

Programme 3. Adaptation of Swedish clean technologies in the field of TCHWM[5]

The proposal: To transfer Swedish "clean" technologies for adaptation to Indian conditions, with small and medium industry as the target. Data and expertise should be exchanged in order to aid in the solving of waste-minimisation problems of industries in the pulp and paper, cement, pharmaceutical, tanning and pesticide industries.

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[4] Centre for Cellular and Molecular Biology, Hyderabad
[5] Toxic Chemicals and Hazardous Waste Management

General comments: The concept as such of technology transfer between the countries has important merits. However, the choice of targets and the mechanisms of implementation will have to elaborated further. There is, for example, no guarantee that the targeted industries are amenable to such transfer. Certainly, large-scale industry will gain from having access to modern technology; but they have their own channels and can afford to buy such services and equipment (and will do it voluntarily or as soon as they are forced to do so). For small and medium-sized industry, modern Swedish technology is not necessarily the solution. This is because modern technology is often too large-scale to be a viable alternative, and because the existing Indian plants do not always use the same raw materials, or are different in other fundamental respects. A typical example is presented by the small-scale pulp mills in India (around 200 units), which have plant capacities as low as 10-50 tons per day and run on raw materials from the agricultural sector. These plants are big polluters but cannot easily be replaced by modern equivalents due to their operational characteristics and "uneconomic" size. This holds true for at least the introduction of waste-minimisation methods (which is implied in the proposal), while traditional end-of-pipe solutions (managing the discharge) may still be an option. It is quite possible, though, that such operations cannot even bear very moderate investments in waste containment and for that reason should instead be closed down.

As far as we can judge, the same restrictions in introducing clean technology exist for the small and medium-sized cement industries and probably even many other industry sectors. For this reason we recommend that the scope for choice of suitable projects is widened to include all industry as well as the municipal sector, the latter with its major problems of waste, sewage and contaminated sources of water. The municipal sector is considered by us because of its many pressing problems (often large-scale), which cannot be taken care of in the same way as is done in a profit-making company. It should also be remembered that, in addition to relevant technology, good management systems and modern monitoring systems are of vital importance not only in industry but also within the municipal sector.

Specific recommendations: Due to the fundamental uncertainties mentioned above, we feel that a sufficient period of fact-finding and project definition should precede a final decision regarding the aim and direction of this programme. In doing this, our following observations should be of some guidance:

- The definition of a detailed action programme should take into account the moderate size and resources of the EPTRI, and for that reason concentrate on a couple of carefully chosen and well-defined programme components, which exhibit good prospects of success. Projects of good demonstration value should be favoured.
- The planning group should include a technical professional from Sweden with wide expertise and ample experience, and a suitable professional from the Indian industry, these external experts working in close co-operation with senior professionals from the EPTRI.
- The proposed establishment of a data link between the EPTRI and a Swedish organisation should be evaluated as to cost and benefit. Less demanding data

transfer by diskettes could represent an alternative. Institutional twinning between the EPTRI and suitable organisation(s) in Sweden should be considered.

- If engaging representatives of Swedish companies (potential suppliers of equipment and technique) in programme activities is contemplated, as stated in the budget presentation, it should be realised that such personnel will seldom have the time to undertake any lengthy, high-quality consultancy, especially if there is no adequate remuneration. It could even be preferable to engage technical consultants who are not directly linked to commercial interests in order to have wider and more impartial advice.

Programme 4. Environment management certification of export-oriented industry

The proposal: To catalyse the introduction of environmental management systems according to the international standard of ISO 14001[6] in Indian enterprises and by that promote responsible environmentally responsible management. The main target group would be the small to medium-sized exporting industrial companies[7].

General comments: For a number of years, industry world-wide has been introducing Environmental Management Systems, for example the ISO 14001, in their operations. The main characteristics of such systems is that they are voluntary, that each industry itself sets its standards and goals (which may be more or less ambitious, but with the basic requirement that laws and regulations are respected), that the company is committed to continual improvements, that a strict system for managing environmental matters within the company shall be introduced, and that the conformance with its internally established plans and procedures is audited and certified by an independent, accredited company. It is to be expected that the certified use of such a system will increasingly be a de facto requirement in order to gain access to the world market. In India, the export industry in particular is taking interest in this development and up to now eight companies have been certified according to the ISO 14001 or its older equivalent, the British BS 7750. There are no accredited certifying organisations in India and therefore Indian companies have to rely on the services of, for example, Australian or European companies for certification. Consulting companies, specialised in the field of EMS, are assisting companies in training their personnel about principles and objectives and may also be helping them to set up and maintain the system. In India the Confederation of Indian Industry (CII) and the National Productivity Council (NPC) are already offering such services and it is expected that the market will grow rapidly.

In the Indian situation, where public control and enforcement of environmental regulations are weak, the importance of "self-control" through EMS could prove to be

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[6] The international EMS standard ISO 14001 was finally established in September 1996, after a lengthy period of development and world-wide consultation.

[7] Small scale industries, that is enterprises with an investment in plant and machinery less than Rs 6 million, account for as much as 37% of India's total export from the industrial sector.

a most effective complement for the achievement of sound environmental behaviour. The EPTRI should be able to play an important role in this development by offering:

- Basic training in the principles and employment of the EMS management tool according to the ISO 14001 standard.
- Assistance in designing, introducing and maintaining such schemes.

This would be well in line with the EPTRI's mission and would, from a strict business point of view, generate revenues, provide a good insight into the range and magnitude of environmental problems faced by the industry and service organisations, establish contacts with companies for further services, and yield professional knowledge and experience. The market is thought to grow rapidly and should in the long run include not only the export industry but also such enterprises as hospitals, ports, commercial establishments, etc. If the EPTRI manages to acquire a very solid competence within this field, efforts could be made to acquire international accreditation as a certifying agency.

Specific recommendations:

- Needless to say, selected EPTRI personnel should be subjected to very thorough training in Sweden as well as in India
- On-the-job training should be arranged by making it possible for EPTRI professionals to follow on-going EMS facilitation in suitable projects in Sweden and India.
- If and when a solid competence within this field of expertise is acquired by the EPTRI, the feasibility (and desirability) of developing the organisation into an accredited certifying organisation (under the supervision of, for example, a Swedish accreditation organisation) should be evaluated and, if positive, realised.

Programme 5. EIA-EMP and layout planning of HW-TSDFs

The proposal: To develop human capacity and acquire equipment within the EPTRI to perform environmental studies (Environmental Impact Assessments, Environmental Management Plans) within the area of Hazardous Wastes - Treatment, Storage, and Disposal Facilities.

General comments: The area of hazardous waste management is highly specialised and no disposal of this kind is taking place in India at the moment. However, a number of efforts are presently being made with support from the World Bank, Germany and Australia (the latter project in co-operation with the SPCB in Andhra Pradesh). It can be expected that, as a result of these studies, a small number of big and rather sophisticated treatment and disposal facilities will be in use in some years time. If the broader field of solid waste management, including the moderately specialised tasks of planning for municipal waste and land fills, are incorporated in the program, the EPTRI may play an important role.

It can be concluded that a variety of skills are needed, which today exist within the EPTRI only to a minor extent. The skills represent procedures and techniques which

can be put to work in a variety of activities within the general field of environmental studies. Consequently, they can be regarded as regular methods and tools within the arena of environmental consultancy. We believe that there is strong justification for developing these competencies within the EPTRI and to do that within a wider framework. In accordance with this, we propose a change of title and objective of the programme in the following way:

New title: Capacity building regarding field methods and techniques for environmental investigations, including the elaboration of EIAs and EMPs.

New project description: To develop competence within the EPTRI regarding methods and techniques for environmental field studies.

Specific recommendations: The following recommendations should be considered when elaborating the detailed programme:

- Training regarding choice of methodologies, handling of equipment and evaluation of results should be carried out as an integrated entirety. Extensive training should be carried out under field conditions, preferably directly in the execution of consultancy assignments or within comparable investigation programmes. Qualified Swedish specialists should be engaged in this training, complemented, as appropriate, by Indian specialists.
- Equipment should be acquired according to a programme of priority and at a pace permitting the organisation to be trained and instruments put in use in a balanced and efficient manner.
- Training should include ways of evaluating data, illustrating the findings and reporting results in such formats that they are easily understood by the customer or other readers and, accordingly, constitute high-quality consultancy products.
- Field and monitoring instruments listed under programme 2 should be transferred to this programme.

Programme 6. Eastern Ghats industrial zoning

The proposal: To develop within the EPTRI a capacity to produce thematic environmental maps for industrial zoning based on the existing Eastern Ghats database.

General comments: The central government of India has initiated the compilation of ecological information in 22 different geographical areas of India in order to establish an Environmental Information Service (EIS). One of these regions, judged to be of fundamental interest because of its natural characteristics and development potential, is the mountain and valley region of Eastern Ghats in central, eastern India. About 50% of the Eastern Ghats fall within the state boundaries of Andhra Pradesh, making up about one third of the total area of this state[8]. The EPTRI was chosen to be the co-ordinating body for the development of an ecological database for this region and is supported financially for this purpose by the central government. Presently, most of the

[8] The Eastern Ghats region has an area of 750 000 square km, that is about 1½ times the area of Sweden

EPTRI's efforts go into the elaboration of a bibliography concerning the area's ecological properties. However, the EPTRI would also like to initiate work regarding ecological spatial data, for example information on soils composition, air quality, water properties, and other data of known geographical location. Such information is usually presented in the form of maps, which requires special competence in data treatment as well as rather sophisticated computer equipment. Presently the EPTRI makes use of groups at universities for data supply and a commercial outfit for GIS data treatment, but intends to integrate and intensify this kind of work in its own offices. Apart from being a source of ecological data for common use, the database will be utilised for land use planning and industrial zoning.

The goal of the ENVIS and its Eastern Ghats component is extremely important. If it is implemented well, the database will allow the basic planning for land use which is so needed in these areas of valuable natural resources, high population growth and industrial development. The strengthening of the EPTRI for this purpose should ensure increased pace and quality in this long-term project.

Specific recommendations:

- A detailed plan of action should be established by the EPTRI professionals aided by Swedish expertise.
- The choice of software and hardware should be done with great care. However, we recommend that the system will be based on PC computers. The inclusion of satellite image treatment facilities should be evaluated. EPTRI staff and a Swedish expert should evaluate the options after extensive consulting with relevant organisations in Hyderabad and elsewhere in India. The proposed budget is sizeable, and it could be advantageous to make purchases in intervals.
- Training of EPTRI personnel should take place in Sweden as well as in India (outside as well as inside the EPTRI).

3. Effectiveness and efficiency

The successful execution of the proposed programmes would definitely establish the EPTRI as an important driving force within the field of environmental services in India. This would be a very major achievement in a country with such an acute environmental situation and, in relation to this, so little environmental competence available.

A Logical Frame Analysis of the new proposal is presented in "Project Plan 1996-2000". In principle, this matrix is relevant, but will have to be revised according to the possible changes motivated by our recommendations.

In designing the Sida support for the period 1996-2000, and thereby dealing with aspects such as level of ambition, conditions, and the organisation of the project execution, the following major aspects should be kept in mind:

Technical sustainability: The EPTRI has proceeded well towards establishing solid environmental competence within the organisation. This includes professional capabilities, laboratory and information services, and the different work tools (manuals,

field work routines, etc.) that have been developed. This is a good start, and with the further progress that will come with the proposed Phase 2 activities, as well as through the increased experience gained from continued training and consultancy activities, the outlook for the future seems encouraging. Still, the rate of success will depend on a number of factors, as discussed under the following headlines.

Institutional sustainability: The EPTRI organisation has already reached substantial stability. This is based on the good theoretical education of the personnel, the intensive training being provided and a stability gained by the fact that few people leave the organisation.

The EPTRI has a very able management. A major concern in this respect (also found in many other young organisations) is the dependence on the present very dynamic leadership and the risk connected with a possible change on these posts. We propose that Sida use its influence in order to retain this personnel during the next phase of the project.

Commercial sustainability: As discussed in Chapter IV, (The role of the EPTRI), the EPTRI started out as training institute but cannot survive only by working within this narrow sector. The provision of remunerated consulting services is therefore a necessity, both as a source of income and a source of knowledge and experience of real-life problems. The term "consulting services" should be understood in its broadest meaning, including, for example, smaller or bigger technical tasks on behalf of companies, as well as long-term environmental surveys with governmental or international funding. In fact, this wide "market" , based on the non-profit status of the EPTRI and its close relations with state authorities, constitutes a most important commercial possibility that is to the great advantage of the EPTRI as opposed to strictly private consultancies. Well exploited, this situation ought to guarantee the commercial viability of the EPTRI.

Economic and financial sustainability: As discussed at some length in Chapter V.6, the EPTRI cannot expect to receive any more than the present contribution of Rs 2 million per year for the coverage of running costs in the future. Furthermore, the income from conducting training courses seldom compensates for the cost involved. Consequently, consultancy work (in its wide sense) will have to be the economic backbone of future EPTRI activities.

The EPTRI was making a certain loss in the fiscal year 1995/96, and there are a number of issues which will have to be addressed in order to attain a healthy financial situation for the future. These main issues include:

- The productivity of the personnel should be improved
- The overhead cost should be brought down
- The ratio between the category of personnel that brings in earnings and those only giving support should be increased
- Investments in instruments and other equipment should be done with great care, so as to achieve the maximum revenue from such acquisitions

- A mechanism should be found to reserve funds for future replacement and maintenance of equipment, in order to guarantee that quality and standards are upheld

Given an awareness of these fundamental financial factors among the EPTRI management, and that the necessary tools for management and control are put in place, the EPTRI has all possibilities of performing well in these respects (for further details refer to Chapter V.6).

Management issues: The EPTRI is presently managed very much from the top. This is natural in a new organisation, but not necessarily favourable in a growing consulting organisation. In order to bring in modern management procedures, it is proposed that a formal management system, complemented with a financial management system, is introduced. Well adapted to the host organisation, such systems would be excellent for planning of operations. It will also force the staff to provide appropriate input to the system, which, by use of these data, generates information which aid in planning and decision-making.

In order to keep control of costs, efficiency and the viability of purchases related to support services from the information centre and the laboratory, it would be useful to introduce separate cost-profit centres for these activities. This can be accommodated within the new management/financial system.

The management issues are obviously of prime importance for the future performance of the EPTRI. We propose that these issues be made into a special programme within the Sida support and that they be implemented as soon as possible. Support from Sweden as well as from Indian expertise would be needed. Unlike the six development programmes being proposed, this task is not technical in character and addresses primarily the duties of the EPTRI management. Possibly this activity could be made a responsibility of the Sida-recruited advisor, aided by suitable specialists.

4. Realism regarding implementation

The EPTRI is already an organisation which has reached a certain stability and maturity. The organisation has managed well in absorbing the support given hitherto, both regarding the training of its personnel and the acquisition and putting to use of instruments and other equipment. Provided that the concerns expressed above are addressed to a reasonable degree, the proposed support can be regarded as highly realistic in serving its very urgent purpose.

5. Organisation and monitoring

The proposed six programmes, with the possible addition of a special effort regarding the introduction of a management system within EPTRI, represent a set of broadly varying tasks. Accordingly, a variety of expertise will be needed for their execution. In this situation, it could be advantageous to acquire the needed services in Sweden not from one sole consultancy, but from the best qualified firm in each specific case

(programme). This could give a better result than buying the complete services from one all-round firm (with or without subconsultants), as it could give access to specialised organisations that are very qualified within their field of expertise but do not have broad enough resources to take on the complete set of programmes.

However, the use of such a mode of acquiring support services requires careful control, so that conflicts or overlaps do not arise. A compromise would be to group the programmes into *areas of activities* according to their affinity. We propose the following grouping (using shortened and modified programme titles):

	Characteristics (index words)
Group A Programme 1, Information Programme 6, Industrial zoning	GIS, computer systems, data treatment, data bases, map presentations, information retrieval systems
Group B Programme 2, Laboratory build-up Programme 3, Environmental technology Programme 5, Environmental investigation methods and techniques	instruments, analytical methods, monitoring techniques, technical designs
Group C Programme 4, Environmental management systems	regulations, control, corporate environmental systems and management, certification
Group D EPTRI management programme	financial control, planning

If EPTRI needs support for the process of buying these services, this could be provided by an independent advisor or by the consultant chosen for the execution of one of the groups of activities, for example the consultant for Group D.

The presently available proposals for a continued Sida support are conceptual in character and do not provide all the information needed in order to plan the activities in detail. Such further definition and planning is also foreseen in the Project Plan (the proposal). Another option would be to request more detailed plans as part of the tenders to be invited for; in this way the creativity of the presumptive consultants can be exploited.

As it is difficult to anticipate the development and course within a programme for the whole project period, it might be advisable to divide up the work in phases and adapt the programme step by step according to progress and results. A continuation may

even be made conditional on the attainment of certain goals. The procurement of equipment should follow the same phased approach.

For reasons of efficiency, but also as a means of training, in the execution of the project, each development programme should have a responsible person, a project manager, who supervises the operations of his/her programme. This would also facilitate the overall supervision of the activities by the EPTRI management.

Presumably, the Sida-recruited advisor will play an important role, as has been the case till now, in aiding the EPTRI management in managerial and financial questions. As proposed above, this assistance should be expanded to include the establishment of a suitable management/financial system.

As discussed in Chapter V.5, it may be beneficial to require from presumptive consultants that they develop creative proposals regarding training contents and conditions and that they make concrete commitments to this end.

Annexes

Annex A 1. EPTRI Organisation
2. List of Projects
3. List of Programmes Conducted by EPTRI 1992-1996
4. EPTRI Instruments
5. EPTRI Income, Number of Samples Analysed

Annex B Terms of Reference, Sida Consultant

Annex A

1. EPTRI Organisation
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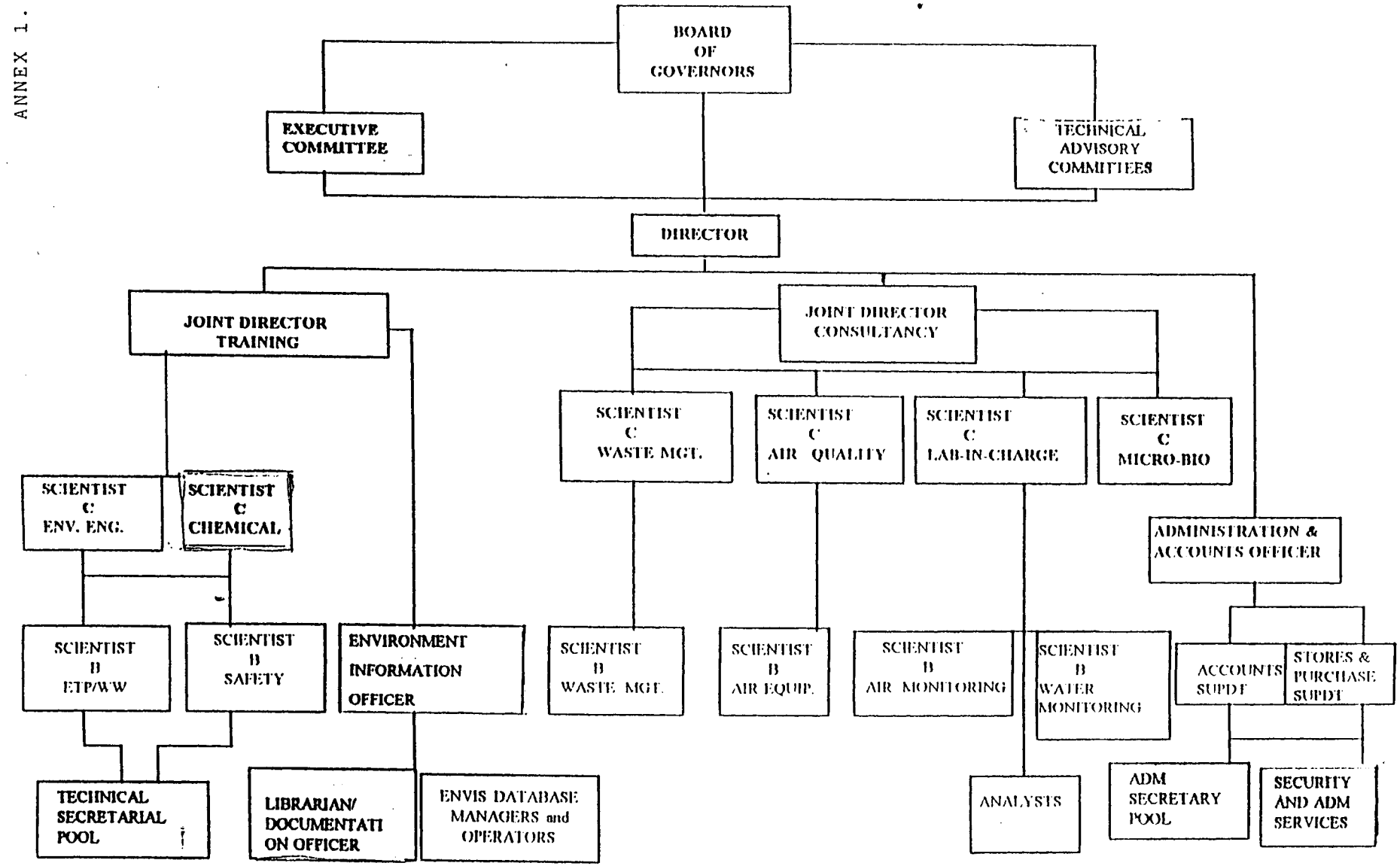
5. EPTRI Income, Number of Samples Analysed

ANNEX 1.

EPTRI-ORGANISATION



LIST OF PROJECTS

Sl No	Name of the Project	Sanctioned on	Completed on
1	Air quality monitoring in ICRISAT	10-1992	4-1993
2	REIA for HERITAGE	11-1992	4-1993
3	REIA for Sudershan Drugs & Intermediates	1-1993	5-1994
4	REIA for SIRIS	1-1993	
5	Design of ETP-Chaitanyna Oil Mills	2-1993	
6	GFCL - Ammonia Storage Tank inspection	4-1993	6-1994
7	Design of ETP - NVR Sugars	6-1993	
8	Risk Analysis for Vantech Pesticides Ltd	5-1993	5-1994
9	Air quality monitoring for ICRISAT - phase II	8-1993	10-1993
10	Industrial Estate Survey -CPCB sponsered project	10-1993	11-1994
11	Status of Water supply, Waste water generation, Collection, Treatment and Disposal in Metrocities - CPCB Project	12-1993	11-1195
12	-do- Class I cities - CPCB Project	12-1993	11-1995
13	-do- Class II towns - CPCB Project	12-1993	11-1995
14	Status of Solid waste management in Metrocities	12-1993	12-1995
15	REIA of Dai Ichi Karkaria dyes, Nacharam	4-1994	2-1995
16	Waste minimisation in A.P.Paper mills Ltd	5-1994	
17	Upgradation of ETP of A.P.Dairy, Lalapet	3-1994	
18	REIA of Shri Shakti LPG	5-1994	
19	Risk Analysis of Shri Shakti LPG	5-1994	
20	Risk Analysis of Dia-ichi Kankaria Ltd	7-1994	2-1995
21	Godavari River Action Plan - CPCB sponsored project	9-1994	3-1995
22	EIA Balaji Dairy	10-1994	2-1995
23	REIA for Bauxite mining project	10-1994	
24	REIA of Lordvin Labs	11-1994	
25	Evaluation of Essar Gujarat EIA	10-1994	1-1995
26	Review of EIA Maxworth	-94	9-1995
27	Status of Solid waste Generation, Collection, Treatment and Disposal in Class I cities - CPCB sponsored project	1-1995	3-1-1996
28	Status of Solid waste Generation, Collection, Treatment and Disposal in Class II towns - CPCB sponsored project		
29	R&D project GOI self treatment of organic/metal polluted waste water treatment with flyash a three in one technology	3-1995	
30	ETP Design - Balaji Dairy	6-1995	12-1995
31	Computerisation of data for large & medium scale industries in A.P.State - World Bank sponsored	7-1995	10-1995

LIST OF TRAINING PROGRAMMES CONDUCTED BY EPTRI FROM 1992 - 1996

SL.No	NAME OF THE PROGRAMME	VENUE	DURATION DAYS	DATES OF PRG.
1	Waste Management and Low Waste TEchnologies	Hyderabad	5	25TH 30 Sept 92
2	Enviroment Audit	Hyderabad	4	27Th 30 th Jan93
3	Environment Audit	Vizag	4	3-6th Feb.93
4	Risk Analysis	Hyderabad	5	22-26th Feb.93
5	Hazardous Waste Management	Hyderabad	4	29 th Mar-1st Aprl.93
6	Hazardous Waste Management	Bangalore	5	3-7th Aprl.93
7	Process and Envtl.Technology in Pulp & Paper Industry	Hyderabad	11	4-14th May.93
8	Industrial Effluent Treatment and Advanced Course on Technology and Equipment	Hyderabad	5	24-28th May.93
9	Monitoring and Envtl.Control Systems	Hyderabad	9	23-31st Aug.93
10	Water Monitoring and Envtl.Control Systems	Madras	4	6-9th Sept.93
11	Hazardous Waste Management	Bangalore	4	22-25th Nov.93
12	Environmental Technology for the Cement Industry	Hyderabad	4	17-20 th Nov.93
13	Effluent Treatment Plants Supervisors & operators	Hyderabad	24	24th Nov.-18th Dec.93
14	Environmental Issues in Thermal Power Plants	Hyderabad	4	2-5th Aug.93
15	Environment Impact Assessment	Kakinada	6	18th -23rd Aprl.94
16	Environment Impact Assessment	Hyderabad	3	29-30th June,94
17	Cost Effective Effluent Treatment Plants	Hyderabad	14	25th Aug-7th Sept.94
18	Industrial Air pollution	Madras	2	12-13th Sept.94
19	Industrial Air Pollution	Hyderabad	3	15-17th Sept.94
20	Toxic Chemicals & Hazardous Waste Management	Hyderabad	4	Nov.94
21	Environmental Issues in Thermal Power Plants	Hyderabad	3	14-16th Nov.94
22	Waste Audit	Hyderabad	3	30th Nov-2nd Dec.94
23	Organising and Monitoring an Environmental Laboratory in an Industry	Hyderabad	3	29-30th June,95
24	Orientation for State Pollution Control Boards Envineers & Scientists	Hyderabad	10	4-13th Sept.95
25	Risk Analysis	Hyderabad	3	25-27th Oct.95
26	Environment policy, Planning and Management Course (BCD-EPTRI)	Hyderabad	11	29th Jan-9th Feb.96

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5	Hazardous Waste Management	Hyderabad	4	29 th Mar-1st Aprl.93
6	Hazardous Waste Management	Bangalore	5	3-7th Aprl.93
7	Process and Envtl.Technology in Pulp & Paper Industry	Hyderabad	11	4-14th May.93
8	Industrial Effluent Treatment and Advanced Course on Technology and Equipment	Hyderabad	5	24-28th May.93
9	Monitoring and Envtl.Control Systems	Hyderabad	9	23-31st Aug.93
10	Water Monitoring and Envtl.Control Systems	Madras	4	6-9th Sept.93
11	Hazardous Waste Management	Bangalore	4	22-25th Nov.93
12	Environmental Technology for the Cement Industry	Hyderabad	4	17-20 th Nov.93
13	Effluent Treatment Plants Supervisors & operators	Hyderabad	24	24th Nov.-18th Dec.93
14	Environmental Issues in Thermal Power Plants	Hyderabad	4	2-5th Aug.93
15	Environment Impact Assessment	Kakinada	6	18th -23rd Aprl.94
16	Environment Impact Assessment	Hyderabad	3	29-30th June,94
17	Cost Effective Effluent Treatment Plants	Hyderabad	14	25th Aug-7th Sept.94
18	Industrial Air pollution	Madras	2	12-13th Sept.94
19	Industrial Air Pollution	Hyderabad	3	15-17th Sept.94
20	Toxic Chemicals & Hazardous Waste Management	Hyderabad	4	Nov.94
21	Environmental Issues in Thermal Power Plants	Hyderabad	3	14-16th Nov.94
22	Waste Audit	Hyderabad	3	30th Nov-2nd Dec.94
23	Organising and Monitoring an Environmental Laboratory in an Industry	Hyderabad	3	29-30th June,95
24	Orientation for State Pollution Control Boards Envineers & Scientists	Hyderabad	10	4-13th Sept.95
25	Risk Analysis	Hyderabad	3	25-27th Oct.95
26	Environment policy, Planning and Management Course (BCD-EPTRI)	Hyderabad	11	29th Jan-9th Feb.96

27	Meterology in Air Pollution Analysis & Control	Hyderabad	3	22-24th Feb.96
28	Risk Analysis	Hyderabad	3	11-13th Mar.96
29	Air Pollution Aspects in Cement Industry	Hyderabad	3	23rd-25t Aprl.96
30	Application of Microbiology in Effluent Treatment Plants	Hyderabad	3	15-17th May.96
31	Waste Minimisation & Waste Audit in Pulp and Paper Industry	Hyderabad	3	27-29th May.96
32	Automation of Water and Waste Water Treatment	Hyderabad	2	6-7th June.96
33	Biological Waste Water Treatment	Hyderabad	3	31st July - 2nd Aug.96

ENVIRONMENT PROTECTION TRAINING AND RESEARCH INSTITUTE LABORATORY

S. No	Name of the Instrument	Number of Parameter/ Samples/ Year 1994	1995	1996
1.	Gas Chromatograph	450	175	220
2.	Atomic Absorption Spectrophotometer	--	Installed Sep.,'95	80
3.	UV-Vis. Spectrophotometer	262	482	2468
4.	Visible Spectrophotometer	661	1706	142
5.	Specific Ion Meter	49	265	246
6.	'DASIBI' Ambient Air Monitoring System	--	Installed Nov./Dec.,'95	3,64,042
7.	Stack Gas Analysers: SO2,NO,CO,CO2,Hydrocarbons	*Being used very frequently for the on line sample analysis of stack emissions (consultancy projects)		
8.	Flame Photometer	45	299	308
9.	Trinocular metallurgical microscope	--	13	55
10.	Noise level Meter	70	5391	973

In addition to the above, EPTRI possesses 12 High Volume Samplers and 1 Wind Monitoring System with data logging facility. These units have been extensively used in different consultancy projects(for EIA, EMP, etc.) of the Institute. The auto-sampler and digital flow-meter have been used for the collection of samples from surface water bodies for Irrigation and Lake water projects and for the measurement of flows of different streams of industries.

All instrument facilities like pH meter, conductivity meter, BOD incubator, a sensitive electronic balance, rough balance, turbiditymeter, etc. which are essential for carrying out the wet-analysis for the common parameters in water and waste water from different sources are available in the laboratory and are being used regularly.

ENVIRONMENT PROTECTION TRAINING AND RESEARCH INSTITUTE LABORATORY

STATEMENT OF NO. OF SAMPLES ANALYSED AND INCOME FROM EXTERNAL SOURCES:

Year	No of samples (External)	Consultancy (EPTRI Projects)	Research Project	Revenue from external services	Customer % Internal	External
1994 - 95	**150**	**1120**	**Not defined**	**22,000**	**88**	**12**
1995 - 96	**475**	**1450**	**@ 25 samples per week (on average)**	**1,54,000**	**75**	**25**
1996(till 31st August)	**269**	**912**	**@ 10 samples a day (on average; basic spectros copy work)**	**49,000**	77	23

Annex B

Terms of Reference, Sida Consultant

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DRAFT 1996-06-25

TERMS OF REFERENCE

EVALUATION OF SIDA┤S ASSISTANCE TO THE ENVIRONMENT PROTECTION TRAINING AND RESEARCH INSTITUTE IN HYDERABAD (EPTRI)

1. BACKGROUND

Sida is supporting the Environment Protection Training and Research Institute in Hyderabad (EPTRI), India, according to a Specific Agreement signed by the Governments of India and Sweden on December 13, 1991.

In January 1992 the Environment Protection Training Centre within the Andhra Pradesh State Pollution Control Board (APPCB) was upgraded to an Autonomous Registered Society under the Department of Environment in the State of Andhra Pradesh. This was done as a preparation for extended services by the Centre as State Pollution Control Boards are not permitted to carry out consultancy services.

In 1991 the Ministry of Environment and Forestry, Government of India, declared the Institute a Centre for Environmental Training in southern India.

The Terms of Reference for the Consultancy Services are dated March 12, 1992. The Contract with the Consultant, ┼F-Industrins Processkonsult AB, was signed on July 10, 1992, and ┼F-IPK initiated work on the project in September that year.

The objectives of the Project were defined in the Terms of Reference for the Consultancy Services in the following words:

"The Project has as its main objectives

- to establish a quality oriented institutional framework for providing training to practising engineers/scientists from the industry sector in order to improve their skills in specific subjects/areas,

- to provide training to the personnel of the Pollution Control Boards of the four Southern States, inter alia regarding the environmental impact of location of industries and industrial emissions

- and also, through training, increase the general environmen- tal awareness of other groups in the society, particularly legislators, heads of local authorities, industrialists, lawyers, prosecutors, judges and journalists.

The Specific Agreement states i.a. :

That Sweden shall make available to India, as a grant, resources not exceeding SEK 15 000 000. The funds "shall be used in accordance with annual work plans and budgets agreed upon annually between the Parties."

That India shall make available "all financial and other resources needed and not provided by Sweden to secure the implementation of the Project in accordance with the aims and purpose as defined in the Draft Work Plan."

The project period has been extended up to March 31, 1997.

Sida is considering to support EPTRI during a second Project period, starting January 1, 1997. EPTRI will deliver a proposal for a Project Plan in July 1996.

A selection of relevant documents on the Project are listed in Appendix 1.

2. PURPOSE AND SCOPE OF WORK

The mission will have the double purposes of :

a) Assessing achievements and results of the first phase of cooperation and qualitative status reached by the institution. The purpose of this evaluative study is to document experiences and lessons of importance for the continued development of the institution, while providing a firmer base for considerations of the content, form and shape of a possible continued cooperation and support.

b) Appraisal of a Draft proposal for continued support to the development of EPTRI.

3. SPECIFIC TASKS

3.1 The evaluative assessment

The study shall cover the following main aspects:

Relevance of:

* The Institute in the context of the environmental challenges, current policies, legislation, institutions and major environmentally related programmes in India and Andhra Pradesh;

* The Sida support provided in order to build the capacity and ability of EPTRI;

Achievements during the first phase in reaching planned and agreed outputs and targets;

Effectiveness, i.e.to what extent the activities undertaken are efficient means in order to reach project and development objectives;

Long term effects and possible impact of the work of the Institute and the support provided. The assessment should specifically analyze effects on the environment,as well as consider effects on poverty, equity and gender equality;

Efficiency, i.e. have outputs and results been achieved at the most efficient way and lowest cost possible. The analysis should include both the activities to strengthen and develop the Institute as well as the organization and the services pro-vided by the organization as such;

Sustainability of results including:

* financial and economic sustainability and viability,
* institutional/organizational sustainability,

In carrying out the assessment and analysis the following specific issues **shall be given special attention:**

- -the degree to which institution and capacity building targets and objectives have been reached;

- Have activities related to capacity building and institutional development corresponded to conditions and requirements in India ?

- Has the financial planning and control of the project been conducted to satisfaction ?

- Has the overall support provided by the Swedish Consultancy firm been adequate in terms of cost efficiency, quality, timeliness and adaptation to conditions and needs ? Special attention should be given to the approach to capacity building;

- Has the project received the necessary support (policy, financial, otherwise) from State authorities ?

- Have modifications in Work Plans, agreed upon in connection with the annual review meetings, been executed and given expected results ?

- Has EPTRI today reached a convincing state of institutional, technical, financial and commercial sustinability ? If not, what will be needed to reach it ?

3.2 Appraisal of the draft project document, covering the following aspects:

Relevance, taking into account the state of competence reached today by EPTRI as well as currently proposed strategy for long term cooperation between Sweden and India;

Effectiveness of the proposed means and their efficiency in achieving financial, technical, institutional and commercial sustainability, analysing the proposal in terms of a LFA. The analysis should specifically consider to what extent the proposal represents a logical continuation of the first phase and the conclusions made in the evaluative study;

Efficiency, including assessment of proposed external cooperation and inputs;

Realism, i.e. to what extent the proposed project appears to be feasible to implement as proposed, identifying obvious risks, constraints and modifications needed. The analysis should also include assessment of State ownership and participation, roles to be played by different actors etc.;

Organization and monitoring;

Aspects of sustainability.

4. CONCLUSIONS AND RECOMMENDATIONS

Under each part of the study, the Mission shall present its major findings, conclusions and recommendations. With respect to the Draft Project proposal, the recommendations shall specifically include proposed modifications and amendments.

5.IMPLEMENTATION

The Mission will report to Sida and will work in close contact with EPTRI.

The Mission shall also cooperate with the Chief Secretary to the Goverment of Andhra Pradesh and Chairman, Board of Governors, EPTRI, and the Principal Secretary to the Goverment of Andhra Pradesh, Environment, Forests Science and Technoogy Dept. and Vice-Chairman, Board of Governors, EPTRI.

6. TIME SCHEDULE AND CONSULTANCY TIME REQUIRED

The evaluation should start in September and be terminated by October 31, 1996.

It is estimated that the evaluation will need three consultants, two Swedes and one Indian expert, working 3 man weeks each, including preparations, a visit to India and the elaboration of the Final Report.

7. REPORTING

The Mission shall deliver the Final Report within two weeks after the return from the visit to India, not later than October 31, 1996.

Sida Evaluations - 1996/97

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

96/39 Sri Lankan - Swedish Research Cooperation. Nimal Sanderatne, Jan S. Nilsson
Department for Research Cooperation, SAREC

96/40 Curriculum Development in Ethiopia, A Consultancy Study for the Ministry of Education in Ethiopia and for Sida. Mikael Palme, Wiggo Kilborn, Christopher Stroud, Oleg Popov
Department for Democracy and Social Development

96/41 Sida Support to Environmental Public Awareness and Training Projects through The Panos Institute, Gemini News Service and Television Trust for the Environment. Leo Kenny, Alice Petren
Department for Democracy and Social Development

96/42 Concessionary Credits in Support of Economic Development in Zimbabwe. Karlis Goppers
Department for Infrastructure and Economic Cooperation

96/43 Botswana Road Safety Improvement Projects. Rob Davey
Department for Infrastructure and Economic Cooperation

96/44 Programa de Estudo Pos Draduacao - PEP Guinea Bissau 1992-1996. Roy Carr Hill, Ahmed Dawalbeit
Department for Democracy and Social Development

96/45 Capacity Building and Networking, A meta-evaluation of African regional research networks. Jerker Carlsson, Lennart Wolgemuth
Department for Evaluation and Internal Audit

96/46 Support to the Maritime Sector in Lithuania. Nils Bruzelius
Department for Central and Eastern Europe

96/47 Local Development Programme in Nicaragua, PRODEL. Irene Vance, Jorge Vargas
Department for Infrastructure and Economic Development

96/48 The Planta Nicaragua Rehabilitation Programme. Consulting Services. Judith Muller, Per-Johan Svenningsson
Department for Infrastructure and Economic Development

96/49 Sida Support to the International Institute for Educational Planning, IIEP. Peter Williams, Lees Maxey
Department for Democracy and Social Development

96/50 The Human Factor. Cooperation in Public Administration between Sweden and Mongolia. Lennart Peck, Marianne Hultberg
Department for Infrastructure and Economic Cooperation

97/1 Swedish Consultancy Trust Funds with the African Development Bank. Karlis Goppers, Sven Öhlund
Department for Infrastructure and Economic Cooperation

97/2 Programa de Vivienda Social de FUPROVI, Costa Rica. Lillemor Andersson-Brolin, Bauricio Silva
Department for Infrastructure and Economic Cooperation

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