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DEPARTMENT OF EXTERNAL RESOURCES  
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MINISTRY OF HOUSING AND CONSTRUCTION  
NATIONAL WATER SUPPLY AND DRAINAGE BOARD  
SRI LANKA

## KANDY DISTRICT WATER SUPPLY AND SANITATION PROJECT

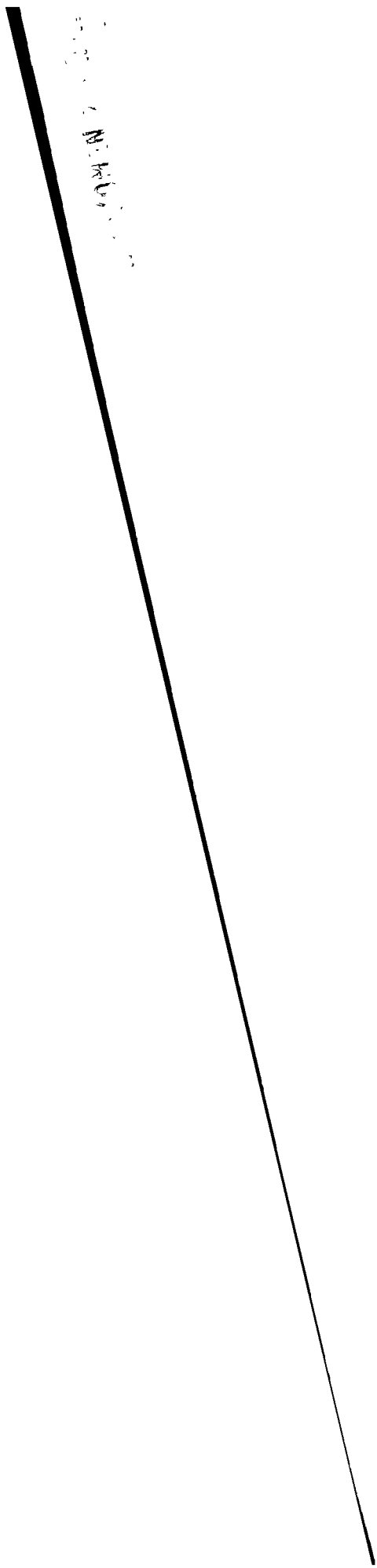
### PHASE I

OCTOBER 1987 - SEPTEMBER 1991

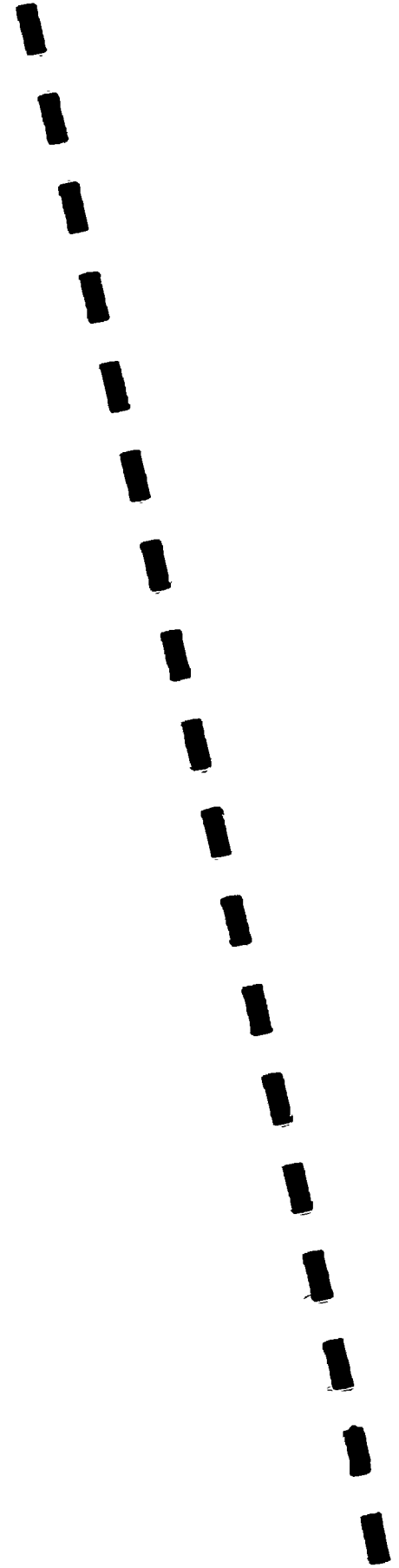
# FINAL REPORT

March 1992

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**KANDY DISTRICT WATER SUPPLY AND SANITATION PROJECT**

**PHASE I**

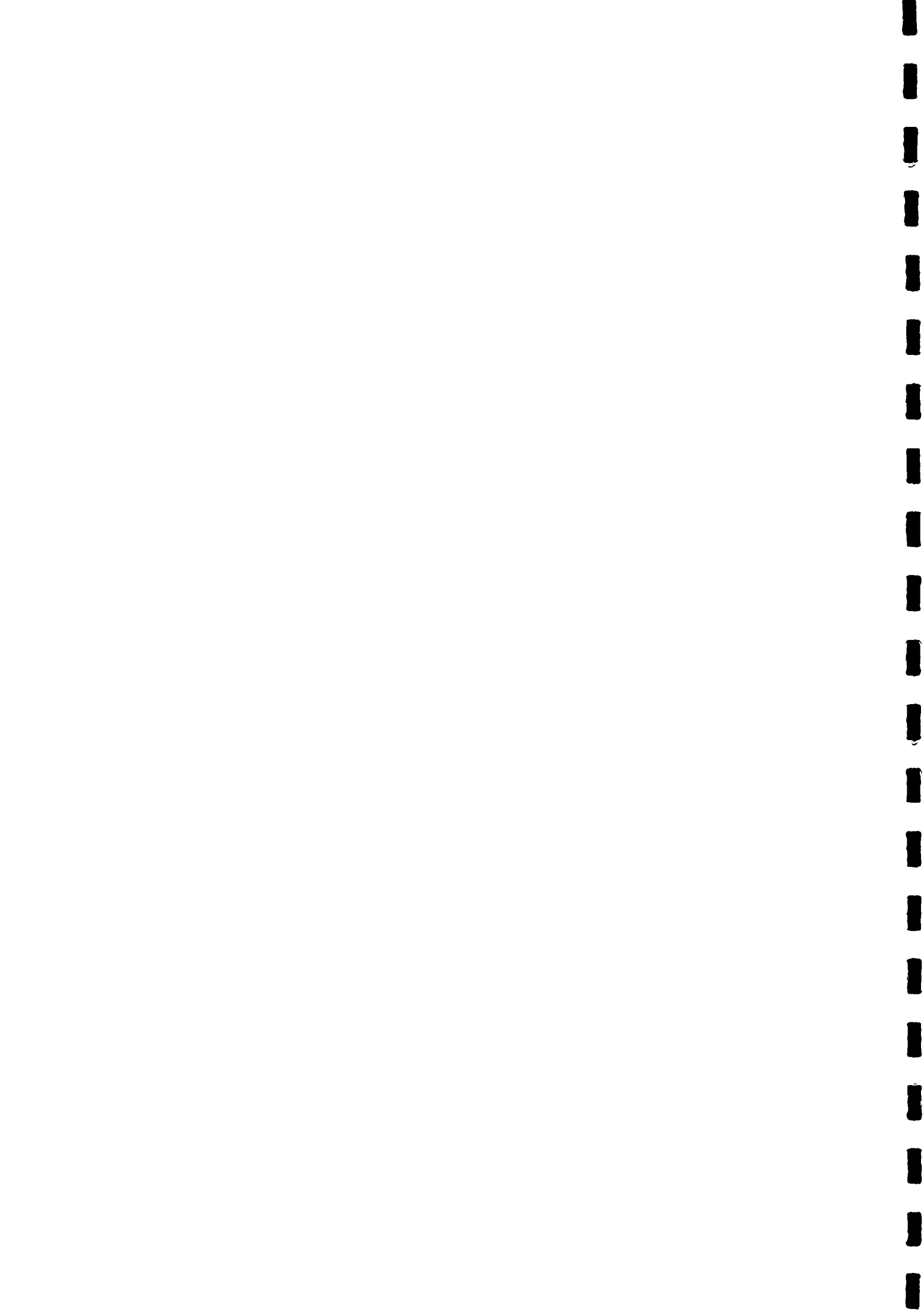
**OCTOBER 1987 - SEPTEMBER 1991**

**FINAL REPORT**

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## **ACKNOWLEDGEMENT**

*On behalf of Soil and Water Ltd. we take this opportunity to convey our sincere thanks for the excellent co-operation extended to us throughout the Implementation of Phase I of the KDWSSP.*

*It has indeed been a privilege to work in the atmosphere of mutual trust and helpfulness that prevailed throughout the project period, all the way from the beneficiaries through their consumer societies, Voluntary Health Workers, Voluntary Caretakers, NGO's, the Pradeshiya Sabha, and the Regional level officials of NWS&DB, Department of Health, Department of Education, State Secretaries and the NWS&DB Head Office officials, the officials of MHC, the officials of MHS and the officials of External Resources district level officials, NWS&DB officials seconded to the project, local professional and support staff employed by us, and Ministry officials at the NWS&DB level.*

*During the implementation of the project, organizations and institutions not directly involved also made significant contributions, eg. GTZ, DANIDA, UNICEF, USAID, UNDP, ADB, Sarvodaya, University of Peradeniya, Institute of Fundamental Studies, The Sri Lankan Standards Institute, private entrepreneurs, etc.*

*The Project also enjoyed cordial relationships with the Prime Minister, Members of Parliament and Hon. Ministers and elected members of the Provincial Councils in the District.*

*From the start of the Project, the Government Agents of the District took a keen interest in the Project, in particular Mr. S.M. Tennakoon, Chief Secretary of the Central province.*

*The contributions of all past and present AGAs and Pradeshiya Sabha Chairmen and Women are also gratefully acknowledged.*

*Special thanks are due to the DGM, RSC Central, Mr. P.U. Gunasinghe and the staff of the RSC; the Regional Office staff (NWS&DB); and the NWS&DB staff seconded to the Project, especially Mr. L. Premanath the Project Director.*

*The excellent guidance on all project matters given by the National Co-ordination Committee and the Donor Co-ordination Committee is gratefully acknowledged, especially the contributions of the State Secretary, Mr. C.H. de Tissera, Mr. T.B. Madugalle, Chairman of NWS&DB and Mr. A.P. Chandraratne, General Manager of NWS&DB.*

*Invaluable assistance was also provided by the Department of External Resources.*

*Finally the dedication and unwavering support of all our Sri Lankan staff is gratefully acknowledged.*

*Soil and Water Ltd.*



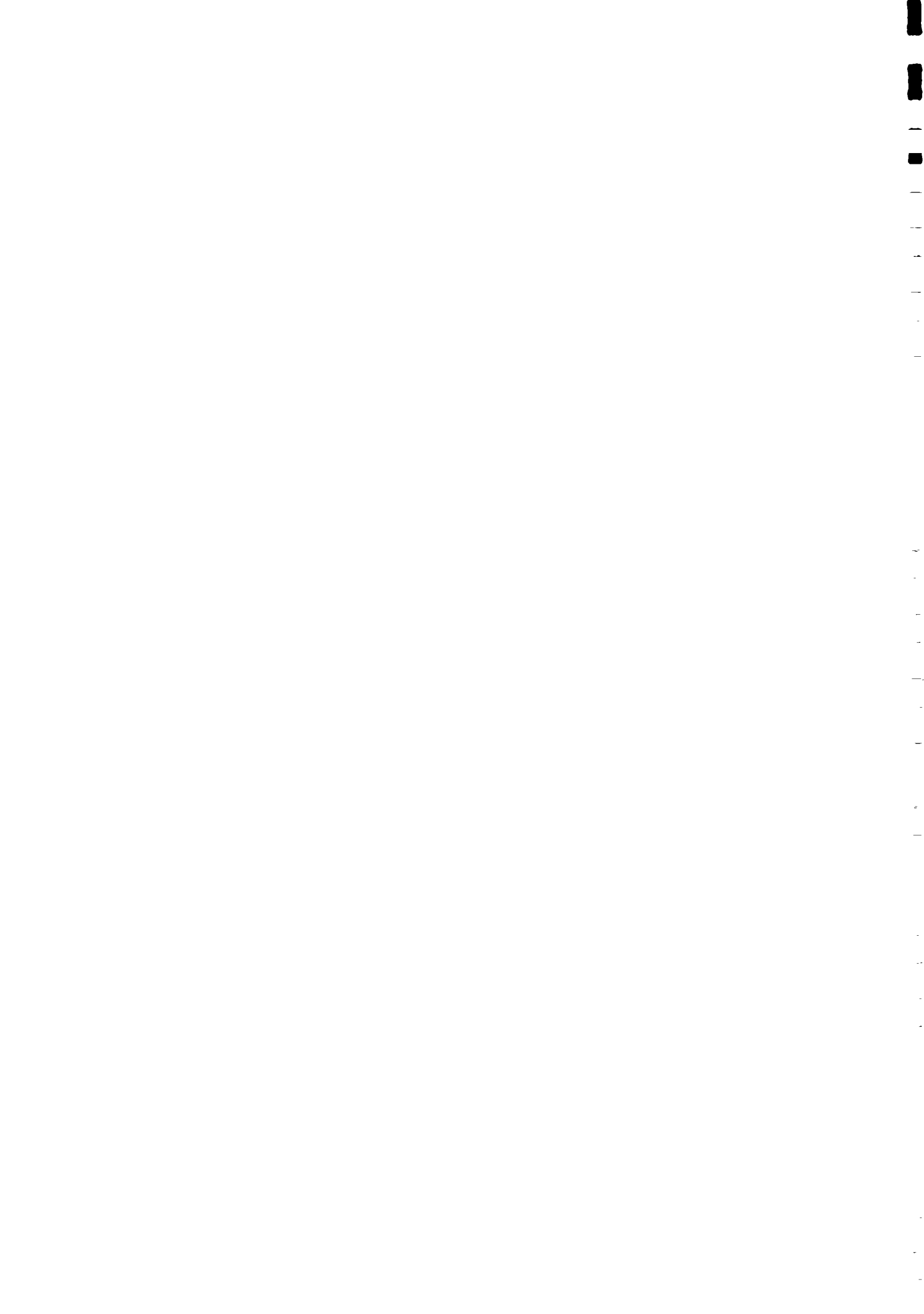
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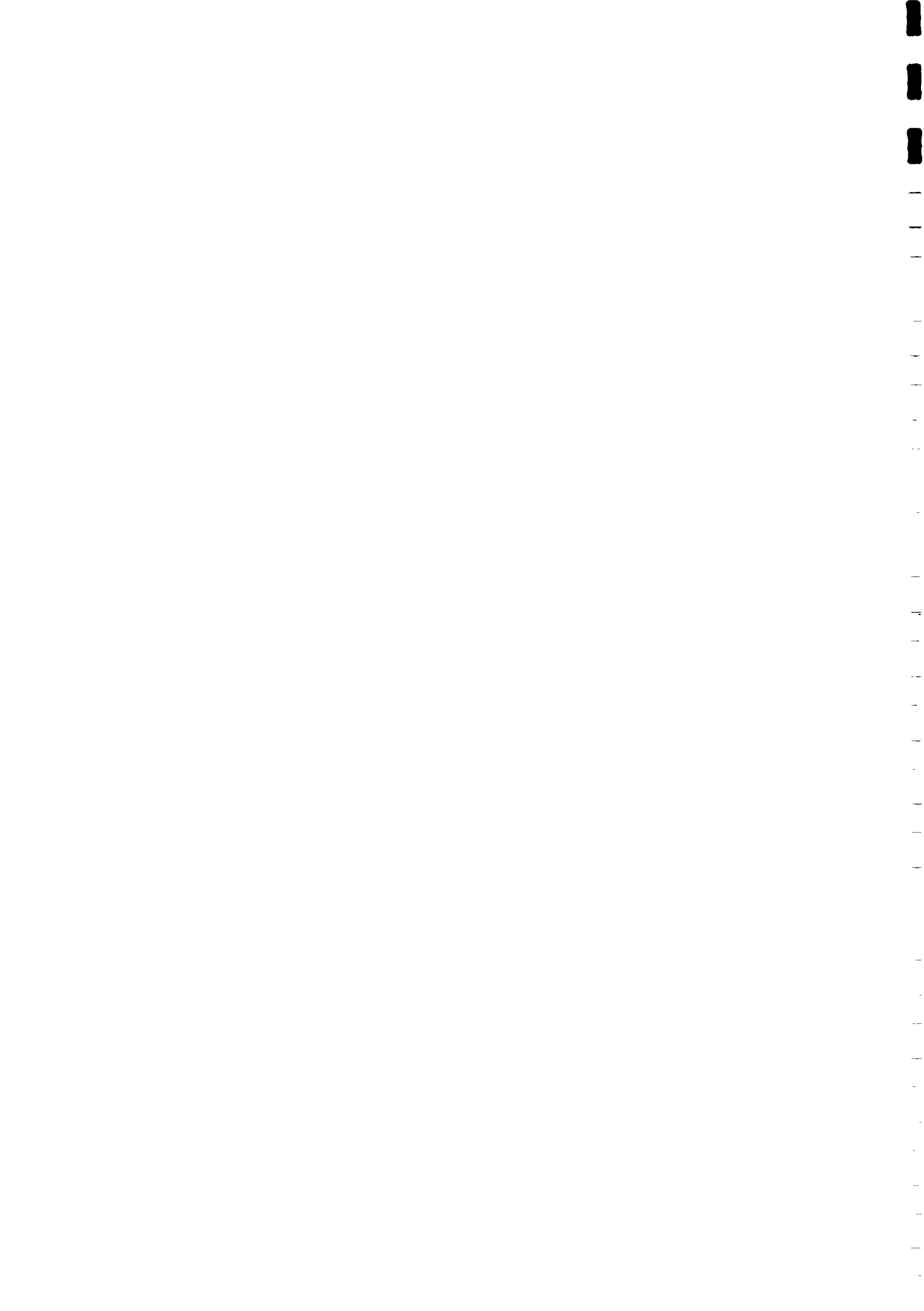


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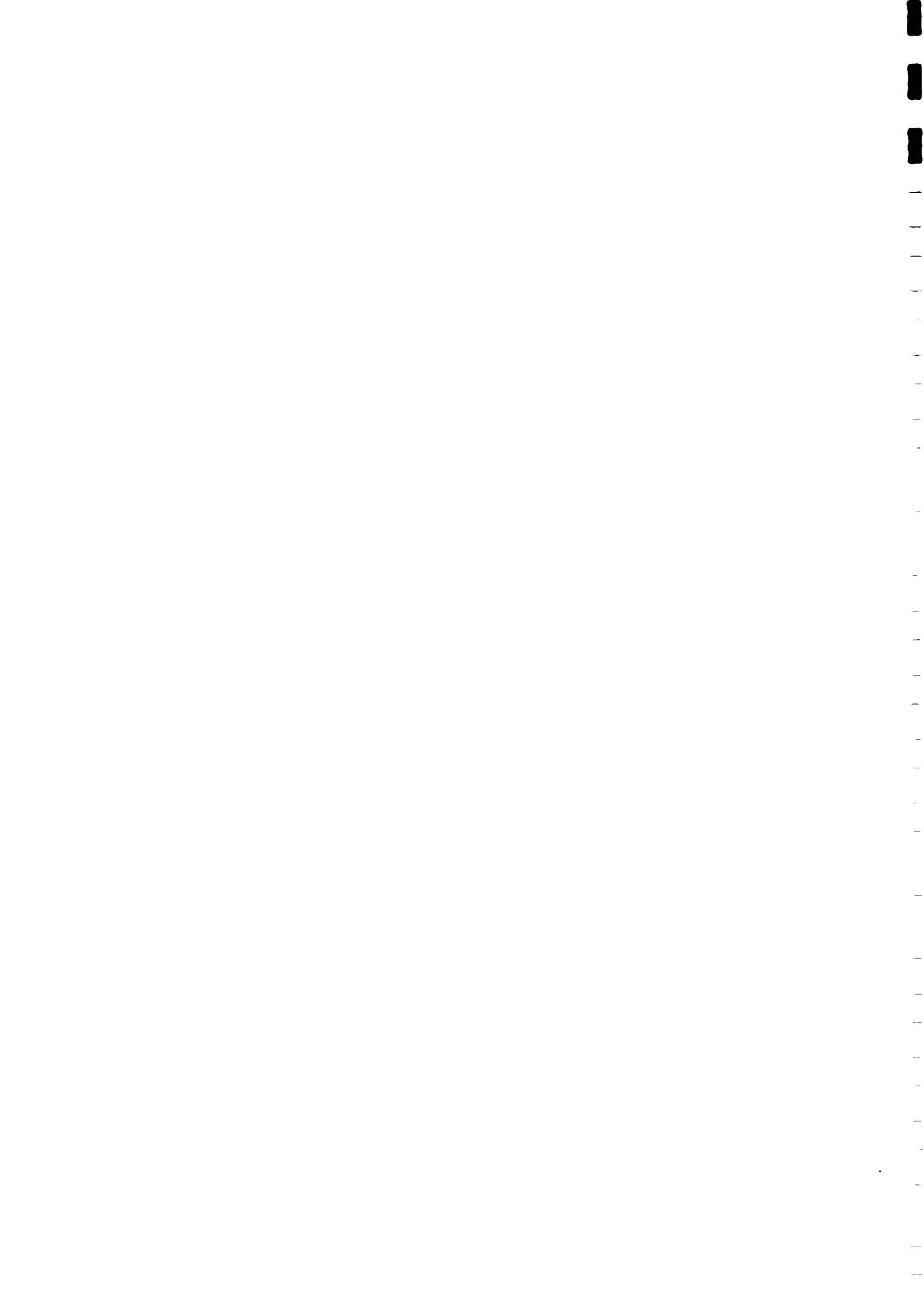
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## ABBREVIATIONS

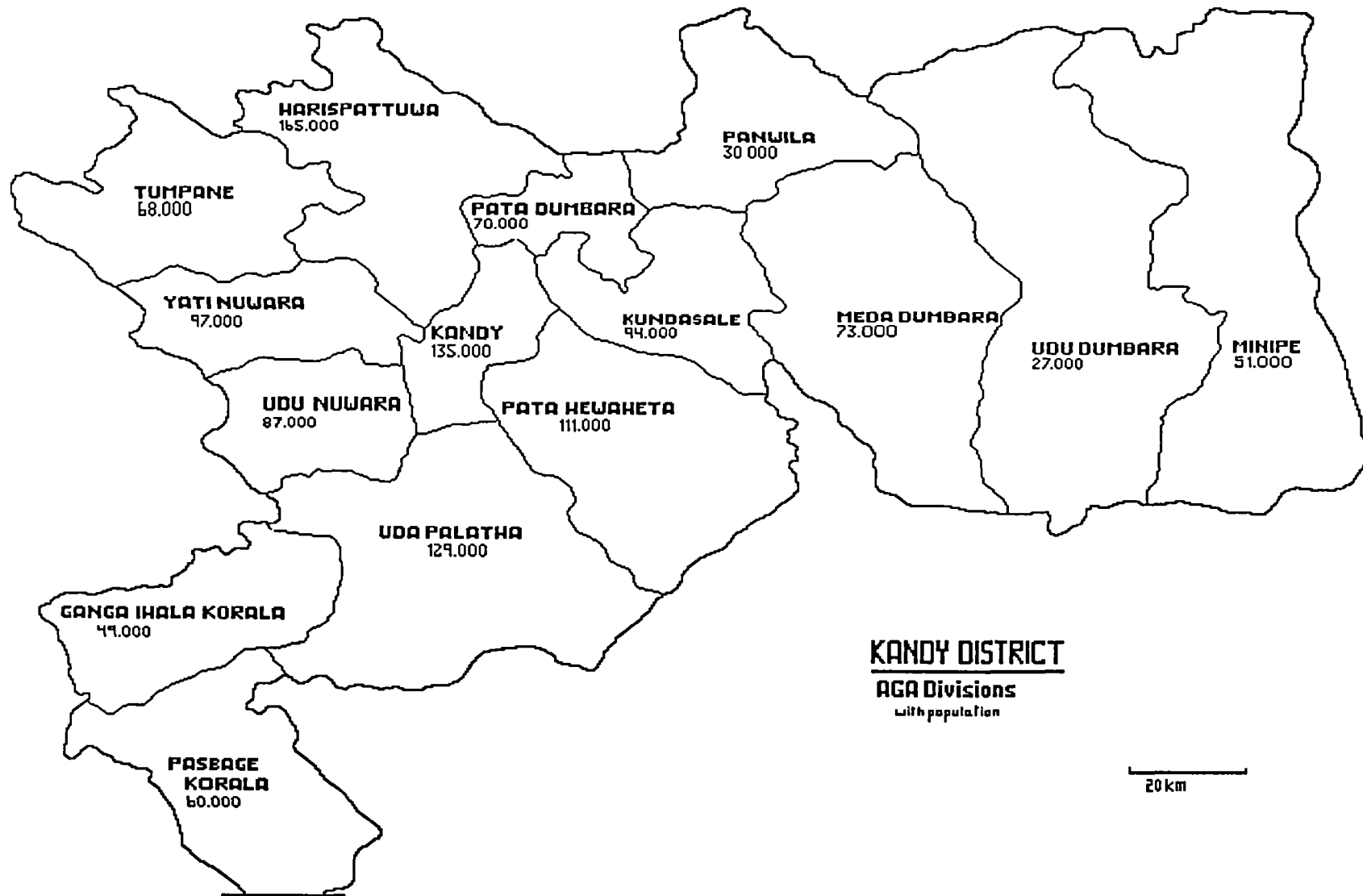
AC	-	Action Committee
ADB	-	Asian Development Bank
ADP	-	Automatic Data Processing
AGA	-	Assistant Government Agent
AGM	-	Assistant General Manager
DANIDA	-	Dannish International Development Agency
DGM	-	Deputy General Manager
DHS	-	Department of Health Services
DPM	-	Deputy Project Manager
ESA	-	External Support Agency
FIM	-	Finnish Mark
FINNIDA	-	Finnish International Development Agency
GA	-	Government Agent
GN	-	Grama Niladhari
HEB	-	Health Education Bureau
HRD	-	Human Resources Development
HWSS	-	Harispattuwa Water supply Scheme
HWSSP	-	Harispattuwa Water Supply and Sanitation Project
ID	-	Institutional Development
IDP	-	Institutional Development Project
IEC	-	Information, Education, Communication
IMF	-	International Monetary Fund
IRP	-	Iron Removal Plant
KDWSSP	-	Kandy District Water Supply and Sanitation Project
MHC	-	Ministry of Housing and Construction
MHS	-	Ministry of Health Services
MOH	-	Medical Officer of Health
MOHWA	-	Ministry of Health and Women's Affairs
MP	-	Member of Parliament
NCC	-	National Co-ordination Committee
NWS&DB	-	National Water Supply and Drainage Board
O&M	-	Operation and Maintenance
PD	-	Project Document
PDHS	-	Provincial Director of Health Services
PM	-	Project Manager
PS	-	Pradeshiya Sabha
RO	-	Regional Office
Rs.	-	Rupees
RSC	-	Regional Support Centre
SLR	-	Sri Lankan Rupees
UNICEF	-	United Nations Children's Fund
USAID	-	United States Agency for International Development
WB	-	World Bank
WSSSP	-	Water Supply and Sanitation Sector Project

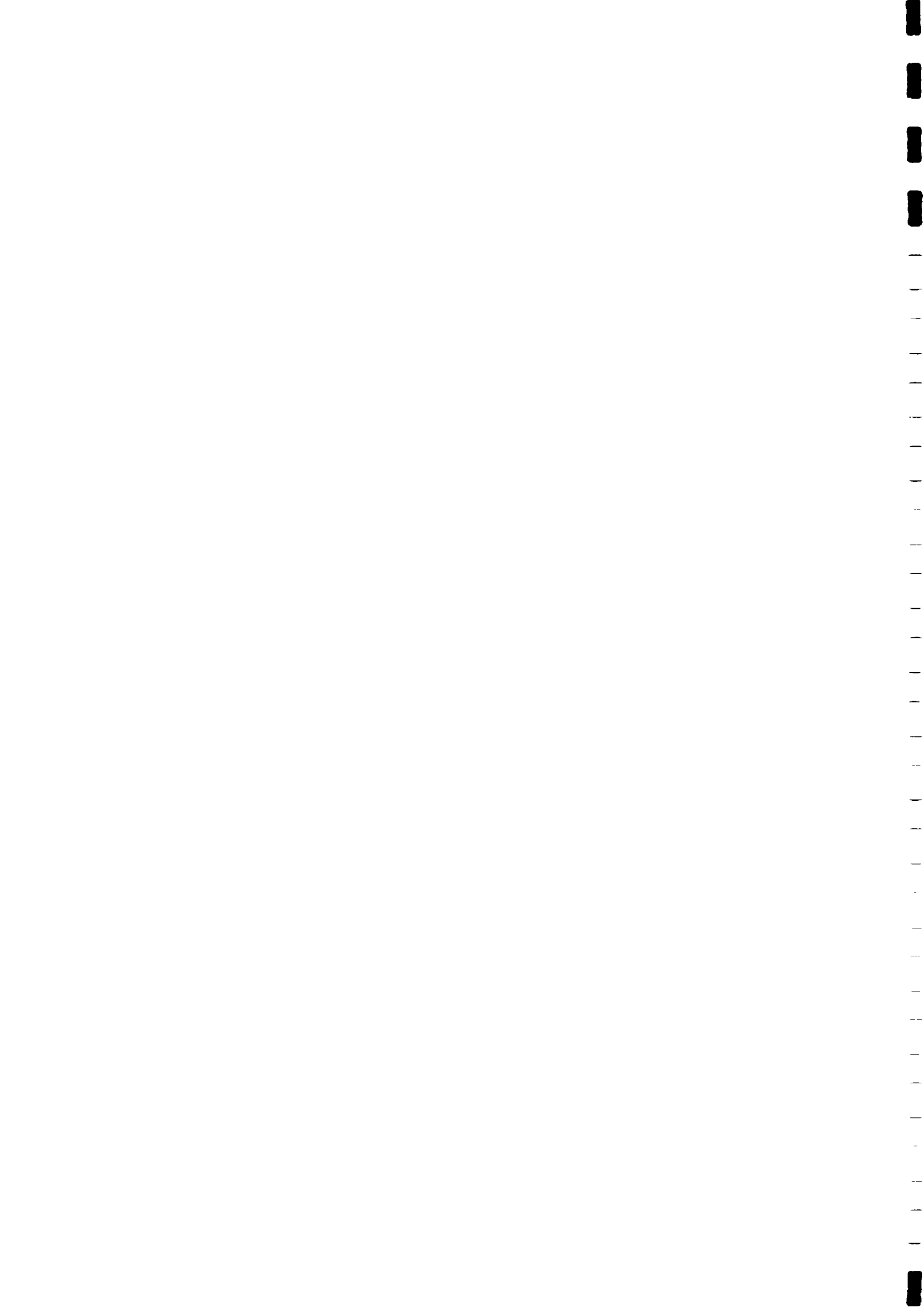


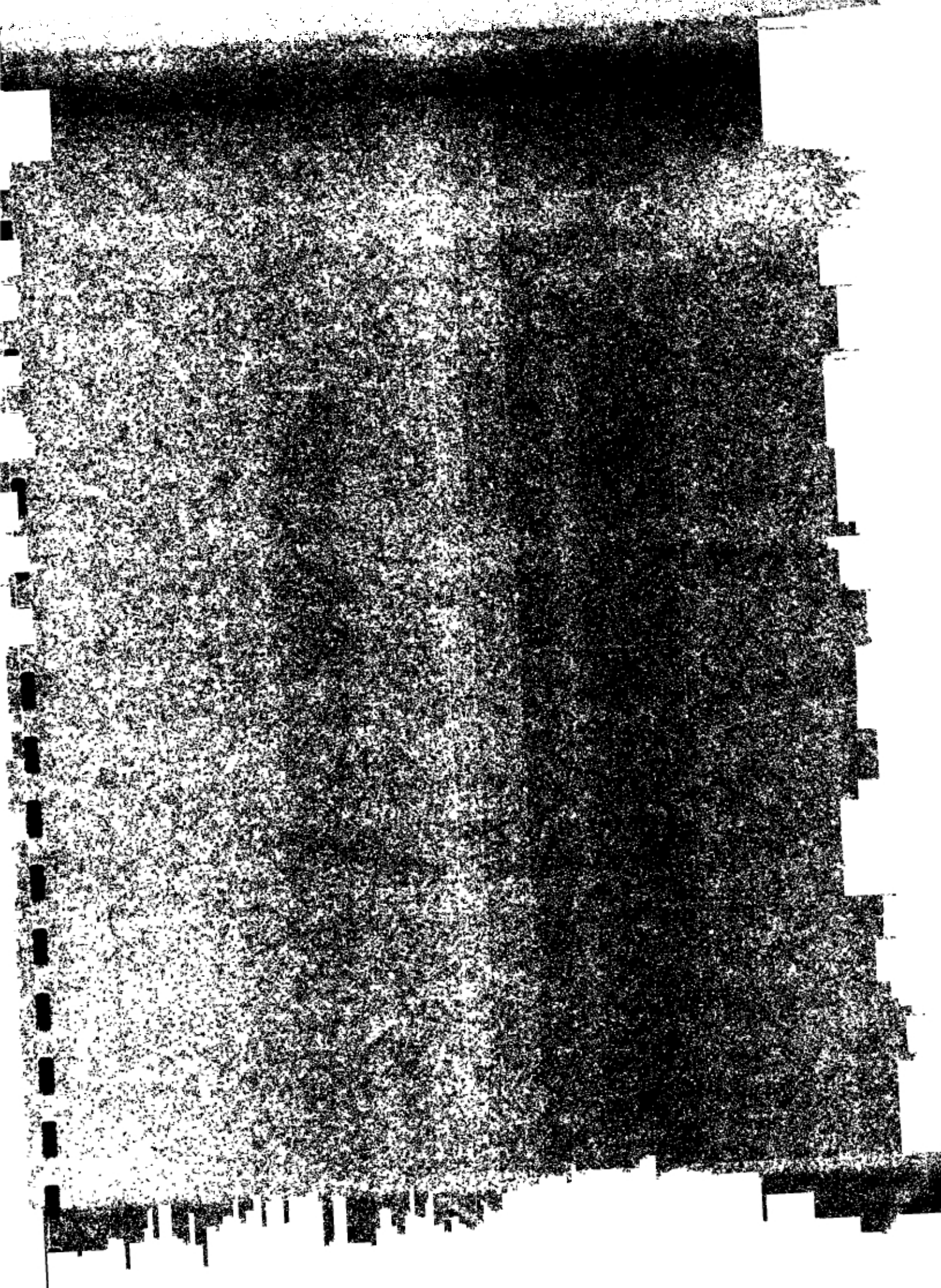


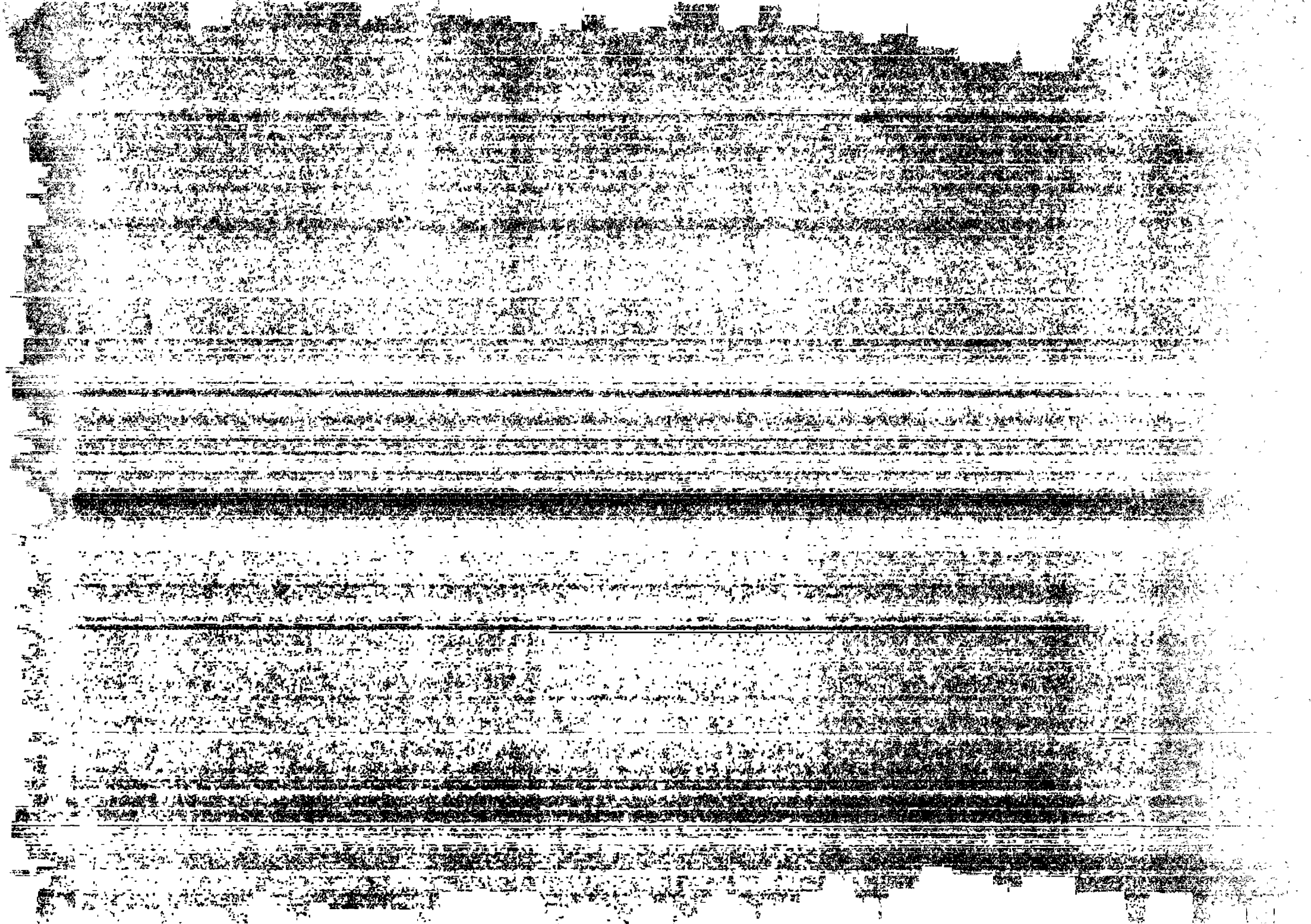












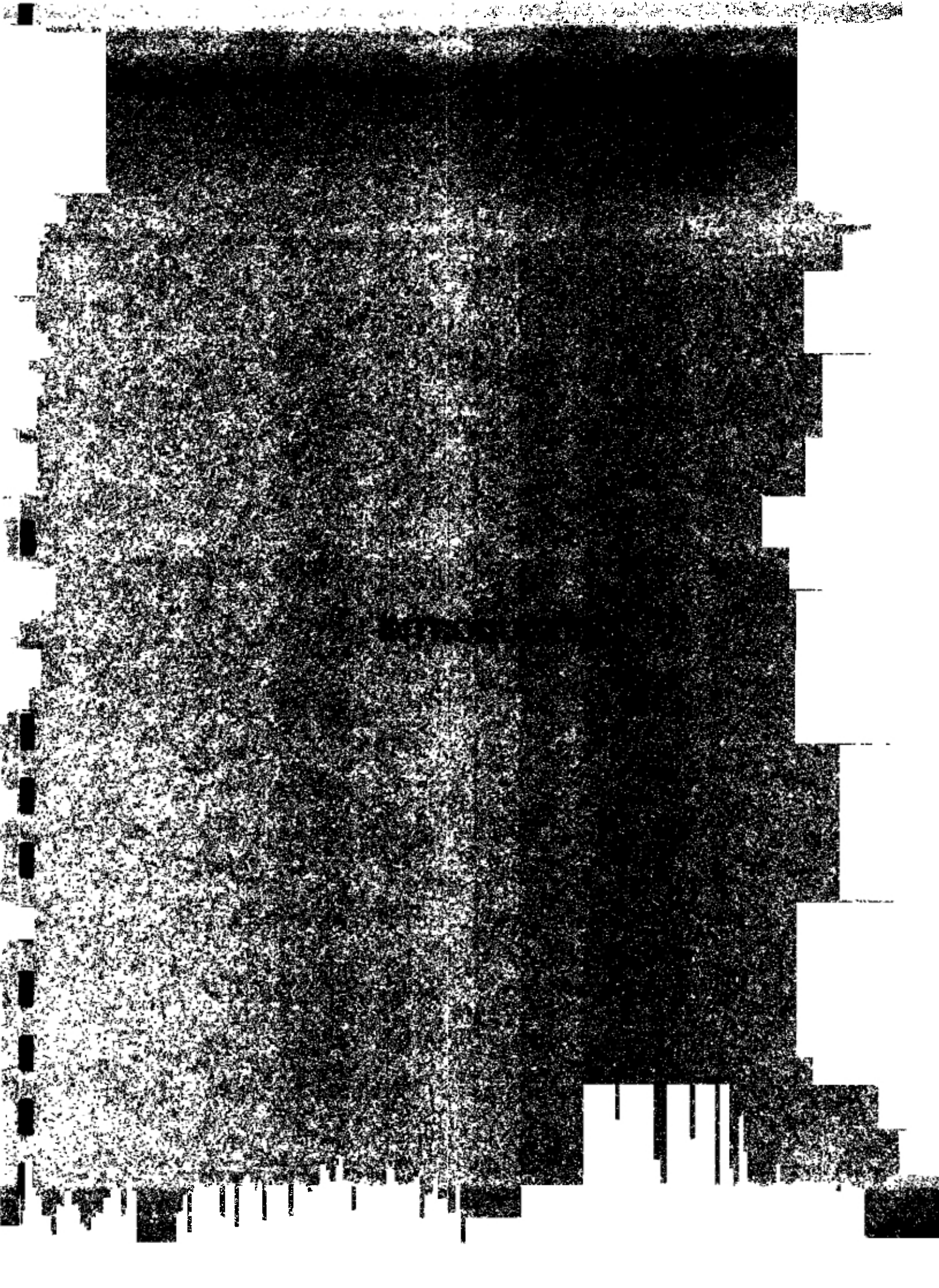
## KDWSSP PHASE I

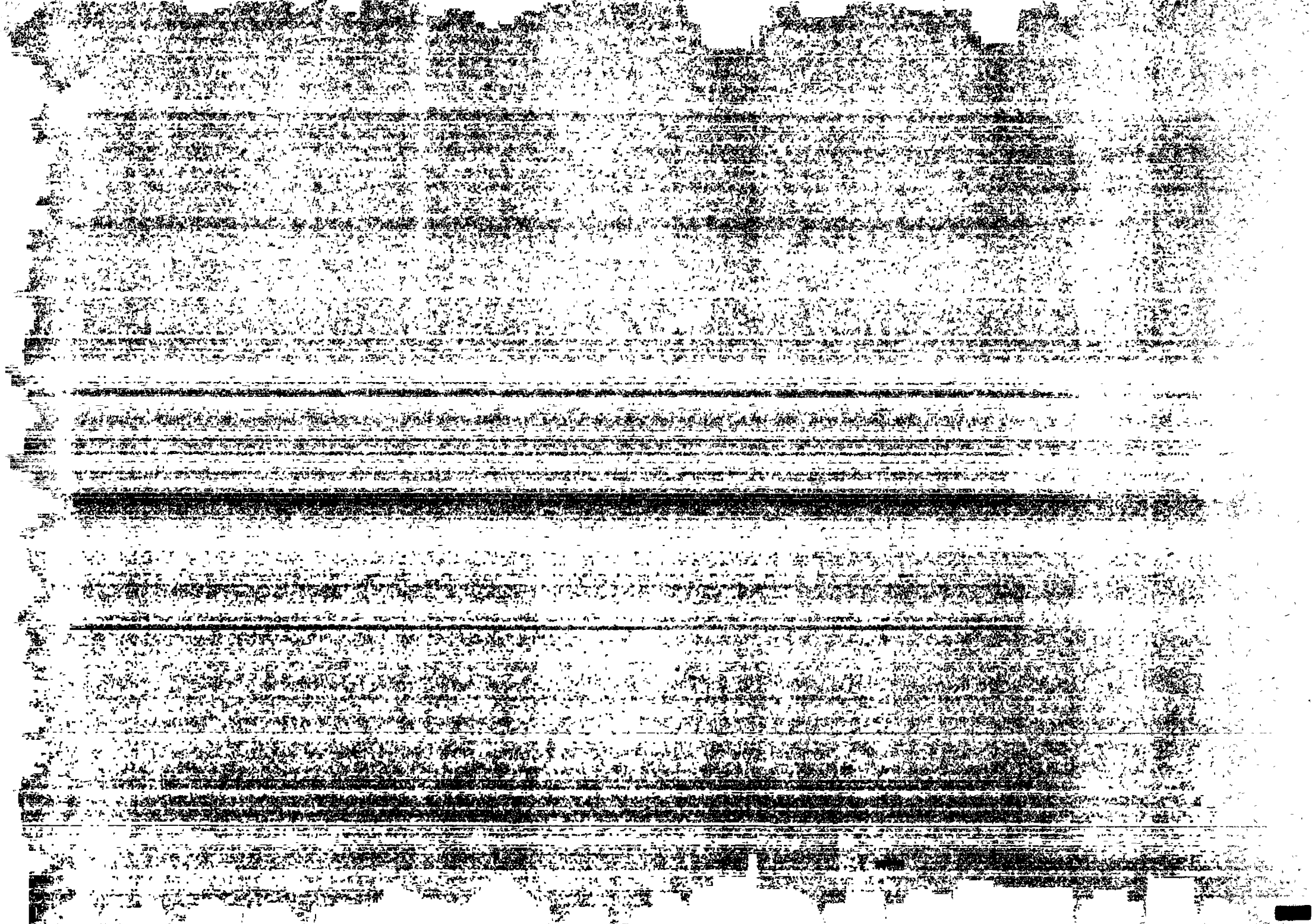
### FACT SHEET

		Plan	Actual
<b>Implementation period</b>		01.09.1987-31.12.1990	01.10.1987-30.09.1991
Foreign component	mFIM	64.6	63.9 (99%)
Local component	mRs.	57.0	46.6 (82%)
Local component (Hanspattuwa balance)	mRs.	21.5	15.3 (71%)
Project costs	mFIM	76.0	70.5 (93%)
Technical assistance	mFIM	16.6	17.2 (103%)
Hand pump wells	nos.	550-650	783 (130%)
Latrines	nos.	17,000	31,000 (182%)
Piped schemes	nos.	n.a.	16 (n.a.)
Strategic plan		Required	Completed
Beneficiaries served			
- hand pump wells		53,000 - 62,000	75,000 (130%)
- latrines		102,000	186,000 (182%)
- piped schemes		50,000	102,000 (204%)
Community participation		Required	Succeeded
Institution building		Elements only	Commenced with broad scope
Training		Elements only	8500 mandays
Scheme viability		Required	Conditions created for viability locally
Sustainability		Not provided	Consolidation started
Involvement of Sri Lankans on all levels of joint implementation		Required	Succeeded
NWS&DB personnel input	manmonths	1450	1146 (79%)
Expatriate input	manmonths	331	421 (127%)
Directly employed local input	manmonths	10688	19615 (183%)









## 1. INTRODUCTION

### 1.1 General

Although this is specifically the final report on the Phase I activities of the KDWSSP, October 1987 to September 1991, the reported activities must be seen as part of an ongoing programme that started in 1980 in Harispattuwa division of the District. Phase I has been a turning point, during which the vision of the programme has evolved dramatically. What started out in the early 1980s as basically a water supply construction project, is now a wide-ranging development programme, encompassing human resource development along with activities in the water sector, health education and sanitation. Phase I has laid the foundations to ensure that in the future these activities can be and will be carried out by Sri Lankans.

This report will not only enumerate the physical outputs of Phase I, it will also try to give some feeling of the obstacles that were overcome, the importance of the programme to the people of Kandy and of Sri Lanka and the non-physical accomplishments that do not lend themselves to enumeration. The Project has made a real contribution to the quality of life for many people living in Kandy District, but the impact has been greatest on those men and women working for the KDWSSP. Their personal development has been a key element that has made the Project work and they will continue to contribute long after the foreigners leave.

Phase I was implemented with the knowledge that there would almost certainly be a Phase II and so many of the Project activities will continue into the future. It should be kept in mind by the reader, therefore, that this is a report that does not tell the final story on the KDWSSP. The successes of Phase I may be further enhanced and less successful parts of the programme may well reach maturity during the next phase.

### 1.2 Objectives

The Project Document for Phase I was prepared in 1986-87 by a team assigned by the World Bank. The team had at its disposal a draft which was prepared by the consultant implementing HWSSP. The assignment of a WB team for project preparation reflected the donor's desire to bring the whole project cycle to the level practised by the established multilateral ESAs.

The preamble to Phase I objectives says "greater emphasis will now be placed on the affordability and sustainability aspects and on the rehabilitation of existing water systems". A further "immediate objective is to identify and develop affordable water sources for areas of greatest need". The specific objectives were listed in the PD as follows.

- to strengthen institution building by involving Sri Lankans at all levels and in all phases of water supply development activities;
- to improve the existing Udunuwara-Yatinuwara pumped water supply, so that adequate service is given to 35,000 people;
- initiation of other urgently needed schemes to be identified, such as Kandy Municipality, Gampola, etc.;



- to construct or rehabilitate 14 small gravity supplies in Udunuwara to serve 14,000 people;
- to install between 550 and 650 community wells, which (in addition to wells in current programmes) would serve a total of between 55,000 and 65,000 people in areas of low population density in Udunuwara, Galagedera and elsewhere in Kandy District;
- to rehabilitate 300 hand pumped wells in Harispattuwa District, serving about 30,000 people;
- to provide material, financial and technical assistance for the construction of 17,000 latrines, in addition to the 12,500 included in previous programmes, thus increasing the number of people served by about 130,000 in Galagedera, Harispattuwa and Udunuwara;
- investigations and designs for these water supply and sanitation schemes;
- a socio-cultural study and a health education programme timed to help the beneficiaries obtain maximum benefit from the schemes.

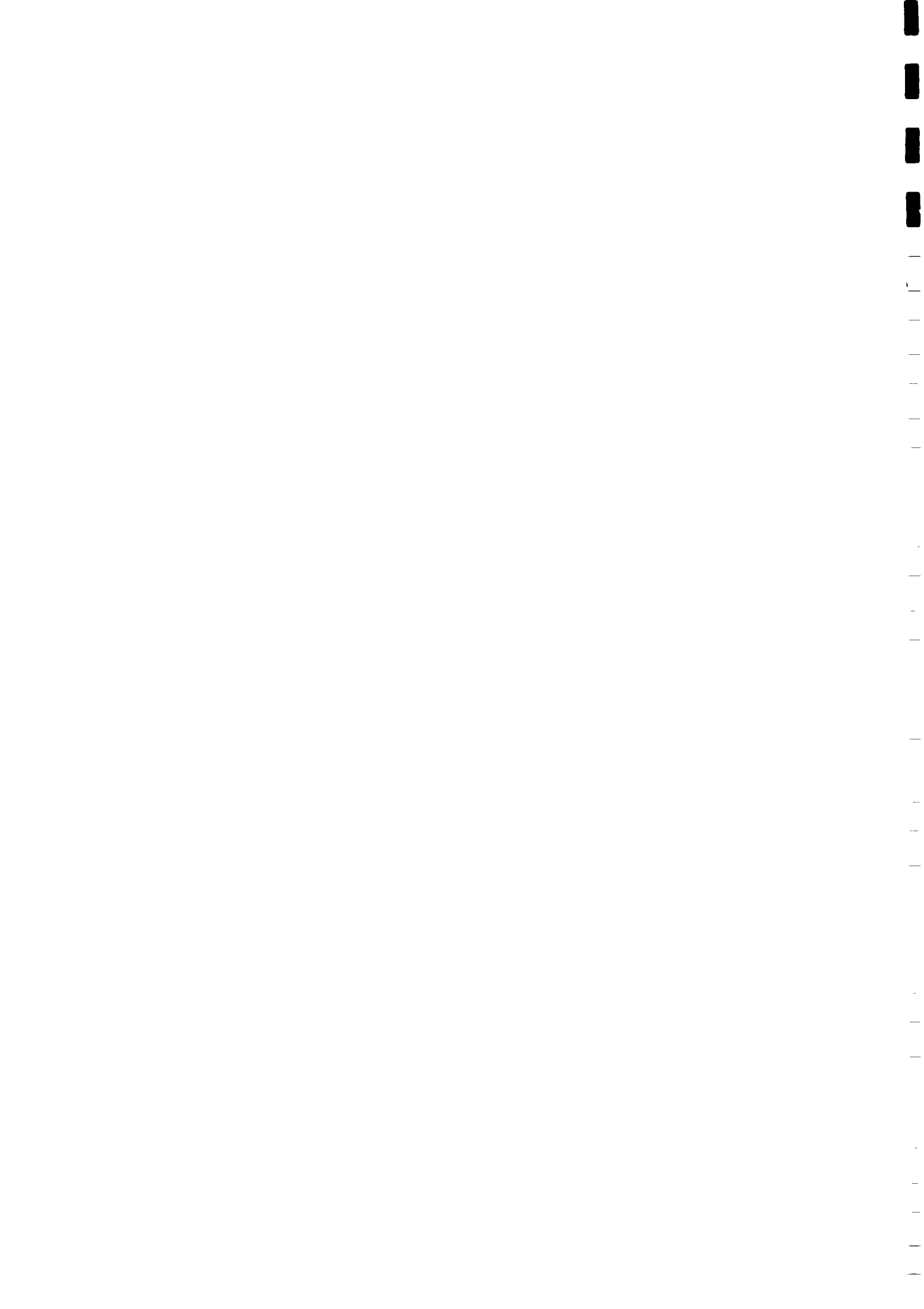
It is, of course, obvious in the light of the present experience, that the objective statement was woefully inadequate. The clear message from the list of objectives is that Phase I is a construction Project with very limited involvement in other aspects of development. The reference made to institution building seems to grade the activity down to only "involving Sri Lankans at all levels and in all phases of water supply development activities".

Unfortunately the attitude displayed by the objective statement characterises the other parts of the PD as well. For example, the Project budget allocates only FIM 55,000 to training, representing 0.07% of the Project total FIM 76 million.

Consequently, Phase I was planned, budgeted, manned and started off as predominantly a construction project, albeit envisaging community participation in point source water supply and sanitation.

The above should not be read as criticism towards the people who planned the project. International development co-operation is a fast evolving activity, where methods and priorities have been and will be changing with accumulated experience. The five year phase cycle demonstrates this change strikingly.

The donors and the recipients seem to have slightly differing priorities. While the donors emphasize institution building sustainability and HRD, non-physical targets, the recipients favour physical outputs as the development vehicles. Consequently the planned projects are compromises between the two priorities. This is clearly visible now in the Phase II PD. It now appears that inputs to the non-physical sector will not be adequate to meet the expectations prevailing at the time of closing Phase II. A further observation is that when ambitious construction and institutional development programmes are implemented simultaneously by the same organization, the physical outputs very easily overshadow the software activities. Physical outputs are measurable and visible, while the non-physical are more difficult to enumerate.



### 1.3 Implementation Environment

Since 1983 armed disturbances have plagued Sri Lanka. The Elam was started in 1983 and is still (1992) continuing between the Government and Tamil separatists. It has been confined mostly to northern and eastern areas. It has not directly affected project activities in any way. The war expenditure may have, however, indirectly contributed to the slow mobilization of the local component during the first three years of Phase I.

On the top of separatist conflict, temporarily suspended by Indian military intervention, Sri Lanka experienced a violent armed rebellion starting July 1988 and ending January 1990. A Sinhala extremist movement, JVP, attempted to seize power by a terror campaign paralyzing society. It is estimated that during the 18 months of civil war some 6,500 people were killed by the subversives and some 60,000 ("The Island" Newspaper, 23.04.1991) by the groups supporting the Government.

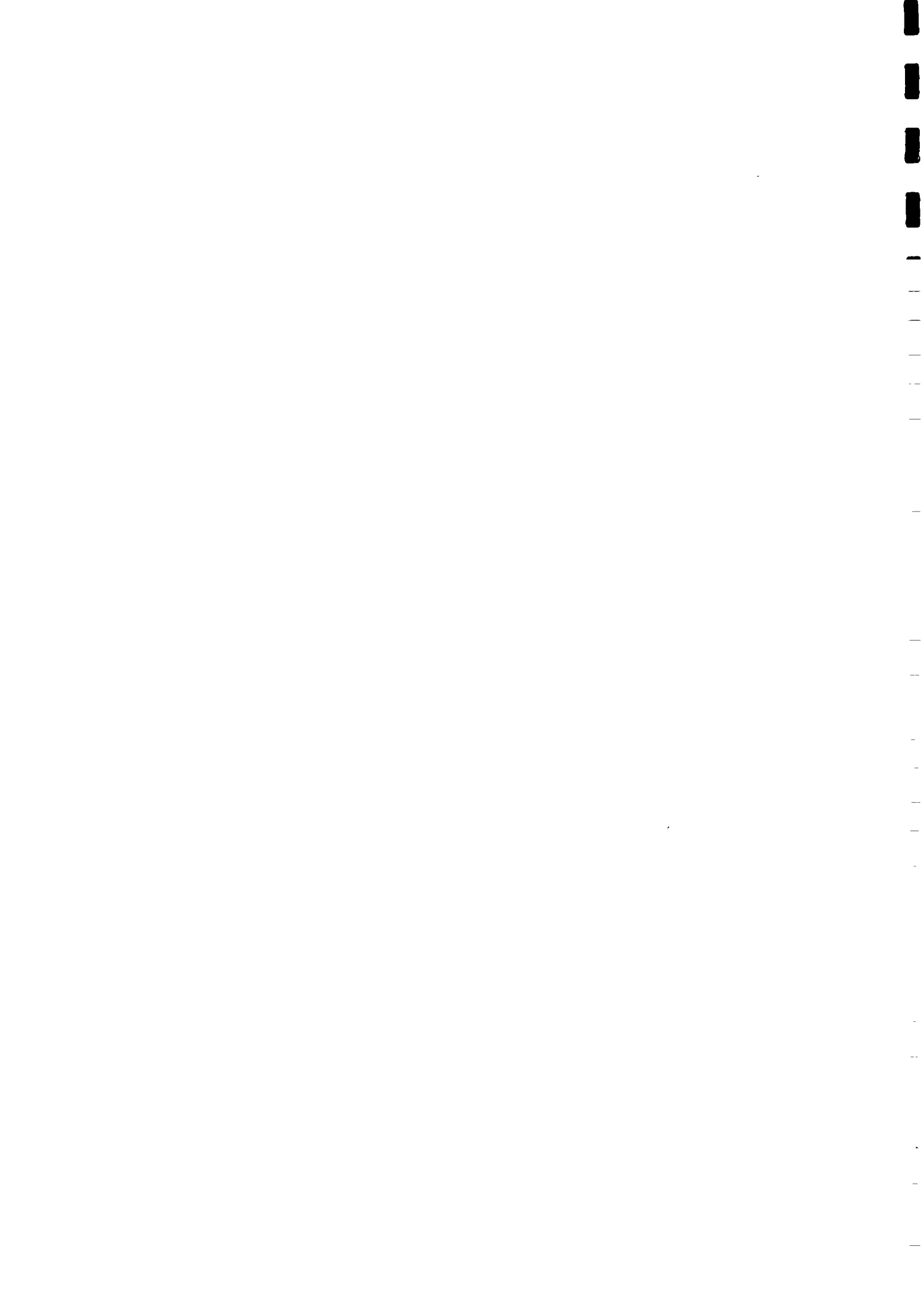
The JVP terror campaign managed to seriously disrupt life. Hartals (curfews imposed by dissident organizations), curfews, disruption of fuel supply and telecommunication, large scale non-attendance in Government offices and the general tension inevitably slowed Project progress. Deployment of expatriates to the island was extremely difficult. The cumulative effect was estimated to be 4 months of lost progress.

The Project suffered also direct casualties. One jeep was blown to pieces by a landmine, injuring 8 staff members. The injuries were generally slight. Three well-drilling rigs were burned at the drilling sites and a fourth NWS&DB rig on the way to the Project. Insurance covered the losses to the equipment owned by FINNIDA, but the two NWS&DB rigs were not covered.

Project management in civil war conditions becomes a grave exercise. The big issue is, of course, should the activities be suspended and if yes, then when to suspend and how to prepare for the eventual restart. In this case the suspension option was not selected. The factors favouring hanging on were:

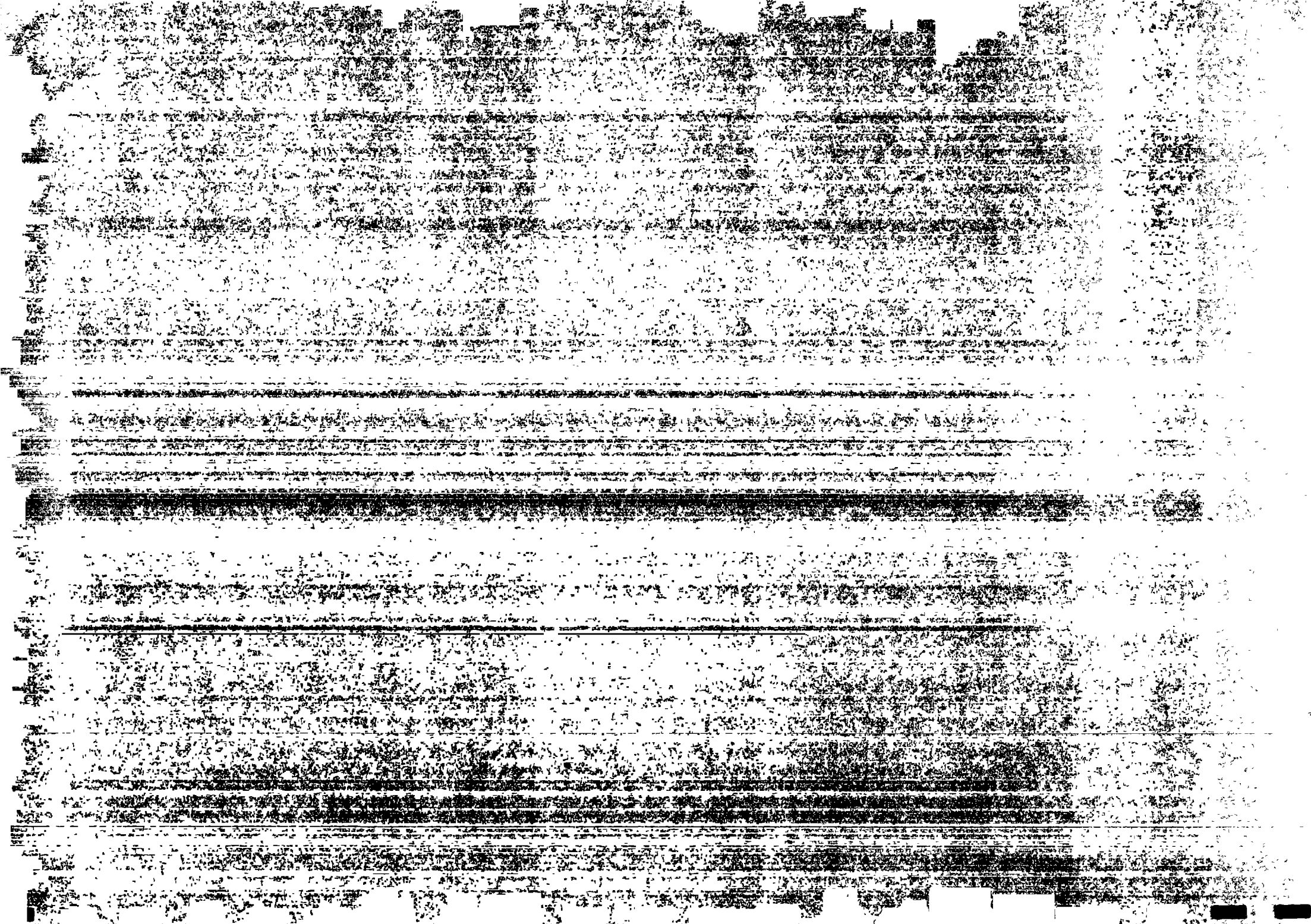
- due to the community participation approach, it was possible to continue activities at the village level even at times when it seemed that the entire island was at a standstill;
- delays and incidents involving project equipment or personnel accumulated slowly without any concentrated periods of violence requiring a stoppage;
- when physical damage to project equipment or personnel occurred, JVP wall posters apologized;
- expatriate personnel were not felt to be targeted in the conflict;
- demobilization and the subsequent remobilization were estimated to mean the loss of 6 months worth of progress;

In this case the decision to continue despite the risks proved to be correct. The damage to progress was minimized. From January 1990 onwards the tension gradually eased and normal conditions returned.









## 2. CULTURAL AND INSTITUTIONAL SETTING

### 2.1 Cultural Background

While phase I started off very much as a construction project, it was soon understood that a substantial institutional development (ID) component would be necessary to address the sustainability issue.

Successful institutional development usually means change taking place in the institutional culture, even changes in behaviour deriving its origins from the national culture. Cultural changes cannot be imposed. Any attempt in that direction would be swiftly rejected and the organization would close its ranks against outside interference. The only way is to facilitate the change within the culture, to nurture the growth of knowledge and skills, which then in turn lead to change in the set values and norms guiding everyday actions.

Although it is very difficult for a foreigner to fully understand the culture of another country, nevertheless a maximum amount of understanding is needed in the ID process. It is, therefore, useful to review the cultural aspects for non-Sri Lankan readers, especially recording how the contemporary expatriates saw them. The following quotations are from Dr. R. Bradley's excellent Final Report on Institutional Development of the NWS&DB, Engineering Science, 1991.

#### Asian Frame

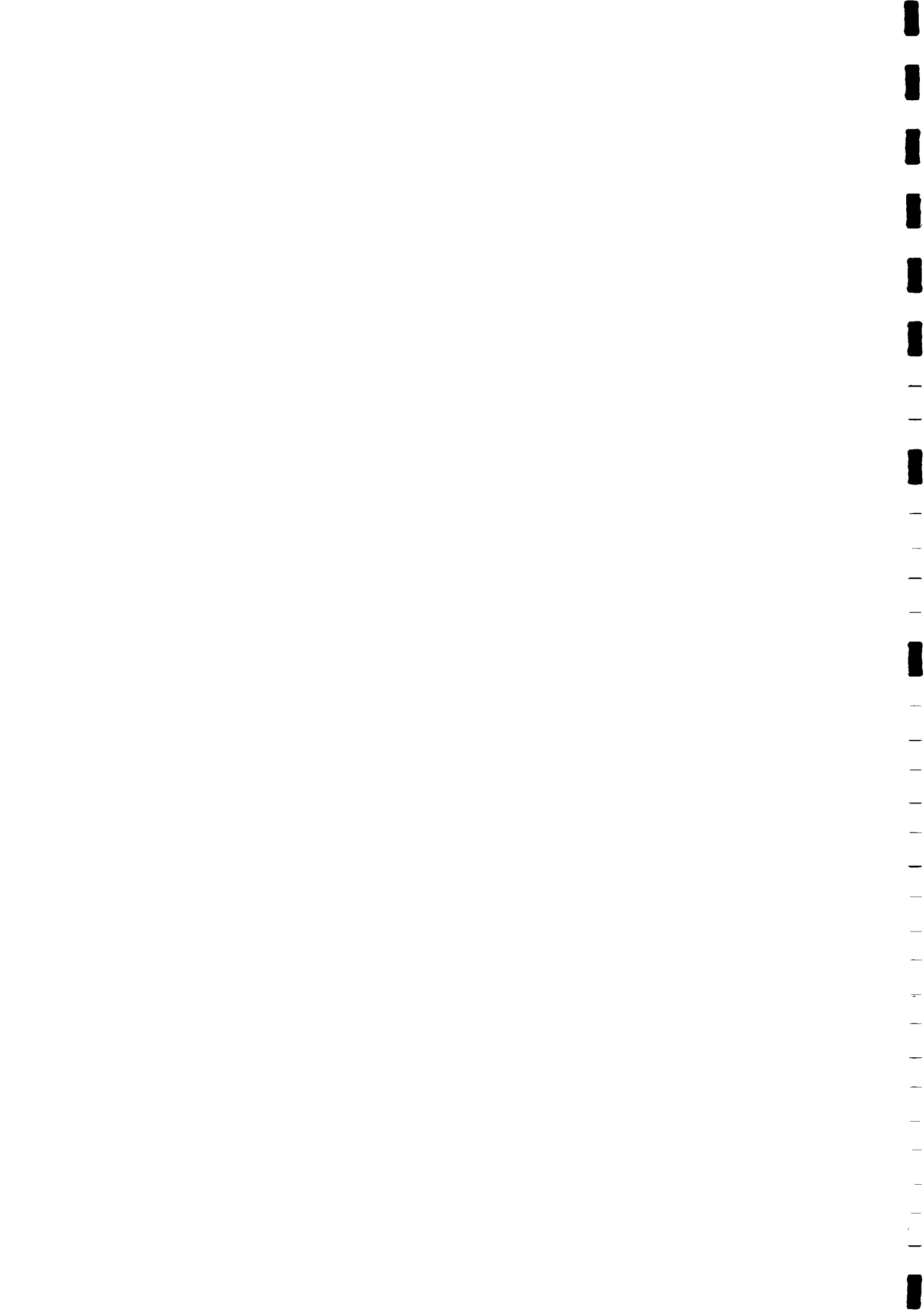
The European culture characteristically places the emphasis on individuals, rather than on group as the Asian culture does.

*"The extended Asian family lends itself to group orientation, and can be contrasted with the nuclear family concept in many western societies, which is predisposed to an individualistic orientation. A strong extended family orientation may tend to prevent the development of individual decision-making capacity because the family elders pronounce on key matters. The young Asian is, therefore, shielded from having to strategise and decide since family support is ever-present. In the work situation the support is removed and it is difficult to reach a quick decision. A cultural trait may develop of "no decision equals no action equals no trouble", which is really a way of avoiding having to stand up and be counted. Although the young Asian manager may be physically independent he is not necessarily psychologically independent. The tendency is to form a committee so that the decision then belongs to everyone."*

*"The importance of family and community is regularly espoused in official pronouncements in Asia. In fact the then Prime Minister of Singapore, Mr. Lee Kuan Yew, defined Asian values as 'putting community above self, upholding the family, settling things by consensus rather than confrontation.' (Economist, 1989a)."*

#### "Sri Lankan Context"

*"Statements, such as that quoted from the Singapore Prime Minister are also heard from Sri Lankan statesmen, often linked to religious values. However,*



*care must be taken when basing cultural traits on religion. It is all too easy for someone brought up under the so-called 'protestant work ethic' to dismiss some of the Asian religions as encouraging laziness. It is perhaps a truism that most eastern religions are based on a withdrawal from reality with a search for a higher plane, and the dominant Buddhist philosophy in Sri Lanka is no exception. However, the philosophy has to be kept in perspective, the following quotation for example, (Premadasa 1990), is not an exhortation to sit back and do nothing, it is fundamentally sound advice on how to approach a problem:"*

*" 'When ordinary human beings look at the world they see things differently. Each one has a different view. The result is conflict. However, when we see things as they really are, without attachment, conflict ceases. So the way to end conflict is to attain that state of mind, which will give us a sense of detachment. The root of the problem is attachment. Where there is attachment, there is conflict, pain, suffering and unhappiness. When attachment ceases there is true happiness.' "*

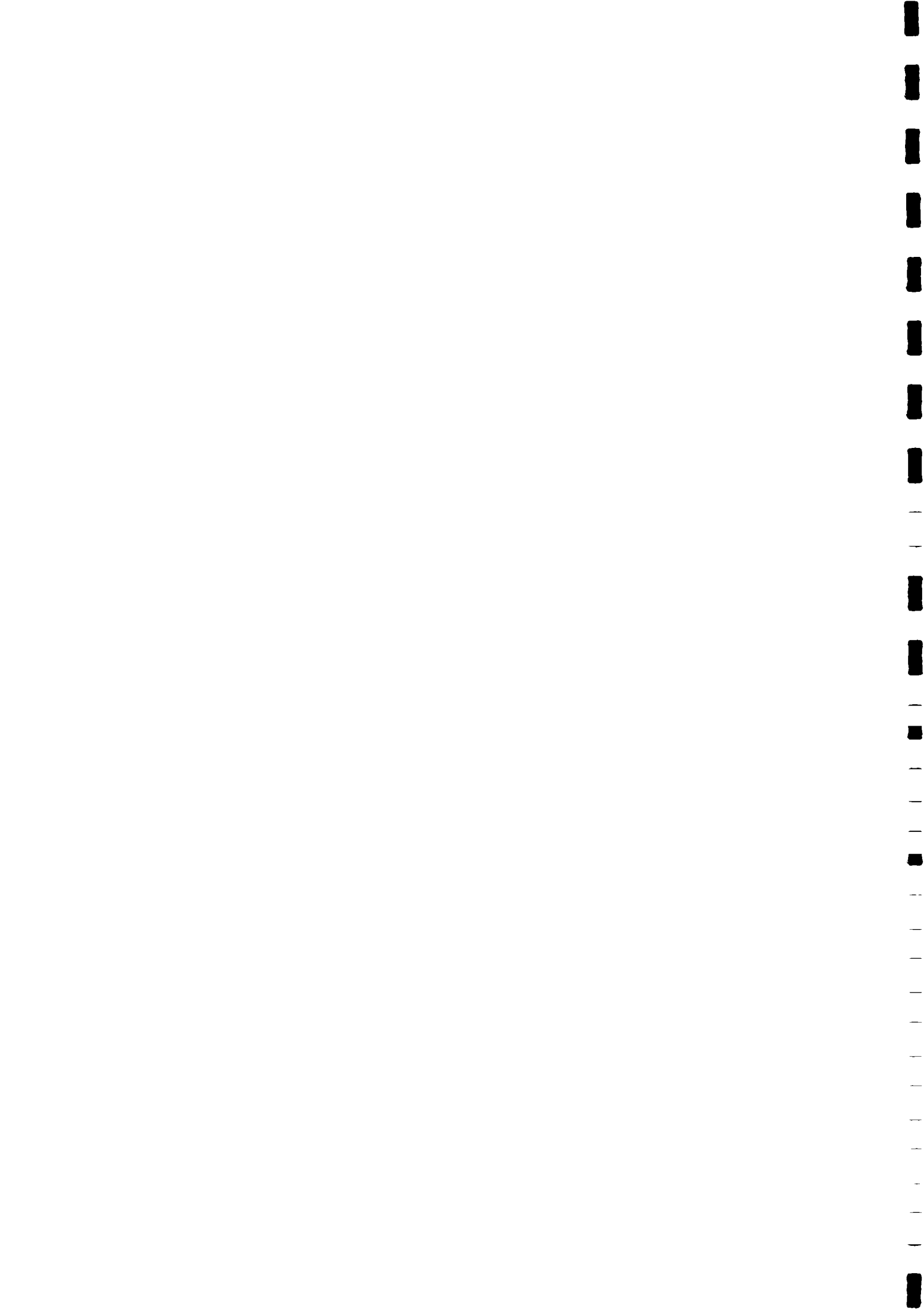
*"A review of a country's history can illuminate some of the cultural traits. For over two thousand years there existed in Sri Lanka a strong spirit of communality with the population having a strong sense of duty to family, community and king. The evidence of impressive community-based irrigation schemes bears testament to this communality. During colonial times the state became all-powerful and the concept of communal or public property somehow changed to government property, 'theirs' rather than 'ours.' Following independence a period of heavy socialism tended to reinforce the attitude of reliance on the state and currently Sri Lanka is trying to get out of this mould and move towards a greater reliance on individual efforts. These shifts in policy touch the very roots of traditional beliefs and have had an impact on the national culture."*

*"Sri Lankan society is not based on a sense of equality. The sense of communality existed within a caste system, which went back to Indian origins. The reincarnation doctrine of birth and re-birth is linked to the caste system in the sense that a superior- inferior status is predestined, being based on a past life cycle. The old Sri Lankan kings did not rule on the basis of social equality, but the system was accepted. "*

*"National education and health systems based on western models and a tendency for the political elite, at least until very recently, to be the product of English-language western oriented private schools, all placed strong pressures on the centuries old traditions. The civil disturbances of the Tamil-Sinhala ethnic problem and the Janatha Vimukthi Peramuna (JVP) insurrection are all symptoms of a society undergoing tremendous stress, out of which a cultural change is probably inevitable. "*

#### "Public Sector Culture"

*"Within the overall national culture the Sri Lankan government or public sector has its own particular traits. Two of the most recognizable characteristics are political interference in public sector organizations and a rigid adherence to regulations. "*



*"The first characteristic is not, of course, restricted solely to Sri Lanka, or even to Asia. Many governments traditionally use state organizations as sources of political patronage (Edwards and others, 1991). In Sri Lanka there has been a growing tendency for such political interference to increase since independence, with politicians making decisions that should be made by management."*

*"According to Senanayake (1990), MPs have arrogated to themselves executive power in their constituencies without any legal or official sanctions. A typical example quoted by Jayaweera (1989) refers to a certain state sector corporation, where in order to obtain a job, the patronage of local MPs or a membership card of the governing party is a prerequisite. However, he does point out that this practice had been the case with every party in government during the last 20 to 25 years."*

The new government elected in 1989 has been trying to reverse this trend. The observation from the Project level is, that the government has been successful. The interference has predominantly ceased. Instead the MPs and Ministers have valuably supported project activities by resolving land issues and administrative impasses. From the Engineering Science Final Report again:

*"The custom of anonymous petitions was alluded to in the preceding section. Because these are accepted by politicians and often acted on, fear is instilled in public sector employees and as a result regulations and procedures are followed to the letter to guard against any accusation of non-compliance. An officer is really risking his status if he 'breaks' a procedure slightly, even in the interests of getting a job done more efficiently, because that will be used by some individual oozing "malevolence coated with cowardice" (to quote Vittachi, 1987) to discredit the officer or to favour his own cause. Depositing such anonymous petitions into the waste paper basket would take away a major irritant to efficient operations in the public sector."*

*"The old colonial administrative and financial regulations, which were ideal in an epoch when a foreign power was managing Sri Lanka with the aim of eliminating any siphoning-off of money destined for its treasury overseas, are not necessarily the most relevant for a public sector corporation in the present day. The grid of regulations is far too rigid to encourage discretion or initiative, let alone flexibility and change."*

*"During the last years the cultural norms of the government sector as described in this section have been subjected to an unprecedented scrutiny by the government itself and by external support agencies, notably the IMF. A programme has been introduced, based on restructuring the economy to eliminate loss-making state enterprises and to encourage the private sector. This programme, if successful, will have an almost revolutionary impact on the status quo and on the basic cultural attitudes of the Sri Lankan public sector as a whole."*





## NWS&DB Culture

The Engineering Science Final Report listed the following features that summarized the NWS&DB culture at the start of the ID intervention:

- \* conflict avoidance
- \* sub-group cohesiveness (engineer-dominated)
- \* peer sensitivity and a high level of protectiveness
- \* burying individual accountability in collective responsibility
- \* personnel/group agenda rather than corporate agenda
- \* avoidance of open communication
- \* reliance on written procedures (no flexibility or innovative approaches to problem solving)
- \* hierarchial management style
- \* status conscious (professional engineers)
- \* negative outlook towards problem resolution
- \* committees solve everything
- \* avoidance of performance measurement
- \* jealousy of individual success (contra to group collectively and sameness)

Changes have taken place during the past year. Although the basic characteristics still remain the same, there is now (1992) a marked tendency towards innovative problem solving, performance measurement and delegation of powers. The IDP was also successful in turning the state department-type thinking towards service oriented financially independent corporate-type attitudes. This effort should be continued.

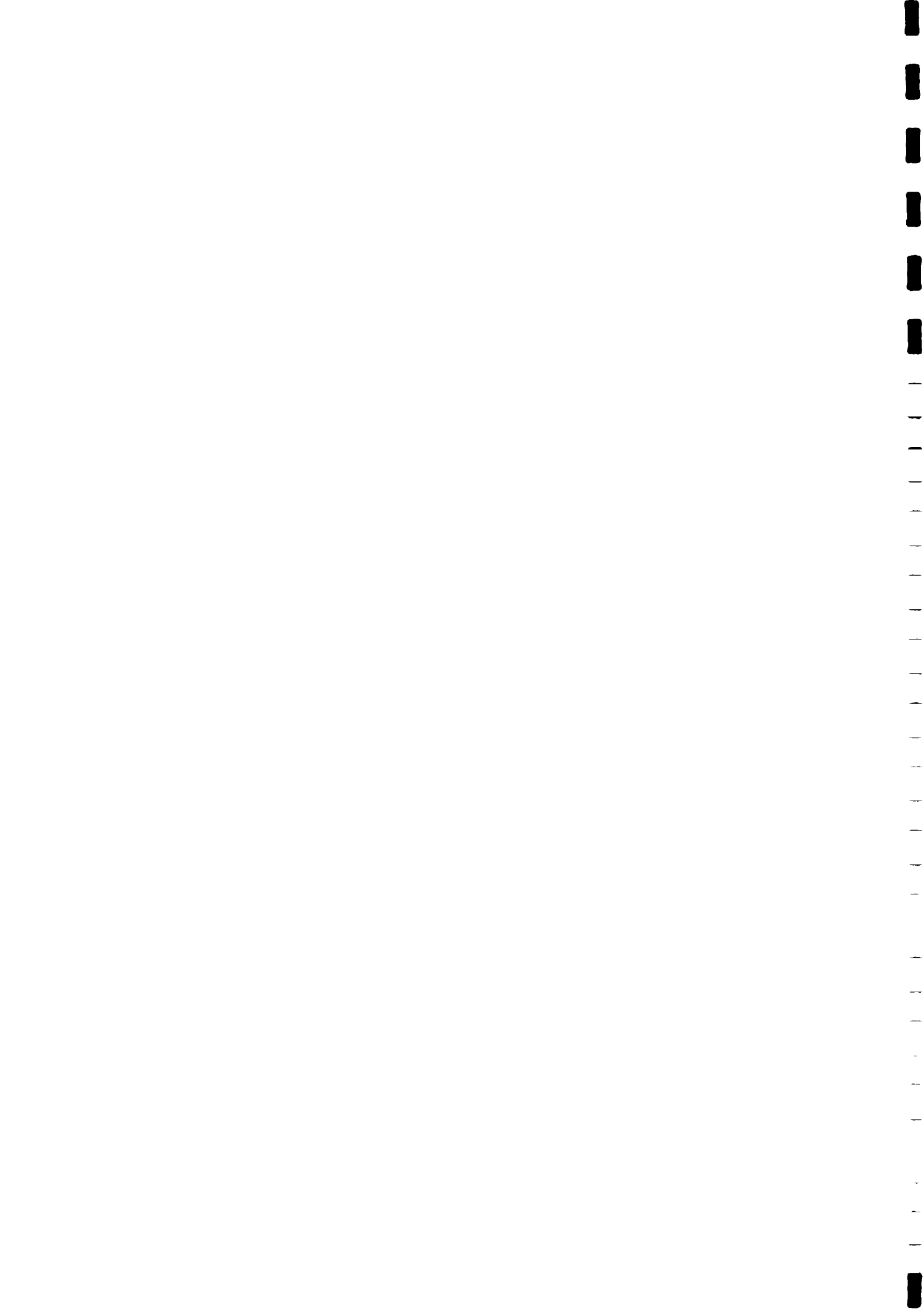
## 2.2 Project Culture

The implementation organization consisted typically 6 expatriates, 25 secondees from NWS&DB and 400 staff and labour directly employed by the Finnish Consultant in charge of the activities. The expatriates brought with them a target oriented, competitive and time conscious culture, which to Sri Lankans was often felt to be rude, insensitive and irreverent, although the benefits to efficiency were acknowledged.

Some cultural features had a profound effect on the Project. An example is the way "avoidance of performance measurement" leads directly to the practice of promotion by seniority rather than merit as well as being a negation of the whole concept of basing activities, even maintenance, on the results of monitoring and analysis.

The hierarchical management style and status consciousness led to a very different feeling than that in a Finnish organization and sometimes presented obstacles to in-depth staff and institutional development that were not easily overcome. The hierarchical style was evident from comments frequently heard during attempts to develop staff capabilities. Instead of explaining why something should be done and emphasizing the importance of thinking for themselves, the Sri Lankan style is often to "just tell them what to do". The result tended to be a layered structure with staff showing less versatility than needed for working in a complex environment like that of the Project. Creativity was stifled by the feeling that following orders was enough.

Status consciousness was most visible in the barriers between professional engineers and other staff members and placed limits on the scope of people's work that seemed artificial to someone from outside the culture. It is quite normal for an engineer in any country to



make a design that is impractical or at least not as good as it could be. It is also quite normal for the man who should follow the design to explain the realities of executing it to the engineer and often the two of them end up working together to come up with something better than either one could do alone. This two way communication between "white collar" and "blue collar" was more difficult in Sri Lanka because of the status gap, but the Project managed to make some progress by bringing in advisors, who helped to bridge the gap by working in both the office and the field.

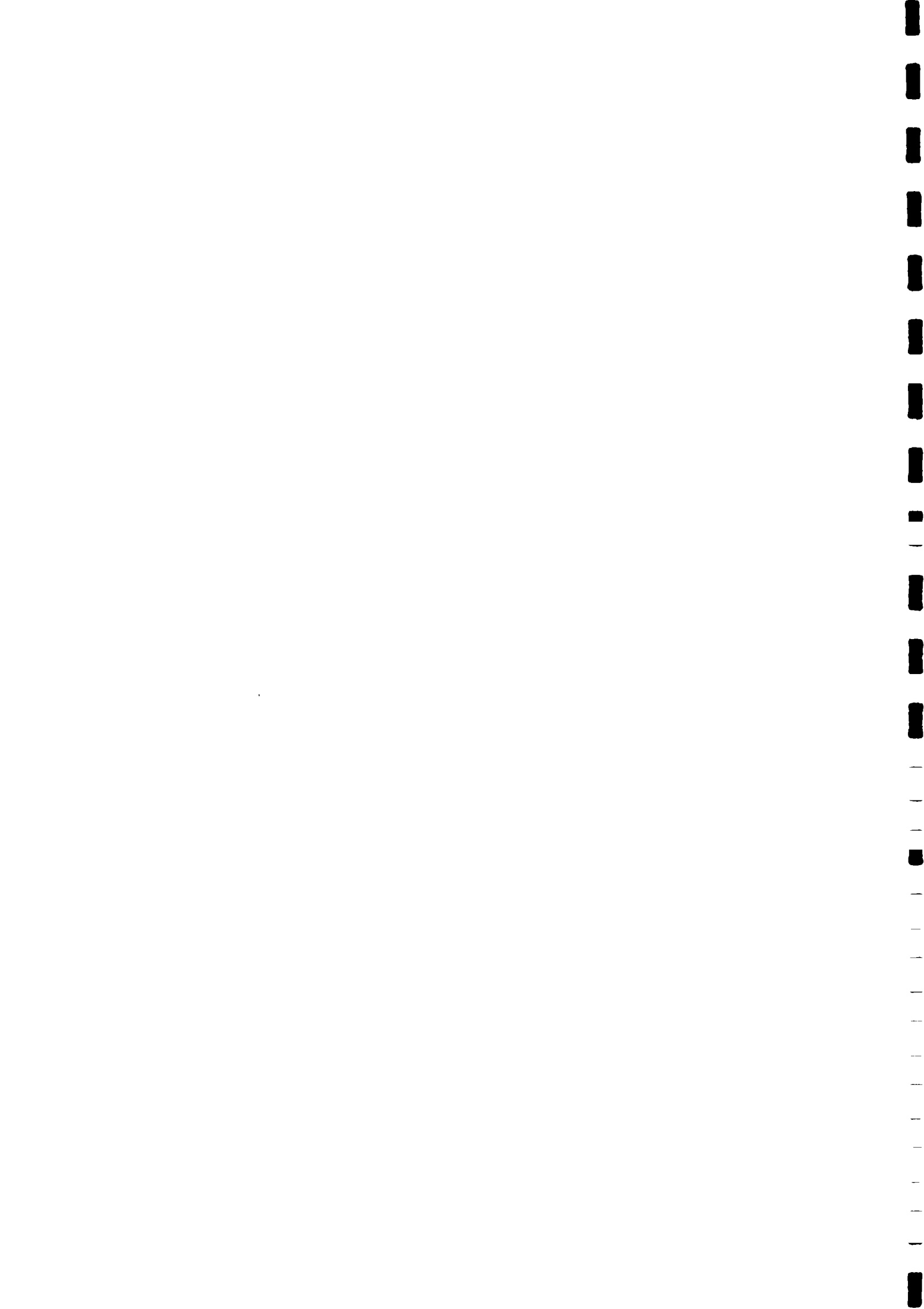
Generally Sri Lankans liked to work in the Project organization. The simple procedures and uncomplicated decision making process were appreciated, tight attendance and vehicle use practises were understood, and the negative performance feedback, although often felt to be rude and insensitive, was tolerated. Unfortunately the directly employed staff was not convinced that a change is taking place in NWS&DB as well. An essential part of the directly employed staff is opting not to continue in the Project when the management is handed over to NWS&DB in June 1992.

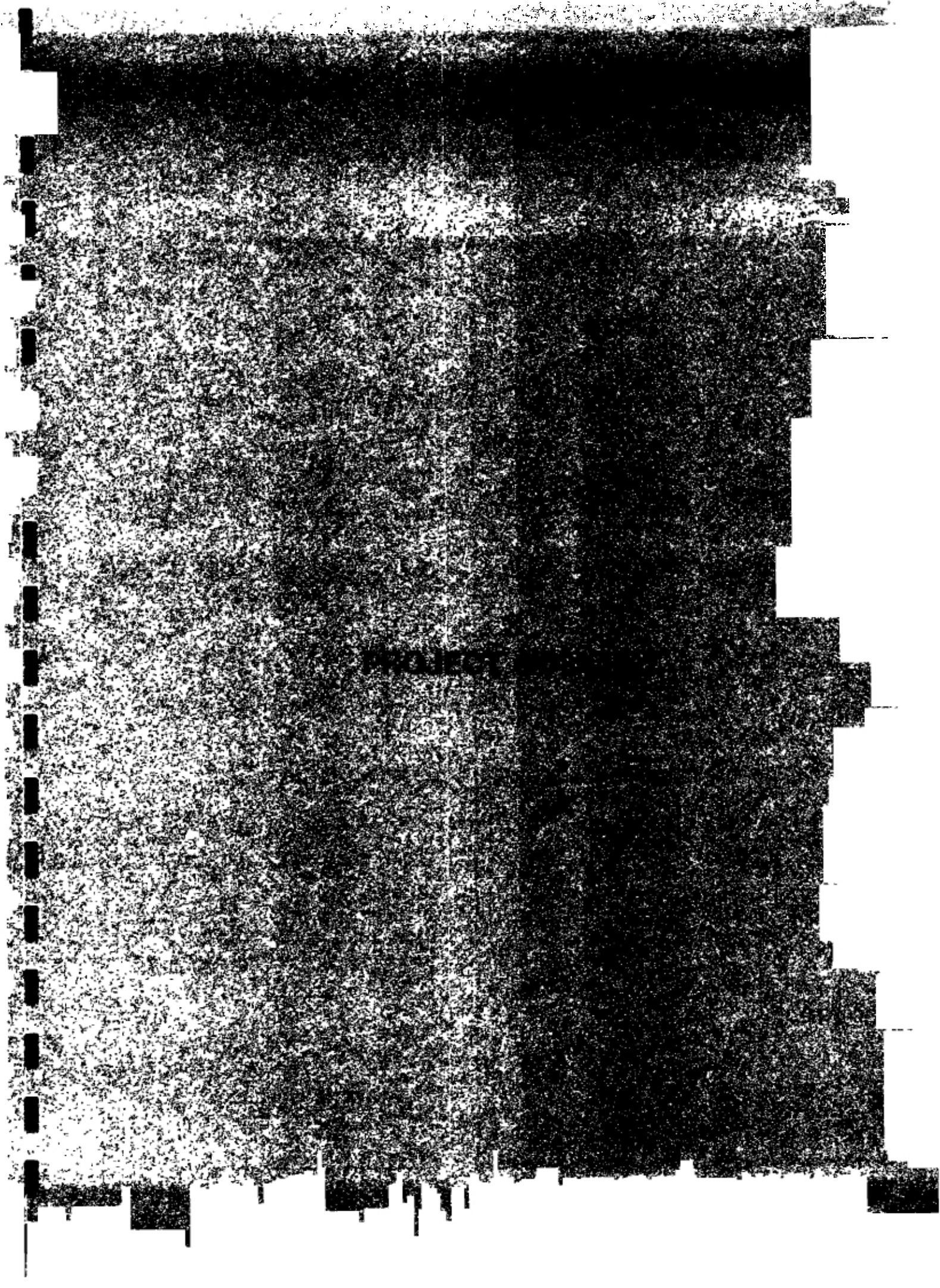
The cultural divide should not be overemphasized. Mutual respect prevailed and many lasting friendships were wrought over the divide. People adapt as necessary and if that adaptation does not seem fast enough to foreigners, then too bad for the foreigners. What should be emphasized is that projects like the KDWSSP have one foot in each culture and can easily be misunderstood by both. How easy it is for the donor to demand faster progress, more efficiency and cultural sensitivity at the same time the beneficiary is complaining about too much pressure. The Project managed to keep a good balance between the two and the progress it has made has not been at the cost of cultural disruption in Sri Lanka.

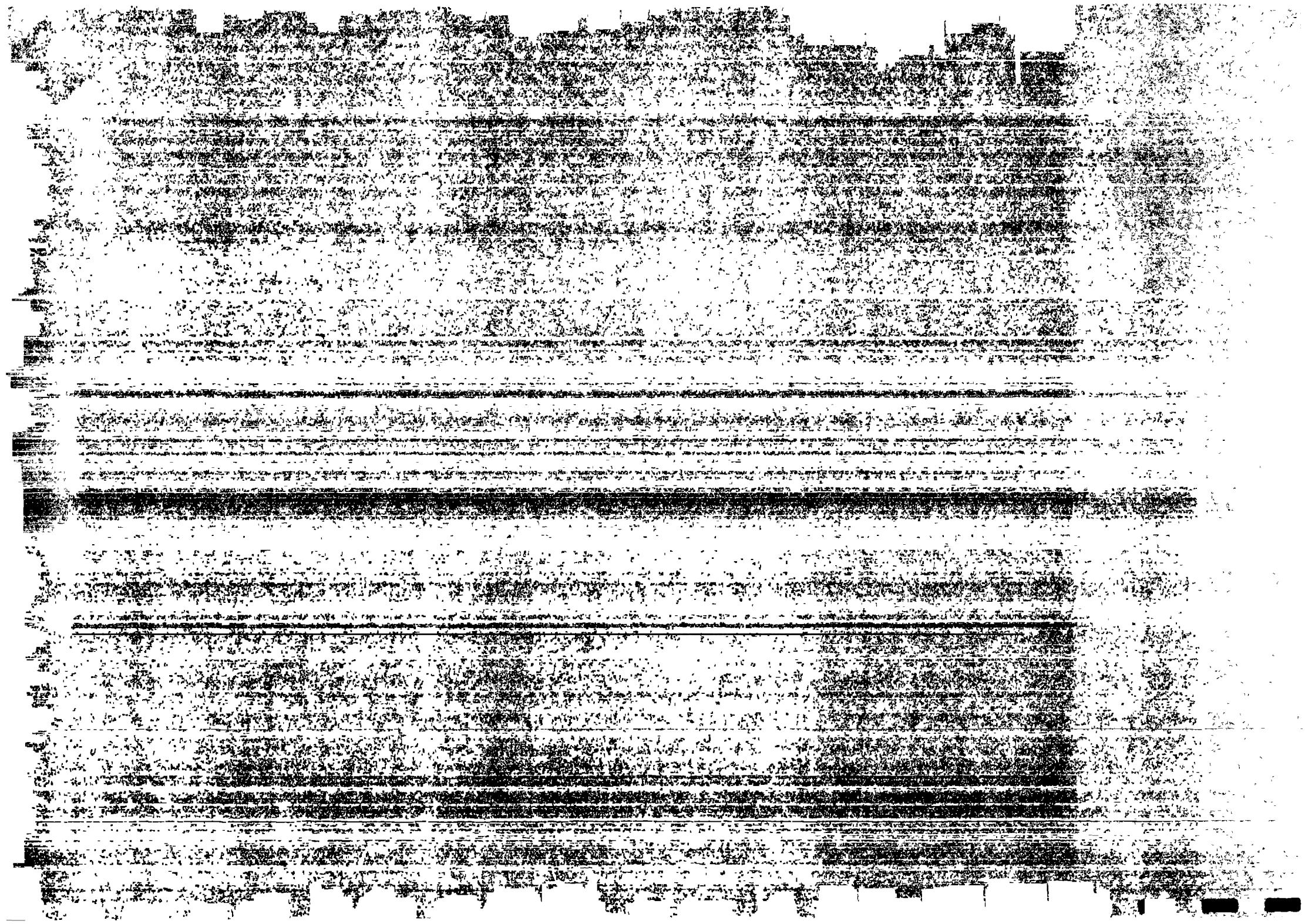
It should be understood that whatever changes took place were not inflicted on Sri Lanka, Project staff were normally eager to work with foreign engineers because they wanted to learn and grow, and growth often means change. Whether these changes amounted to some kind of "technological imperialism" was beyond the scope of the Project to consider, but they were clearly an important, mostly positive, element in strengthening the staff and institutions.

#### Department of Health Services

The Project health education activities were carried out by the DHS of the Provincial Council for Kandy Region. The devolution of the activity from the central government to the provincial level took place in 1987, It is difficult to estimate whether it was the devolution or the energetic management since 1989, but the DHS started to exude enthusiasm and innovative approaches, although severely ridden with red tape.







### **3. PROJECT CONCEPT**

#### **3.1 Strategy**

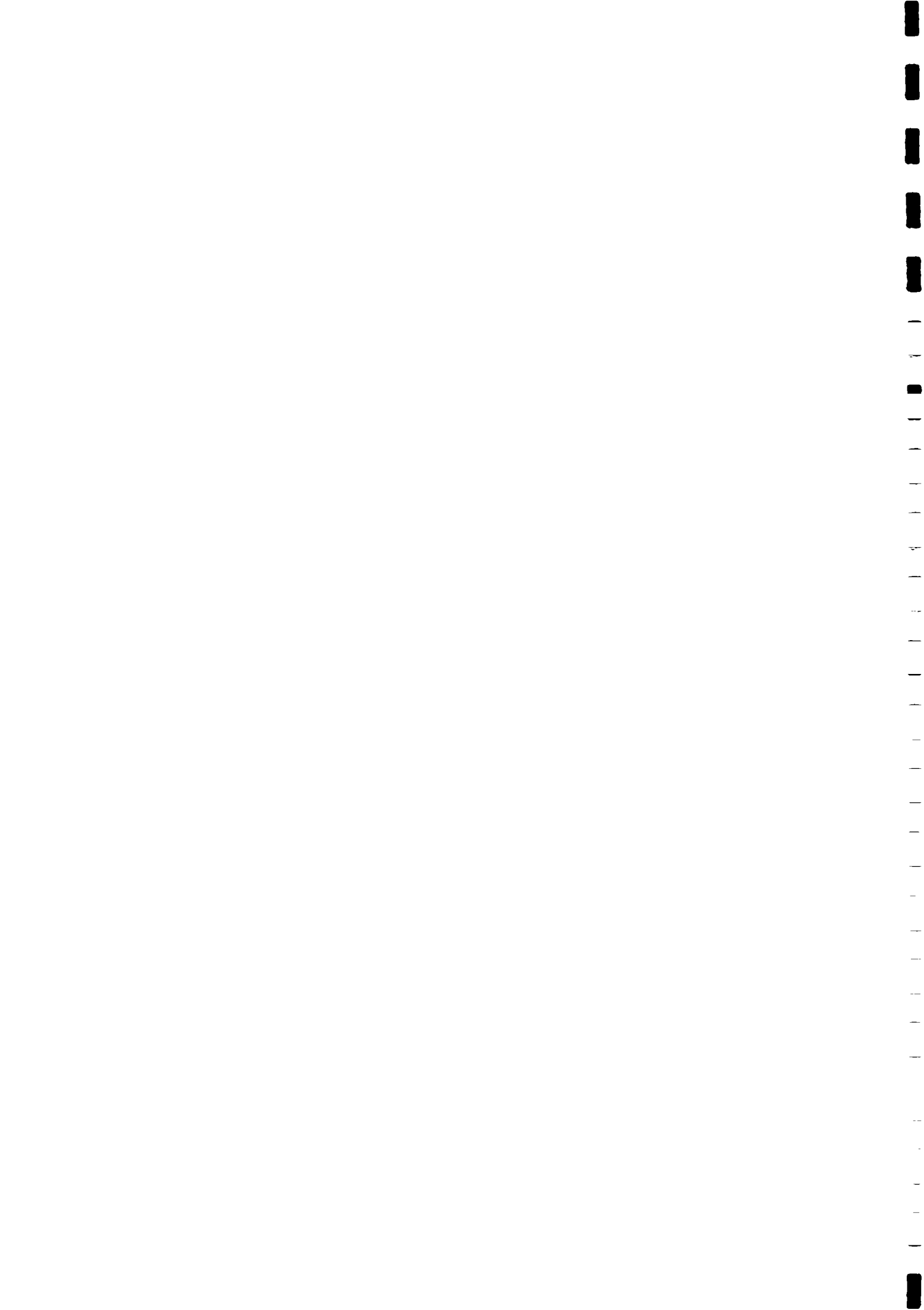
The strategy followed can be summarized as follows:

- \* simultaneous development of water supply and sanitation services as well as health education,
- \* priority in water supply to piped gravity schemes,
- \* if gravity schemes are not possible, next choice to be hand pump wells,
- \* piped schemes to be considered only in areas with a population density over 2,000 persons/km<sup>2</sup>,
- \* piped schemes need to be viable,
- \* latrines to be constructed by the beneficiaries themselves with approximately 50% material and financial support from the Project,
- \* hand pump wells to be implemented with maximum community participation and only with prior commitment from the community for O&M,
- \* health education to be implemented by the health authorities,
- \* emphasis to be on moving from construction towards consolidation and institutional development,
- \* joint decision making by the NWS&DB and Consultant for maximum on-the-job training.

#### **3.2 Overview**

The KDWSSP was one element in the Government of Sri Lanka's Decade Plan (1981 to 1990) for the water supply and sanitation sector. The Finnish Government has been supporting water sector development in Kandy District since 1980 and the KDWSSP can be seen as a logical extension of earlier work. Kandy District can not be called a microcosm of Sri Lanka because the country has a wide variety of both terrain and climates, but many of the problems that exist in Kandy District were the same as those in other areas.

There is no real need to sell the goals of the Project. Who would argue against the need for making safe water and sanitary toilet facilities accessible to the population of the District? Educating people to get the full benefit from improved water and sanitation facilities also makes sense. Where there is some room for controversy in the case of water is in deciding exactly who is going to get water first, how much they will get, how convenient access to that water will be and how much they will pay for it. And because the Project made the sanitation facilities and education an adjunct to the water supply program, decisions made about water also affected them.





The criteria for making these decisions came from the donor's desire that:

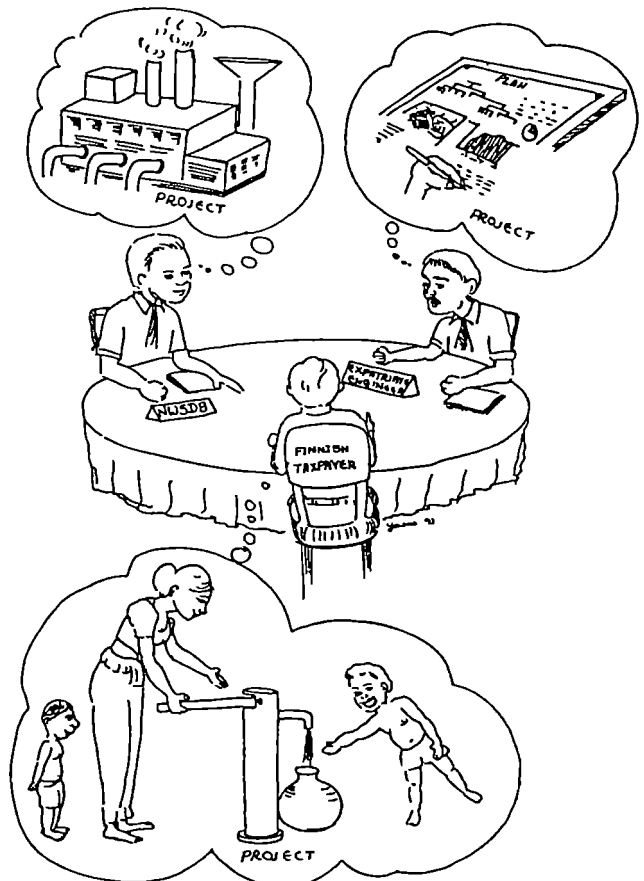
- the Project should benefit as many people as possible with its limited resources,
- women's participation and role should be supported,
- poor people should be specifically included,
- viability and sustainability have top priority,
- Sri Lankan people and institutions should be capable of operating and maintaining everything built by the Project in a sustainable way.

The Government of Sri Lanka has committed itself to the concept expressed in the New Delhi Statement, "Some for all rather than more for some" and so is in basic agreement with the donor. Like all governments, however, it has to temper its philosophy with political reality and that reality in Sri Lanka is that middle class citizens want water piped to their homes, but are not too happy about paying for it. That is a logical outcome of earlier policy to give water almost free of charge.

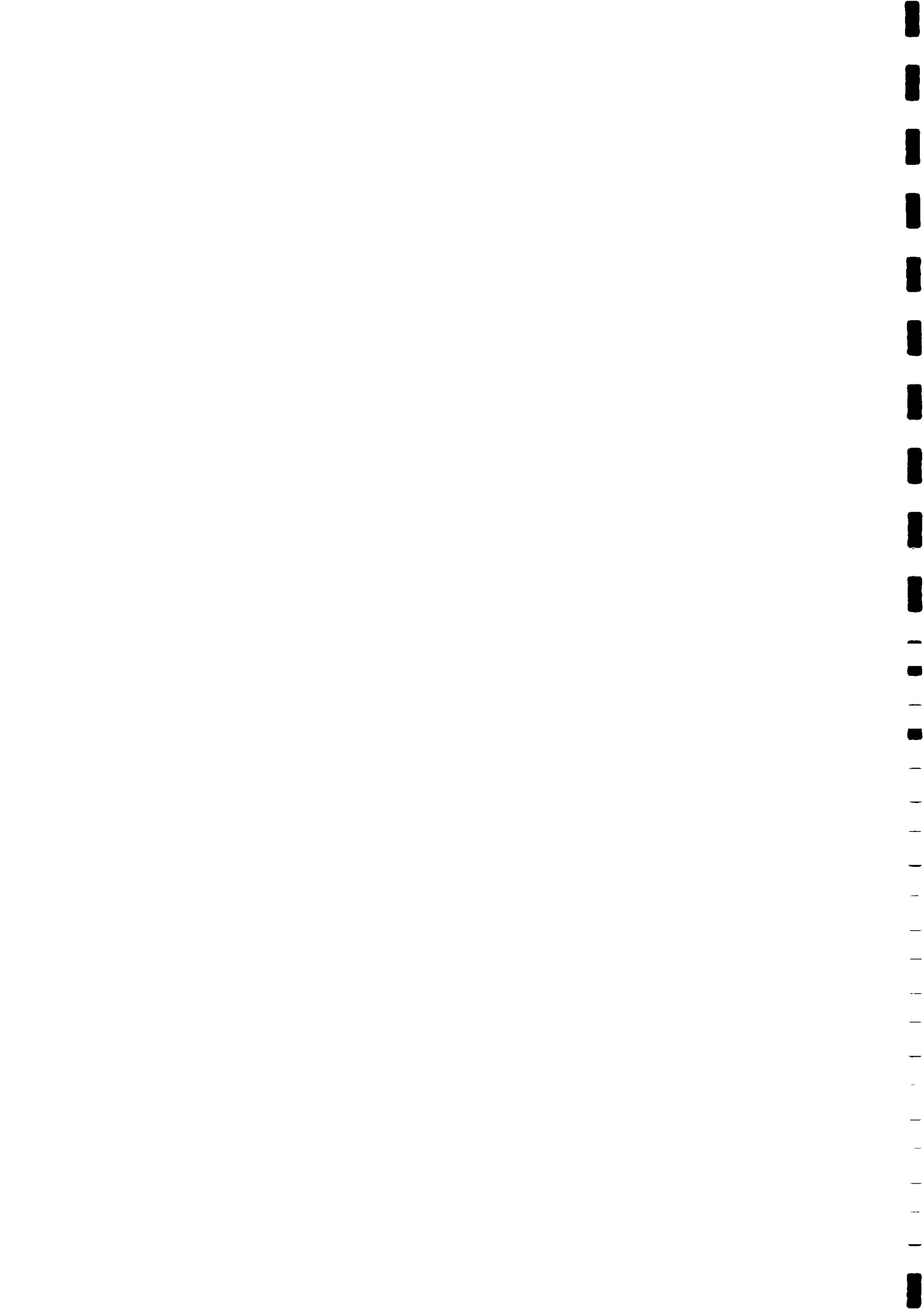
The basis for the Project was, of course, what the Governments of Sri Lanka and Finland wanted, but in actually drawing up the details, experiences of earlier Finnish projects added an element of realism to project strategies.

The earlier HWSSP had built 11 small water supply schemes in Kandy District and by the time the KDWSSP was started they were providing feedback about viability and the NWS&DB's operation and maintenance capability. The two most striking pieces of information were that the NWS&DB's water tariff was much too low to pay even the operating expenses of the schemes and that maintenance was minimal.

The result of adding realism gained from experience to the shared goals of the two governments was that what have might been just a construction project was shaped and enhanced into one that involved whole communities in its activities and tried to help the Government of Sri Lanka discover solutions to the problems of viability and sustainability.



The Project Was Different Things To Different People



In other words the Project tried to solve underlying problems instead of just pouring in resources. This was not as easy as it may sound and involved a complete change in orientation of both expatriate and Sri Lankan staff. Engineers who had spent their careers designing pipelines and pumping systems had to learn about development issues and work closely with social scientists. NWS&DB had to start thinking about hand pumps as well as giant pumping stations.

It would be nice to be able to write that everyone immediately saw the light and became believers in community participation, viability and sustainability, but the truth is that these were contentious issues throughout the Project. Many people just wanted to build water supply schemes and latrines without getting involved in social and political issues.

What can be said is that there was an evolutionary change in thinking, accompanied by appropriate action, toward more involvement of the institutions and people and that activities were driven less by the traditional "construction first" reflex of many engineers.

Fortunately the momentum gained in the direction of sustainable development can be expected to be maintained in Phase II of the KDWSSP. An overview of Phase I without a future would be an overview of a story stopped at midpoint. A project devoted to construction could be viewed as complete when the last brick was put in place, but by trying to be more, the KDWSSP has committed itself to a longer term point of view.

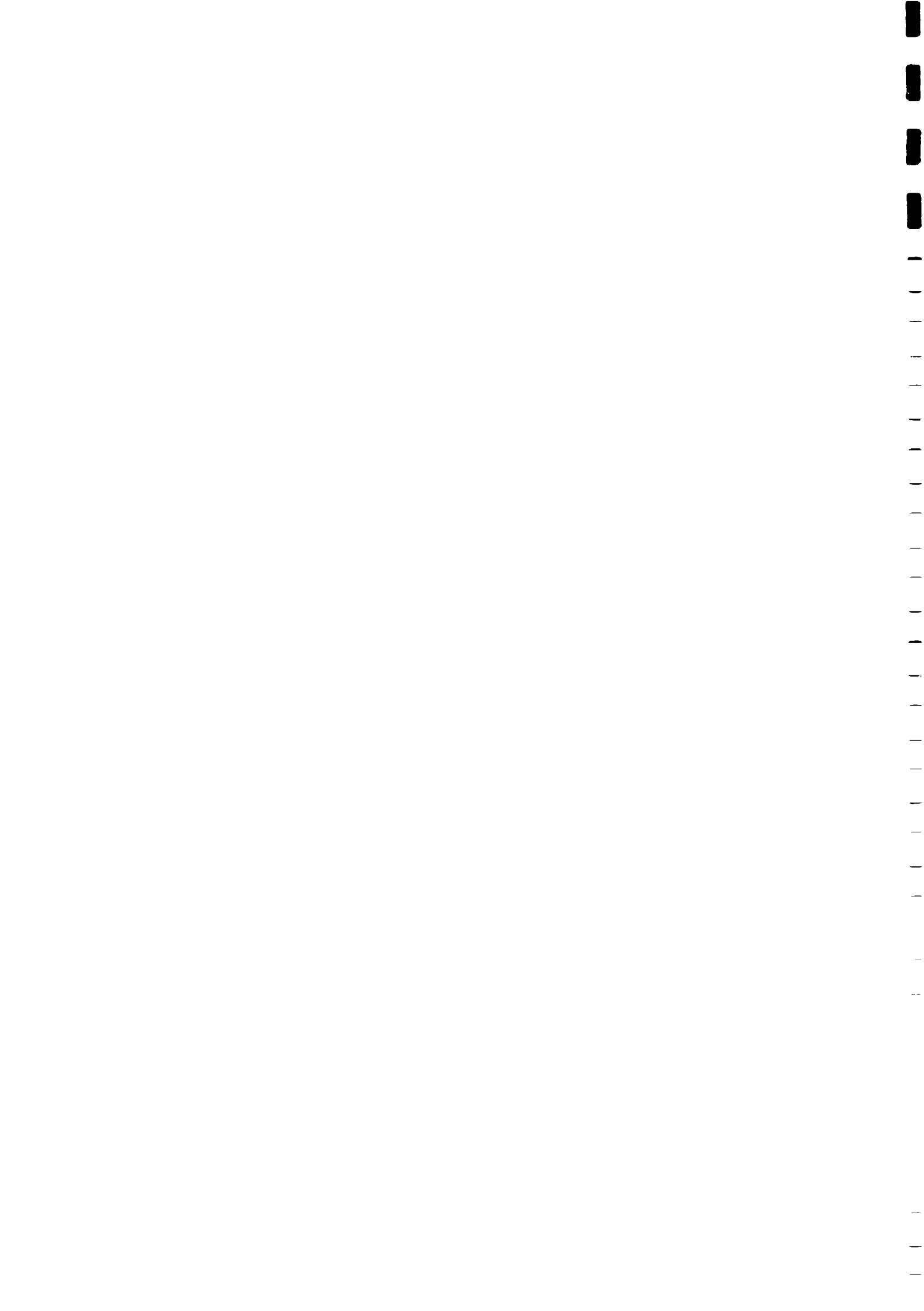
### 3.3 Management Approach

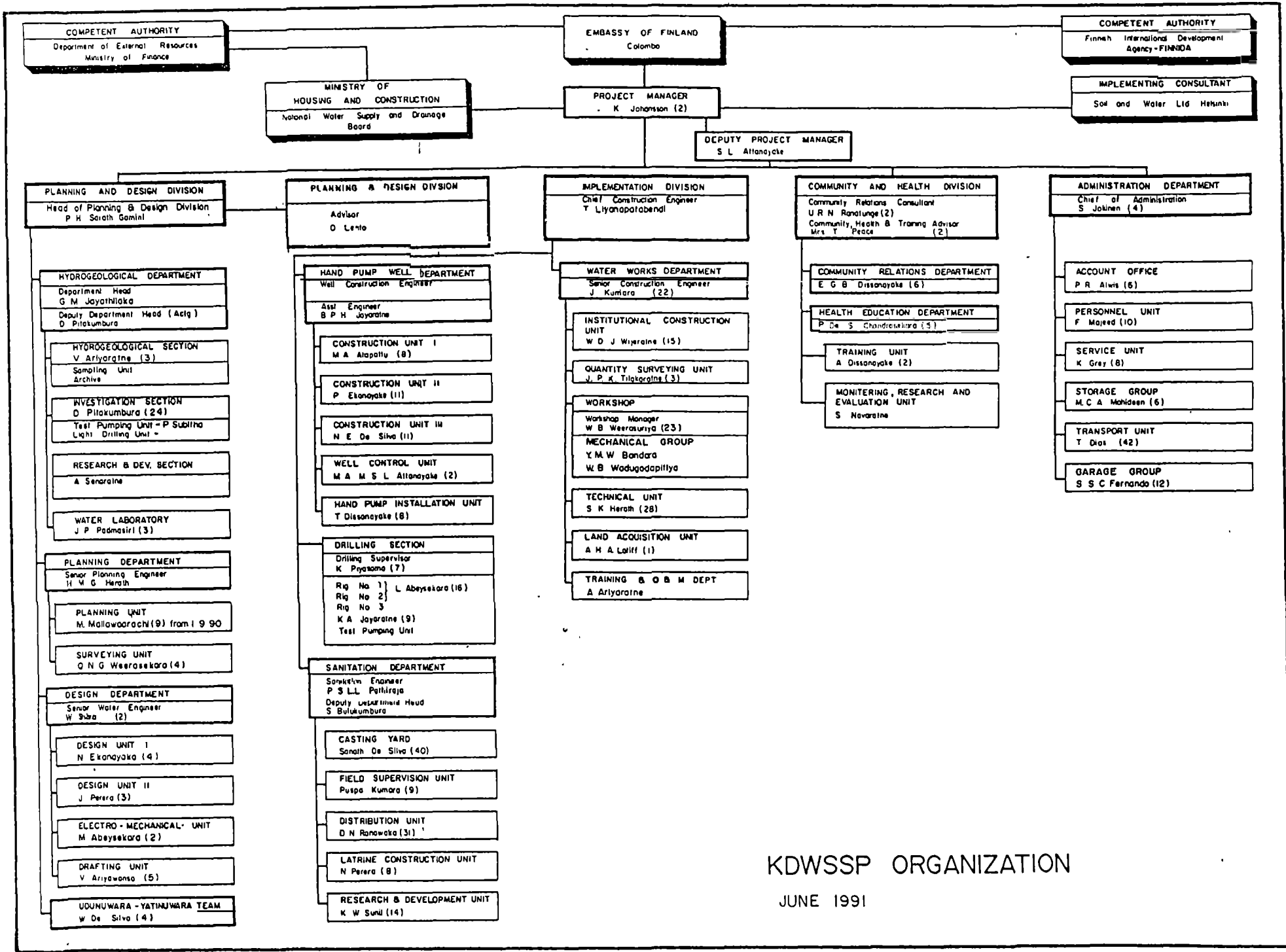
The typical project organization is presented on the next page. The field organization is divided into three divisions: planning/design, implementation and community relations/health education, and into an administration department reporting directly to the Project management. The various executing departments are then grouped within the divisions.

Management was carried out by a joint PM/DPM team, where the DPM was the senior representative of the NWS&DB. From the NWS&DB the Project was supervised by the Project Director and an AGM level officer stationed in NWS&DB headquarters in Colombo in the construction section. Initially the exact tasks of the Director and the Deputy Project Manager were not clear, but these were clarified in early 1989, when the DPM was allocated more responsibilities from the NWS&DB and also from the consultant. Thereafter the management system worked smoothly.

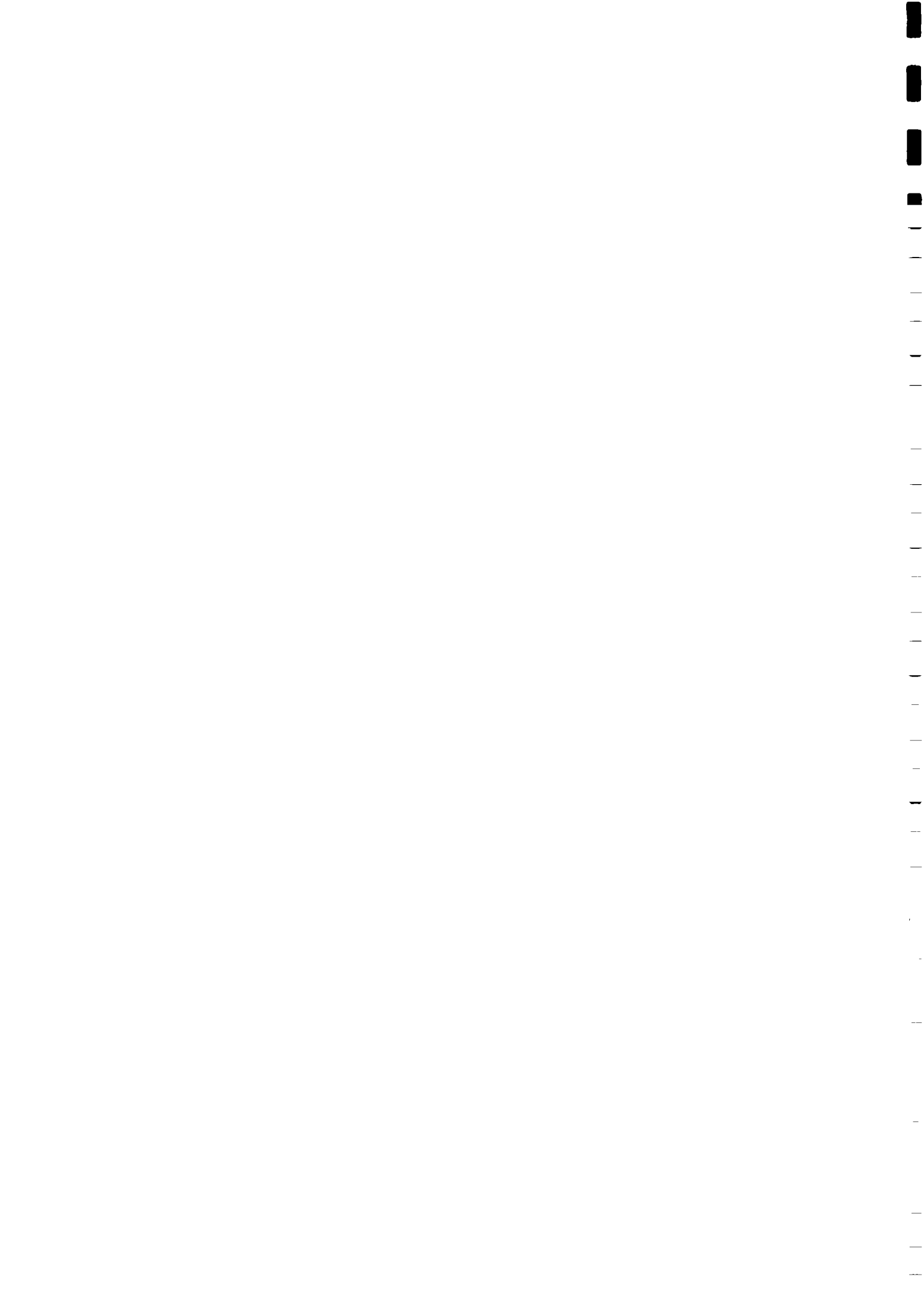
The Project was staffed by the Consultant's expatriates, NWS&DB secondees and local staff employed directly by the Consultant. NWS&DB had constant problems deploying the planned number of secondees. Although the Project period was twice extended, a total of 9 months, the secondee manmonths came to only 79% of the plan. On the other hand the directly employed manmonths increased to 183% of those planned. Time extension explains part of the increase, but the major part is the result of the difficulty in using contractors. Major construction was carried out directly by the Project organization (Peradeniya intake, Harispattuwa consolidation, staff quarters).

There was not much turnover among directly employed staff, except in one respect. The senior staff, especially the engineers tended to leave the Project for other countries in numbers (11). Most emigrated to Australia, but a few took jobs in other countries as well. Specially trained planning and design resources were seriously depleted.





KDWSSP ORGANIZATION  
JUNE 1991



The majority decision making forum in the Project was the Executive Board. It was chaired by the Project Manager and attended by the Deputy Project Manager and all of the Project Manager's direct subordinates. In the beginning it had five expatriates and one Sri Lankan, but this ratio changed as the Project progressed. In the end there were two expatriates and five Sri Lankans. The Executive Board met one hundred and two times. It was the major on-the-job management training forum in the Project.

The contractual structure with FINNIDA was such that the implementing Consultant was contractually independent from the NWS&DB. This created a feeling in NWS&DB of being aside, as there was no formal contractual relation between NWS&DB and the Consultant. To overcome this, a memorandum of understanding between the parties was signed in 1988. Although this memorandum worked well in defining the role of the different actors, NWS&DB has annually proposed that a tripartite agreement should be developed for the Project. FINNIDA has rejected these proposals so far.

The coordination between the competent authorities and different agencies involved was arranged through a quarterly NCC Meeting. The meeting was chaired by the Secretary or State Secretary from the MHC, and attended also by the representatives of MOHWA, DHS of the Central Region, Commissioner of Local Government of Central Region as well as by representatives of the Embassy of Finland and the Project.

Co-ordination at the District level was organized through the DCC chaired first by the GA and later the Secretary to the Provincial Council. The meetings were held usually monthly and attended by representatives of all local authorities and involved government organizations.

To further improve co-ordination at the AGA division (later Pradeshiya Sabha) level, co-ordination meetings were held in the divisions where implementation was active.

Although all the committees and meetings were useful and provided solutions to many difficult issues, they also tended to take quite a lot of the Project officers' time.

#### **3.4 Technical Assistance - From Being in Charge to Advising**

The technical assistance component of Phase I consisted mainly of expatriate experts working with Sri Lankans. During the start-up period of the Project it was felt that the experts would be more effective if they could actually take charge and bring to Sri Lanka the direct benefits of their experience. The expatriates in charge of planning and design, implementation and health education and sanitation brought the project activities up to speed quickly and were able to transfer their expertise to their counterparts and co-workers in the course of day-to-day activities.

Leaving the expatriates in charge of departmental project activities after the start-up period would have created long-term problems in meeting Phase I goals. First, without actually giving the Sri Lankan staff the opportunity to prove themselves in decision making roles it would have been impossible to guarantee the sustainability of improvements introduced during the course of the Project. Also, as newly appointed division and department heads, the Sri Lankan staff found themselves with problems they had not faced as counterparts. The information transfer from advisor to Sri Lankan division head later in the Project was of a different nature than that from the earlier expatriate division head to counterpart.





Putting the Sri Lankan staff in charge as early as possible and even earlier than anticipated in the PD helped solve the problem of cultural bias. Any foreign expert carries with him or her his or her own cultural background as well as his or her expertise. These newly appointed managers combined insider knowledge of the culture with access to both inside and outside expertise.

The transfer of position and responsibility also started the process of transferring the "ownership" of the project. The KDWSSP was (and is) very well known in Kandy, but it is known as the "FINNIDA" Project. The goal of sustainability meant that, at least in the minds of senior staff, it had to become a Sri Lankan project.

It would be misleading to leave out the problems associated with the transfer of authority. Some of the cultural norms that separate a Finnish from a Sri Lankan project may also seem to be an impediment to agreement. One obvious example is the method of selecting staff for promotion: when the time came to choose new division heads it was assumed among the Finns that it would be done by merit while many Sri Lankans believed that it should be done by seniority. Selection was, in fact, based on merit, leaving some Sri Lankans realizing that they had seen another lesson in management while others felt that their own cultural values had been usurped.

One supervising trait was observed. While the system of expatriate line manager working with and later handing over the management responsibility to the local counterpart worked well, it could not be continued thereafter from Sri Lankan to Sri Lankan. The newly appointed line managers did not want to work with an equal as counterpart, preferring to have assistants only. When the expatriate-trained managers got promoted or were transferred out of the Project by NWS&DB, the organization always faced a partial skill vacuum.

### 3.5 Relations with Other Projects

KDWSSP was lucky in that it was not a unique effort. Co-operation with two other contemporary projects was particularly beneficial. The USAID supported WSSSP concentrated on the institutional development of the NWS&DB. This project can be considered to have been a real success in helping the NWS&DB change from a government department towards being a consumer oriented public utility. The strategies and policies of the KDWSSP and WSSSP were similar and the efforts supported each other. Unfortunately the funding from USAID was not continued after 1991.

Another important contemporary project was the DANIDA supported Matale-Polonnaruwa Water Supply and Sanitation Project (M-PWSSP). With a similar scope and concept and offices only 10 minutes apart, the two projects shared experience and supported each other in many ways.

As the various projects working with the NWS&DB often faced similar problems, it was soon felt feasible to formalize the co-operation. Initiated by the WSSSP, the NWS&DB started quarterly donor project co-ordination meetings in the Central RSC. The meetings were chaired by the Additional General Manager (O) and were very useful in sharing information and co-ordinating the various institutional support activities.



## **4. PROJECT IMPLEMENTATION**

### **4.1 Planning**

#### **4.1.1 Planning Strategy**

Planning was recognized as one of the most important activities of the KDWSSP, it determined the shape and direction of the project and also the future of water supply development in Kandy District. By using staff from the NWS&DB as the key actors in planning and design, the Project also strengthened Sri Lanka's capability and helped to elevate the planning process beyond the level of political prioritization only.

Extensive investigations into consumption patterns and potential water sources were undertaken. Work was made more difficult by the lack of a government land use plan and in many cases assumptions had to be made about the future based on little more than guesswork.

By the end of Phase I the planning function was being carried out almost entirely by seconded NWS&DB staff members and so its replicability should be insured.

#### **4.1.2 Financial Viability and Sustainability**

One of the goals of the KDWSSP was to leave Sri Lanka with not only improved water supplies, but more viable ones. The billing of non-domestic water consumers by the NWS&DB started in 1981 and was expanded to include most domestic users in 1984. That meant that when the KDWSSP was starting up in 1987 the idea of consumers paying for their water and equally, the idea of the NWS&DB charging for it, were fairly new and a lot of adjustments were still being made to the system.

Charging users directly both brought in money and gave the NWS&DB a mechanism for controlling waste and misuse. Before 1984 there were no market forces affecting how much water people used and the result was that rational planning was almost impossible. Unfortunately, the move to bill consumers was not politically popular and until 1991 the water tariff was kept extremely low and did not even pay for operation and maintenance, much less capital costs.

The Project's strategy for improving viability was to attack the problem from both sides - to reduce the costs while increasing the revenue. Planning and design was focused on safe, cost-effective systems while local institutions were strengthened to enable them to operate and maintain water supply schemes efficiently. Some of the NWS&DB's water supply schemes were found to have 70% of their output unaccounted for (and unpaid for) with 50% being quite common. The whole idea of water as a valuable commodity that is produced, distributed and that should be sold with a minimum of wastage was reinforced.

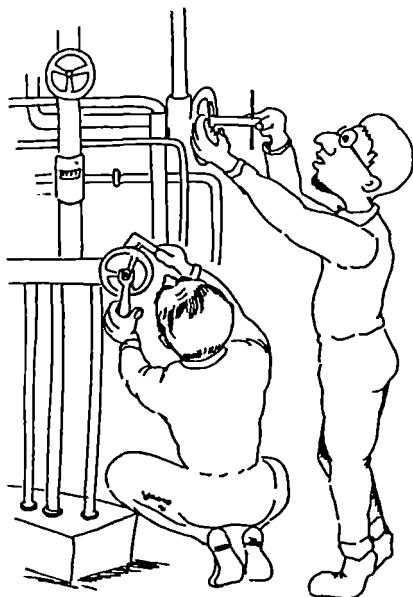
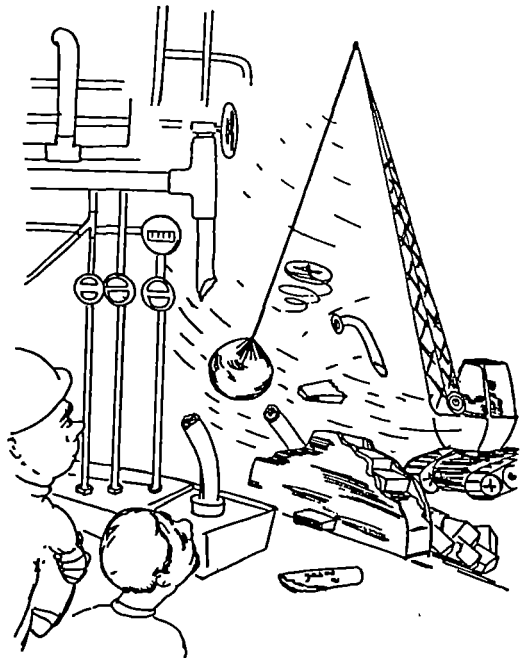
As the water tariff was raised from effectively nothing to one that almost covered the cost of operation and maintenance, consumption patterns became sensitive to institutional control and it was found that the problems of some schemes could be solved by careful operation and maintenance, non-revenue water control and proper billing instead of costly augmentations. Planning became an effective tool for rationalizing all aspects of supplying water instead of merely the first step in increasing the size.



The other side of the viability coin is sustainability. The ability of local institutions to keep their water supply schemes working is an obvious condition to making them viable and again, the new higher water tariffs gave the project some tools to work with. Effective budgeting became possible and with it the chance to introduce planned maintenance and repair instead of the continuation of "chasing breakdowns." Previous low tariffs meant little money for maintenance and therefore, a cycle of breakdowns and system degradation, ending with the need for a complete rehabilitation.

The use of "rehabilitations" in place of maintenance was a difficult habit to change because it represents perfectly rational behaviour on the part of the institutions.

As long as donors are willing to rehabilitate systems, but not contribute to their maintenance it makes sense for the institution to let them do so



The KDWSSP worked to break this pattern by not agreeing to wholesale rehabilitations, instead encouraging the institutions to repair and maintain their existing systems where possible.



#### **4.1.3 Investigations**

Both surface water and ground water were investigated as potential sources. a Project innovation was to use community participation in taking measurements of surface water on a daily basis. This was particularly valuable since there is often a great variation over short periods of time and monthly readings do not give an accurate picture. It is an example of an innovation that will eventually benefit the NWS&DB.

As part of the investigation into potential ground water sources, 1,104 boreholes were drilled. Of these, 646 were recommended as potential sources for hand pumps. Another 80 boreholes had flushing yields of more than 200 litres per minutes and were recommended for consideration as production wells for piped schemes.

Extensive use was made of aerial photographs and 1:10,000 maps prepared by the Agricultural Base Mapping Project. However, these maps did not cover the entire area, resulting in a large amount of field work. Further, existing demographic information was not sufficiently detailed and the last census was from 1981. Demographic data was, therefore, produced by actually counting the houses in the planning/design area. In evaluating the feasibility of developing a water source the design criteria of 180 litres per person per day for house connections and 45 litres per person per day for stand posts, in addition to population density criteria, was used.

Instead of using only the per person consumption, the Project refined the NWS&DB's normal methods of estimation by factoring in the normal quantity of unaccounted water and made allowances for system degradation.

#### **4.1.4 Ampitiya Pilot Tariff Development Programme**

The Ampitiya Water Supply Scheme was initially managed by the NWS&DB using water bought in bulk from the Kandy Municipal Council. Because of breakdowns and heavy demand there were frequent interruptions and the community requested help from the KDWSSP. Although the Ampitiya scheme was not included in the Phase I document, it was seen as an opportunity to improve the supply of water to the people of Ampitiya while testing the acceptability of higher water tariffs.

The Project used its community participation unit to inform the residents of Ampitiya that a pilot programme might be possible, if people were willing to pay more for their water. The final arrangement, with the residents' consent, was for the Project to develop a new source of water for Ampitiya and undertake a rehabilitation of the scheme in exchange for the tariff being raised so that it was sufficient to recover 100% of the cost of operation and maintenance plus 15% of the capital cost of the Project's work. Because the NWS&DB could not change its tariff for only the Ampitiya scheme, the Pradeshiya Sabha took over the management of the distribution system and consumer billing.

The pilot programme involved both water supply and institutional development. For water supply development the project drilled boreholes, which yield 1,500m<sup>3</sup> per day and connected them to the distribution system. It was then necessary to work with the Pradeshiya Sabha to make the scheme viable. This part of the programme included:

- leak detection and repair,
- development of a billing system,
- development of a budget control system,





- stores management training,
- pipe laying and plumbing training,
- training in pipe and valve selection,
- formation of stand post consumer societies,
- development of a management information system,
- training in consumer relations.

The new tariff, necessary to cover operation and maintenance plus 15% of capital costs resulted in an average billing rate of 7.08 rupees per m<sup>3</sup> compared with the NWS&DB's average of 3.33 rupees. This relatively high billing rate is necessitated mainly by an extremely high quantity of unaccounted water, at times in excess of 70%. Even though the Pradeshiya Sabha is buying water at 3.80 it is still losing money.

The break-even tariff for Pradeshiya Sabha can be only evaluated after the commissioning of the new pumping main in Phase II. In any case the capability and the willingness of Pradeshiya Sabha in the reduction of the unaccounted water will be the key factor.

Going along with consumers' resistance to the higher tariff is their complaint about the quality of the new borehole water. The borehole water is within NWS&DB standards for hardness, but does not taste as nice to the people of Ampitiya as the river water they are used to.

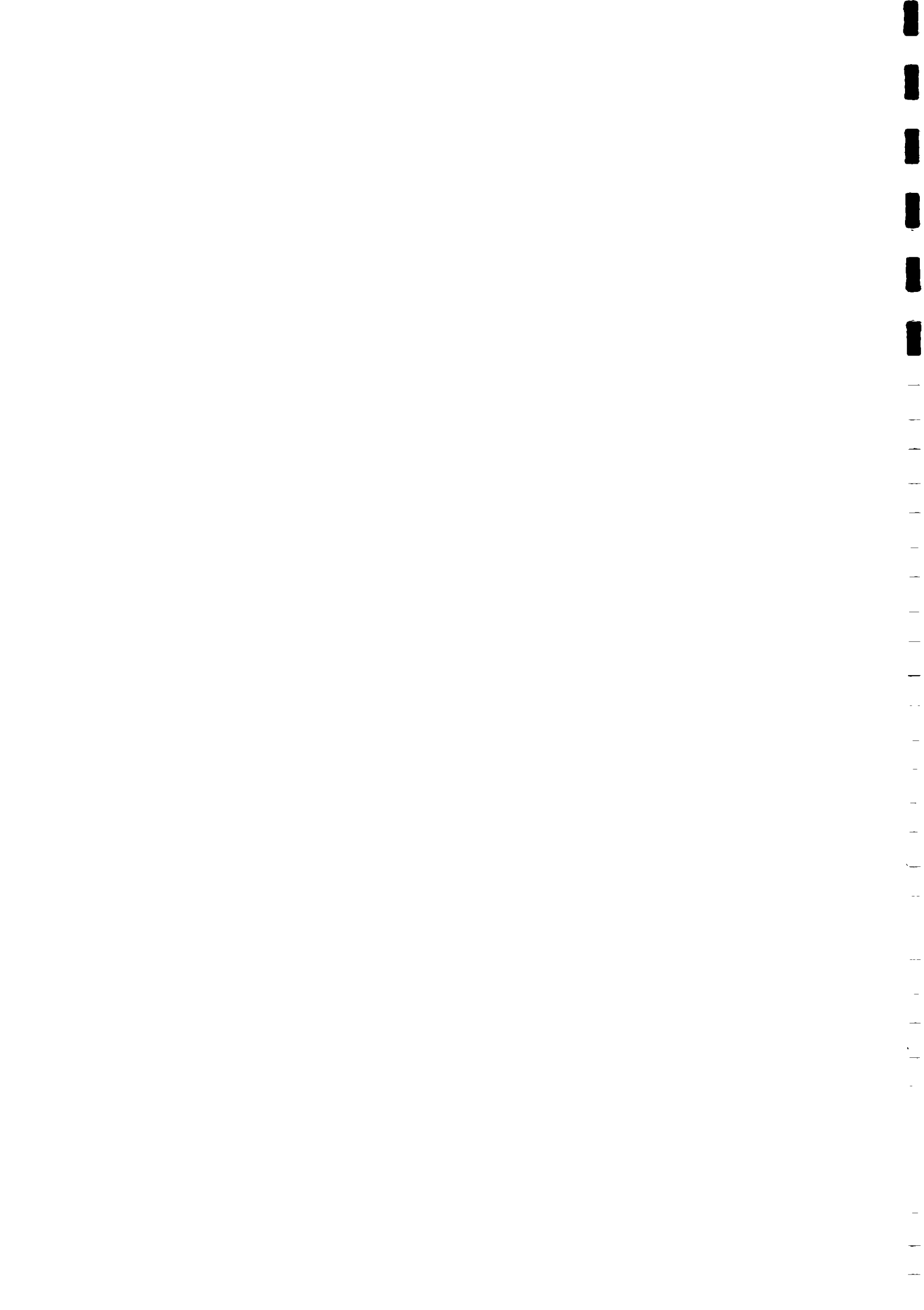
The success or failure of this pilot programme lies mainly with the success or failure of the Pradeshiya Sabha to bring the amount of unaccounted water under control. If it can repair leaking pipes, find illegal connections and keep most of the water meters working accurately it should be able to make the scheme viable. People will probably get used to the taste.

At the end of Phase I the success was still very much in doubt. Finally, this programme will be a test, not only of the acceptability of higher tariffs, but of a community's ability to take control of its own water supply and make it work.

#### 4.1.5 Udunuwara/Yatinuwara River Bed Filters

Rehabilitation of the Udunuwara/Yatinuwara river intake was an opportunity to design, build and test an innovative system of filtering water as it leaves the river. Two filter beds were built in the river channel itself. No chemicals are added and no sedimentation takes place, which makes the maintenance relatively easy and inexpensive.

The quality of water supplied by this system is within Sri Lankan standards for turbidity, pH and total iron, but the colour is, during the rainy season, above the maximum permissible level due to the mechanical treatment only. The following table shows the comparative quality of water before and after filtration.



Monthly Average for 1991	Colour mg/l Pt		Turbidity FTU		Total Iron mg/l Fe	
	Channel River Water	Filtered Water	Channel River Water	Filtered Water	Channel River Water	Filtered Water
March	49	25	9	5	0.35	0.15
April	75	35	14	6	0.38	0.16
May	86	38	16	7	0.50	0.15
June	110	53	20	9	0.71	0.20
July	60	24	11	5	0.40	0.14
August	100	40	18	7	0.54	0.15
September	115	27	40	8	0.53	0.13

#### 4.1.6 Specific Planning and Design Activities

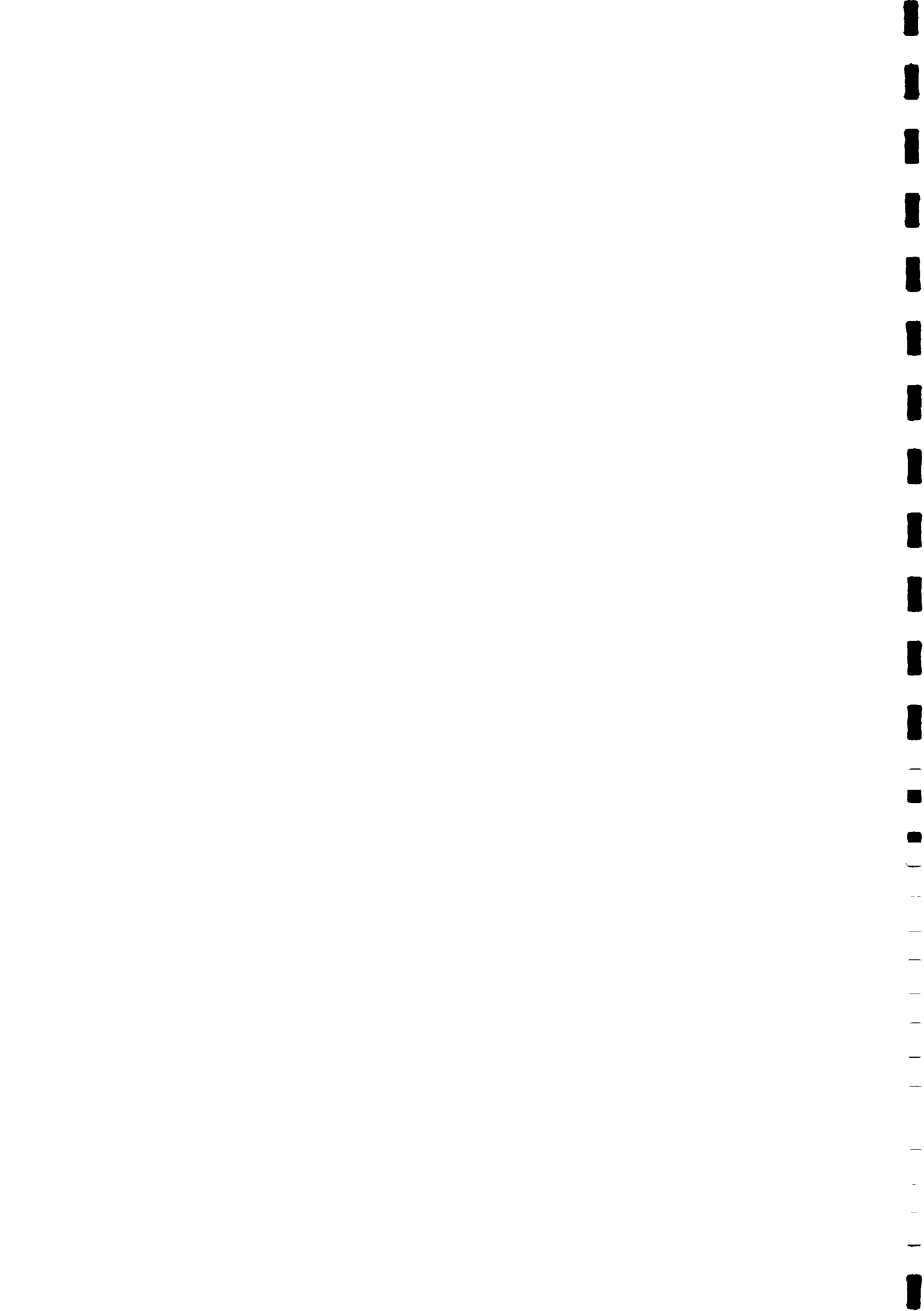
##### Strategic Planning

Phase I of the KDWSSP included the preparation of the strategic plan for the entire Kandy District as the main planning activity. The planning work was started in late 1987 and the strategic plan was completed in mid 1991 as the "District Report" with detailed studies and proposals for Udunuwara, Kundasale, Galagedera, Patha Dumbara, Yatinuwara and Meda Dumbara AGA divisions. The remaining, less densely populated, AGA divisions of the district were covered in the district report in the form of basic data of the existing water supply systems and cost estimates for possible improvements.

The detailed proposals of the District Report cover a population of 501,500 persons at 1990 level.

As a part of strategic planning activities a socio-cultural study for the district was carried out in 1988-1989. A Sri Lankan sub-consultant was hired for this task. The general unrest during the study period affected the agreed time schedules and the sub-consultant left part of the assigned area incomplete, concentrating on the more densely populated AGA divisions. The study report did not fully meet the expectations of the Project and future scheme specific reviews may be needed to assess the viability from the socio-economic point of view.

As part of the ground work for the district report, detailed feasibility studies (divisional reports) were prepared for the AGA divisions listed above. Initially the expatriate planning engineers were responsible for the feasibility studies, but since 1990 the Sri Lankan engineers have been in charge. Preparation of the feasibility studies is a lengthy process and the scheduling of the studies has been badly affected by the migration of the key project personnel. At the end of October 1991 three of the feasibility reports were still in preparation. Feasibility studies for 11 minor, 1 medium and 1 major size gravity scheme were also prepared.



## Harispattuwa Balance Works

The Phase I Project Document did not include specific design activities for the 11 piped water supply schemes in the Harispattuwa project area. At the end of the Harispattuwa project in 1987 the NWS&DB and consultant of the HWSSP agreed on the importance of checking the dimensioning of these schemes. This checking indicated differences between the original and new design figures, so that further studies were considered necessary and an expatriate planning engineer was assigned for the review study. The review study was carried out during February - November 1988. During the study period, 8 of the schemes were commissioned while the balance were still under construction. The study recommended that the following measures be taken to consolidate the schemes to the original design level and secure their financial viability:

- increase the water tariff to approximately 5 Rs./m<sup>3</sup>,
- limit the number of house connections until substantial increase of tariff,
- augment the capacity at three intakes to original level,
- provide uniform stand-by arrangements,
- give support to regional office of NWS&DB to consolidate and maintain the schemes,
- close Gohagoda sanitary landfill,
- make minor technical improvements.

After the approval of the competent authorities in mid 1989, more detailed studies and ground water investigations were started. During these studies more consolidation work was identified to bring the schemes to the original design level. The progress in the investigation drilling programme was slow, mainly due to land availability and access problems and at the end of the Project period two possible sources remained undrilled. A financial proposal for the consolidation works in Phase II was prepared in May 1991, the estimated financial input being almost FIM 5 million.

At the end of the Phase I two major consolidation design packages were 50 per cent completed.

## 4.2 Design

### 4.2.1 Scope of Design Activities

As mentioned above, the Project Document for Phase I did not include design activities for the Harispattuwa Water Supply Scheme. The same situation applies to the rehabilitation of the Udunuwara/Yatinuwara Water Supply Scheme.

The PD foresaw the completion of civil, electrical and mechanical designs by the HWSSP consultant by the end of October 1987, leaving the implementation responsibility for the KDWSSP. In reality, however, the situation was much different. The designs for the rehabilitation of Peradeniya intake and distribution



network had not been started and, in fact, even the selection of the long term source to supply the existing distribution had not been made.

KDWSSP activities were started by re-testing the Elpitiya river bank source in order to prepare a feasibility study for the source and continued with rehabilitation designs for Peradeniya intake and the distribution network. The designs for Peradeniya intake were completed during 1990 and the network design by the end of Phase I.

Both Harispattuwa schemes and the Udunuwara/Yatinuwara scheme required extensive inputs by key personnel of the planning and design division, affecting adversely other activities of the Project.

### Hydrogeological Studies

The hydrogeological department of the Project was initially responsible for well drilling activities in addition to the ground water studies and investigations. Drilling activities were transferred to the implementation division of the Project in the beginning of 1990. A total of 1,104 bore holes were drilled by the Project - 911 for the hand pump well programme and 193 for investigation purposes in connection with feasibility studies. Six hundred and forty six boreholes were recommended for hand pump installation. The total yield of the investigation boreholes recommended as production wells was 40,400m<sup>3</sup>/d.

The water laboratory was managed by the hydrogeological department of the project. During Phase I the laboratory analyzed 10,578 chemical and 8,615 bacteriological samples.

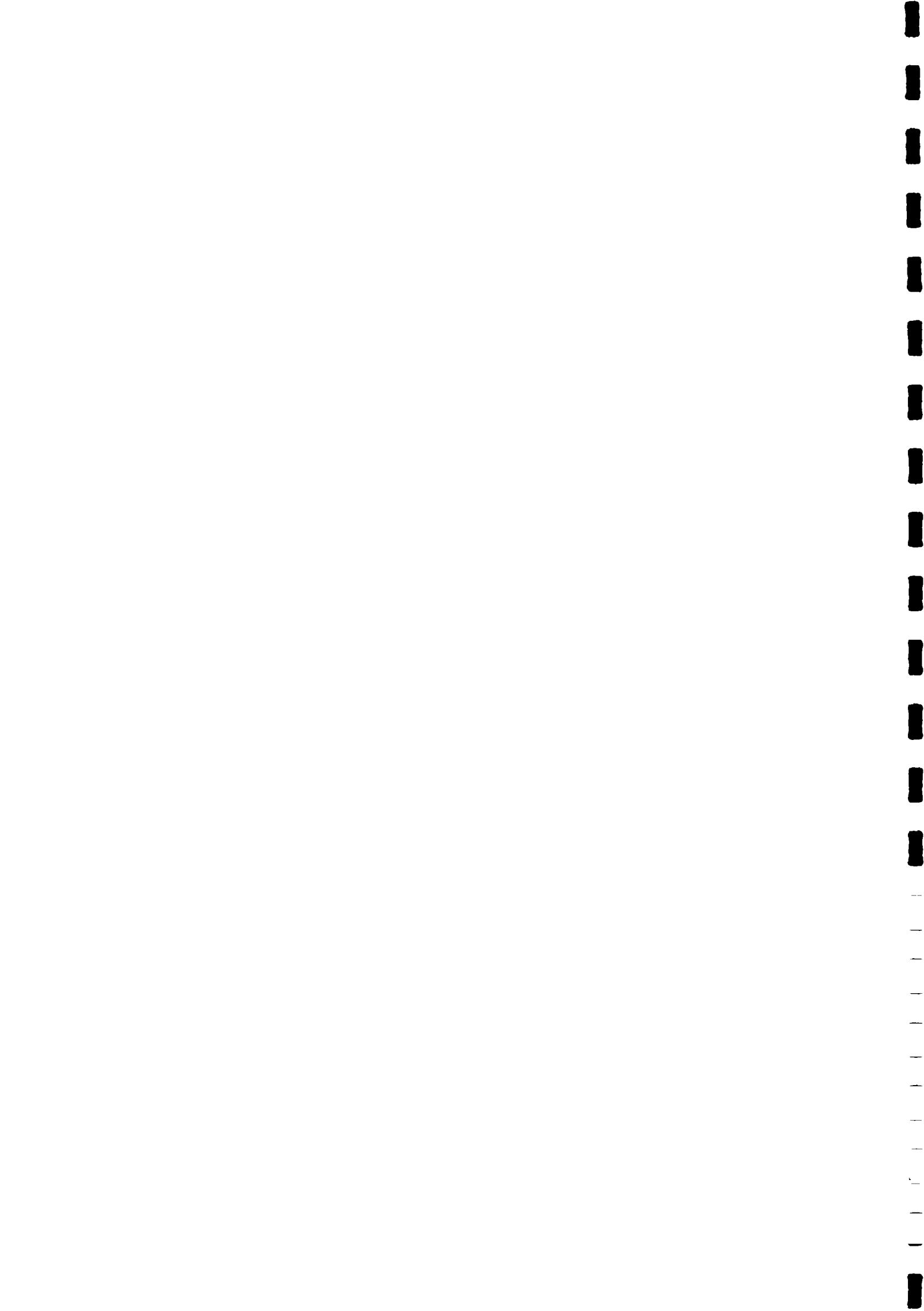
The hydrogeological department carried out extensive research and development programmes during Phase I. The research reports are listed in Appendix 6. The research studies included among other topics a low cost iron removal plant (IRP) for hand pump wells. This design, the FINNIDA type, has now been adopted by some other water supply Projects in the Island.

### Detail Designs

The detail design efforts concentrated mainly on Udunuwara/Yatinuwara and Ampitiya during the period 1987-1991. From mid 1991 the main design activity was the consolidation of the Harispattuwa schemes. Designs for eleven minor gravity schemes were also prepared during Phase I.

### Planning and Design Resources/Capacity

During the whole of Phase I there was constant dialogue between the Consultant and NWS&DB on planning/design resources. As the task was enlarged (Udunuwara/Yatinuwara and Harispattuwa consolidation) and the NWS&DB had their secondee quota filled to only 50-60%, it would have been reasonable for them to second planning and design engineers to the project. These were, however, not available, and as directly employed engineers left the country, the Project suffered from a constant shortage of qualified staff. Delays were inevitable.





An attempt was made to train designers, since part of the reason for low output (one engineer manmonth equaled Rs. 700,000 worth of investment) was thought to be the wide professional gap between draughtsmen and engineers. On the job training was successful, except that engineers were not enthusiastic about sitting down at the drawing table and actually producing the drawings.

#### Use of Local Component

The Project Document said that local consultants should be used for many Project activities in order to boost the resources and to improve the availability and level of consultancy services in the sector. The NWS&DB, however, preferred strongly to use in-house services and rejected the idea in the beginning. It was possible to use local consultants for five assignments although reluctance still clearly existed.

The Kandy District Socio-Cultural Study, Harispattuwa follow-up study and hydraulic model study for Peradeniya intake channel were given, after tendering, to a private consulting consortium, a team from Peradeniya University and a government institution respectively. All assignments started and proceeded almost on time to the final draft stage. At that time delays started to accumulate. All ended severely delayed and with patched up reports.

The fourth assignment to make a feasibility study for Nawalapitiya water supply produced a report of reasonable quality and was only slightly delayed.

The fifth assignment, to design a new RSC building, was given to an architectural firm and has proceeded smoothly and professionally.

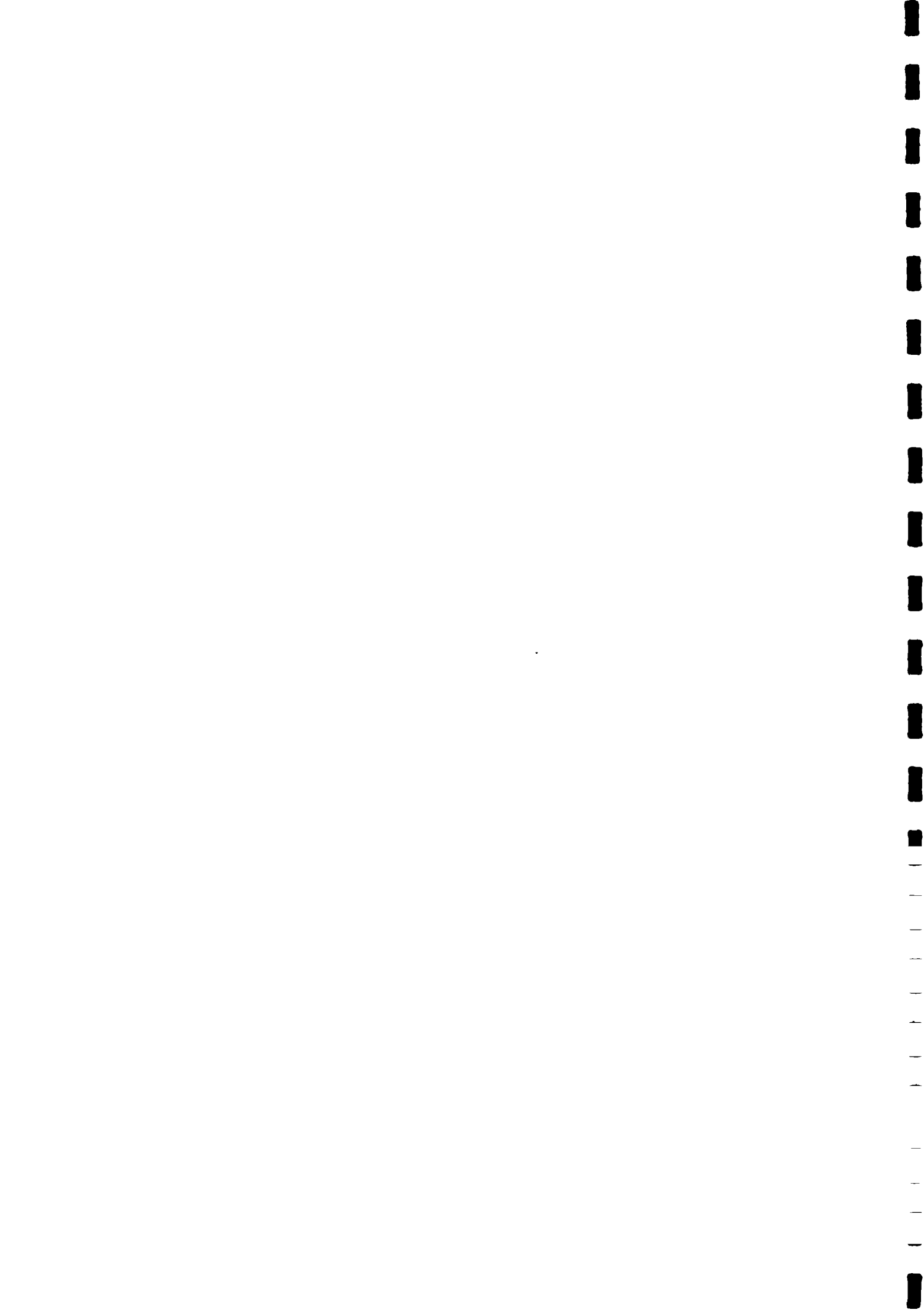
### **4.3 Hand Pump Well Programme**

#### **4.3.1 Strategy**

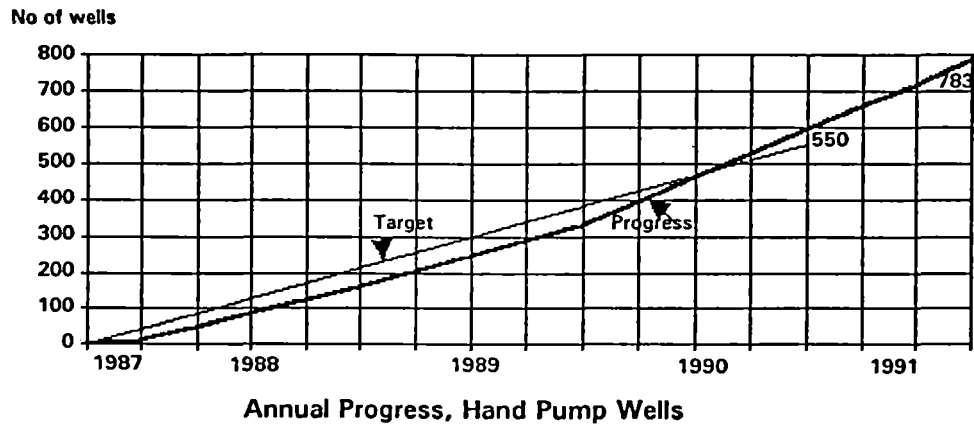
The Project strategy was to develop hand pump water supplies in areas of low population density where gravity schemes were not feasible. In general, hand pump wells were intended to service from ten to twenty families living within 500 meters of the well. The target population of users was about 100 per hand pump well.

Based on the experience of earlier projects, Phase I personnel placed a lot of emphasis on linking the entire hand pump program as closely as possible to community needs and activities. Rather than giving consumers the feeling that "hand pumps fall from the sky", a real effort was made to involve them in the process of siting and to educate them on the need for maintenance.

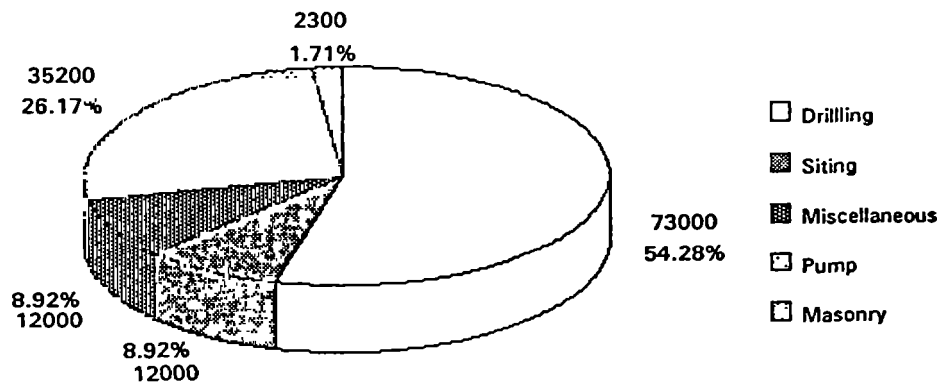
Consumer groups who resisted the idea of taking responsibility for the care of their water supply systems were given low priority and saw their neighbors receiving hand pumps instead of themselves.



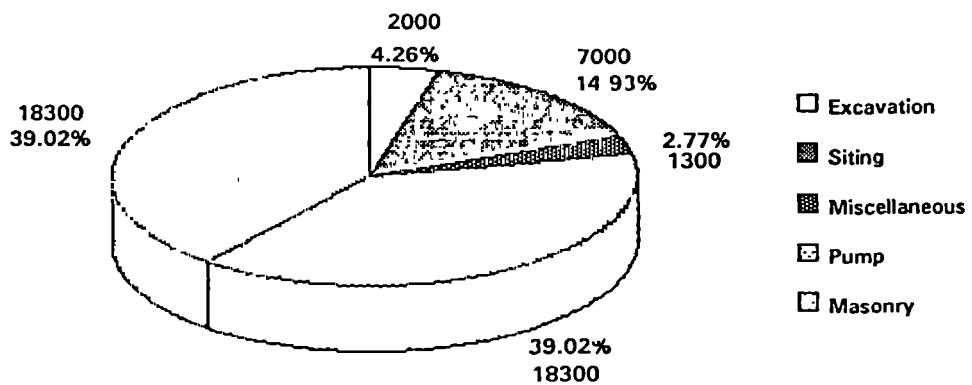
### 4.3.2 Inputs and Outputs



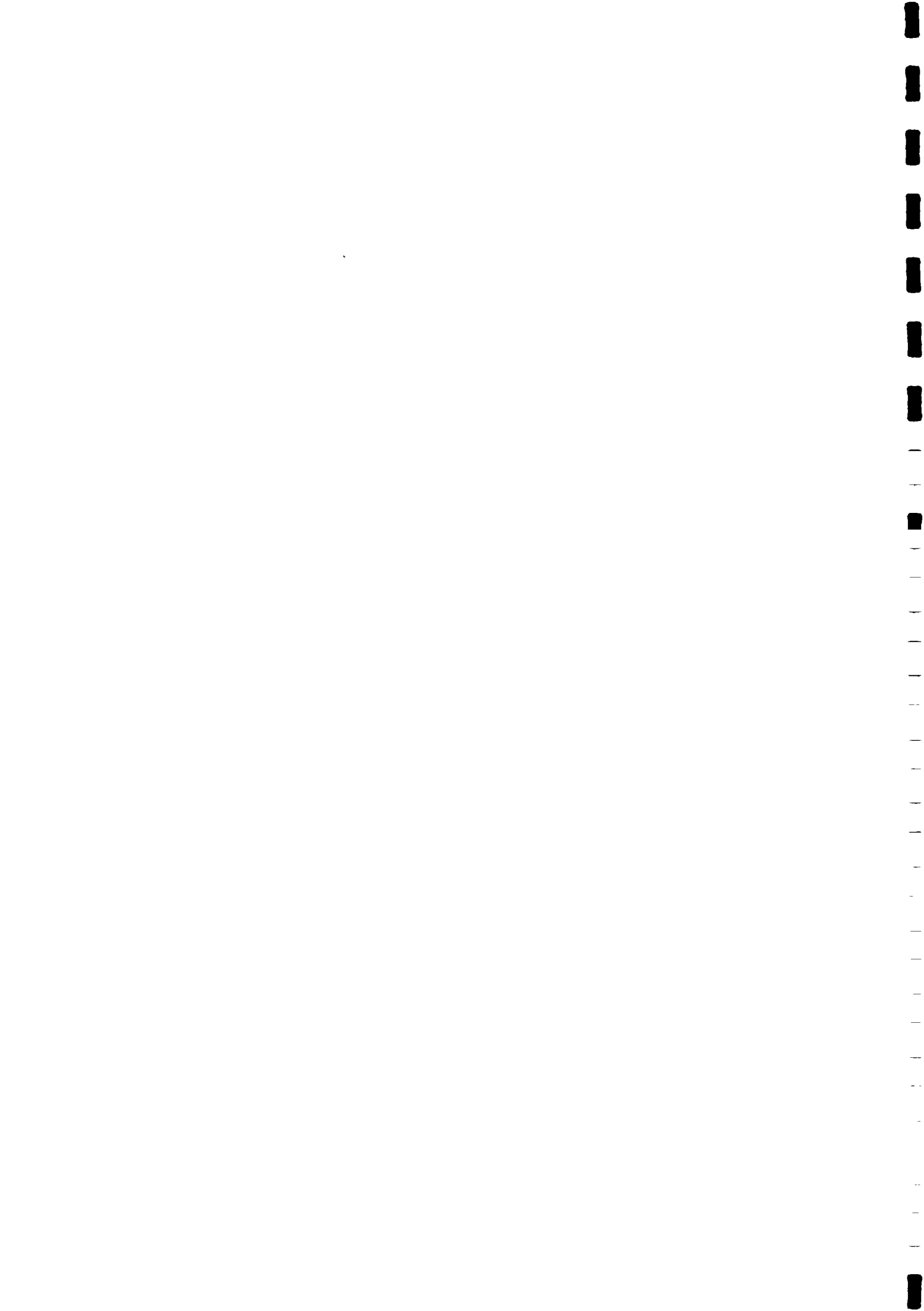
In Phase I the Project completed 783 community hand pump wells to provide safe drinking water to about 77,000 people in Kandy District. This number, more than 20% above the original target in the Project Document (550 to 650 wells), was made possible by a slight shift of Project resources away from some piped schemes that were considered not viable.



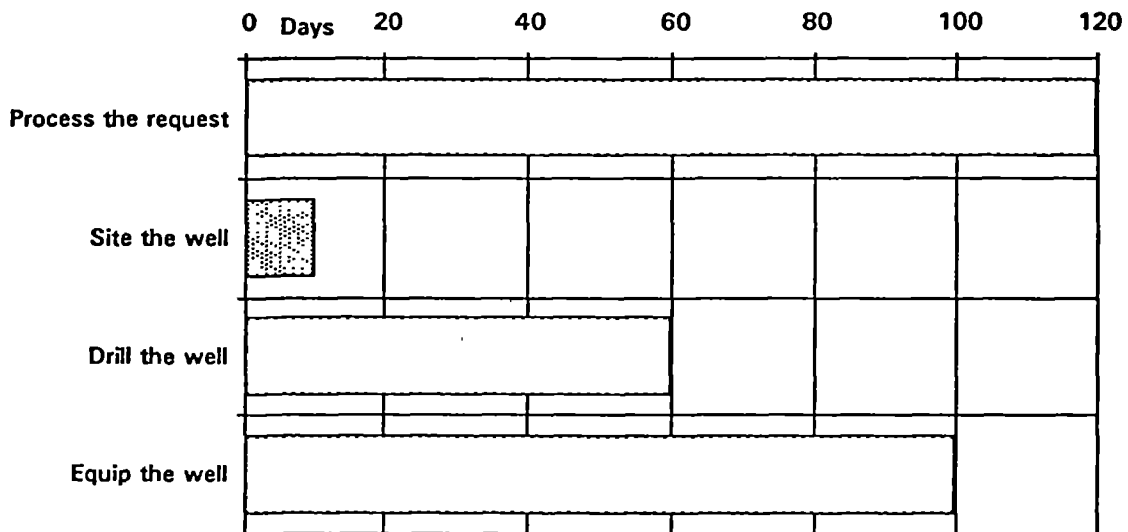
Cost of Drilled Hand Pump Well - 135,000 Rs.



Cost of Hand Dug Hand Pump Well - 47,000 Rs.  
(Voluntary Labour for Excavation)



The time from request for a hand pump system to completion varied greatly, but was typically about 290 days.



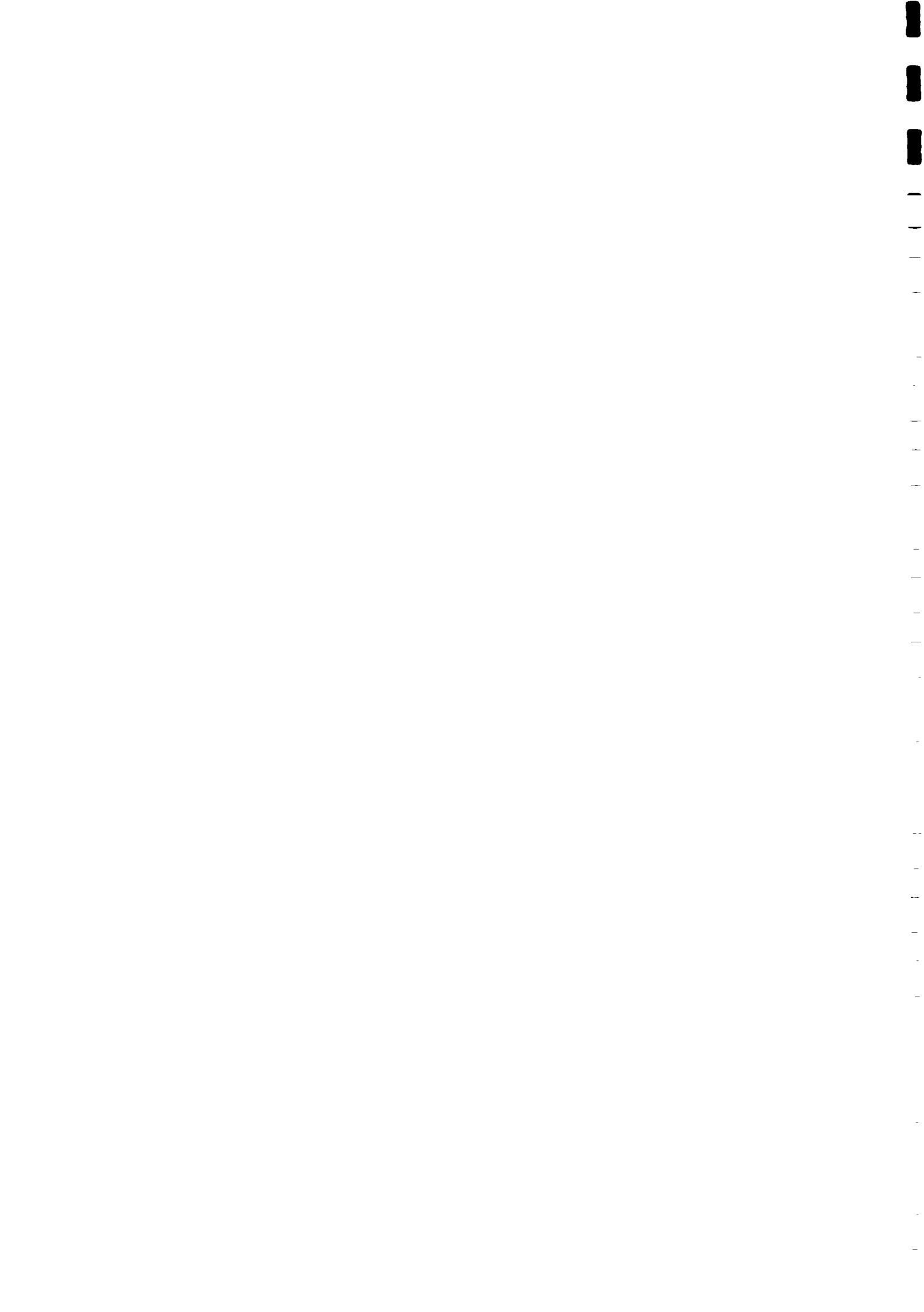
**Time To Provide a Hand Pump Well**

In addition to the construction of 783 new hand pump wells, 556 wells were rehabilitated in Harispattuwa. This was done following the strategy developed for new wells—demanding community participation in the rehabilitation and a commitment to future maintenance. The number of wells constructed during the HWSSP from 1983 to 1987 that needed rehabilitation was disappointingly high. The Project Document envisaged a maximum of 300 wells needing only a change of riser pipes from galvanized iron to plastics.

#### 4.3.3 Community Participation in Hand Pump Well Program

One initial problem faced by the Project was to know exactly with whom to deal at the community level in 1987 and 1988. Pradeshiya Sabhas were formed by an act of the Government of Sri Lanka in 1987 to function as the primary local authority and took the place of Village and Town Councils. The system of local government was very much in a state of transition and the Project had to be quick on its feet to cope with the changes.

By 1989 Pradeshiya Sabhas were better established and it became possible to improve the level of the consumer involvement in both construction and maintenance. The average amount of money per well in operation and maintenance funds increased from 60 rupees in 1989 to 410 rupees by the end of Phase I.



The chart below gives one example of an improved level of involvement and contribution by consumers toward the end of the Project:

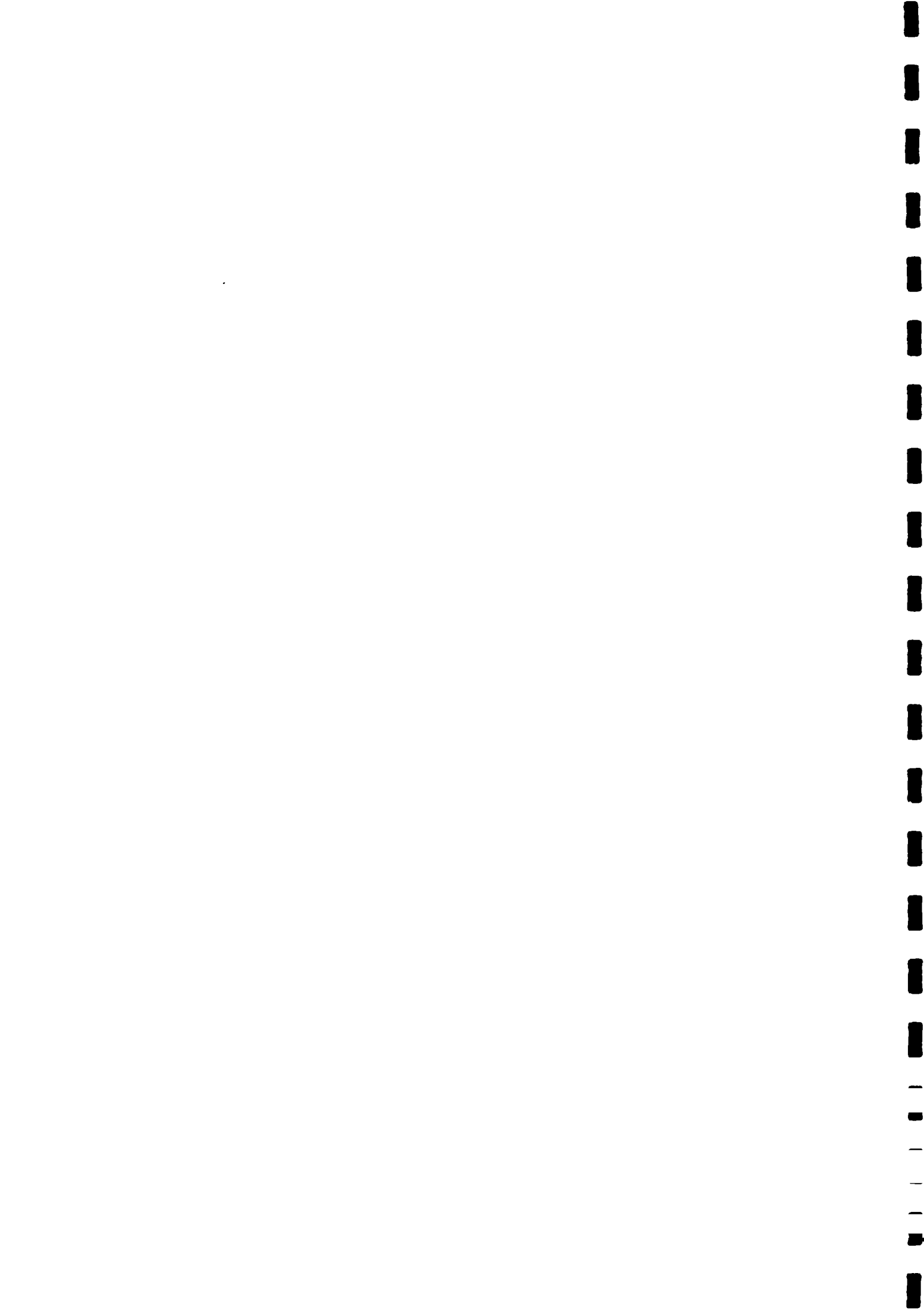
Item	Old Strategy	New Strategy
Supply of construction material from community beneficiaries	None	Sand - 1/4 m <sup>3</sup> Gravel - 1/4 m <sup>3</sup> Approx. value = Rs. 450
Supply of skilled manpower (for masonry work) from the community beneficiaries	None	1 Mason (16 man hours) Approx. value = Rs. 250
Supply of unskilled man- power from the community beneficiaries	1 person (16 man hours) Approx. value = Rs. 150	2 Persons (32 man hours) Approx. value = Rs. 300
Total value of beneficiary contribution	Rs. 150.00	Rs. 1000.00

#### Comparison Of Beneficiary Involvement With Developed Strategy (For One Hand Pump Well)

#### 4.3.4 Sustainability of Hand Pump Systems

An important element of Phase I was to help local authorities set up a system, with consumers as key players, to make sure that the hand pump systems could and would be maintained. A centralized system set up to maintain a large number of widely distributed hand pumps was seen to be costly and probably difficult to sustain. The answer was to empower the people with the greatest stake in the hand pump systems, the users, to do the essential routine maintenance themselves, with backup from their Pradeshiya Sabha and the NWS&DB. A three-tier system was designed and put in place with community and regional authorities committed to support the hand pump users by providing at cost spare parts and specialized service when necessary. This system was, however, still in its early stages of development in 1991 and needs several years of consolidation and support to assure its sustainability. More details about Project activities in community participation, training and institutional support are given in the sections of this report devoted to those topics.

After early trials of different types of hand pump, two models were found to be effective and reliable. The Nira AF 85 direct action low lift pump was installed in shallow wells and the India Mark II pumps in wells requiring a lift of more than 15 meters. Both of these pumps are suitable for village level maintenance and the India Mark II in particular has been widely proven in many third world countries as well as other areas of Sri Lanka.





Locally manufactured pumps that were tested were found to be unsuitable for village level maintenance. The Ministry of Housing and Construction has initiated a drive for the standardization of hand pumps, a move strongly supported by the Project.

#### 4.3.5 Other Hand Pump Related Activities

##### A Pilot Study on Improvement of Traditional Wells

Following a study conducted in 1990 that observed that some households were still using open traditional dug wells as a source of drinking water, a pilot study was initiated to determine the feasibility of improving traditional wells to reduce the likelihood of contamination while using simple, village level technology.

Four unprotected hand dug wells were selected for the study. They were protected and fitted with a simple winch and bucket mechanism operating inside a sealed chamber at the top of the well. The idea was not generally accepted and it was concluded that most consumers would have preferred an open well or a proper hand pump.

Well Number	Improved Traditional well		Open Well	
	TC	FC	TC	FC
1 <sup>st</sup> Well	34	Nil	200	70
2 <sup>nd</sup> Well	40	02	2200	1000
3 <sup>rd</sup> Well	20	Nil	80	10
4 <sup>th</sup> Well	06	Nil	270	120

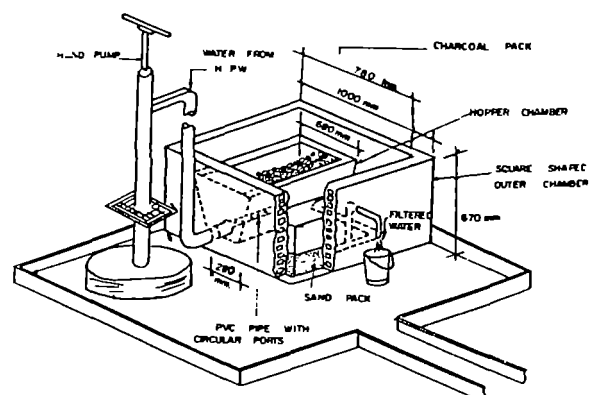
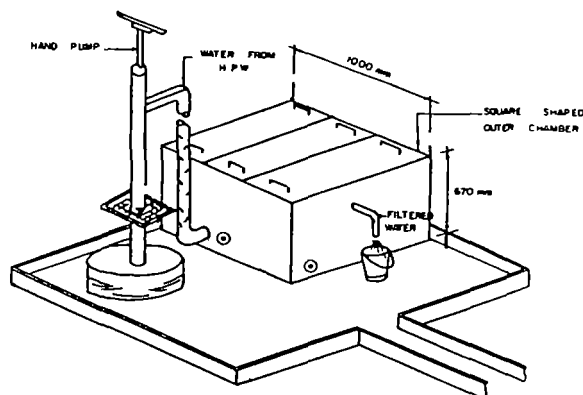
**A Comparison of Water Analysis of Improved Traditional Wells With Samples Collected From Nearby Sources**

##### Iron and Manganese Removal From Ground Water

The presence of iron (more than 0.3 mg/l) and/or manganese (more than 0.05 mg/l) in water makes it undesirable for drinking purposes due to possible unpleasant taste, odour and colour. The population of Sri Lanka appears to be particularly sensitive to these minerals and their presence may be a serious cause of resistance to the hand pump well program within the community.

The Project developed a filter unit to remove iron and manganese and compared its performance with that of a UNICEF filter and a circular type filter made during the HWSSP. The newly developed square FINNIDA filter outperformed the UNICEF filter and overcame cost, weight and maintenance problems found in the earlier circular unit (see Appendix 7 for a comparison of efficiency). The design drew favourable comment from the Project evaluation mission because of its superior performance and the fact that it was made entirely from locally available materials. The design was published and distributed to encourage island-wide use.





**FINNIDA Square Type Filter - Cost 1,600 Rupees**

### Local Manufacture of Hand Pumps, Components and Spares

There are four different locally manufactured hand pumps commonly available in Kandy District. Our experience, mainly with SARVODAYA and JINASENA pumps, uncovered a lot of shortcomings, mostly with riser pipe design, uniformity and durability. The conclusion was that the NIRA AF 85 and India Mark II offer significant advantages over the locally produced models, even more so if the pumps, or at least some components, could be made in Sri Lanka.

As an initial step to check the feasibility of local manufacture of NIRA and India parts, contracts were awarded to local companies for riser pipes, rubber and plastic components, fabricated galvanized pieces and parts for cylinders. The study seemed to indicate that most of the hand pump components and spares could be manufactured locally to the imported standard and at a reasonable price (see list of items manufactured and price comparison in Appendix 9). Because the NIRA 85 is a commercial design it would be necessary to get permission from the manufacturer before making spare parts for sale.

### Well Inventory

The Project developed a computer data base program to store available data on wells and pumps and to monitor their performance. This inventory was transferred to the NWS&DB.

### Quality of Water in Hand Pump Wells

A study was done on the bacteriological contamination and its prevention in hand pump wells in Harispattuwa. Total Coliform and E-Coli were carefully measured and their possible sources identified. One interesting discovery was the rather common occurrence in hand dug wells of bacterial contamination not of faecal origin. This study could not recommend any absolutely reliable method of eliminating this contamination, but concluded that there was no evidence that the aquifers themselves were contaminated. It is possible that in tropical conditions some bacteria of warm blooded animal origin may show positive identification in the standard coliform test. The suspected contamination exerted a powerful influence and resulted in the ratio of hand dug to drilled wells being rather lower than that envisaged in the Project Document.



## **4.4 Piped Water Supply**

### **4.4.1 Strategy**

The Project strategy was to direct its resources to emphasize the concept of viability. Rather than continuing earlier projects' pattern of building new water supply schemes without assuring viability, Phase I built viable gravity schemes and rehabilitated existing pumped schemes where important lessons in viability could be learned.

Since gravity schemes were considered to be the most viable, they were given priority. The project built gravity schemes where (a) the natural supply existed, (b) the population density justified the cost of pipes and (c) the community was willing to participate and contribute to both construction and future maintenance. However, out of a total of 37 gravity scheme sites investigated, only 7 proved feasible and were constructed. The high attrition rate was mainly caused by two factors: (1) no yield during the dry period, and (2) the water was also needed for paddy irrigation, resulting in stiff resistance from farmers. A few schemes were rejected due to agro- chemical pollution.

The gravity scheme activity commanded a disproportionate amount of Project personnel time and resources in investigation, community work and design. The lesson is that the development of small gravity sources takes a great deal of time and resources and the developers should be ready to revert to other source options, usually hand pump wells. Also, it is likely that Kandy District already has too dense a population (700 people/km<sup>2</sup>) to be able to utilize small gravity schemes effectively. Two big schemes, Nilambe Oya and Huluganga, proved nearly feasible, but were not taken up for construction due to lack of funding.

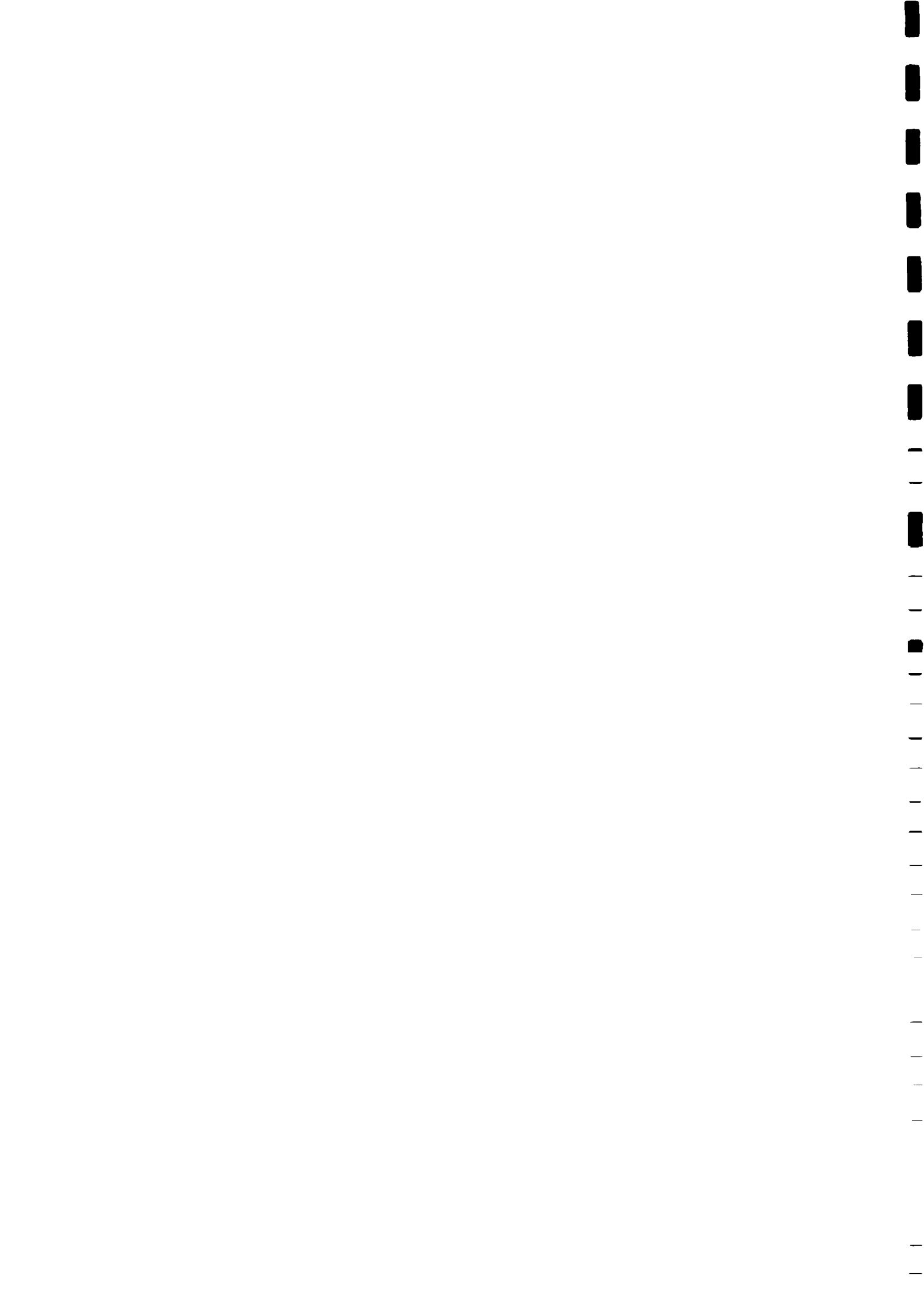
As experiments in improving the viability of existing pumped systems, two very different schemes were selected. Ampitiya is a community of 10.000 people that had been buying its water from the NWS&DB, but wanted to increase the quantity of water to its residents. Because the only feasible additional source of water would be from bore holes and would cost more than the NWS&DB was charging, the project let the people of the community decide whether they would be willing to pay more for their water in order to get project help. The people of Ampitiya agreed to pay a higher price for water and to contribute labour for laying some new pipelines.

The second scheme selected for rehabilitation, Udunuwara/Yatinuwara was a system in bad condition that provides water for 35.000 people living on the outskirts of Kandy. In its existing state at the beginning of Phase I, with worn pumps and leaking pipelines, it was an example of a non-viable scheme. The project strategy was to demonstrate the feasibility of a relatively low-cost method of filtering the water in the river along with upgrading the distribution system to end up with a more efficient scheme.

### **4.4.2 Inputs and Outputs**

Part of the output of Phase I was to complete water supply schemes started as part of the Harispattuwa Water Supply and Sanitation Project. This consisted of:

- a. Completion of 05 Reservoirs and a Iron Removal Plant in five water supply schemes.
- b. Laying of pipes for 7.77 km in five water supply schemes.
- c. Completion of the construction of 16 staff quarters.



Seven new gravity schemes were built in communities with populations of from 300 to 1300 people. The total number of people served by the seven schemes is about 4400 and the total cost of the schemes to the project was 3,240,000 rupees, or about 740 rupees per person. The Ampitiya water supply scheme was improved by drilling and equipping two bore holes, laying a 150 meter long pumping main and extending the distribution system by two kilometers. The capacity of the two new bore holes is 1500 m<sup>3</sup>/day and the total cost of the work to the end of Phase I was 4,3 million rupees. The cost per beneficiary is difficult to assess since the people of Ampitiya were getting some water before the project work, but if the average person is assumed to use 100 liters of water per day, 1500 m<sup>3</sup> is enough water for 15,000 people and so the cost per person would be 280 rupees. However, the cost represents the initial rehabilitation only, and the work will continue in Phase II.

The Udunuwara/Yatinuwara river intake was completely redesigned with two filters right in the river bed and four pumps pumping this filtered water directly to the main reservoir. New equipment for backwashing the filters and disinfecting the water was fitted. The capacity was increased from about 2000 to 6000 m<sup>3</sup> per day for the beneficiary population of about 30,000. The total cost of the work was 42,5 million rupees which works out to about 1200 rupees per person. Rehabilitation of the network will continue in Phase II.

As a logical adjunct to water supply scheme construction, the Institutional Water Supply and Sanitation Program was implemented. Under this program, water supplies were improved in:

- a. 17 Schools
- b. 06 Rural Hospitals
- c. 02 District Hospitals &
- d. 03 Central Dispensaries

And sanitation facilities were improve in:

- a. 29 Schools
- b. 11 Hospitals

The total cost of this work was 3,3 million rupees.

#### **4.4.3 Community Involvement and Participation**

There was a reasonable level of community involvement and participation for the seven gravity schemes, with 40% of the necessary unskilled labour donated by the beneficiaries. The people of Ampitiya dug trenches for about one kilometer of pipeline as well as committing themselves to paying more for water in the future.

Operation and maintenance of the Ampitiya distribution system was taken over by the Pradeshiya Sabha (local government authority) during Phase I and that heightened community interest in water-saving activities such as leak detection.

As a further benefit to the construction industry in Kandy District, the Project paid a total of 15 million rupees to 24 different local contractors for their work.





## **4.5 Sanitation**

### **4.5.1 Background and Strategy**

Phase I of the KDWSSP took over an ongoing sanitation program that had been started by the Harispattuwa Water Supply and Sanitation Project. Initially, the project continued to distribute latrine construction materials committed earlier and simultaneously put into motion a plan to modify the program strategy.

The new strategy was based on the concept of dual need. In order to get the maximum benefit from the Project's limited resources both the need for a sanitary latrine and financial need were required of potential beneficiaries. The project commissioned the Consortium for Development Research and Service to do a Socio-Cultural Study to use as a basis for selecting villages suitable for project activities.

Once target villages were selected, the Project started an orientation and education program using community leaders and grassroots government extension officers to heighten awareness of the benefits of improved sanitation and then applications were called for. Because the very neediest people often find it difficult to take an active role in improving their situation, the village action committees that screened applications made a special effort to identify needy non-applicants and include them in the program. More than 300 demonstration latrines were built for schools and temples to show both construction techniques and the utility of sanitary toilets.

The Project provided some basic manufactured items like reinforced concrete slabs and pit covers, toilet siphons and pipes for each latrine as well as technical assistance and 1000 rupees. The beneficiaries contributed bricks, cement, roofing and their own labour. Estimated in monetary terms, beneficiaries and the Project each contributed inputs worth about 50% of the average latrine cost of 6000 rupees.

### **4.5.2 Inputs and Outputs**

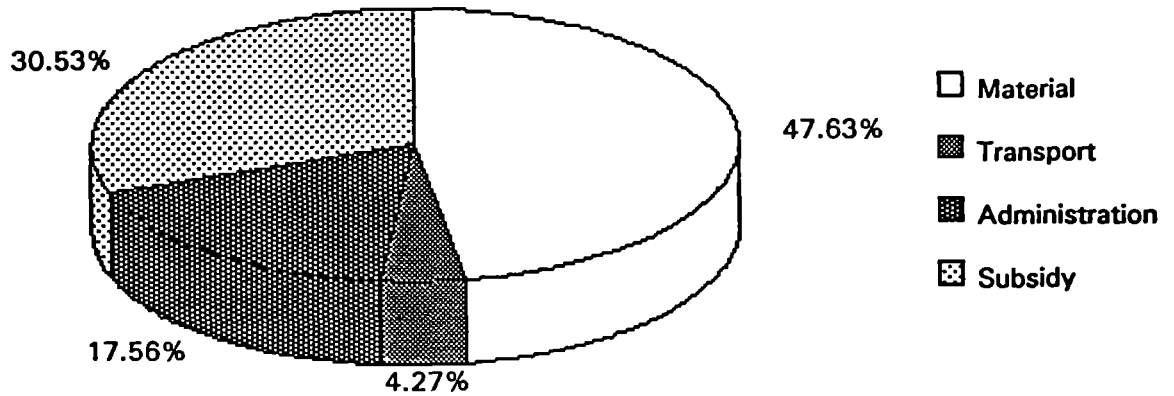
The Phase I Project document proposed a total of 17,000 latrines, but during implementation this figure came up to 31,000. The increase of 80% over the original target was achieved with a cost overrun of only 6%. The unit cost was reduced by 40% during the course of Phase I by constant attention and improvements in design, administration, management and community participation. A total of 32,134 beneficiaries in 760 villages were actually selected and received latrine materials during Phase I. Of these, 30,231 (94.7%) had completed latrines by 30 September 1991 with 92 more completed within the next two months. About 80% of the latrines built had two pits, which can be used alternately and emptied after two to four years. People who chose single pit latrines normally did not have land and/or money for the double pit model.

In addition to the Project's direct program, material and a subsidy were given to 1084 beneficiaries in a cooperative pilot program (described in section 4.5.4). Because some beneficiaries received material late in Phase I the results are not yet definite, but the latest strategy of taking materials away from non-completers and giving them to new beneficiaries appears to have raised the successful completion rate to very nearly 100%.

Counting demonstration latrines and assuming a conservative 95% completion rate for the pilot program, a total of 31,560 sanitary latrines will be the material legacy of the Phase I latrine program. The percentage of households in the Project implementation area having



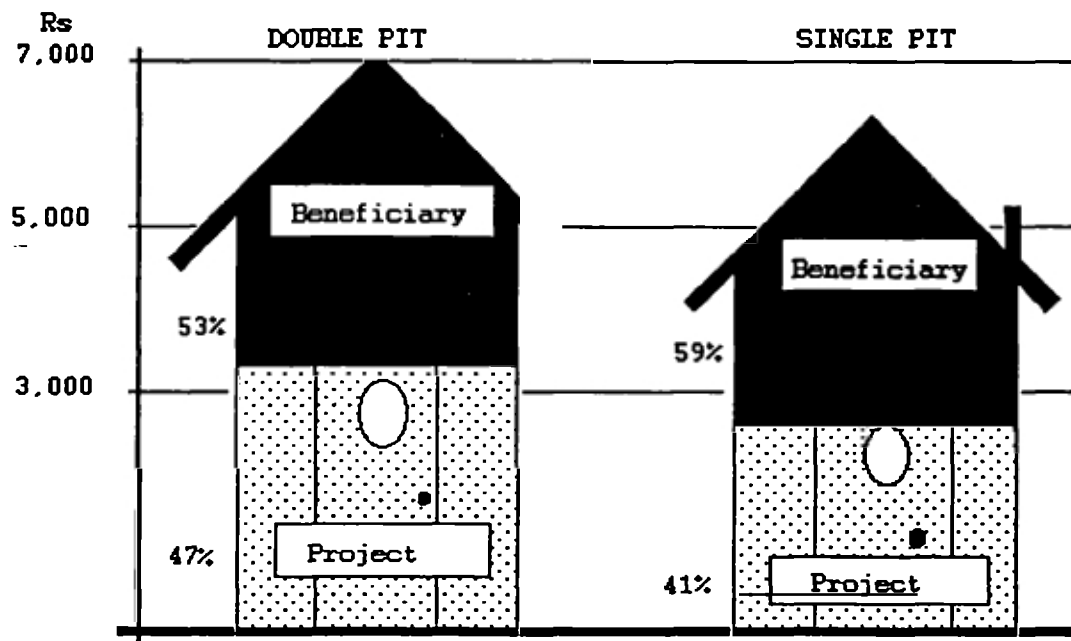
sanitary latrines has increased from between 24 and 45 to over 90 percent as a direct result of KDWSSP activity. The total cost of the latrine program to the Project was 96,2 million rupees (FIM 10,6 million) or 3100 rupees (FIM 310) per completed latrine.



Latrine Cost Breakdown

#### 4.5.3 Level of Community and Beneficiary Participation

Beneficiary participation was an essential part of the strategy and also absolutely necessary to achieve such a high completion rate. The 1000 rupee subsidy was not enough to buy the necessary materials and in addition an estimated 15 man-days, worth about 1400 rupees, was needed for building the average latrine.



Relative Contributions to the Cost of Latrines



Also, in addition to the community involvement during the orientation, education and selection part of the program, village residents volunteered to take a three day course on latrine construction and help beneficiaries when special skills and knowledge were required. These volunteers worked without pay and received a gift hamper from the Project worth about 600 rupees after they had served their communities.

Some members of the community observed that as a result of Project activities there was a new spirit of cooperation and that future programs might benefit from the success of the sanitation project.

#### 4.5.4 Sustainability

Because a subsidy is required to reach the most needy, an attempt was made to increase the level of direct involvement by the government of Sri Lanka by working with the Department of Health Services on a series of pilot projects. In March 1990 the first of these was launched with Department of Health Services personnel taking the place of project employees as implementers and the KDWSSP providing the funding. This first program was considered very successful with 100% of 301 beneficiaries completing their latrines. Further pilot programs are underway.

At the end of 1990 the Project was able to close its own concrete casting yard and started buying slabs and pit covers from local producers. By working with the producers a reasonable level of quality control was maintained and 8025 units were provided commercially by local firms.

#### 4.5.5 Research and Study

Various types of latrine were field tested to find out through actual experience how much they cost to build, how users liked them and whether there were any good or bad side effects. For example 20 "MÖKKI-MAKKI" compost latrines were built and tested in 1989. It was discovered that the beneficial side effect of being able to produce compost was not considered valuable while the inability of the system to tolerate ablution water made them unpopular and they were abandoned by everybody but dedicated project personnel who wanted to pursue the experiment. The main technical disadvantage of the original "MÖKKI-MAKKI" latrine - its evaporation pan that is too small for ablution water, yet perfect for breeding mosquitos--was eliminated in thirteen modified "MÖKKI-MAKKI" type latrines. These utilized a porous collection chamber that allowed liquid to drain into the top layer of earth where it would be used by nearby plants. The modified composting latrine was made completely out of locally available materials. Although promising, development was not continued because the NWS&DB considered the cost unjustified for a nonpriority activity.

An attempt was made to develop rainwater harvesting systems to supply ablution water to latrines. This idea received rather unenthusiastic response from local Project staff and had to be abandoned due to lack of support.



#### **4.5.6 Target Groups/Incentives**

The sanitation program incentive policy was a continuous topic of discussion during Phase I, with the main issue being sustainability. The most prominent argument was that the limited resources available to the health authorities, about 1,500 rupees per latrine, would not be enough to sustain the Project's approach. On the other hand, it was observed that the health authorities' program reaches only an economically narrow sector of population with those people in the greatest need not benefitting. In many areas, almost 30% of the population is so poor that they cannot afford to build a latrine with the rather meager support offered.

This problem was addressed by designing a flexible incentive policy for Phase II. The success of this flexible policy will depend on the integrity of the implementers and the effectiveness of the community participation program.

#### **4.6 Community Participation**

##### **4.6.1 Strategy**

Community participation was an important part of the KDWSSP strategy of turning people in the Project area into actors rather than spectators. In order to do this, the unit had its own strategy. Community relations officers visited hamlets and villages and helped leaders set up Action Committees and/or Consumer Societies. These committees and societies provided a mechanism for two-way communication between the Project and people affected by project activities and were also a nucleus for organizing voluntary work. Written down like this, the strategy seems deceptively simple. To make it work thousands of contact hours combined with diplomatic skills were needed.

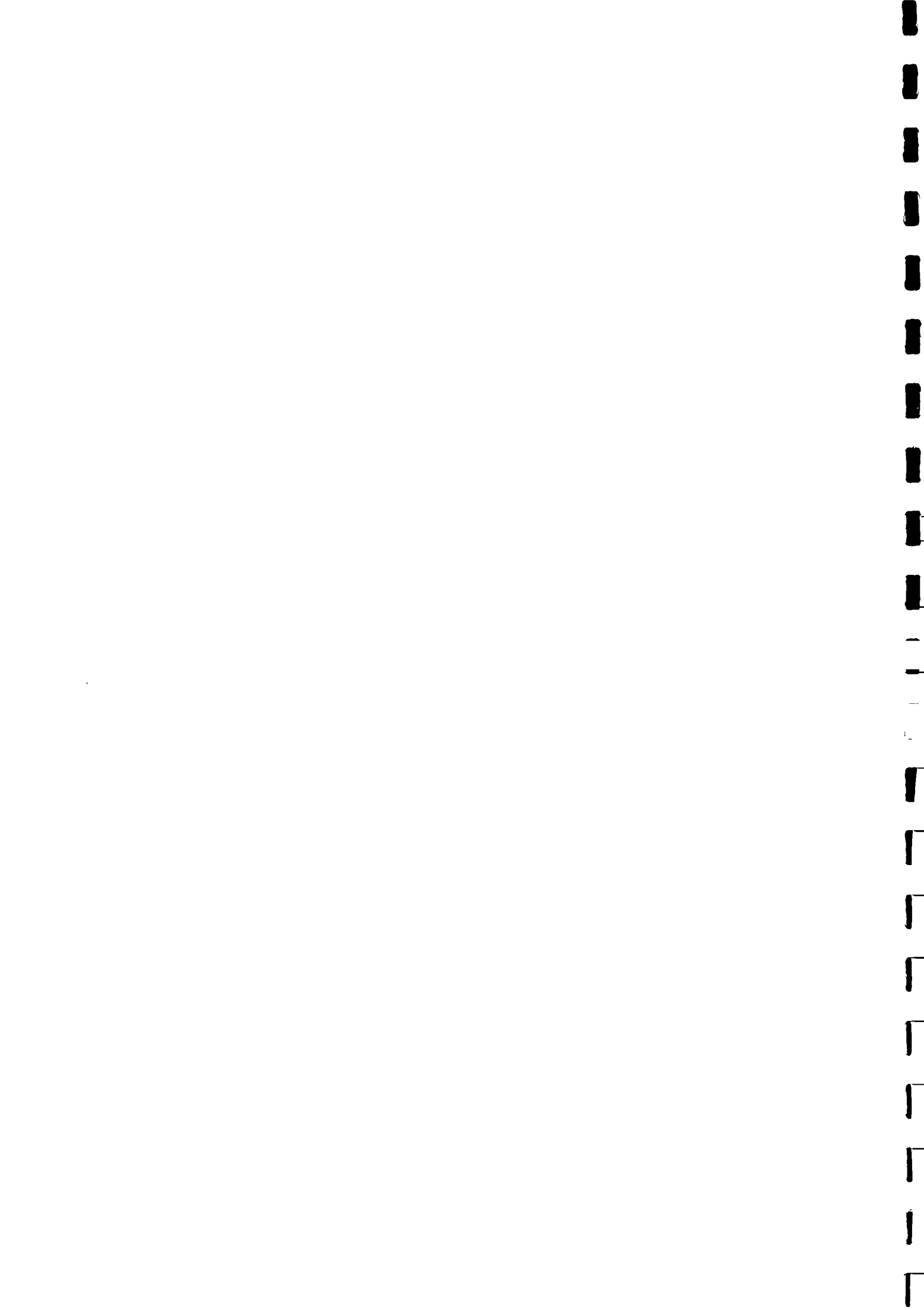
##### **4.6.2 Inputs and Outputs**

The tools used were the interpersonal skills of the community participation unit staff along with some audio visual aids and two sociologists. By the beginning of 1990 there were nine full time community relations officers supporting project work.

##### Hand Pump Program

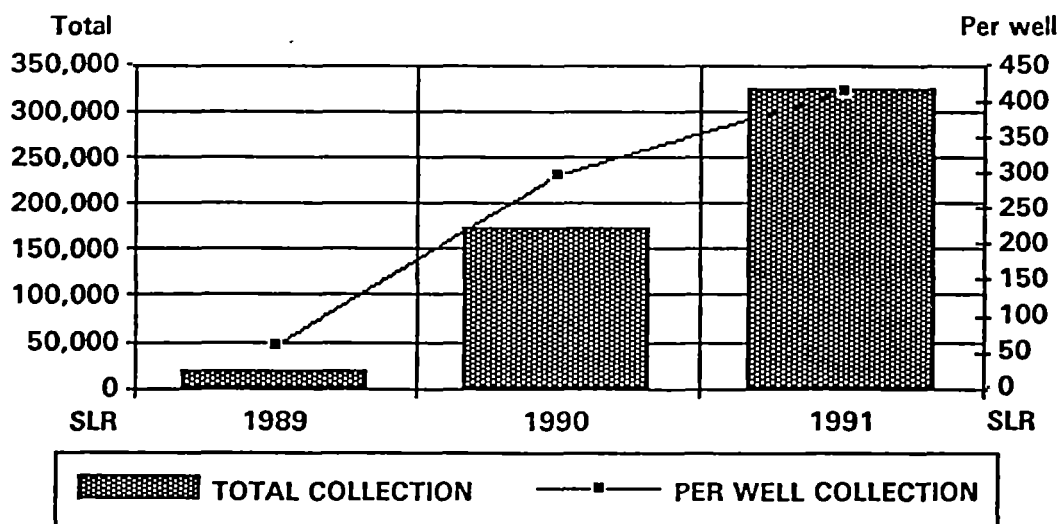
Community participation work led to the setting up of 206 action committees, one in each Grama Seva Niladhari (local government) area where the hand pump program was active. More than 28,000 people attended orientation and education sessions where they learned more about their role in the program as well as issues like siting and maintenance.

A total of 1339 hand pump consumer societies were set up, some of them for hand pumps installed during the earlier Harispattuwa Water Supply and Sanitation Project. One of the lessons learned from that earlier project was the importance of consumer societies to assume a sense of ownership and responsibility for each pump. Consumer societies were formed for 100% of the 783 hand pumps installed during the KDWSSP. Because it is more difficult to convince people of the importance of societies after they have their hand pump, the figure is only 29% for the pumps fitted during the HWSSP.





Each consumer society takes responsibility for the maintenance of its pump both by putting one member—trained by the project—in charge of routine maintenance and minor repairs and by collecting money for a maintenance fund. The fund is for buying spare parts and paying for repairs that can not be done by the consumer society. Only experience will show how much money will be needed for this fund, but initially, 500 rupees has been estimated as a reasonable amount.



Consumer Contribution to Maintenance

#### Gravity Water Supply Schemes

Consumer societies were mobilized during the early planning stages for each of the seven gravity supply schemes built by the Project and took an active part in planning and construction. Communities contributed 40% of all unskilled labour and committed themselves to maintaining the systems.

Gravity schemes are ideally suited to community participation and so there is not much to comment on. The people who benefit from them often have been walking along steep paths to collect water and embrace the idea of contributing to a project that will make the future easier.

#### Ampitiya Piped Water Supply Scheme

The biggest challenge to the community participation unit was introducing the idea of a viable water tariff as a condition to getting Project help improving the Ampitiya water supply scheme. This was an experiment to see if people in a community that had an inadequate piped supply of water would be willing to pay more per cubic meter in order to get a better supply.

There was a three-way negotiation between the Project, the NWS&DB and the Ampitiya Pradeshiya Sabha. The Project would develop a new source of water for Ampitiya by drilling and equipping boreholes and connecting them to the existing system, the Regional Office of the NWS&DB would operate the borehole pumps and sell water to the Pradeshiya Sabha at a bulk rate and the Pradeshiya Sabha would manage and maintain the distribution system and bill the individual consumers for water used.



The community participation unit organized public meetings to tell people about the plan and get their ideas. Fourteen hamlet level consumer societies were formed with the idea that they would eventually take over the management of their distribution systems. At the end of Phase I, there is still some disagreement among consumers about the new higher tariff and the unit is continuing its work. People disagreeing are generally those living in a low-lying area who enjoyed reasonable water supply even before the improvement.

### Sanitation Program

The same action committees network formed for the hand pump program also participated in orientation and education for the sanitation program.

Activity	Harispattuwa	Udunuwara	Galagedera	Kundasale
No. of GN areas taken up	43	62	75	08
No. of AC meetings held	43	62	75	08
No. of orientation programmes held for ACs	43	62	62	08
No. of IEC programmes held	40	-	-	-
No. attended (approximately)	4625	-	-	-
No. of GN areas from where beneficiary applications were received	43	62	75	08
No. of applications collected	8233	10516	10391	1853
No. of beneficiary meetings held	43	62	75	08
No. attended (approximately)	6857	9453	8647	1327

**Distribution of CEP Activities under Sanitation Programme**

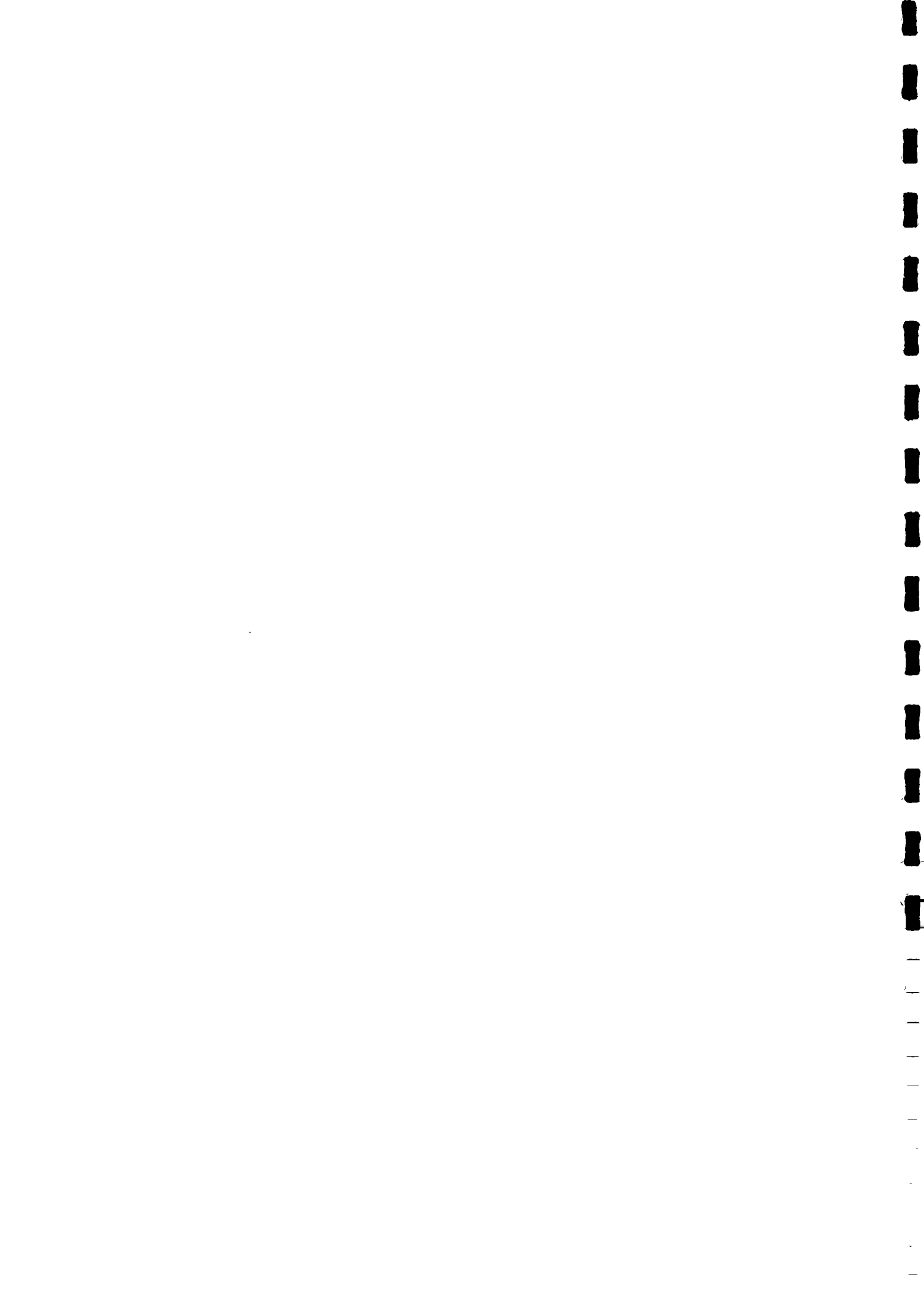
### Institutional Water Supply and Sanitation Program

The community participation activities in this program were mainly aimed at orienting and motivating the authorities and school children concerning the maintenance of the new facilities.

#### **4.6.3 Participation and Development**

The importance of community participation in any kind of development work is almost a cliché and does not require extensive justification. But simple participation is only the beginning of a process. At first members of a community may look at cooperation with outsiders as the price they have to pay for getting help. In other words they are buying their way into the Projects' activities.

During the participation, other things start to happen. Project staff saw an increase in community spirit as a result of their sanitation activities. Communities start to understand that they can influence the development process as it affects them. Feedback starts to replace complaints as they get to know how to encourage development instead of demanding it.



It is generally the poorest communities who had the least skill in drawing development to themselves. The community participation approach helped to change that.

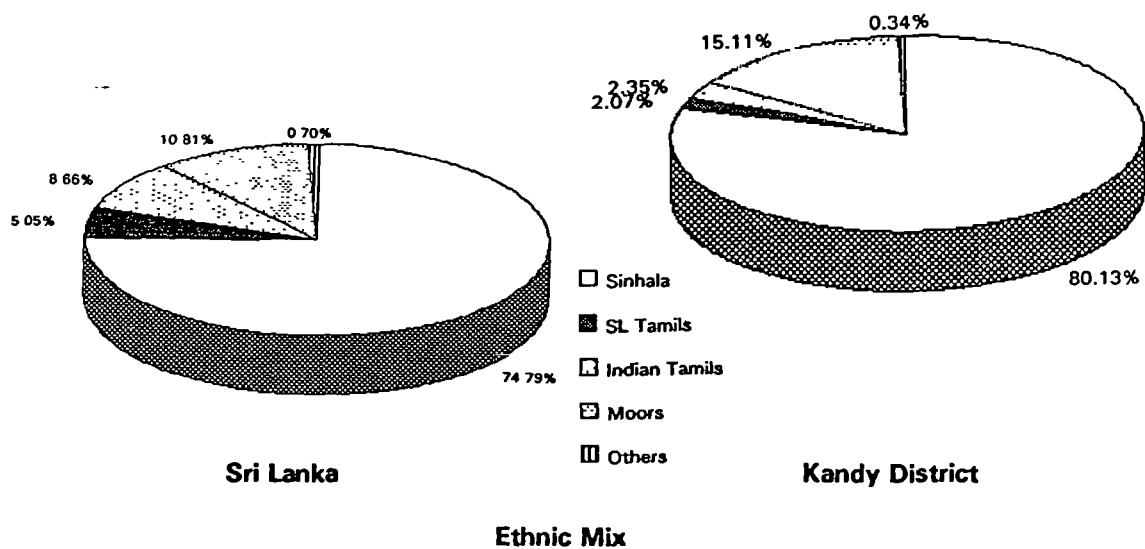
## 4.7 Health Education

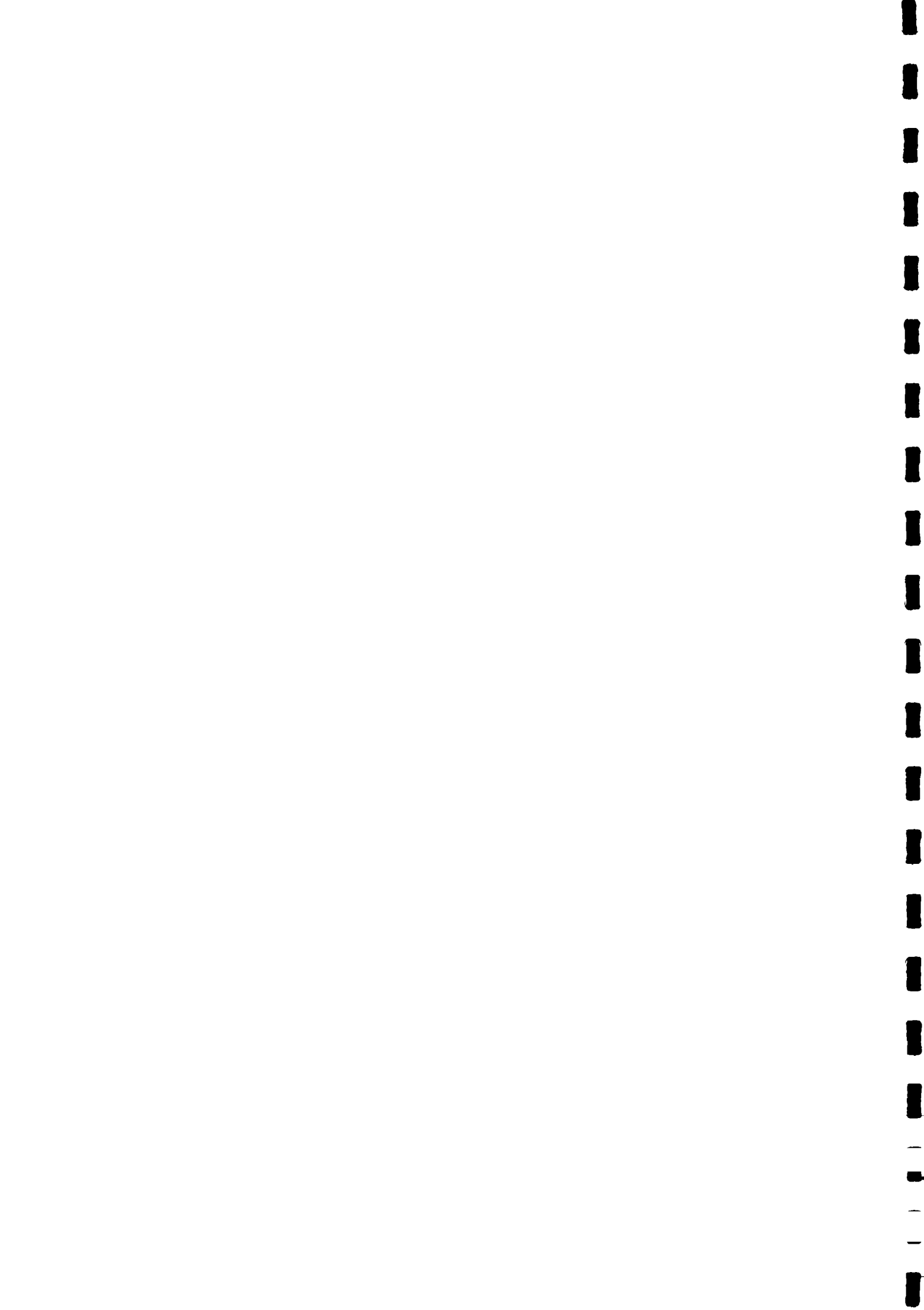
### 4.7.1 Strategy

The government Department of Health Services was the main executing agency for Health Education with the KDWSSP taking a supporting role. Although the original Project strategy for Health Education as written in the Phase I project document was basically limited to helping people get full benefit from the improved water supplies and sanitation facilities, during the course of the project its work assumed a larger role in the District. Even though formal physical integration with the Department of Health Services occurred late in the project, de facto integration of activities took place at the community level at an early stage and the work came to be driven by community need as well as project need.

During the first part of Phase I, Project workers met with community leaders and government public health staff—doctors, midwives and health inspectors—to organize an education and orientation campaign. The strategy was to recruit volunteers, who would be trained by Project personnel and public health staff, to make house visits and inform people about health risk factors and how to minimize or eliminate them. By getting initial support from key community figures, the program eliminated many of the problems that often result when outsiders try to influence community sensibilities.

A further refinement in strategy in 1989 was to focus more attention on school children. This was in recognition of the vulnerability of these children and also their potential as "change agents". It was recognized that each age and ethnic group had its own needs and required its own individual strategy





#### 4.7.2 Specific Programs

##### Public Health Workers

To implement the Project strategy 15 seminars were held to orient and train 185 Public Health Workers. The training was focused on skills needed to plan and implement programs, encourage community participation, communicate at a grassroots level and produce health education materials.

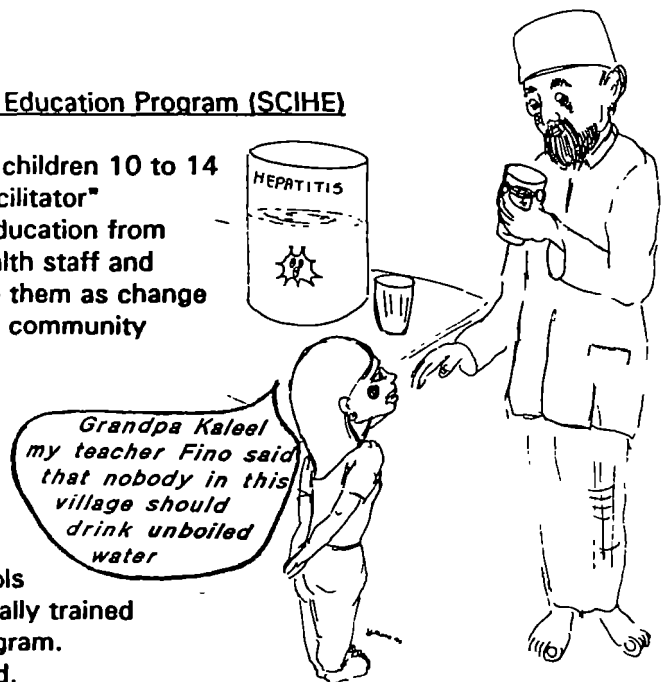
##### Community Health Volunteers

A total of 3167 community health volunteers attended two day training courses aimed at enabling them to assist public health workers on home visits. The majority of volunteers (95%) were young women with some education who received no pay from the Project.

##### School Community Integrated Health Education Program (SCIHE)

This innovative program gave school children 10 to 14 years old the title of "Little Health Facilitator" after giving them intensive health education from specially trained teachers, public health staff and volunteers. The concept was to use them as change agents in school, at home and in the community and to get them to record their own health habits on special cards.

The program specifically targeted practices like boiling drinking water, washing hands, brushing teeth, cleaning kitchen utensils and keeping the home clean. A total of 38 schools participated, with 650 teachers specially trained and 4500 students following the program. In all, 20,000 people were influenced.



##### Preschool Health Education

This program trained 180 preschool teachers in basic hygiene in an attempt to help children when they are most susceptible to health hazards.

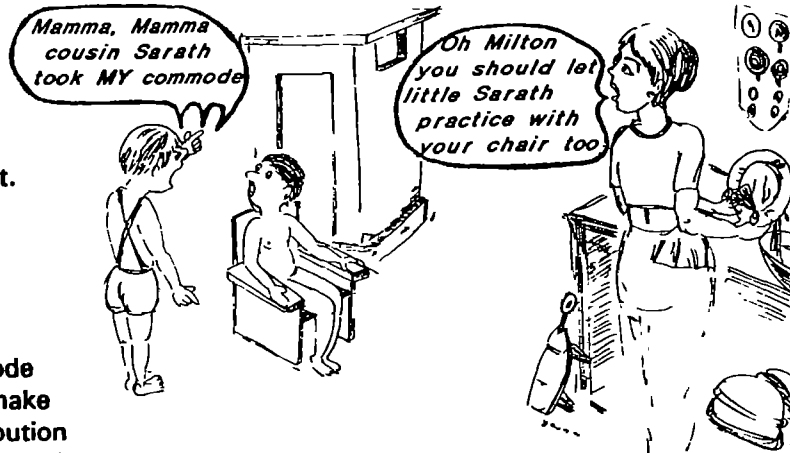
##### Commode Chairs for Preschool Children

The commode chair program is one that has caught the imagination of beneficiaries. One hundred chairs were given to parents so that they could train their children to use a toilet as soon as they could sit. Young children were found to be unable, or even afraid, to use adult latrines and the commode chair was an innovative way of introducing them to sanitary toilet practices. In addition to being popular with parents and children, the chair was much less expensive than another possible solution--building a special latrine for young children.





The program included training in sanitation for the parents and was a pilot for a future, larger project. Based on the feedback during Phase I testing from beneficiaries and the evaluation mission, the commode chair program will make an important contribution and will probably be copied in other countries.



### Hospital Health Education

Courses in basic hygiene were given to 350 employees at 17 hospitals as an adjunct to the provision of water supplies and toilet facilities. These employees are in turn training their patients. Emphasis was given to the importance of maintenance as the only way to safeguard the new facilities. Seventy two water boilers were given to the hospitals and provide safe drinking water for 800 people.

### Radio Program: "Suwa Sandella" (Health Discussion)

The Project and Department of Health Services worked together to organize a 15 minute health education message that was broadcast every Sunday starting in 1990. It is estimated that 75% of Sri Lankans are listening to the radio and that this program reached many of them.

### Health Exhibitions/Health Camps/Health Education Campaigns

The Project and Department of Health Services reached 12,000 people with 12 exhibitions that were organized to complement their other training activities. The exhibitions sometimes included health camps to diagnose problems and treat minor illnesses. Additional emphasis was given at times with campaigns featuring video films, slides and other materials.

### Production and Purchase of Audio Visual and Health Education Materials

A 30 minute video documentary entitled "Water, Sanitation for Health" was produced by the project in collaboration with the Health Education Bureau. By the end of Phase I, about 13,000 people have benefitted from the video.

Two sets of training slides, Tamil language folders, 350 UNICEF flip charts and 600 books were all part of the Project's work.



### Other Material Support

A variety of items, including six motor cycles and one four wheel drive vehicle, were supplied as material support. The total value of this support was 800.000 rupees.

#### **4.7.3 Human Resources Development**

Although the Project offered specific training to attain specific goals, it did not stop there. Many programs were planned to raise awareness and make people understand the value of their work.

- Public health inspectors, nursing sisters and midwives learned how to plan and communicate.
- Medical officers participated in a management level seminar on sustainable development.
- Education tours were organized for public health workers.
- Special conferences were organized periodically for public health staff.
- The Provincial Director of Health Services, the Medical Officer of Health and the head of the Project HE department traveled to Finland to attend the XIX World Conference on Health Education.

#### **4.7.4 Community Participation and Response**

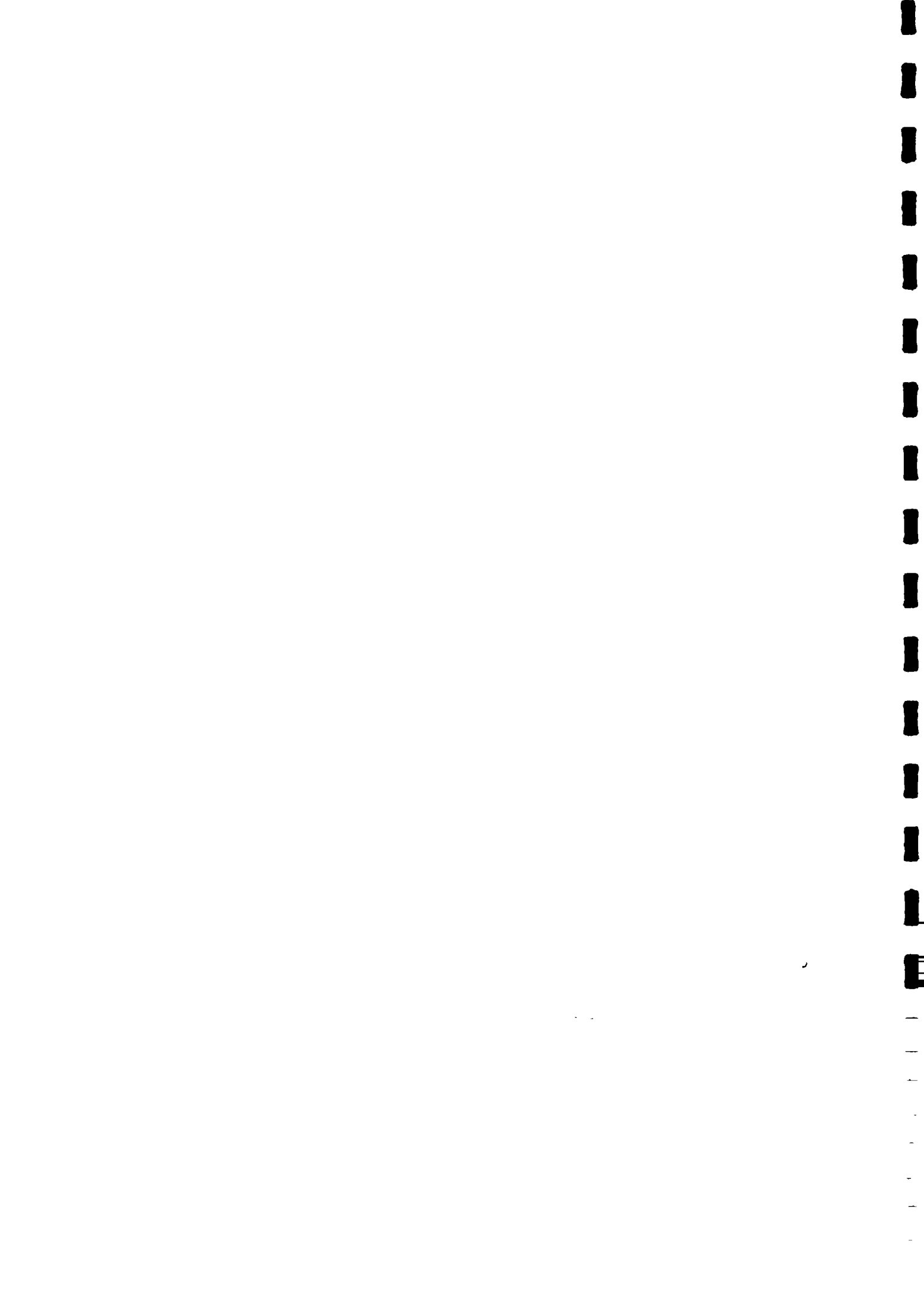
The success of health education activities depends more on the cooperation of the community than, for example, borehole drilling or pipe laying. The population of the Project area responded overwhelmingly, welcoming public health staff, Project staff and volunteers into their homes and discussing health issues freely.

Women not only played an important role in their own homes, but also volunteered to help their neighbors. In the end, 95% of the people who helped the program as health volunteers were women. This interest and participation by the women of the project communities went so far as to add a dimension of primary health care, involving child care and feeding that had not been included in the original project strategy.

#### **4.7.5 Monitoring and Impact Studies**

A considerable effort was made to evaluate the impact of Project activities, but it was difficult to find a yardstick that accurately measured this impact over a short period of time. Some of the steps taken to evaluate progress were:

1. Health education performance was monitored at meetings
  - progress review meeting (monthly)
  - Pradeshiya Sabha level divisional meetings (monthly)
  - Monitoring and evaluation committee meetings (quarterly)
  - Health staff conferences (monthly)



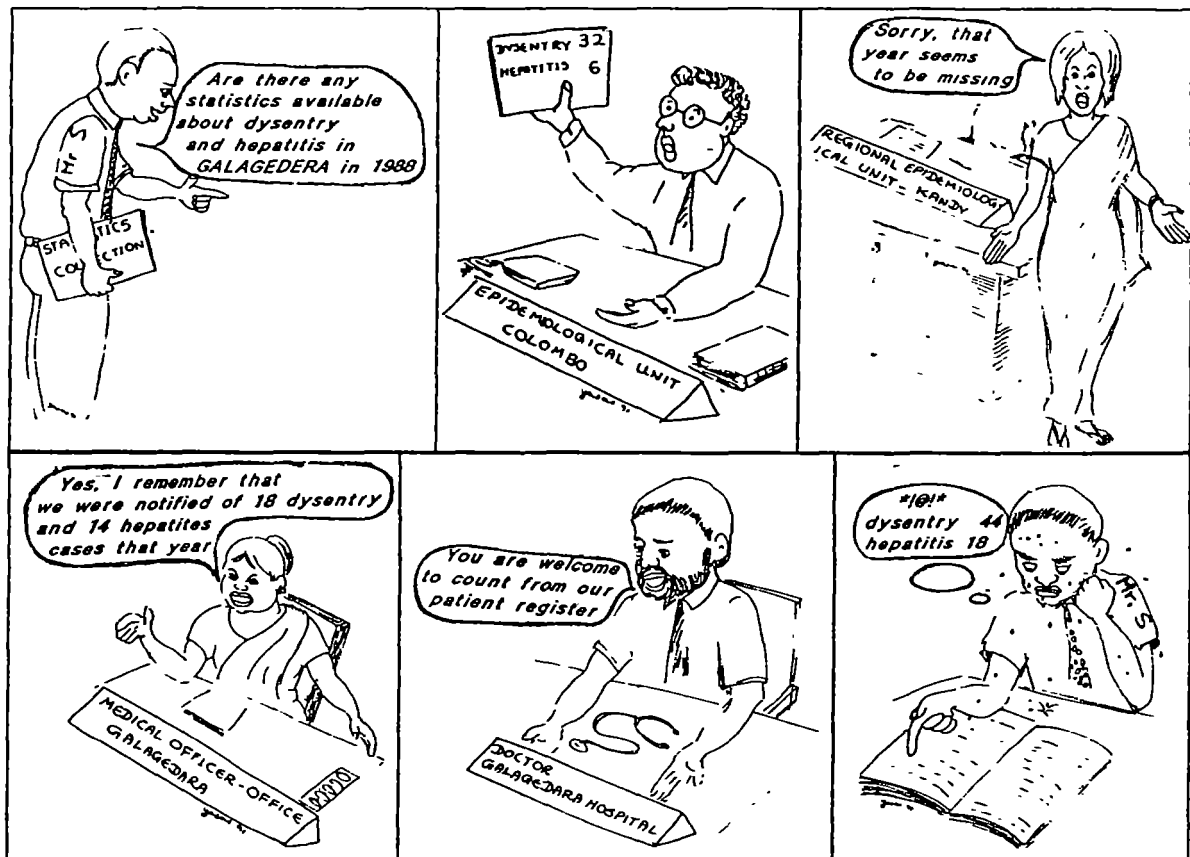
2. "Study on the Impact of School Community Integrated Pilot Health Education Programme," Sisira Navaratne, Sociologist, KDWSSP, July 1991

4.7.6 Conclusions

Project activities reached hundreds of thousands of people with its health education messages and received positive feedback showing interest and appreciation. Unless conventional wisdom about health and sanitation practices are completely wrong, many people must have benefitted and should be leading healthier happier lives.

Unfortunately, it has been impossible to collect reliable statistics about the incidence of bowel diseases because there is no well organized system of record keeping in the country. Surprisingly, the number of hospital admissions for bowel diseases registered at the hospitals themselves is higher than the total number of cases recorded in Colombo or Kandy for the same hospitals. Obviously the figures are wrong and little can be learned from studying them.

Some medical officers have become interested in this problem and it should be possible to get better statistics in the future. In the meantime, justification of the program will have to come from human contact with people who are grateful for the improvement in the quality of their lives.





#### 4.7.7 The Future - Integration With the Department of Health Services

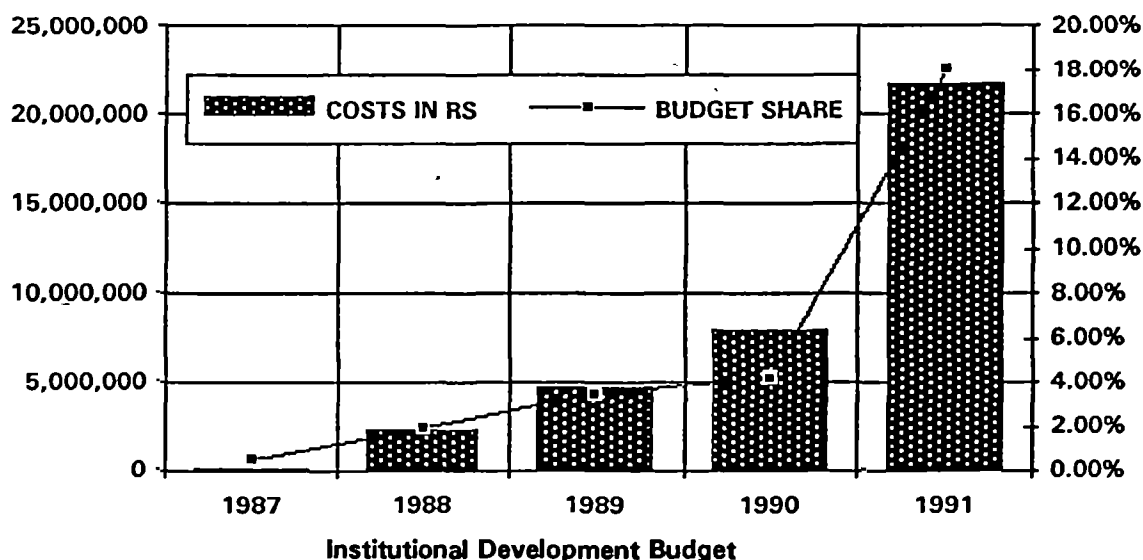
At the end of Phase I, Project health education staff moved to share an office with the Department of Health Services. This physical move marked the complete integration of the programs of both organizations.

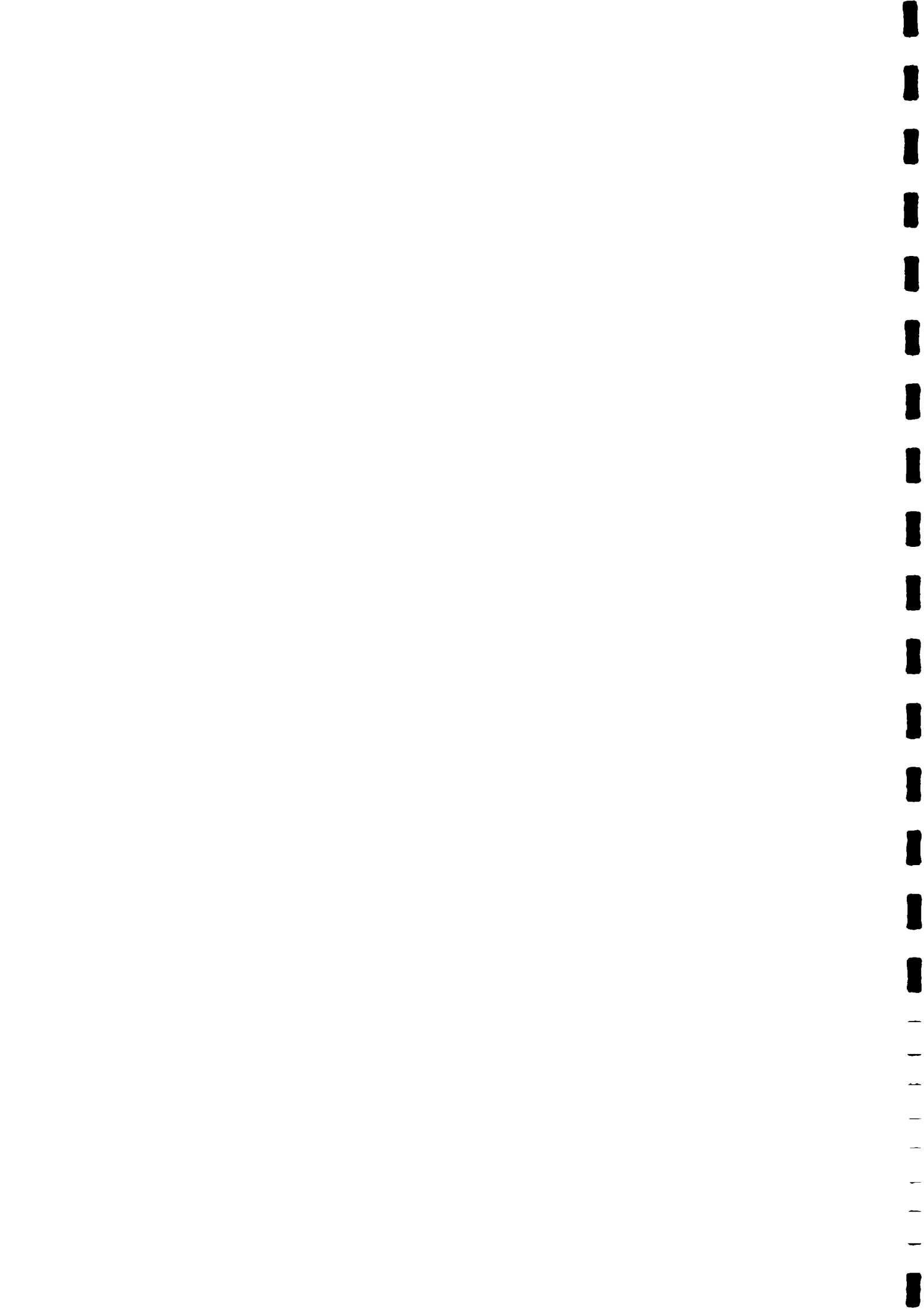
#### 4.8 Institutional Development, O&M Support and Training

##### 4.8.1 Focus on Institutional Development

At its inception, Phase I of the KDWSSP did not include adequate commitment to training and institutional support. The Project document points out the importance of training local authorities to maintain water sector equipment (hand pump wells) and of upgrading the NWS&DB's operation and maintenance (O&M) capability. But at the beginning of the Project, institutional support activities lacked the sharp focus of those in planning, design and implementation, primarily because the Project budget did not reflect the commitment.

The answer was to take a hard look at the institutions, define the areas that needed additional support in order to ensure the sustainability of the project's work and then concentrate attention and resources on those areas. A report was prepared in 1989, detailing weaknesses in the original Phase I plan and budget and recommending the inclusion of a technical training department, headed by a Sri Lankan engineer, and an expatriate Operation and Maintenance Adviser. Those recommendations were accepted by FINNIDA also in 1989. Recruitment of an engineer with suitable operation and maintenance experience proved to be more difficult due to the disturbances on the island and the O&M Adviser did not start work until October 1990.







#### 4.8.2 The Institutions

##### National Water Supply and Drainage Board

The National Water Supply and Drainage Board (NWS&DB) is an autonomous public sector organization under the Ministry of Housing and Construction. It was formed in 1975 from the Department of Water Supply and Drainage and was at that time responsible for planning, building and operating most urban and rural water supply schemes in Sri Lanka.

A process of decentralization started in 1986 has moved many of its original functions such as operation and maintenance and the planning, design and construction of minor new schemes away from the head office in Colombo to newly formed Regional Support Centres.

##### Regional Support Centres

The Central Regional Support Centre (RSC) is one of five RSCs formed and has its head office in Kandy, with Regional Offices (RO) in Kandy, Ampara, Bandarawela and Anuradhapura. The Deputy General Manager (DGM) of the Central RSC is in charge of the five ROs plus an RSC staff to do regional planning and design and financial management.

##### Regional Office

The Kandy RO is directly responsible for the operation and maintenance of most of the water supply schemes in Kandy District and is therefore becoming increasingly involved with KDWSSP activities. The person in charge of the Kandy RO is the Manager of Operations and Maintenance, Kandy.

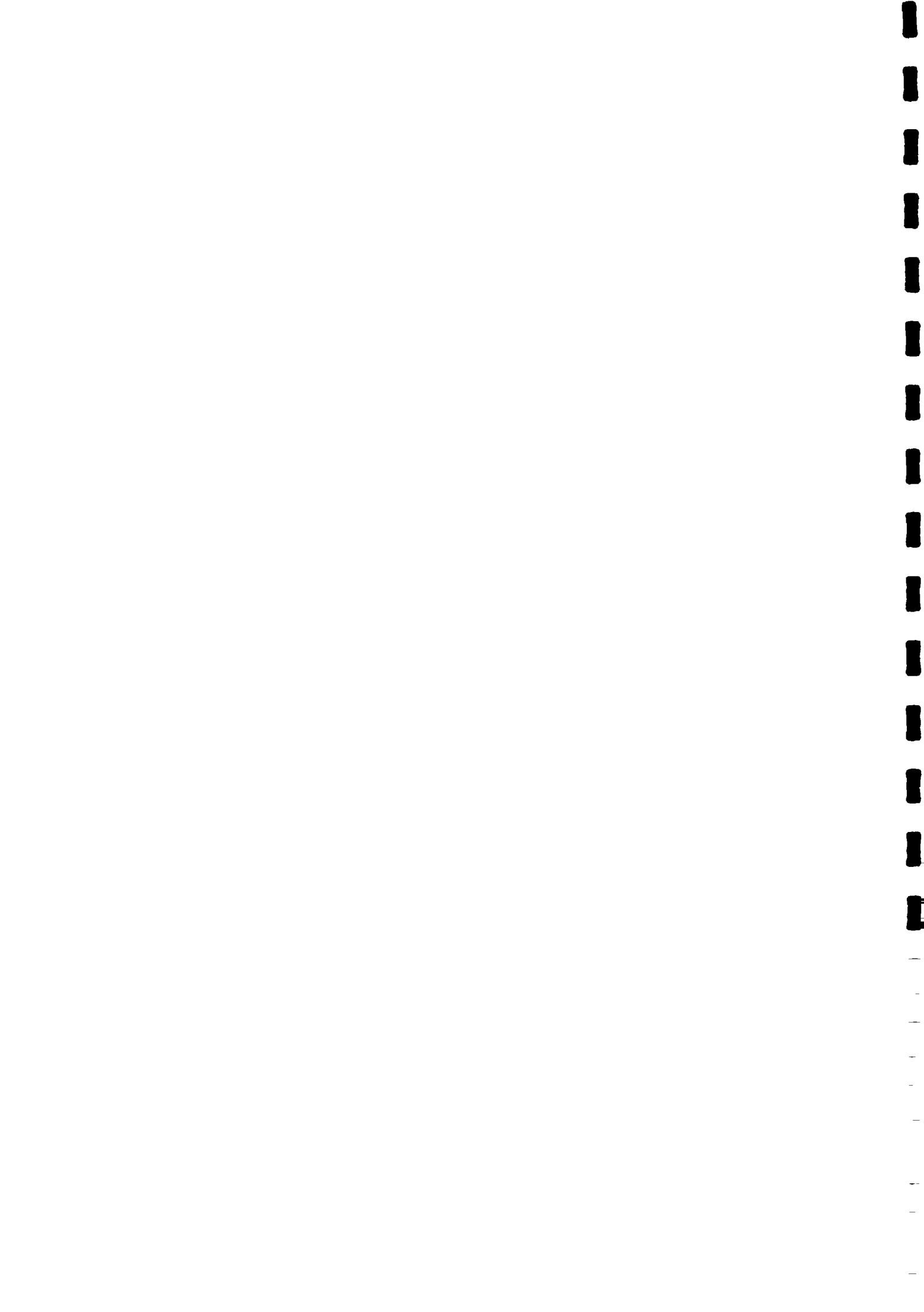
##### Pradeshiva Sabhas

Pradeshiva Sabhas were formed by an act of the Government of Sri Lanka in 1987 to function as the primary local authority and take the place of Village and Town Councils. They have authority outside of municipalities like Colombo, Kandy, Nuwara-Eliya, Galle and Jaffna.

Pradeshiva Sabhas are responsible for most hand pumps and small gravity water supply schemes. They are also increasingly taking charge of water supply scheme distribution networks that have heretofore been under the control of the NWS&DB.

#### 4.8.3 The Institutions as Moving Targets

The start-up of Phase I of the KDWSSP in October 1987 coincided with the early period of decentralization of the NWS&DB. The shift of NWS&DB activities such as operation and maintenance and the planning/design/construction of minor new schemes from Colombo to RSCs meant that KDWSSP had to continuously readjust its institutional development strategy to suit the changing face of the NWS&DB. This "moving target" created dilemmas that consumed a lot more decision making energy than might be considered normal. For example, today's institutional problems must be solved, but what proportion of the project's resources could appropriately be used for solutions which must by definition be temporary, since the status of the institution itself is temporary? In late 1991 it is



estimated that decentralization is 90% complete and so the movement continues, but at a slower pace.

Even more dramatic than the changes in the NWS&DB has been the reinvention of local government, with Pradeshiya Sabhas becoming the dominant agency in charge of affairs outside the municipalities. This is a development target that literally leaped out of nowhere and continued to mature during the course of Phase I.

#### **4.8.4 Making the Best of Change**

The decentralization of the NWS&DB and coming into being of the Pradeshiya Sabhas has not been a negative development, it has only made the design of long term strategies more complicated. The good side cannot be overemphasized. Many of the goals of decentralization—to improve operation and maintenance and to make the organization more responsive to consumers—are also the goals of the KDWSSP.

The fact that Phase I coincided with a time of so many changes and of the growth of new institutions may have actually made the job of introducing new ideas easier than it would otherwise have been. Organizations normally have a lot of momentum to overcome which can be a hinderance to positive development, but during the past four years there were strong forces working to overcome this momentum and it was more a matter of the KDWSSP working to influence the direction of change rather than to force change itself.

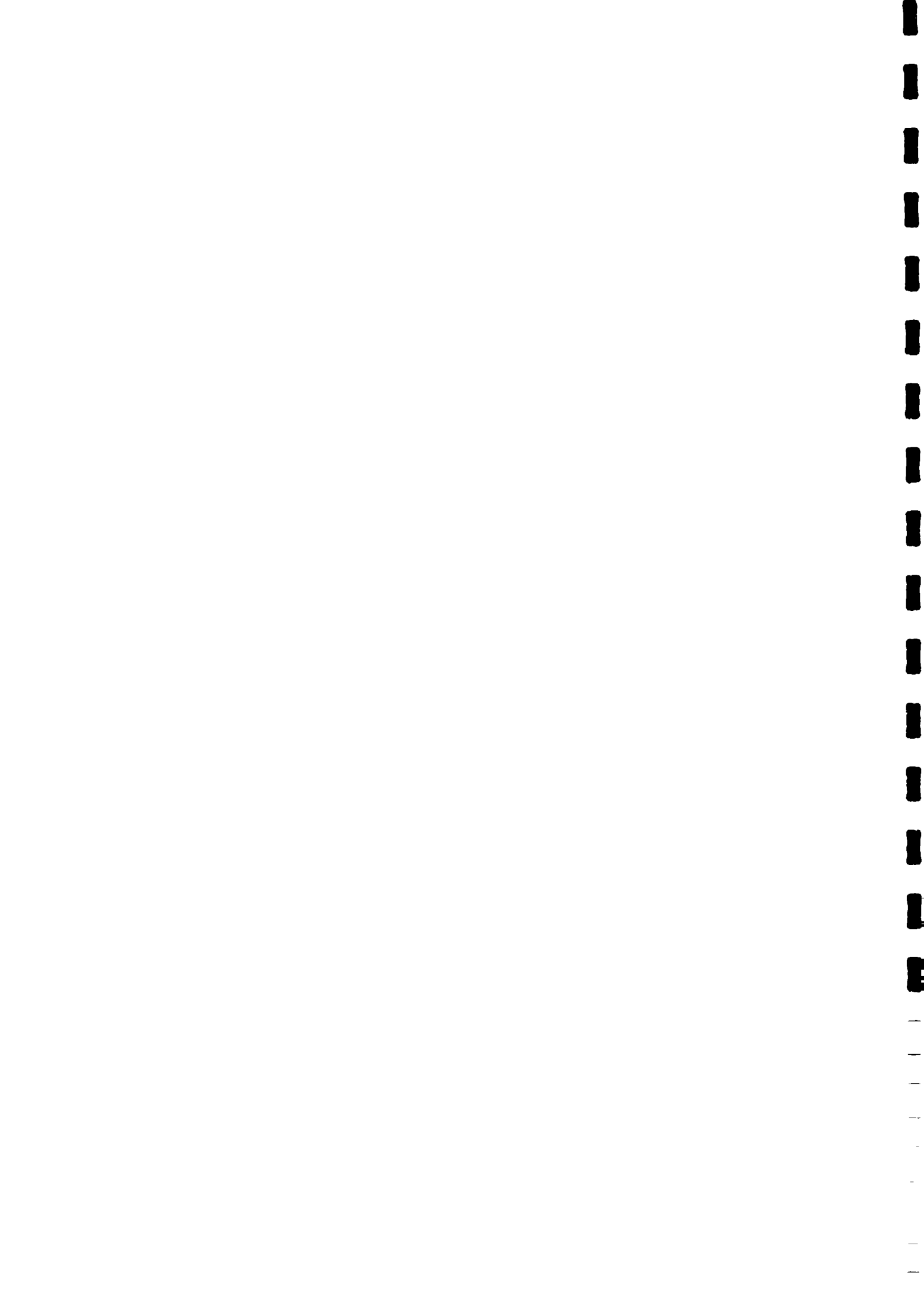
The good side of this is that very positive changes have come about as a result of forces from both inside and outside the institutions. Phase I of the KDWSSP had a significant part in directing some of these changes. It is too soon to know if there is also a bad side to some of these changes. From the point of the view of the management of the KDWSSP it is unfortunate that long-term strategies had to be kept very general and short-term strategies had to be constantly revised to fit the changing circumstances. Assessment of the final outcome resulting from all of this is also difficult because the story is still not over.

Some organizations and their individual employees may also find it difficult to accept that it is almost impossible to give full credit where it may be due because of the complexity of the changing situation and the many agencies involved. It should be accepted, however, that improvements have been made and Sri Lanka has benefitted. Everyone working toward this goal must get some credit.

#### **4.8.5 Strategies**

An important part of Phase I was to support and strengthen local institutions with the Central RSC becoming the most important. A key element of this institution strengthening has been to use seconded NWS&DB personnel in many management and technical positions at the KDWSSP. They have benefitted from the management and technical expertise brought to Sri Lanka by the consultant and will carry this knowledge and ability with them when they return to the NWS&DB.

Although these secondees are valuable weapons in the campaign to strengthen the NWS&DB, they are scatter guns that may not hit specific targets in Kandy District with enough force to have the desired impact. In order to ensure the sustainability of the work done during the KDWSSP Phase I, particular attention was focused on the institutions that are directly concerned with operation and maintenance and the viability of water supplies



in Kandy District. These are the Kandy Regional Office and Pradeshiya Sabhas that have hand pumps, gravity water supply schemes and/or distribution systems to operate and maintain.

These institutions were (and are) still in the process of discovering their powers, their responsibilities and their needs and the following steps were taken to help them during this critical time of development:

- An expatriate Operation and Maintenance (O&M) Advisor was recruited to work directly with the O&M staff at the RO
- An O&M Support Department was set up at the KDWSSP
- The KDWSSP training unit developed and implemented training programmes for the RO and Pradeshiya Sabha staff
- Material assistance was given to the RO and Pradeshiya Sabhas
- Systems to monitor and control activities were developed and made available to the RO and Pradeshiya Sabhas

#### **4.8.6 Developing the Institution - Developing its People**

The relationship of the KDWSSP with the institutions has mandated a careful approach to the selection of words in this report, as it did the nature of the work done during Phase I. Plans, designs and solutions were made available to the institutions, not imposed on them. Planning and designing water supply schemes while simultaneously working with the user institutions to ensure sustainability required difficult decisions about the future capabilities of the institutions. Particularly difficult were decisions about the appropriate level of technology—too low and much of the KDWSSP's potential to upgrade the level of engineering and construction would be wasted, too high and sustainability would be lost. In order to find the appropriate level of technology, several important questions had to be answered.

Is there any difference between developing an institution and developing the people working in the institution? Can a structural change like decentralization effect a dramatic increase in the institution's performance even with the same staff?

Decentralization seems to improve an organization's performance because a specialized organization can better focus on what it must achieve and is closer to the user. Other structural changes may also bring improvements, but ultimately the performance will be limited by the capabilities of the staff. And so the answer seems to be that efforts to effect real improvements in performance must include a coordinated effort to strengthen the staff while encouraging structural reforms.

The KDWSSP Phase I was not charged specifically with attempting to reform institutional structures. However the issues of viability and sustainability meant that there were times when it became the project's business to help shape the institutions with which it was working. This did not take the form of prescribing changes, rather the close relationship between project staff and that of the institutions made it possible for the Project to help the institutions make tough decisions about possible improvements.



The Project was also sensitive to the limitations inherent in public sector institution staffing. The reality is that the NWS&DB has a staff that has been coping with its workload while recognizing that improvements are possible and desirable. The whole purpose of a project like the KDWSSP is to help improve the water supply and water sector institutions based on this reality and not set goals based on an imagined ideal. The strategy was, therefore, to strengthen the institution by setting realistic levels of performance for the staff and then working to develop the staff so that it could attain these levels.

#### 4.8.7 Specific Action

##### Training

An extensive array of courses were organized and given by the Project training department. These ranged from courses for water supply scheme operators, training them on various aspects of preventive maintenance, to special sessions for Pradeshiya Sabha water meter readers. In addition, local institutions were commissioned to give courses in more specialized topics like computer programming and operation. The total number of man-days spent in organized courses was 8500 by the end of Phase I.

The training normally was intended to support an area of project activity, for example, masons were trained to help beneficiaries building latrines in the sanitation programme, but in some cases less specific courses were given as part of general human resources development.

The actual expenditure on training was Rs. 9.4 million.

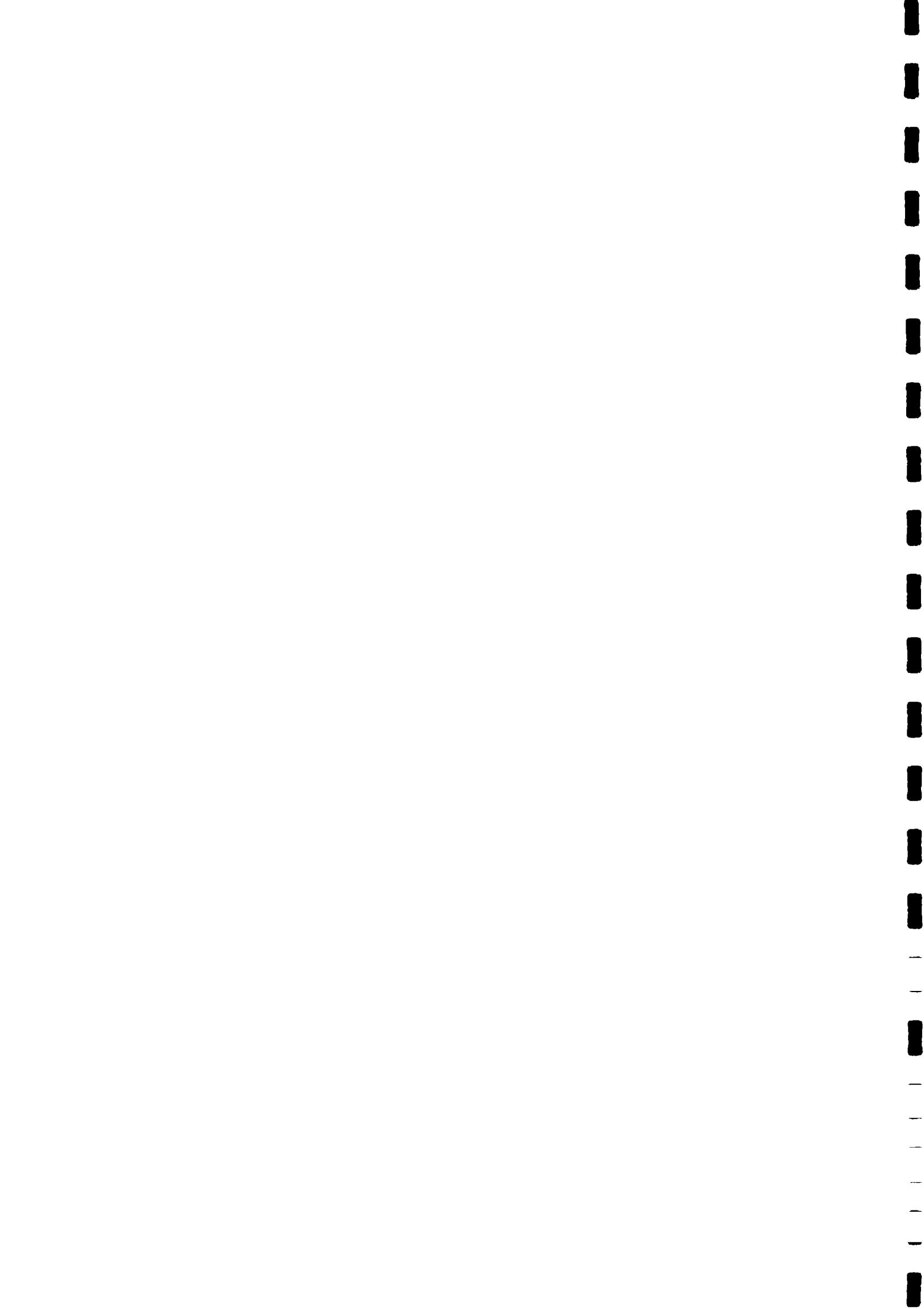
##### Direct Advice

The arrival of the Operation and Maintenance Advisor, with his office in the Regional Office, made it easier for NWS&DB staff to get access to Project expertise and experience and also give feedback about their problems to the Project. The advice went in both directions: to RO staff, helping to strengthen their operation and maintenance programme, and also to project staff about what assistance would be of greatest benefit.

The key areas focused on were:

1. Heightening awareness that operation and maintenance is a valid field of at least equal importance to design and construction,
2. Organizing training where specific skills needed strengthening,
3. Promoting monitoring of both equipment performance and staff activities,
4. Introducing the concept of "performance based" instead of tradition based activities,
5. Organizing procurement and storage of spare parts and supplies,
6. Managing activities instead of administering them.

Although the advisor became part of the RO organization, it was considered essential that he stick to his role and not replace anyone in the management structure.





### Material Assistance

Material assistance was given where it was considered a necessary part of the institution strengthening package, but was kept at an appropriate and sustainable level. Vehicles were needed for maintenance activities, computers were considered appropriate and important for monitoring and certain special tools made big improvements in efficiency. In all, 12.4 million rupees was spent on material assistance for O&M support and fixed assets turned over to institutions.

### Management Packages

Pradeshiya Sabhas in particular needed advice on how to manage and monitor operation and maintenance of their water distribution systems and hand pumps. Courses were given on specific topics, but in order to have a framework to build the courses on it was necessary for the Project to develop complete management and monitoring systems. These included systems for recording water meter readings, billing water users, maintaining hand pumps, monitoring wells and detecting leaks. The systems were designed to be appropriate and yet increase the efficiency of the institutions activities. A total of nine packages were developed and turned over.

Training and institutional development are elaborated in more detail in Appendix 8.

## 4.9 Preparation of Project Document for Phase II

One of the outputs required was a draft Project document for Phase II. The draft was produced on time, early August 1990, but reorganization in FINNIDA as well as reconsideration of the whole Finnish aid policy for Sri Lanka delayed further progress. An appraisal was carried out in May 1991. Phase I was then extended a second time, to September 1991 to allow time for finalizing the Project Document after appraisal and for the conclusion of the Project agreement between the Governments.

One observation made during the preparation process deserves discussion, as it may have general significance. The FINNIDA Guidelines for Project Preparation and Design in its various draft forms were available at the Project when Phase II was planned. The guidelines describe an objective oriented planning methodology, which should lead to a project plan expressed in a logical framework. The methodology is aimed at ensuring the sustainability of the targeted developed state as well as the consistency with the recipient resources and plans.

The planning system is, however, in practise rather difficult to use and leads easily to a situation where the representatives of the recipient are practically excluded from the planning process. A few examples:

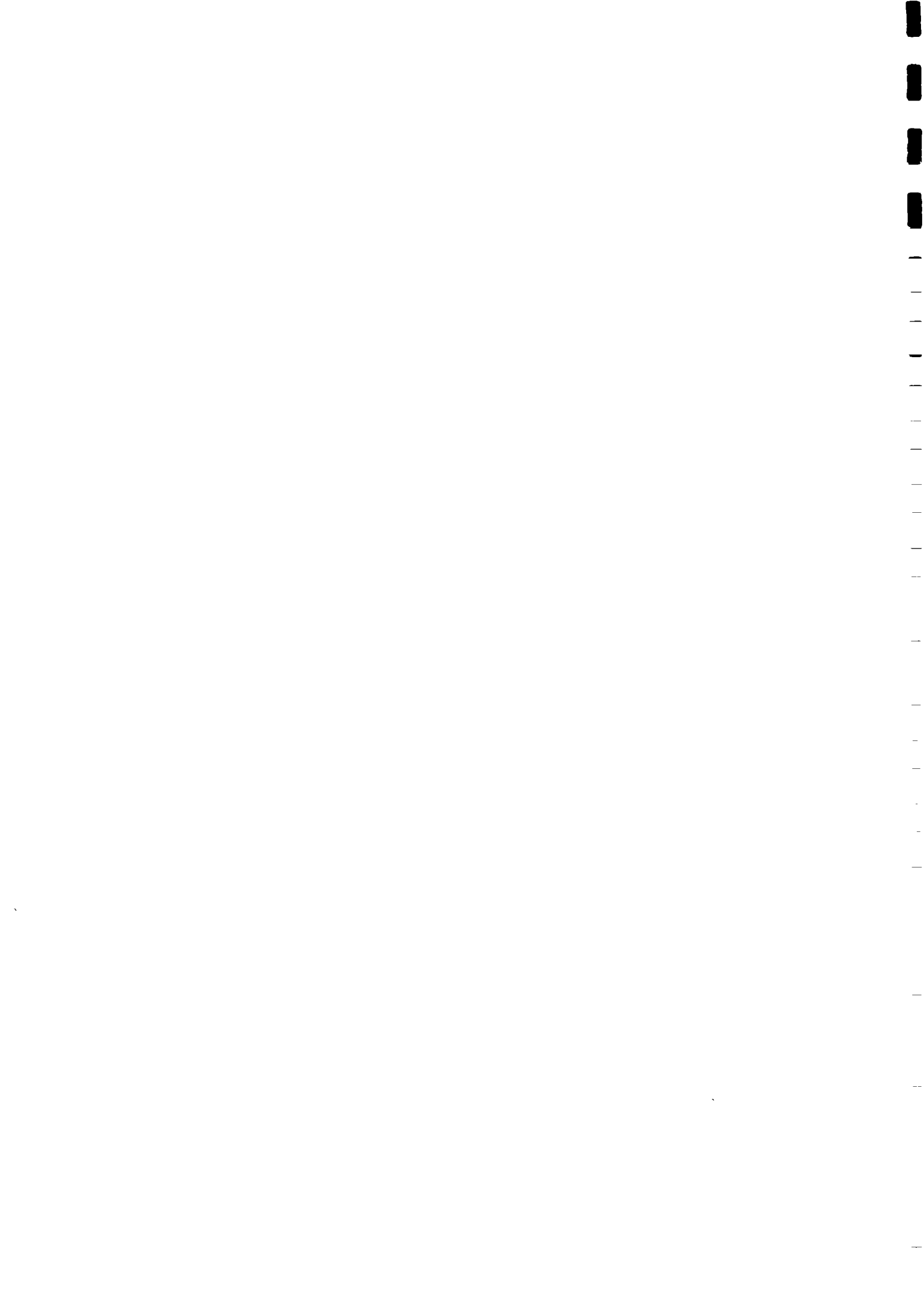
- The necessity to increase inputs and activities in the field of institution building and O&M support was realized among the Project staff late in 1988. As the issue was understood to be vital to the Project success, it was decided to prepare the proposal to competent authorities in the form of condensed project document. The secondary objective was to train the Project senior local staff for the preparation of the actual Phase II Project Document. Schedule-wise the PD approach was a mistake. It took nine months to produce the document in a form that it was acceptable to FINNIDA.

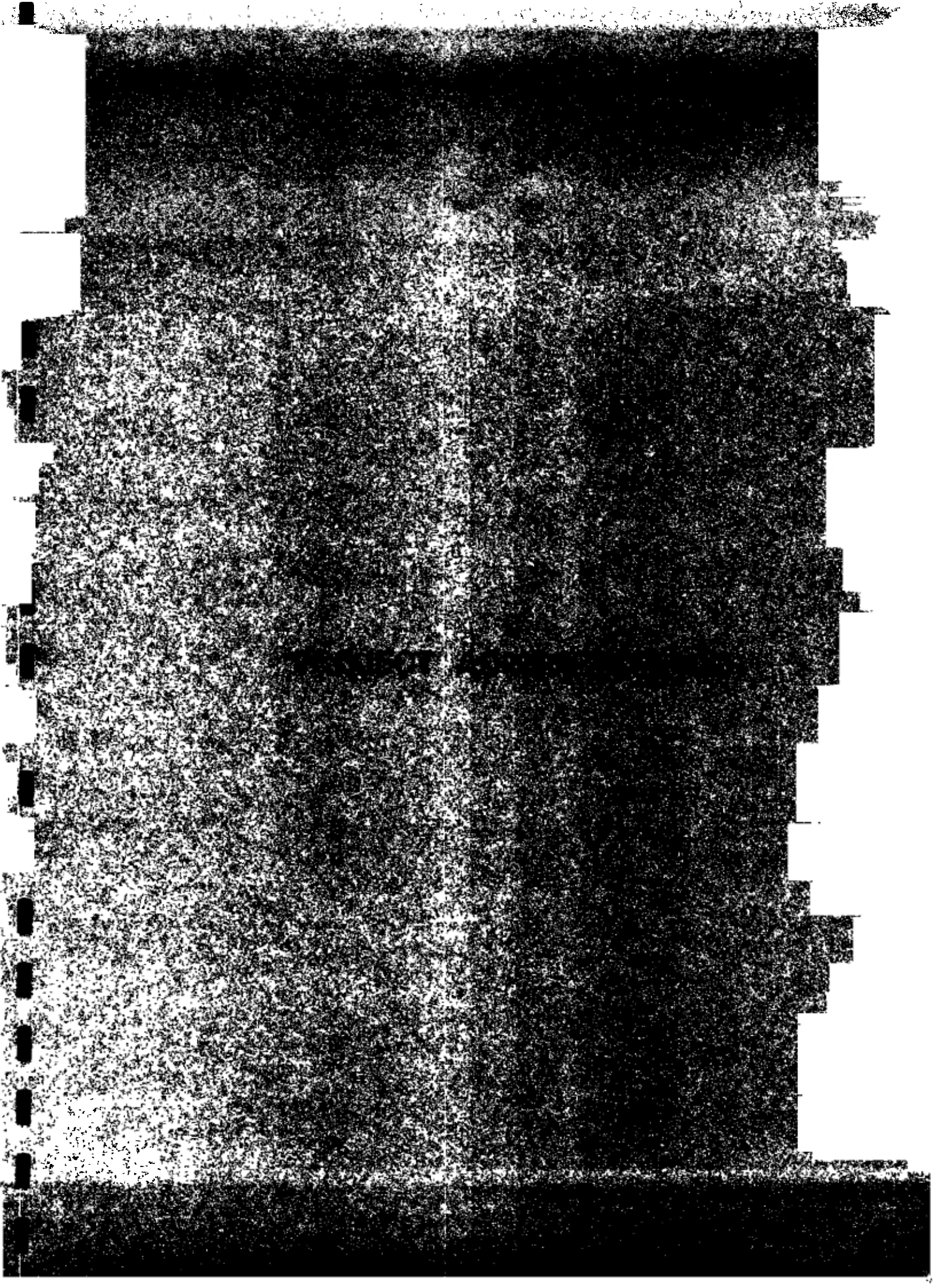


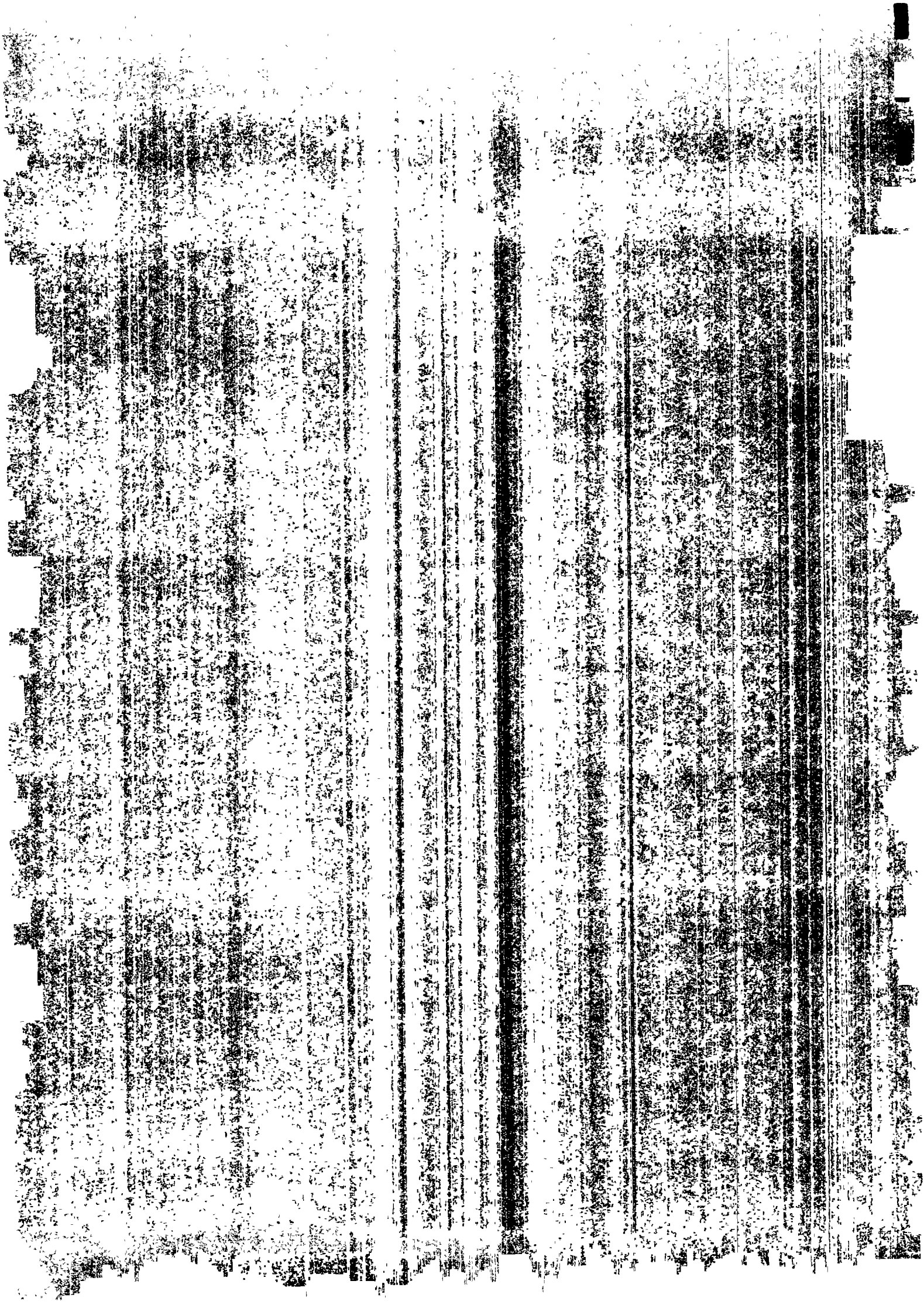
The major difficulty was to get persons previously not familiar with the logical framework to really understand the system.

- The preparation of the Phase II draft took then only four months. But the various sessions to carry out the analyses and assessments very often boiled down to what seemed to be essentials for the recipient:
  - \* what is the budget?
  - \* construction programme and schedule?
  - \* how many expatriates?
  - \* how many vehicles?
  
- That the logical framework is difficult to understand even by persons who are supposedly familiar with it is best illustrated by the Phase I PD. Look once more at the objectives quoted in the section 1.1. The first stated objective is in fact strategy. The others are either outputs or activities.

The complexity of the planning system and the effort needed to learn it seldom draw complaint. A complainant would cast a shadow over his/her own intelligence. But the KDWSSP observation is that the present system requires the dominance of professional planners and easily excludes the recipients from the true planning process. This may lead to well prepared projects, which have, however, low recipient priority. To involve the recipients more in the planning process, the system should be simplified, or specific training organized, or preferably both.







## **5. PROJECT ADMINISTRATION**

### **5.1 General**

The administration of the project included a large scope of activities. The administration took care of procurement, stores, transport and garage services, in addition to more traditional tasks of administration. Chief of Administration's post was filled by an expatriate while all other units were managed by Sri Lankan unit heads. Transport, garage and stores were included in administration department in May 1989, upon departure of expatriate Workshop Engineer.

### **5.2 Accounting**

There were several routes for the payments of foreign and local input, namely:

- by FINNIDA direct to suppliers,
- by FINNIDA internally (reviews, missions),
- by NWS&DB as local component,
- by consultant in Finland, and
- by consultant in Sri Lanka.

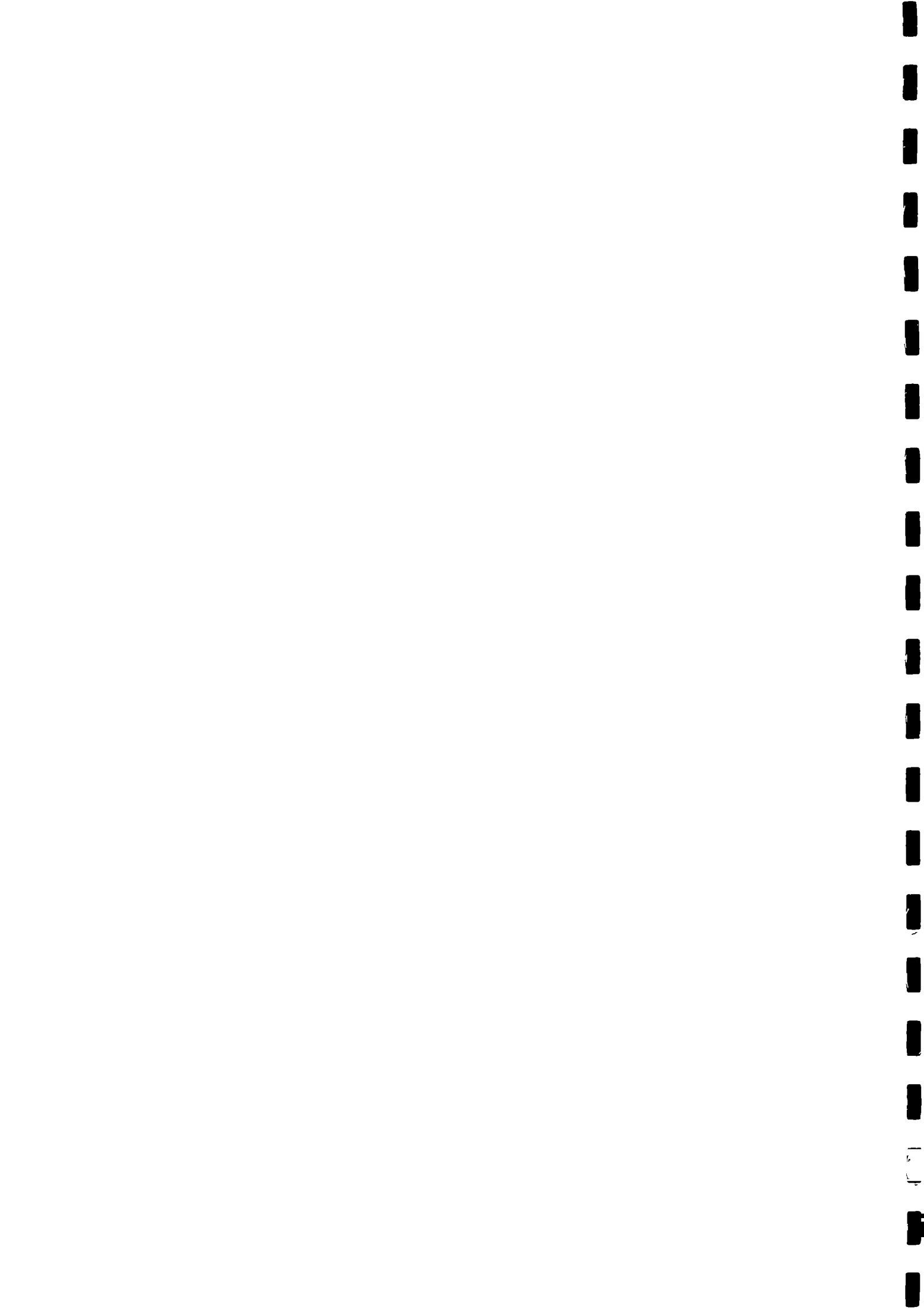
All these were included in project accounts to enable comprehensive and meaningful, up-to-date cost control and follow up.

There were two minor shortcomings that could be mentioned; information for FINNIDA's internal costs was difficult to obtain and was not always available in due time; and NWS&DB's monthly reports for local component have not been verified, in absence of actual receipts. Further, the Project had difficulties to determine into which fiscal year the expenses at the end of calendar year were recorded in FINNIDA's accounts. From all other parts the accounting was carried out without problems. In practice, the accounting was done by a computer, for which a software package was tailored.

The accounts unit was managed by a Sri Lankan and manned with two accountants, one cashier and two ADP operators/programmers, who also worked for other departments and participated in ADP development work.

### **5.3 Invoicing**

The accounting reports included a separate report for foreign input paid in Sri Lanka. The expenses were reported in accordance with the cost codes of FINNIDA. This was the basis for a monthly invoice to FINNIDA for consultant's expenses in Sri Lanka. The invoice contained copies of all receipts, bills, etc. making the invoice very bulky. The average weight of one monthly invoice was approximately 12kg. The Project proposed to FINNIDA in 1988 that the expenditure could be audited in Sri Lanka from time to time rather than sending bulky copies to Finland, but this was not acceptable to FINNIDA at that time.





A separate invoice was monthly made by Consultant's home office, for reimbursement of the costs paid by the Consultant in Finland. Home office also verified and confirmed those invoices which were paid by FINNIDA directly to suppliers.

#### 5.4 Cost Control and Follow-up

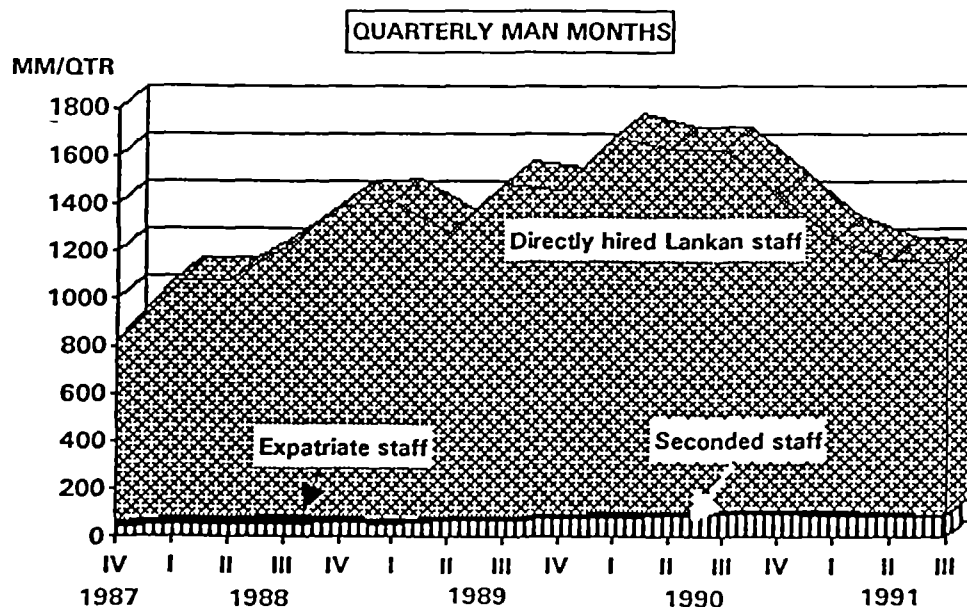
The Project initiated a cost control system, where all costs were also coded activity-wise. The activities were first divided into eight main areas and then further divided into several activities, each having a 3-digit code number. Since one of the main objectives, in addition to actual cost follow-up, was to introduce an efficient and handy tool for cost control and budgeting, the coding was kept as simple as possible. This caused few short comings; some overheads could have been divided into activities or shown separately. The problem was recognized, but as the effects were more or less cosmetic, it was felt that it is better to keep the system simple to facilitate easy adoption of it. Each transaction was recorded also in accordance with the FINNIDA cost type costing system.

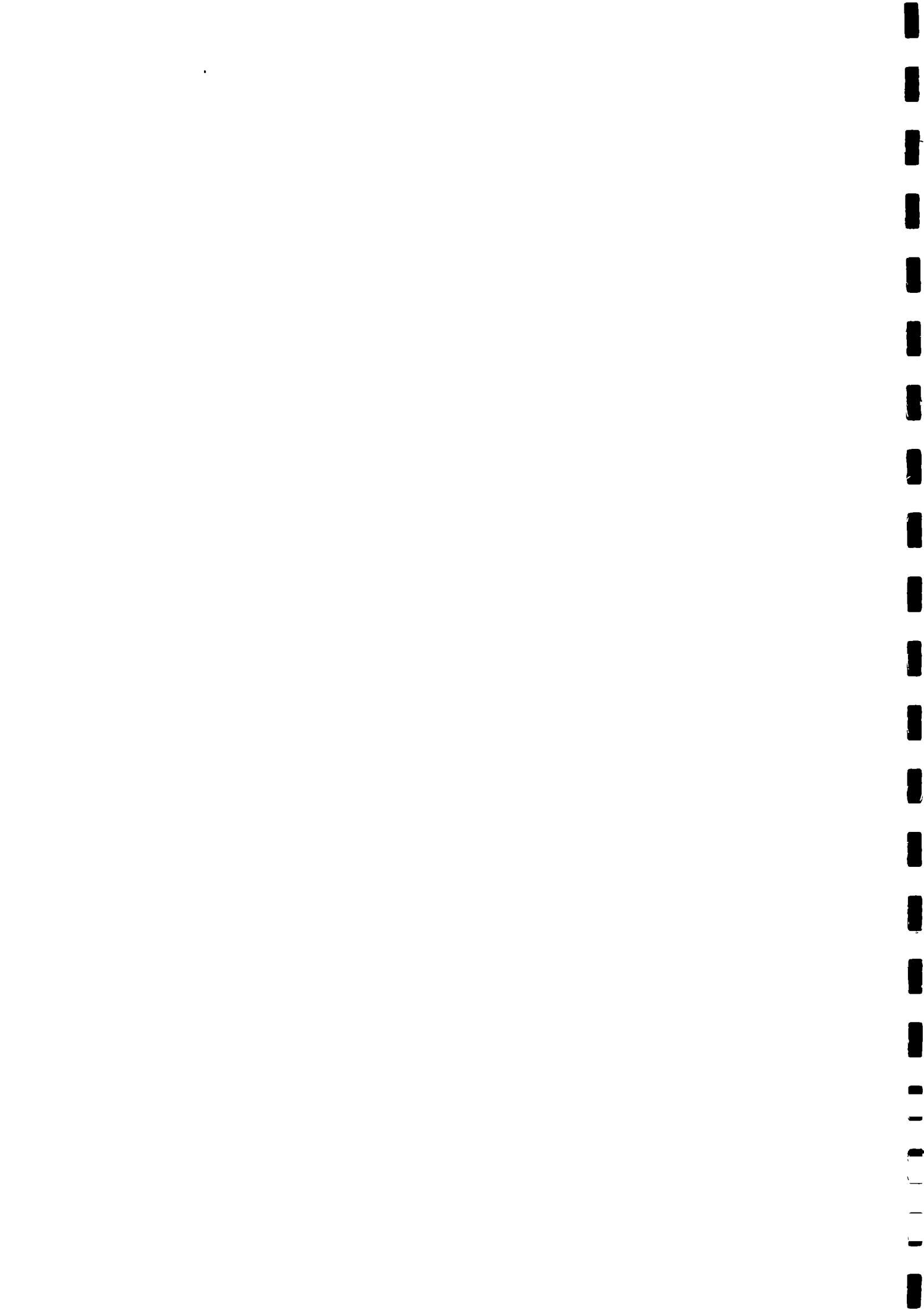
The organization adopted the system within a few months and in the course of the Project also learned to use it as a tool for cost control and budgeting. In Phase II the system will be improved, paying more attention to exactness.

#### 5.5 Personnel

Personnel Unit commanded by the Personnel Manager took care of all personnel management tasks and some of the office services.

The most laborious task was the monthly payrolling of salaries. Salaries were prepared by computer, for which a software was developed in the Project. Payrolling time averaged 2-3 days, resulting in necessary documents to pay and account for the salaries and obligatory pension and tax contributions.





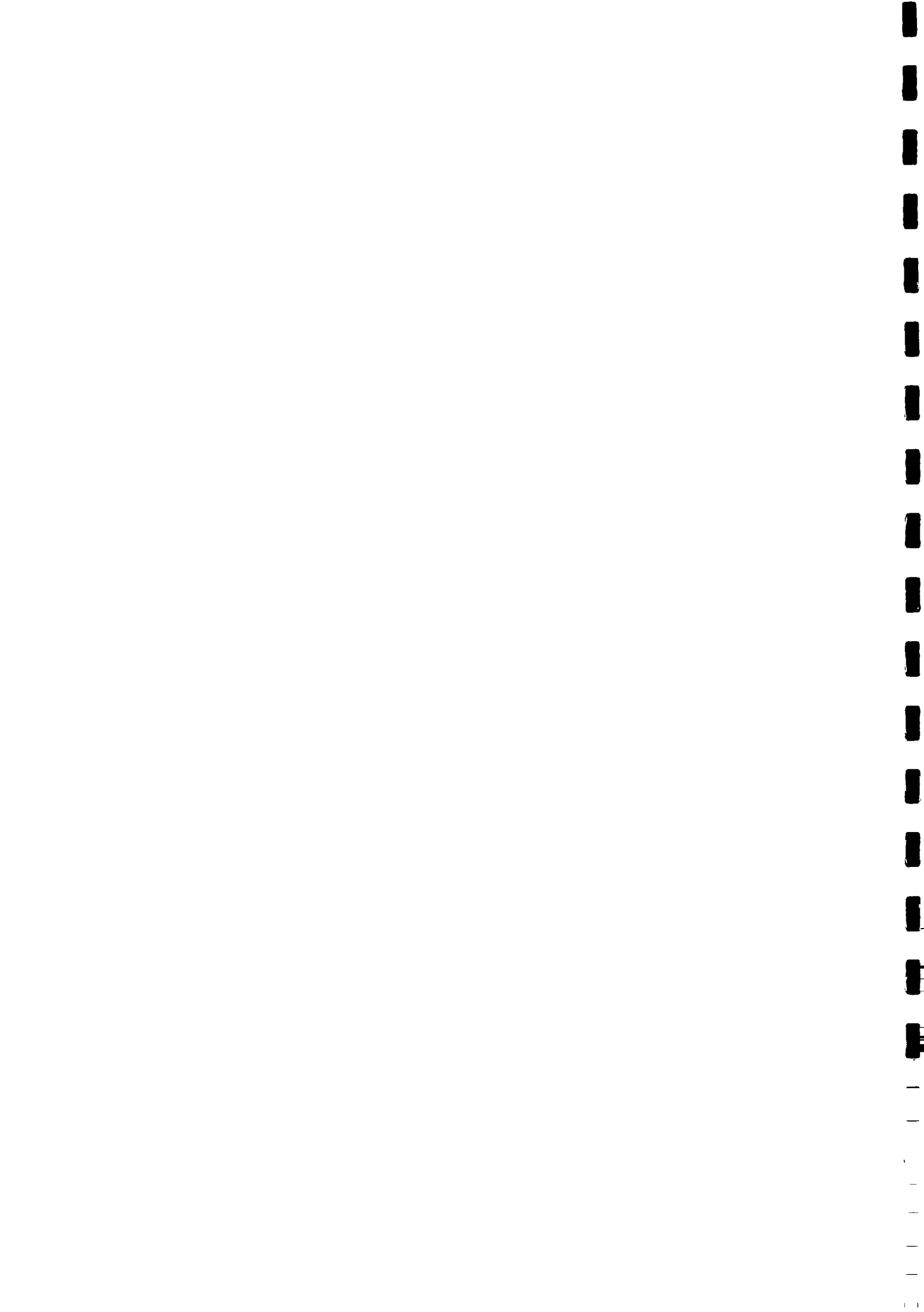
The unit made commendable work in sorting out employees' EPF (Employees' Provident Fund) and ETF (Employees' Trust Fund) records in appropriate government departments. Especially EPF records were in chaotic order and it would have been very difficult for an employee to obtain his pension money at the time of retirement in a situation where the employer is a foreign firm and not continuously represented in the island. The records were sorted out and there should be no problems for employees to claim their savings. Personnel unit initiated the scheme where employees' salaries were paid directly to their bank accounts. It took three years and only the arrival of computerized banking to the market enabled the Project to implement the scheme successfully. Since late 1990 all staff salaries have been paid directly to their bank accounts. This is not a small accomplishment. It introduced to some 400 persons the idea and benefits of saving money in bank. For most people in Sri Lanka, the personal economy is still a one month long hand to mouth cycle.

## 5.6 Procurement, Customs

Local procurement was handled by the Service Officer and his Assistant. Ordering powers were delegated to divisional level for routine procurement and purchases with lesser value. Procurement was mainly done from suppliers in Kandy area, but in some cases the Project was forced to move procurement to Colombo to prevent formation of local cartels. It appears to be customary that suppliers of an area form cartels in order to command better prices. This was particularly noted in stationery, vehicle spare parts, squatting pans and some hardware items. Hardware items were in small lots and it was not feasible or possible to buy them from Colombo. The Project agreed fixed discounts for these purchases and controlled the prices by random price verifications. All other mentioned items were procured in Colombo directly from importers or manufacturers.

The main problem in local procurement was that departments did not plan their material needs in advance, resulting in constant shortage of materials and panic procurement. With considerable effort and with utilization of central store services the situation was remarkably improved during 1988-89 and finally in 1989-90 reached satisfactory level. The other main problem was partly connected to the same; departments found it difficult to use centralized, planned procurement. They opted to do the procurement themselves, thus wasting a lot of productive time and transport facilities. This attitude was persistent and the problem had to be solved with limitations of buying power and with extended internal control. Satisfactory order was reached in 1989-90.

As Consultant's authority to buy directly from suppliers was limited to FIM 50,000.00, most of the overseas procurement was done by Government Purchase Centre (GPC) of Finland, through Consultant's home office. This arrangement was not satisfactory and should be developed in the future. In practice, minimum delivery time for even common ex-stock goods was six months. This resulted in several work stoppages for want of spare parts to machinery and delayed implementation of some other works as well. Further, Project's detailed instructions for shipping documents were rarely met. This caused delays in clearing and in a few instances only the goodwill of Customs and port authorities prevented confiscation of goods. Late delivery of documents and errors in them caused additional expenses in demurrage and multiplied trips to Colombo. The Project made 312 overseas orders. It is recommended that in future projects, with equal or bigger bulk of overseas orders, the implementing agency is given sufficient authority and manpower to control the overseas procurement or that GPC's procedures are developed.



Clearance of shipments, after a brief use of local forwarders, was done by a wharf clerk, stationed in Colombo and working under the Service Officer. The solution to hire own man to do the clearing proved justified. Clearing was done within reasonable time and without bribes. The cost was less than what forwarder's fees would have been. The same person also assisted in local procurement, in expatriates' visas and in other follow-up work in Colombo. This saved a lot of time and travel between Kandy and Colombo.

## 5.7 Transport

Transport unit consisted of Transport Officer and 40-48 drivers, working under the Chief of Administration. Drivers were further seconded to departments, together with the vehicles.

The large project area and variety of the activities, especially community and planning, created big demand for transport. The Project had 38 own vehicles largely inherited from HWSSP and used also hired vehicles in the beginning to meet the transport demand. Averagely, the Project vehicles travelled 95,000 km per month. The total mileage during the Project was 4.6 mill.km. In addition to this, the Project had 25 motor bikes, allocated to departments. Total mileage made by motor bikes was 1.4 mill.km. or 30,000 km/month.

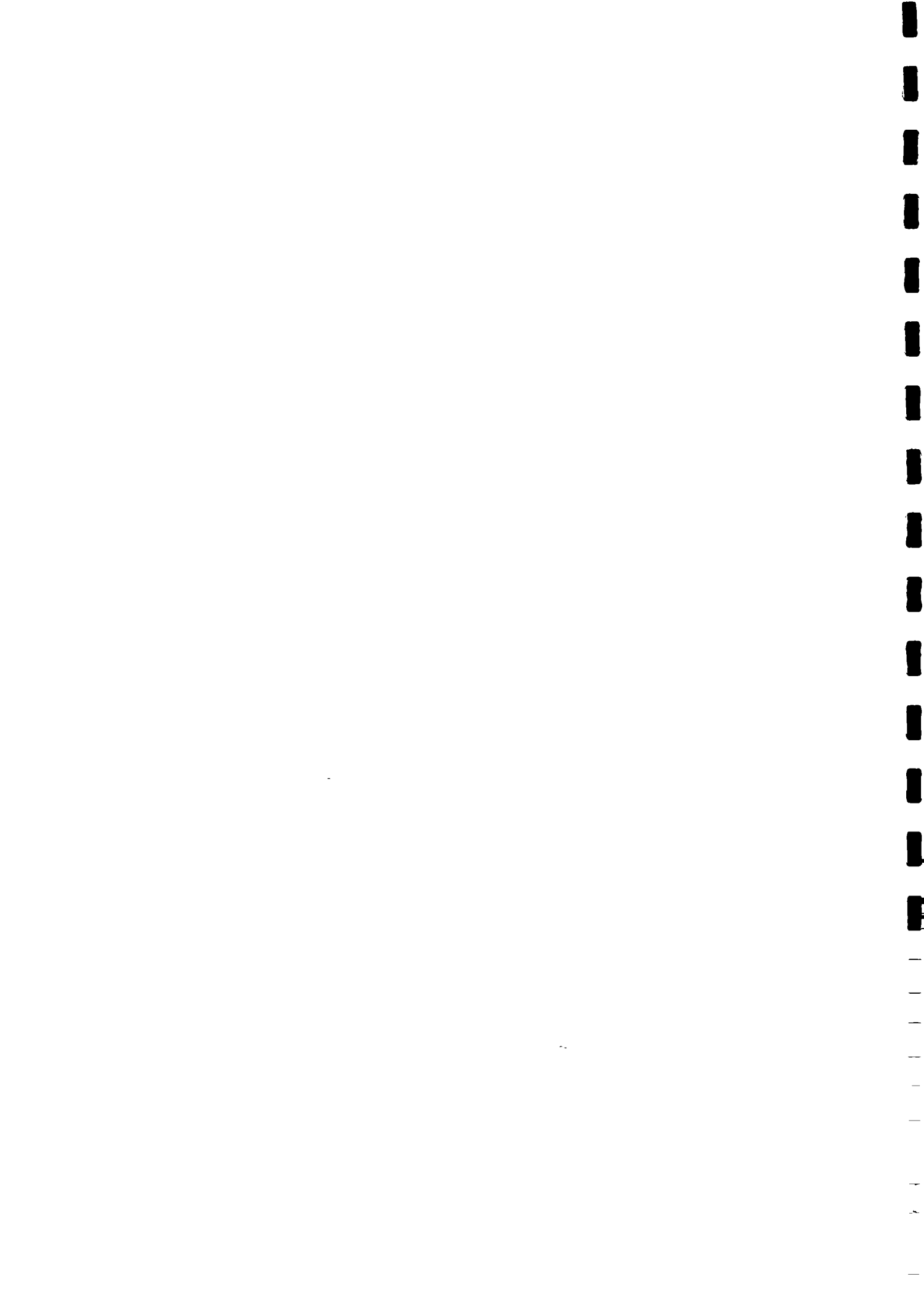
## 5.8 Garage

In May 1989, the Project workshop was divided into two; fabrication and garage. Garage unit was added under administration. The unit consisted of a foreman and 6-9 mechanics and helpers. The unit was responsible to maintain the transport fleet and field machinery, like drilling rigs, compressors and other machines. Under the new and skilled foreman, the condition of the transport fleet and the field machinery improved and number of break downs decreased remarkably. Further, planned preventive maintenance was improved for vehicles and was in some parts introduced for machinery. In the beginning of the phase, the garage services were suffering from large scale pilfering involving also several spare part suppliers. This was eliminated successfully.

## 5.9 Stores

As the garage and stores were included in administration in May 1989 in the re-organization of the workshop complex. New storing facilities were constructed to accommodate the stock items earlier stored in numerous and separate places. The stock control system was computerized at the same time, enabling more effective control of the material movement. Stores were further developed and arranged and the control improved. Regular physical inventories were used to monitor the store's performance. At the end of the Project, the total value of goods in stores was Rs. 34,057,323.00, consisting of 2,600 different stock items.

In the beginning of the Project, goods valued to Rs. 25,539,174.00 was received from Harispattuwa Water Supply and Sanitation Project. These included a large quantity of piping and other materials, which were still in the stores at the end of the phase. The



Project made several attempts to dispose of those materials, but did not manage to do it. Part of the material could have been used in the Project with adjustments to designs, while some materials could only be disposed of by selling them. A committee to arrange the sale of the surplus material was nominated by NWS&DB early in 1991, but the sale did not materialize during Phase I. As a lesson from this, it could be recorded, that design engineers should take into consideration existing material in stocks when planning new structures, quantity surveyors' skills should be used when ordering materials and last, but not least, the approach to new orders should be more critical. Orders to fulfil the budget allocations only should not be allowed.

As far as stores are concerned, some negative incidents, from the beginning of the project, can be mentioned: selling of Project's materials for own benefits and stealing of wire mesh. Value of the materials lost has been estimated to be approximately Rs. 500,000 - 700,000. Due to effective internal control similar cases have not been met.

#### **5.10 Automatic Data Processing**

The Project's administration department played an important role in developing the ADP, in the Project and as well in the recipient line agencies. The following software development work could be listed:

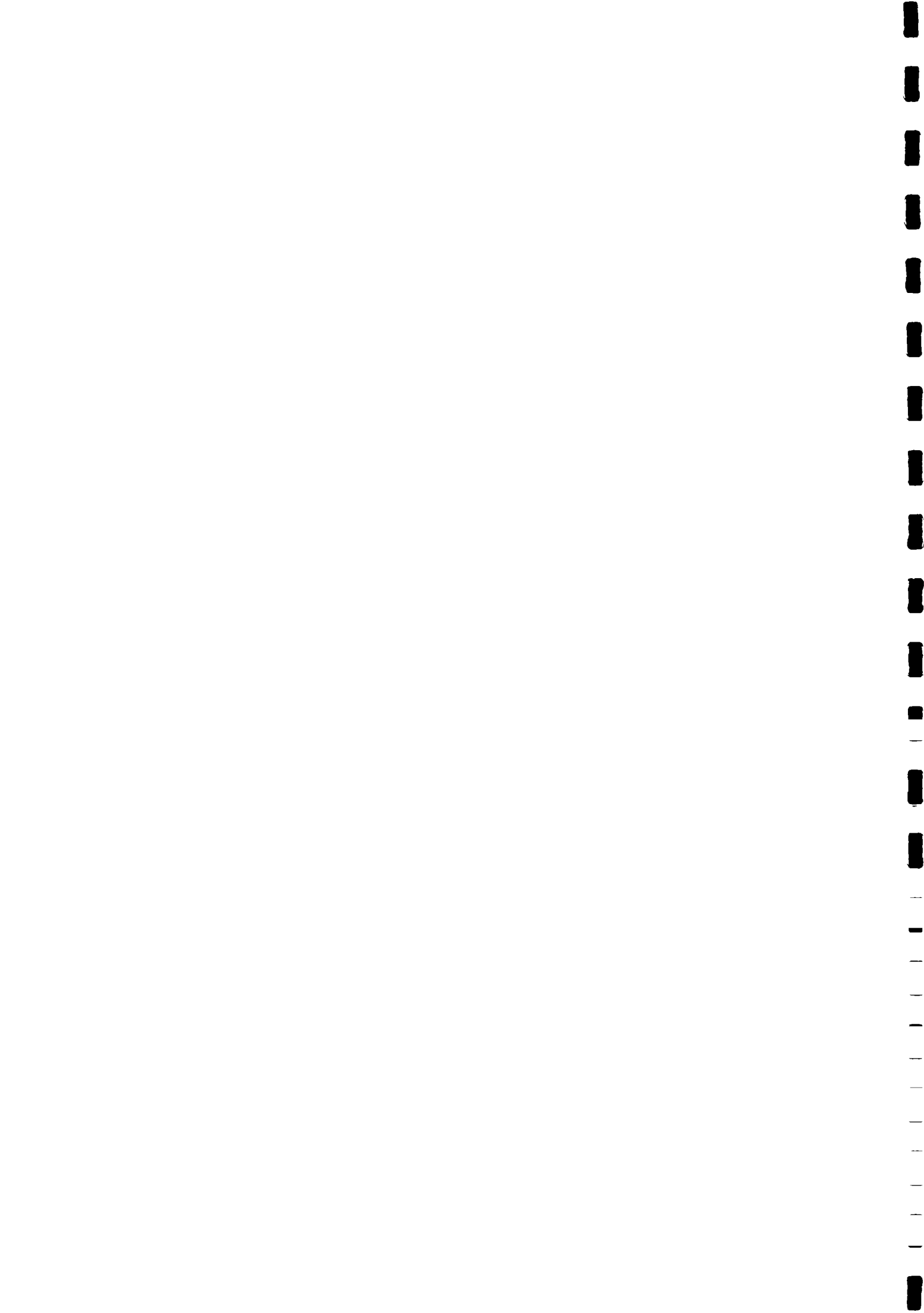
- salary computing package for the Project,
- stock control package,
- sanitation control and data package,
- salary computing package for governmental institutions,
- water billing and revenue control package for Pradeshiya Sabhas,
- expatriate's time report package,
- conversion package for currencies,
- overseas order control and management package,
- budget package,
- statistical package for planning department.

Several packages, mainly for line agencies, were under work at the end of Phase I. The packages were mainly developed in Dbase-programming language. This language was selected as it is the only commonly known computer language in Sri Lanka. This outruled the use of more sophisticated languages. ADP section also trained the staff of Pradeshiya Sabhas and the Project to use the packages, and computers in general.

The Project was commenced with only one computer, meant for accounting and salaries only. It was soon noticed that word processing and other activities also need to be computerized. Several computers were procured and extensive training programme implemented. At the end of the Project the computers were in common use, saving time in retyping of numerous reports and giving the staff a good base to further develop their skills in accordance with today's technology.

#### **5.11 Legal Matters**

The Administration Department was in charge of legal disputes and court cases. A number of appeals against the Project were filed in Labour Tribunal. At the end of the Project, all finalized cases ended in favour of the Project with the Labor Tribunal

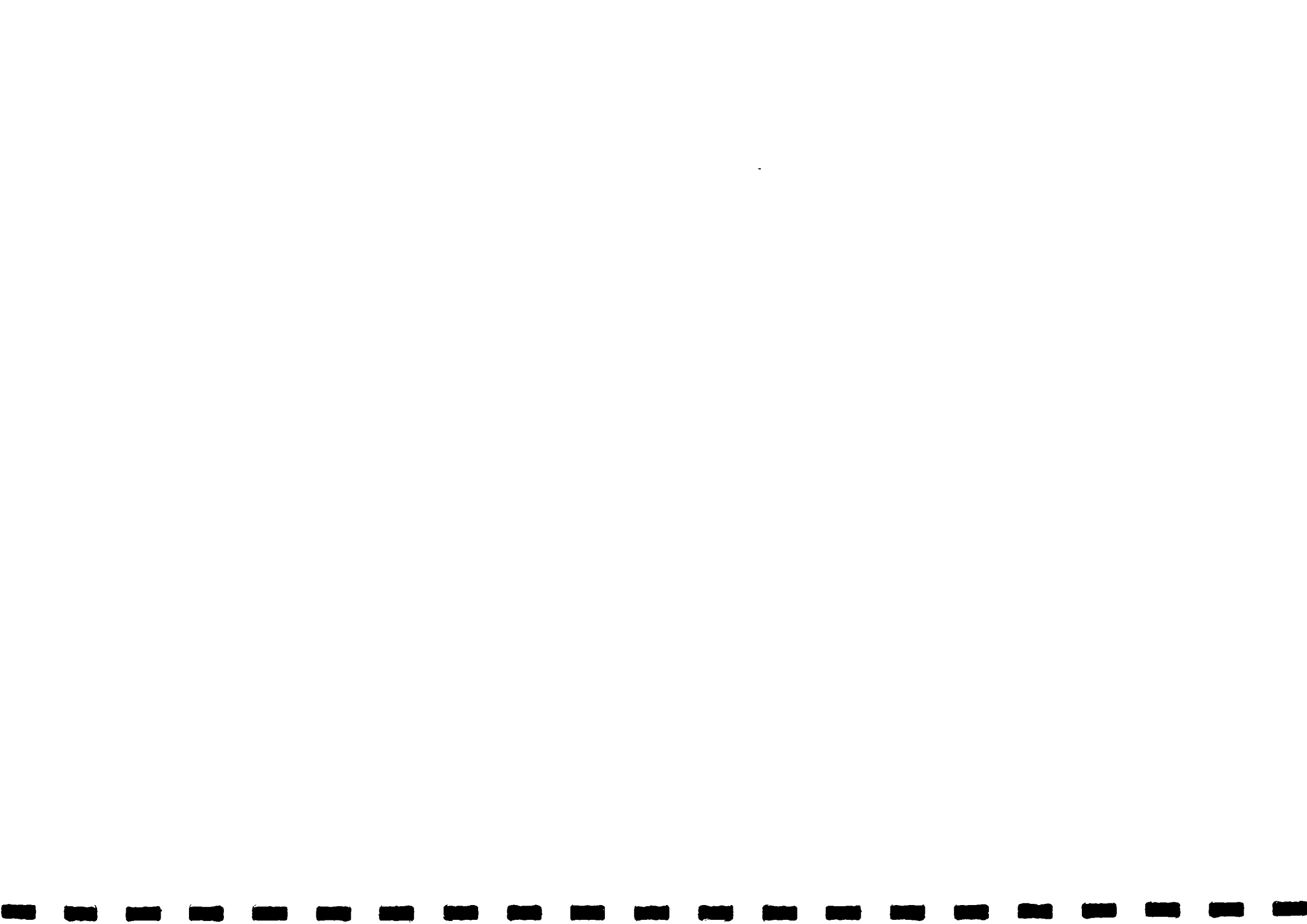


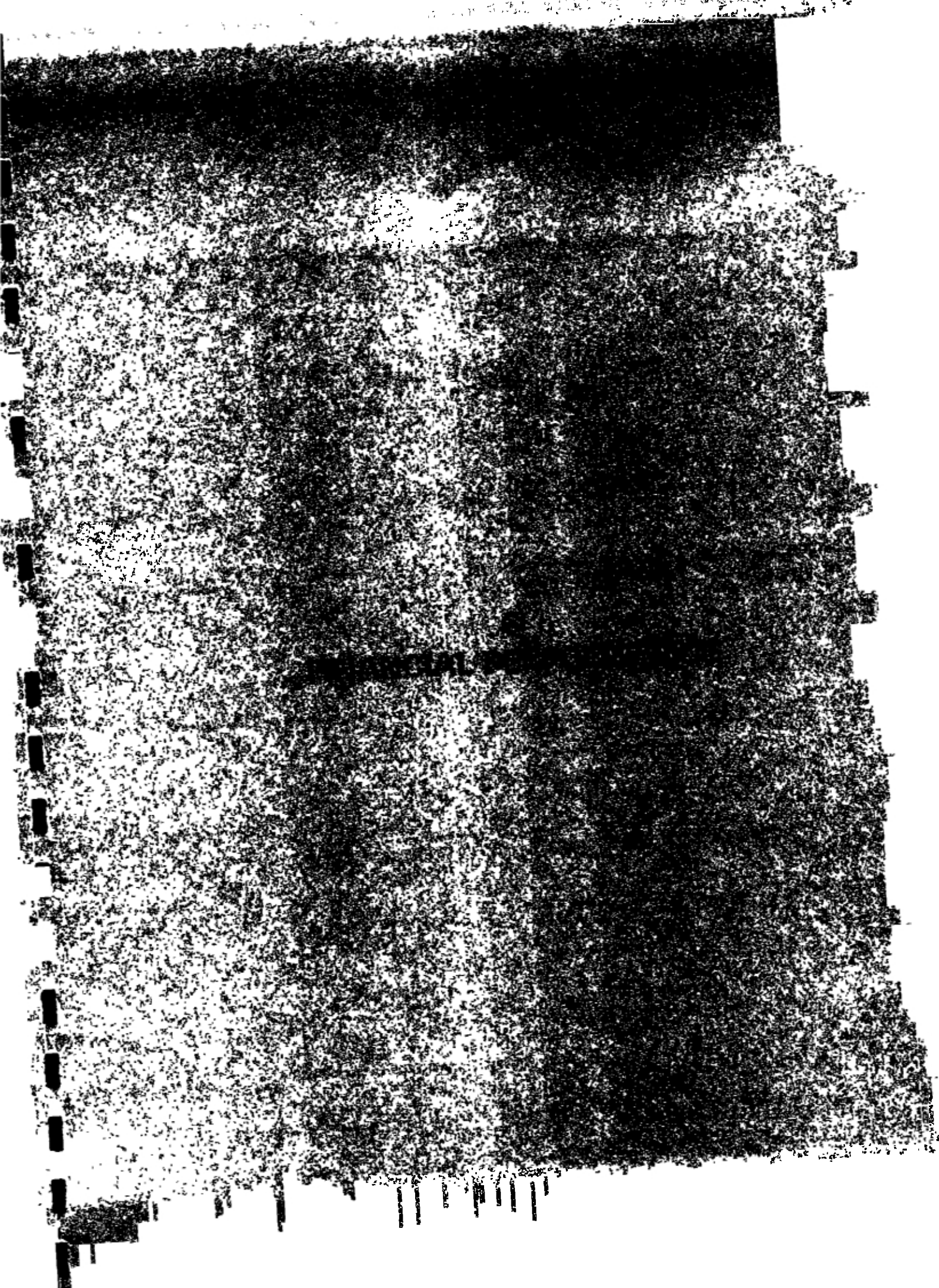


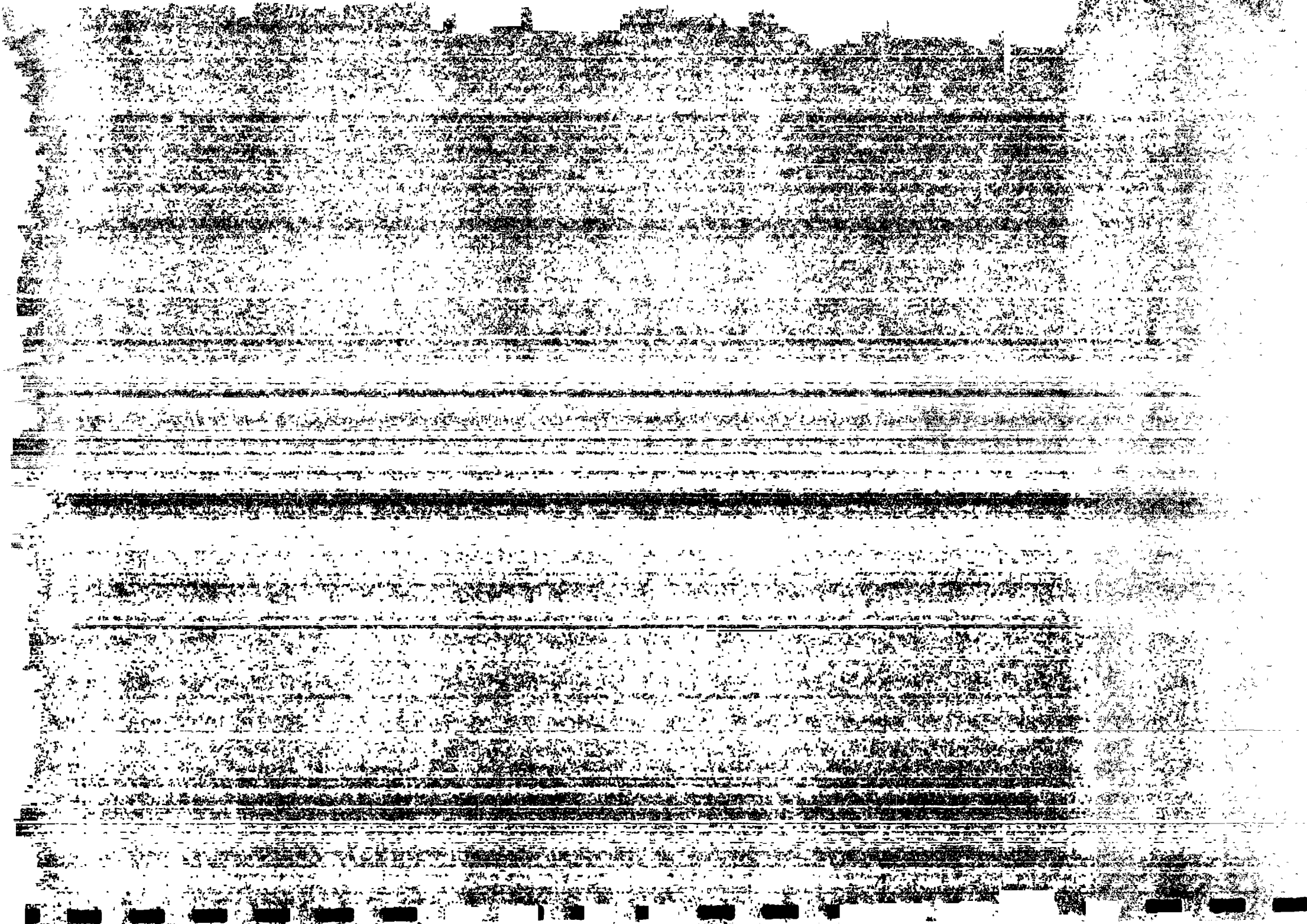
confirming the actions taken. All of the cases could have been avoided by a mutual settlement, where the Project would have had to pay some 2-3 month's salary to the applicants. It was, however, decided, that this could encourage misconduct among the staff.

Apart from labour cases there are three civil cases against the Project in courts:

- two traffic cases, where the other party claims compensation. Both cases are handed over to the insurance company for them to settle. Cases were still in courts at the end of the Phase
- a case where a supplier demands compensation for a lot of timber, which was rejected by the Project. The timber was rejected as it was not Mango as ordered, but some other timber not suitable for the purpose. The case has been in courts for over two years without any progress.





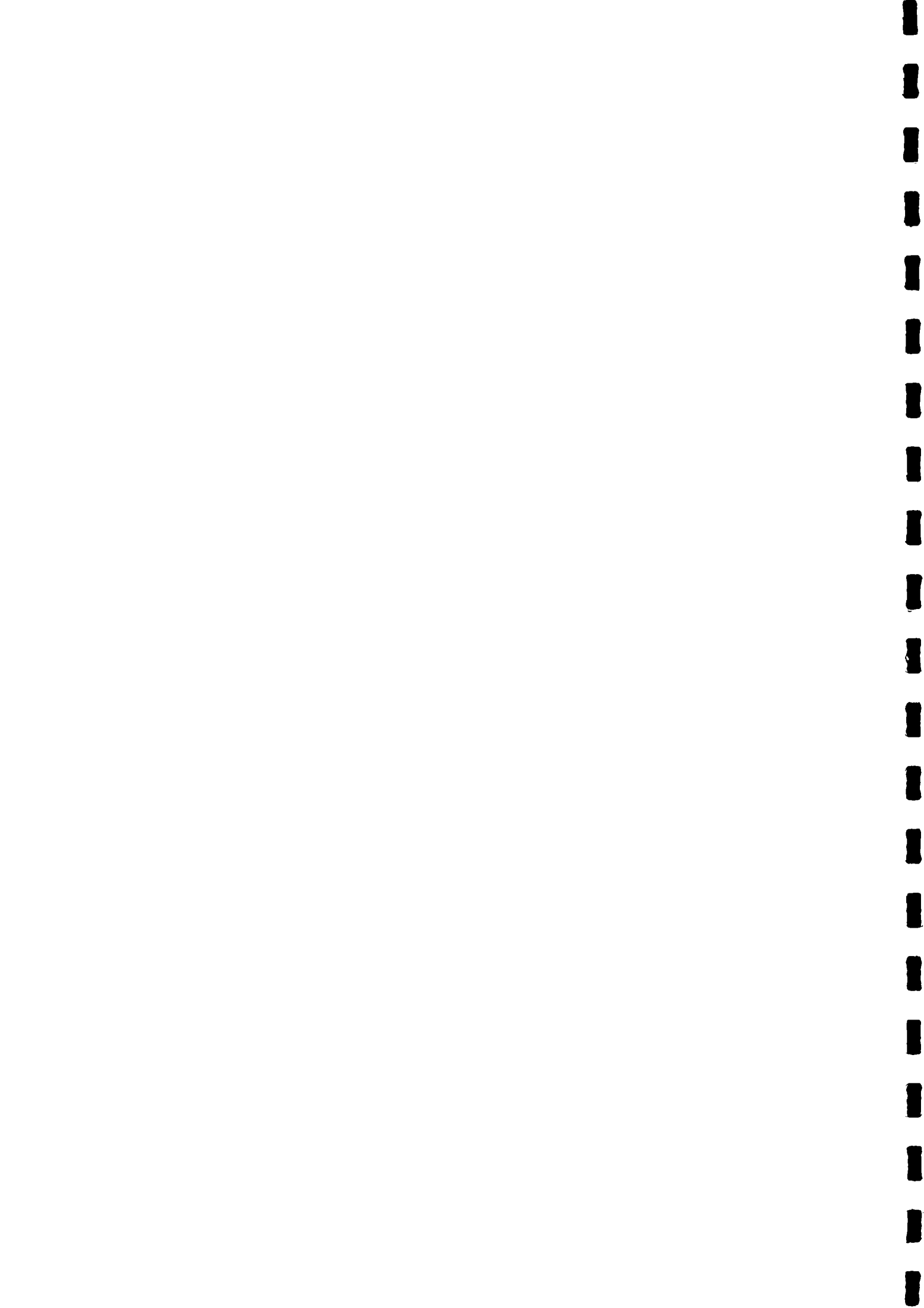


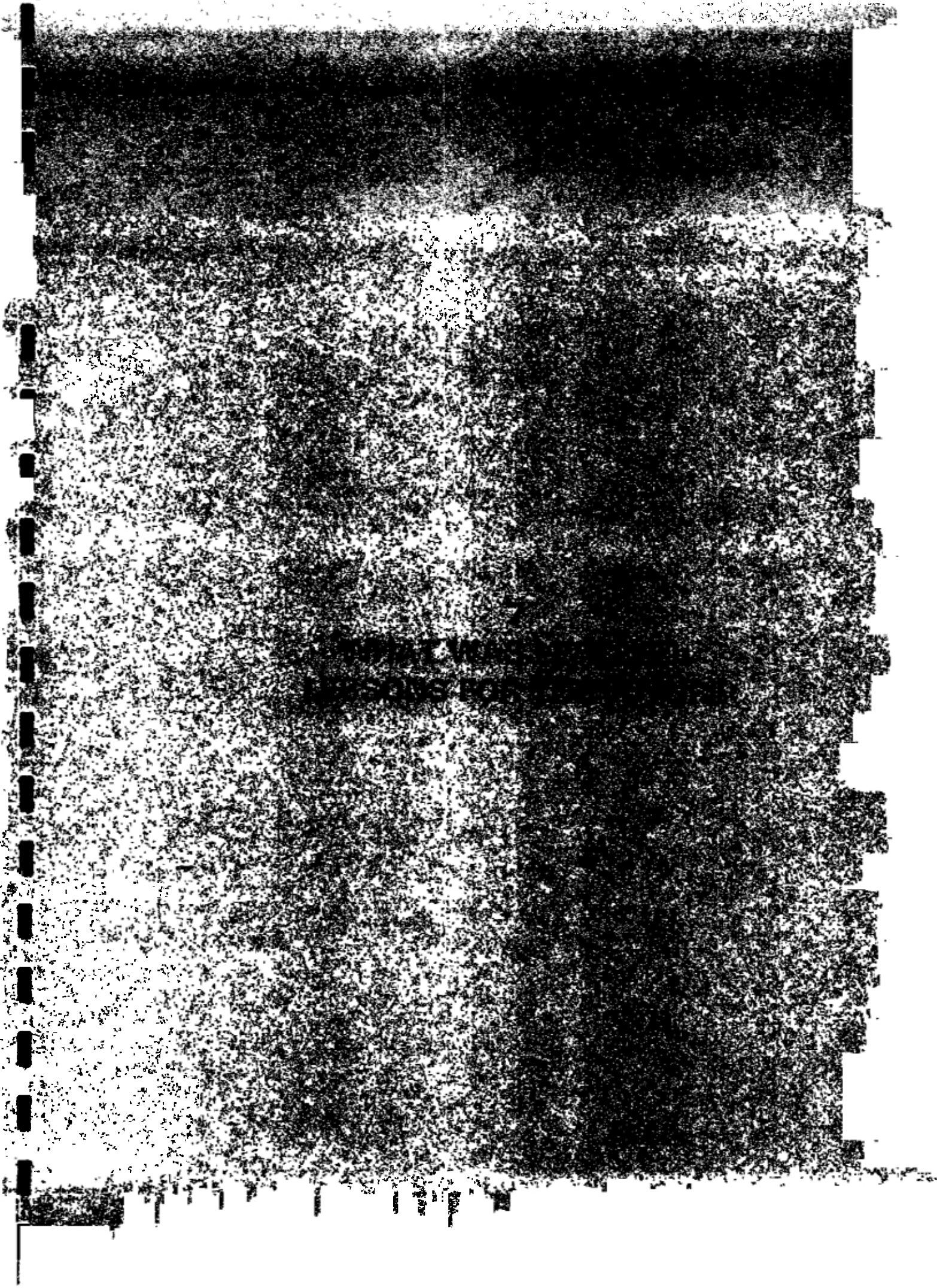
## 6. FINANCIAL PERFORMANCE

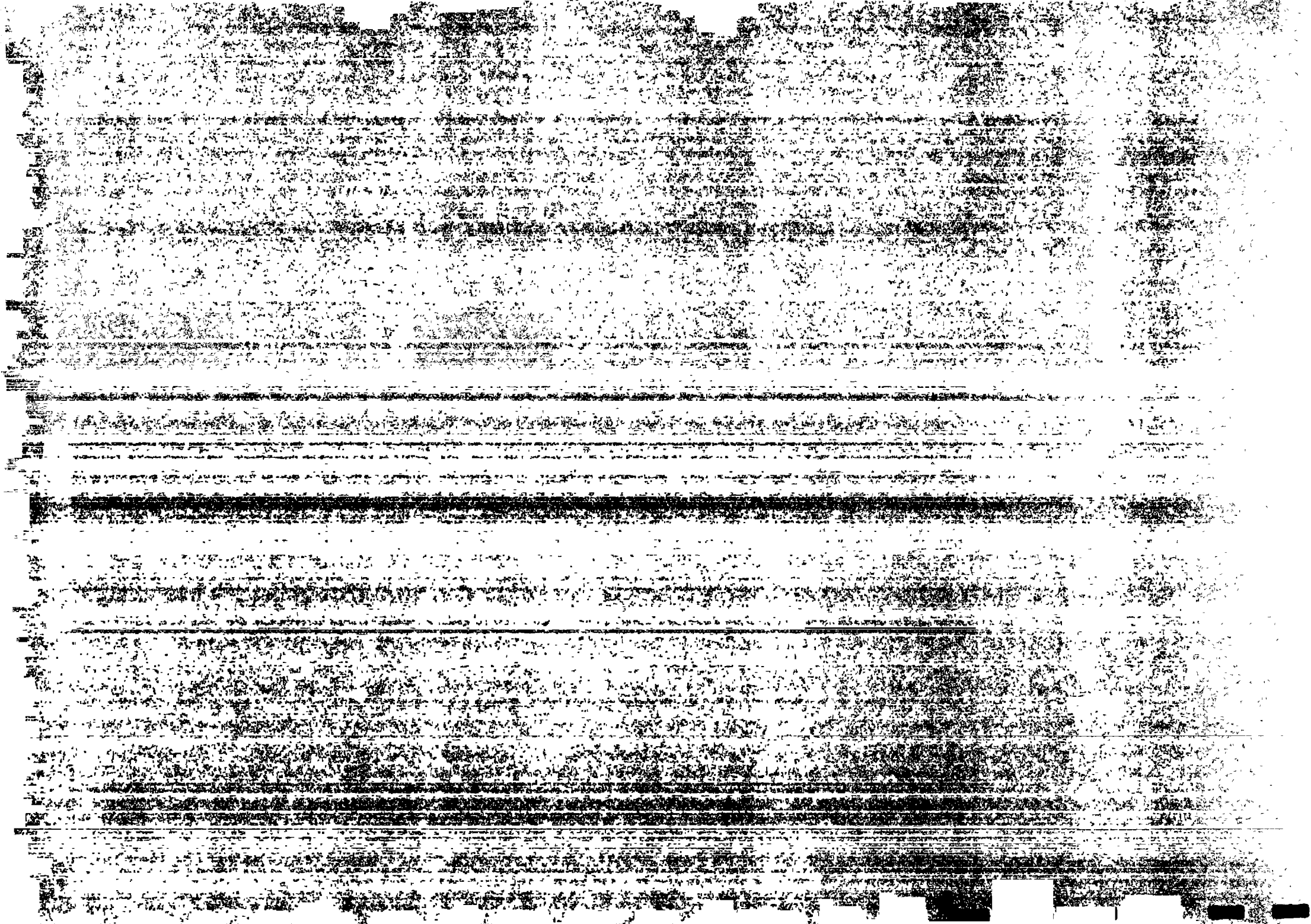
The detailed financial performance is presented in Appendix 4. Out of the FIM 64.6 million foreign component, 99% was disbursed. The local component expenditure was Rs. 46.6 million representing 82% of the target Rs. 57 million. It was, however, only 6.8% of the total expenditure, while the target was 15%. This apparent discrepancy is the result of the following NWS&DB proposals, which FINNIDA approved during the phase:

- Technical assistance to be 100% grant without 15% local component,
- The planning exchange rate was 1 FIM to 5 Rs. The actual average exchange rate during implementation was 1 FIM to 9 Rs. The local contribution was allowed to decrease accordingly rather than demanding the NWS&DB stick to the 15% contribution clause,
- Overheads of 35% of NWS&DB secondees' salary costs were counted in the local component as of 01.01.1991.

The Finnish contribution was 100% grant.









## **7. WHAT WAS LEARNED: LESSONS FOR THE FUTURE**

### **7.1 General**

Applying what was learned is particularly significant for the KDWSSP as it enters its second phase. Lessons for the future of Phase I are lessons for the present in Phase II and have a direct bearing on its activities. It is also appropriate to focus more on what was learned about the institutions in Sri Lanka as project activities shift from construction of developing these institutions.

### **7.2 NWS&DB Engineering Culture**

The key to understanding the NWS&DB is to know that it is an organization dominated by civil engineers. That is not intended as a negative statement, merely a description that helps explain why there has been a traditional lack of commercial awareness and concentration on design and construction at the expense of operation and maintenance. This is changing somewhat now that consumers are being charged for water and the NWS&DB must confront issues like viability directly rather than existing solely on government funds.

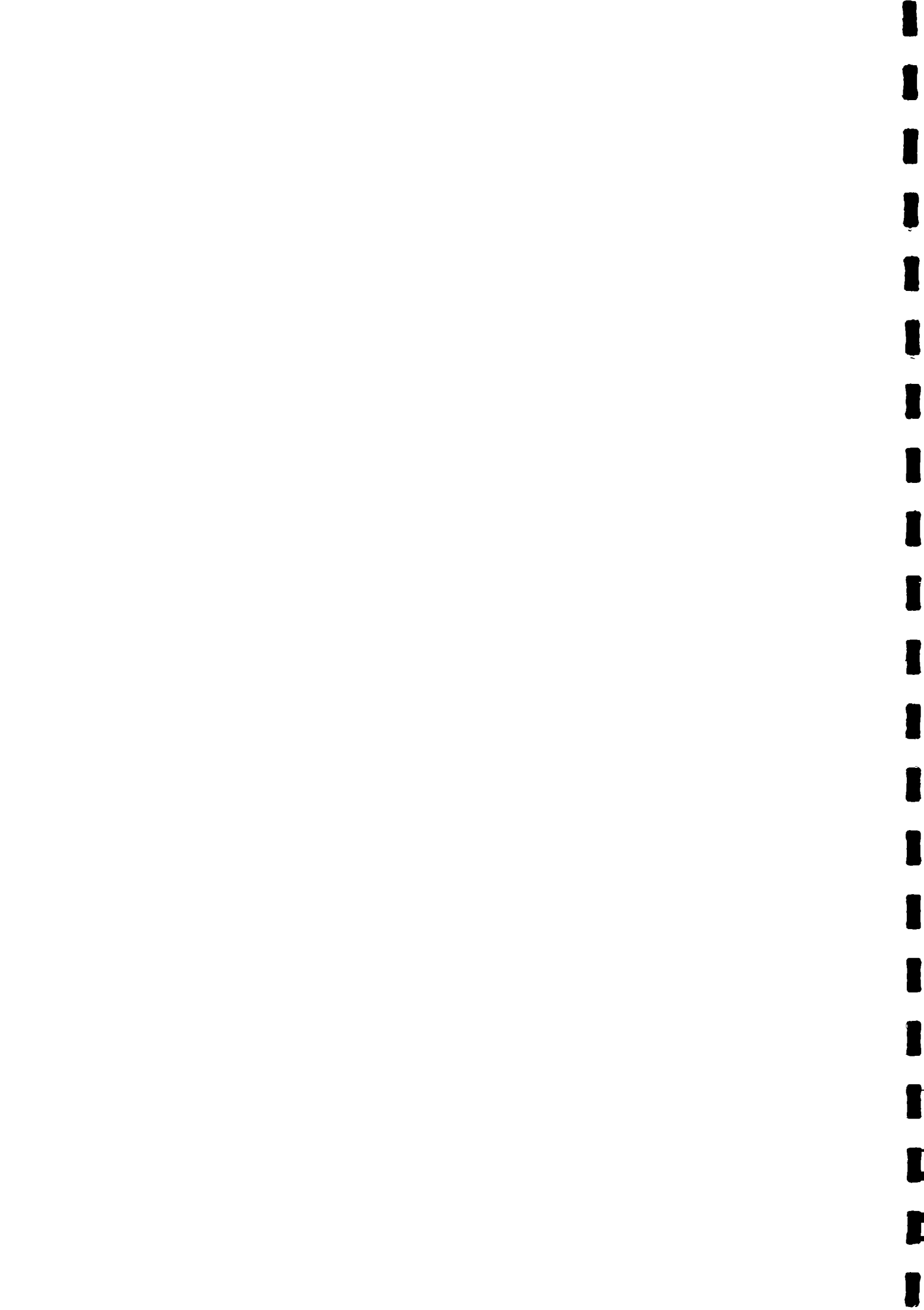
A project planning small-scale water supply schemes and/or the installation of hand pumps must take into account NWS&DB indifference to activities that do not involve major civil engineering works. The implementation of Phase I was marked with great interest by the NWS&DB in activities involving major piped water supply schemes and not much interest in those concerning hand pumps or small schemes.

The lesson for the future is that any project that wants its work to be truly sustainable must look past the rhetoric, which indicates an interest in all water supply schemes, and plan its programmes based on the reality, which is that the NWS&DB has its hands full with its traditional work and has shown minimal interest in the sustainability of small-scale schemes, including hand pumps. The implication of this is that a successful project must either increase the NWS&DB's involvement in small schemes or develop a sustainability strategy that does not depend on its involvement.

### **7.3 Transfer of Knowledge Amongst Peers and to Subordinates**

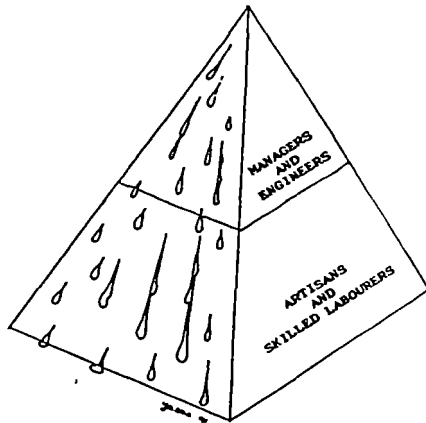
In the beginning an important part of Phase I was to place experienced foreign professionals in key positions so that their experience and knowledge would be transferred to Sri Lankan counterparts and their peers and subordinates. The idea was that one foreign professional would favourably influence relatively large numbers of Sri Lankans.

Unfortunately, this strategy was not as successful as was envisioned in the project plan. The relative lack of open communication and passing-on of knowledge appeared to be part of the culture and may not be amenable to change. The lesson learned was that if a project aims to disseminate knowledge widely, it must make that dissemination part of its programme.



## 7.4 The Gap Between "White Collar" and "Blue Collar"

This gap has already been discussed in section 2.2 of this report, but is considered in greater detail here as one of the important things that should be taken into account when planning future projects. The two features "hierarchical" and "status consciousness" together lead to great importance being placed on an employee's exact position in an organization and, equally, the symbols that go with that position.



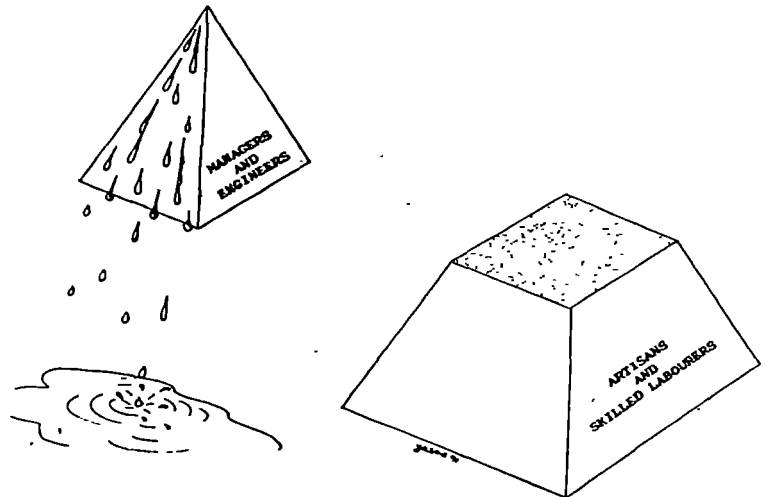
Without Gap

One important symbol is the freedom from doing manual labour: lifting, carrying, cleaning, etc. This symbol affected project work at all levels: engineers were reluctant to do hands-on field inspections and evaluations, technicians and foremen passed their hands-on work to skilled labourers and even skilled labourers were reluctant to do any manual work if they could pass it on to an unskilled labourer.

The importance of this to the KDWSSP was that it left a hole in the spectrum of skills. A lot of the equipment used in modern water supply systems can only be understood, installed, serviced and repaired properly after studying complex written instructions, which may be updated from time to time.

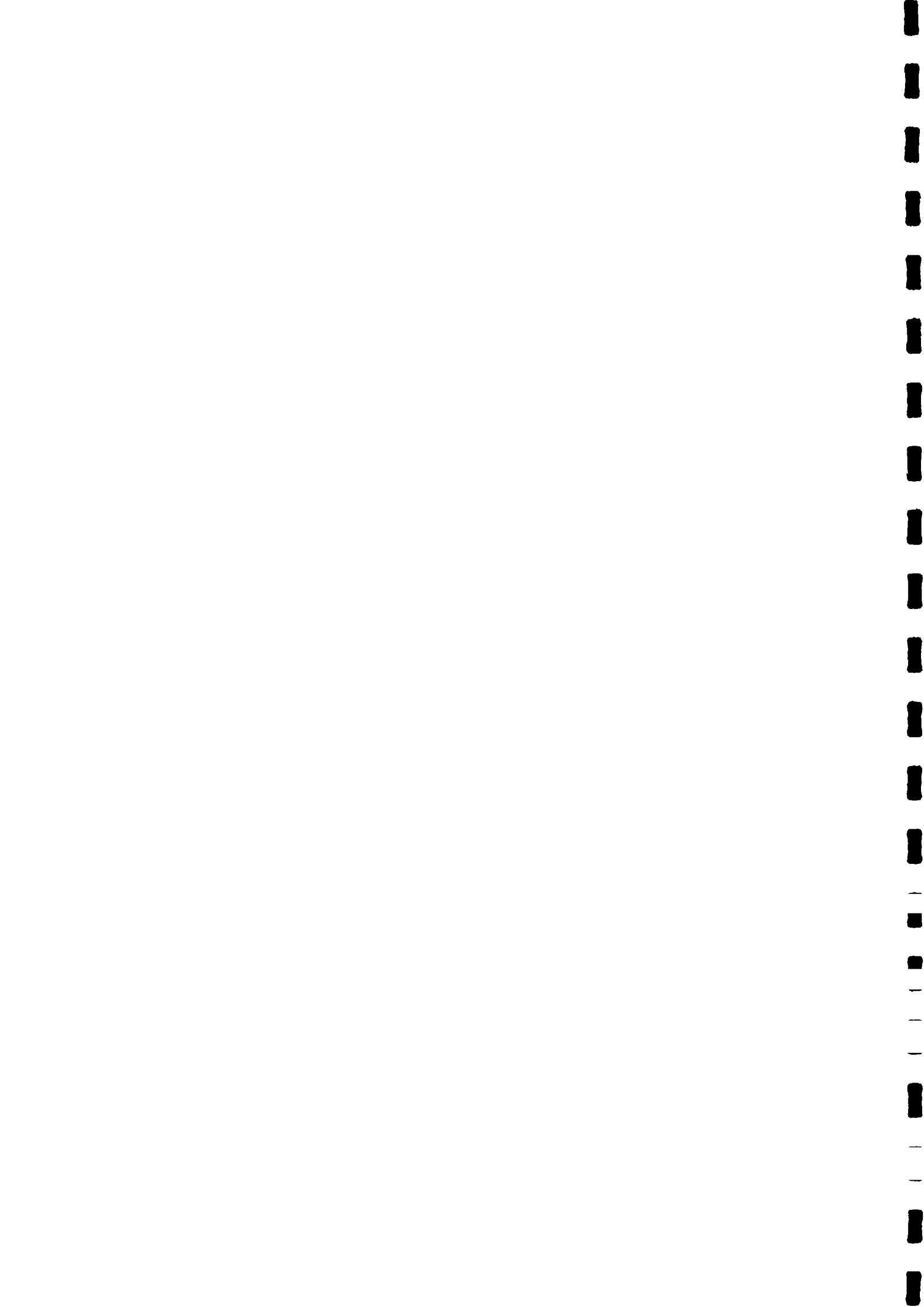
The skills required to do both the work and the studying bridge the white collar - blue collar gap and encompass both analytical and manual skills. In operation and maintenance, the ability to learn from both study and hands-on experience, to analyze why something stopped working and prevent it from happening in the future is essential.

The lesson for the future is one that is often ignored, both because it is not completely understood and because it does not carry a message that fits current development theology.



With Gap

The lesson is that technical assistance may be needed at the practical, hands-on level as much as in theoretical engineering and management. A successful project must examine the entire spectrum of skills and include programmes to strengthen weak links at every level.



## **7.5 The Political Environment**

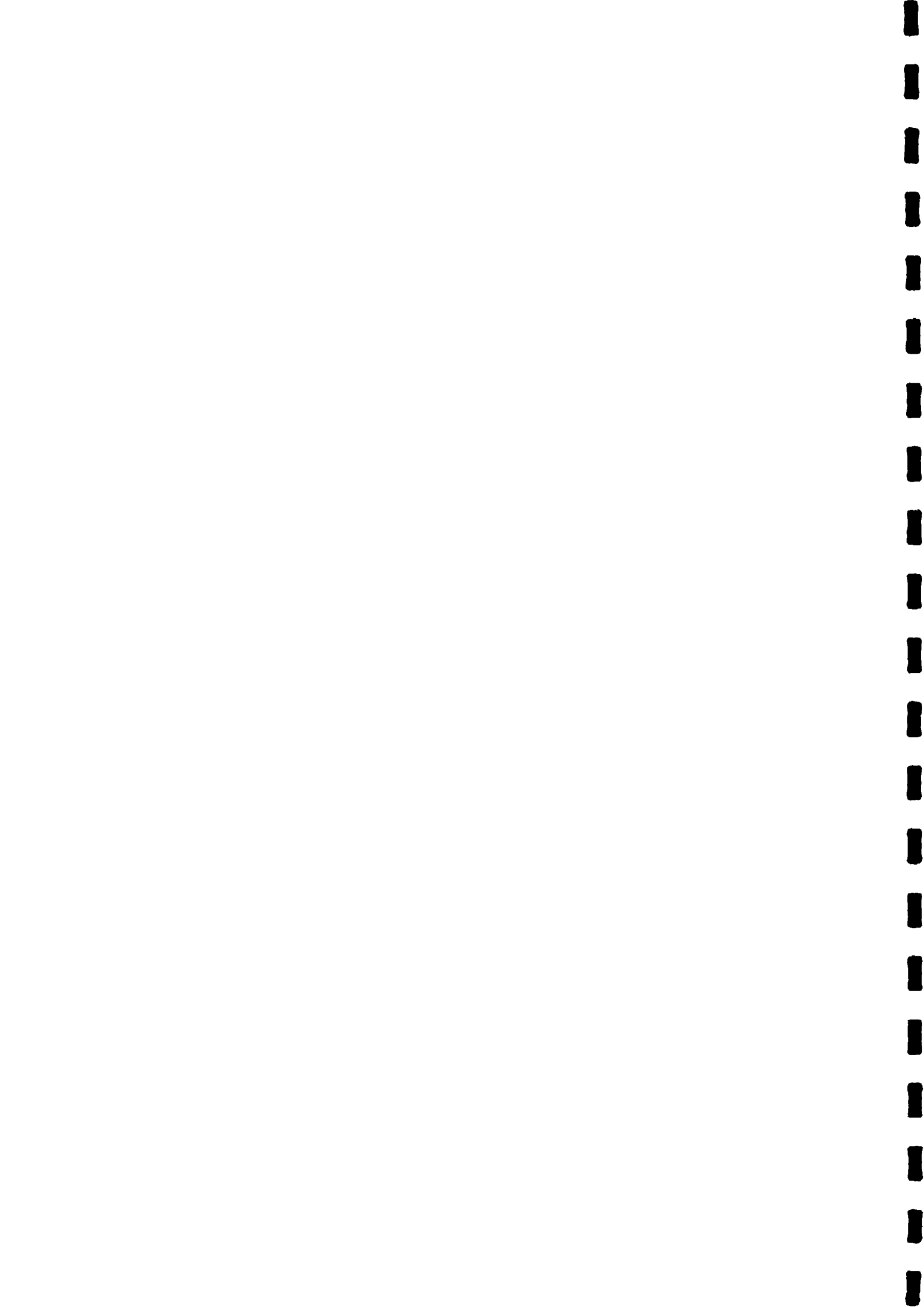
Political forces exist as part of the operating environment for any project and in the case of the KDWSSP they were sometimes positive, accelerating the pace of project activities, and sometimes multidirectional, exerting conflicting pressures. There is, for example, a conflict between the politically desirable goals of providing high levels of employment and inexpensive water. In addition, the project found itself initially unprepared for the political communication needed.

The lesson for the future is that project staff should be familiar with the political issues raised by their activities and try to anticipate and avoid conflicts. Also the design of a project should include definitions of the powers and rights vested in the project in order to reduce the potential for misunderstanding.

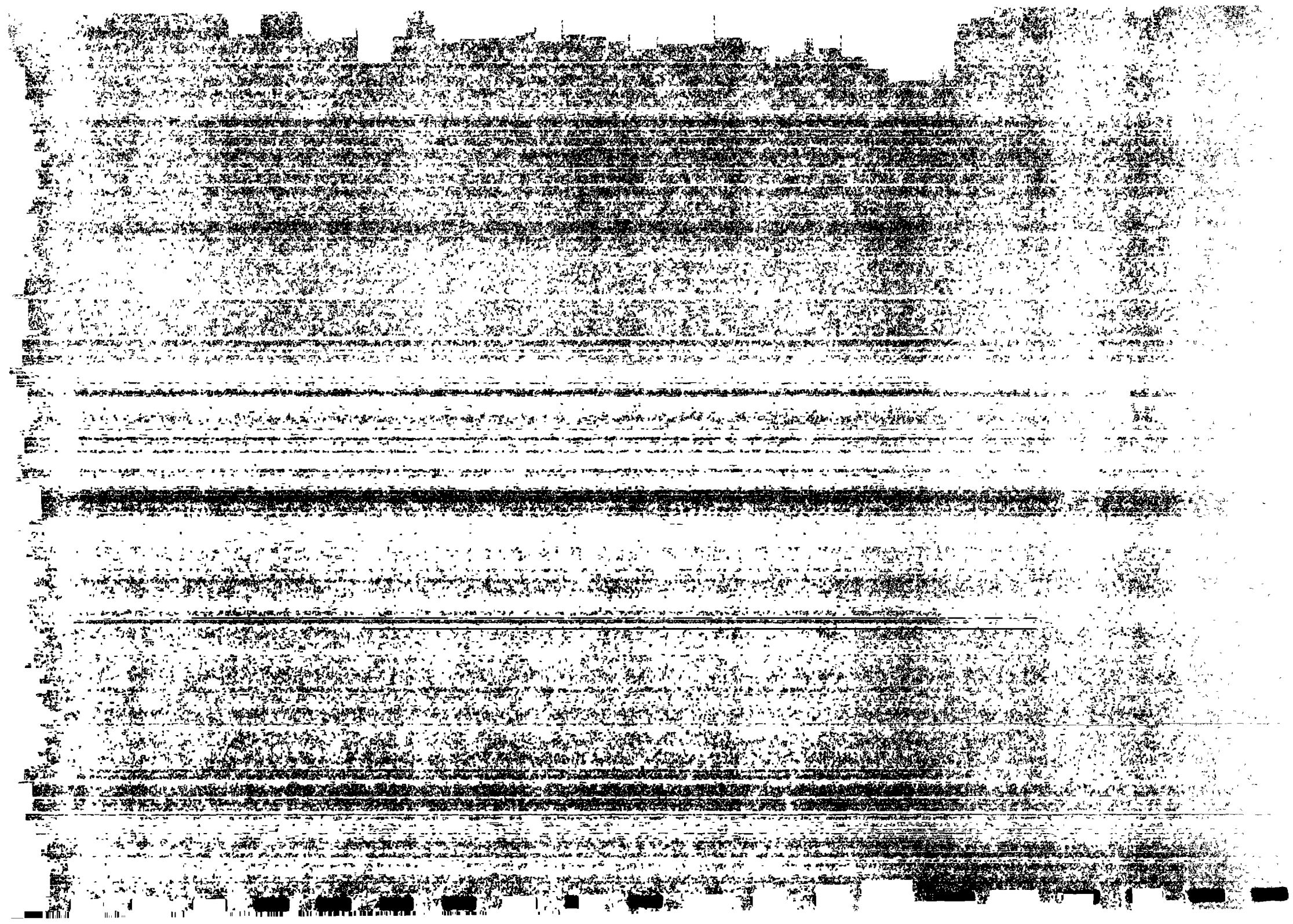
## **7.6 The Time Required for Institutional Development**

During the four year course of Phase I of the KDWSSP the emphasis shifted to include more manmonths devoted to institutional development. Engineers who were used to measuring inputs and outputs, scheduling progress and demanding on-time completion could only watch as the institutional development component of the project frustrated all attempts at tidy scheduling and programming. It was apparent that larger forces than those commanded by the project were affecting the way local institutions worked and the speed at which they could change.

What was learned was that institutional development takes time. Engineering Science, Inc., funded by USAID wrote in its final report, "ID takes time, six years is a minimum period on which to base the project design." The lesson for the future is that true institutional development and change must come from within the institutions themselves, at their own pace. The proper role of the KDWSSP in institutional development is that of a catalyst or change agent.



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## 8. CONCLUSIONS AND RECOMMENDATIONS

A comparison of the Project's goals with its achievements leads inevitably to the conclusion that Phase I was successful. Not only do many more people now have access to safe water and sanitation, the institutions in those sectors have been strengthened as well. That raises the question: "since it worked, why not more of the same?"

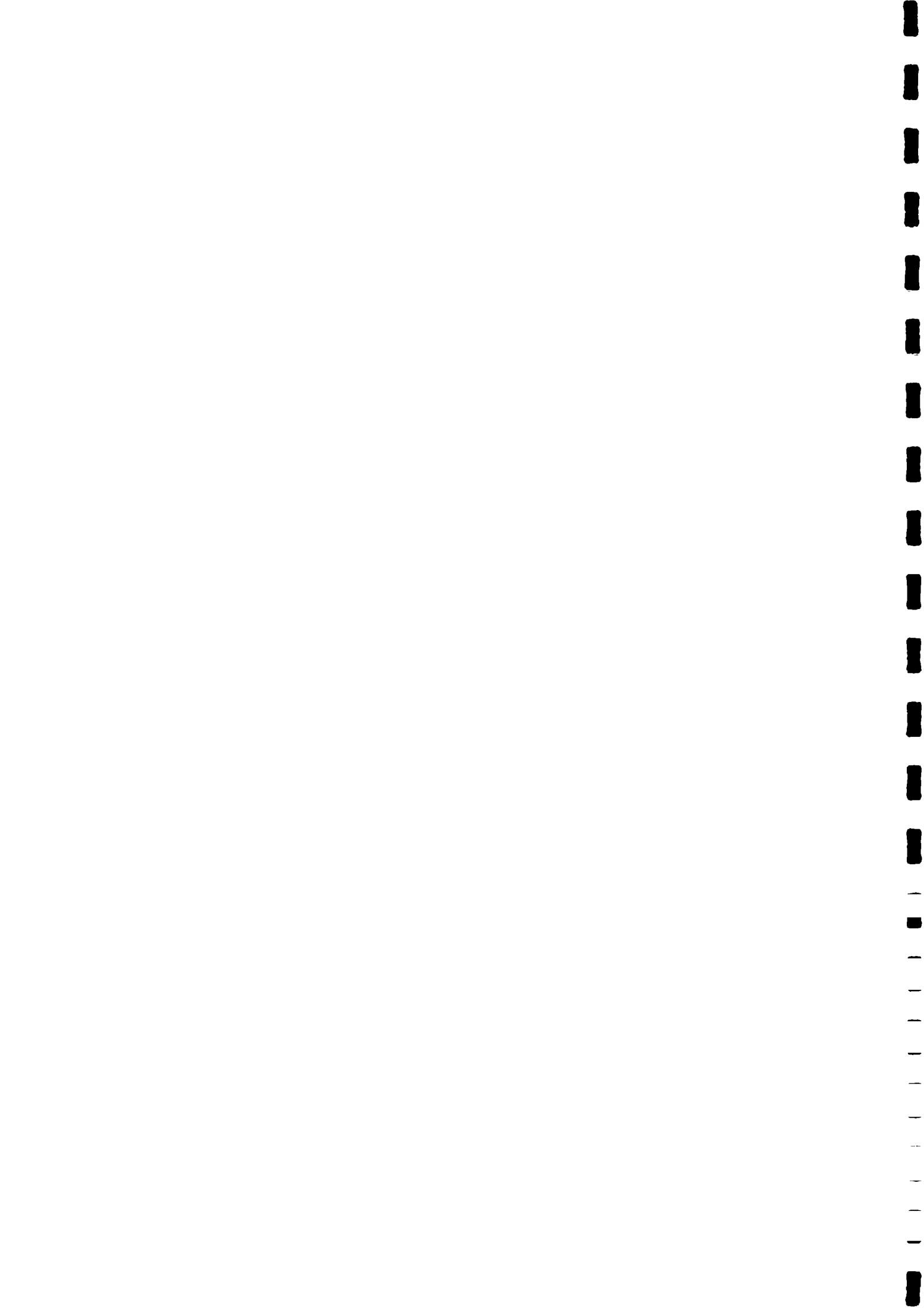
The answer to that question is repeated over and over again in this report: change. Both the situation and institutions have changed dramatically and what was appropriate for the '80s may not work so well for the '90s. Many of the easy water supply schemes, those with a river running nearby a densely populated area, have been built. The NWS&DB likes and understands those schemes and the KDWSSP worked to help them to understand, operate and maintain them better. The Project was not quite so successful in getting the NWS&DB to like and understand ground water sources. A lot of effort was focused on this area and while it can be said that the NWS&DB's ability to work with ground water sources has improved, its attitude toward them is still quite wary.

This is unfortunate because the only viable source for much of the population of the island is ground water. The government of Sri Lanka is committed to extending safe water supply to most of the population in the near future and finds itself with a dilemma: its main water sector organization, the NWS&DB, has been designed to deal with large schemes that are not viable for the majority of Sri Lankans. The NWS&DB can be likened to a delivery company that has been set up to operate a few big trucks. Now it finds itself being asked to extend its service by including hundreds of bicycle and motor cycle messengers. Although the basic business, delivery service, may be the same, the management, operation and maintenance requirements are completely different.

Looking to the future, the job of supplying water to the majority of Sri Lankans is going to be a matter of filling niches, using the appropriate technology for each situation. Many people will best be served by hand dug wells, others by bore holes fitted with hand pumps. More densely populated areas may get electric pumps with reservoirs and distribution pipes. Issues like the proliferation of types of equipment and necessary spare parts, the pollution of ground water by latrines and ownership of sources will complicate the equation.

A big question for the sector is which organization or organizations can do the job best? The NWS&DB has decentralized, become more commercial and increased its sensitivity to consumer demands, but there is still some question about whether it is really interested in hand dug wells and boreholes. Local authorities may be much more interested in developing small supplies, but do they have the expertise? The NWS&DB now has the responsibility for large schemes, but when is a scheme too small to attract its attention?

The KDWSSP, like many foreign funded projects in the '80s, became an implementing agency, doing the work that probably should have been done by Sri Lankan organizations. And then, having taken over the implementation, it sought out the Sri Lankan organizations that should have done the work, but did not have the resources and tried to make them over into its own image. Donors have been largely responsible for trying to impose this kind of change on local organizations like the NWS&DB, but can they really change them enough and how much resentment will come along with attempting to bend them too much beyond their natural orientation? What seems to be missing are Sri Lankan organizations that are prepared, physically and philosophically, to do the job in the rural areas that donors and the government of Sri Lanka agree should be done.



Looking at Phase I of the KDWSSP as an exercise in improving water and sanitation, it would be logical to recommend more of the same. But delving more deeply into the issues of institution building and sustainability, the recommendation must be for donors to spend more of their resources developing the appropriate local agencies and then letting those agencies participate more fully in the implementation. If no local organization can be found or created that can cooperate, in spirit as well as action, with the donor it might be best to rethink the wisdom of funding the project.

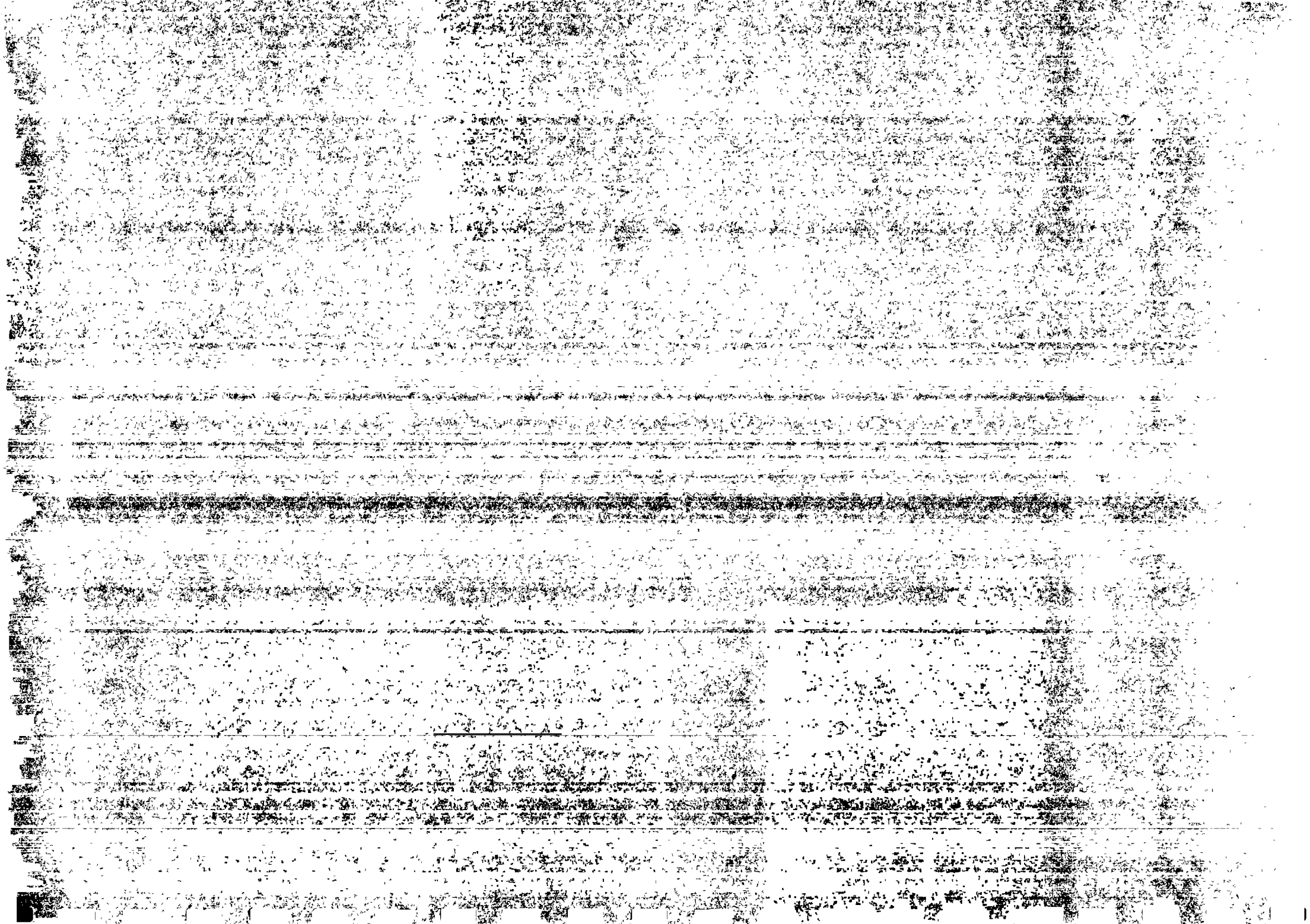
This is not a condemnation of development assistance or even a suggestion that it should be reduced. It is a statement that the issues of the 1990s, viability and sustainability, demand a new approach. The key to this approach will be to make the development of local institutions the cornerstone of any project instead of an afterthought.



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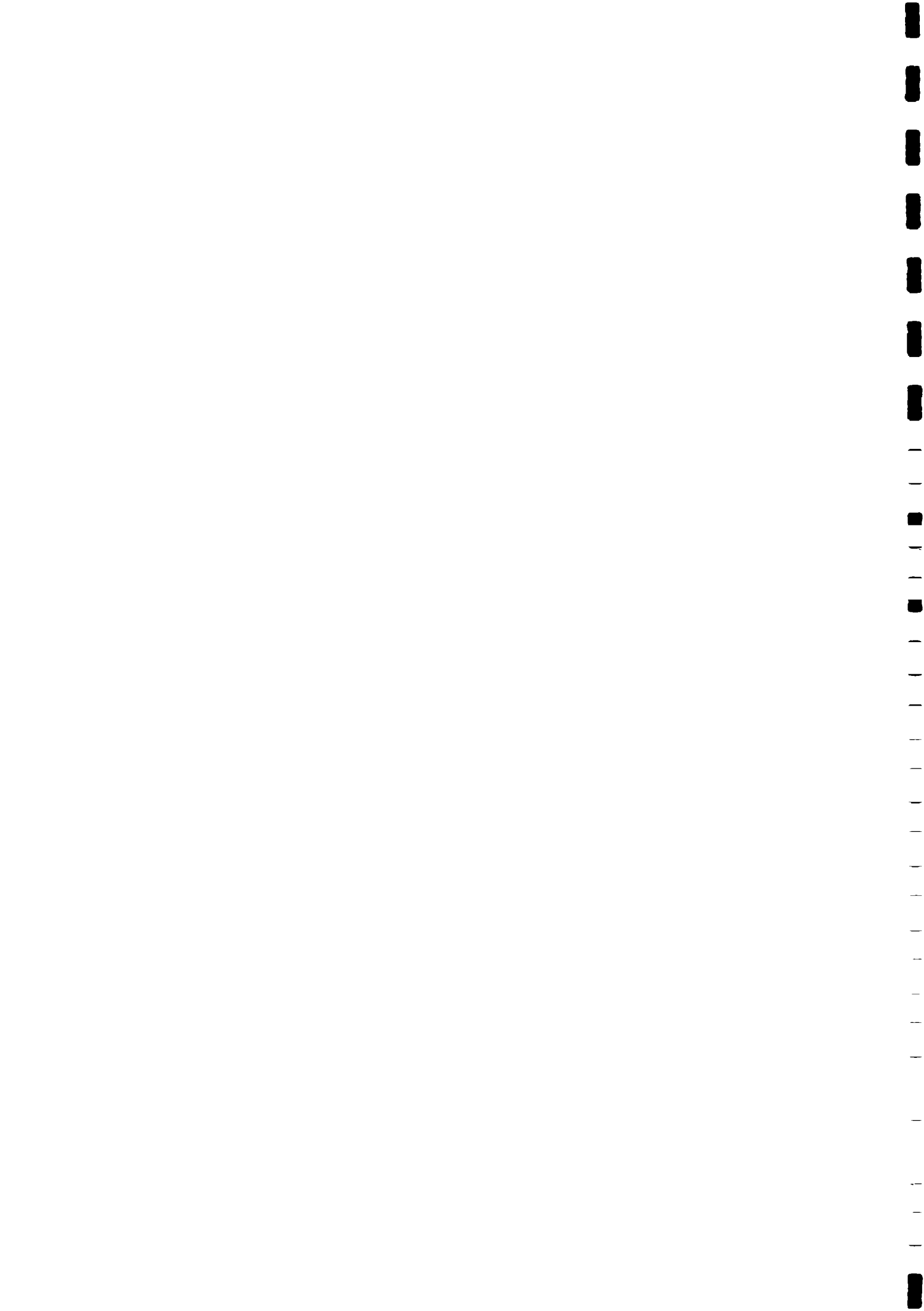
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## EXPATRIATE MAN MONTHS

EXPATRIATE'S NAME	DESIGNATION	DATE START	DATE END	MAN MONTHS
<b>IN SRI LANKA</b>				
Aapola Roger	Hydrogeologist	01.03.88	06.07.90	24
Ettala Urpo	Workshop Engineer	16.12.87	19.05.89	16
Hakala Pertti	Chief Construction Engineer	04.11.87	31.12.90	35
Hassinen-Ali Azzani Tuulikki	Community & Health Advisor	12.10.87	31.05.91	38
Huotarinen Hannu	Well Engineer, Engineering Advi	23.10.87	29.03.89	22
Järvelä Pertti	Design Trainer	27.09.90	31.08.91	10
Johansson Kari	Project Manager	01.07.88	30.09.91	34
Jokinen Seppo	Chief of Administration	01.09.87	30.09.91	45
Kankaanpää Pekka	Project Manager	15.09.87	08.07.88	9
Kuokkanen Markku	D&P Advisor	23.02.90	31.12.90	9
Laru Eero	Sanitation Engineer	16.09.87	18.09.89	23
Lento Irma	Design Engineer	01.02.90	05.07.90	4
Lento Olli	Chief Desing & Planning Engine	02.10.87	05.10.90	36
Päivinen Markku	Drilling Supervisor	18.09.87	16.09.88	12
Pease David	Operation & Maintenance Advis	12.10.90	30.09.91	11
Salminen Kristiina	Feasibility Study Expert	03.02.88	15.11.88	8
Taka Matti	Hydrogeologist	16.09.87	05.11.89	33
Tuittula-Pease Tuija	Health & Sanitation Advisor	26.04.91	30.09.91	4
Short term expert visits	Ten experts	01.10.87	30.09.91	10
<b>TOTAL IN SRI LANKA</b>				<b>383</b>
<b>IN FINLAND</b>				
Coordination	Project Coordinator	01.10.87	30.09.91	18
Secretary & procurement	Project Secretary	01.10.87	30.09.91	11
Experts	Several experts	01.10.87	30.09.91	9
<b>TOTAL IN FINLAND</b>				<b>38</b>
<b>TOTAL MAN MONTHS OF EXPATRIATE INPUT</b>				<b>421</b>





SECONDEE MAN MONTHS

SECONDEE NAME	DESIGNATION	DATE START	DATE LEFT	MAN MONTHS
<b>ADMINISTRATION</b>				<b>92</b>
ATTANAYAKE M A M S L	DEPUTY PROJ. MANAGER	01-Nov-90		11
SIRISENA A	CLERK	01-Dec-89		22
SOMAWATHIE W M	CLERK	01-Dec-89		22
VITANAGE D C	DEPUTY PROJ. MANAGER	01-Oct-87	31-Oct-90	37
<b>PLANNING &amp; DESIGN</b>				<b>475</b>
ABEYSEKARA M	ENGINEER	06-Jul-88		39
ATTANAYAKE A M D D	TECH ASSISTANT	02-Nov-87	31-Aug-91	46
DAYARATNE G	ENGINEER	27-Mar-91		6
DOOLWALA N C	TECH ASSISTANT	07-Apr-89	30-Sep-90	18
GINIGE S G	ENGINEER	11-Jan-88	31-Jan-91	37
MADAWELA R M C N K	TECH ASSISTANT	01-Oct-87	20-Aug-91	47
MEEGODA	ENGINEER	17-Jun-91		3
MENIKDEWELA W M S K	ENGINEER	03-Apr-89	21-Jun-91	27
NEDURANA J R B	ENGINEER	14-Dec-87	30-Jun-90	30
PERERA J K L C	ENGINEER	08-Mar-90		19
RATNAYAKE N S K	TECH ASSISTANT	01-Oct-87		48
SARATH GAMINI P H	ENGINEER	23-Oct-87		47
SENANAYAKE P S S	TECH ASSISTANT	03-Oct-89		24
SENARATH G R R P	ENGINEER	22-Mar-91		6
SENAVIRATNE S M	TECH ASSISTANT	04-Apr-89		30
WIJEKOON P M L C	TECH ASSISTANT	01-Oct-87		48
<b>WELL PROGRAM</b>				<b>69</b>
ATHAPATHU M P	TECH ASSISTANT	02-Nov-87	20-Jul-90	32
ATTANAYAKE M A M S L	ENGINEER	01-Oct-87	31-Oct-90	37
<b>WATER WORKS</b>				<b>299</b>
ABEYSHANTHA P	TECH ASSISTANT	01-Oct-87		48
DIAS J B A V	TECH ASSISTANT	03-Oct-89	20-Aug-91	22
DISSANAYAKE P	TECH ASSISTANT	01-Oct-87		48
EKANAYAKE N E M S B	ENGINEER	19-Jun-90	12-Apr-91	10
HERATH I H M S K	ENGINEER	01-Oct-87	08-Nov-90	37
JAGATH KUMARA V	ENGINEER	08-Nov-90		11
JAYARATNE M	PEON	01-Dec-89		22
PEIRIS A R	TECH ASSISTANT	03-Dec-87	20-Jul-90	31
PERERA G V S	TECH ASSISTANT	09-Oct-90		12
PIYADASA R M	TECH ASSISTANT	01-Oct-87	20-Aug-91	47
PODINILAME K A	TECH ASSISTANT	01-Feb-91		8
TENNEKOON T M M H	ENGINEER	01-Jul-91		3
<b>SANITATION PROGRAM</b>				<b>109</b>
JAGATH KUMARA V	ENGINEER	15-Dec-87	08-Nov-90	35
PUSHPA KUMARA H B S	TECH ASSISTANT	01-Oct-87	14-Jun-91	44
RANAWAKA D N	TECH ASSISTANT	06-Apr-89		30
<b>COMMUNITY &amp; HEALTH</b>				<b>66</b>
ILLANGASINGHE G A	SOCIAL Sc OFFICER	15-May-89	30-Jun-90	13
JAYAWEERA K A	SOCIOLOGIST	14-Dec-87	23-Jun-88	6
LEELARATNE A	SOCIOLOGIST	01-Apr-91		6
NUGEKOTUWA A	PEON	01-Dec-89		22
SENEVIRATNA A K	SOCIOLOGIST	01-Mar-90		19
<b>HYDROGEOLOGY</b>				<b>38</b>
ARIYARATNA U G M	HYDROGEOLOGIST	15-Mar-90		18
JAYATILAKE G M	HYDROGEOLOGIST	01-Apr-90		18
<b>TOTAL MAN MONTHS OF SECONDEE INPUT</b>				<b>1146</b>



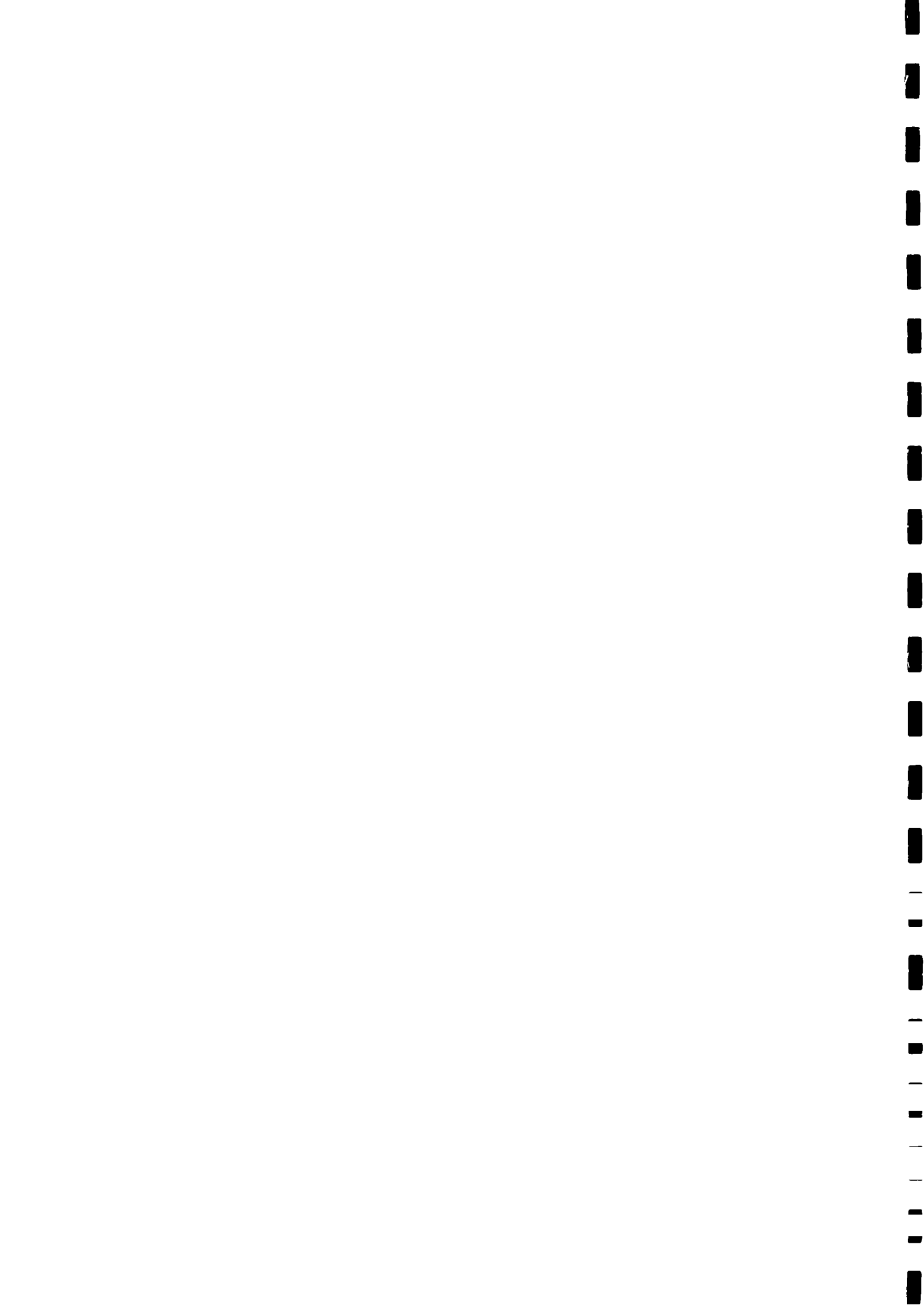
## DIRECTLY HIRED MAN MONTHS

	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
<b>1987</b>													
Administration, Reviews										16	17	17	50
Planning & Design										10	10	17	37
Well Program										44	44	44	132
Water Works										16	16	17	49
Sanitation Program										58	72	73	203
Community & Health										9	14	14	37
Transport, Stores, Work Shop										40	41	42	123
Hydrogeology										43	44	45	132
										236	258	269	763
<b>1988</b>													
Administration, Reviews	18	17	20	15	18	24	24	26	25	21	24	20	252
Planning & Design	19	17	19	16	17	19	19	22	22	18	20	19	227
Well Program	45	44	51	44	45	51	46	49	48	47	50	46	566
Water Works	70	60	66	61	68	74	72	78	101	133	143	122	1,048
Sanitation Program	75	72	87	76	79	91	82	89	86	85	97	98	1,017
Community & Health	14	13	14	12	11	13	12	13	14	12	12	14	154
Transport, Stores, Work Shop	42	39	43	32	36	45	40	47	45	45	47	45	506
Hydrogeology	50	46	52	44	47	55	51	56	60	60	67	62	650
	333	308	352	300	321	372	346	380	401	421	460	426	4,420
<b>1989</b>													
Administration, Reviews	24	18	22	18	25	24	27	30	29	30	31	22	300
Planning & Design	24	19	25	18	27	19	30	31	30	29	28	21	301
Well Program	54	46	50	42	51	51	49	52	49	51	56	45	596
Water Works	135	76	125	79	100	50	91	95	85	76	93	109	1,114
Sanitation Program	110	102	118	93	125	91	120	128	117	117	124	103	1,348
Community & Health	17	12	15	11	16	13	16	17	19	21	19	14	190
Transport, Stores, Work Shop	46	43	47	42	50	45	40	50	44	44	48	41	540
Hydrogeology	68	56	74	62	76	54	79	87	80	83	85	68	872
	478	372	476	365	470	347	452	490	453	451	484	423	5,261
<b>1990</b>													
Administration, Reviews	28	25	29	25	30	30	34	32	28	35	35	27	358
Planning & Design	26	24	24	16	19	19	19	22	27	23	22	18	259
Well Program	55	47	50	46	56	50	55	54	44	49	46	41	593
Water Works	127	141	194	136	141	133	122	114	91	110	95	79	1,483
Sanitation Program	113	124	113	94	102	96	100	98	85	86	63	50	1,124
Community & Health	23	26	30	17	20	21	26	26	21	28	29	20	285
Transport, Stores, Work Shop	44	47	45	68	80	78	83	90	75	80	77	70	837
Hydrogeology	74	77	93	72	83	86	92	91	80	86	81	73	988
	490	511	578	474	531	513	531	527	451	495	448	378	5,927
<b>1991</b>													
Administration, Reviews	33	28	30	29	27	27	31	30	27				262
Planning & Design	25	21	33	33	27	31	36	33	29				268
Well Program	41	35	36	39	30	28	31	36	34				310
Water Works	88	50	58	60	54	44	72	67	59				552
Sanitation Program	41	36	35	36	36	33	34	33	29				313
Community & Health	30	27	27	34	27	31	24	24	21				245
Transport, Stores, Work Shop	77	68	74	76	71	66	77	75	72				656
Hydrogeology	88	75	77	77	72	65	68	61	55				638
	423	340	370	384	344	325	373	359	326				3,244
<b>GRAND TOTAL</b>													<b>19,615</b>



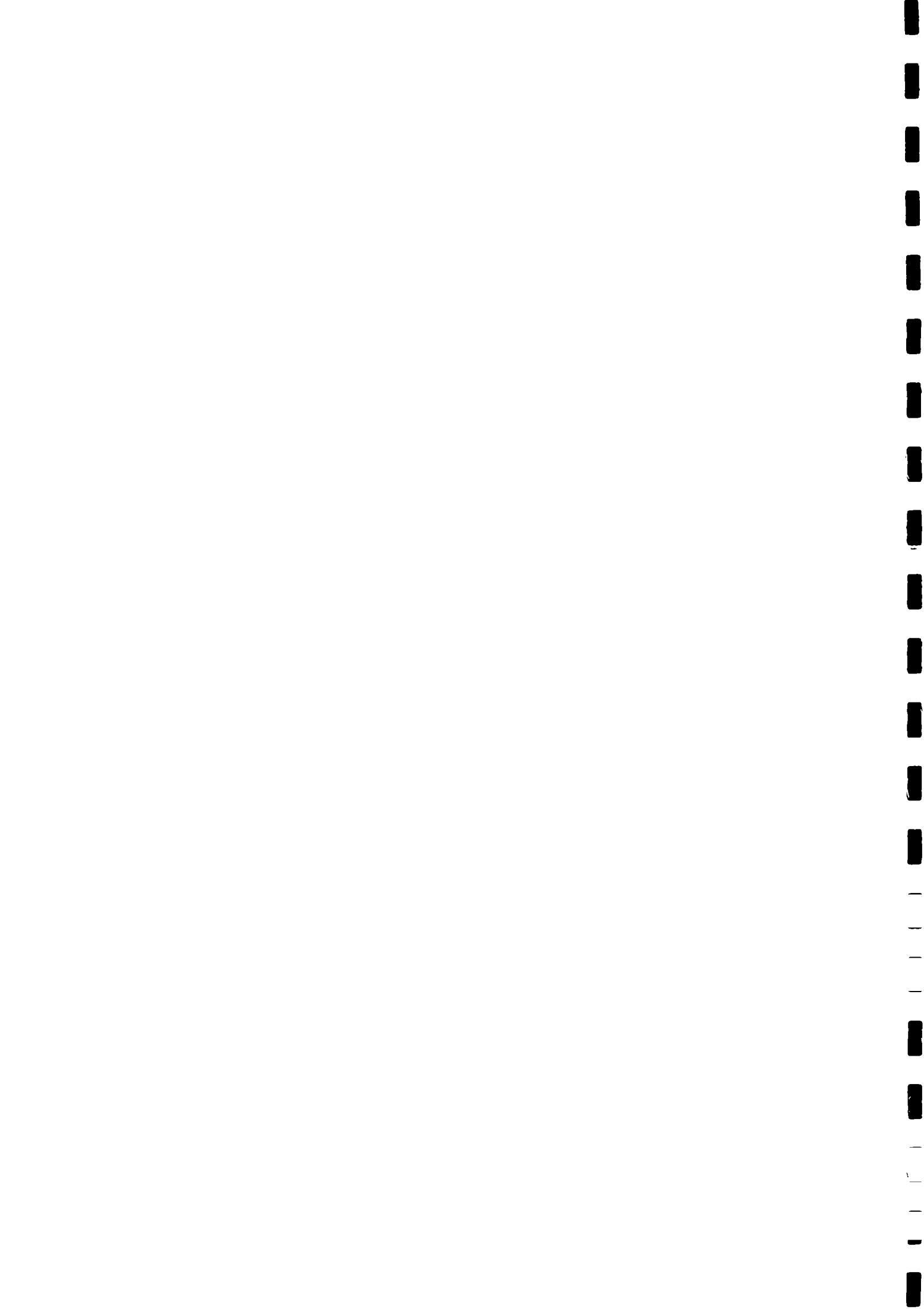
## UTILIZATION OF FUNDS IN FINNISH MARKS

ACTIVITY	1987	1988	1989	1990	1991	TOTAL	%
Administration, reviews, overheads	242,475	1,125,512	1,096,146	1,196,473	594,353	4,254,958	6.03%
Planning and Design	76,924	357,062	347,746	379,574	188,555	1,349,860	1.91%
Well Program	231,056	1,072,492	1,044,510	1,140,110	566,356	4,054,523	5.75%
Water Works	517,448	2,401,871	2,339,204	2,553,303	1,268,364	9,080,190	12.88%
Sanitation Program	602,175	2,795,157	2,722,229	2,971,385	1,476,136	10,567,082	14.99%
Community and Health	113,970	529,021	515,218	562,374	279,362	1,999,945	2.84%
Transport, Work Shop, Stores	222,029	1,030,606	1,003,716	1,095,583	544,235	3,896,169	5.53%
Hydrogeology	381,480	1,770,743	1,724,542	1,882,384	935,082	6,694,231	9.49%
Materials in store, fixed assets	286,225	1,328,587	1,293,923	1,412,352	701,591	5,022,678	7.12%
<b>TOTAL PROJECT COSTS</b>	<b>2,673,781</b>	<b>12,411,051</b>	<b>12,087,235</b>	<b>13,193,537</b>	<b>6,554,034</b>	<b>46,919,638</b>	<b>66.54%</b>
Technical Assistance	969,780	4,501,490	4,384,042	4,785,298	2,377,116	17,017,726	24.13%
<b>TOTAL FOREIGN INPUT</b>	<b>3,643,563</b>	<b>16,912,565</b>	<b>16,471,301</b>	<b>17,978,862</b>	<b>8,931,073</b>	<b>63,937,364</b>	<b>90.68%</b>
Local component, KDWSSP	6,000	425,000	652,000	1,662,000	1,949,000	4,694,000	6.66%
Local component, HWSSP	436,000	816,000	329,000	150,000	149,000	1,880,000	2.67%
<b>TOTAL LOCAL INPUT</b>	<b>442,000</b>	<b>1,241,000</b>	<b>981,000</b>	<b>1,812,000</b>	<b>2,098,000</b>	<b>6,574,000</b>	<b>9.32%</b>
<b>TOTAL INPUT</b>	<b>4,085,563</b>	<b>18,153,565</b>	<b>17,452,301</b>	<b>19,790,862</b>	<b>11,029,073</b>	<b>70,511,364</b>	<b>100.00%</b>



TOTAL COSTS, '000 Rs.

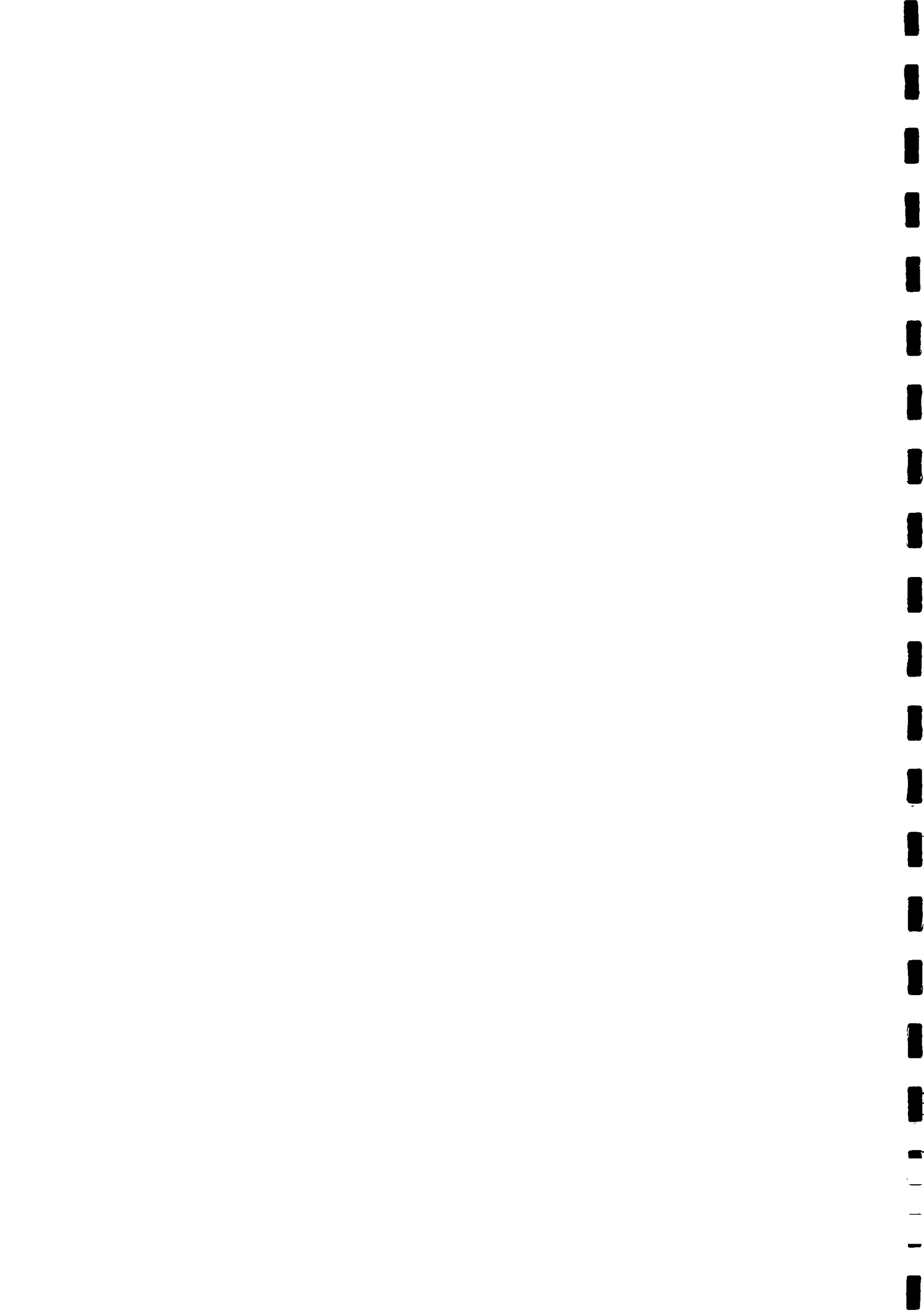
Activity	Consult fee	Fixed assets	Sub' contract	Subsidy paymen	SL salaries	Other personn	Houses Premise	Staff travel	Spares Materlal	Office material	Other costs	Local Input	Project total
<b>ADMINISTRATION</b>													
General	1,000	7			23	3		3	12	31	269	3	1,351
Management	18,977	44		10	864	208	3	254	6	20	514	1,140	22,040
Staff	13,485	490			4,333	3,315	3,904	2,547	382	19	4,276	151	32,902
Premises, utilities	6	6,298	55		156	44	2,743	28	1,928	4,858	6,251		22,367
Home office	13,726					1		1,698		1,305	1,208		17,938
Missions, evaluations	813	5	119	16	643	107		636	1	4	98		2,442
HWSSP Augmentat	34		145		33	1		93	6	3	865		1,180
<b>DEPARTMENT TOTAL</b>	<b>48,041</b>	<b>6,844</b>	<b>319</b>	<b>26</b>	<b>6,052</b>	<b>3,679</b>	<b>6,650</b>	<b>5,259</b>	<b>2,335</b>	<b>6,240</b>	<b>13,481</b>	<b>1,294</b>	<b>100,220</b>
<b>PLANNING &amp; DESIGN</b>													
General	12,481	297			1,691	194	6	239	221	353	1,041	2,155	18,678
Water resourc. study	16				115	13			33	4	41	6	228
WSS, Udunuwara	16				275	32		1	3		28		355
WSS, Galagedera					92	10					16		118
WSS, Yatinuwara			59		80	7			6		5		157
WSS, Kundasale			4		110	8			114		5		241
WSS, Pathadumbara	68				137	15			4		5	1	230
WSS, Medadumbara					83	7			3				93
WSS, Other areas			27		429	57		1	6		2		522
Wate Supply Plans	1,430	17			133	21			1		35		1,637
WSP, Udunuwara	2,005	1		4	743	77		53	44	1	80	121	3,129
WSP, Galagedera	170		1		86	7							264
WSP, Yatinuwara			27		218	30					15		290
WSP, Kundasale	720	2			328	24			4		3	1	1,082
WSP, Pathadubara	158				311	27			31		5		532
WSP, Medadumbara	192				194	24			5		5		420
WSP, Other areas	535	1	780		497	38			42		5		1,898
Strategic Plan			142		22	2							166





TOTAL COSTS, '000 Rs.

Activity	Consult fee	Fixed assets	Sub' i contract	Subsidy paymen	SL salaries	Other personn	Houses Premise	Staff travel	Spares Material	Office material	Other costs	Local Input	Project total
Sanitation Plan					1				2				3
Socio-Cultural Study	40				1								41
Detail Designs	168	104			177	13			26		25		513
DD, Udunuwara	3		2,246		154	303		3	2	1	75		2,787
DD, Galagedara	10		1		26	2							39
DD, Yatinuwara	54				1								55
DD, Kundasale					1								1
DD, Pathadumbara					2								2
DD, Metadumbara	10				19	2							31
DD, Other areas	1,771				236	27		2	2			528	2,566
Rehabilitation					24	4							28
Rehab, Udunuwara	987	15	10		146	8			25			13	1,204
HWSSP, Augmentatio	3,335				507	59			7	1	58		3,967
HWSSP, Rajapihilla	294				32	3			12				341
HWSSP, Gohagoda	133				8	1			365				507
HWSSP, Halloluwa	142				50	6			1				199
HWSSP, Kondadeniya	53				66	9			32		1		161
HWSSP, Bokkawela	118				12	1			40			2	173
<b>DEPARTMENT TOTAL</b>	<b>24909</b>	<b>437</b>	<b>3297</b>	<b>4</b>	<b>7007</b>	<b>1031</b>	<b>6</b>	<b>299</b>	<b>1031</b>	<b>360</b>	<b>1450</b>	<b>2827</b>	<b>42,658</b>
<b>WELLS</b>													
General	1,514	198		1	1,495	157		13	4,082	44	997	363	8,864
Impr. tradional wells	22			6	64	6		1	111				210
Hand Dug Wells	303	60		3	161	25		2	1,060		153		1,767
HDW, Udunuwara	331	35		165	891	78	34	13	3,614	1	244		5,406
HDW, Galagedera		11		106	591	62	30	6	1,048		148		2,002
HDW, Yatinuwara									3				3
HDW, Kundasale				10	72	9		1	14		1		107
HDW, Harispat. new					11	1				2			14



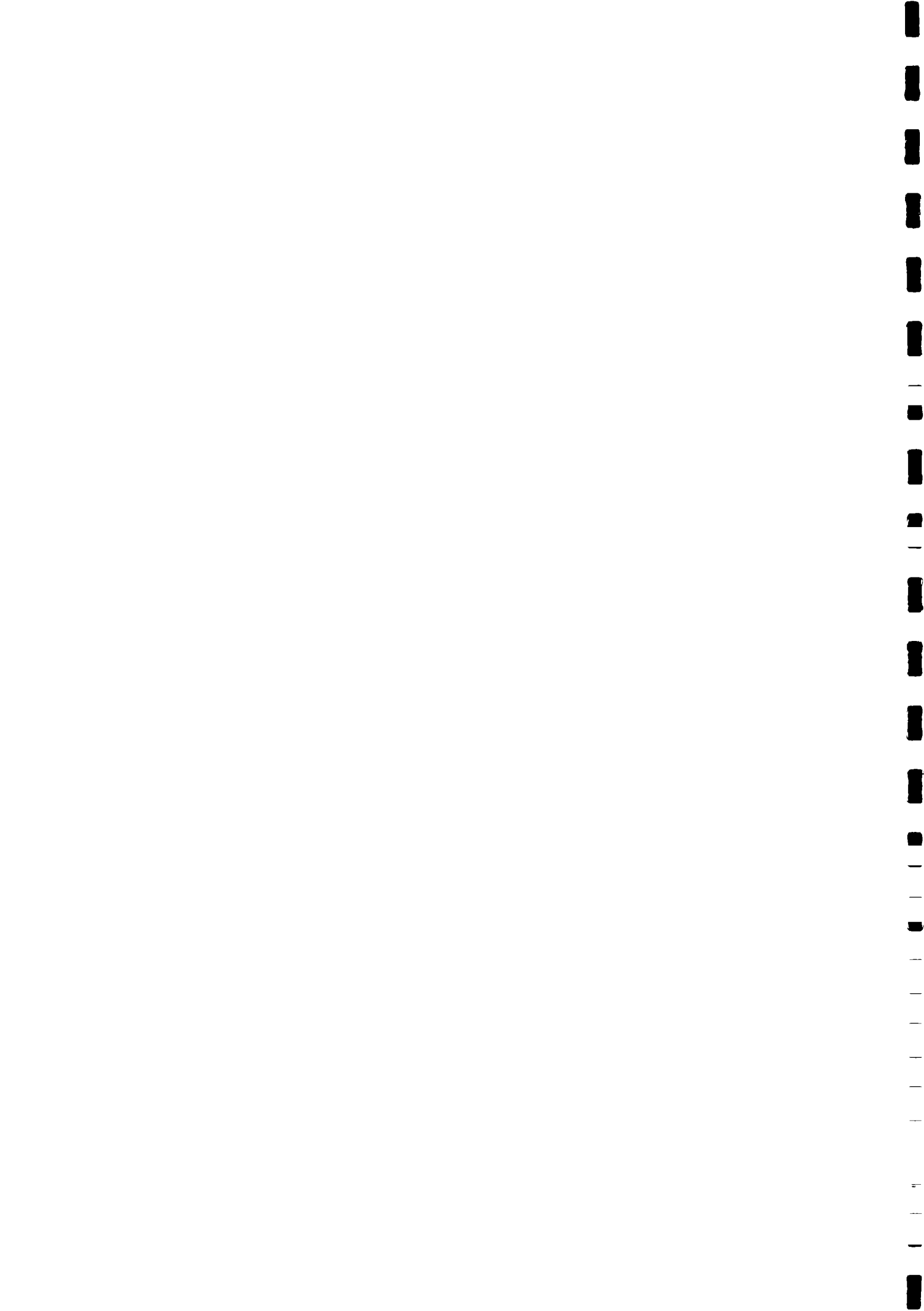
TOTAL COSTS, '000 Rs.

Activity	Consult fee	Fixed assets	Sub' contract	Subsidy paymen	SL salaries	Other personn	Houses Premise	Staff travel	Spares Material	Office material	Other costs	Local input	Project total
HDW, Other areas				48	186	24		1	524				783
Drilled wells	356				265	31			1,140		71		1,863
DW, Udunuwara	142			15	1,035	86			2,022		86		3,386
DW, Galagedera				1	152	16			1,304		9		1,482
DW, Yatinuwara					1				11				12
DW, Kundasale		2		13	946	105			5,742		17		6,825
DW, Gampola					2								2
DW, Harisp. new					3								3
DW, HWSSP					7								7
DW, Other areas					97	11			1,469				1,577
Rehabilitation	5				63	6			668	2	19		763
Rehab, Harispattuwa	4				106	11			3,332		3		3,456
Rehab., HWSSP	144				382	34		4	1,078		159		1,801
HWSSP Augamentatio	3		4		17	1			25				50
<b>DEPARTMENT TOTAL</b>	<b>2,824</b>	<b>306</b>	<b>4</b>	<b>368</b>	<b>6,547</b>	<b>663</b>	<b>64</b>	<b>41</b>	<b>27,247</b>	<b>49</b>	<b>1,907</b>	<b>363</b>	<b>40,383</b>
<b>WATER WORKS</b>													
General	7,796	37			810	119		3		25	-295	93	8,588
O&M Support	5,726	321	276	385	263	119		153	12,075	117	218	3,750	23,403
HWSSP Schemes	2,141		21		1,015	126	10	95	357	10	304	3,963	8,042
HWSSP, Kulugamma			25		304	29			1,201		82	1,643	3,284
HWSSP, Hedeniya	7				506	48			5,514		49	1,616	7,740
HWSSP, Akurana					22	2			12			180	216
HWSSP, Alawathugoda			36		474	40			2,925		35	2,083	5,593
HWSSP, Ankumbura	12		7		313	33			83		46	1,875	2,369
HWSSP, Galhinna			36		401	40			437		36	523	1,473
HWSSP, Staff quarter	23				210	20			57		120	2,951	3,381
KDWSSP Schemes	7				19	9			9		1	33	78
KDWSSP, Udunuwara		9			4	1			3		5	3	25



TOTAL COSTS, '000 Rs.

Activity	Consult fee	Fixed assets	Sub' contract	Subsidy paymen	SL salaries	Other personn	Houses Premise	Staff travel	Spares Material	Office material	Other costs	Local input	Project total
KDWSSP, Galagedera					4				1	2			7
KDWSSP, Yatinuwara					5	1			1				7
KDWSSP, Kundasale					80				82				162
KDWSSP, Udunuwara	24				28	2			12		27	165	258
KDWSSP, Peradeniya	954	300	1,713		3,296	381	25	69	27,269	4	2,881	5,018	41,910
KDWSSP, Ampitiya	16	122	453		415	35	4		2,812		210	152	4,219
KDWSSP, Other schemes			3		10	1			5				19
Gravity Schemes	75				54	5			114		1	35	284
GS, Udunuwara	32	7		14	590	70			1,046		145	25	1,929
GS, Galagedera				49	159	21		1	540		13		783
GS, Yatinuwara					2				1				3
GS, Kundasale									1				1
Udunuwara rehabilitation		18			467	53			1,417		158	8,591	10,704
Institutional latrines		24	699	36	846	97			1,492		88		3,282
HWSSP, Augmentatio	9	3	138		291	35			3,778		7	176	4,437
HWSSP, Rajapihilla					5				392				397
HWSSP, Halloluwa					6	1			36			2	45
HWSSP, Kondadeniya				17					6			322	345
HWSSP, Bokkawela											4	2	6
<b>DEPARTMENT TOTAL</b>	<b>16822</b>	<b>841</b>	<b>3407</b>	<b>501</b>	<b>10599</b>	<b>1288</b>	<b>39</b>	<b>321</b>	<b>61678</b>	<b>158</b>	<b>4135</b>	<b>33201</b>	<b>132,990</b>
<b>SANITATION</b>													
General	4,146	21	26	1	999	111	17	2	943	184	316	357	7,123
Research	1,722	28	516	339	411	41	8	164	918	6	178		4,331
Gonigoda distribution		903			491	64			10,655	13	571		12,697
Udunuwara distributio	25	1		10,368	1,187	124		26	897	8	676		13,312
Galagedera distribution				9,868	1,247	126		34	7,118	8	728		19,129
Kundasale distribution				1,453	80	9			3,269		47		4,858
Harispattuwa distribution				8,376	954	65		3	1,376		1,026		11,800



**TOTAL COSTS, '000 Rs.**

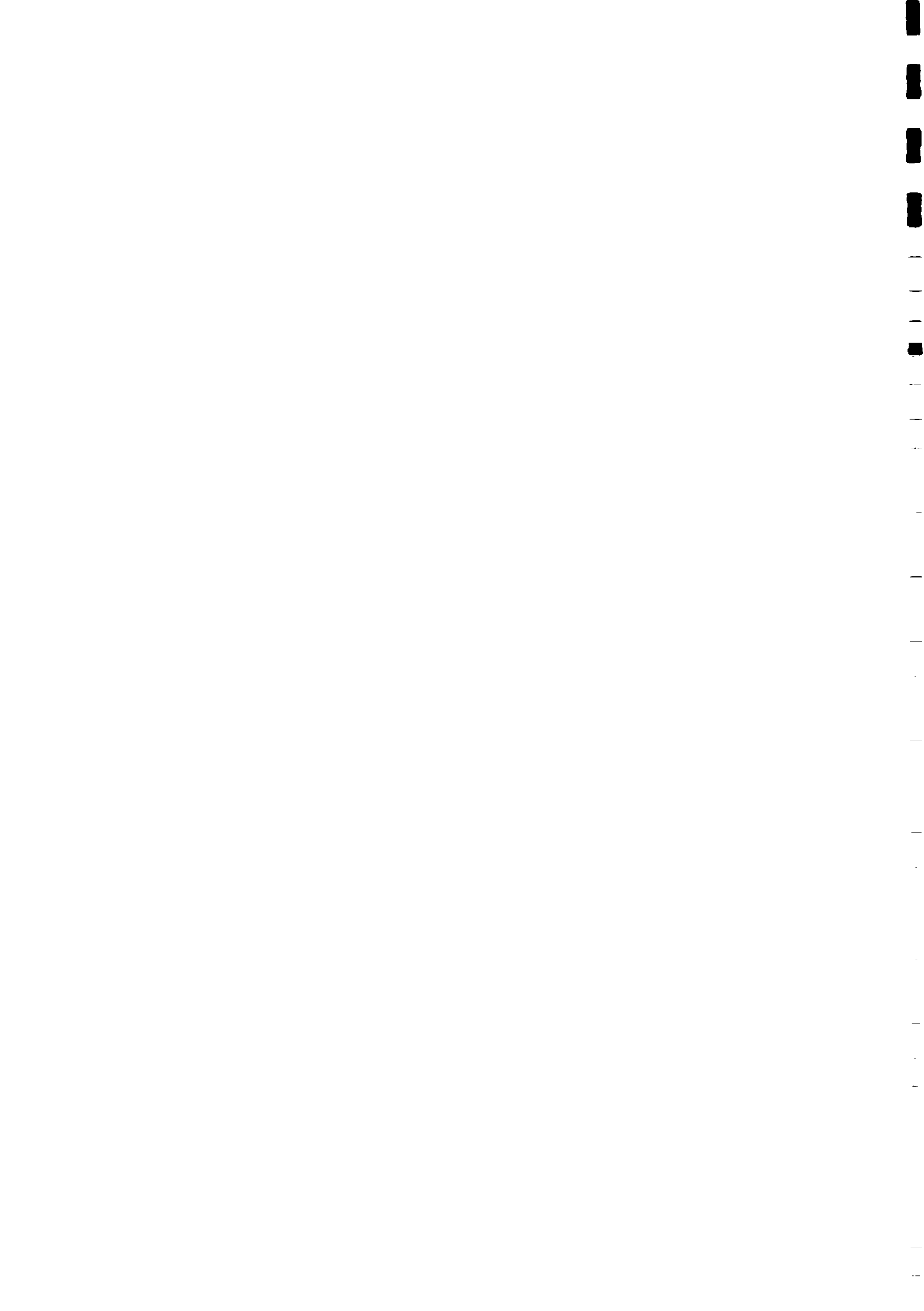
Activity	Consult fee	Fixed assets	Sub' contract	Subsidy paymen	SL salaries	Other personn	Houses Premise	Staff travel	Spares Material	Office material	Other costs	Local Input	Project total
HWSSP Distribution				37	209	21			962		15		1,244
Field supervision		2		3	118	9	12	1	44	6	42	811	1,048
FS, Udunuwara					504	47		13	7		43		614
FS, Galagedera	27			41	565	56		6	10		23		728
FS, Kundasale					75	9							84
FS, Harispattuwa new	20			33	448	37		37		5	63		643
FS HWSSP	209				66	10		1	44		42		372
Hedeniya Yard, sanit		95	122		3,397	337	58		17,978	19	941		22,947
Hedeniya Yard, well	7			6	184	19	12		788	4	143		1,163
Marathugoda Yard		460			498	46	8		2,017	1	300		3,330
<b>DEPARTMENT TOTAL</b>	<b>6156</b>	<b>1510</b>	<b>664</b>	<b>30525</b>	<b>11433</b>	<b>1131</b>	<b>115</b>	<b>287</b>	<b>47026</b>	<b>254</b>	<b>5154</b>	<b>1168</b>	<b>105,423</b>
<b>HEALTH EDUCATION</b>													
General	90	16	158		550	71		3	395	18	108	87	1,496
Health Education	12,457	266	233	38	1,421	195	63	106	1,506	221	71	116	16,693
HE, Udunuwara		9		92	95	27		21	173	42	29	14	502
HE, Galagedera		8		74	171	45		17	145	49	26	5	540
HE, HWSSP		3		55	69	17		30	123	5	10		312
HE, Other areas				93	166	42			110	44	85	8	548
Training	1,776	23	76	36	621	89		489	20	33	1,119	18	4,300
Training, wells	10			33	123	31		1	5	30	161		394
Training, Sanitation	1,226	20		213	341	184		10	526	23	309		2,852
Training, construction	115	6	16	3	78	12		8	1	12	41		292
Training, staff	475		1		70	26		98		3	713		1,386
Training, work shop	130			12	24	2				7	3		178
Community relations	3,482	66		68	1,466	194			65	69	395	131	5,936
CR Udunuwara				13	360	50					102	38	563
CR Galagedera				7	577	72			1	5	18	29	709
CR Yatinuwara				7	42	5							54





TOTAL COSTS, '000 Rs.

Activity	Consult fee	Fixed assets	Sub' contract	Subsidy paymen	SL salaries	Other personn	Houses Premise	Staff travel	Spares Material	Office material	Other costs	Local Input	Project total
CR Kundasale					389	57					94	31	571
CD Harispattuwa new					81	10							91
CR HWSSP				16	9	4						1	30
CR, Other areas					412	48					1	19	480
Socio-cultural study	120	4	395		88	8				1	86		702
<b>DEPARTMENT TOTAL</b>	<b>19,881</b>	<b>421</b>	<b>879</b>	<b>760</b>	<b>7,153</b>	<b>1,189</b>	<b>63</b>	<b>783</b>	<b>3,070</b>	<b>562</b>	<b>3,371</b>	<b>497</b>	<b>38,629</b>
<b>WORK SHOP</b>													
General	4,140	176	224		807	161	11	83	1,224	9	1,254	37	8,126
Vehicles	514	12,583	4		5,189	555			16,199	3	3,156		38,203
Machinery	20	76			1,594	205			1,259	1	1,112		4,267
Stores	552	422	62		769	97	8		323	14	918		3,165
<b>DEPARTMENT TOTAL</b>	<b>5,226</b>	<b>13,257</b>	<b>290</b>	<b>0</b>	<b>8,359</b>	<b>1,018</b>	<b>19</b>	<b>83</b>	<b>19,005</b>	<b>27</b>	<b>6,440</b>	<b>37</b>	<b>53,761</b>
<b>HYDROGEOLOGY</b>													
General	2,936	7,988			106	83		333	464	3	1,277	339	13,529
Hydrog. Studies	13,832	32			2,981	384		20	171	38	398		17,856
HS HWSSP	1,734				6	1			12	1	24		1,778
Laboratory		61	3		1,033	143		20	2,194	25	592	1	4,072
Lab, HWSSP									6	3	5		14
Geophysical studies	179								2		31		212
Rig I	852	13,258			1,843	157		4	8,308	1	232		24,655
Rig I, HWSSP					4				9	1			14
Rig II	832	10,013		1	1,787	152		5	12,428		146		25,364
Rig II, HWSSP					166	17			653				836
Rig III		2,755			1,383	114		3	6,293		57	38	10,643
Rig IV		3,849			349	30			922				5,150
NWS&DB rigs		7			735	64		3	2,748		46	22,129	25,732
Subcontracted rigs			6,984								5		6,989



TOTAL COSTS, '000 Rs.

Activity	Consult fee	Fixed assets	Sub' contract	Subsidy paymen	SL salaries	Other personn	Houses Premise	Staff travel	Spares Material	Office material	Other costs	Local Input	Project total
Test pumping	310	866			2,109	180		4	1,945		120		5,534
Test pumping HWSSP					19	1			105				125
HWSSP Augmentation	1,060				10	1			29				1,100
DEPARTMENT TOTAL	21,735	38,829	6,987	1	12,531	1,327	0	392	36,289	72	2,933	22,507	143,603
GRAND TOTAL	145,594	62,445	15,847	32,185	69,681	11,326	6,956	7,465	197,681	7,722	38,871	61,894	657,667



**PLANNING AND DESIGN:**

**DESIGN DEPARTMENT**

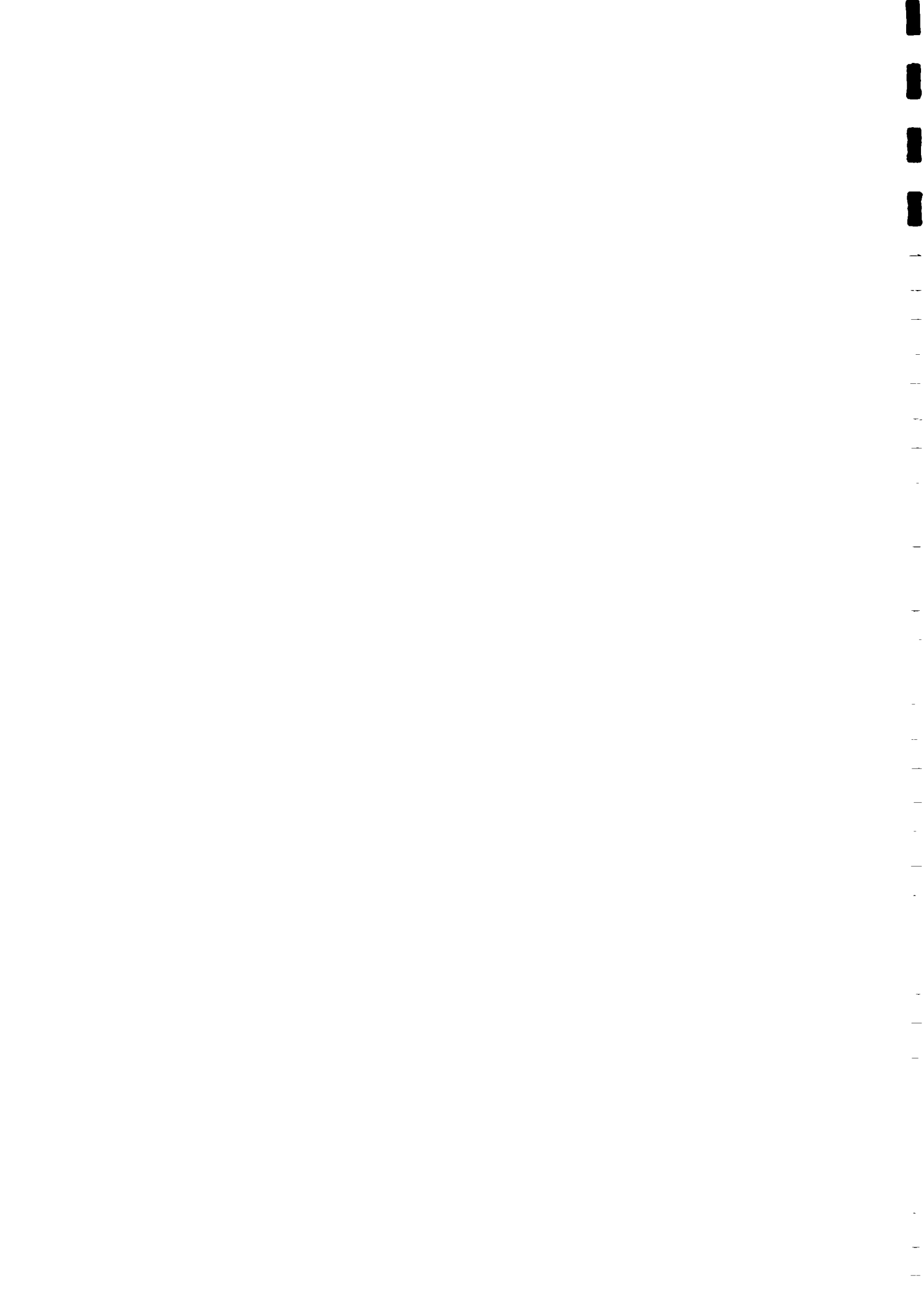
**Harispattuwa Water Supply Schemes**

**General**

1. Harispattuwa feasibility report amendment. follow-up study - Harispattuwa.  
K.Salminen/us - R1-20-09/08.
2. Study on Harispattuwa WSSP hand pump wells which are not handed over to Pradeshiya Sabah - Interim report.  
R1-30-08/80.

**Technical Reports**

3. Technical Proposal of Consolidation of Akurana WSS  
GS. Thangarajah/ff - R1-20-00/21
4. Technical Report on Consolidation of Kondadeniya, Kulugamma and Gohagoda (part) WSS  
PBG\_Dissanayake/ff - R1-20-00/98
5. Technical Report on Consolidation of Yatihalagala and Gohagoda (part) WSS  
G Dayaratna/kw - R1-20-00/100
6. Technical Report on Consolidation of Rajaphilla WSS  
JKLC Perera/ff - R1-20-00/102



PLANNING DEPARTMENT

Gravity Water Supply Schemes:

7. Kotagaloluwa WSS - feasibility report.  
J.R.Nedurana/us - R1-20-00/04
8. Ganguldeniya WSS - feasibility report.  
J.R.Nedurana/us - R1-20-00/07.
9. Dharmapura Janapadaya WSS.  
J.R.Nedurana/us - R1-20-00/11.
10. Elpitikanda WSS.  
J.R.Nedurana/us - R1-20-00/14.
11. Mawweekumbura WSS.  
J.R.Nedurana/us - R1-20-00/23.
12. Aluthgama WSS.  
J.R.Nedurana/us - R1-20-00/47.
13. Feasibility report on Kannadeniya WSS.  
S.G.Ginige/us - R1-20-00/05.
14. Aludeniya feasibility report.  
S.G.Ginige/us - R1-20-00/52.





**Strategic Plan General:**

15. Selection of priority areas for strategic planning KDWSSP-Phase 1.  
August, 1988 - AGM(P).
16. KDWSSP - Strategic plan activities and priority areas.  
June 1988 - O.Lento
17. Medadumbara Divisional Report  
C Vannickasinkam/sw
18. Pathadumbara Divisional Report  
PI Mallawarachchi/us, BGK Ariyaratna/kw
19. Water Supply and Sanitation District Report- Kandy District  
Vol. I, II, III  
O. Lanto, PH Sarath Gamini/us - R1/20/00/54
20. Yatinuwara Divisional Report  
DM Dushantha/sw R1/20/00/86

**Strategic Plan Areal:**

21. Udunuwara/Yatinuwara WS rehabilitation pre-feasibility report.  
O.Lento/us - R1-20-01/09.
22. Addendum 1 to pre-feasibility study.  
H.Huotarinen/us.



23. Nilambe oya as the gravity source for Udunuwara-Yatinuwara WSS.  
S.G.Ginige/sk - R1-20-01/06.
24. Rehabilitation program for Udunuwara existing water supply network.  
O.Lento/us - R1-20-01/47.
25. Addendum III to pre-feasibility study Udunuwara WSS.  
O.Lento/us - R1-20-01/21.
26. Udunuwara network improvement proposal.  
O.Lento/us - R1-20-01/16.
27. Galagedara strategic plan.  
M.Tissarachchi/us - R1-20-02/18.
28. Kundasale WS pre-feasibility report.  
O.Lento/us - R1-20-02/19.
29. Addendum strategic plan for Galagedara.  
M.Tissarachchi/us - R1-20-02/38.

#### **Rehabilitation of Water Supply Schemes Feasibility Reports:**

30. Udunuwara network rehabilitation status report.  
S.G.Ginige/tg - R1-20-01/01.
31. Report on the proposed Peradeniya intake rehabilitation.  
S.G.Ginige/us - R1-20-00/13.
32. Peradeniya intake.  
O.Lento/us - R1-20-00/24.



33. Feasibility report on Ampitiya water supply rehabilitation.  
S.G.Ginige/us - R1-20-00/20.
34. Ampitiya WSS.  
S.G.Ginige/lw - R1-20-00/35.
35. Tennekumbura WSS.  
J.R.Nedurana/lw - R1-20-00/40.
36. Welamboda WSS.  
J.R.Nedurana/lw - R1-20-00/42.
37. Udu/Yatinuwara water works status report on the rehabilitation of Peradeniya intake.  
H.Huotarinen/sd - R1-20-01/12.
38. Rehabilitation of Nawalapitiya Water Supply Scheme  
Vol. I, II, III  
Resource Development Consultant Ltd.
39. Rehabilitation of Medadumbara Water Supply Scheme  
MDA Gunawardena/nn - R1/20/08/66
40. Rehabilitation of Wattegama Water Supply Scheme  
D. Manikkaraja/nn - R1/20/00/68
41. Rehabilitation of Tennekumbura Water Supply Scheme  
BGK Ariyaratna/sw - R1/20/00/103



**Tariff Development:**

42. Ampitiya WSS development of cost of water and tariff structure.  
V.Arulgnanendran, S.G.Ginige, P.H.S.Gamini/.. - R1-20-00/36.
43. Cost of water supply in Sri Lanka.  
O.Lento/us - R1-20-00/43.

**Feasibility Reports for New Proposed Schemes**

44. Welamboda Water Supply Scheme  
B.G.K. Ariyaratna/sw - R1/20/00/99
45. Gonambil Colony Water Supply Scheme  
D Manikkaraja/us R1/20/00/91





## STUDIES AND REPORTS PREPARED DURING PHASE 1

## HYDROGEOLOGY:

1. 12.10.87 Aspects on Udunuwara Water Supply & Sanitation Project. Elpitiya investigations - 12.10.87 - M.Taka/sds.
2. Preliminary report on the bacteriologically contaminated wells in Harispattuwa. 23.11.87 - M.Taka/sds.
3. The present stage of the drilling rigs & proposal for updating the equipment. 12.12.87 - M.Taka/sds, Revised edition 18.01.88.
4. Geophysical investigations in Kandy District Water Supply and Sanitation Project, ideas and considerations. 03.02.88 - M.Taka/sds.
5. Bacteriological survey of open wells in the project area. 02.03.88 - J.P.Padmasiri/sds - R1-30-00/03.
6. Report of the investigation wells, 13-WB-245 & 2001-KU, 2007-KU for Kundasale Proposed WSS. 31-3.88 - M.Taka/sds - R1-80-04/02.
7. Report of the investigation borehole 2008-KU for Menikhinna WSS. 31.03.88 - M.Taka/sds - R1-80-04/03.
8. Bacteriological census of the hand pump wells in KDWSSP - first quarter 1988. 05.04.88 - J.P.Padmasiri - R1-30-00/12.
9. Report on Mission to NWS&DB Groundwater Section to clarify the suitability of the rigs for KDWSSP. 29.04.88 - M.Taka/sds - R1-80-00/04.
10. Study on bacteriological contamination & its prevention in hand pump wells in Harispattuwa Water Supply Scheme Project area. 18.05.88 - E.Partio, M.Taka, R.Aapola/sds - R1-30-09/25.
11. Testing of Geophysical methods in hydrogeological investigations in Kandy district. 07.06.88 - E.Partio, M.Taka, R.Aapola, T.P.Karunaratne, D.G.S.W.Pitakumbura/sds. R1-80-00/06  
Revised copy 22.06.88
12. Proposed study on radioactivity of groundwater. 09.06.88 - M.Taka/sds - R1-80-00/07.
13. Hydrogeological investigations in Elpitiya. 06.07.88 - M.Taka/sds - R1-80-01/08.
14. Improvements made in iron removal plant unit (Interim report) 07.11.88 - J.P. Padmasiri/sds - R1-30-01/63.



15. Chemical and bacteriological data in hand pump wells of HWSSP in Pujapitiya AGA Div. 1983-88  
03.04.89 - J.P.Padmasiri/ph.
16. Chemical and bacteriological data in hand pump wells of HWSSP in Katugastota AGA Div.1983-87  
31.01.89 - J.P.Padmasiri/ph.
17. Report on contamination hazards of Gohagoda groundwater intake plant  
02.05.89 - M.Taka/sds - R1-80-09/09.
18. Improvements made in iron removal plant unit  
12.12.88 - J.P.Padmasiri/sds - R1-30-01/71.
19. Report on groundwater investigations in Ampitiya - BH 2080-SE.  
26.05.89 - M.Taka/sds - R1-80-00/10.
20. Preliminary report on pumping test of Elpitiya well field, Udunuwara.  
31.05.89 - M.Taka/sds - R1-80-01/11.
21. Report on test pumping capacity.  
13.06.89 - M.Taka/sds - R1-80-00/13.
22. A comparative study on quality of water in open (unprotected) wells and hand pump (protected) wells.  
21.07.89 - J.P.Padmasiri/ph - R1-30-01/84.
23. The test pumping report of the BH No. 2035 in Welamboda in Udunuwara AGA's Div. (electorate). 13.12.89 - D.G.S.W. Pitakumbura/us - R1-80-00/16.
24. The three pot storage system as a possible means of improving water quality.  
21.12.1989 - J.P. Padmasiri/ph - R1-80-00/17.
25. Simultaneous test pumping report of BH No. 2080-SE and 2116-SE at ampitiya in Kandy District.  
21.03.90 - D.G.S.W. Pitakumbura/sds.
26. Bacteria as indicator faecal contamination.  
20.04.90 - M.Taka, R.Aapola/sds - R1-80-00/19.
27. Report of the test pumping of boreholes 2135-PD, 2136-PD, 2137-PD 2138-PD, 2139-PD and 2140-PD.  
01.06.90 - A.Senaratne/sds - R1-80-00/20.
28. Test pumping reports of the BH Nos. 2102-PD, 2121-PD, 2123-PD, 2133-PD and 2134-PD, Atalahagoda at Wattegama in Kandy District.  
06.07.1990 - D.G.S.W.Pitakumbura/sds - R1-80-00/21.
29. Test pumping of BH No. 2120-PD and 2100-PD.  
06.07.1990 - U.G.M.Ariyaratne/sds - R1-80-00/22.
30. Test pumping report of boreholes (2106-PD, 2107-PD and 2108-PD).  
11.06.90 - G.M.Jayatilake - R1-80-00/24.



31. Report of the test pumping in borehole nos. 2127-PD and 2128-PD, located at Thunkandura, Pathadumbara.  
11.06.1990 - U. de S.Jayawardena/sds - R1-80-00/25.
32. Summary on Harispattuwa alternative hand pump wells which are to improve.  
14.07.1990 - U. de S.Jayawardena/nn - R1-80-09/26.
33. Report on feasibility study for a groundwater source, IFS Kandy.  
28.06.1990 - G.M.Jayatilake/sds - R1-80-00/27.
34. Semi annual report - 1990, Hydrogeological dept.  
04.06.1990 - G.M. Jayatilake/sds - R1-80-00/28.
35. Report of the agro-chemical contamination in surface and ground water in Kandy district carried out by CISIR, Colombo.  
15.08.1990 - J.P.Padmasiri/sds - R1-80-00/29.
36. Water quality and soil profiles of Halloluwa new wells WB 23, 24 & 25.  
08.08.1990 - J.P.Padmasiri/nn - R1-80-00/30.
37. Test pumping report of BH Nos. 2116-SE, 2145-SE, 2160-SE, Ampitiya, Kandy district.  
10.08.1990 - D.G.S.W. Pitakumbura/sds - R1-80-00/31.
38. Note on groundwater conditions upgrading of existing water supply scheme at Minigamuwa, Galagedara AGA's division.  
17.08.1990 - G.M.Jayatilake/sds - R1-80-00/32.
39. Test pumping report of productive wells 8015-HA and 8016-HA of Inigala.  
10.08.1990 - U.G.M. Ariyaratne\sds - R1-80-08/33.
40. Test pumping report of the productive well no. 2118-PD of Polgolla.  
10.08.1990 - U.G.M. Ariyaratne/sds - R1-80-00/34.
41. Report of the test pumping of BH Nos. 2112-PD, 2113-PD, 2114-PD and 2115-PD.  
17.08.1990 - A.Senaratne/sds - R1-80-00/37.
42. Report on analysis and evaluation of pumping test data of BH Nos. 8013-HA and 8014-HA, Hunnanoya (Rajapihilla) in Harispattuwa electorate, Kandy district.  
05.09.1990 - D.G.S.W.Pitakumbura/sds - R1-80-09/38.
43. Report on the study of groundwater resources in Pathadumbara AGA division, Kandy district.  
Analysis and evaluation of pumping test data.  
13.09.1990 - G.M. Jayatilake/sds - R1-80-00/41.
44. A bacteriological study of groundwater in the Central Region of Sri Lanka.  
13.09.1990 - J.P.Padmasiri, C.Kodikara/ph - R1-80-00/42.
45. Yield Rajapihilla Intake. (brief report)  
05.10.1990 - M.Taka/sds - R1-80-09/43.
46. Quarterly report on hydrogeological activities 3<sup>rd</sup> quarter-1990 (July - September).  
29.10.1990 - G.M. Jayatilake/sds - R1-80.00/45.

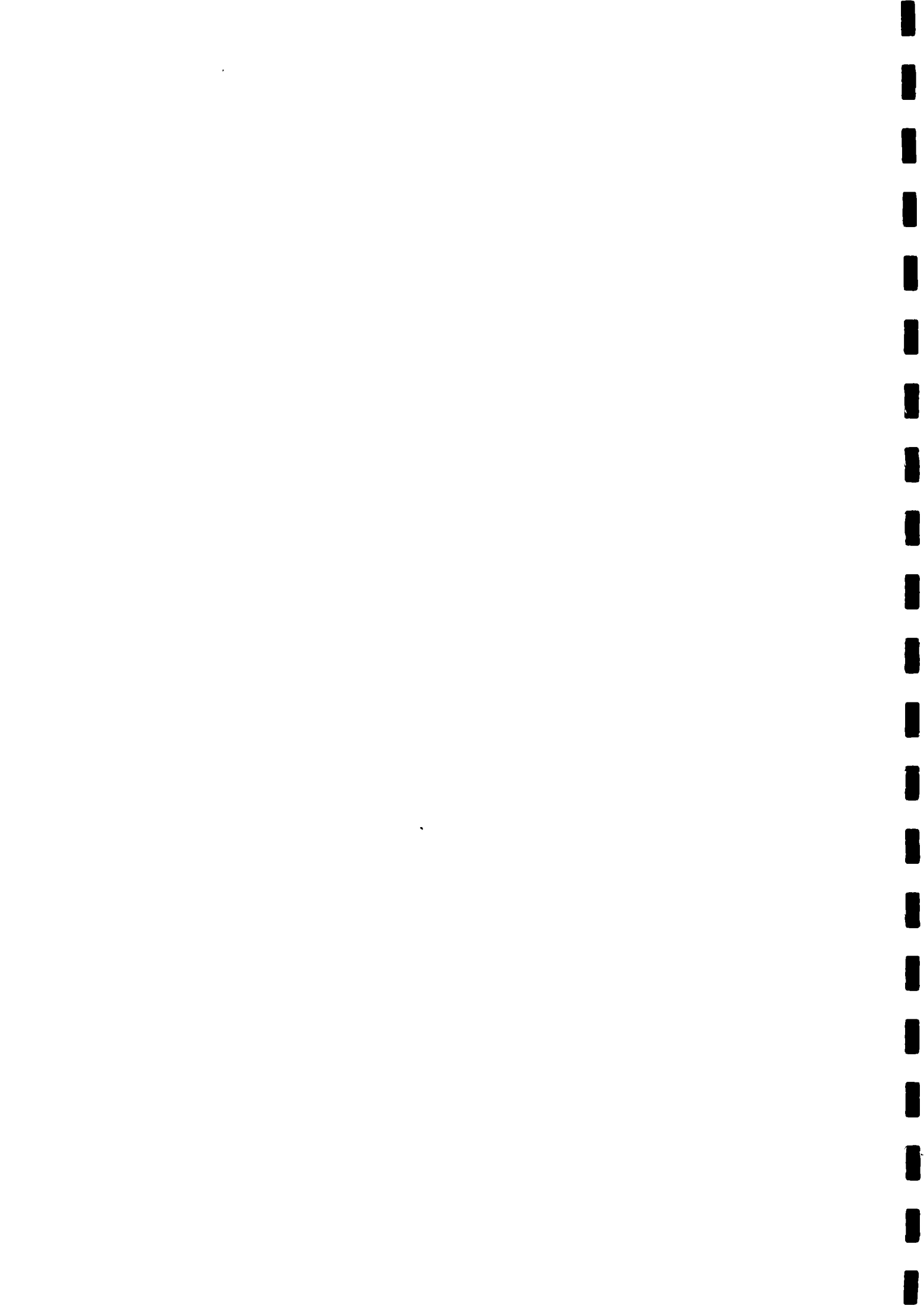


47. Study of additional groundwater resources for the water supply schemes at Bokkawala, Rajapihilla, Gohagoda and Akurana in Harispattuwa. (Draft)  
06.11.1990 - A.Senaratne, G.M.Jayatilake/sds - R1-80-08/46.
48. Water quality of hand pump wells in Galagedara.  
08.11.1990 - U. de S.Jayawardena, J.P.Padmasiri/ph - R1-80-02/47.
49. Hedeniya water supply scheme - Harispattuwa.  
22.11.1990 - J.P.Padmasiri/ph - R1-80-09/48.
50. Review of Harispattuwa intakes and Hydrogeological study programme.  
06.12.1990 - M.Taka/us,sds - R1-80-09/49.
51. Note on the preliminary hydrogeological investigations from groundwater development in Nawalapitiya town area. (brief report)  
14.12.1990 - D.G.S.W.Pitakumbura, A.Senaratne/as - R1-80-00/50.
52. Bacteriological quality of water in the Udunuwara gravity water supply schemes in 1990.  
18.12.1990 - J.P.Padmasiri/sds - R1-80-01/51.
53. Report on the hydrogeological study for groundwater resources in Yatinuwara.  
20.12.1990 - A.Senaratne, G.M. Jayatilake/sds - R1-80-00/52
54. Quality of groundwater problems and remedies - A case study from Kundasale in Kandy district.  
22.01.1991 - J.P.Padmasiri, A.Senaratne, G.M.Jayatilake/ph - R1-80-04/53.
55. Summary report on groundwater investigations in Kandy district.  
28.01.1991 - D.G.S.W.Pitakumbura/sds - R1-80-00/54.
56. Report on the hydrogeological investigations at Gannoruwa well field.  
31.01.1991 - A.Senaratne/sds - R1-80-00/55.
57. Report on the Halloluwa water supply scheme - problems and remedies. (brief report).  
31.01.1991 - A.Senaratne/sds - R1-80-09/56.
58. A comparative study on quality of water in traditional wells and borehole/shallow hand pump wells. 08.02.1991 - J.P.Padmasiri, U.de S.Jayawardena/ph - R1-80-00/57.  
First South Asia Geological Congress - Pakistan(1992) p31
59. Analysis of pumping test data - Kondadeniya water supply scheme.  
07.03.1991 - M.Taka, D.G.S.W. Pitakumbura/sds - R1-80-09/58.
60. Report on the study of groundwater resources for the proposed water supply scheme at Tennekumbura. (Analysis and evaluation of pumping test data)  
12.03.1991 - G.M. Jayatilake/sds - R1-80-00/59.
61. Ampitiya water supply scheme.  
25.03.1991 - J.P.Padmasiri/ph - R1-80-00/61.
62. Present stage of investigation and rehabilitation of Harispattuwa intakes.  
08.04.1992 - M.Taka/sds - R1-80-00/62.





63. Quarterly progress report of the hydrogeological dept. The 1<sup>st</sup> quarter 1991  
11.04.1991 - G.M. Jayatilake/sds - R1-80-00/64
64. Hydrogeological investigations of Harispattuwa groundwater intakes.  
16.05.1991 - M.Taka/sds - R1-80-09/76.
65. Operation and maintenance of the filter units of the hand pump wells in Kandy district.  
04.06.1991 - J.P.Padmasiri/nm - R1-80-00/79.
66. Report on the estimation of groundwater availability at Kondadeniya intake well field.  
(Analysis of pumping test data) (Draft report)  
06.05.1991 - G.M. Jayatilake/sds - R1-80-09/80.
67. Natural filter media for iron and manganese removal from groundwater.  
21.06.1991 - A.Senaratne, J.P.Padmasiri, M.A.S.L.Attanayake/ph - R1-80-01/83.
68. Adaptation of compost latrine for Sri Lankan environment.  
July,1991 - J.P.Padmasiri, Sisira Navaratne - R1-50-00/14
69. Reduction of iron in groundwater using low cost filter unit.  
15.07.1991 - J.P.Padmasiri, M.A.S.L.Attanayake/ph - R1-80-00/87.
70. Harispattuwa piped water supply scheme: hydrogeological recommendations for the consolidation of Harispattuwa water supply schemes.  
Nov. 1991 - G.M.Jayatilake/sds - R1-80-09/88.
71. Review of water quality of Harispattuwa water supply schemes.  
30.08.1991 - J.P.Padmasiri/ph - R1-80-09/89.
72. Recommendations from groundwater development at Welamboda for the proposed pipe borne water supply scheme.  
02.09.1991 - G.M.Jayatilake, D.G.S.W.Pitakumbura/sds - R1-80-01/90.
73. Report on the development and cleaning of deep productive wells (boreholes) at Rajapihilla intake well field. Rehabilitation & maintenance of groundwater sources in Harispattuwa area.  
10.09.1991 - G.M.Jayatilake/sds - R1-80-09/91.
74. Chemical investigations on the mechanism of iron and manganese removal and the removal of nitrate from groundwater.  
25.09.1991 - J.P.padmasiri, O.A.Ileperuma, H.A.Abeysirigunewardena/mw - R1-80-00/92.
75. Bacteriological, chemical and geological characteristics in hand pump wells in Udunuwara area in Udunuwara, Kandy district.  
Journal of the Geological Society of Sri Lanka Vol.3, January,1991, p33-40  
J.P.Padmasiri, D.G.S.W.Pitakumbura.
76. A study of the bacteriological quality of groundwater in Udunuwara.  
C.Kodikara, J.P.Padmasiri/..



77. Removal of Fe and Mn using charcoal in hand pump wells in Udunuwara.  
August,1989 - Institute of Chemistry sessions - Chemistry of Sri Lanka,  
vol.6(1989)p13,  
Institute of Chemistry. J.P.Padmasiri.
78. Bacteriological testing of pipe water in plantations.  
J.P.Padmasiri
79. A study in the behaviour of some chemical parameters in deep groundwater of  
fractured crystalline rocks in Kandy district, Sri Lanka.  
December, 1990 - U. de S.Jayawardena, J.P.K.Kotuwegedara/udsj - P1-80-00/07
80. A study of extraction of groundwater from major production wells from Kandy  
district, Sri Lanka.  
D.G.S.W.Pitakumbura, U.de S.Jayawardena.
81. Occurrence of groundwater in fractured crystalline rocks in synforms  
(arenas) in the highland group of Sri Lanka.  
January,1991 - D.G.S.W. Pitakumbura, A.Senaratne, G.M.Jayatilake/sds.



STUDIES CONDUCTED BY THE MR&E UNIT DURING PHASE I

1. Follow-up Study - KDWSSP Phase I - September 1990
2. Study of the beneficiaries attitude to residue removal from latrines and their later use as fertiliser - November 1990
3. Study of the consumer's paying capacity of Ampitiya Water Supply Project - March 1990
4. Study of the consumer's paying capacity of Medamahanuwara Water Supply Project - May 1990
5. Study of the consumer's paying capacity of Wattegama Water Supply Project - August 1991
6. Identification of reasons for delays in latrine construction - October 1990
7. Adaptation of Makki-Mokki latrines for Sri Lankan environment - July 1991
8. Pilot Sanitation Programme implemented by the Dept. of Health - A Case Study - March 1991
9. School Community Health Education Programme - Assessment - July 1991
10. Follow-up study - Mahawatta Water Supply and Sanitation Programme - August 1991
11. Improved traditional wells - An Assessment - February 1991
12. Status of Gravity Water Supply Schemes in Udunuwara - November 1991
13. Follow-up Study - Gonawala Sanitation Programme - on going



### Efficiency of Iron and Manganese Reduction in the Filter Units

Table below shows the percentage reduction of total iron and manganese in the 06 hand pump wells tested

Well No.	Filter Type	Charcoal Type and Duration	Average T. Iron mg/l		Percentage Reduction of T. Iron	Average Manganese mg/l		Percentage Reduction Mn
			Inlet	Outlet		Inlet	Outlet	
1041-UN	FINNIDA	Wood <1cm - 18 weeks	1.56	0.09	94.2	0.74	0.17	77.0
4020-UN	UNICEF	TIMCO™ <2cm - 06 weeks	1.30	0.11	91.5	5.05	4.75	5.9
		TIMCO washed and reused - 05 weeks	1.48	0.40	73.0	4.53	4.07	10.1
		Wood <1cm - 08 weeks	1.69	0.19	88.7	4.07	3.47	14.7
UN/2020	FINNIDA	Coconut shell - 15 weeks	0.34	0.10	70.6	0.11	0.04	63.6
4044-UN	FINNIDA	Coconut shell - 05 weeks	6.74	0.54	92.0	0.70	0.22	68.6
		Coconut shell washed and reused - 04 weeks	12.75	0.28	99.7	0.90	0.25	72.2
		Wood <1cm - 06 weeks	5.92	0.45	92.4	2.15	0.24	88.8
4049-UN	FINNIDA	Wood <1cm - 08 weeks	7.35	0.63	91.4	2.40	0.60	75.0
4047-UN	FINNIDA	Wood <1cm - 10 weeks	4.05	0.21	94.8	0.88	0.25	71.6





### Training Programmes for NWSDB, Local Authorities.

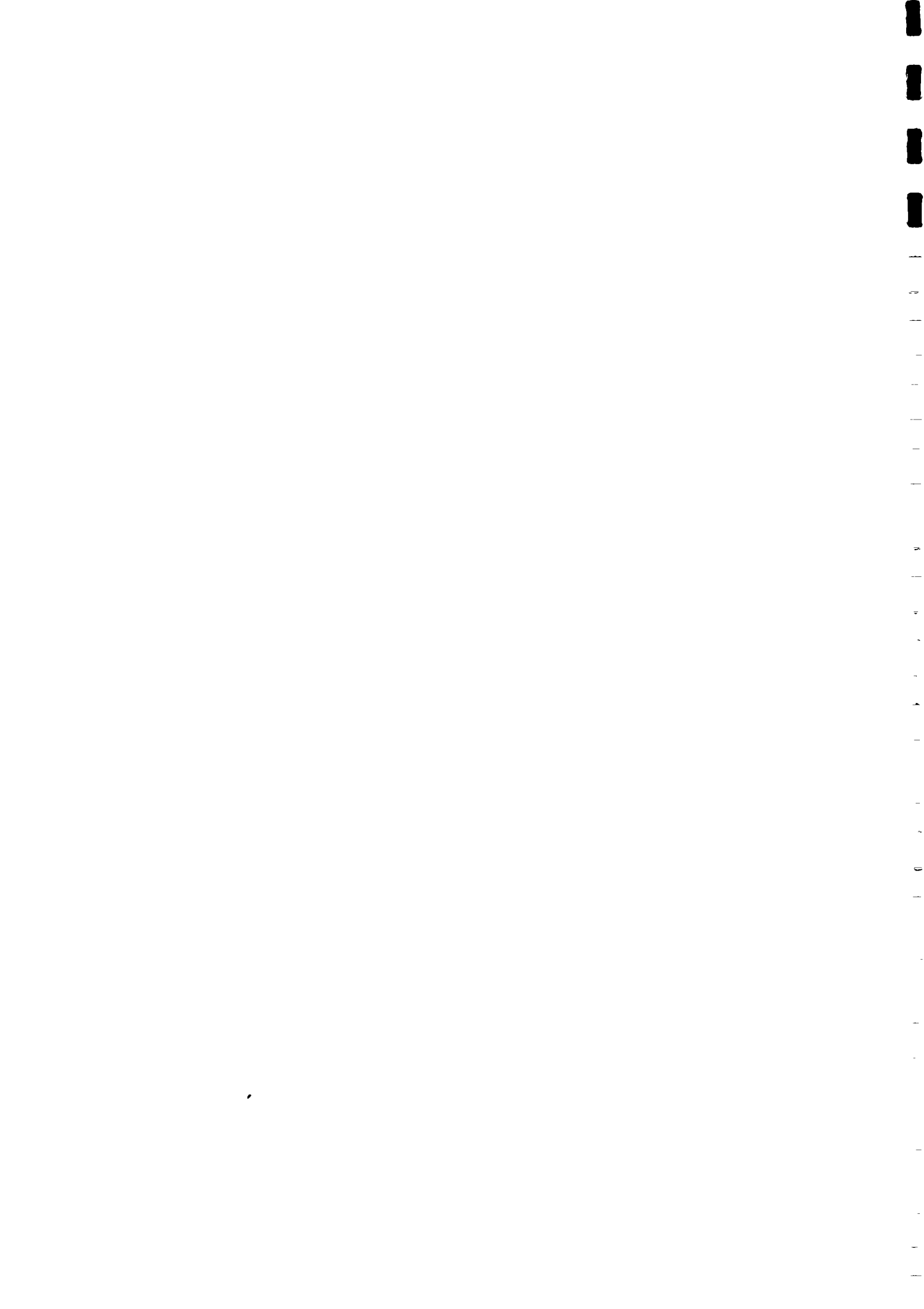
	<u>Programme</u>	<u>Duration (Days)</u>	<u>Participants</u>
1.	Training Programme for P/S Pump mechanics.	71	09
2.	Orientation seminar for P/s members.	01	48
3.	Pradeshiya Sabha TAs training Programme.	05	13
4.	Course in Basic Techniological and Scientific knowledge for administration. AGA Kundasale	01	01
5.	Workshop on management skills. Engineers - NWSDB	05	01
6.	Accounts and Audit Clerks. Clerks - NWSDB	05	03
7.	Pump Operators training programme Ampitiya and Kundasale WSS.	01	08
8.	Meter readers training programme Ampitiya and Kundasale P/s	01	05
9.	O&M Seminar on Harispattuwa Engineers and TAs - NWSDB	01	14
10.	On the Job Training on Harispattuwa WSS. Pump operators - NWSDB	25	04
11.	Pump Mechanics Training Programme P/s.	71	08
12.	Meter readers training programme Ampitiya P/s.	01	05
13.	Short training course in Budgeting, cashflow and claims in construction. NWSDB - TAs and Engineers.	04	04
14.	Training of Pradeshiya Sabha Hand Pump Mechanics - P/s	01	20



	<u>Programme</u>	<u>Duration (Days)</u>	<u>Participants</u>
15.	Training of Accounts and Audit Clerks. Clerks - NWSDB	05	05
16.	Training course in construction management for higher level construction managers. NWSDB - TAs Engineers.	01	02
17.	Pump Mechanics Training Programme	71	02

Years	1987	1988	1989	1990	1991
Mandays	-	657	65	148	845

Total Mandays - 1715



## Training Programme for Project Staff

Project staff were participated in several training programmes during Phase I of KDWSSP, under following categories.

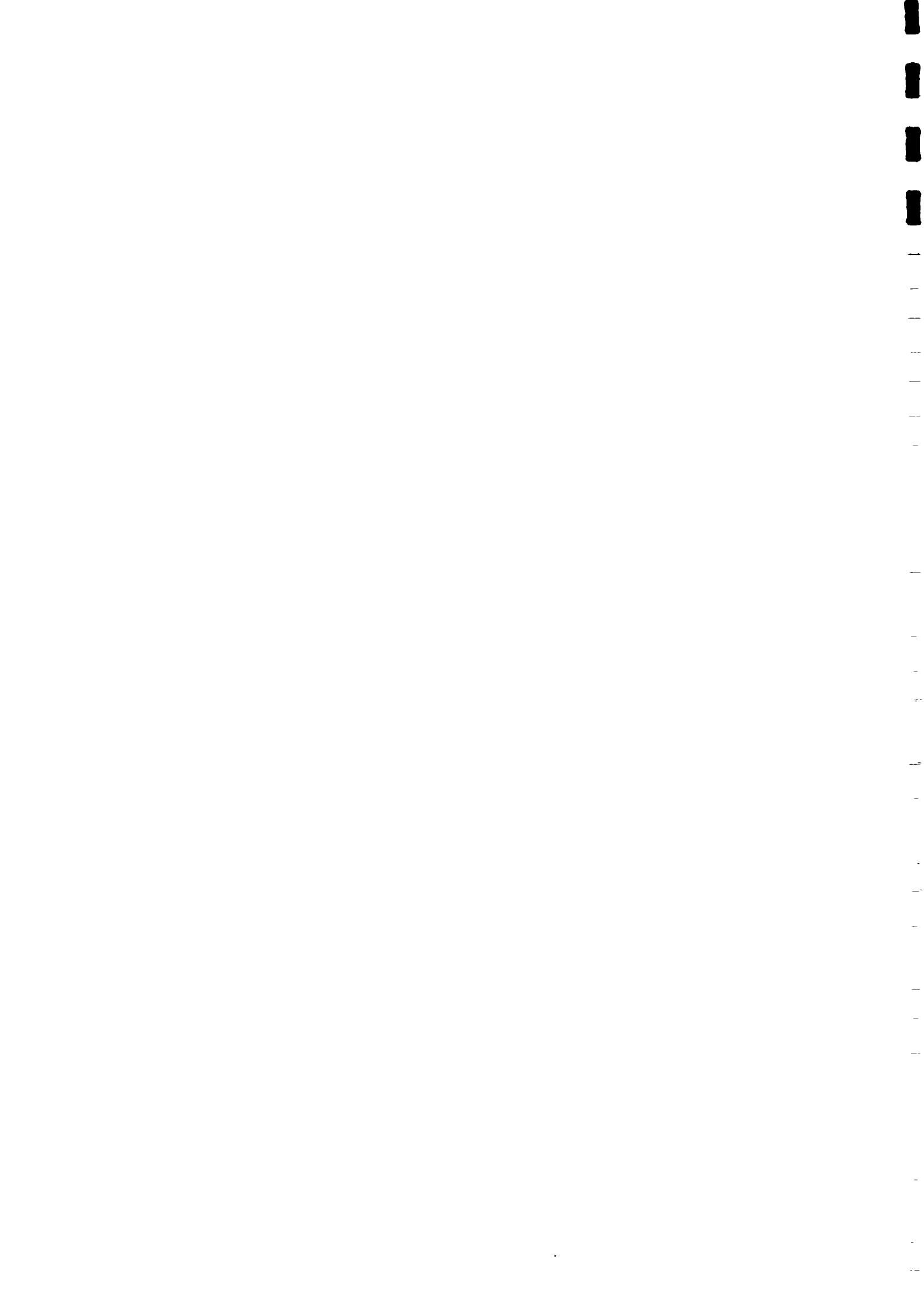
- Construction management, administration, termination etc.
- Management
- Labour relations
- Planning & Design
- Computer training
- Land escaping
- Project preparation
- Quantity surveying
- O&M of electromechanical systems etc.

Further many project officers were participated in overseas training courses, as follows:

	<u>Programme</u>	<u>Duration</u>
(a).	Micro Computer training workshop on project monitoring, Bombay, India. D C Vitanage	2 weeks
(b).	Technology & management of Rural Water Supply and Sanitation facilities. Bangkok, Thailand. S.L. Attanayake	3 weeks
(c).	Planning & management of Rural water Supply and Sanitation. Bangkok, Thailand. V. R .J. Arulgnanendran	26 days
(d).	Hand Pump Development and Testing of Hand Pumps. U.K S. L. Attanayake	10 days

Year	1987	1988	1989	1990	1991
Mandays	-	646	344	1098	980

Total Mandays - 3068



## TYPICAL PRICE COMPARISON

## List of Fabricated and Cast Items

Item	Description	Pump Model	Unit Rate (Rs.)	Cost of imported items
				Unit Rate (Rs) (Ex Factory Price)
01	India Mark II above ground components * Head Assembly * Handle Assembly * Cone Flange * Water Tank * Pump Pedestal	India Mark II	8170.00	7095.00
02	Chain Coupling	India Mark II	475.00	118.00
03	Piston Assembly	India Mark II (STD)	350.00	300.00
04	Piston Assembly	India Mark II (OTC)	450.00	473.00
05	Foot Valve Assembly	India Mark II (OTC)	900.00	602.00
07	Plunger Seat	Nira AF-76	50.00	360.00
08	Base Plate	Nira AF-85	650.00	2717.00

## List of Plastic Items Manufactured Locally for NIRA AF-85

Item	WITH MOULD COST		WITHOUT MOULD COST	COST OF IMPORTED ITEMS
	Unit Price Rs.	Mould Cost Rs.	Unit Price Rs.	Unit Price Rs.
Plunger Body	15.50	140,000.00 + BTT	850.00	1520.00
Bush Bearing	27.50	105,000.00 + BTT	1940.00	935.00
Plunger Nipple	8.15	70,000.00 + BTT	340.00	432.00
Bottom Valve Body	26.00	110,000.00 + BTT	830.00	1343.00
Bottom Valve Limiter	13.00	85,000.00 + BTT	210.00	792.00
Plunger Ring	5.75	45,000.00 + BTT	340.00	540.00
Valve	5.00	75,000.00 + BTT	150.00	540.00

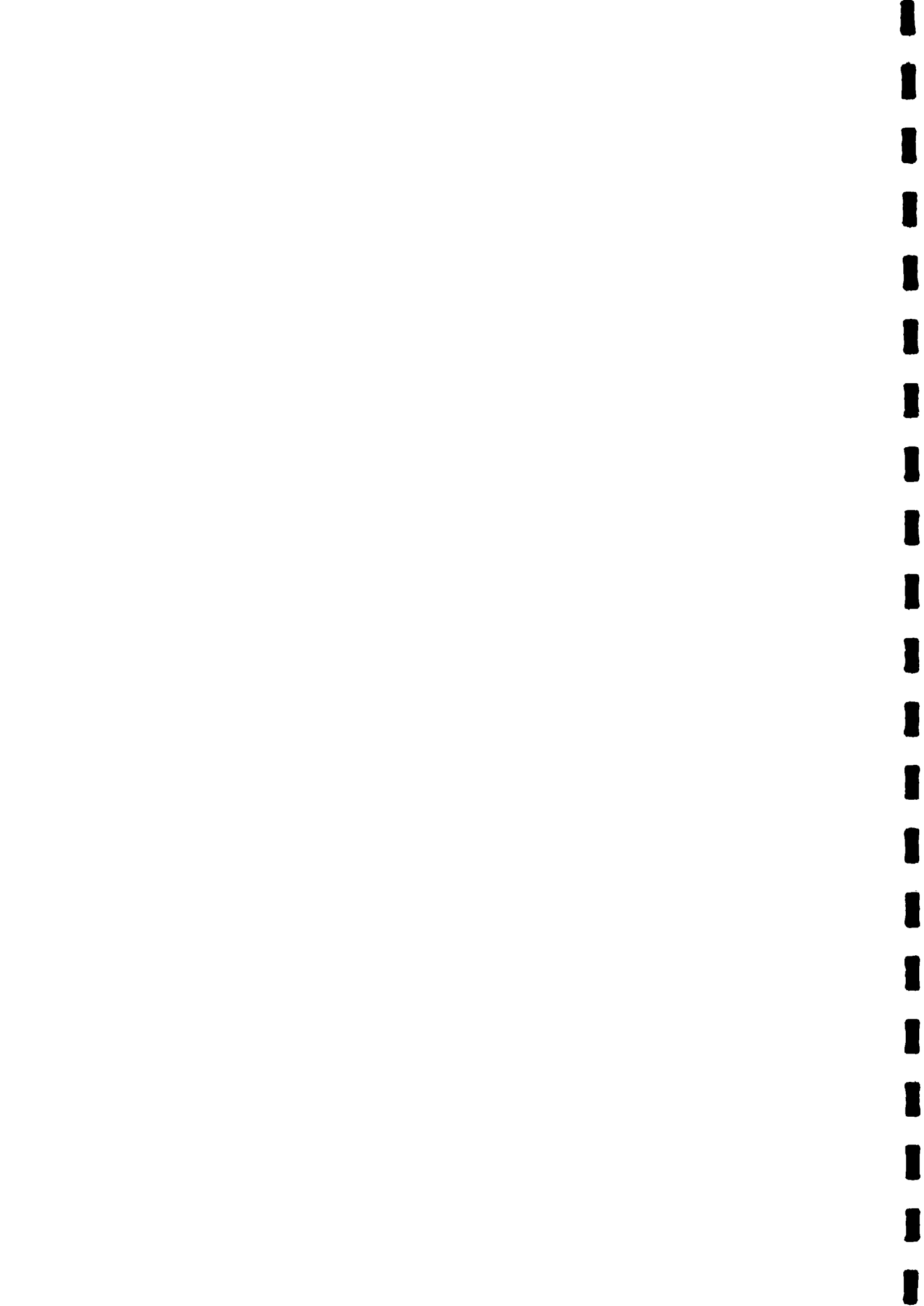




### LOCALLY MANUFACTURED HAND PUMP SPARES

#### List of Rupper Components Produced Locally

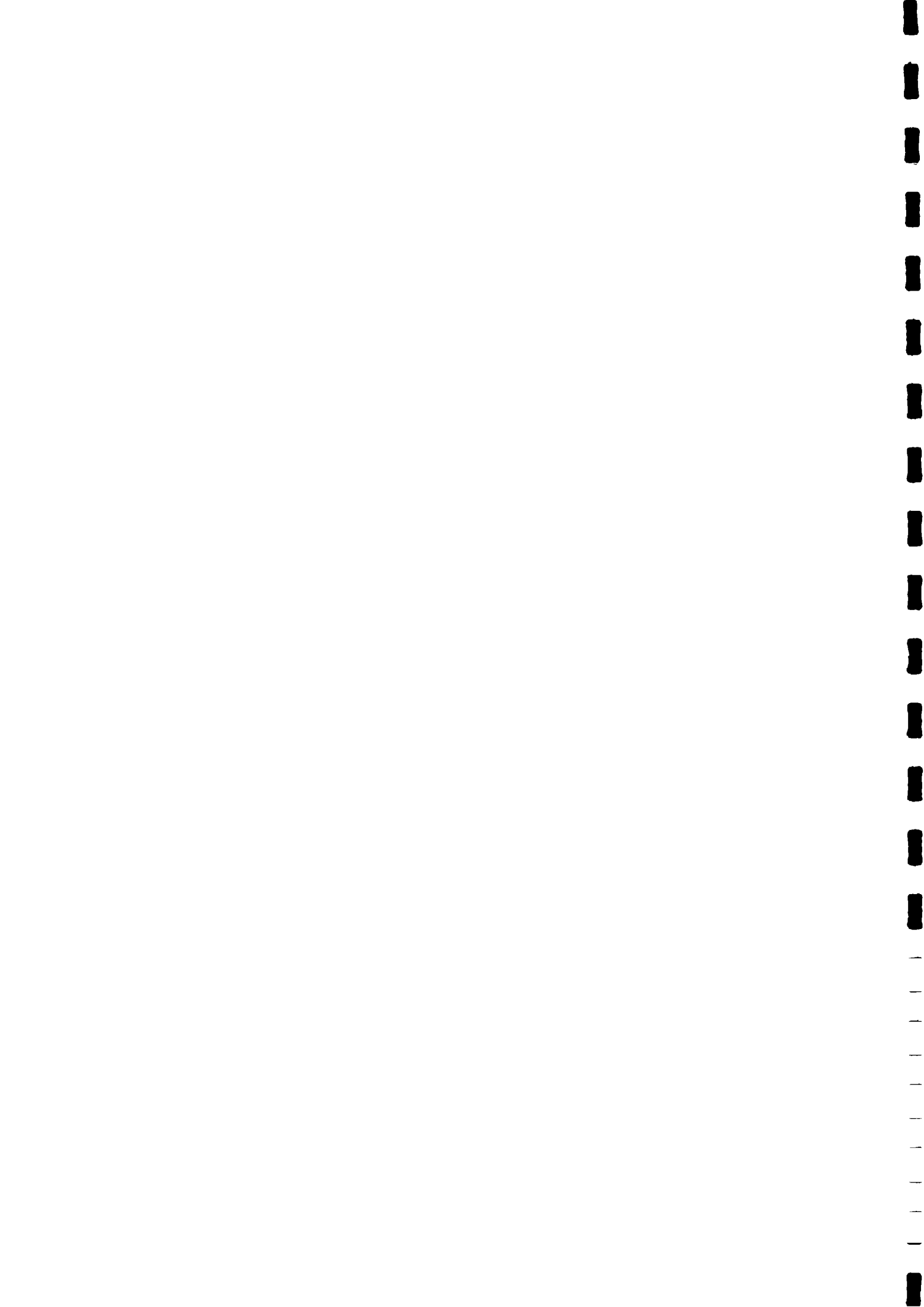
Item	Description	Pump Model	Unit Rate (Rs)
01	Compression Cone	India Mark II STD - Model	45.00
02	Compression Cone	India Mark II OTC Design	60.00
03	Cup Seal	India Mark II	30.00
04	Bottom Valve 'O' ring	India Mark II OTC Design	6.00
05	Rubber Seal (Bottom Cap)	India Mark II OTC Design	7.50
06	Riser Pipe Centralizer (Circular Type)	India Mark II OTC Design	27.50
07	Riser Pipe Centralizer (Square Type)	India Mark II OTC Design	30.00
08	Rod Centralizer	India Mark II OTC Design	90.00
09	Rod Centralizer	Afridev	25.00
10	Pipe Centralizer	Afridev	90.00
11	Rubber Cone	Afridev	80.00
12	Planger Seal	Afridev	15.00
13	'O' Ring	Afridev	11.50
14	Valve Bobbin	Afridev	26.00
15	Cup Seal	Nira AF-76	50.00



SUMMARY OF HEALTH EDUCATION ACTIVITIES  
CARRIED OUT IN PROJECT PHASE I

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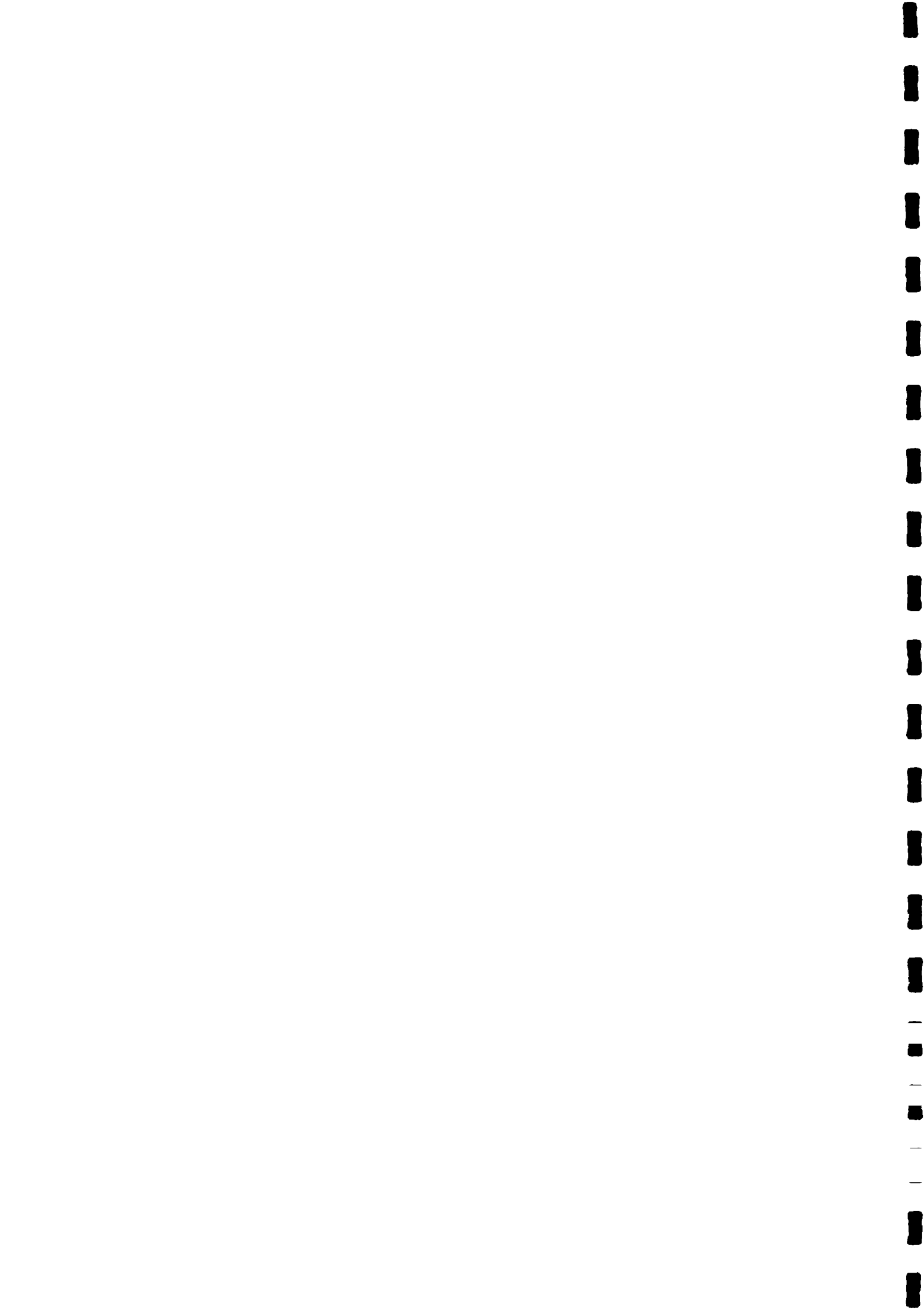
NO	ACTIVITY	1987	1988	1989	1990	1991	TOTAL
01	<u>Training, Seminars Workshops</u>						
	1. Community Health Volunteer training	05	41	27	01	19	93
	No. of volunteers trained	152	1607	921	40	447	3167
	2. Seminars for :						
	A. Public Health Staff	02	03	03	04	03	15
	B. School Principals and H/S		02	01	-	03	06
	Teachers	-	-	-	01	05	06
	C. Pre-school Teachers	06	12	02	-	-	20
	D. Community Leaders	-	03	-	-	07	10
	- In-service training workshop for Hospital Employees						
02	<u>Health Education Program</u>						
	A. For mothers, Youths, Volunteers, Water Consumers Village Leaders etc..	-	-	53	209	232	494
	B. For patients at Medical Institutions	05	18	46	21	21	114
	C. Clean-up campaigns	-	-	09	23	23	36
	D. Health Camps held	-	-	02	02	-	04
	E. Mass HE Campaigns	-	-	02	02	-	04
	F. Poster Competitions held	-	01	-	-	01	02
	G. Essay Competitions held	-	01	-	-	01	02
	H. Health Exhibitions held	-	03	01	03	05	12



NO	ACTIVITY	1987	1988	1989	1990	1991	Total
03	<u>Conferences and Meetings</u>						
	A. Health Monitoring Committee Meetings	03	12	03	02	02	22
	B. Health Staff Conferences	12	12	26	26	18	82
	C. Divisional Meetings	-	-	18	16	06	40
	D. Others	08	08	11	12	04	35
04	<u>School Health Education</u>						
	A. No. of schools where SCIHE program introduced	-	-	08	-	30	38
	B. Orientation programs for Tenders	-	-	08	-	18	26
	C. Orientation programs for Little Health Facilitators	-	-	08	-	12	20
05	Provision of Motor Vehicles to Health Department						
	- No. of Jeeps given	-	-	01	-	-	01
	- No. of Motor Cycles given	-	-	05	03	03	08
06	<u>Development of HE materials for Health Dept.</u>						
	A. Display boards sets for Exhibitions	02	02	-	-	03	07
	B. Folders, Sinhala/Tamil	-	5000 copies	-	-	3000 copies	8,000 copies
	C. Health Volunteer Guide Book	-	-	1,000 copies	-	-	1000 copies
	D. Health Survey Forms	-	-	02	-	-	02
	E. "Good Child Book"/Tamil	-	-	60,000	-	-	60,000 forms
	F. Film Slide sets	-	-	3,000 copies	-	-	3,000
	G. Little Health Facilitator cards	-	-	5,000 copies	3,000 copies	-	8,000
	H. Video Film on "Water and Sanitation for Health"	-	-	-	-	-	01



NO	ACTIVITY	1987	1988	1989	1990	1991	TOTAL
07	<u>Audio Visual and Other Material support to Health Department</u> A. No. of Health Institutions provided with AV equipments B. No. of Electric water boilers provided to Medical Institutions. with boilers stands	-	02	05	-	-	07
		-	-	-	72	-	72





Summary of Investigation Wells in Kandy District Done by the KDWSSP - Phase I

AGA Division/Area	No. of Investigation Wells		No. of Investigation Wells Recommended Already as Production Wells		No. of Investigation Wells Converted as HP Wells on Community Request		Total Recommended Yield m <sup>3</sup> /d		Recommended Yield m <sup>3</sup> /d per BH	
	D BHs	S BHs	D BHs	S BHs	D BHs	S BHs	D BHs	S BHs	D BHs	S BHs
Galagedera	38	03	19 (50%)	-	-	-	4900	-	260	nil
Udunuwara	05	09	-	9	-	-	-	1000	-	1000
Kundasale	40	-	6 (15%)	-	13	-	6000	-	1000	-
Pathadumbara	42	-	23 (55%)	-	02	-	8150	-	350	-
Senkadagala	14	-	6 (43%)	-	03	-	2100	-	350	-
Yatinuwara	30	10	10 (33%)	7	04	-	2985	6300	300	900
Galagedera	02	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>171</b>	<b>22</b>	<b>64</b>	<b>16</b>	<b>22</b>	<b>-</b>	<b>24135</b>	<b>16300</b>	<b>2260</b>	<b>2000</b>



