DGIS

Assistance to Environmental Impact Asessments in APWELL and APLIFT

June 1994

POS 011- 62

T1178

delft hydraulics

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ACRONYMS

AFPRO	Action for Food Production
AP	Andhra Pradesh
APLIFT	Andhra Pradesh Surface Water Lift Irrigation Project
APMIS	Andhra Pradesh Minor Irrigation Schemes
APSEB	Andhra Pradesh State Electricity Board
APSIDC	Andhra Pradesh State Irrigation Development Corporation
APSGWD	Andhra Pradesh State Ground Water Department
APSRAC	Andhra Pradesh State Remote Sensing Application Centre
APWELL	Andhra Pradesh Bore Well Irrigation project
ASCI	Administrative Staff College of India
CEC	Cation Exchange Capacity
CGWB	Central Ground Water Board
DAL/ZZ	South Asia Desk, Ministry of Foreign Affairs, The Hague
Dfl	Netherlands Guilders
DGIS	Directorate-General for International Cooperation of the Netherlands
	Ministry of Foreign Affairs
DST/ML	Special Programme for the Environment at the Ministry of Foreign
	Affairs, The Hague
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
GOAP	Government of Andhra Pradesh
GOI	Government of India
GON	Government of the Netherlands
GPH	Gallon per hour
ID	Irrigated Dryland
IRDAS	Institute for Resource Development and Social Management
NEERI	National Environmental Engineering Research Institute
NGO	Non-Governmental Organization
NGVO	Non-Governmental Voluntary Organization
0&м	Operation and Maintenance
PROGRESS	People's Research Organization for Grass-root Environmental Scien-
	tific Service
RNE	Royal Netherlands Embassy
SC & ST	Scheduled Castes and Scheduled Tribes
ТА	Tecnnical Assistance
ToR	Terms of Reference
WALMANTARI	Water and Land Management Training and Research Institute

GLOSSARY

ayacut	irrigation command area
crore	10,000,000 (1,00,00,000)
kharif	rainy season, late June until October
lakh	100,000 (1,00,000)
mandal	administrative level between village and district

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marginal farmer	farmer owing less than 1 hectares of land
medium farmer	farmer owing more than 2 hectares of land
rabi	dry season, November until February
taluk	district
small farmer	farmer owing between one and two hectare of land

EXCHANGE RATES (MARCH 1994)

1 US\$	= Rs. 31.00
100 Rs	= US\$ 3.23
1 US\$	= Dfl. 1.90
1 Dfl	= Rs. 16.32

Summary

This report summarises the involvement of a Dutch EIA expert in the execution of two Environmental Impact Assessments for minor irrigation projects in Andrhra Pradesh, India. The projects are the Andhra Pradesh Ground Water Bore Well Irrigation Project (APWELL) and the Andhra Pradesh Lift Irrigation Project (APLIFT). Both projects aim at increasing the agricultural production of small and marginal farmers through the provision of ground water, respectively surface water irrigation facilities.

In the first introductory chapter of this report, the Environmental Impact Assessment policy of the Netherlands Directorate General for International Cooperation is discussed. In line with this policy it was decided that the two projects, which are presently under preparation and which will be co-financed by the Government of the Netherlands and the Government of Andhra Pradesh, should be subject to an environmental impact assessment before implementation. According to the Indian legislation the projects do not need an environmental impact assessment, since they cover areas of less than 10,000 ha.

It was also decided that the impact assessments should be carried out by an Indian Institute. The Administrative Staff College of India (ASCI) in Hyderabad was asked to submit a proposal and was later awarded the study. The Andhra Pradesh State Remote Sensing Application Centre (APSRAC) and VIMTA Labs. Ltd. were included in the proposal as nominated subcontractors for the collection of baseline data.

However, it was realised that the experience with EIA for water resources development and irrigation projects of ASCI was rather limited and that support and advise in defining, starting up and planning of the environmental impact statement as well as the methodology development was needed. For this support and advise a contract was awarded to DELFT HYDRAULICS. This report only deals with the involvement of the Dutch expert, the results of the actual impact assessments are available in two separate impact statements, prepared by ASCI, and are only briefly summarised in this report. The specific and more general objectives of the involvement of a Dutch expert in the EIA project is also discussed in the first chapter. The APLIFT and APWELL projects are briefly described in chapter 2.

The environmental impact assessments were carried out between November 1993 and April 1994 along the lines described in the ASCI project proposal. This proposal, and the Terms of Reference on the basis of which the proposal was made, are discussed in chapter 3, together with the capabilities and organisation of ASCI and the initial workplan that was drafted for the study.

The actual contribution of the Dutch consultant to the execution of the EIA's (summarised in chapter 4) took place in the form of four visits to Hyderabad and a 3 day working session with two members of the ASCI project team in the Netherlands. Reports drafted after each of these visits are given in Annex 2. The first visit to India took place before the start of the project in July 1993. During this visit an assessment of the EIA capabilities of ASCI was made, the Terms of Reference for the study and the ASCI proposal were discussed, training needs were assessed and a first workplan was drafted. The main objective of the second visit (November-December 1993) was to help organise and participate in a scoping workshop for the projects. Besides, a number of field visits were made for the selection of the project sites and a more detailed workplan was drafted. X

Objectives of the third visit to ASCI (January 1994) were to check the progress of the EIA studies and to assist in starting up the data analysis, impact prediction and formulation of mitigating measures. During this visit a rough outline of the environmental impact statements was made and the introductory chapters for the statements were written. The final, fourth, visit to Hyderabad in March/April 1994 was meant to review the impact statements, to assist in preparing and conducting a workshop in which the results of the studies were presented and discussed, and to help incorporate comments on the reports, expressed during the workshop, in the final impact statements. In reality much time was spent in actually writing the impact statements.

In chapter 5 the EIA's in APWELL and APLIFT are evaluated. It is concluded that environmental issues received fairly ample attention in the APWELL and APLIFT formulation mission reports, project documents, etc. In the project documents it is stated that amendments, related to environmental aspects of the projects, can be made, once the results of the impact assessments become available. Several recommendations for such amendments are given in this report. Proposals made by PROGRESS and IRDAS, two NGO's which will be involved in the implementation of the project, lack attention for environmental issues. Also the list of selection criteria on the basis of which districts will be selected for irrigation development by the implementing agency, the Andhra Pradesh State Irrigation Development Corporation (APSIDC), does not mention environmental issues.

No separate Terms of Reference (ToR) for the two EIA studies were available, only a ToR for the EIA in APWELL is given in the report of the formulation mission of the Andhra Pradesh Minor Irrigation Schemes project. Overall this ToR was appropriate, and the ASCI proposal generally followed the ToR. This ToR aimed for a general assessment of the impacts of the projects on a district and regional level for the whole project area and zooming in on the actual project sites. This was concluded to be irrealistic given the size of the total project area, the number of irrigation schemes and bore wells and the available time. The actual EIA studies had the form of pilot studies in 2 districts only. Other elements of the ToR that were not realistic are the proposed use of a multi-criterion evaluation procedure and the assumption that most data are available as secondary data and that no additional field work was required.

The ASCI proposal was lacking a clear methodology statement and a clear description of tasks and responsibilities of the sub-contractors involved in the study. The latter is related to the somewhat confusing contract awarding procedure of the Royal Netherlands Embassy, who identified two subcontractors for the project, VIMTA Labs. Ltd. and the Andhra Pradesh State Remote Sensing Application Agency (APSRAC). However, no specific tasks were identified and no ToR's were formulated. Also the contract awarding of ASCI took a long time and the start of the project suffered from lack of communication between DGIS, the RNE and ASCI. The role of the RNE in the execution of the EIA's and backstopping of the Dutch expert was limited.

The expertise available at ASCI for carrying out EIA's was very limited at the start of the project. The execution of the project and the participation of two ASCI staff members in an EIA training course in the Netherlands increased the capabilities of ASCI to carry out EIA's in the field of agriculture and irrigation. Unfortunately this increase in expertise and experience was concentrated very much on one person, who will be leaving ASCI. ASCI proved very well able to collect data in the field and at secondary sources. Capabilities to interpret and analyze data are limited, as are the capabilities to report. Supporting staff, computer

facilities, etc. were available at the right moments and the organisation of field trips and the workshops was excellent.

The role of VIMTA Labs. Ltd. was merely limited to the collection of data in the field and analysis of soil and water samples. VIMTA Labs. is without doubt the best equipped laboratory in Hyderabad, also the company seems to be organised very well. Performance from the point of view of keeping to agreed time schedules was very poor.

APSRAC only provided data in the final stage of the study. Since the report of APSRAC has not been received yet, it is hard to assess the quality of the work that has been done. The applicability of the remote sensing results in the present EIA studies is thought to be fairly limited, because impacts have been assessed for small irrigation schemes only. Time management of APSRAC was very poor.

The APSIDC was very helpful in organising the field trips and in providing data. Also their contribution to the workshops was very positive. It is estimated that the awareness of environmental impacts of irrigation projects among the APSIDC staff has increased considerably as a result of the project.

In the EIA studies impacts on a number of key environmental parameters were assessed. These key environmental parameters can be brought together into five groups: water quantity, water quality, air quality, soils and the biotic environment. Changes in these key environmental parameters have an impact on a number of public interests like agricultural production, socio-economic development, public health, drinking water provision, natural resources management and socio-cultural values.

To assess the impacts, proposed APWELL and APLIFT sites in two districts were compared with so-called control sites, areas with comparable physical and socio-economic conditions, where irrigation has already been developed. Impacts on water quantity, the availability of the resource, were rated fairly seriously: neither the procedures for attaining a hydrological clearance for lift irrigation development, nor the procedures followed to assess the groundwater development potential are such that a sustainable use of the surface water respectively groundwater resource is guaranteed.

Impacts on the water quality are mostly related to over-use of pesticides and fertilisers and can be minimised by a better dosage and timing of the application of these agro-chemicals. The quality of both the groundwater and the surface water is sufficient for irrigation purposes.

Adverse impacts on soil characteristics are related to waterlogging, nutrient leaching and salinisation risks. These negative impacts can be prevented by a good system design (e.g. lining of the canals), appropriate crop selection and appropriate agricultural and irrigation management. Extension of the farmers is of utmost importance again.

Impacts on air quality are minimal and can be neglected. Impacts on the biotic environment are probably limited and only of local importance. They therefore will have to be assessed at every site.

Public health is likely to improve on most sites, since the socio-economic conditions of the local population (and so the nutritional and hygienic status) are likely to improve, negative

impacts may be related to contamination of drinking water as a result of over-use of fertilisers and pesticides and direct negative impacts on human health of agro-chemical application.

Most of the negative impacts of the APLIFT and APWELL project can fairly easily be prevented by good agricultural and irrigation management. Extension of the farmers is very important is this respect. It also has to be mentioned that the total amount of water to be pumped up respectively lifted by the APWELL and APLIFT project is very limited compared to the amount already extracted. Nevertheless it is recommended to carry out a rapid environmental impact assessment, with an emphasis on water availability and impacts on the biotic environment, for each proposed lift irrigation scheme and cluster of bore wells. Since management of the systems is a crucial factor in minimising negative impacts, monitoring of the actual performance of the systems and monitoring of the environmental impacts is very important.

The EIA studies also exposed a number of uncertainties and errors in the assumptions which formed the basis for the APWELL and APLIFT project formulation. Important in this respect are:

- the assumption that 75% of the bore wells will be successful, in reality this will be much lower, even if the criteria to declare a well successful are lowered, as is the current practise of APSIDC;
- the assumption that hydrological clearances are a guarantee for sufficient surface water for lift irrigation;
- the assumption that groundwater availability is no problem in so-called "white" districts;
- the assumption that farmers will only grow irrigated dryland crops. In reality most farmers will start to grow paddy rice, which requires much more water than ID crops, leading to water shortages at the tail ends of the schemes;
- the assumption that farmers will be able to contribute 35% of the cost of establishment of bore wells and lift irrigation schemes. Even 10% is considered too high; and
- the assumption that farmers are willing and able to manage their own irrigation systems.

If the EIA's had been executed at an earlier stage of the project cycle, these uncertainties might have been taken into account in the project design and the EIA studies would have served their true purpose, a tool for project planning, better.

As far as the question of possible integration of EIA studies with Gender Impact Studies and Poverty Impact Studies is concerned the consultant agrees with the statement made by the Gender Impact study team that a gradual integration of the 3 types of studies is possible and should be aimed for.

As part of the Terms of Reference the consultant was asked to identify institutes and organisations which could play a role in the monitoring of environmental impacts during the execution and finalisation of the APWELL and APLIFT projects. It was assumed that also further impact assessments will have to be carried out, either in the form of complete EIA's or in the form of rapid assessments. Capabilities and in-house expertise in conducting EIA's in the agriculture and irrigation field were therefore also inventoried.

On the basis of discussions with various people who were met during the consultant's stays in Hyderabad and contacts with a large number of institutes and organisations, it was decided that three organisations/institutes would be visited for a more detailed discussion on available equipment, expertise and capabilities. The organisations were: the Action for Food Programme (AFPRO), an NGO active in the field of agriculture, rural development and irrigation, the Andhra Pradesh State Ground Water Department, the governmental organisation which is responsible for the monitoring of ground water quantity and quality in the Andhra Pradesh State, and the Water and Land Management and Training Institute (WALMANTARI). Besides, the capabilities of the Administrative Staff College and VIMTA Labs. Ltd. were re-assessed.

Based on visits to these organisations and discussions with staff members active in the field of environment and agriculture/irrigation, it was concluded that an organisation which can independently carry out a monitoring programme or do impact assessments of irrigation projects is not available in Hyderabad. From a broad EIA point of view, WALMANTARI seems the best equipped institute to organise and supervise EIA related activities. Monitoring of water levels and aquifer performance will have to be sub-contracted to either AFPRO or the APSGWD. For soil and water sample analysis VIMTA Labs. Ltd. could be hired. Their facilities are by far the best available in Hyderabad. Besides, other organisations/institutes will have to be subcontracted for the monitoring/assessment of impacts on public health and flora and fauna and the irrigation system performance, including socio-economic impacts. This would mean that at least 4 or 5 institutes/organisations would be involved in the monitoring/assessment activities. The present APWELL and APLIFT EIA project has shown that this may result in serious organisational problems. The capabilities of ASCI are very much related to the person of Dr. Satish and are insufficient, once Dr. Satish leaves the institute.

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1 Introduction

1.1 The Environmental Impact Assessment policy of the Directorate General for International Cooperation

All over the world natural resources are subject to increasing exploitation pressure. Overexploitation and exhaustion are common environmental problems in many countries. At the same time associated pollution levels tend to increase. As a result, environmental management, the difficult task to balance the needs of society with the limits set by the environment, becomes more and more important and should be addressed in any project, plan or policy.

This was also recognised by the Directorate General for International Cooperation (DGIS) of the Netherlands Ministry of Foreign Affairs, who, in the policy document "A World of Difference" (DGIS, 1990), defined sustainable development as one of its main policy objectives. The preservation of the "ecoscope" by means of protection, conservation and improved management of nature and the natural resources is considered very important and Environmental Impact Assessment (EIA) of plans and programmes is thought to be one of the ways to meet this objective. The other priority objectives in the Netherlands development cooperation policy are poverty alleviation and autonomy of woman.

In the DGIS publication "Environmental Impact Assessment in Development Cooperation" (DGIS, 1993) the environment is defined as the living and non living surroundings of organisms, including humankind. As such, constituents of the environment are not only for instance climate, the soil, the vegetation, the fauna and their interrelationships, but also the people's socio-cultural ways. An important concept in this respect is also the concept of the "ecoscope", as discussed in "A world of difference". According to this document the ecoscope includes all economic functions of the environment. In a certain stage of its evolution an ecosystem can provide a limited amount of resources and also can absorb a limited amount of polluting substances, without degradation. Over-exploitation of the resources does not only affect the productive capacity of the environment but also its regulation and information function. Every use of non-renewable resources, over-exploitation of renewable resources and pollution reduces the ecoscope. Sustainable use of the resources means that the essential processes in the ecosystem are not disturbed and that the ecoscope is maintained while mitigating measures and alternatives are taken into account to prevent, correct or compensate damage. EIA as a process to provide information on the environmental effects of proposed activities, projects and programmes, is a very useful tool in environmental planning and decision making and may help to avoid a reduction in the ecoscope. EIA is concerned with identifying, predicting and evaluating the foreseeable environmental effects, both beneficial and adverse, of public and private (development) activities and with the generation of alternatives and mitigating measures, aiming at eliminating or minimizing the negative and optimizing the positive impacts.

According to the Netherlands policy for development cooperation, EIA has to be an integrated part of the project cycle of any development cooperation activity. The first step is the initial assessment of environmental impacts as part of the so-called D-screening, in which possible implications of a project idea or proposal for poverty, woman in development and environment are estimated. It is also assessed whether or not the project will be carried out in an area which is vulnerable from an environmental point of view.

The next step in the procedure after the initial screening is the scoping. Scoping concerns the determination of the most significant potential environmental impacts associated with the project and the identification of possible alternatives which would enable the project to be implemented in the most environmentally sound manner. Scoping is carried out by experts and policy makers together in a meeting between donor agency, government officials and environmental experts, preferably during the preparation phase of the project.

Scoping results in project specific guidelines for the EIA to be included in the ToR for the feasibility study. In the project cycle this results in an Environmental Impact Statement (EIS) to be drafted during the formulation stage. The EIS is defined as a report in which the effects of a certain project, plan or policy on the physical, natural and social environment are presented, as well as an analysis of possible alternatives to avoid, limit or mitigate these negative environmental impacts. The EIS may contain detailed proposals for mitigating measures that are translated into activities to be included in the project document, which forms the basis for the implementation of the project or programme.

In line with the general DGIS policies it was decided that both the Andhra Pradesh Lift Irrigation Project (APLIFT) and the Andhra Pradesh Ground Water Bore Well Irrigation Project (APWELL), two minor irrigation projects which are presently under preparation and which will be co-financed by the Government of the Netherlands and the Government of Andhra Pradesh, should be subject to an environmental impact assessment before implementation. However, both projects have gone through a very long preparation period. Already in 1987 a first fact finding mission visited Andhra Pradesh. The DGIS policy objective of sustainable development, on the other hand, is of a recent date and is actually still in a stage of further development of the instruments for operationalisation. As a result, the above sketched procedure for inclusion of EIA in the project cycle was not completely followed in the APWELL and APLIFT project. The EIA came in a fairly advanced stage of the project cycle: the projects were already determined on the basis of their engineering, technical and economical feasibility. As such, alternatives to the projects were left out of the scope of the study and efforts concentrated on identifying mitigating measures which can be incorporated in the implementation phase of the projects.

It was also decided that the EIA's should be carried out by an Indian Institute, but at the same time it was realised that experience with EIA for water resources development and irrigation projects in India is rather limited and that support and advise in defining, starting up and planning of the Environmental Impact Statement as well as in the methodology development was needed. The Administrative Staff College of India (ASCI) in Hyderabad was asked to submit a proposal for the EIA. The Andhra Pradesh State Remote Sensing Application Centre (APSRSAC) and VIMTA Labs. Ltd., both located in Hyderabad as well, were included in the proposal as nominated subcontractors for the collection of the baseline data. DELFT HYDRAU-LICS of the Netherlands was asked to support and advise ASCI in drafting the EIA's for the two projects. The ASCI proposal will be discussed briefly in chapter 3, the Terms of Reference of DELFT HYDRAULICS are given in Annex 1. This report gives an overview of the involvement of the Dutch consultant in the EIA projects.

The EIA studies were carried out in the period November 1993-April 1994 by the Agricultural and Rural Development Area of ASCI, the EIA project team was headed by Dr. S. Satish. The

input of DELFT HYDRAULICS was provided by Dr. M. Vis, who visited Hyderabad four times between July 1993 and April 1994.

1.2 Objectives of the project

The immediate objective of the project was to support and advise the Administrative Staff College of India (ASCI) in drafting Environmental Impact Assessments for the Andhra Pradesh Lift Irrigation and the Andhra Pradesh Ground Water Bore Well Irrigation projects and recommend in which way a linkage between the results of the EIA and the monitoring of the environmental impacts during the execution and finalisation of the APWELL and APLIFT projects can be assured by specifying tasks and responsibilities of the various parties involved in monitoring the projects.

Other objectives of the project were related to institution building and improvement of capabilities in the environmental field, especially in the field of Environmental Impact Assessment. More specific: to improve the capabilities of the Administrative Staff College for conducting EIA training for government officials. At the same time the capabilities of ASCI to actually conduct an environmental impact assessment for the APWELL and APLIFT projects were improved.

Since 1987 DGIS is involved in the creation of awareness and the enlargement of expertise in the field of Environmental Impact Assessment among officials of the Indian Ministry of Environment and Forests as well as among (high ranking) policy makers of a large number of governmental organisations, that are involved in the execution of the Indian environmental legislation and policies, like Pollution Control Boards, Irrigation Departments etc. In the period between 1987 en 1992 three High Level Policy Seminars and 15 workshops have been organised in India within this framework. These workshops, dealing with EIA in Water Resources Development projects, EIA in Port and Harbour Development and EIA for Industrial Siting and Landuse Planning were held at a number of Indian research and training institutes, amongst which ASCI. Secondary objectives of the workshops were to "train the trainers" and to improve the capabilities of a number of Indian Institutes to independently carry out environmental impact assessments.

The Administrative Staff College of India is one of the institutes which were though to be able to play a role in the further training in the field of EIA, as well as in independently carrying out impact assessments. Therefore ASCI has been assigned by DGIS to carry out the EIA's for the APLIFT and APWELL projects. Since it was realised that the level of basic knowledge and experience in EIA studies of ASCI was insufficient to carry these projects out independently, the project described here not only aimed at supporting and advising ASCI in carrying out its assignment, but also at providing further "on the job training". 2.18

2 Description of the APWELL and APLIFT projects

2.1 History of the projects

As mentioned in paragraph 1.1 the APWELL project has already a long history. In 1987 the Government of India (GOI) submitted a proposal to the Government of the Netherlands (GON) for funding of a number of minor irrigation projects in Andhra Pradesh. A Netherlands fact finding mission expressed its preference for ground water irrigation through bore wells. A revised project proposal was appraised by an Indo-Netherlands mission in 1990. The mission recommended that the mission report should pay explicit attention to the agro-economic and socio-economic aspects of the project as well as to irrigated agriculture extension, environmental impacts and the project's impact on woman. Comments of the GOI and the Government of Andhra Pradesh (GOAP) on the appraisal report were incorporated in a new proposal, which was submitted to the GON in 1991. In March 1992 a formulation mission fielded by GON prepared a project document for consideration by GOI and GON.

At the same time a proposal for a "Surface Water Lift Irrigation Schemes" project was prepared by the Andhra Pradesh State Irrigation Development Corporation (APSIDC). Also in March 1992 this proposal was discussed by an Indo-Netherlands fact finding mission and GOAP and APSIDC. On the basis of the missions recommendations APSIDC forwarded a revised project document in April 1992. In May 1992 an appraisal mission was fielded to assess this revised project proposal.

In November-December 1992 a Dutch mission was fielded with the task to formulate the Andhra Pradesh Lift Irrigation project (APLIFT) and further specify the APWELL project document on organisational arrangements and privatisation of the bore wells. Besides, the mission had to screen both project documents on contradictory approach and conflicting activities and requirements, as well as create conditions for the incorporation of the results of the EIA in the implementation phase.

Although the APWELL and APLIFT projects are closely related to each other, in the sense that the projects are located in the same area, are implemented by the same organisation, follow a similar approach and have the same target group and external funding, it was decided that two separate Environmental Impact Statements should be prepared by ASCI.

2.2 Main features of the APWELL project

The immediate objective of the APWELL project is to increase agricultural production of small and marginal farmers in a number of districts in Andhra Pradesh through the provision of ground water irrigation facilities. The more long term objective is to improve the living conditions of the small and marginal farmers, by means of environmentally sound and sustainable interventions.

In total 5,400 bore wells will be created in seven districts of the hard rock area of the state. Also, about 280 sick wells will be rehabilitated and 500 observation wells will be constructed. The schemes will be selected on the basis of the following criteria: at least 80% of the participants will be small or marginal farmer (i.e. having less than 5 acres of land), whereas at least 65% of the area to be irrigated has to belong to small and marginal farmers. As a result of the EIA some environmental criteria may be added to the ones mentioned above.

The schemes will consist of bore wells each yielding on average 15 to 16 M^3 per hour, with an average command area of 3 ha. The total net irrigated area will be about 16,200 ha and about 13,500 small and marginal farmers will benefit from the project.

Other important key features of the project are farmer participation and privatisation of the schemes. The farmers will participate in design and construction of their own schemes and will pay part of the cost, whereas they will assume complete ownership of the schemes infrastructure one year after commissioning of the pumps. Non governmental organisations (NGO's) will assist the farmers in organising themselves and will provide training in irrigated agriculture. Special attention will be given to the position of woman. Irrigation engineers will be trained in farmer's organisational and participatory aspects.

The project will be implemented by APDISC and non governmental organisations, the activities of APSIDC and the NGO'S will be coordinated by a Technical Assistance (TA)-Consultant who will reside in a Programme Support Office. APSIDC will be responsible for the preparation, design, construction, commissioning and initial operation of the schemes and for training of the farmers on scheme operation and maintenance. The NGO'S will be responsible for the execution of the non-engineering activities such as organisation and training of farmers and coordination with existing district development activities. The total project cost are estimated at Dfl. 40.8 million (Rp 69.3 crores) and will be shared between the GON (68.8%), the GOAP (12.5%) and the farmers (18.8%). The project duration will be 6 years. Table 1 summarises the main features of the APWELL project.

Number of bore wells	5,400
Command area Total Per scheme	16,200 ha 3 ha
Target group	13,500 small and marginal men and women farmers
Target area: districts	Prakasam Mahabubnagar Kurnool Anantapur Nalgonda Chittoor Cuddapah
Implementing agencies	APSIDC, NGO'S, Programme Support Office
Long term objective	Improve living conditions of small and marginal farmers through sustainable and environmentally sound interven- tions
Immediate objective	Increase agricultural production of small and marginal farmers in target area through provision of irrigation facilities
Project duration	6 years
Project cost	Dfl. 40.8 million (Rs 69.3 crores)

Table 1 Main features of the APWELL project

2.3 Main features of the APLIFT project

As for the APWELL project, the immediate objective of the APLIFT project is to increase agricultural production of small and marginal farmers in a number of districts in Andhra Pradesh, in this project not through the provision of ground water irrigation facilities, but by providing surface water lift irrigation facilities. The more long term objectives of the project, the criteria for scheme selection, the way in which the project will be implementated and important features like farmers participation and privatisation are similar to those of the APWELL project.

In total 107 lift irrigation schemes will be constructed, covering a total area of about 24,500 ha. The project will be located in 7 districts in the basins of the rivers Krishna, Godavari and of some minor rivers in the Centre and North of the State. In total 20,000 small and marginal farm families will benefit from the project. It is assumed that water will be available during the kharif and rabi seasons, if water is only available during the kharif season, the expected benefits are insufficient to interest farmers in the project.

Creation and installation of a lift irrigation scheme will take approximately 4 years. Typically a scheme will consist of an intake structure, a conveying system and a number of diversion

boxes, culverts and other structures. The total cost of the project are estimated at Dfl. 32.7 million (Rp 55.6 crores) and will be shared between the GON (68.2%), the GOAP (11.6%) and the farmers (20.2%). Table 2 summarises the main features of the APLIFT project.

N	
Number of schemes	107
Command area Total Per scheme	24,500 ha < 1000 ha
Target group	20,000 small and marginal men and women farmers
Target area: districts	Prakasam Mahabubnagar Kurnool Warangal Kamman Adilabad Guntur
Implementing agencies	APSIDC, NGO'S, Programme Support Office
Long term objective	Improve living conditions of small and marginal farmers through sustainable and environmentally sound interven- tions
Immediate objective	Increase agricultural production of small and marginal farmers in target area through provision of irrigation facilities
Project duration	6 years
Project cost	Dfl. 32.7 million (Rs 55.6 crores)

Table 2 Main features of the APLIFT project

3 Starting situation and workplan

3.1 EIA policy of the Government of India

In India it is now recognized that projects should not only be evaluated on their economic returns and technical feasibility, but also on possible undesired environmental consequences. To incorporate environmental issues in development projects from the project formulation stage on, an Environmental Impact Assessment procedure has been introduced. Government approval towards investment decisions and selection of sites for projects in various sectors, including river valley (irrigation) projects, is accorded on the basis of the environmental impact assessment and clearance thereof.

Impact assessment of a development project is carried out by the Ministry of Environment and Forests, with the help of inter-ministerial Appraisal Committees, comprising of experts from various, project related, disciplines. The feasibility reports along with an Environmental Management Plan and/or an Environmental Impact Statement, as provided by the project authorities, are scrutinized by these Expert Groups. To help the project authorities, the Ministry of Environment has developed guidelines and questionnaires indicating the environmental issues that have to be addressed in the Environmental Management Plan or Environmental Impact Statement.

Guidelines and a questionnaire for environmental impact assessment of river valley and Hydro-Electric projects have been issued by Ministry of Environment and Forest of the Government of India in 1985 and 1989 respectively (GOI,. Ministry of Environment and Forests, 1985, 1989).

According to the guidelines only major irrigation projects, covering 10,000 ha and above require an Environmental Impact Assessment.

Specific laws to regulate the use of (ground)water resources are under debate but have not yet been implemented.

3.2 Capabilities and organisation of ASCI

At the start of the project some knowledge on environmental impact assessment procedures and techniques was available at ASCI. In the past ASCI twice hosted a workshop on EIA carried out within the framework of the Indo-Dutch project on EIA by Geoplan. A number of ASCI faculty members also participated in these workshops. This knowledge is mainly available in the Energy, Environment & Technology and the Agriculture & Rural Development areas of ASCI. However, this knowledge is insufficient to produce an environmental impact assessment for the APWELL and APLIFT project, which will meet the required DGIS standards. Also the experience of ASCI with EIA is insufficient to develop and deliver courses on the subject. Actual experience with carrying out an EIA is considered a prerequisite to be able to develop and conduct successful courses and workshops.

The Administrative Staff College, located in Hyderabad, Andrah Pradesh, is an autonomous

and self financing institution by the Government of India, supported by the corporate sector. ASCI is primarily a training institute, active in the field of management development. Besides research, consultancy is done for a variety of clients, amongst which international donor agencies.

ASCI has a professional Staff of about 40 persons, sub-divided into 7 areas: Energy, Environment & Technology; Finance; Marketing; Computer and Management Information Systems; Agriculture & Rural Development; Human Resources; and Economics.

The assistance was mainly directed towards the faculty members of the Agriculture and Rural Development Area at ASCI. Sub-contractors of ASCI in the project, VIMTA Labs. Ltd. and the Andrah Pradesh State Remote Sensing Application Centre (APSRSAC), benefitted from the project as well. Furthermore, creation of awareness of environmental impacts among the officers of the project implementing agency, the Andrah Pradesh State Irrigation Development Corporation, was also aimed for. The project group at ASCI consisted of 7 persons, 5 man and 2 woman.

3.3 The Terms of Reference for the EIA studies in APWELL and APLIFT

The Terms of Reference for the EIA study by ASCI have been drafted in February 1992 by a formulation team, which was fielded to prepare the project document for the Andhra Pradesh Minor Irrigation Schemes (APMIS) project. The Terms of Reference for the Environmental Impact Statement is given as Appendix 4 of this Project Document. No separate ToR has been prepared for the EIA of the APLIFT project.

The ToR states that, in view of the stage of preparation of the project, the comparison of alternatives will have to be limited to the site selection. It was also recognised that the diffuse nature of the project limits the possibility for a detailed specification of impacts and it was concluded that the impact statement should concentrate on general impacts and provide an inventory of issues to be included in the procedure for site selection.

Input of a Dutch expert was thought to be essential to ensure the development of a balanced approach in the Environmental Impact Study of the project, as well as in future impact assessments to be carried out by ASCI. The input of the Dutch expert was thought to take place in the initial stage of the study to help define the details and in the final stage, to help formulate conclusions. Some of the main elements of the ToR are reproduced in the following:

Baseline studies

The ToR assumes that the baseline conditions in the whole project area will be described, that project activities are already described in the Project Document and that the socioeconomic and demographic aspects are dealt with by other components of the project.

Impact assessment

Impacts have to be evaluated and quantified by the project team. Firstly the impacts of the project activities on a district or regional level have to be identified and quantified. These include effects on:

- water resources;
- water quality;
- public health;
- soil fertility;
- use of fertilisers and pesticides; and
- type of crops.

Secondly, these impacts have to be assessed for each individual site in a much more specific way.

The time available for the study does not permit additional field studies, but a study based on remote sensing data can be used to provide a basis for the prediction of the locations and extent of some specific impacts.

Mitigating measures

For all significant adverse effects of the project, the possibility of corrective measures has to be investigated, the formulation of these measures has to be done based on <u>site specific</u> characteristics.

Monitoring

The results of a monitoring programme will be used to determine the need for corrective measures and will also allow the validation of the assumptions that formed the basis for the impact statement. Monitoring should concern the following characteristics:

- ground water levels;
- water quality data (irrigation and drinking water);
- soil quality data (organic matter, CEC, etc.); and
- use of agro-chemicals (type, amount, timing).

Staff requirements

For the execution of the study the following fields will have to be covered:

- environmental sciences/natural resources;
- agriculture/water management;
- irrigation;
- hydro-geology;
- (geo)-chemistry;
- public health;
- drinking water supply;
- soil science;
- sociology; and
- (agro)-economy.

By focusing on the key issues, the team can be limited to the following experts:

- environmentalist/natural resources specialist;
- agriculture/water management specialist;
- hydro-geologist;
- chemist; and
- soil scientist.

ASCI will take care of the agricultural issues and general data management. The Dutch consultant will cover the environmental and natural resources component and help in formulation of the methodology and the integration of the data at the end of the study. One of the remaining posts will be filled in by a scientist from the National Environmental Engineering Research Institute (NEERI) or another Indian Institute, the other two will be filled in by local consultants.

Timing and organisation

The EIA will have to be completed before the Inception Phase of the project, in order to allow incorporation of the recommended measures and procedures in the general approach of the project. The study requires a period of 3 months and will start with a workshop to produce an inventory of the possible impacts, followed by scoping of the identified impacts. During the workshop also the most suitable approach will be formulated. Data collection, coordinated by ASCI, will be finished by the end of the first month. The results will be collected and assembled into a report by ASCI as well. The report will be distributed among the members of the team for comments and inclusion of additional data. These comments and additional data will be collected by ASCI and distributed again to the study team members. In the meantime a baseline survey will be carried out by the Andhra Pradesh State Remote Sensing Application Centre.

In the two weeks before the end of the study a workshop for the integration of all assembled opinions and data will be organised. During the workshop a selection of suitable environmental indicators will be made and these will be used in a multi-criterion decision making model.

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3.4 The ASCI proposal

ASCI submitted a proposal for carrying out the Environmental Impact Assessments to the Dutch Embassy in the summer of 1992 (exact date not known). The proposal was written on the basis of a Terms of Reference for the Environmental Impact Statement, as given in Appendix 4 of the Andhra Pradesh Ground Water Minor Irrigation Schemes (APMIS) Project Document of March 1992 and summarised in paragraph 3.3. A contract was only awarded in July 1993, after a first visit of the consultant to Hyderabad.

The proposal gives a short description of the APWELL and APLIFT projects and states that the EIA is on a pilot basis and confined to 2 districts, Prakasam en Mahabubnagar, for the two projects jointly. Later it was decided that 2 separate impact assessments would be elaborated. As objectives of the EIA's are given:

- development of an environmental inventory of the project area to assess the problems and potentials and to serve as a benchmark for future monitoring;
- prediction of the impacts of the projects;
- design of technically feasible, socially acceptable and economically viable mitigating measures;
- appraisal of the alternative development options and selection of the one which maximises the benefits per unit of investment; and
- clarification of the role and responsibilities of the different project partners.

These objectives are well in line with the general objectives commonly set for Environmental Impact Assessments.

In the proposal also the environmental aspects that may be affected by the projects and thus have to be taken into account in the EIA, are given. These are:

- water quantity, rates of abstraction should be equal or less than the rate of recharge (APWELL);
- water quality, water quality should not jeopardise future use; leaching of chemicals, contamination with inadequate treated sewage and increased salinity contents has to be prevented;
- air quality;
- public health, problems may arise as a result of deterioration of air and water quality;
- soil fertility, reduced productivity as a result of soil erosion; and
- biodiversity, reduction in gene pool content.

The specific attention for air quality aspects seems not totally justified, on the other hand, water borne diseases and water logging and salinisation problems are not specifically mentioned in the proposal.

The proposal mentions a number of components of a conceptual framework for EIA like: impact identification, baseline studies, prediction of impacts, assessment of impacts, trade-off analysis and identification and evaluation of mitigating measures. Missing elements are the autonomous developments and monitoring aspects. The approach for each of these components is only very briefly described and the following project staff is proposed:

- environmental sciences/natural resources specialist;
- agriculture/water management specialist;
- watershed management specialist;
- hydro-geologist;
- chemist; and
- soil scientist.

The proposal mentions that social and economic elements are considered to be already covered in the project document and that other data will be extracted from various agencies and that additional field trips and laboratory analysis will be made. ASCI will identify a nodal agency for the collation of this information and is responsible for:

- agriculture relates issues;
- general data management;

- overall management, incl recruitment;
- preparation of EIS; and
- preparation of a monitoring framework.

External consulting help will be sought from a hydro-geologist, a chemist, a soil scientist and a watershed management specialist.

3.5 Initial workplan

Although the project officially started on the first of November 1993, the consultant already spent one week at ASCI in July 1993 for first discussions on the project. During this first visit a rough draft workplan for the EIA projects was made. This workplan was revised and detailed during the second visit of the consultant in November 1993. In this paragraph the workplan is presented, in the next chapter the consultants involvement in the EIA projects will be discussed.

It was agreed that the project would cover a period of 6 months and that a draft end report would be submitted within 4 weeks of finalisation of the project. It was also agreed that at the start of the project, early November, a training course of 2 weeks in the Netherlands for 2 ASCI staff members would be arranged for. Directly following this training course, the second half of november, the ASCI staff members would stay for a couple of days in Delft to draft a final plan for a "scoping workshop" to be held in Hyderabad in early December.

Objectives of this scoping workshop were to define the approach to be followed in the EIA project, to identify the most relevant impacts and to define the required database. A secondary objective was to create more environmental awareness amongst the participants. Participants to the workshop were representatives of the APWELL/APLIFT project executing agency (the Andrah Pradesh State Irrigation Development Corporation), representatives of various research and training institutes active in the field of irrigation and water resources development, representatives of relevant governmental organisations (e.g. A.P. State Groundwater Board), and local NGO's, as well as representatives of the Andrah Pradesh State Remote Sensing Application Centre (APSRAC) and VIMTA Labs. Ltd., two sub-contractors of ASCI in the project.

The consultant helped organise and participated in the workshop. Prior to the workshop, a field visit took place to become more familiar with the actual field situation and to select the APWELL and APLIFT schemes for which the EIA would be taken up. After the workshop, a more detailed workplan for ASCI and both VIMTA Labs. Ltd. and the APSRSAC was drafted. The workplan for the consultant was closely linked to this workplan, since his first objective was to assist ASCI in carrying out the EIA. According to the planning ASCI, VIMTA Labs. Ltd. and APSRSAC would start data collection in the Mehabubnagar district immediately after the workshop. Data would be collected at one proposed APLIFT site and at one existing lift irrigation site, as well as at one proposed APWELL site and at a site with an existing cluster of bore wells. Secondary data would also be collected at the various institutes dealing with EIA and irrigation/water resources development related fields.

Since the data collection was planned to be finalised by the first week of January, a next visit of the consultant was planned for early January, to assist in starting up the data analysis and

in helping interpret the results. Draft reporting was planned to start in this period as well. In the period from half January till half March the data on the sites in the Prakasam districts would be collected, analyzed and interpreted. Final data interpretation and draft reporting would take place during a visit of the Consultant in the second half of March. During this period also a second workshop was organised in which the results of the study were presented. The results of the discussions during the workshop were incorporated in the final report. ¥,

4 Execution of the APWELL and APLIFT EIA projects and the consultants involvements

The EIA studies were carried out between November 1993 and April 1994. Before starting the actual studies, 2 staff members of ASCI, Dr. S. Satish and Mr. D. Vijay Sai, as well as 2 staff members of the project implementing agency, the Andhra Pradesh State Irrigation Development Corporation, Mr. K.V. Subba Reddy and Mr. V. Ramesh participated in an EIA course of 2 weeks in the Netherlands, organised by GEOPLAN, Consultants in Training and Human Resources Development. The consultant was involved in this training course. After the course Mr. Satish and Mr. Sai stayed another three days in the Netherlands for discussions with the consultant at DELFT HYDRAULICS.

During the execution of the studies the consultant trice visited Hyderabad to support and advise the Indian Counterpart in drafting the Environmental Impact Statements. Besides, ASCI was visited in July 1993. After each visit the progress of the projects was reported and discussed at the Royal Netherlands Embassy (RNE) in New Delhi and at DGIS, DST/ML. In this chapter the main results of the visits are summarised, more detailed information is available in annex 2, in which the itineraries and reports of the various visits are put together.

4.1 First visit to Hyderabad (July 1993)

A first short visit to Hyderabad was made between the 18th and the 23rd of July. Main objectives of the visit were to assess the state of affairs at ASCI, to discuss the Terms of Reference of the Dutch Expert and to check the perception of the project of the Indian counterpart. Besides, EIA training needs were identified, a draft workplan was made, and first ideas for an inception (scoping) workshop for the EIA's of the APLIFT and APWELL project were discussed.

4.1.1 State of affairs at ASCI

It turned out that ASCI was totally unprepared to start the project and not very well aware of what was actually expected of them. Although the first negotiations on the project go back to December 1991, a contract had not yet been awarded and ASCI had "put the project out of their mind". The latest contact with the Embassy dated from end of May 1993 and also DGIS in the Hague had not been in touch with ASCI. In this respect the visit of the Dutch expert, as a sign that finally something was going to happen, came as a surprise. This had serious consequences for the planning of the project, since Dr. Satish, the only person aware of the project at ASCI, was involved in a number of other projects and could only make himself available after half October 1993. It also became clear that involvement of other staff members had to be arranged for 3 to 4 months in advance as well.

4.1.2 Perception of the project

As far as perception of he EIA projects is concerned, it became clear that ASCI had in mind that only one report for the combined APWELL and APLIFT project would have to be submitted

and that no impact assessment for the APWELL project could be done as long as the sites for the wells were not known. It also became clear that ASCI presumed that an EIA training course of 1 month would be provided in the Netherlands before the start of the project and that the Netherlands would provide an expert to cover the EIA/natural resources aspects of the project. These perceptions were fairly contradictive with the ideas and ToR of the Dutch consultant, who assumed that the project had to start as soon as possible, that training, if needed, would be provided sometime during the course of the project, that 2 reports had to be prepared and that the role of the consultant was limited to support and advise and not execution of the imajor part of the EIA.

Differences in perception were discussed, and it became clear that Dr. Satish would not be available before half october and that other members of his staff could neither be mobilised before that date. It also became clear that the background knowledge of Environmental Impact Assessment procedures and methodologies of Dr. Satish and the other possible team members was so limited that training in EIA procedures and methodologies *before* the actual start of the project was required. The actual training needs were inventoried and a draft workplan was made. The workplan aimed at a training in the Netherlands in October and a start of the actual project activities in India in the second half of November. According to this first planning the project would be finalised by the end of April 1994. Finally a first set-up for an EIA scoping workshop at the start of the actual project was made.

4.2 Scoping workshop preparation in the Netherlands (1-4 November 1993)

Following the EIA training course in the Netherlands Dr. Satish and Mr. Sai of ASCI stayed three days at DELFT HYDRAULICS for discussions and preparation of the EIA scoping workshop. A large amount of literature was reviewed and various checklists were drafted. Presentations and a draft project document, to be presented at the workshop, were prepared.

4.3 Second visit to Hyderabad (17 November - 4 December 1993)

The main objectives of the second visit to Hyderabad were to help organise and prepare the EIA scoping workshop, to discuss the EIA studies with the sub-contractors of ASCI. (VIMTA Labs. Ltd. and the Andhra Pradesh State Remote Sensing Application Centre (APSRAC)), to select a number of project sites in the field and to draft a more detailed workplan for the EIA studies.

4.3.1 The scoping workshop

For the scoping workshop, which lasted three days, some 30 people from various backgrounds (research and training institutes, NGO's, implementing agencies etc.) had been invited. The objectives of the workshop were:

to formulate the expected output of the project;

- to define the approach to be followed;
- to identify the environmental characteristics (parameters) that have to be studied;
- to select indictors that will be used to assess the environmental impacts;
- to identify prediction methods;
- to identify possible mitigating measures;
 - to define the required database:
 - which data are needed;
 - which data are available; and
 - how reliable are the data;
- to contribute to the final project document.

Input into the workshop were the draft project document and a number of keynote papers dealing with subjects such as a conceptual framework for EIA studies, water resources development, water availability assessment, water quality and public health, flora and fauna and general environmental impacts of irrigation projects. After the presentation of each keynote paper the total group was divided in a number of sub-groups which discussed the presented item according to a fixed agenda. At the end of each day the results of the discussions in the sub-groups were presented and discussed plenary.

Overall it can be stated that the workshop has been very successful. Most of the participants were keen to share their experiences and to discuss matters. Discussions in most of the working groups focused on the relevant issues and a better understanding on probable impacts was gained as well as information on existing data at the various institutes. Of even more importance is the way in which the workshop has added to the environmental awareness of a fairly large number of APSIDC and Andhra Pradesh Ground Water Department (APGWD) engineers and that personal contacts during the workshop will greatly facilitate the data collection at these institutes. ASCI, VIMTA Labs. Ltd. and APSRSAC staff members present at the workshops benefited from the information exchange and felt more confident towards the tasks assigned to them than before the workshop.

The workshop was very well led by Dr. Satish and the facilities provided by ASCI were very good.

4.3.2 EIA capabilities of ASCI, VIMTA Labs. and the APSRSAC

Discussions with the ASCI project staff and at VIMTA Labs. and the Andhra Pradesh State Remote Sensing Application Centre revealed that the performance of ASCI in the study will depend heavily on the performance of Dr. Satish, it will really be a one-man show, since the capabilities of the supporting staff are very limited. Also the experience and capabilities of VIMTA Labs. in the field of EIA turned out to be very limited. Although their laboratory facilities are quit impressive and they seem able to collect and analyze data, they need to be guided very precisely in where and what to sample. The role of the Andhra Pradesh Remote Sensing Application Centre in providing baseline data may be relatively limited as a result of the fact that only small areas are covered by the EIA.

Of the required expertise, mentioned in the ASCI proposal (see paragraph 3.2), ASCI provides expertise in the agricultural field, VIMTA Labs. in the field of chemistry and the APSRSAC in the field of hydro-geology. Experience in the field of soil science, watershed management,

water resources planning and environmental sciences and natural resources is not available in the project team and has to be brought in from outside. On the contrary, ecology and public health aspects are covered fairly well by specialists of VIMTA Labs. and ASCI respectively.

4.3.3 Selection of study sites

During field visits to the Prakasam and Mahabubnagar districts sites were selected for the pilot EIA's. In each district a proposed APWELL and a proposed APLIFT site was selected as well as an existing ground water irrigation scheme and an existing lift irrigation scheme. Existing sites were selected for study as well as to be able to assess environmental impacts by comparison with control sites. The Andhra Pradesh State Irrigation Development Corporation, the implementing agency was asked to select the sites. For the APWELL project a cluster approach was adopted, meaning that the environmental impacts of the development of a number of close to each other located bore wells was assessed.

APSIDC was very cooperative and had prepared the field visits very well. However, the criteria with regard to selection of schemes as given in the APWELL and APLIFT project documents seemed not to be strictly followed by APSIDC. The impression was that they are quite opportunistic in their approach, that is, that they have a number of schemes "on the shelf" that will be implemented in a certain order as soon as funds become available from one source or another.

Also deviating from what is mentioned in the project documents is that the financial contribution of the farmers to the establishment costs of bore wells and lift irrigation schemes has been decreased from 35% to 10% by APSIDC, even these 10% are considered to be too high. During discussions with participants of the workshop it was furthermore stated that privatisation of the schemes is out of the question. "Hardware" that becomes available in directly or indirectly (by means of grants) government funded projects *always* stays government property, even the trees in reforested areas.

The field visits also showed that, again in contradiction with what is stated in the project documents, it is very likely that cropping patterns will change after the introduction of irrigation. There seems to be a very high preference for paddy rice growing for a variety of reasons.

Of importance is also the fact that APSIDC is only responsible for a very minor proportion of the lift irrigation and bore well schemes in the state. The majority is implemented by private enterprises, which can not be controlled. As a result impacts of the APSIDC projects will be very limited compared to the (cumulative) impacts of private projects. Likewise, mitigative measures may become totally irrelevant. For example, exhaustion of groundwater resources is uncontrollable, because no (legal) means exist to prevent private well owners from pumping as much water as they like, even in the very immediate surroundings of an APSIDC well.

4.3.4 Revised workplan and data collection program

The workplan of July 1993 was revised and, based on discussions in the scoping workshop, a detailed data collection program for ASCI and VIMTA Labs. was drafted. Data collection and analysis concentrated on water quantity aspects, water quality aspects, soils and agriculture, air quality and socio-economic and public healthy conditions. The kind of analysis to be done by APSRSAC was agreed upon.

4.4 Third visit to Hyderabad (January 9 - January 22 1994)

Objectives of the third visit of the Dutch expert to ASCI were to check the progress of the APWELL and APLIFT EIA studies and to assist in starting up the data analysis and help in interpreting the results in such a way impact predictions can be made and mitigating measures can be formulated. It was also aimed for to draft a rough outline for the final report and to assist in writing the introductory chapters.

4.4.1 Progress of the APWELL and APLIFT EIA studies

Concerning the project progress it could be concluded that a lot of data had been gathered, mainly by VIMTA Labs. Although clear appointments were made that all the samples would be analyses and survey data processed before my arrival in India, no real written down information was available. No data analysis had been done so far and most of the information was only available in the heads of the people concerned. In other words, progress had been less than assumed and the main purpose of my visit, assisting in the data analysis and the interpretation of the results in such a way that impact predictions could be made and mitigating measures formulated, could not be fully realised.

Both VIMTA Labs. and ASCI seemed very well able to collect all sorts of data and to present the gathered information in nice tables. To make a distinction between relevant and irrelevant data turned out to be harder, as is the conversion of data into useful information. Although I tried to put some systematics in the procedure of converting data into information I was not totally convinced that the message got through and we may run the risk that the Impact Assessment becomes the well known stack of tables, from which the reader has to draw it's own conclusions.

Progress of the work at APSRSAC was also limited, they only did some preparatory work.

4.4.2 Impact prediction

Impacts are mostly related to water quantity aspects. Concerning the bore well project it became more and more clear that sustainable yields, both of the aquifers and the individual wells are not assessed properly. As far as the APLIFT project is concerned, data on river flows and future water demands are not available and hydrological clearances are based on irrealistic data. Besides, the system design is generally not tuned to the cropping pattern that will emerge. Paddy is a major crop and cannot be denied. Other problems in the lift irrigation schemes are related to waterlogging, clogging of canals, aquatic weeds and over-use of

fertilisers and pesticides. Most of these problems can partly be prevented by lining the distribution canals. Water and air quality do not seem to be crucial factors, public health impacts yet have to be assessed.

Important is also to notice that people's capacity/willingness to manage the schemes on their own is not evident. Even if people are willing to manage the schemes on their own, problems may arise due to the high costs of operation and maintenance of the schemes, difficulties in obtaining spares and having repairs done and difficulties with revenue collection and cropping pattern imposition. From a cost perspective, it is expected that farmers will never agree to run the schemes on their own. Instead of Rs. 150 per year, the amount a farmer has to pay for irrigation water presently, he will have to pay Rs. 1,100, an increase by more than 600 per cent.

4.4.3 Reporting

A review of available literature was made and a list of reports and literature references that still had to be collected for inclusion in the study was drafted. Also the set-up of the Environmental Impact Statement was discussed and a preliminary table of contents was compiled. A start with writing down the first introductory chapters for the report was made.

4.5 Fourth visit to Hyderabad (March 20 - April 2 1994)

The main objectives of the fourth visit to Hyderabad were to review the draft EIA reports and to assist in the preparation of a workshop in which the results of the study would be presented to the same people who participated in the scoping workshop. It was planned that after the workshop some time would be spent on incorporating comments of the workshop participants in the EIA reports.

4.5.1 Review of the EIA reports

It turned out that the overall progress at ASCI had been very disappointing. According to the latest planning (January 11, 1994) data collection and analysis for both the APWELL and APLIFT sites in the Mahabubnagar district should have been finished at the end of week 2 (January 15). Data collection and analysis for the sites in the Prakasam district was scheduled to be finalised by the end of week 8 (February 26). With the Andhra Pradesh State Remote Sensing Application Centre (Dr. Rao) it was agreed that the results of the Remote Sensing analysis should be available no later than end of week 10 (March 12). The first 3 weeks of March would be used for report writing by Dr. Satish. Also an executive summary would be compiled, to be distributed among the participants of the second workshop, not later than end of week 11 (March 18). In week 12 the Dutch consultant would be available in Hyderabad for review of the reports and assistance in the preparation of the workshop. The workshop was planned to be held on the 25th of March. Week 13 was planned to be used for further review of the reports and incorporation of comments and suggestions made by the workshop participants. End of March draft reports were supposed to be available.During the discussions it became clear that the delay was substantial: of the APWELL site in the Mahabubnagar district information on both the proposed and existing sites had been gathered and
the samples have been analyzed, except for the public health data. In the Prakasam district only the water quantity aspects of both the proposed and control scheme had been finalised, all other information (on water quality, soils, air quality, health aspects) still had to be delivered by VIMTA Labs. Ltd. ASCI took care of the socio-economic aspects.

As far as the APLIFT sites in both the Prakasam and the Mahabubnagar Districts was concerned, all information was available except for the public health aspects. The available data had been analyzed and interpretations had been made, as well as a start with the reporting.

As reasons for the delay were given that it was a difficult task for VIMTA Labs. Ltd., because it was the first time they did this kind of survey. Furthermore, they had a lot of other assignments "and hence delay was inevitable". Even worse was the situation concerning the APSRSAC: nothing had been delivered. Reasons for the delay: too many other projects.

The real reason for the delay may also have been related to the fact that Dr. Satish will be leaving ASCI as per the first of May. He still seemed committed to the project, but his more long-term interests have decreased considerably and he has been very busy with finalising other obligations and arranging the details of his transfer. This will certainly have had an impact on the way the study has been managed by him.

Data collection and analysis by VIMTA Labs. Ltd., overall, seemed to have been carried out quite good, although part of the sampling and analysis had been done twice, because the results did not seem to fall within the expected ranges. Most of the data was presented in large, unstructured tables, no attempt had been made to organise, combine and summarise data in a logical way. Interpretation of the data by VIMTA Labs. has been very limited, only the part on ecological impacts (flora and fauna) had been worked out in more detail.

Review of the APWELL and APLIFT EIA "reports" learned that the reporting sofar was far from complete. The reports were missing any logic and organisation and were quite obviously put together very hasty. They were written in a "telegram" style, full of errors, and any form of lay-out was missing. Analysis data were not used to support conclusions, no cross references were made and interpretation of information was often erroneous. In other words: a long way to go. It was decided that the consultant would try to write the missing chapters and rewrite, to the extent possible, the APWELL EIA report. Set up and general information chapters of this report could than be used as an example for Dr. Satish to finish the APLIFT report.

4.5.2 The EIA workshop

The preliminary results of the EIA studies were presented on a one day workshop, held at the Administrative Staff College. More or less the same people that attended the scoping workshop in November were invited again. Results so far were presented by Dr. Satish (ASCI), Sujeet Kishen (VIMTA Labs.) and Dr. R.S. Rao (APSRSAC). Ample time had been reserved for discussion. Nearly all the invited persons, about 25 in total, were attending the workshop. The discussions were lively and served the purpose of the workshop: checking and improving the results of the EIA studies. The overall conclusions of the workshop, and for that matter of the EIA's, are that most impacts are related to the water quantity aspects of the project: the unsustainability of the resource use. The quality of the water is suitable for irrigation and irrigated agriculture does not seriously decrease the quality of surface waters. Impacts on the soil, the air quality and the human health conditions are also minimal. Surprising was that establishing irrigation at 3 of the 4 selected sites may have some serious repercussions on the flora and fauna.

4.5.6 Final reporting

A discussion on the possible timeschedule for the final reporting revealed that Dr. Satish would only be available till April 20. After that date he has other obligations. It also appeared that the APSRSAC would not be able to sent in the results of it's analysis before the 10^{th} of April. This meant that incorporation of the information in the EIA reports was impossible. After some discussion a middle of the road solution was reached, Dr. Rao and Dr. Satish agreed to sit together for 1 or 2 days and try to incorporate the most relevant information into the EIA reports. The final APSRSAC report will be added to the EIA's as an annex. It was agreed that Dr. Satish would sent the EIA reports to the Royal Netherlands Embassy in New Delhi and to DGIS, DST/ML in the Hague on the 20^{th} of April.

5 Evaluation of the EIA in APLIFT and APWELL

5.1 Environmental issues in the project documents

The APMIS mission report (NEDWORG, February 1993) states that one of the objectives of the Minor Irrigation Projects mission of November 1992 was to create conditions for the incorporation of the results of the Environmental Impact Assessment in the implementation phase of the projects. This is materialised in a short paragraph in the produced APWELL and APLIFT project documents (NEDWORG, February 1993) in which it is stated that the documents will be amended to include, were necessary, environmental aspects, once the results of the impact assessments become available.

Besides, the importance of environmental issues is stressed a number of times in the documents. To start with, both project documents explicitly state that the interventions to improve the living conditions of the small and marginal farmers in the project area have to be sustainable and environmentally sound. Furthermore environment is addressed in a separate section of the documents, in which environmental aspects that have to be taken into account in the project execution are listed. They are: conservation of soil and water, the water availability and the inefficient use of irrigation water leading to drainage and/or salinity problems. It is also stated that separate and independent EIA's will be made in two districts and that the recommendations of the EIA's will be included in the bidders' proposals and be integrated in the project procedures to be described in the work plan.

It is also mentioned that the EIA's will identify the indicators that have to be included in the environmental monitoring programme and make recommendations for training. The monitoring programme should address the quality and availability of the groundwater (surface water not mentioned), training should emphasize on economic water use, appropriate irrigation practices and crop selection and soil and water conservation.

Of importance is also that the project reports mention that the team leader of the TA-Consultant needs to have a good perception of environmental aspects of irrigation projects. Besides, short term input of an environmental specialist for 6 months (APWELL) respectively 3 months (APLIFT) is foreseen.

However, the qualifications of the team leader of the TA-Consultancy team (Annex 6 in the project documents) only mentions "good perception of social and socio-economic aspects of irrigation projects". Good perception of environmental aspects is not made explicit in these Terms of Reference for TA-Consultancy service. Neither is environment mentioned as one of the aspects to be taken into account in the external mid term evaluation of the project.

The proposal made by PROGRESS (Annex 8 of the mission report) does not specifically mention the environment, other than as part of the eco development programme in which woman play am important role. The IRDAS proposal (Annex 9) specifically mentions that further degradation of the environment should be prevented and that the existing situation should be improved, but does not indicate how this could be guaranteed.

The APSIDC selection criteria for districts to be selected in the APLIFT and APWELL projects, as given in Annex 5 of the mission report, are: the unirrigated cropped area, the geographical

area of drought prone taluks, the tribal population and the number of small and marginal farmers. <u>Environmental criteria</u> are not taken into account, and it is assumed that groundwater availability on the district level will not be a limiting factor.

Training needs as identified in the mission report only mention environmental issues as a subject in the training of the trainers (field workers of the NGO'S, AED, DRDA). The APSIDC district and division staff, as well as the senior staff should receive some training in environmental issues as well. Partly this has been covered by the participation of two APSIDC senior staff members in an EIA course in the Netherlands and participation of district staff in the APLIFT and APWELL EIA workshops in Hyderabad.

The APMIS Project Document and Mission Report of March 1992 (M-Consult, 1992) state that environmental impacts of the APWELL project are likely to be minimal. The Terms of Reference for the EIA study, Annex 4 to the Project Document, gives an overview of the potential impacts. Potential impacts of the APLIFT project are summarised in the APLIFT Appraisal Report of June 1992. It is stated that with good management of the projects, impacts on the environment will be minimal and that environmental studies are not necessary, since the areas to be transformed into irrigated areas are already under agriculture.

5.2 The terms of reference and ASCI proposal for the EIA study

The Terms of Reference for the EIA study and the ASCI proposal for carrying out the study have been presented briefly in chapter 3. In this section some comments on the ToR and the ASCI proposal will be given and the main differences between the two will be discussed.

The ToR aims for a general assessment of the impacts of the projects on a district and regional level for the whole project area and zooming in on the actual project sites. This seems irrealistic given the size of the total project area, the number of irrigation schemes and bore wells and the available time. Although it is stated that no comparison of alternatives will be made, the use of a multi-criterion evaluation procedure is recommended. It is not made clear what the objective of applying such a procedure could be.

The specific impacts to be studied, as mentioned in the ToR, cover the range of potential effects and the proposed staff requirements are appropriate. The assumption that most data are available as secondary data and that no additional field work is required is very optimistic. The remote sensing studies and the use that can be made of the results of such studies are insufficiently specified. The proposed duration of the study, 3 months in total, is very short, given the amount of communication between the various experts involved that is assumed.

The ASCI proposal generally follows the ToR. However, it mentions that the EIA will be initiated on a pilot basis for 2 districts only. Impacts on the air quality and biodiversity are added to the list of potential effects. This specific attention for air quality seems not totally justified, on the other hand, water borne diseases and water logging and salinisation problems are not specifically mentioned in the proposal. The conceptual framework for EIA mentioned in the proposal is not explained and a description of a general approach or specific procedures is missing.

The fields to be covered and expertise required, as mentioned in the proposal, are the same as those given in the ToR. The proposal mentions that besides collection of secondary data, primary data will also be generated during field trips and in the laboratory. This is in contrast with the ToR, in which was mentioned that only secondary data would be used.

The responsibilities of ASCI are described in the proposal, tasks and responsibilities of other agencies not.

5.3 Execution of the EIA's

Parties involved in the EIA

A fairly large number of organisations were involved in the organisation and execution of the EIA's. An overview is presented in the following table. The type of involvement of each organisation is given as well. The performance of each of the organisations in the process of organising and executing the EIA's will be discussed in the next paragraphs.

DGIS DAL/ZZ

In the preparation of the APWELL and APLIFT projects, environment received considerable attention. The seriousness of the impacts on the environment was well estimated and a ToR for the EIA studies was prepared. Some elements of the ToR were not very realistic or lacked detail, but the overall framework was well applicable. The role of DGIS DAL/ZZ in the actual execution of the study was very limited.

DGIS DST/ML

The division of roles between DGIS DST/ML and the RNE in coordinating the EIA study was not always very clear. Communication between the Hague and Delhi was not flawless and there seemed to be a difference in perception of the capabilities of Indian Institutes to carry out EIA studies. DGIS DST/ML was much more optimistic, and therefore had much higher expectations of the outcome of the study than the environmental expert at the RNE. Concerning the preparation of a ToR for and contracting of a Dutch expert it has to be remarked that contracting took place in a late stage and was not very well communicated with the RNE and ASCI. The Terms of Reference for the expert were very general.

Royal Netherlands Embassy

The environmental expert of the RNE contracted ASCI for carrying out the EIA studies. This is a logical choice, given the earlier involvement of ASCI in the Indo-Dutch EIA training programme. Contract negotiations were too lengthy and the actual contract was only awarded after the first visit of the Dutch expert to Hyderabad. The ASCI proposal, which formed the basis for the contract, was insufficiently reviewed and discussed with ASCI. Besides, the RNE also identified 2 sub-contractors for ASCI: VIMTA Labs. Ltd. and the APSRSAC. Although these institutes are both top of the line in their respective fields, the roles they were expected to play in the studies were not specified; no Terms of Reference for these Institutes were prepared. ASCI only knew which part of the budget had to be sub-contracted but did not know what to ask for it.

Organisation	Type of involvement				
dgis dal/zz dst/ml	preparation of APWELL and APLIFT, incl. preparation of the ToR for the EIA studies; coordination of the EIA; identification, preparation of ToR and con- tracting of Dutch expert				
Royal Netherlands Embassy	identification and contracting of Indian execu- ting agencies; backstopping of Dutch expert				
ASCI	responsible for carrying out the EIA studies and preparation of the impact statements; responsible for sub-contracting study partners				
VIMTA Labs. Ltd.	sub-contracted by ASCI, responsible for base- line data collection and laboratory analysis of water and soil samples				
APSRSAC	sub-contracted by ASCI, responsible for base- line data collection by means of interpretation of remote sensing images				
APSIDC	helped in the preparation and execution of the fieldwork; provided secondary data; participation in the workshops				
Various NGO's and research institutes	provision of data; participation in the workshops				
Dutch consultant	supported and advised ASCI in all stages of the EIA; regularly reported progress of the study and bottlenecks to the RNE and DGIS/DST-ML; drafted a report which summarises the experi- ences during the project				

Table 5 Overview of parties involved in the EIA's in Apwell and Apl	Table 3	Overview of	parties	involved	in	the EIA	's	in	APWELL	and	APLI	FT
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Backstopping of the Dutch expert and involvement in the execution of the EIA has been limited to debriefings after each visit and participation of the environmental expert and the expert on land and water of the Embassy in the scoping workshop during one day only. Guidance of the Dutch expert, i.e. in the form of comments on the reports of the various visits, has been very limited and participation in the final EIA workshop could have been very useful. However, it is realised that the fact that the environmental expert of the RNE left Delhi half way down the project and had to be replaced, may have had a negative influence on the involvement of the RNE with the project. Harder to explain is the apparent difference in opinion on the usefulness and desirability of impact assessments in APWELL and APLIFT that was perceived at the beginning of the study between the environment and land and water expert of the RNE. The actual execution of the EIA studies by ASCI deviated in a number of aspects from what was proposed in the proposal for the study. Most of these changes have been negotiated with the environment expert of the Royal Netherlands Embassy and have not been documented properly. Important changes were that the EIA's were only executed for 2 lift irrigation schemes and 2 bore well clusters, one of each in the Prakasam and the Mahabubnagar district. A district or regional assessment was not made. Also the total duration of the study was extended from 4 to 6 months.

ASCI

ASCI indeed acted as coordinator of the study, with sub-contracts awarded to VIMTA Labs. Ltd. for baseline data collection and laboratory analysis and to APSRSAC for remote sensing analysis. A study team as proposed in the ToR and the ASCI proposal was not assembled. At ASCI only Dr. Satish was really involved with the project, at VIMTA Labs. Mr. Sujeet Kishen was more or less full time involved with the project. Other expertise was acquired on ad-hoc basis. When needed experts in the various fields were visited and asked for data or expert judgements. Dr. Satish made very good use of his very extended network of professionals working in the field of environment, agriculture and irrigation. Nearly any desired appointment could be arranged for within hours. The commitment of Dr. Satish to the project was very high, even in the final stages when it was clear that he would be leaving ASCI for a new position.

The expertise available at ASCI for carrying out these kind of studies was very limited at the start of the project. Two areas within ASCI are dealing with environment: the Energy, Environment & Technology Area and the Agriculture and Rural Development Area. The former area has experience in EIA's but mainly carries out academic desk studies, whereas the latter area is much more applied research and field oriented. Attempts to team up the 2 areas failed due to competence problems within ASCI. The execution of the project and the participation of Dr. Satish and Mr. Sai in the EIA course in the Netherlands, increased the capabilities of ASCI to carry out EIA's in the field of agriculture and irrigation. Unfortunately this increase in expertise and experience was concentrated very much on the person of Dr. Satish, who has been leaving ASCI.

ASCI (= Dr. Satish) proved very well able to collect data in the field and at secondary sources and to summarise this in nice tables. Capabilities to interpret and analyze data, i.e. to transform data into information, are limited, as are the capabilities to report.

Capabilities of Dr. Satish to manage the project internal at ASCI were sufficient. Supporting staff, computer facilities, etc. were available at the right moments and the organisation of field trips and the workshops was excellent. Also the logistics, lodging, provision of office space etc. for the Dutch expert was arranged for very well. Managing the project externally, i.e. forcing VIMTA Labs. and APSRAC to stick to the set time schedules proved more difficult. Reasons for this may be the lack of good ToR's for the subcontractors, and the unique position of APSRAC and the seniority of it's director, who clearly is used to handle projects the way he likes to handle them. Also of importance may have been the fact that Dr. Satish was also involved in finalising a number of other projects and was not fulltime available for the EIA projects. Furthermore the negotiations with his new employer and ASCI about his transfer to Guwahati will have taken a fairly large part of his time and attention during the final, crucial stage of the data collection and analysis period of the projects.

VIMTA Labs. Ltd.

June 1994

The role of VIMTA Labs. Ltd. was merely limited to the collection of data in the field and analysis of soil and water samples. Only Mr. Sujeet Kishen, the Assistant Director of the Environmental Division of VIMTA Labs. assisted in data analysis and was involved in the preparation of the reports.

VIMTA Labs. is without doubt the best equipped laboratory in Hyderabad, also the company seems to be organised very well. The soil, water and air sampling programmes and analysis were done quit well, although some re-sampling and repetition of analysis had to be done, because thorough examination of the results exposed some errors. VIMTA Labs. turned out not to be able to do the socio-economic survey. Performance from the point of view of keeping to agreed time schedules was very poor. Results were delivered with very much delay and on every occasion VIMTA Labs. people were late on their appointments. As reasons for the delays inexperience and involvement in other projects were mentioned.

Indeed, VIMTA Labs. has limited experience with EIA in the field of agriculture and irrigation. More experience is available in EIA's in the field of mining and industrial development, which concentrate on measuring and predicting pollution levels and comparing the predicted levels with the Indian Standards.

APSRAC

APSRAC only provided data in the final stage of the study, Dr. R.S. Rao, the Director, was consulted a number of times during the study and seemed to have a profound knowledge of remote sensing applications and groundwater hydrology. Since the report of APSRAC has not been received yet, it is hard to assess the quality of the work that has been done. The applicability of the remote sensing results in the present EIA studies is thought to be fairly limited, because impacts have been assessed for small irrigation schemes only. APSRAC can make regional analysis of an area of 720 km² and a more detailed analysis (10 X 10 km) of the scheme sites themselves. Their role seems more important in the stage of site selection, when regional analysis have to be made and zones of over-development and possible recharge of groundwater have to be assessed.

Time management of APSRAC was very poor. No information was available at the agreed date. As reasons were given the involvement in a large number of other projects. Other reasons were already given in the paragraph in which the performance of ASCI is discussed. What could be added is that it was rumoured that Dr. Rao had been promised an ARC-INFO GIS system by the environment expert of the RNE. This promise had (not yet) been fulfilled, which reduced Dr. Rao's enthusiasm for the EIA project considerably.

APSIDC

The APSIDC was very helpful in organising the field trips and in providing data. Also their contribution to the workshops was very positive. It is estimated that the awareness of environmental impacts of irrigation projects among the APSIDC staff has increased considerably as a result of the project.

NGO's, research institutes and governmental organisations

The provision of data by the various NGO's and research institutes that were visited during the project was, thanks to the very good personal contacts of Dr. Satish, very well. The same is valid for e.g. the Andhra Pradesh Groundwater Department, other governmental bodies,

e.g. the Central Water Commission were less cooperative. The contributions of the various NGO's, research institutes and governmental organisations to the workshops were very well, both in delivering a number of key-note papers and in participation in the discussions.

5.4 Main results of the EIA's

The results of the EIA studies in APWELL and APLIFT are reported in 2 separate reports by ASCI. In this paragraph a brief summary of some of the most important findings of the studies will be given

Impacts on a number of key environmental parameters were assessed in the EIA studies. These key environmental parameters can be brought together into five groups: water quantity, water quality, air quality, soils and the biotic environment. Changes in these key environmental parameters have an impact on a number of public interests like agricultural production, socio-economic development, public health, drinking water provision, natural resources management and socio-cultural values.

To assess the impacts, proposed APWELL and APLIFT sites in two districts were compared with so-called control sites, areas with comparable physical and socio-economic conditions, where irrigation has already been developed.

Impacts on water quantity, the availability of the resource, were rated fairly seriously: neither the procedures for attaining a hydrological clearance for lift irrigation development, nor the procedures followed to assess the groundwater development potential are such that a sustainable use of the surface water respectively groundwater resource is guaranteed. This problem is not easy to solve since the required data are lacking or unreliable. Groundwater recharge can be improved by combining the irrigation development with soil and water conservation measures in a watershed approach.

Whether or not sufficient water will be available on a certain site also depends on the system lay-out and the type of crops grown. The assumption that only ID crops will be grown is irrealistic.

Impacts on the water quality are mostly related to over-use of pesticides and fertilisers and can be minimised by a better dosage and timing of the application of these agro-chemicals. Agricultural and irrigation extension to the farmers is crucial in this respect. The quality of both the groundwater and the surface water is sufficient for irrigation purposes.

Impacts on the air quality of the irrigation projects is minimal and can be neglected.

Adverse impacts on soil characteristics are related to waterlogging, nutrient leaching and salinisation risks. These negative impacts can be prevented by a good system design (e.g. lining of the canals), appropriate crop selection and appropriate agricultural and irrigation management. Extension of the farmers is of utmost importance again.

Impacts on the biotic environment are probably very limited but will have to be assessed at every site.

Public health is likely to improve on most sites, since the socio-economic conditions of the local population (and so the nutritional and hygienic status) are likely to improve, negative impacts may be related to contamination of drinking water as a result of over-use of fertilisers and pesticides and direct negative impacts on human health of agro-chemical application.

From the foregoing it will be clear that the negative impacts of the APLIFT and APWELL project are mainly related to water quantity aspects, most other potential adverse impacts can fairly easily be prevented by good agricultural and irrigation management. Extension of the farmers is very important is this respect. It furthermore has to be mentioned that the total amount of water to be pumped up respectively lifted by the APWELL and APLIFT project is very limited compared to the amount already extracted and that the increase in irrigated area as a result of the two projects is very limited compared to the increase in agricultural area as a result of other planned and ongoing projects, both by the government and the private sector.

Although overall environmental impacts of the APWELL and APLIFT projects are thought to be fairly limited as long as site selection and system design and lay-out are carried out appropriately, water availability aspects are taken into account explicitly, and the farmers are well instructed in appropriate agricultural and irrigation management, it should be realised that physical and socio-economic conditions in Andhra Pradesh differ widely from one region to another. As a result the same irrigation development may have totally different impacts in different regions. The results of the pilot EIA's for the 2 districts show this. It is therefore recommended that rapid EIA's are carried out for each scheme to be developed.

Finally, it has to be remarked that the EIA studies also exposed a number of uncertainties and errors in the assumptions which formed the basis for the APWELL and APLIFT project formulation. This is discussed in more detail in paragraph 5.7 and in the reports of the various visits to Hyderabad which are given in Annex 2.

5.5 Timing of the EIA's in the project cycle

Ideally the Environmental Impact Statement should be drafted during the formulation stage of the project cycle (DGIS, 1993). As such results of the EIA, e.g. proposals for mitigating measures that are translated into actual activities, can be included in the project document. In the case of APWELL and APLIFT the EIA came in in a fairly advanced stage of the project cycle: the project was already determined on the basis of its engineering, technical and economical feasibility. As such, alternatives to the project had to be left out of the scope of the study and efforts concentrated on identifying mitigating measures which can be incorporated in the implementation phase of the project. Provisions for the inclusion of the study results in the project documents have been made (see paragraph 5.1).

From a number of points of view the EIA's were clearly executed too late, as stated in the foregoing paragraph, the EIA studies exposed a number of uncertainties and errors in the assumptions which formed the basis for the APWELL and APLIFT project formulation. In other words, had the EIA studies been carries out earlier, they would have served their true purpose, a tool for project planning, better.

On the other hand, execution of an EIA in a very early stage of the project cycle has some

disadvantages as well. To be able to assess the impacts, information on the objectives and outputs of the project, as well as the project activities and locations is needed. If this information is not available, as may be the case in the very early stages of the project cycle, the impact assessment may have to be very general and be limited in value. Actually, environmental issues should be taken into account in all stages of the project cycle. In the APWELL and APLIFT project this has more or less been the case till now on, and it is recommended to continue execution of rapid EIA's in the implementation phase of the project and to start environmental impact monitoring programmes as soon as schemes are implemented. This to be able to change the project management or design as soon as negative impacts on the environment are perceived.

5.6 Possibilities for integration of the EIA with the Gender Impact Study and the Poverty Impact Study

As far as the question of possible integration of EIA studies with Gender Impact Studies and Poverty Impact Studies is concerned the consultant agrees with the statement made by the GIS team (paragraph 6.7 of the Gender Impact Study Methodology Report, 1993) that a gradual integration of the 3 types of studies should be aimed for. Some of the baseline information, i.e. on socio-economic conditions, public health etc. is useful for all three studies, and, as rightly stated in the GIS report, some environmental impacts affect woman more than man and vice verse. That gender impact studies focus more on social processes and institutional questions and environmental impact studies more on technical details is not necessary a disadvantage, but could be complemantary.

A combined, or at least concurrent study has indeed the big advantage that implementing agencies, but also the local population, are not disturbed three times by three different study teams. During the execution of the EIA studie "mission fatique" was observed at the implementing agency and at the field level.

5.7 Integration of the results of the EIA's in the project documents

As stated in an earlier paragraph, environmental issues received fairly ample attention in the project documents of APWELL and APLIFT of February 1993. Nevertheless, the results of the EIA studies indicate that the project documents may require some adaptations. In this paragraph the main changes that should be made are discussed. Reference is made to the respective paragraphs in the project documents.

In the chapters 3 of the documents, in which the projects are described, the project design is discussed (paragraph 3.4). Three phases of scheme establishment are discussed, the initiation and preparation phase, the construction phase and the initial operation phase. It is advised to incorporate a rapid environmental impact assessment in the initiation phase. Such an assessment could be carried out as soon as the site for a lift irrigation scheme or a cluster of bore wells is identified. Emphasis should lay on the surface/ground water availability and on possible impacts on the biotic environment (flora and fauna). The third phase, the initial operation, should include monitoring of environmental impacts, as described in chapter 6. If negative impacts on the environment are uncovered, ownership should only be transferred to the farmers after implementation of mitigating measures or adaption of the system design or lay-out.

Paragraph 3.6, Environment, could be replaced by a short summary of the main findings of the EIA's, whereas in paragraph 3.8, Training, training of the APSIDC middle executive staff in environmental issues should be mentioned.

In chapter 5, in which the project activities are described, the rapid EIA and the environmental monitoring should be mentioned, preferably as tasks of the NGO's. In chapter 8, Organisation, the tasks of the NGO's are summarised (paragraph 8.2). The monitoring task, performed by carrying out physical output surveys, should be extended with environmental monitoring. Also the rapid EIA as one of the tasks of the NGO's should be mentioned in this paragraph. Monitoring should not be done by the same NGO that is also responsible for implementation of the project.

Also in chapter 8 the organization chart for the project is given. In the Advisory Committee, as presented in this chart, an expert on environmental issues is missing. It is advised to include such an expert in the Committee.

Paragraph 8.3 describes the technical assistance by the GON. As is already mentioned, it is stated that the ex-patriate team leader needs to have a good perception of environmental aspects of irrigation projects. This statement is not repeated in the qualifications of the TA Team Leader as described in Annex 6. Moreover, environmental expertise on a permanent basis is missing in the TA team. If rapid EIA's have to be carried out and environmental monitoring has to take place, it is advised to have at least one permanent team member with sufficient knowledge of environmental aspects of irrigation projects. In the proposed team emphasis is put very much on the social sciences: besides an ex-patriate and an Indian social scientist a socio-agronomist, with an advanced degree in agronomy or social sciences, is proposed. It is advised to change the qualifications of the latter to a degree in agronomy or environmental sciences and to require good knowledge of environmental aspects of irrigation. The responsibilities of this local expert should also include the rapid EIA's and the environmental monitoring. Short term input of an ex-patriate environmental specialist of 6 months for the APWELL project seems sufficient, however, the three months input for the APLIFT project should be increased to 6 months as well. In Annex 3, table 3, of the APWELL document the input of the environmental specialist is given as only 3 months. This has to be corrected to 6 months. The same is valid for the APLIFT project. Of importance is also that the input of the environmental specialist should not be concentrated in the first years of the project but should also allow for evaluation of the results of the environmental monitoring programme at the end of the 5 year project period. If it is not possible to incorporate environmental expertise in the permanent project staff, an increase of the specialists involvement with another 3 months for each of the projects is advised.

In chapter 9, Reporting, monitoring and evaluation, a mid-term evaluation at the end of project year 2 is mentioned. This evaluation will assess the impacts of the project in terms of household incomes, review the basic assumptions underlying the project design and identify causes of failure and success. It is recommended to include the impacts on the environment in the evaluation as well.

The above remarks refer to environmental aspects and the way in which they can be accounted for in the project documents. Of importance is also that the EIA studies indicated a number of uncertainties and errors in the assumptions which formed the basis for the APWELL and APLIFT project formulation. The most important onces are:

- the assumption that 75% of the bore wells will be successfull, in reality this will be much lower, even if the criteria to declare a well successfull are lowered, as is the current practise of APSIDC;
- the assumption that hydrological clearances are a guarentee for sufficient surface water for lift irrigation;
- the assumption that groundwater availability is no problem in so-called "white" districts;
- the assumption that farmers will only grow irrigated dryland crops. In reality most farmers will start to grow paddy rice, which requires much more water than ID crops, leading to water shortages at the tail ends of the schemes;
- the assumption that farmers will be able to contribute 35% of the cost of establishment of bore wells and lift irrigation schemes. Even 10% is considered too high; and
- the assumption that farmers are willing and able to manage their own irrigation systems.

Some of these statements may need confirmation, if valid however, adaptation of a number of paragraphs of the project documents will be required.

5.8 Conclusions



Environmental issues received fairly ample attention in the APWELL and APLIFT formulation mission reports, project documents, etc. Possibilities to amend the project documents and include environment related issues are still open. The Terms of Reference for the EIA studies was generally appropriate, and the ASCI proposal more or less followed the ToR. The assumption, made in the ToR, that the EIA's would assess the impacts of the projects on a district and regional level for the whole project area and zoom in on the actual project sites, was not realistic given the size of the total project area, the number of irrigation schemes and bore wells and the available time. Also irrealistic were the proposed use of a multi-criterion evaluation procedure and the assumption that most data are available as secondary data and that no additional field work was required.

The role of the Royal Netherlands Embassy in the negotiations with ASCI was somewhat confusing. Contract awarding took a long time and no specific tasks were identified and no ToR's were formulated for the two subcontractors for the project. The expertise available at ASCI for carrying out EIA's was very limited at the start of the project. The execution of the project and the participation of two ASCI staff members in an EIA training course in the Netherlands increased these capabilities. Unfortunately this increase in expertise and experience was concentrated very much on one person, who will be leaving ASCI. Although VIMTA Labs. is without doubt the best equipped laboratory in Hyderabad their overall performance suffered from a very poor time management. The same is valid for APSRAC.

As far as APSIDC is concerned, it can be concluded that the overall attitude towards the EIA studies was very positive and that the awareness of environmental impacts of irrigation

projects among the APSIDC staff has increased considerably as a result of the project.

As a result of the EIA studies, it can be concluded that the negative impacts of the APWELL and APLIFT projects are mostly related to water quantity aspects: neither the procedures for attaining a hydrological clearance for lift irrigation development, nor the procedures followed to assess the groundwater development potential are such that a sustainable use of the surface water respectively groundwater resource is guaranteed. Impacts on water quality, soil characteristics, air quality, public health, and the biotic environment are limited and can fairly easily be prevented by a good system design and good agricultural and irrigation management. Extension of the farmers is very important is this respect. Nevertheless it is recommended to carry out a rapid environmental impact assessment, with an emphasis on water availability and impacts on the biotic environment, for each proposed lift irrigation scheme and cluster of bore wells. Whether or not the system management is appropriate will have to be controlled with a monitoring program.

If the EIA's had been executed at an earlier stage of the project cycle, a number of uncertainties and errors in the assumptions which underlay the projects could have been prevented and the EIA studies would have served their true purpose, a tool for project planning, better. Integration of the EIA studies with the Gender Impact Study could have been useful. Both studies could have benefitted from a joint data collection program and "mission fatigue" of the APSIDC officials and the local population could have been prevented.

6 Monitoring in the APLIFT/APWELL project

6.1 Introduction

As part of the Terms of Reference the consultant was asked to identify institutes and organisations which could play a role in the monitoring of environmental impacts during the execution and finalisation of the APWELL and APLIFT projects. It is assumed that also further impact assessments will have to be carried out, either in the form of complete EIA's or in the form of rapid assessments. Capabilities and in-house expertise in conducting EIA's in the agriculture and irrigation field were therefore also inventoried.

On the basis of discussions with various people who were met during the consultant's stays in Hyderabad and contacts with a large number of institutes and organisations, it was decided that three organisations/institutes would be visited for a more detailed discussion on available equipment, expertise and capabilities. The organisations were: the Action for Food Production (AFPRO), an NGO active in the field of agriculture, rural development and irrigation, the Andhra Pradesh State Ground Water Department, the governmental organisation which is responsible for the monitoring of ground water quantity and quality in the Andhra Pradesh State, and the Water and Land Management and Training Institute (WALMANTARI). Besides the capabilities of the Administrative Staff College and VIMTA Labs. Ltd. were re-assessed. It is assumed that monitoring the environmental impacts of the projects should not be done by the NGO's that are responsible for the implementation of the projects.

6.2 Parameters to monitor

Since the major impacts of the APWELL project are related to aquifer depletion and falling ground water tables, ground water levels and well capacities are important parameters to monitor. For the monitoring of the ground water levels the APWELL project will develop 500 observation wells scattered over Andhra Pradesh State. Groundwater levels should preferably be measured once a week, but this would require local people to do the observations. Measurements once a month by a survey team is for practical reasons to be advised. The observations will be much more reliable and are probably a better source of information than less reliable weekly observations made by local people.

The capacity of the wells will have to be monitored by pumping tests. There are several possible reasons for a drop in well capacity. Commonly it is the result of increasing resistance of the flow into the well as a result of clogging of the well screen or the aquifer formation around it by deposits which have precipitated from the groundwater. Rehabilitation measures can be taken to solve the problem. Well capacity testing could be done on a sample basis, the number of wells that have to be tested will depend on the distribution of the 5,400 wells over the different aquifers. Carrying out a complete well test may require a whole week, including the mobilization and demobilization of the survey team and equipment. Well testing is only possible during about 7 months per year, the months without rain and without standing crops. Of much more importance however, although not strictly monitoring, is the initial well testing to asses the well's capacity for the selection of the permanent pumping equipment. This is done by means of pumping tests, in which the lowering of the water table is measured while the well is pumped at step-wise increasing capacities. In the present APSIDC practise

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this is not done. If bore well development is taken up in clusters, it will probably suffice to carry out a pumping test near each observation well, e.i. in 10% of the developed wells.

Monitoring of water quantity impacts of the APLIFT project will be very hard for the simple reason that no base line data are available.

From a water quality point of view the suitability of the groundwater for irrigation purposes, i.e. the salinity and SAR value, will have to be monitored. Special attention will have to be paid to the fluoride level of the water, especially where the water is used for domestic purposes. Since groundwater quality is generally fairly constant, sampling frequency can be low, twice per year, pre- and post monsoon, or quarterly will be sufficient. Again the number of sites to be monitored will depend on the distribution of the wells over the various aquifers. It is recommended to couple the water level monitoring and the water quality sampling programmes.

Suitability for irrigation of the surface water in the APLIFT project requires monitoring on a more frequent base, once a month seems more appropriate than quarterly. The number of schemes to be monitored will depend on the location of the different schemes in relation to the various sources of water. As far as the quality of the irrigation drainage water is concerned, this is not expected to deteriorate the surface water quality. Nevertheless monitoring the drainage water quality is advised, since it may indicate over-use of fertilisers and pesticides. This is valid for both the APWELL and APLIFT project.

Impact of the introduction of irrigation on the soil properties, in both the APWELL and APLIFT schemes, can best be monitored as part of a complete survey of the performance of the scheme. Such a survey should include a complete input-output analysis (seeds, fertiliser, pesticides, labour etc. versus yields and revenue), assessment of he types and areas of crops grown, the irrigated area, the waterlogged area, the area affected by salinisation, the occurrence of aquatic weeds, and the irrigation efficiency. Such surveys will also give an idea of the socio-economic impacts of the project, and should take place on a sample basis. The number of schemes to be surveyed depends on the variation in environmental conditions, cropping calenders and management practises between the schemes. Every season, i.e. twice a year, a survey should be carried out.

Impacts of the APWELL and APLIFT project on public health could be monitored by means of simple health surveys. Important parameters to monitor are the incidence of malaria and other water borne diseases, the incidence of diarrhoea, the "under 5 mortality" and the "infant (under one) mortality". Number of visits to a doctor or a hospital is probably not a good indicator, since this may increase with general welfare; at present people are too poor to visit a doctor or a clinic. The public health situation will not change directly after implementation of irrigated agriculture, a survey should therefore take place after a number of years, say 5.

Whether or not impacts on flora and fauna will have to be monitored will strongly depend on the local situation at a given scheme. Where rare and endangered species are reported for the areas under development, the relative occurrence of these species has to be monitored.

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6.3 Capabilities of the Action for Food Production (AFPRO)

AFPRO is a large non-profit, non-government voluntary organisation (NGVO) that coordinates, supports, evaluates and gives technical services and support to grass-root NGVO's for the implementation of environmentally sound food production and related projects. It aims at sustainable development of the weaker sections of the rural communities, especially the landless and women.

The organisation has been founded in 1966 and operates nationwide. Discussions were held with Mr. C. Uday Shanker, Director of the Hyderabad based Field Unit IV. Mr. Shanker was a participant in both the EIA workshops and had expressed a keen interest and showed a good understanding of the environmental implications of bore well and lift irrigation development. The following disciplines are available at Field Unit IV: hydrology, civil engineering, geo-physics, forestry (botany), agricultural engineering and fisheries. The address of the Unit in Hyderabad is:

AFPRO, Field Unit IV 202/20 Yincon House 3 Habshi Guda Hyderabad 500007 Tel: (..) 040 850413

AFPRO has experience in pumping tests and monitoring of groundwater levels. As far as pumping tests are considered, AFPRO has sufficient equipment and trained personnel to field two survey teams. Costs of a complete aquifer test are estimated at about 15,000 Rs. (3,500 Rs./day). For groundwater level monitoring two or three teams could be fielded.

As far as water quality is considered, AFPRO has little experience in water sampling and has no laboratory facilities in Hyderabad. AFPRO is a member of the National Association of Water Development Agencies in the Voluntary sector and can use the Association's laboratory facilities in Pune.

AFPRO has experience in organising Participatory Rural Appraisals to assess the performance of irrigation schemes. However, they lack the skills and experience to do it themselves. Also monitoring of impacts on public health and flora and fauna has never been done by AFPRO, neither is the capacity and experience available.

Overall it was concluded that AFPRO is not only very well equipped but also very much interested in monitoring groundwater levels and carrying out pumping tests. They are also interested in organising and supervising of a programme to monitor irrigation system performance. Monitoring of impacts on water quality, public health and flora and fauna falls outside the scope of interest of the organisation.

AFPRO is not willing and able to carry out complete Environmental Impact Assessments, they do not consider this kind of activities a part of their core business, and would have to rely too heavily on other organisations and institutes who would do major parts of the work as sub-contractors. The experience with ASCI has shown that this is not a desirable situation.

6.4 Capabilities of the Andhra Pradesh State Ground Water Department

The Andhra Pradesh State Ground Water Department (APSGWD) is the governmental body that is responsible for the formulation of the ground water policy in the state. Assessment of ground water potentials is an important element in the policy formulation. APSGWD monitors a large number of open wells (1 every 10 km², about 1,000 in total). Every week the water level in these wells is measured by local people, who sent the data to the office in Hyderabad. About 5 times per year APSGWD officials visit the observation wells and check the observations made by the local people.

Sampling for water quality assessment is done 4 to 5 times per year, or only pre- and post monsoon. This is always done by APSGWD officials, and the samples are sent to the district laboratories for analysis. Water quality in the command areas is also monitored; in the first weeks of May, July and October 1,000 to 1,500 samples are taken. Chemical parameters assessed are: Total Dissolved Solids, Natrium, total Phosphorous, Calcium, Magnesium, Fluoride and Nitrate. The analysis results are sent to the office in Hyderabad. About 150 people are employed at the office in Hyderabad. The following disciplines are covered: geology, geo-physics, chemical engineering, hydrology and mechanical engineering.

Processing of the water quantity and water quality data is not a standard procedure and is only done for special purposes, e.g. to solve a specific problem or to support legislation. Yearbooks or other overviews are not published. The processing of the data is manual but at present a computerised procedure is tested. This system is thought to be operational within a year.

At APSGWD discussions were held with the Managing Director Mr. T. Narasimha Reddy and two of the Deputy Directors, Mr. Sripathi Reddy and Mr. I. Ramakrishna Rao. the address of the department is:

APSGWD B.K.R.K. Govt. Office Complex, 8th Floor, B-Block Tank Bund Road Hyderabad 500 029 tel: (..) 040 241602

It became clear that the APSGWD is only able to monitor water quantity impacts of the APWELL project. They are well equipped and organised for this task and the proposed 500 observation wells of the APWELL project could be fitted into the monitoring routine of the 1,000 APSGWD observation wells. Pumping tests are also part of the normal task of the APSGWD and could be carried out for monitoring purposes.

Although APSGWD is active in groundwater sampling and analysis, a visit to the office in Hyderabad revealed that the laboratory facilities are very limited. Only standard analysis can be done with very old and outdated equipment, toxins and pesticide analysis is not possible. However, at present a proposal for the establishment of a new environmental and water quality laboratory is being reviewed as part of the World Bank financed National Hydrology Project. In July it will be decided whether or not the APSGWD will receive support for such a facility. If so, it will at least take a year before the laboratory is operational.

Experience with monitoring irrigation system performance, public health aspects and impacts on flora and fauna is not available at APSGWD.

6.5 Capabilities of the Water and Land Management Training Institute (WALMANTARI)

The WALMANTARI is basically an agricultural training institute for farmers and government officials. Emphasis lays on irrigated agriculture. Besides training, research is carried out. The WALMANTARI in Hyderabad has a faculty of about 35 people, most of them with a background in agricultural engineering. All faculty members are delegated from other organisations and institutes, i.e. universities, the irrigation department, the ground water department etc. This implies that good relationships with a large number of institutes and organisations active in the field of agriculture and irrigation exist. Disciplines available are agronomy, soil science, soil physics, ground- and surface water hydrology, irrigation management, soil conservation and watershed management and computer sciences. The Environmental Cell of WALMANTARI consists of 13 people and there are plans to extend the group with a biologist and a sociologist.

Environmental Impact Assessment is one of the mandates of WALMANTARI and at present 18 EIA's on major irrigation projects are carried out by WALMANTARI for the AP State Pollution Control Board.

Discussions were held with the general director of WALMANTARI Prof. Dr. P.G. Sastry and one of the executive engineers, Dr. Ranga Rao. The address of WALMANTARI is:

WALMANTARI Himayatsagar, Hyderabad 500 030 Tel: (..) 040 245282

WALMANTARI is interested and able to monitor environmental impacts and carry out impact assessments for minor irrigation projects. However, the available staff is rather limited and lacks important disciplines. Also, although a number of EIA's are presently being carried out, the experience is limited. Most of the knowledge and experience concerning EIA is concentrated in the person of Prof. Sastry, who has been nominated for another position and may leave WALMANTARI in the near future. Available equipment, e.g. for carrying out pumping tests, and laboratory facilities are limited. Standard analysis can be done at the laboratory but it is clearly more equipped for demonstration purposes than for handling of large amounts of samples. WALMANTARI seems relatively suitable as an institute to organise and supervise impact assessments or monitoring programmes, provided that Prof Sastry is available. Furthermore, fairly large parts of the work will have to be sub-contracted which may result in organisational problems.

6.6 Capabilities of the Administrative Staff College of India (ASCI) and VIMTA Labs. Ltd.

The administrative Staff College of India is an autonomous and self financing institution by the Government of India, supported by the corporate sector. ASCI is primarily a training institute, active in the field of management development. Beside research, consultancy is done for a variety of clients, amongst which international donor agencies. ASCI has a professional staff of about 40 people, sub-divided into 7 "areas": Energy, Environment and Technology; Finance; Marketing; Computer and Management Information Systems; Agriculture and Rural Development; Human Resources; and Economics.

The APWELL and APLIFT EIA's have been carried out by the Agriculture and Rural Development area. However, as stated before, the project has very much been a "one-man show" of Dr. Satish. With Dr. Satish leaving the institute the capabilities of the Agriculture and Rural Development area for carrying out EIA's or monitoring programmes is reduced to almost zero, the more so because also the Head of the area, Dr. Ramesh, will resign.

According to Dr. Satish capabilities within the Environment and technology area (headed by Dr. Bowonder) are limited as well. This area is specialised in environmental problems related to industrial processes and is very scientifically oriented. Monitoring in the field or carrying out fieldwork for an impact assessment is hardly ever done. Knowledge of agriculture and irrigation is insufficient.

At VIMTA Labs. Ltd. a discussion was held with Dr. S.P. Vasireddy, the managing director and Dr. K.S.M. Rao. VIMTA Labs. is trying to increase their capabilities in the field of EIA. The APWELL and APLIFT EIA's have been their first EIA's in the agricultural field. More experience is available in EIA's for mining and industrial development projects. Most of these EIA's concentrate on measuring and predicting pollution levels and comparing the predicted levels with the Indian standards. Laboratory and computer facilities at VIMTA Labs. are excellent.

Dr. Vasireddy showed a keen interest in further involvement in monitoring or impact assessments, and expressed that VIMTA Labs. was trying to hire some people with more specific EIA experience. At present the capabilities to independently carry out EIA's in the agriculture and irrigation field are insufficient.

6.7 Conclusions

An organisation which can independently carry out a monitoring programme or do impact assessments of irrigation projects is not available in Hyderabad. From a broad EIA point of view, WALMANTARI (i.e. Prof. Sastry) seems the best equipped institute to organise and supervise EIA related activities. Monitoring of water levels and aquifer performance will have to be sub-contracted to either AFPRO or the APSGWD. For soil and water sample analysis VIMTA Labs. Ltd. could be hired. Their facilities are by far the best available in Hyderabad. Besides, other organisations/institutes will have to be subcontracted for the monitoring/assessment of impacts on public health and flora and fauna and the irrigation system performance, including socio-economic impacts. This would mean that at least 4 or ÷.

5 institutes/organisations would be involved in the monitoring/assessment activities. The present APWELL and APLIFT EIA project has shown that this may result in serious organisational problems.

7 Literature and references

Project documentation APMIS/APLIFT/APWELL.

- Groundwater Minor Irrigation Schemes. Draft Report for Financial Assistance (revised). A.P. State Irrigation Development Corporation Ltd Hyderabad. not dated.
- Report of the Appraisal Mission to the groundwater Minor Irrigation Schemes of the Government of Andhra Pradesh, India. December 1990.
- Report on socio-economic impact study in the scheme areas of APSIDC highlighting the role of women in agriculture. For APSIDC Ltd Hyderabad by Andhra Pradesh Productivity Council Hyderabad. not dated.

Andhra Pradesh Groundwater Minor Irrigation Schemes (APMIS). Mission Report. March 1992.

- Andhra Pradesh Groundwater Minor Irrigation Schemes (APMIS). Project Document. March 1992.
- Surface Water Lift Irrigation Schemes. Project Report for External Assistance. A.P. State Irrigation Development Corporation Ltd Hyderabad. September 1990.
- Identification Memorandum Andhra Pradesh Surface Water Lift Irrigation Schemes. Royal Netherlands Embassy, May 1991.

Andhra Pradesh Surface Water Lift Irrigation Schemes (APLIFT). Fact finding Mission. April 1992.

Andhra Pradesh Surface Water Lift Irrigation Schemes (APLIFT appraisal). June 1992.

- Project Document. Andhra Pradesh Surface Water Lift Irrigation Schemes. Government of the Netherlands, Government of India. February 1993.
- Project Document. Andhra Pradesh Ground Water Bore well Irrigation Schemes. Government of the Netherlands, Government of India. February 1993.
- Mission Report. Andhra Pradesh Minor Irrigation Schemes. Government of the Netherlands, Government of India February 1993.

Literature and References:

Andhra Pradesh Forest Department, leaflets

- Andhra Pradesh Forests 1992
- Wildlife Sanctuaries of Andhra Pradesh.
- Andhra Pradesh State Groundwater Department, April 1990, Districtwise groundwater resources of Andhra Pradesh.
- Andhra Pradesh State Groundwater Department, 1977, Studies on Hydrologic parameters of groundwater recharge in water balance computations Andhra Pradesh, Research Series no. 6, April 1977.
- Andhra Pradesh State Irrigation Development Corporation, 1987, Groundwater development potential in different districts of Andhra Pradesh.

Andhra Pradesh State Irrigation Development Corporation, 1991. Annual plan 1991-1992.

Andhra Pradesh State Irrigation Development Corporation. 16th Annual Report, 1990-1991 and following.

- Asian Development Bank, 1991, Environmental Guidelines for Selected Agricultural and Natural Resources Development Projects, Office of the Environment, Asian Development Bank, Manilla, Phillipines.
- Athavale, R.N., Rangarajan, R. and Muralidharan, D., 1992, Measurement of natural recharge in India, Journal Geophysical Society of India, Vol 22.

- Barton Worthington, E. (Ed), 1987. Arid land irrigation in developing countries, Environmental Problems and effects. Pergamon Press, Oxford.
- Battelle Pacific Northwest Laboratories, 1974. Environmental Assessment Manual, Columbia River and Tributaries, prepared for the United Stated Corps of Engineers, North Pacific Division.
- Bowonder, B. and S.S.R. Prasad, 1986. Ground water depletion in semiarid agroclimatic regions: Environmental management issues, Centre for Energy, Environment and Technology, Administrative Staff College of India.
- Central Groundwater Board, Ministry of Agriculture and Irrigation, 1980, Groundwater Resources of Andhra Pradesh, edited by K.C.B. Raju.
- Central Groundwater Board, Ministry of Irrigation and Power, 1983, Hydrogeological Atlas of Andhra Pradesh.
- Central Groundwater Board, Ministry of Water Resources, 1991. Ground water resources and development prospects in Mahabubnagar District, Andhra Pradesh.
- DGIS, 1993, Environmental Impact Assessment in Development Cooperation.
- DGIS, 1990, A World of Difference, Policy document by the Dutch Directorate-General for International Cooperation.
- ESCAP, Economic and social Commission for Asia and the Pacific, 1990. Environmental Impact Assessment Guidelines for Water Resources Development. Environment and Development Series. United Nations, New York.
- Government of Andhra Pradesh, Institute of Preventive Medicine, 1987, Distribution of Fluoride in drinking water sources, Water Analysis Department I.P.M. Hyd-29.
- Government of India, Ministry of Environment and Forests, 1989. Environmental Impact Assessment of development projects, Background note.
- Government of India, Ministry of Environment and Forests, 1985. Guidelines for Environmental Impact Assessment of River Valley Projects.
- Gvernment of India, Planning Commission, 1991. Eighth Five Year Plan, 1992-1997. New Delhi, the Manager of Publications.
- ILACO B.V., 1985. Agricultural Compandium for rural development in the tropics and subtropics, Elsevier Scientific Publishing Company, Amsterdam.
- Leopold, L.B., 1971. A procedure for Evaluating Environmental Impact, Circular 646, U.S. Geological Survey, Washington D.C.
- Narasimha Reddy, T. and P. Prakasam, 19..., A study of the changes in cropping pattern with the intensification of ground water development in hard rock areas of Andhra Pradesh, State Ground Water Department, Government of Andhra Pradesh, Bhujal News.
- NEDWORG, 1993, Andhra Pradesh Ground Water Bore well Irrigation Schemes, APWELL Project, Project Document.
- Singh, R.P. and Gunwant, M. Desai, 1991. Farmer's fertilizer practices in the semiarid tropics of India. Icrisat Resource Management Programme, Economics Group Progress Report 100.
- USDA, United States Department of Agriculture, 1954. Agriculture Handbook, U.S. Govt. Printing Office, Washington D.C.
- Van Walsum, E., 1993, Gender Impact Study in the Andhra Pradesh Surface Water Lift Irrigation Schemes & Bore well irrigation schemes, Report on the Methodology.

Van Walsum, E., 1993, Gender Impact Study in the Andhra Pradesh Surface Water Lift Irrigation Schemes & Bore well irrigation schemes, A Pilot Study in India.

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Annex 1

Terms of Reference of Dutch EIA expert for EIS in irrigation projects in Andhra Pradesh (APWELL and APLIFT), India.

Fosnumber: IN/92/866

Description of tasks:

- Support and advise the Indian Counterpart in drafting the Environmental Impact Statement. Support the definition, start up and planning of the report as well as the methodology development.
- If needed or required locally support activities that are related to the actual contents of the EIA.
- Report the progress of the project to DGIS and the Dutch Embassy in New Delhi after every visit to India. Special attention has to be given to bottlenecks, if any, the need for additional support, the progress of the project in relation to the planning and other important developments.
- If desired by the Indian Counterpart and considered useful by HMA/New Delhi, organise an on-the-job training for two experts of ASCI in the Netherlands.
- Draft a report in which experiences during the project that are significant for possible follow-up activities are summarised, bottlenecks are identified and recommendations are formulated. This Final Report has to be written in the English language and has to be submitted to DST/ML (in twentyfold).

Additional, as mentioned in Memorandum 327 of DST/ML (Verbeek) with copies to DAL/ZZ and the Dutch Embassy in New Delhi:

• Recommend in which way a linkage between the results of the EIA study and the "monitoring" of the environmental impacts during the execution and finalising of the APWELL and APLIFT projects can be assured. Tasks and responsibilities of the various parties have to be mentioned explicitly. The recommendations will be made at such a time that they can be incorporated in the BEMO's of the two irrigation projects.

Annex 2

Reports of visits to Hyderabad

- 1- Report of the visit in July 1993
- 2- Report of the visit in November/December 1993
- 3- Report of the visit in January 1994
- 4- Report of the visit in March/April 1994

Report on the first visit to Hyderabad within the framework of the EIA of the APWELL en APLIFT projects, 18-23 July, 1993.

Wat voorafging:

Eind april is ondergetekende benaderd door Liesbeth Verbeek (DGIS STL/ML) met de vraag of ik belangstelling had een EIA voor 2 irrigatie projecten in India te begeleiden. Het antwoord was een "in principe ja". Enerzijds ja, ingegeven door positieve ervaringen met de MER cursus in India in het verleden, anderzijds toch een "in principe" omdat in de eerste plaats nog niet helemaal duidelijk was wat er moest gebeuren en omdat ik op de korte en middellange termijn nogal wat andere verplichtingen had die misschien niet te combineren zouden zijn met een snelle inzet in India.

Een paar dagen later is er, na het bijwonen van een presentatie van de resultaten van de Gender Impact Study, verder gepraat, waarna begin juni op basis van een door Liesbeth Verbeek aangegeven ruwe richtlijn een voorlopige begroting voor een bijdrage aan het project is ingediend. Dit was uiteraard niet veel meer dan een soort inspanningsverplichting, omdat een ToR nog ontbrak. In een begeleidend schrijven is aangegeven dat ik in week 28 en 29 (ca 10 tot 20 juli) een bezoek aan India zou kunnen brengen en dat ik daarna pas weer in oktober beschikbaar zou zijn. Ook is aangegeven dat het gezien andere verplichtingen voor mij onmogelijk is 3 bezoeken van ca. 3 weken aan India te brengen binnen een tijdsbestek van 4 maanden en dat deze bezoeken over minimaal 6 maanden uitgesmeerd moeten worden. Verder is gemeld dat het Waterloopkundig Laboratorium (WL) geen kant en klare cursussen op het gebied van EIA op de plank heeft liggen, wel dat er misschien mogelijkheden voor een soort on-the-job training zijn, afhankelijk van de wensen.

Op 5 juli vernam ik van Liesbeth Verbeek dat het geplande bezoek aan India mogelijk was. Voorafgaand heeft op 7 juli nog kort overleg plaatsgevonden bij DGIS. Omdat nog vrij onduidelijk was wat er van mij verwacht werd was het voornaamste doel van dit overleg het bespreken van een Terms of Reference voor mijn inbreng. Een korte samenvatting van het overleg wordt hieronder gegeven. Donderdag 8 juli werd evenwel duidelijk dat niemand van de ASCI staff "likely to be involved in the project" aanwezig zou zijn in de week van 11 t/m 18 juli. In overleg met Liesbeth Verbeek is daarna besloten toch een kort bezoek aan India te brengen in een poging wat duidelijkheid in de zaak te krijgen en afspraken te maken.

Korte samenvatting van het overleg van 7 juli tussen Liesbeth Verbeek en Rinus Vis

Tijdens het overleg zijn drie zaken aan de orde geweest: 1) de begroting/het contract, 2) de TOR voor mijn inbreng en 3) doel van het eerste bezoek aan India.

Ad 1)

DGIS DST/ML is akkoord met de ingediende begroting, dat wil zeggen exclusief de voor training opgenomen post. Daarvoor moet later eventueel een aparte begroting gemaakt worden. Voor de training is 28 kf beschikbaar. Wel moet nog een officieel begrotingsformulier ingevuld worden. Verdere afhandeling zal nog wel even op zich laten wachten. Een mondelinge toezegging is voor WL evenwel voldoende om met werkzaamheden (inclusief uitzending naar India) te kunnen beginnen. Afgesproken wordt dat WL zo spoedig mogelijk een officieel formulier instuurt en DGIS daarna snel een contract rond zal maken.

Ad 2)

Inmiddels is er een zeer sumiere taakomschrijving voor de EIA expert beschikbaar (Fosnummer IN/92/866) aangevuld met punt 1. van MEMORANDUM 327 van DST/ML (Verbeek). In grote lijnen komt het er op neer dat de EIA expert het tot stand komen van twee Environmental Impact Statements (één voor APWELL en één voor APLIFT) zal begeleiden, met andere woorden dat er in komt te staan wat er in hoort en dat één en ander op de juiste wijze tot stand komt. Daarnaast zal de EIA expert aanbevelingen geven die ertoe moeten leiden dat een koppeling tussen de resultaten van de EIA studie en het "monitoren" van milieu impacts in de uitvoering en afronding van de twee projecten tot stand kan worden gebracht. Hoewel de ToR noemt dat bij gebleken behoefte of noodzaak hulp en ondersteuning zal worden gegeven bij inhoudelijke activiteiten voor het opstellen van de MER, zijn de taken nadrukkelijk ondersteunend en begeleidend. Dit is in lijn met de in Annex 4 van het uit maart 1992 daterende APMIS project document gegeven ToR voor de EIA (de enige ToR in mijn bezit) maar gaat duidelijk minder ver dan wat in het ASCI proposal (pag. 12) staat: "the Dutch expert will cover the environmental and natural resources component of the study". Dat is dus zo ongeveer alles.

Ad 3)

Aangaande het doel van het eerste bezoek aan India zijn de volgende afspraken gemaakt:

- 1- De ToR voor de inzet van de Nederlandse EIA expert zal in het Engels vertaald worden en in Hyderabad/New Delhi met betrokkenen besproken worden. Mis-interpretaties en verkeerde verwachtingen moeten voorkomen worden.
- 2- In Hyderabad zal nog eens nadrukkelijk melding worden gemaakt van het feit dat er twee verschillende Environmental Impact Statements worden verwacht.
- 3- Training. De trainings behoefte zal geïdentificeerd worden.
- 4- Er zal gepoogd worden een werkplan op te stellen.
- 5- Er zal aandacht besteed worden aan de vraag hoe omgegaan zal worden met de Indiaanse wetgeving inzake milieueffect-rapportage.

Bezoek aan India: 18 t/m 23 juli.

Zondag 18 juli:

11.00 uur. Vertrek Amsterdam per KL871, aankomst New Delhi ca. 23.00 uur. Naar een hotel voor een paar uur slaap.

Maandag 19 juli:

6.00 uur. Vertrek naar Hyderabad per IC439, aankomst ca. 8.00 uur. Afgehaald door Dr. Satish. Na wat inleidende babbels bij een kop koffie en het uitpakken van de koffer een eerste gesprek met Satish gevoerd.

De eerste indruk is dat men bij ASCI niet zo goed meer weet wat er van hun verlangt wordt, de eerste onderhandelingen dateren al van december 1991 en inmiddels twijfelt men of het project sowieso nog wel doorgaat ("we put it out of our mind"). Tijdens het gesprek refereert Satish naar stukken, en met name correspondentie met de ambassade, die ik niet ken. Besloten wordt daarom dat ik de middag zal gebruiken om eerst alle stukken te bestuderen en de discussie dinsdagochtend voort te zetten. Een aantal zaken vallen al wel gelijk op:

1- ASCI is van mening dat zolang de sites voor de boreholes niet bekend zijn, er geen EIA voor APWELL gedaan kan worden. Dit is niet eerder besproken met de Ambassade (klopt

dat ?).

- 2- ASCI gaat uit van een training van een maand in Nederland <u>aan het begin van het project</u>, gevolgd door een week opstellen van het werkplan in samenspraak met de Nederlandse EIA expert. Dit is geheel nieuw voor mij maar wordt bevestigd door correspondentie met de Ambassade (brief van Keuken, 18 mei 1993, No. NDE 4097/MK/gg en NDE 4099/MK/gg).
- 3- Rol van de Nederlandse EIA expert is inderdaad onduidelijk, in een brief van 30 september 1992 (No. 9552/MK/ldg) wordt gemeld: "the Netherlands provides the EIA/Natural Resources specialist".
- 4- Binnen ASCI is Satish de enige die iets van het project weet, niemand anders is op de hoogte en niemand is nog aangewezen of vrijgemaakt voor het project.
- 5- Sathish zelf is erg druk met een aantal andere projecten (SIDA, WB, Ford Foundation) en heeft de komende maanden absoluut geen tijd. Half oktober op zijn vroegst. Ook voor het inplannen van andere stafleden moet naar zijn zeggen 3 tot 4 maanden gerekend worden.
- 6- Er heerst nog grote onduidelijkheid over het contract met ASCI. De laatste versie, daterend van 18 mei 1993 (No. NDE 4099/MK/gg), was niet in overeenstemming met de afspraken. Hier is door ASCI in een fax van 26 mei op gewezen. Op 27 mei is antwoord gekomen van de Ambassade waarin toegegeven wordt dat er wat verwarring over budgetten is ontstaan en waarin een aantal veranderingen worden voorgesteld, met name aangaande de contractsom voor VITMA en het sub contracteren van VITMA en APRSA. Vervolgens heeft ASCI op 1 juni per fax laten weten met de voorgestelde veranderingen in te stemmen. Daarna is er geen contact meer met de ambassade geweest, behalve een telex van ASCI op 5 juli waarin gevraagd werd of de fax van 1 juni wel ontvangen was.
- 7- Mijn bezoek kwam als een donderslag bij heldere hemel, voordat ikzelf contact heb opgenomen is er geen enkele communicatie met DGIS of de Ambassade geweest. Toch heb ik via Liesbeth Verbeek, die contact met Delhi had gehad te horen gekregen dat alles OK was.
- 8- Satish is van mening dat 4 maanden te kort is om het project te doen, de pompproeven zouden in verschillende seizoenen gedaan moeten worden zodat zeker 6 tot 8 maanden nodig zijn.

Inmiddels blijkt er nog een file met stukken te zijn, die zal ik morgenochtend doornemen. Daarna zal ik proberen wat duidelijkheid in bepaalde zaken te krijgen, met name mijn rol in het geheel, de trainingsbehoeften, de inceptie workshop en het voorlopige werkplan zullen aandacht moeten hebben.

Dinsdag 20 juli:

Na een paar "courtesy calls" aan o.a. de Principal van het ASCI, T.L. Sankar, en de director van de Agriculture and Rural Development Area van ASCI, Dr. K.S. Ramesh, met Dr. Satish verder gesproken over invulling van het project. Satish kon zich vinden in de Engelse vertaling van mijn Terms of Reference en ziet voordelen in de in de ToR gelegde nadruk op een ondersteunende en begeleidende rol boven een rol van de Nederlandse Expert als teamlid, verantwoordelijk voor de Environmental and Natural Resources component van het project. Werkplan, trainings behoeften en inceptie workshop zijn verder besproken. De eerste ideeën over deze onderwerpen zijn gegeven in de bijlagen.

Woensdag 21 juli:

Gesproken met o.a. Dr. Ramesh S. Durvasula, van de Social Services area van ASCI. Dr. Ramesh zal de public health aspecten in de EIA voor zijn rekening nemen. Hij zal ook deelnemen aan de Inceptie Workshop en daar een keynote paper presenteren of iemand anders vragen een paper voor te bereiden en te presenteren. Baseline data van de public health situstie zijn aanwezig in de vorm van de resultaten van een in 1992 gehouden National Health Family Survey. Uit deze survey (beschikbaar op diskette) zijn ook socio-economic profiles af te leiden. Binnen het EIA project kan de aandacht geconcentreerd worden op de voorspelling van veranderingen die op zullen treden in de public health situatie als gevolg van de vergroting van het geirrigeerde areaal (o.a. door naar veranderende patronen van vector breeding te kijken) en op het ontwerpen van een monitoring programma, waarmee de veranderingen achteraf vastgesteld kunnen worden.

De rest van de dag is besteed aan verdere discussie over en afronding van het werkplan, de opzet van de Inceptie Workshop en de opzet van de Training Course. Ook is er nog wat tijd besteed aan bestudering van kaarten en literatuur in de bibliotheek van ASCI

18.50 uur: vertrek naar Delhi met de IC840

Donderdag 22 juli:

De briefing op de Nederlandse Ambassade met Menno Keuken en Jan van der Laan. De Terms of reference van de Dutch Expert worden in Delhi wel als zeer minimaal beschouwd. Ook had men die graag wat eerder gehad en overleg gepleegd. Jan van der Laan is het absoluut oneens met het laatste punt uit de ToR, waarin sprake is van het opnemen van de resultaten van de EIA studie in de BEMO van het irrigatie project. Dit zou één en ander te zeer vertragen. Menno Keuken zal op zeer korte termijn het contract met ASCI rond maken, ook zal hij binnenkort Hyderabad bezoeken en dan bij ASCI langsgaan en de andere betrokken instituten langsgaan. Het voorgestelde werkprogramma is acceptabel, het is dus zaak te proberen snel een cursus voor de ASCI mensen te organiseren, bij voorkeur in de vorm zoals voorgesteld in de bijlage over de training: een paar weken iets specifiek gericht op EIA gevolgd door wat meer inhoudelijke zaken.

Vrijdag 23 juli:

1.05 uur: terugvlucht naar Amsterdam per KL872
FIRST DRAFT OF A WORKPLAN FOR EIA IN THE ANDRAH PRADESH SURFACE WATER LIFT IRRIGATION SCHEMES (APLIFT) AND GROUND WATER BORE WELL IRRIGATION SCHEMES (APWELL).

The workplan is based on discussions with Dr. S. Satish. These discussions made clear that Dr. Satish will not be available for the project before half october, also other members of his staff cannot be mobilised before that date. It also became clear that the background knowledge of Environmental Impact Assessment procedures and methodologies of Dr. Satish and the other possible team members is so limited that training in EIA procedures and methodologies *before* the actual start of the project is a must. A third starting point in the drafting of the workplan was the assumption that the project has to be spread out over at least 6 months.

Taken the above into account means that the project could start in week 42 (october 18) with a four week training course in the Netherlands, provided the required arrangements can be made. The week following the training course, week 46, november 15 - 20, will be used for discussions between the Dutch expert and the 2 trainees and for writing a draft of the project document of the EIA project.

The actual project activities could than start at november 22 (week 47). In week 47 or 48 an inception workshop will be held to formulate the expected outcome of the project, discuss the approach, the data availability, etc. The draft project document will be discussed and finalised. After the workshop the Dutch expert will stay for 2 or 3 more weeks in Hyderabad to help in starting up the project. Data collection will take about 2 months (december 1993 and january 1994), so the next visit of the Dutch expert should be planned for february 1994 (2 or 3 weeks) at the start of the data analysis. Data analysis will also require ca. two months (february and march). The second workshop can than be held in the beginning of april, after which the report can be finalised (end of the project: third week of april). The Dutch expert will be involved in the workshop and the final reporting (2 or 3 weeks).

Below a barchart of the project activities is given:

	= = = +	+ + *		+ + + -		+ + + **
Oct	Nov	Dec	Jan	Feb	March	April

in which:

or = or + represents one week;
===== indicates the stay of the Indian experts in the Netherlands
+++++ indicates the stay of the Dutch expert in India
* indicated the finalisation of the project document
** indicates the finalisation of the project report

Remarks:

• Because the actual project activities in India only start in december and will be finalised in april, the visits of the Dutch expert to India take place much later in the year than originally planned. Furthermore 3 visits will have to be paid within 4.5 months. This could give problems with other obligations, however this cannot be foreseen at the moment. If required, some shifts in the schedule will have to be made.

 Arrangements for the first workshop will have to be made in the weeks before the ASCI staff leaves India for training in the Netherlands.

TRAINING NEEDS OF ASCI FACULTY WITHIN THE FRAMEWORK OF THE PRO-JECT EIA IN THE ANDRAH PRADESH SURFACE WATER LIFT IRRIGATION SCHEMES (APLIFT) AND GROUND WATER BORE WELL IRRIGATION SCHEMES (APWELL).

Training needs have been discussed with Dr. Satish (projectleader) and Dr. K.S. Ramesh (Director Agriculture and Rural Development Division).

From the discussions it became clear that the basic knowledge of EIA methods and procedures is lacking. This implies that training before the actual start of the project is required. A base course in EIA is needed. Such a (short) course is not readily available at DELFT HYDRAULICS and, to my knowledge, neither at any other institute in the Netherlands. However, DELFT HYDRAULICS was involved in preparing the course book for- and conducting the EIA workshops in India. This course material and the exercises could form the skeleton for a base course in EIA of say two weeks. Preferably, however, such a course should be attended at an institute specialised in such short courses, like the University of Manchester or the University of Aberdeen. Whether or not these institutes organise courses in october/november is not known.

Such a general two week course on EIA could than be completed with a more specialised onthe-job training at DELFT HYDRAULICS, concentrating on the more technical aspects of impact prediction and mitigation in water resources related studies.

Other closely to the EIA project related subjects in which the ASCI staff needs training and in which DELFT HYDRAULICS has experience are:

- Watershed management
 - Soil erosion
 - Soil conservation
 - Reservoir sedimentation
 - Sediment management
- Policy analysis in water resources projects
 - Systems approach
 - Framework of analysis
 - Computational framework
- Sustainable development
 - General concepts
 - Generation of indicators to assess the sustainability of projects
- Multi criteria evaluation
- Data base management

FIRST IDEAS ABOUT THE INCEPTION WORKSHOP FOR THE EIA IN THE ANDRAH PRADESH SURFACE WATER LIFT IRRIGATION SCHEMES AND GROUND WATER BORE WELL IRRIGATION SCHEMES (APLIFT & APWELL).

The actual project activities in India will start with an Inception Workshop. This workshop will take place directly after the training of the ASCI staff in the Netherlands (end of november). This implies that preparations for the workshop have to be made before the ASCI staff leaves India, mid october. The workshop will last three or four days en will have about 25 participants.

Input into the workshop will be the draft project document, which will be prepared by the AscI staff, assisted by the Dutch expert, in the last week of their stay in the Netherlands. Other input will be a number of keynote papers that will be presented during the workshop. Three or four papers should be presented dealing with subjects closely related to the project, e.g. EIA methods and techniques, watershed management, sustainable water resources development, data handling, etc. Who should deliver the keynote papers and exact subjects has to be discussed in more detail.

The objectives of the workshop are:

- Formulation of the expected output of the project
- Definition of the approach to be followed
- Identification of the environmental characteristics (parameters) that have to be studied
- Selection of indictors that will be used to assess the environmental impacts
- Identification of prediction methods
- Identification of possible mitigating measures
- Definition of the required database:
 - which data are needed
 - which data are available
 - how reliable are the data
- Contribute to the final project document.

Approach:

After the presentation of a keynote paper the total group of about 25 people will be divided in 3 or 4 sub-groups which will discuss a number of items according to a fixed agenda. At the end of the day the results of the discussions of the sub-groups will be presented and discussed plenary.

Participants:

Participants will be recruited from different agencies/ institutes. Not only the implementers of the project should be invited but also the users and the NGO's. The following, mostly in Hyderabad located institutes/persons should receive an invitation. The list is open for discussion and will be extended in due time.

- APDISC, Irrigation Department, 3 people
- Engineering Chiefs Office (Intermediate between GOI and AP state, 3 people
- Central Ground Water Development Board, 1 person
- National Geophysical Research Institute, 1 person
- International Crop Research Institute for Semi Arid Tropics (ICRISAT), 1 or 2 people

- Water and Land Management Training and Research Institute, 2 people
- Soil Conservation Institute, 1 person
- National Environmental Engineering Research Institute (NEERI), 1 person
- VIMTA Labs. Ltd., 2 people
- ASCI, 2 or 3 people
- APARS, 2 people
- Dutch Embassy, 1 person
- Dutch Expert, 1 person
- Action for Food Production (AFPRO), Mr. Udji Kumar of this NGO is extremely well informed, 1 person
- Sadguru Water and Development Foundation, NGO, Mr. Harnath Jagawat, 1 person
- two farmers from the area.

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Report on the sectond visit to Hyderabad within the framework of the EIA of the apwell and APLIFT projects (November 17 till December 4, 1993).

Wednesday, november 17:

09.35 hours. Departure from Amsterdam by SR 791, arrival in Dehli: 24.00 hours.

Thursday, november 18:

6.00 hours. Departure for Hyderabad by IC439, arrival 6.00 hours. Met at the airport by Dr. Satish. First discussions revealed that the organisation of the "scoping workshop" is on schedule. All invited people have confirmed their participation and a number of people have spontaneously requested to be allowed to participate. As a result the number of participants will be higher than originally foreseen. This is also due to the fact that quite a number of employees of APDISC, the project implementing agency will participate. This has been requested for by Keuken of the Dutch Embassy in Dehli, who stressed again that preparation of an EIS should not be the only outcome of the study: creation of awareness, e.g. at the level of the implementors, is very important as well.

Friday, november 19:

Visit to APDISC, discussions with Mr. V. Ramesh, Liaison Officer and Mr. S.S. Quadri, Executive Director. Planning of field visits. APDISC is very cooperative, local officers will be made available to guide us in the field and all relevant reports will be made available.

Discussion with Dr. G.V. Prasad, VIMTA Labs. Ltd. The contract of VIMTA Labs. Ltd. for data collection and analysis will be signed today. After the fieldtrips and the workshop, in which Dr. Prasad will participate, further agreements will be made. Experience of VIMTA Labs with environmental impact assessment is very limited.

Saturday, november 20:

Visit to Andrah Pradesh State Remote Sensing Application Centre (APSRAC), Dr. R.S. Rao (Director). Available are LANDSAT, SPOT, IRS and ERS images. The capabilities to process the images seem quite OK, as is proven by the APSRAC contribution to the IWACO Water Resources Study AP-III. The scale of the remote sensing applications is more problematic. The Environmental Impact Assessment will concentrate on individual schemes (APLIFT) or clusters of bore wells (APWELL). This implies that the area covered directly will be very limited compared to the resolution of the images. The best approach will be a two step approach in which a regional analysis of an area of 720 km² is followed by a more detailed analysis of an area of 10 by 10 km (512 by 512 picksels). This will make extrapolation of the results of a detailed EIA to a larger region possible. Based on information on geology, geomorphology, soils, slopes, and vegetation/cropping pattern, composite landunits (so-called Basic Integrated Land and Water Resource Units) will be identified, for each of these units recommended land use will be assessed (so-called Optimal Land Use Farming Systems).

Sunday November 21: Rest

Monday November 22:

Field visit to Mahabubnagar District, with Mr Satish en Mr Prasad. The field visit had two objectives: firstly to get a better idea of the field conditions and secondly to select schemes for the Environmental Impact Assessment. APSIDC, in the person of Mr. Sai Prasad, Executive Engineer of the Mahabubnagar District, was very cooperative and had prepared our field visit very well. Various existing and two proposed sites in the mandal Makhtal were visited. Average annual rainfall in the area is about 1100 mm. Possibilities for groundwater exploitation are very limited due to the low transmissivity of the aquifer.

Mudumal Scheme:

The proposed Mudumal Scheme covers a total area of 5000 acres and comprises 6 very poor villages with in total 2000 to 2500 families. Developments in the area are minimal.

The water has to be lifted from the Krishna River over an elevation of about 45 m. The water will be lifted in two steps and the horizontal distance that has to be spanned is about 2 km. The scheme will provide water for two crops per year. At present a variety of dryland crops is grown, groundnut and paddy are expected to be the main crops, once irrigation water becomes available. Large parts of the area are not cultivated at present and are covered with a sparse vegetation of grasses and bushes. Soil erosion may be a serious problem on the sloping lands. Along the river a small area of private, illegal, lift irrigation is located.

The scheme is not mentioned in the APLIFT Appraisal Report and is strictly spoken too big to be considered in the APLIFT project. However, the scheme will be sub-divided into 4 smaller schemes which may actually each have their own intake.

Muslaipalli Scheme

The proposed Muslaipalli Scheme covers an area of about 2500 acres and comprises 3 villages with in total 600 families. The area is sandwiched between existing lift irrigation schemes (partly illegal, but very well organised) and is much more developed than the Mudumal Scheme area. The area is totally cultivated; groundnuts being an important crop. Water for 2 crops will be provided and it is to be expected that paddy will become a very important crop, as it is in the already existing surrounding schemes.

Water will be lifted from the Krishna River and will be piped 1.5 km inland. Open canals cannot be used, because the water has to pass the already existing private scheme.

The scheme is mentioned in the APLIFT Appraisal Report as Muslaipalli I and Muslaipalli II, each having an area of 1000 acres.

Gudepallur Scheme

The Gudepallur Scheme is an existing scheme which was commissioned in 1987. It covers a total about 2000 acres and comprises lands of various villages. Total development costs in 1987 amounted to 1800 Rp/acre, costs for new developments are estimated at around 4000 Rp/acre. Operation and maintenance cost of the scheme are about 600 Rp/acre/crop, the farmers only pay 75 Rp/acre/crop as fees, the rest of the cost is covered by APSIDC.

The main crops are groundnut and paddy, some jowar is grown. Net crop revenues are about 2000 Rp/acre for jowar (10 quintal a 400 Rp, minus 2000 Rp cost), 4400 Rp/acre for groundnuts (8 quintal a 800 Rp, minus 2000 Rp cost) and 9000 Rp/acre for paddy (30 quintal

a 400 Rp, minus 3000 Rp cost). Water requirements are in the order of 3-4 inches, 8-10 inches and about 30-40 inches for respectively jowar, groundnut and paddy.

Of the two proposed schemes the Mudumal Scheme seems the most suitable one for a pilot Environmental Impact Assessment for the following reasons:

- the area is very backward;
- since the area is more or less virgin, no delineation problems exist with existing schemes and pre development conditions are not influenced too much by ongoing activities in the area;
- illegal water extraction is minimal;
- the area is fairly big and thus relatively divers in physical conditions, this implies that a larger range of environmental impacts may be encountered; and
- since no definite system lay-out has been established, various alternatives can be taken into consideration.

The Gudepallur Scheme is suitable as a control scheme for comparison and impact prediction. The irrigation water is extracted from the same source and physical conditions are comparable.

Because of time constraints the proposed bore well site at Shakabad was not visited. At this site 7 wells will be drilled, which will each irrigate an area of about 10 acres. Nearby a site where bore wells have already been developed is available as a control site.

Tuesday november 23 to friday november 26:

Field visit to Prakasam district with Mr Satish. Various lift irrigation sites in the coastal plain in the vicinity of Chirala were visited, as well as various bore well sites in the upland near Cumbum. The Executive Engineer of the Prakasam District office in Ongole, Mr Gopala Reddy, and the Deputy Executive Engineer of the Chirala sub-district, Mr Subash Babu, accompanied us during our visit to the coastal plain. The bore well sites were discussed with the Deputy Executive Engineer T.L. Narsiman of the Markapur sub-district and V.M. Gupta, geo-hydrologist for the Cuddapah and Prakasam districts.

Palaparru Scheme (Chirala)

The proposed Palaparru Scheme covers an area of 2600 ha and comprises 1 village with 1270 families. The villages in the area have a protected water supply. The source of the irrigation water is the Oregu Vagu drainage canal. The canal and 800 acres of land bordering it are located in the Guntur District. The command area will be located in the Prakasam District, which implies that the water has to cross a non irrigated area, either piped or in an open channel. The total distance over which the water will have to be pumped is about 1.5 km. Hydrological clearance for the scheme has been obtained very recently (last week). Since most of the surrounding area is provided with irrigation water already, the area is very well developed. At present cotton, tobacco and some grams (chick pea) are grown in the area. In the irrigated areas paddy is the main crop (nearly covering 100% of the area). Irrigation water will be provided for 1 crop (late Kharif) on the residual soil moisture a second short duration crop (e.g. grams, 2 months) will be grown.

The preference for paddy cropping is explained by the high yields and prices of the commodity and the stable market. Furthermore paddy is the traditional crop in the area. On the other hand, the tobacco market has declined very much as a result of reduced exports. Cotton requires very high pesticide inputs (costly) and high management skills. High yield fluctuations imply a high risk in growing this crop.

Since the proposed scheme is located in a highly developed irrigated area, a good control scheme is available nearby. Other proposed schemes in the area are very limited in acreage and therefore less suitable for our purposes.

Mittamida Palli and Cumbum Padu bore well schemes

Both the schemes are located in the Markapur sub-district. Geo-hydrological surveys have been carried out and about 1000 bore well sites have been identified, of which some 200 have been cleared. The farmers have to apply for a well which will always be subsidised for the full 100%. At present 620 applications have to be surveyed. Depending on available funds, wells are drilled. The decision which applications will be awarded is made by the Executive engineer in Ongole. Based on observations in observation wells (one in every village) the State Groundwater Department yearly produces a report in which the availability of groundwater is stated. If sufficient water is available new wells can be drilled, provided the required funds are available as well. At presents very limited funds are available and as soon as the APWELL funds are cleared drilling can start. On average 10 wells per month can be drilled.

Fluctuations in power supply are the major problem in bore well schemes. If the voltage drops too much pumping has to be stopped, if not the pump will be damaged. However, if water shortage if threatening to damage the crop, farmers are willing to take the risk and pump at too low voltages. Therefore APSIDC prefers to group bore wells in clusters and to provide such a cluster with its own feeder. Until now APSIDC has taken care (also financially) of the maintenance of the bore wells. Another problem is that in some areas the switchboards of the wells have been stolen.

The Mittamida scheme is located in an area which is already very well developed, most of the area is irrigated, either from tanks of from bore wells. In the area already 20 bore wells exist, providing about 200 acres of land with irrigation water, whereas 15 sites are identified. Also here the main crop is paddy.

The Cumbum Padu scheme is located in a remote and very backward area. The lands are owned by the government and will be made available for poor people. The farmers are so poor that no contribution to the costs of providing a bore well can be expected. In the area 20 sites have been identified, a control site with 8 bore wells is nearby. At present cultivation is limited, and a variety of dryland crops is grown. On lands irrigated from a few private bore wells paddy is grown.

Saturday november 27:

Preparation of the workshop and discussions with the ASCI project team. The ASCI project team will consist of the following persons:

- Dr S. Satish, agronomist, rural development specialist
- Dr Ramesh Durvasula, public health specialist
- Dr Rajagopalan, statistician
- Mr. D. Vijay Sai, computer specialist
- Mr. A.V.L.P. Bhaskar, socio-economic survey specialist
- Mr. K. Sathganand, socio-economic survey specialist
- Mrs. Seethhalakshmi, sociologist

Mrs. Shailaja, sociologist

The above list shows that the technical aspects of the EIA are very meagrely covered, even though an additional geo-hydrologist will be hired. This implies that not only the collection of the data but also the interpretation and analysis fitted for the impact assessment have to be done by the delivering sub-contractors, VIMTA Labs. and APSRAC. These agencies seem able to collect the data, but experience with EIA is totally lacking. The ASCI staff will only be able to present the data nicely, analysis and interpretation, in other words extract information from the data, as well as reporting will have to be done completely by Mr Satish.

Sunday november 28:

Preparation of workshop, discussions with some of the participants that had already arrived: Dr Nippes (Indo German Bilateral Project "Watershed Management" and Harnath Jagavat, Chief Executive Sadguru Water and Development Foundation, Gujarat. The foundation implemented 85 minor lift irrigation schemes, 9000 bore wells and is active in the field of watershed development and social forestry. The approach followed is very comparable with the approach proposed for the APWELL and APLIFT implementation. It could be useful if some of the APSIDC officials would visit the project area to get familiar with the followed approach.

Monday november 29:

First day of the workshop. Nearly all the invited people attended, in total about 30 persons.

After the opening remarks of Mr. Shankar (Principal of ASCI), Mr. S.S. Quadri, the Executive Engineer of APSIDC, gave an explanation of the two projects. The proposed conceptual framework was explained afterwards by Mr. Vis. In the afternoon various topics were discussed in smaller groups. De results of these discussions were presented plenary. The overall impression was that most participants are keen to share their experiences and to discuss matters. A remarkable point in the presentation of Mr Quadri (APSIDC) was that the contribution of the farmers in the cost of the schemes has been lowered from 35 to 10%.

Tuesday november 30:

Second day of the workshop. Present: about 28 people. The keynote address by Mr Narasimha Reddy (Director A.P. Ground Water Department) was well prepared and gave an excellent overview of the (geo) hydrological data availability and processing practices. Dr. Rao (Director A.P. State Remote Sensing Application Centre) gave an overview of the possible uses of Remote Sensing techniques, whereas Mr Jagavat shared his experiences with minor irrigation development with the participants. Discussions in most of the working groups focused on the relevant issues, however, in some groups discussions were on a too general level and were not very contributing to our purpose.

Wednesday december 1:

Third day of the workshop. Present: still around 30 people, indicating the keen interest in the subject of the participants. Also present were Jan van der Laan and Menno Keuken of the Royal Netherlands Embassy in New Delhi. Key note addresses were delivered by Dr Ramesh Durvasula (ASCI) on Public health aspects of water resources development, by Dr. Vittal Rao (NEERI) on Flora and Fauna and by Dr Sastri, General Director of the Water and Land Managerment Training and Research Institute (WALMANTARI) in Hyderabad who delivered a general lecture on environmental aspects of irrigation and water resources development. In the closing session of the workshop, which was attended by Mr Madan Mohan Reddy (Vice-Chairman of APSIDC) and Mr Quadri (Exacutive Director of APSIDC), Dr Satish gave a summary of the results of the workshop.

Overall it can be stated that the workshop has been very successful, a better understanding on probable impacts has been gained as well as information on existing data at the various institutes. Of even more importance is the way in which the workshop has added to the environmental awareness of a fairly large number of APSIDC and AP Ground Water Department engineers and that personal contacts during the workshop will greatly facilitate the data collection at these institutes. ASCI, VIMTA Labs. and APSRSAC staff members present at the workshops profitted from the information exchange and feel more confident towards the tasks assigned to them than before the workshop.

The workshop was very well led by Dr. Satish and the facilities provided by ASCI were very good.

Discussions with Van der Laan and Keuken solved most of the problems/uncertainties that are listed at the end of this memo.

Thursday december 2:

Further elaboration of the results of the workshop and drafting of workplans for ASCI, VIMTA Labs. and APSRSAC. These workplans are given in Annex C.

Friday december 3: Further discussions on the continuation of the project and reporting.

18.50 hours: travel to New Delhi by IC 840.

Saturday december 4: 01.55 hours: travel to Amsterdam by SR 195. Some observations that may require special attention:

- As mentioned above the experience and capabilities of VIMTA Labs. in the field of EIA are limited, although they seem able to collect and analyze data, they need to be guided very precisely in where and what to sample. Results of the workshop give this guidance sufficiently.
- The performance of ASCI will depend heavily on the performance of Mr Satish, it will really be a one-man show. Supporting staff is ample available.
- The role of the Andrah Pradesh Remote Sensing Application Centre in providing baseline data may be relatively limited as a result of the fact that only small areas are covered by the EIA.
- The criteria with regard to selection of schemes seem not to be strictly followed by APSIDC. The impression is that they are quite opportunistic in their approach, that is that they have a number of schemes "on the shelf" that will be implemented in a certain order as soon as funds become available from one source or another.
- APSIDC is only responsible for a very minor proportion of the lift irrigation and bore well schemes in the state. The majority is implemented by private enterprises, which can not be controlled. As a result impacts of the APSIDC projects will be very limited compared to the (cumulative) impacts of private projects. Likewise, mitigative measures may become totally irrelevant. For example, exhaustion of groundwater resources is uncontrollable, because no (legal) means exist to prevent private well owners from pumping as much water as they like, even in the very immediate surroundings of an APSIDC well.
- During the field visits it was observed that some of the (APSIDC) officials are suffering from "mission fatigue", a lot of mission have been visiting and they do not see very much progress in the project. One reason the more to try to carry G.I.S. and E.I.A. studies in the future simultaneously and tuned to each other.
- The financial contribution of the farmers to the establishment costs of bore wells and lift irrigation schemes is decreased from 35% to 10% by APSIDC, even these 10% are considered to be too high.
- During discussions with participants to the workshop it was stated that privatisation of the schemes is out of the question. "Hardware" that becomes available in directly or indirectly (by means of grants) government funded projects always stay government property, even the trees in reforested areas.
- In contradiction with what is stated in the project documents it is very likely that cropping patterns will shange after the introduction of irrigation. There is a very high preference for paddy growing, for reasons given above.

Workplan

The here given workplan follows the more general workplan which has been drafted at the end of the consultants visit to Hyderabad in July 1993, given as Bijlage 2 to the APWELL/A-PWELL EIA memo dated July 22, 1993.

The in this memo mentioned training of the ASCI expert has taken place in the Netherlands in weeks 42 and 43 (October 17 till October 30). Following this training the ASCI experts spent 3 days at the DELFT HYDRAULICS office in Delft, to discuss and plan the scoping workshop of the project. This workshop was scheduled to take place in week 47 or 48 and has indeed been held in week 48 (November 29 till December 1).

Originally a stay of the Dutch expert in Hyderabad after the workshop had been planned for. In reality this visit has taken place in the weeks preceding the workshop. In these weeks fieldvisits have been made and the APLIFT schemes and bore well clusters for which the EIA will be made have been identified in both the Mahabubnagar and the Prakasam district.

The following details the workplan starting with week 49 (December 6) and ending with week 13, 1994. It assumes that a first rough and preliminary draft of the EIS will be ready by the end of March. The last week of March a workshop will be held in which the results of the study will be presented. Results of the discussions during the workshop will be incorporated in the draft end report which will be prepared in April.

ASCI and VIMTA Labs. will start data collection in week 49. In the same week the Andrah Pradesh State Remote Sensing Application Centre (APSRSAC) can start processing of the satellite images. Data collection will start in the Mahabubnagar district. Data will be collected at one proposed APLIFT site (the Mudumal Scheme) and at one existing lift irrigation site (the Gudepallur Scheme), as well as at one proposed APWELL site (Shakabad) and at a site with an existing cluster of bore wells (not yet identified). Secondary data will be collected at the various institutes dealing with EIA and irrigation/water resources development related fields. The kind of data that will be collected and the soil, water and air parameters that have to be analyzed are given in the summary report of the scoping workshop. Some additional remarks concerning the data collection and sampling are given at the end of this annex.

Soil, water and air quality sampling, an agricultural survey, a household survey, a flora and fauna survey and mapping of soil erosion, slopes, soil orders, soil depths, soil stoniness and drainage characteristics will be carried out by VIMTA Labs. The susceptibility of the soils to erosion and runoff, salinisation and alkalinisation will be assessed as well, as will areas affected by waterlogging, salinisation, alkalinisation and soil erosion in the control area. ASCI will supervise the fieldwork and will collect the baseline data for the health impact assessment.

The data collection and sample analysis will be finalised by the first week of January, so a next visit of the Dutch consultant is planned for early January, to assist in starting up the data analysis and in helping interpret the results in such a way that impact predictions can be made and mitigating measures can be formulated. Draft reporting will also start. If needed additional samples or data will be collected and the data collection/sampling program for the schemes in the Prakasam district will be adapted.

In the period from half January till March the data on the sites in the Prakasam districts, the Palaparru lift irrigation scheme and a nearby located control scheme as well as the Cumbum Padu proposed and existing bore well clusters, will be collected, analyzed and interpreted. Again secondary data will be collected as well. VIMTA Labs. will collect and analyze the data as described above for the Mehabubnagar district under supervision of ASCI. Interpretation of the data in the sense of impact prediction and design of mitigating measures will be done by ASCI in the first weeks of March. ASCI will also gather information on the legal framework in which the EIA takes place and on the ongoing plans and policies in the area. Final assessment of the impacts and mitigating measures, as well as draft reporting will take place during a visit of the Dutch consultant in the second half of March. During this period a second workshop will be organised in which the results of the study will be presented.

During his visits to India in January and March 1994 the Dutch consultant will pay specific attention to identifying institutes which may play a role in the monitoring of the environmental impacts during the execution and finalisation of the APWELL and APLIFT projects.

Additional remarks concerning the data collection program of VIMTA Labs.

As stated above the data requirements for the EIA are stated in the summary report of the scoping workshop. Some additional remarks are given below:

Water quantity:

To be able to judge whether a hydrologic clearance really means that sufficient water will be available for lift irrigation in the future the following questions have to be answered (see also the memo provided by Vis at the scoping workshop):

- what is the current practice in assessing whether or not a hydrological clearance will be given? The Department of Minor Irrigation gives clearances and will be able to give the required information.
- are there any limitations in this method, in other words does the method ensure availability of certain minimum flows? Related to this question are questions like:
 - what are the present and future upstream water uses and how are these taken into account?
 - what are the present and future downstream water demands and how are these taken into account, including the minimum demand to sustain downstream ecology and prevent further salt water intrusion in the river mouths?
 - which are the applied time horizons?

To assess whether or not the expected yields of groundwater at the proposed bore well sites are sustainable, the following items, concerning ground water availability on a macro, watershed level have to be described and analyzed:

- the current status of the groundwater in the district, mandal and village, information has to be gathered on: numbers of wells, number of failing wells, causes of failure, total amount of yearly extracted water, total well irrigated area etc. Information will be available a.o. at the A.P. Ground Water Department (APGWD).
- the current practice in assessing ground water availability
 - what are the limitations of this method and how could it be improved?

- special attention should be given to the private wells, are they sufficiently taken into account?
- the trend in groundwater levels in the study areas. Use data of observation wells available at APGWD.
- possibilities to introduce other irrigation techniques, like drip irrigation, to keep wells with declining yields operational
- possibilities to increase the recharge of the ground water, e.g. upper watershed management

On the micro level of the individual sites (proposed and existing), the following items have to be addressed:

- the procedure of bore well site location (Remote Sensing, Geo-hydrological surveys)
- observation well data, fluctuations over the years as well as within the years
- well capacities by pump tests
- possibilities to apply special irrigation techniques (drip irrigation) for well with a yield less than 2500 gph
- private well development, will these jeopardise the proposed scheme?

Water quality:

The water quality parameters that will be assessed are given in the summary report of the scoping workshop. Existing information on water quality, as available with the APSIDC will be collected and analyzed. Besides autonomous developments in water quality (changes that are to be expected irrespective of the project) e.g. as a result of further increases in population density, industrial development, emissions from power plants etc. The number of samples to be taken depends on the spacial variability, at this moment this variability is not known. Advice will be sought at the Public Health Engineering Department before sampling starts. The below given numbers are therefore indicative only.

Proposed APLIFT Scheme:

- 2 samples of the irrigation water source near the proposed intake

- 5 to 10 samples in open wells near the proposed scheme

Existing (control) lift irrigation scheme:

- 2 samples of the irrigation water at the intake
- 20 to 30 samples of the drainage water at various places in the scheme
- 5 to 10 samples in open wells near the scheme

Ideally sampling, both of the intake and the drainage water, should be spread over the year to be able to assess fluctuations due to other hydrological conditions (low flows, high flows) or other stages of the crop. This will be impossible in the present study. Therefore it should be tried to take drainage water samples in different parts of the scheme, having crops in a different stage of their development. Besides the expected variability in water quality could be addressed qualitatively, based on expert knowledge and literature.

Proposed APWELL scheme

- 2 samples of the ground water from a nearby bore well

- 5 to 10 samples in open wells near the proposed scheme Existing (control) bore well scheme:

- 2 samples of the irrigation water at the intake

- 20 to 30 samples of the drainage water at various places in the scheme
- 5 to 10 samples in open wells near the scheme

Pesticide use in irrigated areas may lead to increased levels of toxins in the food grains as well as the crop residues that are used as animal fodder. Samples of food grains, animal fodder and milk in the control scheme have to be analyzed on the presence of pesticides or other toxins.

Soils and agriculture:

As decided on the scoping workshop the following geomorphological and soil parameters have to be assessed for the soils in both the proposed and existing lift irrigation and bore well schemes: slopes, soil orders, land capability class, irrigability capacity, soil erosion status, nutrient losses, soil depths, soil stoniness, drainage characteristics, as well as the susceptibility of the soils to erosion and runoff, salinisation and alkalinisation. Besides the existing landuse/vegetation will be assessed in the proposed schemes as well as areas affected by erosion, waterlogging and salinisation and alkalinisation in the existing schemes. The relevant information will be displayed on maps on A4 format.

Again, the number of samples to be taken depends on whether only the top soil has to be sampled or also the subsoil and on the spacial variability of the soils, at this moment this variability is not known. Advice will be sought at the Department of Agriculture before sampling starts. Physical, chemical and biological characteristics that will be assessed are given in the summary report of the scoping workshop.

Air quality:

VIMTA Labs. is very well experienced in air quality sampling and is able to make a good sampling program. The most important goal of the air quality study should be well kept in mind: if household fuels change as a result of a change in crops/agricultural practices as a result of the introduction of irrigation, does this effect the indoor air quality. Parameters to be analyzed are as given in the summary report of the scoping workshop.

(Socio-economic) farm survey:

The (socio-economic farm survey has to give an insight in cropping patterns, fertiliser and pesticide use, agronomic practices etc. etc. ASCI has ample experience with socio-economic farm surveys and will make a detailed survey program.

Additional remarks concerning the role of the Andrah Pradesh State Remote Sensing Application Centre

APSRSAC will make a regional analysis of an area of 720 km² of the areas in which the proposed and existing lift and bore well irrigation schemes are located, followed by a more detailed analysis (10×10 km) of the scheme sites themselves. They will follow the standard approach in assessing Basic Integrated Land and Water Units (based on analysis of geology, geomorphology, soils, slopes, and vegetation/cropping pattern) and deriving recommended

land use (the so-called Optimal Land Use Systems).

Besides APSRSAC will assess zones of over development of groundwater in the selected areas, help delineate groundwater watersheds and assist in defining possible upper watershed ground water recharge possibilities.

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Report on the third visit to India Hyderabad within the framework of the EIA of the APWELL and APLIFT project (January 9 till January 22, 1994).

Sunday, January 9:

10.45 hours. Departure from Amsterdam by LH 760, arrival in Dehli: 01.30 hours.

Monday, January 10:

16.45 hours. Departure for Hyderabad by IC839, arrival 19.00 hours.

Tuesday, January 11:

Discussions on the APLIFT project progress with Dr. Satish and Dr. Prasad (VIMTA Labs.). The fieldwork in the lift irrigation and groundwater irrigation schemes in the Mahabubnagar District have nearly been completed, in the coming weeks a few more site visits will be made. Laboratory analysis of the samples taken is on its way and will be finished by the end of this week. For the fieldwork two questionnaires and a checklist for the sampling of soils and water have been made. Preliminary observations, indicate that the environmental impacts are mainly related to water quantity aspects. Most of the problems expected are resulting from the fact that hydrological clearances are only given to grow irrigated dryland crops. System design is also based on this assumption, whereas in reality paddy rice will be cultivated. As a result certain areas at the tail ends do not receive sufficient water. Once paddy rice growing starts, the paddy area increases as a result of an increase of waterlogged areas, only suitable for rice growing.

In the afternoon the remaining part of the study was planned. Data collection and sample analysis in the Prakasam district will be finished by the end of February and the overall results will be presented in a summary which will be distributed at the end of week 11 (March 18). The results will also be presented at a workshop, which is tentatively scheduled for friday the 25th of March. Commends received on the workshop, for which the same people who participated in the scoping workshop of November 1993 will be invited, will be incorporated in the draft report which will be finalised in week 12 (friday April the 1st). The Dutch consultant will help prepare and participate in the workshop and will assist in drafting the draft report. It is proposed that the draft report will be sent to APSIDC, the Dutch Embassy and DGIs for review and will be finalised within 1 month after receiving the commends.

Wednesday, January 12

Discussions on the APWELL project progress with Dr. Satish and Dr. Prasad and Mr. Sujeet Kishen of VIMTA Labs. For the APWELL EIA study a site has been selected, near the village Appayapally, in the Linhal Mandal. APSIDC has selected the site and has made available a short report on the details of the project. The village is located in a valley, surrounded by forested hills. All the villagers belong to scheduled tribes and the area is very backward. Skin diseases and a form of paralysis are very common in the village. At present irrigated agriculture is limited. Twenty-three open wells, which were constructed within the framework of a special programme at the cost of 40,000 Rp each and some of which are at present polluted, provide irrigation water to about 100 acres agricultural land. In the valley development of a cluster of approximately 200 bore wells is possible, which would provide water to irrigate some 3000 acres of farmland. The expected cropping pattern is 100% paddy in the kharif season and 50% paddy in the rabi season. Besides paddy, groundnuts, castor beans,

jowar and pulses will be grown in the rabi season. For irrigation development levelling and terracing is required, as are special agricultural and irrigation extension programmes.

Advantages of the cluster approach are:

- systematic planning of the scheme is possible
- implementation of the scheme will be easier
- better opportunities for monitoring
- power can be supplied by means of an independent transformer
- area development can take place on a watershed basis
- private well development can be avoided
- project results are clear.

In the afternoon data presentation techniques were discussed with some of the members of the ASCI project staff.

The control scheme for the bore well EIA is located near Makthal, at some distance of the proposed scheme. The reason for this is that near the proposed scheme no bore well schemes that are already a number of years operational could be identified.

Thursday, January 13, Friday January 14

Review of available literature and reports and drafting of a list of reports and literature references that still have to be collected for inclusion in the study. Also the set-up of the Environmental Impact Statement was discussed and a preliminary table of contents was compiled. A start with writing down the first introductory chapters for the report was made.

Saturday, January 15

Discussions with Dr. R.S. Rao and Mr. Venkata Swamy of the Andhra Pradesh State Remote Sensing Application Centre. Delineation of the areas in the Mahabubnagar District that will be covered in the interpretation of the satellite images. Exact areas in the Prakasam District can only be established after a next field visit with the APSIDC people.

From observations on the satellite images sofar some conclusions can be drawn:

Mudmal APLIFT irrigation scheme:

Availability of water will be no problem, the Krishna river at this point is perennial, there may even be some backwater effects of a reservoir under construction. The area is sensitive to erosion and salinization in the lowlying parts. The majority of the soils is fairly coarse grained and is unsuitable for paddy cropping. The area may be part of a nature reserve of the endangered "Black Buck". This will be checked.

Appayapally APWELL scheme:

The available maps at the APSRSAC do not show a major fracture zone in the area. APSIDC based their information on areal photographs. A check will have to be made. Two hundred bore wells seems very much for a relative small village, whereas "back of the envelope" calculations indicate that safe yields may be insufficient to provide the proposed area of 3000 acres with water for paddy. The procedures and techniques followed by APSIDC in ground water development were discussed in detail. The overall picture that emerges is that the current procedures are sub-standard: bore well development is demand driven and not based on available supply. Safe yields are not established and not used to define the irrigated area

and the desirable cropping calendar, but the other way around. AFPRO is mentioned as an NGO that has capabilities and equipment to do good pumping tests and monitor wells.

Sunday, January 16 Rest

Monday, January 17

Visit to VIMTA Labs. and discussion of the survey results with Dr. Rao, Dr. Prasad and Mr. Sujeet Kishen. Field survey, sampling and sample analysis seem to have been carried out appropriately. Results are presently summarised in tables. Data analysis and presentation has not yet started and has been discussed.

Tuesday, January 18

Continuation of the drafting of the introductory chapters, reviewing literature for appropriate methods to present the impacts of the project.

Wednesday, January 19

Discussion with Dr. Satish on the proposed table of contents for the report, the introductory chapters and possible methods to present results. Planning of additional data collection at APSIDC and State Ground Water Board with Dr. Satish, Mr. Sai and Mr. Sujeet Kishen.

Thursday, January 20

Final discussions on project planning, further reporting and travel to Delhi by IC 840.

Friday, January 21

Due to the fact that the flight to Delhi took 21 hours instead of the usual 2, the debriefing at the Royal Netherlands Embassy had to be cancelled. Instead the project was discussed more informally over dinner at the residence of Mr. Keuken.

Saturday, January 22 03.05 hours departure for the Netherlands by LH 761

Conclusions and general observations:

ASCI, as well as VIMTA Labs. and APSRSAC still appear very keen on the project, they have the feeling that they can learn something from it and put a lot of effort in it. On the other side, at ASCI it is still very much Satish' one man show, the second man, Sai, who also participated in the EIA course in the Netherlands, is of very limited value. Other people involved are more of the assistant level. Besides, Satish' availability has not been 100%, due to extended involvement with the Upper Krishna resettlement project.

Concerning the project progress it can be concluded that a lot of data have been gathered, mainly by VIMTA Labs. Although clear appointments were made that all the samples would be analyses and survey data processed before my arrival in India, no real written down information was available. No data analysis had been done so far and most of the information is only available in the heads of the people concerned. In other words, progress has been less than assumed and the main purpose of my visit, assisting in the data analysis and the interpretation of the results in such a way that impact predictions could be made and mitigating measures formulated, could not be fully realised.

Both VIMTA Labs. and ASCI are very well able to collect all sorts of data and to present it in nice tables. To make a distinction between relevant and irrelevant data is harder, as is the conversion of data to useful information. Although I have been trying to put some systematics in the procedure of converting data to information I am not totally convinced that the message got through and we may run the risk that the Impact Assessment becomes the well known stack of tables, from which the reader ha to draw it's own conclusions. In an attempt to reduce this risk as much as possible, I have asked ASCI to sent results of their analysis as soon as they become available.

Progress of the work at APSRSAC was also limited, they only did some preparatory work. Their capabilities seem OK, Dr. Rao, APSRSAC's director, who is involved personally in the project, is very resourceful and has come forward with a lot of valuable suggestions. My feeling is that APSRSAC will finish their tasks according to schedule.

Impacts are mostly related to water quantity aspects. Concerning the bore well projects it becomes more and more clear that sustainable yields, both of the aquifers and the individual wells are not assessed properly. Besides, the system design is generally not tuned to the cropping pattern that will emerge. The latter also is valid for the LIFT irrigation schemes. Paddy is a major crop and cannot be denied. Other problems in the lift irrigation schemes are related to waterlogging, clogging of canals and aquatic weeds. These problems can partly be prevented by lining the distribution canals. Water and air quality do not seem to be crucial factors, public health impacts yet have to be assessed.

Some final remarks:

- the VIMTA Labs. laboratory facilities seem quit OK, but they are well known for mixing up samples. Care has to be taken.
- the cooperation of APSIDC is still very good, information is made available upon request and great interest in the whole exercise is shown. However, there are signs that the policy is changing now that Mr. Quadri resigned as executive director. For certain favours a signed letter is now required.

- time schedules set sofar still seem realistic and a first draft of the report should be available by the end of March.

delft hydraulics

Overview of preliminary results of the APLIFT and APWELL EIA study in Mahabubnagar district

APLIFT

General:

Two control lift irrigation schemes have been studied in the Mahabubnagar district. The canals in one of the schemes are lined, whereas the other scheme is characterised by unlined canals. Environmental impacts of the lift irrigation development are more significant in the scheme with unlined canals than in the lined scheme. It seems that proper lining of the canals reduces the problems significantly. The encountered problems are mainly related to the system design and the distribution of the available water over the system. Water quality and human health problems are insignificant.

The objective of the proposed Mudmal Lift Irrigation Scheme is to irrigate 5,000 acres of land for 2 seasons by lifting water from Krishna river. In the design it is assumed that the farmers will only grow irrigated dryland crops. In the Kharif season irrigation water has to be provided at least 4 times and at maximum 6 times. In the Rabi season irrigation water has normally to be provided 8 times. Sixteen hours of pumping is envisaged in a day with a pump capacity of 50 Cusecs i.e., 1 Cusec for every 100 acres.

Water could be lifted from four different intake points along the river, either singly or combined. A first exercise, hence, is to determine the merits and demerits of each intake. The intake should be located such that a maximum amount of water can be lifted for most months in an year at the lowest cost: in other words the length of the main pipeline should be minimum. Also, the main pipeline should end at the highest point in the command area, so that water can flow freely by gravity throughout the command area.

The evaluation of the intakes is based on:

- water availability for lifting, whether the required discharge of 50 Cusecs is available for lifting for the crop periods or not
- water flow, is it possible to distribute the water over 5000 acres by gravity or not?
- initial investment
- the required Operation and Maintenance, includes power consumption.

System design:

Hydrological clearance is only given for the cultivation of Irrigated Dryland crops. In reality the farmers will start to grow paddy. Water tables around the paddy fields rise and make the cultivation of e.g. groundnuts impossible. As a result, the paddy area spreads out and commonly 30 to 50% of the irrigated area is cultivated with paddy after 5 to 7 years and uses nearly all the available water; some 20% of the area is not reached by irrigation water at all, resulting in conflicts between users.

Seepage is another problem related to paddy cultivation, in the studied schemes some 30% of the area had become waterlogged and returnflows, in the form of small streams, are very high (up to 30%). Yields in the waterlogged areas of the scheme are reported to have decreased considerably over the years. Furthermore, illegal lifts, currently applying diesel

pumps, will and cannot be excluded from drawing water from the scheme and the total acreage of the scheme may become 7,000 acres. This is not taken into account in the system design.

Other reasons for the waterlogging and distribution problems are related to the fact that distributary canals are not lined, resulting in seepage into the fields along the canals. Blocking of the canals due to sedimentation or excessive aquatic weed growth (Aap) is also common. The water flow stagnates and the water sweeps into the adjacent fields. Sediments enter the canals mainly as a result of trampling of the unlined canal banks by cattle.

Intervillage problems and poor design of the layout of the systems are also mentioned as reasons for tail-end problems.

Poor performance of the irrigation schemes, in the sense that not only large amounts of water are lost, but also that average yields are low, is attributed to a complete lack in irrigation and agricultural extension. The farmers are not familiar with irrigated agriculture and have never received any guidance in the transition from rainfed to irrigated agriculture. Agricultural practices are therefore not very appropriate, as can be concluded from e.g. the fertiliser application, which is not tuned to the crop requirements.

Some points to note:

- 1- No data are available on Krishna flows. Some data may be available for points upstream at the Central Water Commission, but only separately for the Krishna and Bheema rivers. The two needs to be aggregated to arrive at an estimate for our purpose. Major upstream water users for Krishna include the upper riparian state, Karnataka, (two dams are envisaged) which would result in a reduction of water by 730 TMC. And another user is the Raichur Thermal Power Corporation.
- 2- Hydrological clearance, in reality, is a mere concurrence. Leave alone the methodology, even the data are not maintained nor considered while giving the clearance. Discussions are held informally with the CWC, actually the proponent has to ensure the availability of water.
- 3- Lifts designed on the foreshore of reservoirs should not be located near the Full Reservoir Level, but at realistic estimates of water levels. Consequently, the entire machinery should be able to withstand flooding.
- 4- Irrigable area must be a estimated realistically. High lying not irrigable patches should be identified and left out of the system. Land levelling is essential and must form a part of the initial Project plan itself.
- 5- The proposed area's soils seems to have a poor water holding capacity. As a result, water requirement will be relatively high and the risk of water logging in low lying areas increases.
- 6- Irrigation reduces soil erosion, but run-off needs to be taken care of properly.
- 7- Changes in cropping patterns are bound to occur. As a result the local demand for Jowar (dry crop) will have to be met in another way.
- 8- In irrigated areas fertilizers are overused, indicating a lack of knowledge/extension.
- 9- Air quality will improve after the introduction of irrigation, both outdoor (less dust) and indoor. Indoor air quality improves as a result of the replacement of wood stoves by biogas plants. Increasing livestock populations, as a result of the availability of more fodder, provide the base material for the plants.

- 10- Migration rates reduce after the introduction of irrigation.
- 11- With the introduction of irrigation, health status will improve as nutritional levels improve.
- 12- People's capacity/willingness to manage the schemes on their own is not evident.
- 13- Even if people are willing to manage the schemes on their own, they are not able to do so for
 - Technological reasons
 - O&M will be a high cost proposition
 - Difficulties in obtaining spares and having repairs done
 - Revenue collection: problem of free riders
 - Cropping pattern imposition
- 14- From a cost perspective, farmers will never agree to run the schemes on their own. Instead of Rs. 150 per year, a farmer is incurring on irrigation presently, he will have to pay Rs. 1,100, an increase by more than 600 per cent.
- 15- In fact, this is a typical case of a 'market failure', which makes the government intervention a must. At best, one can envisage the activities in a GO-NGO-People collaboration, with well defined roles and responsibilities for each partner (based on the merits of each).
- 16- APSIDC is characterized by inordinate delays in execution. Proper timeframe must be set for each scheme and the project as a whole.

APWELL

General:

Involvement of APSIDC in bore well development in the Mahabubnagar district is fairly limited. APSIDC developed 1100 wells of which 900 were energised, as compared to the development of 12,000 private bore wells and 15,000 private open wells. In Andrah Pradesh State as a whole, APSIDC developed 12,000 wells in the last 20 years. Although APSIDC has 16 operational rigs, drilling of wells is not done by APSIDC, but by private companies. These private companies charge 260 Rp/m for drilling, whereas the costs of drilling by APSIDC would be 440 Rp/m.

Assessment of groundwater development potential:

The potential for bore well development is assessed by the State Ground Water Department by comparing the groundwater recharge with the groundwater extraction on a Mandal scale. Based on the ratio between recharge and extraction, areas are coded as white, grey or black zones for groundwater development. In white zones unrestricted development is possible, in grey zones development is restricted, whereas in black zones no further development is possible.

It is assumed that 15% of the annual rainfall infiltrates and is added to the groundwater reserves. Of this infiltrating water 65% is assumed to contribute to the aquifers. Assessments in the past (1984 by the State Ground Water Department and 1986 by the Central Ground Water Board), applying the same methodology but using different spacial scales, gave non compatible results. Besides, drilling may continue in the black zones, because it is not forbidden, only subsidies are not given. Successful drilling of large numbers of wells in a number of black zones has been reported.

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Although the general methodology is acceptable, the results are highly erroneous because both the recharge and the extraction estimates are not very precise. Reasons for this are:

- the units for assessment of the potential are based on administrative and not on physical boundaries,
- rainfall data are unreliable, due to wrong location and spacing of the rainfall gages and poor methods of data collection and data processing;
- groundwater recharge areas are considered to coincide with watershed areas;
- pumping test data are extrapolated over a large number of wells, besides the pumping tests are unreliable due to voltage fluctuations during the daytime. As a result the capacity of the used pumps is never known exactly. Pump tests are done by private companies, APSIDC never does any pump tests;
- data from observation wells have to be taken by local people and sent to APSIDC. At many sites, data are not taken or not sent to APSIDC, besides errors in the measurements are common and the waterlevels in the observation wells vary substantially over short periods (within a day);
- water extraction is estimated only very roughly by multiplying the area under different crops with specific crop water requirements.

The general feeling at APSIDC (confirmed by Dr. R.S. Rao, APSRSAC, formerly State Ground Water Board) is that delineation into white, grey and black zones, based on actual available data is not very meaningful.

APSIDC procedure for bore well development:

The procedure followed by APSIDC consists of a number of steps. The beneficiaries has to apply for the development of a bore well by sending in a list with names, certificates stating their status as small or marginal farmer and 200 Rp fees. Only applications from farmers in areas that have a potential for ground water development are taken into consideration. If there is an open well within 250 m of the location of the new bore well, a declaration of no objection of the owner of the open well has to be sent in. About ten percent of the well applications fall within this category. In an estimated 10% of these cases, the owners of the open well are forced to sign a declaration of no objection.

About 6 to 10% of the wells that are drilled fall outside the potential areas. That they are still drilled has political reasons.

Blindly following the 250m rule seems not realistic, local conditions like the direction of the fractures or joints etc. should also be taken into account. This requires more involvement of the geohydrologist and the geophysical expert in the whole procedure. Presently the role of the geology team is finished after the site selection. They only receive the rock samples, gathered during the drilling, which is done by a private enterprise, for further analysis. The origin of these samples is often poorly documented and subject to error.

Well failure:

Even when applying the new APSIDC norm of 1500 gallons/hour (compared to 2500 GPH earlier) a large percentage of the wells drilled in the state are failures: 40% between April 1992 and March 1993 and 20% in 1993. In Mahabubnagar District 74 out of 160 wells (46%) failed between April 1992 and March 1993 and 31 out of 170 (18%) between January and

November 1993. The reason for the reduction in failure rate in the last year is that a discharge of 1500 GPH is now applied as the minimum to call a well successful, instead of 2500 GPH. A problem in assessing the failure rate is that real well capacities are almost never assessed. Only the discharges during the drilling are recorded and these observations are often erroneous, because the equipment used is not suitable for the high pressure rigs nowadays applied. Furthermore the private tend to underreport the number of wells with yields below 1500 GPH, because they get less paid for wells that fail as compared to successful wells. Reasons for well failure are both geological and mechanical. To the latter category belong problems related to lowering of the casing pipes to the wrong depth and collapse (caving) of the wells. Well collapse is reported for 5 to 6% of the APSIDC wells.

Another problem is related to the generally long time span between drilling the well and energizing it, 5 to 6 years is not uncommon. In this period 3 to 4% of the wells collapse or dry up, for example as a result of nearby development of private wells. Reduction of well discharges is a commonly experienced feature and is related to the fact that safe yields are not assessed, as should be done to be able to choose a pump with the appropriate capacity and to assess the area that can be irrigated given a certain crop mix and cropping calender. In practice the pump capacity is based upon the desired cropping calender and irrigated area (demand driven instead of based on safe yields). In Mahabubnagar District 15% of the wells is reported to be abandoned within 5 years of drilling for geological (8%) or mechanical (7%) reasons. Next to overpumping insufficient spacing of wells and insufficient rainfall may cause a reduction in well yields. In this respect the conflict with drinkingwater wells of the Panchayati Raj Engineering Department needs to be mentioned as well. According to the official rules, no wells should be drilled within 3 km of a Panchayati Raj well.

Taken the above into account it can be calculated that only some 50% of the selected sites will (still) be operational after 5 years. An overview of the reasons for failure is given in the table below:

Reason for failure	% of total	
Drilling in wrong site (political compulsory)	5	
Insufficient yield	25	
Collapse/dry up before connection to power	3	
Dry up (geological reason)	8	
Dry up (mechanical reason)	7	
Total	48	

Both private companies and APSIDC are interested in developing as much wells as possible: private companies because they do the drilling, APSIDC because they receive 400 Rp per well per crop season for maintenance.

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delft hydraulics

Report on the fourth visit to Hyderabad within the framework of the EIA for the APWELL and APLIFT project (March 20 till April 2, 1994).

Sunday, March 20:

10.45 hours. Departure from Amsterdam by LH 760, arrival in Delhi: 02.30 hours.

Monday, March 21:

09.40 hours. Departure for Hyderabad by IC840, arrival 11.45 hours.

Discussions on the progress of the project with Dr. Satish. The overall progress is very disappointing. According to the latest planning (January 11, 1994) data collection and analysis for both the APWELL and APLIFT sites in the Mahaboobnagar district should have been finished at the end of week 2 (January 15). Data collection and analysis for the sites in the Prakasam district was scheduled to be finalised by the end of week 8 (February 26). With the Andhra Pradesh State Remote Sensing Application Centre (Dr. Rao) it was agreed that the results of the Remote Sensing analysis should be available no later than end of week 10 (March 12). The first 3 weeks of March would be used for report writing by Dr. Satish. Also an executive summary would be compiled, to be distributed among the participants of the second workshop, not later than end of week 11 (March 18). In week 12 the Dutch consultant would be available in Hyderabad for review of the reports and assistance in the preparation of the workshop. The workshop was planned to be held on the 25th of March. Week 13 was planned to be used for further review of the reports and incorporation of comments and suggestions made by the workshop participants. End of March draft reports were supposed to be available for review by DGIS and the Sector Specialists at the Netherlands Embassy. It was also agreed that Dr. Satish would keep the Dutch consultant informed on the progress of the study and sent preliminary results and finalised parts of the reports to the Netherlands. In spite of various faxes to ASCI in which this agreement was memorised and an update of the situation was asked for, no real insight in the state of affairs was given, although there were some indications that there might be "some" delay. This has been communicated with DGIS in the Hague, shortly before my departure to India.

During the discussions it became clear that the delay was substantial. The status at this moment is as follows:

APWELL sites:

- Mahaboobnagar district: information on both the proposed and existing sites has been gathered and the samples have been analyzed, except for the public health data.
- Prakasam district: only the water quantity aspects of both the proposed and control scheme have been finalised, all other information (on water quality, soils, air quality, health aspects) still has to be delivered by VIMTA Labs. ASCI took care of the socio-economic aspects.

APLIFT sites:

- Mahaboobnagar district: all information is available except for the public health aspects.
- Prakasam district: same as Mahaboobnagar district.

The missing information is expected to become available in the course of the week. The available data have been analyzed and interpretations have been made, a start with the reporting has been made.

As reasons for the delay is given that it was a difficult task for VIMTA Labs., because it was the first time they did this kind of survey. Furthermore, they had a lot of other assignments "and hence delay was inevitable". Not very convincing I would say. The overall experience with VIMTA Labs. people has been that they are late on every occasion. Whether on official business or on the personal level, they turn up at every appointment at least one hour late.

Even worse are the time management capabilities of APSRSAC. Until now, nothing has been delivered: expected data of receiving their contribution to the report: 1st of April. Reasons of delay: too many other projects.

Although Dr. Satish has been trying hard to speed up the work of VIMTA Labs., a meeting between the managing directors of ASCI and VIMTA Labs. has been held to discus the problem, the real reason for the delay may also be related to the fact that Dr. Satish will be leaving ASCI as per the first of May, to join the Rashtriya Gramin Vikis Nihdi (RGVN, Entrepreneurship Development Institute of India) in Guwahati, Assam, as director. Dr. Satish still seems committed to the project, but his more long-term interests have decreased considerably and he has been very busy with finalising other obligations and arranging the details of his transfer. This will certainly have had an impact on the way the study has been managed by him.

What was a bit surprising was that, apparently, the delays have been discussed with Menno Keuken and Mr. Ranjan, the new Programme Officer Land and Water at the Netherlands Embassy, during their visit to ASCI in February and that this has not been communicated with the Dutch consultant.

Tuesday, March 22:

Review of the collected data and analysis results. Data collection and analysis by VIMTA Labs., overall, seems to have been carried out quite good, although part of the sampling and analysis has been done twice, because the results did not seem to fall within the expected ranges. More difficulties were encountered in the socio-economic studies, in which VIMTA Labs. is not very experienced. As a result, it was decided that ASCI would collect the socio-economic data.

The number of water quality samples taken is:

APWELL:

- Mahaboobnagar district: proposed site: 5, existing site 4
- Prakasam district: proposed site 5, existing site 5

APLIFT:

- Mahaboobnagar district: proposed site 57, existing site 38
- Prakasam district: proposed site 14, existing site 11

The sampling programme as carried out deviates considerably from what was discussed with VIMTA Labs. in december 1993. At that time it was agreed that 7 to 12 samples would be taken at the proposed APWELL site and 27 to 42 samples at the control APWELL site. It turns out that at the control APWELL site only ground water samples have been taken, no open wells and surface waters are sampled. This implies that no assessment of impacts of irrigated agriculture on water quality in wells and surface waters is possible.

For the APLIFT schemes it was also agreed to take 7 to 12 samples at the proposed sites and 27 to 42 at the existing sites.

The number of soil samples taken is:

APWELL:

- Mahaboobnagar district: proposed site: 10, existing site 10
- Prakasam district: proposed site 7, existing site 8

APLIFT:

- Mahaboobnagar district: proposed site 50, existing site 50
- Prakasam district: proposed site 15, existing site 15

Except for the soil structure, all parameters on which was agreed have been assessed. Limited information seems to be collected on agricultural practices, land use patterns, farming systems, agrochemical use, irrigation practices, soil conservation etc. Pumping tests to assess aquifer yields have not been carried out.

The data are presented in large, unstructured tables, no attempt have been made to organise, combine and summarise data in a logical way. Interpretation of the data by VIMTA Labs. has been very limited, only the part on ecological impacts (flora and fauna) has been worked out in more detail.

Wednesday, March 23, Thursday March 24

After discussions with VIMTA Labs. (Dr. K.S. Rao and Sujeet Kishen; Dr. Prasad the former project leader of VIMTA Labs. was reported to be sick, but is apparently removed from the project) and the APRSAC (Dr. R.S. Rao), which did not give a better idea of the reasons of the delay and which affirmed the latest agreements on delivery of the information, the APWELL and APLIFT EIA "reports" were reviewed. In reality the reports sofar are far from complete and missing any logic and organisation. They are quite obviously put together very hasty. They are written in a "telegramme" style, full of errors, and any form of lay-out is missing. Analysis data are not used to support conclusions, no cross references are made and interpretation of information is often erroneous. In other words: a long way to go. It was decided that the consultant would try to write the missing chapters and rewrite, to the extent possible, the APWELL EIA report. Set up and general information chapters of this report will be used as an example for Satish to finish the APLIFT report.

A discussion on a possible time schedule revealed that Dr. Satish is only available till April 20, after that he has other obligations. It was decided to start the report writing along the lines discussed above and make a new planning by the end of the consultants stay in India. *Friday March 25*

Courtesy calls to Mr. T.L. Shankar, principal of ASCI and Dr. K.S. Ramesh, Head of the Agricultural and Rural Development area of ASCI.

Most of the missing data, except for the data on public health, have by now been delivered by VIMTA Labs., in to form of tables only. No interpretation of the data is given. The quality of the data seems OK.

(Re)-writing ASCI'S EIA report on APWELL

Saturday, March 26 (Re)-writing ASCI'S EIA report on APWELL

Sunday, March 27

(Re)-writing ASCI'S EIA report on APWELL and preparation of the workshop.

Monday, March 28

The preliminary results of the EIA studies were presented on a workshop, held at the Administrative Staff College. More or less the same people that attended the November workshop were invited again. Results so far were presented by Dr. Satish (ASCI), Sujeet Kishen (VIMTA Labs.) and Dr. R.S. Rao (APSRSAC). Ample time had been reserved for discussion. Nearly all the invited persons, about 25 in total, were attending the workshop. The discussions were lively and served the purpose of the workshop: checking and improving the results of the E.I.A. studies. Some of the presented conclusions are quite consequential for the Andhra Pradesh State Irrigation Development Cooperation and resulted in tempestuous debate. The overall conclusions of the workshop, and for that matter of the E.I.A.'s, are that most impacts are related to the water quantity aspects of the project, the unsustainability of the resource use. The quality of surface waters. Impacts on the soil, the air quality and the human health conditions are also minimal. Surprising was that establishing irrigation at 3 of the 4 selected sites may have some serious repercussions on the flora and fauna.

Like the November workshop, also this workshop was very well organised by ASCI/Dr. Satish.

In discussions after the workshop Dr. R.S. Rao stated that the APSRSAC will not be able to sent in the results of it's analysis before the 10th of April. This will mean that incorporation of the information in the EIA reports is impossible. After some discussion a middle of the road solution was reached, Dr. Rao and Dr. Satish will sit together for 1 or 2 days in the next weeks to try to incorporate the most relevant information into the EIA reports. The final APSRSAC report will be added to the EIA's as an annex.

Tuesday, March 29

(Re)-writing ASCI'S EIA report on APWELL.

Discussions with Mr. C. Uday Shankar, Director of the Hyderabad Division of Action for Food Programme (AFPRO), an NGO active in the field of rural development and agriculture. The possible role of AFPRO in the monitoring part of the EIA was discussed.

Wednesday, March 30 (Re)-writing ASCI'S EIA report on APWELL.

Visit to the Andhra Pradesh State Groundwater Department. Discussions with the Managing Director, Mr. T. Narashima Reddy and Mr. Sripathi Reddy (Deputy Director) and Mr. I. Ramakrishna Reddy (Deputy Director). The possible role of department in the monitoring part of the EIA was discussed and the laboratory facilities were visited.

Visit to the Water and Land Management Training and Research Institute (WALMANTARI). The model farm, training facilities and the laboratory were visited. Discussion with Prof. P.G. Sastry and his colleagues on the WALMANTARI's experience in conducting EIA's for irrigation projects and the possible role that the institute could play in monitoring the environmental impacts of the APWELL and APLIFT projects.

Dr. Satish announced that Dr. K.S. Ramesh will resign as Head of the Agricultural Area of ASCI. This means 2 things: Dr. Satish will even be more occupied with organisational affairs in the next two weeks and the strength of the Rural and Agricultural Area of ASCI reduces to almost zero.

Thursday, March 31

Final discussions on project planning and further reporting with Dr. Satish. The first 7 chapters of the APWELL report have been (re)-written by the Dutch consultant, time to rewrite the remaining chapters was not available. Lay-out and contents of the remaining chapters has been discussed and agreed upon with Dr. Satish. Dr. Satish will have to complete these in the next two to three weeks. Besides the whole APLIFT report will have to be (re)-written. Since VIMTA Labs. has better printing and reproduction facilities than ASCI, the final reproduction of the reports will be done by VIMTA Labs. Data communication between ASCI and DELFT HYDRAULICS is possible by means of E-mail. If arrangements can be made with DGIS in the Hague, the Dutch consultant could play a role in final editing of the reports.

Visit to VIMTA Labs. for discussions with the managing director, Dr. S.P. Vasireddy. Discussed was the delay in delivery of the analysis results and the possible involvement of VIMTA Labs. in the monitoring part of the EIA.

Travel to Delhi by IC 840. Arrival in Delhi: 21.45 hours.

Friday, April 1

Debriefing at the Royal Netherlands Embassy with Ardi Braken.

Saturday, April 2

03.05 hours departure for the Netherlands by LH 761, arrival in Amsterdam 10.00 hours

Conclusions, general observations, and actions to be taken

- the performance of VIMTA Labs., from the point of view of keeping to agreed time schedules has been very poor. Quality of the work is quite good but required thorough checking with experts in the various fields and in some cases re-sampling and repetition of the analysis;
- also the performance of the APSRSAC has been very disappointing. They seem to set their own schedules and are not used to work on a project basis, which means reporting according to certain pre-set deadlines. They have a monopoly in the field and can afford this attitude. Quality of the work is hard to assess, since I have not seen very much until now;
- ASCI: all and all Dr. Satish is still very committed to the project, but he has not been able to pay the required attention to the project, because of his imminent departure from ASCI and because of other obligations. Project management certainly has suffered from this. Besides, the interpretation of the data and reporting has been sub-standard, probably, at least partly, due to a lack of time. With Dr. Satish leaving ASCI the capacity of the

Agricultural and Rural Development Area has become very limited, as mentioned in earlier reports, the EIA project at ASCI was very much a one-man show. The fact that also Dr. Ramesh will leave the area makes the situation even worse. Other areas at ASCI, e.g. the Environmental Area (Dr. Bowonder) are very much training oriented and have limited experience and desire to go out into the field. Furthermore the Environmental area is very much industry oriented and lacks the required agricultural expertise;

- APSIDC: as during the first workshop, the representatives of this organisation who were attending the workshop were very receptive and participated fully in the discussions. Lately there have been some problems with making available information by the organisation. By compiling the information requested by ASCI, APSIDC probably started realising some of their organisations shortcomings, which resulted in a less open attitude towards provision of information. Rumour has it that APSIDC is nearing a state of bankruptcy. As a result of bad performance, they have been put on the blacklist by a number of district collectors and some big funding agencies (e.g. the A.P. Scheduled Cast Finance Corporation) have approached the State Ground Water Development Department to do their bore well development (780 wells last years), which was formerly done by APSIDC. Development of wells is not within the mandate of the Department, but still has been taken up because it helps the Department in gathering the required information for its policy development tasks; and
- the time schedule set for the final reporting is very tight, if not impossible, however, Dr. Satish is confident that he will be able to finish the reports in time. In my opinion some further involvement of the Dutch consultant may be needed to upgrade the ASCI reporting to such a level that valuable conclusions for the rest of the APWELL/APLIFT project implementation can be drawn from it. Direct data communication between ASCI and DELFT HYDRAULICS is possible by means of E-mail. If arrangements can be made with DGIS in the Hague, the Dutch consultant could play a role in final data analysis and editing of the reports.

Annex 3

List of persons met

Andhra Pradesh State Irrigation Development Corporation

- Mr. S.S. Quadri, Executive Director, Hyderabad.
- Mr. V. Ramesh, Liason Officer, Hyderabad.
- Mr. M. Prabhakara Ramamurthy, Executive Engineer, Hyderabad.
- Mr. N. Sai Jagannadha Rao, Executive Engineer, Hyderabad.
- Mr. M. Manik Pradhu, Executive Engineer, Hyderabad.
- Mr. T. Sai Prasad, Executive Engineer, Mehaboobnager.
- Mr. S. Subhash Babu, Deputy Executive Engineer, Chirala.
- Mr. K. Rama Krishna, Executive Engineer, Kurnool.
- Mr. N. Challamiah, Executive Engineer, Guntur.
- Mr. V.T. Chander, Hydrogeologist, Hyderabad.
- Mr. K.V. Subba Reddy, Executive Engineer, Eluru.

Andhra Pradesh State Ground Water Department.

- Mr. T. Narashima Reddy, Managing Director, Hyderabad.
- Mr. Sripathi Reddy, Deputy Director, Hyderabad.
- Mr. I. Ramakrishna Rao, Deputy Director, Hyderabad.
- Mr. Ramakrishna Rao, Deputy Director, Hyderabad.

Andhra Pradesh State Remote Sensing Application Centre, Hyderabad.

- Dr. R.S. Rao, Director,
- Mr. M. Venkata Swamy, Scientific Officer.
- Mr. Mastan Rao, Scientific Officer.

Water & Land Management Training and Research Institute, Hyderabad.

- Prof. P.G. Sastry, Director.
- Dr. Ranga Rao, Executive engineer.

VIMTA Labs. Ltd., Hyderabad.

- Dr. S.P. Vasireddy, Managing Director.
- Dr. K.S.M. Rao, Director Laboratory.
- Mr. G.V. Prasad, Deputy Director, Environment Division.
- Mr. Sujeet Kishen, Asst. Director, Environment Division.
- Dr. M. Ravi Kiran, Ecologist, Environment Division.

Action for Food Production, Hyderabad.

Mr. C. Uday Shanker, Director.

Institutive for Resource Development & Social Management, Hyderabad.

- Mr. E. Raghava Rao.
- Mr. T. Moinuddin.

Mahashawaran Watershed Development Project, Hyderabad.

Mr. A. Krishna Murthy, Project Director.

Central Research Institute for Dryland Agriculture, Hyderabad.

- Mr. M.V. Padmanabhan, Hydrogeologist.
- Mr. K.L. Sharma, Soil Scientist.

Sadguru Water and Development Foundation, Dahood, Gujarat.

• Mr. Harnath Jagavat, Project Director.

International Crops Research Institute for the Semi Arid Tropics, Hyderabad.

• Mr. Awadhal, Director.

Rural Development and Self Employment Trainings Institute, Udipi.

• Mr. K.V. Bhat, Director.

Indo-German Watershed Project, New Delhi.

• Dr. K.R. Nippes, Project Director.

Administrative Staff College of India, Hyderabad.

- Mr. T. L. Shankar, Principal.
- Dr. K.S. Ramesh, Head Agriculture and Rural Development Area.
- Dr. B. Bowonder, Head of the Energy, Environment and Technology Area.
- Dr. Ramesh Durvasula.
- Dr. A.A. Firdausi.
- Mr. B.S. Chetty.
- Mr. D. Vijaya Sai.
- Mr. K. Satyanand.
- Ms. S. Seethalakshmi.
- Mr. A.V. Bhaskar Rao.
- Mr. A. Daniel.

Royal Netherlands Embassy, New Delhi

- Mr. M.P. Keuken, First Secretary, Sectorspecialist Environment.
- Mrs. A. Braken, Interim Sectorspecialist Environment.
- Mr. J.C. van der Laan, First Secretary, Sectorspecialist Land and Water.
- Mr. K.V.N. Ranjan, Programme Officer, Land and Water Sector.
e location 'De Voorst'

e main office

main office

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