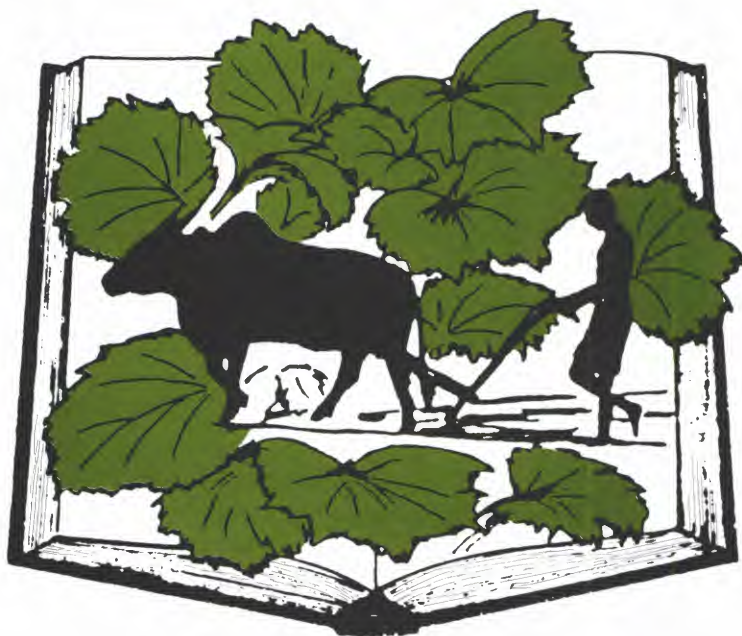


TOWARDS A STRATEGY FOR
REHABILITATION AND DEVELOPMENT
OF IRRIGATION SYSTEMS IN THE
BATTICALOA DISTRICT, SRI LANKA
A CONCEPT PAPER

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Report To NORAD
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N. Shanmugaratnam

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N. Shanmugaratnam

Towards a Strategy for Rehabilitation and Development of Irrigation Systems in the Batticaloa District - A Concept Paper

1. Introduction

Agriculture and fisheries are the mainstay of the rural household economies of Batticaloa district. Agriculture in the district is synonymous with rice cultivation as the latter remains the most important agricultural activity for the vast majority of its farm households. However, a wide range of subsidiary food crops and tree crops like coconut and cashew are also cultivated in the highlands. While the availability of a variety of soils offers opportunities for such a diversified agricultural land use, the scarcity of water at critical times in the cropping cycles has remained a major constraint to the district's economic and social advancement. Yet Batticaloa's water resources in terms of total annual precipitation and other natural sources are not meagre by any standard. The water problem is caused primarily by the uneven distribution of rainfall and the inadequacies in conservation and management. Only 34 percent of the rainwater in an average year can be conserved in the existing irrigation tanks when they are fully functioning. However, until the mid 1980s these large and small irrigation schemes, which supplied water for 37.5 percent of the 57, 120 ha of paddy cultivated in the district, played a major role in making Batticaloa a surplus producer of paddy. With the advent of the civil war around 1985, the district's economy, largely dependent on agriculture and fisheries, came under growing stress leading to negative growth rates in several years. The irrigation infrastructure has been subject to damage and degeneration due to the effects of the war. Today, a majority of the minor irrigation schemes and many irrigation and drainage structures of the major schemes are in a bad state of disrepair. Moreover, the socio-economic dislocations caused by the war have seriously undermined local level institutions concerned with land water resources management and rural development.

It would, however, be unreasonable to assume that all the ills of Batticaloa's irrigation schemes began with the outbreak of the civil war. Engineers, administrators and independent observers in the district have told the present writer that the irrigation systems had suffered from defective construction and inefficiencies due to lack of maintenance and other institutional weaknesses including failures of farmers' organisations even prior to 1985. Local institutions, formalised as Farmers' Organisations and still in their formative stages, were quite weak in resource management even before the war started. Furthermore, insufficient allocation of funds by the central government has been a constant constraint to improvement and development of irrigation and water management facilities in the district. There was indeed a growing backlog of rehabilitation before the war. Batticaloa's neglect by successive governments is reflected in its stagnation in irrigation development as compared with the neighbouring

Polonnaruwa and Ampara districts, where more than 75 percent of area under paddy is irrigated. Batticaloa also has the lowest PQLI in the Eastern Province. However, the development of the Gal oya irrigation scheme in the neighbouring Ampara district contributed to an increase in the supply of water to Batticaloa through the Navakiri tank. At present 6000 ha in Batticaloa are irrigated by this Tank which is located in the Ampara district.

The war unleashed new forces that disrupted the social and economic life of the region in various ways. However, incidents of direct physical damage to the irrigation infrastructure by bombs and shells have so far been few, isolated and unintended. The irrigation and drainage structures have actually been deteriorating due to the lack of routine maintenance and timely repair of damages caused by floods and wild animals like elephants. The causes of this failure are directly linked to the mass displacement of farmers from their villages and the inability of the irrigation, agrarian services, agriculture and other concerned government departments to carry out their normal duties as a result of the war. Rehabilitation of the irrigation infrastructure and revival and improvement of the local level management institutions are among the more basic prerequisites to initiate economic recovery and reverse the negative trend.

2. Rehabilitation of Irrigation Systems: The Concept

This study, commissioned by the NORAD assisted Batticaloa Integrated Rehabilitation and Reconstruction Programme (BIRRP), is an input towards a strategy for rehabilitation of the irrigation systems in the district. Conceptually and in this particular case, rehabilitation implies two interrelated dimensions: i) physical repairs to the irrigation infrastructure to restore it to its designed capacity, and ii) the resuscitation of the institutions concerned with management of the land-water resources to ensure the efficient, equitable and sustainable utilisation of these resources. The former involves rebuilding of fixed capital assets in the form of tanks, canals, regulators and other structures to conserve, distribute and drain water as a common pool resource. The latter involves the rebuilding of institutions as social capital to adopt and set the rules of managing the common pool resource and the physical structures in ways that ensure efficiency, distributive fairness to present users, and sustainability. There are, thus, both quantitative and qualitative dimensions to rehabilitation. In Batticaloa's context, the qualitative - i.e. the institutional - dimension needs to be underlined more emphatically as rehabilitation tends to be viewed mainly, and at times solely, in pure and simple quantitative terms. I make this observation at the outset as I was struck by the absence of a focus on institutional aspects in the numerous project proposals for rehabilitation submitted to BIRRP. Yet I was impressed by the knowledge many government officials had on institutional problems when I had occasions to exchange ideas with them.

Rehabilitation of the irrigation infrastructure is not an end in itself. For it to bear good results, it has to be co-ordinated with rehabilitation of individual

farm household economies which involves rebuilding the capital stock at the farm level. Farm households cannot make the best use of irrigation if they do not have the basic farm implements, the know-how and material means to practice efficient on-farm irrigation and access to credit and production inputs like draught power or tractors, seeds and fertilisers. Displacement, lack of credit and loss of access to inputs and markets for the non-displaced, and decline in real income have contributed to pauperisation of large sections of the agricultural population. Therefore, it does make sense to take into account the rehabilitation needs at the farm level when rehabilitation of a particular irrigation scheme is being planned and implemented. There is a need for a mechanism to facilitate as best as possible the co-ordination of the two processes of rehabilitation.

It must be pointed out that rehabilitation offers opportunities to promote and achieve development through improved resource management at the community and individual-farm level. By rebuilding a defect-free physical infrastructure, avoiding the wasteful practices of the past and by making "*produce more with less*" the motto, productivity of land, water and labour can be raised. This can lead to higher income and possibly to better quality of life.

3.0 Terms of Reference and Execution of Assignment

The mandate for this study has been inspired by BIRRP's concern that a coherent strategy is needed for the rehabilitation of the irrigation systems in Batticaloa "to ensure the most effective and equitable use of the resources by the different groups of users." The Consultant's task is to prepare a concept paper which "outlines problems, issues and concerns to be addressed by the irrigation strategy", and "proposes a plan for developing the irrigation strategy". The paper should address the following issues:

- the need for an irrigation strategy for Batticaloa District
- the objectives and contents of the strategy
- the present state of the irrigation infrastructure, the institutional arrangements, capacities and constraints
- water management and infrastructure maintenance by the users
- overview of technical expertise available for the development of the irrigation strategy
- organisational follow up for planning and implementation in the short and long terms.

The assignment, which involved a total of three consultant-weeks, was carried out in November 1995 in Sri Lanka. The Consultant was based at the BIRRP office in Batticaloa and had access to almost all the relevant documents. A series of discussions was held with key officials of the Central and Provincial Irrigation, Agrarian Services, Agriculture, and Planning Departments and with the Government Agent. Meetings were also held with Farmers' Organisations. The Consultant visited several sites in the Batticaloa district to gain first hand knowledge of irrigation and land

problems. Mr. Per Wam, Advisor to BIRRP, was closely associated with the Consultant throughout the assignment.

4.0 Is Rehabilitation Possible in Batticaloa Today?

The answer is Yes. Certain types of rehabilitation work are not only possible but urgently needed to stabilise household economies and community life, encourage the return of farmers to their villages, avoid preventable out-migration of people from rural areas and to arrest the trend of negative growth of the district's economy. It is also possible to significantly expand the scope and coverage of rehabilitation if the protagonists of the war, the civil administration and producers' organisations can agree on some practical arrangements as suggested below. We reached this conclusion after listening to leaders of Farmers' Organisations, government officials, and farmers who have just returned to their villages after years of displacement and after our visits to several sites to see for ourselves the physical conditions of irrigation structures. We were impressed by the thinking and preparatory work that have been going on in the irrigation and agrarian services departments and by the suggestions put forward by Farmers' Organisations on war-time rehabilitation. There is a clear consensus among all these groups that emergency relief alone is not sufficient and that the existing possibilities for rehabilitation must be tapped for the benefit of the district's society and economy. An important point made by some is that dependence on relief for two or three years, can have adverse effects on the morale of the recipients and breed hopelessness. Participation in rehabilitation and even a partial return to production activity are an essential means to restore hope and confidence in the minds of the victims of the war who are mostly farmers and fishermen.

It is in the nature of the ongoing civil war that the intensity of disruptions varies spatially and temporally. Not all localities are equally affected at the same time. Some may have a sufficient degree of stability to undertake minor rehabilitation and begin to reap benefits almost immediately while others may be under prolonged stress due to military activities and become temporarily depopulated. This variability permits certain types of rehabilitation work in some areas, at least. We also observed during our field visits to sites in the western sector of the district that farmers have started returning to their homes in areas where the army has recently closed its camps and moved out. *Rehabilitation of the basic village level infrastructure is a necessary condition for stabilisation of household economies and community life in these areas.*

An important factor to be taken into account is the shifts in the balance of power between the government and LTTE. A major part of the district's countryside lying beyond the lagoon has now come under LTTE's control. However, the majority of the district's population still remains in the eastern part. Tamil farmers from colonies bordering Ampara and Polonnaruwa are reluctant to return and they may not be motivated to do so until peace returns. But they do go back to their farms during the day to

cultivate and take care of the crop. For example, colonists from units 35, 37, 38, 39 and 40 in Porathivu Pattu and Manmunai Pattu West who returned to their original villages in and after 1990 have become 'commuting farmers' to borrow a term from a local official. Displaced Muslim farmers seem to be a more unfortunate lot. These are people who fled their farms in the western part (*paduvankarai*) due to the anti-Muslim violence of different Tamil militant groups before 1990 and that of the LTTE after 1990. They have not been able to return to their lands yet.

Displaced farmers from other parts like Koralai Pattu and Eravur Pattu seem to be trickling back to their villages slowly to settle down. Here again the fear that there may be major military showdowns between government and LTTE discourages many from taking the decision to return as resident farmers. Many displaced farmers may choose to return to their villages seasonally to cultivate a *maha* crop of paddy and some highland *chena*. We did see large tracts of newly sown paddy fields in parts of the west. These ground realities cannot be ignored by rehabilitation agencies and workers - governmental or non-governmental, national or international. Our understanding of the situation suggests that governmental and non-governmental agencies can carry out certain types of rehabilitation work in LTTE-controlled areas too, if appropriate modalities can be worked out. The government should be aware that a failure on its part to permit rehabilitation in LTTE areas can be construed by the people in those areas as discrimination and non-humanitarian. This would only further alienate the government from the people. On the other hand, a positive policy and open commitment to rehabilitation in these areas are bound to enhance the political credibility of the government. Government's efforts to win the hearts and minds of the people can bear dramatic results if it can successfully devise ways and means to enable farmers to re-commence cultivation in and around areas occupied by the security forces. Restrictions on transport of agricultural inputs have also severely hurt production. The scope for rehabilitation and economic recovery can be significantly changed if the military hierarchy, civil administration and Farmers' Organisations can reach an accord in these areas.

For its part, the LTTE should realise that it is responsible for creating the right conditions for the displaced Muslim farmers/land owners to return to their lands in areas under its control. Failure to do so will not only cause further hardship to these families but also aggravate communal disharmony and delay the progress of rehabilitation. In the field, the Consultant had an opportunity to interact with the Deputy Leader of the LTTE and its district political leader in the presence of some senior government officials. The subject of this meeting was rehabilitation in the areas currently controlled by the LTTE. The Deputy Leader said that he could guarantee on behalf of his organisation that no obstruction would be caused to any rehabilitation activity in LTTE-controlled areas. He also assured that the LTTE would not take away government or NGO vehicles and that the personnel coming to do rehabilitation and development work would receive their co-operation. He did point to precedents of collaboration

between his organisation and governmental and Sri Lankan and foreign non-governmental bodies in the North in relief and rehabilitation. Unfortunately, at the time of this meeting, the Consultant did not have the facts concerning displaced Muslim farmers and, as a result, was unable to raise the matter with the Deputy Leader of the LTTE. Subsequently he met with displaced Muslim farmers and learnt from their representatives that all they expected from the LTTE leadership was a guarantee that they can return to their lands and resume their economic life without any harassment. Some of them said that it might be possible to extract such a guarantee from the LTTE today while the others were sceptical. The former based their belief on what they saw as signs of change in the LTTE's attitude towards the Muslims. The latter would believe only when the guarantee is actually given and put into practice. The Consultant's view is that a neutral agency should take this matter up with the LTTE and secure the understanding and guarantee that would make the Muslim farmers feel secure enough to return to their lands.

From the above perspective, many are the possibilities for rehabilitation in today's Batticaloa. There are, of course, constraints too, as pointed out above. The scope of rehabilitation can be greatly broadened if some of these constraints can be removed.

5.0 Water Resources

As already pointed out, Batticaloa district is reasonably well endowed with water resources though crop production is constrained by seasonal water scarcity. However, this problem can be overcome to a great extent by conserving the surplus rain water for supplementary irrigation. The mean monthly rainfall is shown in Table 1.

Table 1: Mean Monthly Rainfall and Number of Rain Days in Batticaloa

Month	Rainfall m m	No. of Rain days
January	279.1	16
February	178.3	10
March	84.8	08
April	72.4	07
May	31.2	05
June	18.5	03
July	37.8	04
August	61.7	06
September	47.8	05
October	178.1	14
November	285.2	18
December	429.8	20
Annual	1704.7	116

Source: Statistical Handbook of Batticaloa District 1995.

The main rainy season is from December to February when the North-East Monsoon blows. More than a half of the annual precipitation is received during this season. From an agricultural perspective, moisture stress is high between May and September.

There are four major rivers and 11 streams flowing through the district (Map 2). The sources of the four major rivers, Maduru Oya, Mundanai Aru, Magillavattuvan and Andeli Oya, lie outside Batticaloa district while the catchments of all the 11 streams are within the district. None of the rivers and streams are perennial but they flood during the rainy season almost annually causing damage to paddy fields and flood bunds. There are 15 minor and 8 major flood areas mostly bordering the Batticaloa and Valaichenai lagoons.

The Maduru Oya reservoir, constructed under the Accelerated Mahaweli Programme and lying about 25 km outside the district, impacts both positively and negatively on the district's land and agriculture. It helps augment water available for agriculture in areas commanded by the Punanai anicut and the Vakaneri Tank. This has solved the problem of water scarcity in these areas. However, when there is heavy rainfall, the flood gates are open to drain the excess water into the river which floods Punanai and Vakaneri causing damage to the anicut and the tank and to about 600 ha of paddy lands. The Mundanai and Magalavatavan river basins are also subject to floods. The main cause of these floods is the deforestation of the upper catchments. The water conservation systems in the district are also inadequate to contain floods. The absence of river training is another factor that aggravates damage to cultivated areas. The situation is also indicative of the potential for raising the water conservation capacity of the district.

The Batticaloa and Valaichenai lagoons are two major water bodies into which several rivers drain their waters. The Batticaloa lagoon also receives drainage water from the Gal Oya scheme. The district ground-water resources are found in three types of aquifers¹ (Map 3): a) In the coastal sandy belt between the sea and the lagoon where the water table is at an average depth of 2.5 meters. b) In the Rugam area and the delta of Magillavattuvan aru extending up to Valaichenai lagoon and Panichchankerni with the water table depth varying between 3 and 10 meters. c) In the rest of the district the aquifers are discontinuous and found in fractures of rock. The water table is more than 13 meters deep. The potential for ground-water development for supplementary irrigation has yet to be systematically studied. However, based on the limited knowledge and experience, it can be said that ground-water can be a supplementary source of irrigation for home gardens and subsidiary food crops in some areas.

¹ Central Environmental Authority (1992): An Environmental Profile of the Batticaloa District.

6.0 An Overview of Agricultural land Use and Irrigation Infrastructure

Agricultural Land Use

The district has 56, 766 ha of asweddumised paddy lands and 47, 000 ha highlands with tree crops and subsidiary food crops (see Map 4 for land use). The distribution of paddy land according to divisions within the district is shown in Table 2. Almost 90 percent of the paddy land is in the sparsely populated western part of the district.

Table 2: Asweddumised Paddy Land in Batticaloa District (Hectares)

Division	Major Irrigation	Minor Irrigation	Rainfed	Total
Koralaipattu North	526.32	682.31	2053.04	3261.67
Koralaipattu West + Koralaipattu	4906.80	743.24	5309.23	10959.27
Eravurpattu	4251.94	655.26	8961.46	13868.66
Eravur Town	-	-	9.72	9.72
Manmunai North	-	16.19	731.29	747.48
Kattankudy	-	-	7.89	7.89
Manmunai pattu	-	-	264.41	264.61
Manmunai South+Eruvil	133.52	454.01	186.88	774.41
Porativupattu	5902.71	298.62	3426.52	9627.85
Manmunai S.west	2195.10	53.04	3980.36	6228.50
Manmunai west	3316.88	87.57	7611.46	11015.91
District	21233.27	2990.24	32542.26	56765.77

Source: Department of Census & Statistics 1995

Paddy Production

As the main crop and a major contributor to the district's economy, the performance of the paddy sub-sector can be used as an indicator of the trend in the rural economy. First some general observations based on some simple ratios regarding 'actual-potential' relations:

- Between 1980 and 1994, the highest share of the total asweddumised land cultivated and harvested in a *maha* season was 77% in 1982/83. The average ratio for the *maha* seasons of 1984/85-1993/94 is 49%; i.e. on the average only a half of the asweddumised land is sown and harvested in the *maha* season in Batticaloa district.

- Between 1980 and 1994, the maximum efficiency reached by the major irrigation schemes in terms of the share of their total command area sown and harvested was 73% in *maha* 1983/84 and 60.4% in *yala* 1989. For minor schemes the corresponding figures were 39.8% in 1984/85 and 30% in 1986 respectively.

- For 1984-1994, The *maha* and *yala* averages of the shares of the total command area that were actually sown and harvested in the major irrigation schemes were 48% and 47% respectively. For minor irrigation schemes both seasons had the same average of 22%.

Table 3: Paddy Production Data 1984/85 - 1993/94

Year	Extent Sown ha	Extent Harvested	Average Yield kg/ha	Production MT
1993/94	31077	27418	2741.5 (86.67)	66,340 (63.06)
1992/93	30855	30547	3038.8 (96.07)	81,920 (78)
1991/92	32004	29883	3037.0 (96.01)	80,000 (76)
1990/91	n. a.	n. a.	n. a.	n. a.
1989/90	38332	36598	2900.0 (91.68)	94,000 (89.35)
1988/89	23704	22894	3052.0 (96.5)	61,652 (58.60)
1987/88	29664	11380	1703.0 (53.84)	17,108 (16.26)
1986/87	29654	28197	3113.0 (98.42)	77,467 (73.67)
1985/86	33279	26788	2609.0 (82.5)	61,194 (58.65)
1984/85	38170	37678	3163.0 (100)	105,182 (100)

Source: Statistical Handbook, Batticaloa District 1995.

These figures show that there are major gaps between what has been officially accepted as the potential and what is realised in the field. Narrowing these gaps should be a major concern of rehabilitation and reconstruction in Batticaloa district.

As shown in Table 3, in the past several years, paddy output and average yield for the main season (*maha*) have been fluctuating below the 1984/85 levels. The same goes for the extents sown and harvested. These figures are indicative of the effects of the war. During these years, the extents sown and harvested in the minor irrigation schemes had shrunk dramatically; for instance, in *maha* 1984/85 these extents were 1195 ha and 1190 ha respectively and they dropped to 465 ha and 387 ha in 1993/94. Displacement and lack of agricultural inputs, farmers' inability to carry out cultural practices in time due to restrictions on their movement and harassment by the military, defects in the irrigation schemes, poor on-farm water management and the absence of any rehabilitation programmes in the western part, where the bulk of the paddy lands lie, are among the major causes of the decline of the paddy sector in the Batticaloa district.

Major and Minor Irrigation Schemes

The Irrigation infrastructure consists of major and minor irrigation schemes and a limited number of tube wells and agro-wells. Basic data on the major schemes are shown in Table 4.

Table 4: Major Tanks in Batticaloa District Under The Central and Provincial Irrigation Departments (CI & PI)

No.	Division & Name of Tank	Command Area (Acres*)	Capacity (Acre feet)
	CHENKALADY DIVISION		
1	Unnichchai (CI)	12,757	41,500
2	Rugam (CI)	9,752	18,600
3	Vakaneri (CI)	8,500	13,500
4	Weligahakandiya (CI)	339	1,869
5	Kithul wewa (CI)	801	4,205
6	Wadamunai (CI)	378	4,250
7	Anaisuddakaddu kulam	310	932
8	Mathurankerni (PI)	402	2,150
9	Kaddumurivu kulam (CI)	850	4,256
10	Kirimichchai odai (PI)	252	1,255
11	Tharavai kulam (PI)	200	285
12	Punanai Anicult (CI)	1,550	--
	PADDIRUPPU DIVISION		
13	Navakiri (CI)	17,505	53,300
14	Thumpankerny (CI)	670	1,194
15	M. P. Aru Scheme (PI) Paluganawa 3892 Ac. ft. Kadukamunai 5026 Ac. ft	7,648	8,918
16	Adachchakal (PI)	325	1,224
17	Periyakulam - Periyaporativu (PI)	340	

18	Periyakulam - Palugamam(PI)	300	-
19	Periyakulam - Mahiloor (PI)	350	-
20	Sevakapathu kulam (PI)	300	-
21	Mahiladitivu kulam (PI)	200	-

* 1 ha=2. 47 acres.

Source: Department of Irrigation, Batticaloa 1995

To these schemes may be added the three water pumps installed on the lagoon to supplement irrigation supply for about 1, 500 acres in late Maha. There are 461 minor irrigation works consisting of 250 tanks and 211 flood bunds and saltwater exclusion bunds.

7.0 Major Problems

1. *Historical inefficiency of irrigation schemes*

It should not be forgotten that the irrigation schemes in Batticaloa were operating at sub-optimal levels even before the war began to impact on them. This was illustrated in the previous section. The war aggravated the pre-existing problems of management and added new ones. Lack of sufficient allocations from the central government, inadequacies in planning and of designs, and institutional failures are among the causes of the historical problems. Some of these aspects are discussed at various points in the sections that follow; see 8 and 9 in particular.

2. *Degeneration of the physical infrastructure*

Almost all the schemes belonging to all categories are in various states of disrepair. Headworks (bunds, sluices and spills) as well as the canal systems have been affected. The major irrigation schemes have suffered from lack of routine maintenance for many years. The field staff and maintenance workers of the Irrigation Department were unable to carry out their normal functions due to restrictions imposed by security forces and due to the fear that LTTE guerrillas might appropriate their vehicles and construction materials. The headworks of the major and medium irrigation tanks could have been maintained in their normal state if these personnel of the Irrigation Department were permitted by the army to do their routine tasks. Bunds of many tanks have been extensively damaged due to failure to treat scours which had turned into major breaches with time. For instance, failure to repair a minor breach in the Unnnichai tank bund in 1988 had led to an annual loss of 3, 000 ac. ft of water in the last few years. Originally, the damage caused by rains was quite small and required only a minor routine treatment but this was not done as the army, occupying the headworks, did not allow the Irrigation Department to do repairs. The headworks of other major tanks and the canal systems of all the major schemes have also suffered without routine maintenance. The security forces had also interfered with the rotational water supply system of the Irrigation Department. They often closed the gates of tanks in the night when they

should have been kept open according to the irrigation schedule. The reason given was that the noise created by the water flow interfered with the monitoring of Tiger movements in the area. But this deprived the farmers of irrigation water and, as a result, they had to face adverse economic consequences. On one occasion, security personnel fully opened all the gates of a major tank causing a sudden flood and serious damage to canals and local roads. The army gave no valid explanation to the irrigation authorities and our attempts to find a valid military rationale for such interference with the irrigation systems proved futile. On the other hand, the lack of concern shown by the security personnel for national assets is a disturbing sign calling for sensible steps by the defence authorities in Batticaloa.

Displacement of farmers has affected maintenance of field channels in the major schemes and of minor tanks and their canal systems, flood bunds and salt water exclusion bunds. Village tanks have not been desilted for years and many of them have their bunds breached and the regulators damaged. About half of the 250 minor tanks have been abandoned due to displacement or unrepaired damages. The others which are functioning are not operating at their full capacities. Maintenance of minor tanks is also affected by the increase in the number of non-resident farmers in the western parts of the district. Earlier, non-resident farmers in these areas were mostly the larger land owners who visited the village during the cultivation season. Now many smaller farmers have also become non-resident due to the war and the worsening infrastructure of the village. The concentration of relief and rehabilitation activities in the east has encouraged out-migration and discouraged displaced farmers from resettling in their home villages.

Flood bunds and salt water exclusion bunds have also deteriorated. The former are traditional flood control and water and soil conservation structures. The latter are a traditional mechanism to prevent the flow of salt water from the lagoon into adjoining paddy fields. They also serve as flood bunds. Their deterioration has led to the flow of salt water into paddy lands which, as a result, have become uncultivable. This problem affects lands on the Buffalo island and the long stretch along the lagoon on the land side.

3. Poor On-farm water Management

This is an old problem unrelated to the war. Efficient and sustainable on-farm water management requires careful levelling of the land and construction and maintenance of permanent and seasonal irrigation canals and drainage outlets. According to officials of the Agrarian, Irrigation and Agriculture Departments, farm levelling is not a popular practice among farmers in Batticaloa unlike their counterparts in Ampara and Polonnaruwa. Failure to level the land and adopt economical use of water is a major cause of waste of this vital resource. An unlevelled farm is also not suitable for cultivation of subsidiary food crops in *yala* as water is unevenly distributed and standing water in depressions can cause serious damage to these 'dry-foot' crops.

4. *Institutional constraints (see below)*

5. *Inadequate funding (see below)*

8.0 The Institutional Set-up and Capacities

Irrigation comes under the direct purview of three government departments in the district: Central Irrigation, Provincial Irrigation and, Agrarian Services. Tanks in river basins that fall within more than a single province belong to the Central while those whose catchments lie within a single province belong to the Provincial Irrigation Department. Batticaloa's minor irrigation schemes come under the Commissioner of Agrarian Services although they should belong to the Provincial Irrigation Department under the provisions of devolution enacted in the Thirteenth Amendment to the Constitution of Sri Lanka. The Department of Agriculture and the Agricultural Development Authority are also concerned with irrigation but at the farm level. It is within the mandate of the former to advise farmers on irrigation needs of crops and on-farm water management while the latter is mainly engaged in pilot projects promoting agro-wells and economic use of their water for small scale highland cultivation.

Central Irrigation Department

The Central Irrigation Department is governed by the Irrigation Ordinance which was first enacted in 1946 and subsequently amended several times. The ordinance is a comprehensive piece of legislation and through its most recent amendment (1994) provides for, *inter alia*, the establishment of Farmers' Organisations and Project Management Committees. In Batticaloa, the Central Irrigation Department has jurisdiction over 10 major tanks commanding a total area of 55, 000 acres. It is headed by the Deputy Director of Irrigation (Batticaloa) under whom there is a Chief Irrigation Engineer, two Divisional Engineers, one for Chenkalady and the other for Paddiruppu, and seven Technical Assistants. Below the Technical Assistants are Work Supervisors and Maintenance Labourers. The Central Irrigation Department needs ten more Technical Assistants to meet its full personnel requirements. It receives its financial allocations from the central government. Currently, the annual allocation for operations, maintenance and improvement is about Rs 10 million whereas the requirement as estimated by the Deputy Director is Rs 20 million. This department is obviously short of both technical assistants and funds to undertake any major rehabilitation or irrigation capacity augmentation programme.

The department's engineers and technical assistants are well qualified, experienced and competent. They have also taken seriously the question of institution building at the local level and training of Farmers' Organisations. An Irrigation Management Cell (IMAC) has been formed at the district level with the Chief Irrigation Engineer in charge. The main

objective of the Cell is to "to facilitate efficient, effective and sustainable management of the irrigation system, with the participation of users". However, at present there are only two trainers on the staff and one of them is often called upon to conduct farmer training outside the district in different parts of the country. Both these officers underwent systematic training to be trainers at the Irrigation Technical Institute in Galgamuwa in a programme sponsored by the ADB. The shortage of trainers is an acutely felt problem. Local level institution building process and its constraints are discussed below.

Farmers' Organisations and Training Activities

The Central Irrigation Department has been engaged in establishing Farmers' Organisations (FOs) and Project Management Committees (PMCs) in accordance with the Irrigation Ordinance (Amendment) Act NO. 13 of 1994. The whole process from initiation of action to set up FOs at the level of distributory canals to their formalisation and the formation of the PMC as the apex organisation for a major scheme takes more than a year. It takes another year to complete the basic training programme which normally begins at some point in the first year. The Consultant was told by the trainers who are also Project Managers that it takes two years to complete the process of FOs and PMC formation and basic training in one major irrigation scheme.

A brief account of the process of FO and PMC formation should help understand how demanding it is of time and human resources. FO formation in a major scheme begins with the Institutional Development Officers (IDOs) of the Agriculture and Irrigation Departments contacting and interacting with farmers with the objective identifying a leader for each field channel unit. The field channel level leaders are grouped together at the distributory channel level to constitute the FO which elects its executive committee. In the case of river irrigation systems (i.e. where water from a tank is released into a river and tapped by anicuts as in the Rugam system), the FO is formed according to hydrological units. In either case the average area per FO is around 500 acres. For FO formation to be participatory, it has to be staggered so as to utilise the periods when farmers have little or no farm work to get the message across through individual and group meetings. Though this slows down the process, it helps to legitimise an FO among its members. After forming FOs for the whole scheme, the PMC is constituted by their Presidents and representatives from relevant government departments such. The Project Manager serves as the Secretary of the PMC until such time a farmer is able to take over that function. The Ordinance requires that farmer representatives should not be less than 50 percent of the PMC. The training programme for FO leaders covers topics like local traditions of irrigation management, leadership development, the relevant laws and bylaws, financial management, works and contracts, and operation and management. Special manuals with cases and practical exercises are used for the last three subjects.

Quite a demanding exercise indeed. The two training officers, who are senior Technical Assistants, have just completed the establishment of PMCs in two schemes. *In the absence of additional trainers, and if the security situation does not improve, the formation of FOs and PMCs and completion of the basic training programme in the remaining eight major irrigation schemes are likely to take several years. The time frame can be considerably reduced by increasing the number of trainers and getting the co-operation of the Sri Lankan military and the LTTE for the IDOs and trainers to carry out their work in the field.*

As regards the trainers, other districts seem to be worse-off than Batticaloa. Of the fifteen trainers trained by the Central Irrigation Department for the whole country, only six are functioning as trainers. The others have either moved out of training or have retired. It does not seem realistic to expect the Department to supply more trainers to Batticaloa in the short-run. Other alternatives have to be found as suggested in section 11. 3.

The consultant is unable to comment on the actual impact of the training programme on the FOs. The following general observations may be made: a) The trainers are competent and motivated. b) The quality of the training material appears to be good and relevant and the methods of communication adopted are satisfactory too. c) FO formation and training programmes have so far been insensitive to the gender dimension of institution building. Women are conspicuous by their absence in FOs although they are part of the farm household labour force and the number of female headed households has increased in recent years due to the rising number of war widows.

Provincial Irrigation Department

The Provincial Irrigation Department, created after the Thirteenth Amendment, currently is responsible for 12 major irrigation schemes commanding 10, 000 acres. The schemes fall into two divisions: Chenkallady and Paddiruppu. The department is headed by a Deputy Director of Irrigation. There are three Engineers, four Technical Assistants and an adequate number of Work Supervisors and maintenance labourers. This department is still in its early stages and suffers from acute shortage of funds. Although it has sufficient technical staff, it is not engaged in any institution building activities among farmers. That responsibility rests with Agrarian Services department. There is no Provincial Council in the North-East and, at present, the region administered by a Governor appointed by the President. *The absence of a functioning Provincial Council seems to have adversely affected the development of the department as there is no representative body to fight for a reasonable allocation of funds from the central government.*

Agrarian Services Department

This department comes under the central government but it is in charge of minor irrigation schemes which should belong to the Provincial Irrigation Department. The Commissioner of Agrarian Services, whose office is in Colombo is the head of the department. The office of the Deputy Commissioner for the Eastern Province is in Trincomalee. The district office is headed by an Assistant Commissioner. It is short of staff and funds. The staff situation is shown below.

Category	Present number	Vacancies
Engineer	nil	1
Senior Technical officer	1	nil
Technical officers	1	4
Divisional officers	12	5

The district office should have more technical staff if it is to satisfactorily discharge its responsibilities. Apparently, the central government thinks that Batticaloa Agrarian Services already has its full quota. This, perhaps, would have been acceptable if the district office had not taken over part of the responsibilities of the Provincial Irrigation Department. The vacancies for Divisional Officers (DOs) need to be filled too. Four of the DOs on the staff have been trained as farmer trainers by the Agrarian Research and Training Institute. However, a near total lack of funds to provide for transport, accommodation and subsistence for farmers and shortage of audio-visual and other training aids seriously hinder the department's training work in the district.

Farmers' Organisations and Training

Batticaloa Agrarian Services is responsible for the establishment and training of 239 FOs including those in the schemes under the Provincial Irrigation Department. These FOs are governed by the Agrarian Services Act and the by-laws for FOs issued by the Agrarian Services Department. The formation of FOs began in 1992 and so far a total of 195 have been formed. Out of these, 120 have been registered. The minimum membership for the formation of an FO is 50 from a *kandam* (a traditional socio-spatial unit of farm households) with an annual fee of Rs 100 per member. An FO should complete three months of functioning and have its full membership fees paid to its bank account to become eligible for registration.

The FOs receive some preliminary training before registration. Subsequent training, according to the programme of the department, includes topics quite akin to those covered in the training programme of the Central irrigation department. *Training activities have become limited due to reasons already stated. Of the three departments concerned with irrigation in the district, the Agrarian Services seems to be the most severely subject to logistical constraints.*

Agriculture Department

It appears that the role of this department in promoting water management and conservation at the farm level has shrunk to a level of insignificance. The department no longer has extension workers at the village level as they were converted into Grama Sevaka Niladharis. It does not seem to be having any other mechanism to reach the farm level and promote more efficient and sustainable soil and water management practices. The Agriculture department's record on this function was dismal even when it had its own extension workers. Agricultural extension is being privatised in the whole country but it has yet to take place in this district. The district and the Eastern Province as whole suffered a major loss when the Agricultural Research Station at Karadiyan Aru was destroyed by a Tamil militant group and finally closed down by the government.

9. 0 The Need for and Objectives of an Irrigation Rehabilitation Strategy for Batticaloa District

The foregoing descriptions of the state of the irrigation infrastructure and the financial and institutional constraints identified should suffice to justify the need for a systematic approach to rehabilitation as defined in this paper. Rehabilitation and further development of the irrigation systems are indispensable for the revival of the district's economy and to assist the displaced and dispossessed farmers to rebuild their household economies. Moreover, there is also a need to introduce a more rational and sustainable approach to the use of land and water resources and to human settlement. In the post-independence period, land and water development approaches have been strongly underpinned by an obsession with big dams and major settlements without due consideration to long term sustainability. The bigness of the physical structures was not matched by a sound approach to augmentation and integration of existing ancient and recent tanks, institution building for resource management, farmer training and participation including cost-sharing, economic diversification and promotion of ethnic harmony. As observed by D. L. O. Mendis in a personal conversation with the author, it is not the large scale of the river basin development projects in Sri Lanka but the hydraulic engineering reductionism of the approach to planning and designs that has to be criticised. This approach is not informed by fundamental ecological principles; on the contrary, it violates them to the detriment of environment and society in contrast to the ancient systems. The Batticaloa district needs strategies to address all these issues although it has not been a site for any new major irrigation schemes in the past three decades. Apparently, the absence of such major interventions, which is perceived by the local population as evidence of discrimination by successive governments, was not a sufficient condition to enable the growth of alternative ideas on land-water resources development and management.

The persistence of the conventional thinking is evident in how the Mahaweli Project proposes to incorporate parts of Batticaloa district under

System B. Under this scheme the ancient and small irrigation schemes between Vadamunai and Kiran will be levelled and the fields will be fed by a canal system. A better alternative seems to be to integrate the existing micro systems into the macro system, enhance their capacities, and utilise them to store water from the Mahaweli and develop the irrigation and drainage systems around them. This approach is likely to cause less environmental and social disruption and reduce uncertainties caused by a total dependence on a mega canal system. It can also enable better local distribution of water, community development and participatory management.

Objectives of the Strategy

The main objectives of an irrigation rehabilitation strategy for Batticaloa are identified below. They pertain to rehabilitation though later on in the text we refer to phases beyond it.

The objectives of the strategy should be to:

- Rehabilitate the irrigation infrastructure consisting of major and minor irrigation systems including drainage to their designed capacities in a planned manner and in ways that integrate the two;
- Plan and implement rehabilitation of major irrigation systems in ways that augment the capacities of minor systems wherever feasible;
- Restore the damaged agricultural roads to enable the movement of people and goods and facilitate agricultural production and marketing;
- Repair the damaged flood bunds and salt-water exclusion bunds and to construct new ones wherever necessary;
- Raise water-use efficiency by adopting improved water management systems at the tank and irrigation and drainage canal levels and on the farm with due consideration to soil type and conservation, and to levelling for paddy cultivation in *maha* and paddy and/or other field crops in *yala*;
- Assist in construction of wells and tube wells wherever feasible for the promotion of non-paddy crops (other field crops and vegetables) in the *yala* season;
- Promote the re-establishment or activation of Farmers' Organisations and their participation at the village level;
- Raise awareness among development officials and farmers about the long-term sustainability of land-water resource utilisation; and

- Plan and implement rehabilitation activities in ways that promote harmony between different ethnic groups.

Towards the achievement of these objectives, the strategy should ensure that institutional mechanisms are in place to:

- Co-ordinate the participation of the different government departments;

- Strengthen the departments' capacities in planning and monitoring and in educating and training farmers in land, water and environmental laws and regulations and resource management;

- Enable active participation of Farmers' Organisations in prioritising, planning, implementing and monitoring rehabilitation works at the local level;

- Enable women's participation in Farmers' Organisations;

- Transfer to Farmers' Organisations knowledge on relevant legislation and their enforcement mechanisms, administrative structures and their workings, and train them in water management at the tank, canal and farm levels, and in contracting and execution of projects; and

- Promote understanding and harmony between members of different ethnic groups inhabiting common and neighbouring localities and sharing common water resources.

10.0 Key Elements of a Strategy

Prioritisation and Phasing

An irrigation rehabilitation and development strategy for Batticaloa has to identify the priorities and temporal phases of plans and implementation with due regard to the current state of armed conflict, the institutional capacities for planning and implementation, and the scale and economic feasibility of investments. Though the civil war in the East is of relatively low intensity at present, there are uncertainties as to how it will change in the immediate future. According to the Consultant's assessment of the situation, an escalation of armed hostilities in the near future cannot be ruled out. This implies that the area's infrastructure may be threatened with further deterioration and damage. This uncertainty does not seem to favour the undertaking of rehabilitation of major irrigation works, which requires heavier capital investment, until peace returns and demilitarisation begins on a permanent basis. Peace is also a necessary precondition for all the displaced farmers to return to their homes. *Large-scale rehabilitation is not feasible before conditions are created for all the displaced farmers to be resettled in their villages. This, however, should*

not prevent BIRRP from initiating long-term planning for rehabilitation and development or from executing rehabilitation work that can be undertaken even before a cessation of hostilities.

A programme for rehabilitation and development of irrigation systems in the Batticaloa district may be divided into three phases which again may be internally prioritised with reference to some criteria identified on the basis of ground realities and logistical constraints. BIRRP may choose to limit itself to one or more of these phases or parts of them and depending on its choice initiate the pre-planning and planning activities.

Phase I: Low risk rehabilitation and institution building under conditions of armed conflict

Phase II: Rehabilitation of major irrigation schemes and institution building in peace time

Phase III: Planned expansion of the district's irrigation capacity by augmentation of existing schemes and construction new schemes including ground-water development schemes and institution building

Detailed planning of these three phases may be undertaken sequentially or concurrently depending on the availability of human and financial resources. However, planning and implementation of Phase I should commence as early as possible. If conditions change favourably and depending on the contents of the final programme adopted by BIRRP, implementation of the second and third phases can begin while the first phase is still on. It is not possible in this paper to discuss each of the three phases in great detail. Fortunately, the Consultant has been able to collect sufficient information to spell out in some detail the main elements of a framework for Phase I. A similar discussion of Phases II & III would require much more work than is possible under the present assignment. Moreover, Phase III falls outside the scope of a rehabilitation strategy. This explains why no attempt is made in this paper to treat these phases in detail.

Phase I : Low Risk Rehabilitation

Based on findings from field visits and meetings with farmers' organisations and government officials, the consultant is reasonably convinced that a wide range of rehabilitation works can be undertaken even under the present conditions of armed conflict. These are low risk and most urgently needed interventions. They are considered low risk in the sense that the planning and execution of rehabilitation can be localised and generally carried out at low capital cost with the exception of few higher cost projects which may be chosen because of low risk. The beneficiaries as represented by their Farmers' Organisation would themselves become the contractors of the project in most cases. From a regional perspective, the risk is spread over a large number of small schemes in a wide geographic area. The following activities seem to be most suitable to be undertaken in Phase I.

- i) Rehabilitation of minor irrigation schemes
- ii) minor repairs on major irrigation and drainage canals
- iii) Renovation of low risk anicuts and River training
- iv) Construction of agro-wells for *yala* cultivation of crops other than paddy.
- v) Promotion of on-farm water management practices

i) Rehabilitation of minor irrigation schemes.

This should receive the highest priority within Phase I and among all phases. The consultant believes that certain rehabilitation activities can be undertaken in the near future. These interventions are identified below in a general order of priority for the first phase and further field investigations based on the criteria suggested are needed for final identification of fundable projects and their prioritisation :

- Rehabilitation of minor tanks and their canal systems
- Repair of agricultural roads
- Restoration of flood bunds
- Restoration of salt water exclusion bunds

Rehabilitation of Minor tanks and canal systems

According to the Assistant Commissioner of Agrarian Services and his Senior Technical Assistant, about fifty percent of the 250 minor tanks are still working though at below capacity due to siltation and damaged canals. The balance are abandoned because the villagers have been displaced or the bunds are badly breached or both. Some criteria need to be established to prioritise rehabilitation of all these tanks. The following criteria, identified with the help of field officers and Farmers' Organisations, are suggested:

- Working tanks should be given precedence over abandoned tanks. Rehabilitation normally includes desilting, breach-filling, and repair of irrigation and drainage canals and regulators. However, the rehabilitation plan should always take into account the present/ future possibilities of integrating minor (micro) irrigation systems into major irrigation systems.
- Among the working tanks, priority should be assessed on the basis of the following criteria:
 - Number of resident families: Should not be less than a third of the total number of families belonging to the village and this number should either be stable or increasing and not

decreasing due to insecurity caused by military movements. If, on the other hand, the number of resident families is decreasing due to disincentive caused by an unrenovated tank and the associated infrastructure, an intervention to renovate them would probably reverse the trend.

- Farmers' Organisation: Should be registered and functioning.

- Participation: The Farmers' Organisation should participate in the planning and implementation, and be prepared to directly take over as the contractor where the cost of rehabilitation does not exceed Rs. 250, 000. It should also be prepared to be a tenderer and accept the contract if successful in the bid when the cost exceeds Rs. 250, 000. Cost-sharing by farmers should be encouraged and wherever possible made mandatory.

Agricultural roads

In general, rehabilitation of agricultural roads should be prioritised in conjunction with that of minor tanks as shown above. However, consideration should be given to agricultural roads whose repair can make a substantial contribution to village economies in a given area irrespective of the priority statuses of the individual tanks in the villages concerned. Even in such cases the criteria of Farmers' Organisation and Participation should be observed.

Flood bunds

Flood bunds are an essential means to conserve soil and water and in most instances their repair/construction can be carried out by the Farmers' Organisation with community labour and with some external financial and technical assistance. The necessary technical assistance is available in Agrarian Services and the Irrigation Departments but funds are needed to meet the labour, material and equipment costs. As a general principle, all Farmers' Organisations should be encouraged to repair damaged flood bunds and construct new ones.

Salt water exclusion bunds

These are critical to farm lands along the lagoon and on the Buffaloo island. The approach to their rehabilitation should be as above.

Minor repairs on major irrigation canal systems

These include desilting, repair of canal bunds, regulators and conservation structures on main, distributory and field channels. Prioritisation may be based on the same or appropriately modified principles adopted for minor tanks (see above).

Renovation of anicuts and River Training

Anicuts play an important role in water conservation in several parts of the district. The cost of renovating a damaged anicut is generally higher than that of a minor tank. However, the immediate and longer term benefits are higher too in terms of area irrigated and number of beneficiaries. Damaged anicuts serving areas where farmers have resumed cultivation and where they have also begun resettling deserve to be included in Phase I. During our field work, we saw the Lower Thottam anicut and talked to a farmer in the area. This anicut was damaged by a stray shell which landed on it in 1988 during IPKF time. Farmers in the area are now practising rainfed paddy cultivation. The area cultivated is smaller than when the anicut was functioning. Farmers do adopt some temporary measures like blocking the water at the anicut with sand bags but with little success. An anicut like this should qualify to be included in Phase I. Another project that qualifies is the construction of a permanent anicut at Kirambulchenai across the Mundanai river in the Rugam division to replace the temporary sand dams which are regularly washed off by the waters of the river at the height of the rainy season.

Water conservation in anicuts like Lower Thottam and Kirambulchenai can be increased by river training. The latter refers to the practice of controlling flood waters from meandering and to stabilising the flow along a regular course to maximise water conservation in anicuts. River training, while saving agricultural lands from floods, also helps conserve soil.

On-farm soil-water management

This should become an integral part of any irrigation rehabilitation strategy and a focus of farmer training and campaigns of FOs among their members. It should be consciously internalised as a responsibility of the two Irrigation and the Agrarian Services departments in their respective schemes to avoid the danger of it falling between the different stools.

11. 0 Link with NIRP

Government of Sri Lanka has started a National Irrigation Rehabilitation Project (NIRP). Some 64 minor tanks in the district have been earmarked for rehabilitation under this Project. Investigations are on these tanks for the preparation of project proposals and work is expected to commence next year. Farmers benefiting from this project are expected to share 10 percent of the cost by way of providing labour. NIRP may be a possible source of financial support to implement rehabilitation projects in Phase I and later. This makes planning of Phase I even more urgent.

12. 0 Follow up

12. 1 Integrated Review of Irrigation Schemes and Farmers' Organisations

Considerable processed information is available on many of the irrigation schemes of the district regarding the physical state, extent of damage and areas and number of families involved. At present, this information remains fragmented in departmental reports and project proposals. There is a need to construct a holistic and empirically accurate picture of the state of the district's irrigation in relation to agriculture. Such a review should necessarily address farmers' institution building processes and problems. Documentation is richer on the engineering and other physical aspects of irrigated agriculture but very rudimentary on farmers' problems and institution building at the local level for water and land management. An integrated district-wide review is a basic need for planning the three phases of rehabilitation proposed in this report. Such a review should address the following:

- An inventory of all categories of irrigation schemes in the district with reference to their capacities, canal systems, extents of land, farmers, cropping indices, damages, displacement and resettlement trends. This is a preliminary task and can be farmed out to the respective departments. A common but modifiable matrix should be used for the presentation of the statistical data. The Central and Provincial Irrigation have got most of the data in hand. The Agrarian Services Department has got data on a large number of the minor schemes. Their data collection may demand some time and resources.
- Intradistrict variations in displacement and resettlement trends, availability of production inputs, and environmental damage. Ethnic relations in irrigation schemes. Tentative prioritisation of localities for rehabilitation.
- Progress in formation of FOs and their training and the constraints to progress.
- Women's participation in FOs: possibilities and constraints
- Current state of water distribution efficiency.
- On-farm water management.
- Progress of NIRP and its potentials to promote rehabilitation
- Potentials for groundwater development

- Information gaps concerning water management, environmental management, and the needed socio-economic and technical studies to fill them.

The three departments are in a position to provide most of the basic data on all the last five areas. However, external professional help is needed for the integration of the material and on socio-economic aspects. The most practical and cost-effective way to carry out this much needed review is to form a team consisting of members from the three departments dealing with irrigation, the Agriculture department and two social scientists (resource and institutional economist/sociologist/political scientist) from outside these departments. One of the social scientists may play the role of co-ordinator of the study. The co-ordinator should be hired on a full-time basis. It should be possible to complete this study within 3-4 months.

12.2 Planning of Phase I

Phase I is best seen as a process involving a variety of interventions which are individually planned but systematically co-ordinated. Each individual project should be fitted into a larger framework of a plan so as to monitor progress and ensure a balance between different parts of the district and between localities. The framework should also help in prioritisation. We have presented a basic framework which can be adapted to serve as a basis to plan Phase I. It is important to have a co-ordinating centre with a senior professional as head. Since rehabilitation of minor schemes is the most central activity of this phase, Agrarian Services has a major responsibility in working with FOs to formulate project proposals and to prioritise them. It must be reiterated that rehabilitation plans for minor schemes should always take into account the possibilities for integration of these schemes into major schemes.

Central and Provincial Irrigation departments are responsible for projects in their schemes. The three departments need to co-ordinate between themselves and with government sponsored programmes like NIRP. One principal aim of planning this phase is to have project proposals that are realistic and well formulated to meet the standards of national and international funding agencies.

Some general guidelines, in addition to those stated in section 10:

- Create, strengthen and maintain the link between rehabilitation and sustainable development via the principle of *'producing more with less'*, thereby aiming at a higher level of productivity than in or before 1985.
- In repairing or replacing damaged structures, always check if better and affordable options are available in terms of water and soil conservation, distributive efficiency and choose the most feasible. Avoid reproducing defective structures in the name of rehabilitation.

- Strive to create a participatory ethic which instils a sense of collective ownership of irrigation infrastructure and a willingness to share costs among the users.

12. 3 Institutional Strengthening (Phase I)

All three departments need to be strengthened in terms of the number and or competence of staff to deal with both the physical and institutional aspects of rehabilitation. The second aspect should receive special emphasis. The Central Irrigation Department is constrained by shortage of funds and personnel, particularly to form FOs and train farmers. Without increasing the number of trainers and IDOs, the FOs programme will become unduly protracted. This will hamper rehabilitation. The following options may be considered to increase the number of IDOs and trainers:

i) Central Irrigation may increase the number of trainers on its staff by having some of its IEs and TAs trained by the two trainers in a short intensive course.

ii) Central Irrigation may recruit some competent persons on a temporary basis and have them intensively trained as trainers-cum-IDOs. The funding for this may have to come from outside sources like BIRRP.

The Provincial Irrigation has no staff training or farmer training programmes. This is not a satisfactory situation, especially when the Agrarian Services department is unable to handle all the FO formation and training activities in the Provincial and minor schemes. Some systematic collaboration between the two is necessary. The Provincial Irrigation should have some of its staff trained as trainers. Both the Provincial and the Agrarian services may adopt measures like the two above. There is also a third option:

BIRRP may intervene with a full-fledged support programme for local level institution building by recruiting the necessary personnel, training them with the help of Central Irrigation, and attaching them to Central and Provincial Irrigation and the Agrarian Services. It must be borne in mind that there are legal and other differences arising from physical scale and structures between the three departments. The institution building and training programmes for the Provincial Irrigation and Agrarian Services Departments should be appropriately modified.

12. 4 Co-ordination

The need for co-ordination between the three main departments dealing with irrigation has already been stressed. It is also important to involve the department of Agriculture and the ADA. As pointed out in section 2 above, irrigation rehabilitation has to be planned and implemented in conjunction with programmes/ projects of rehabilitation of household economies.

12. 5 Planning of Phases II & III

As mentioned before, planning of these phases involve considerable preparatory work. Most of the technical data may be available with the two departments of irrigation. The necessary engineering expertise may also be partly available in these departments. Services of additional personnel may be obtained from other national engineering institutions. Socio-economic data and expertise in planning and institutional development will have to be found from other Sri Lankan institutions like the universities, research institutes and private consultancy firms. A set of guidelines to the planning process should be formulated at an early stage. These guidelines should incorporate the three principles stated in 12. 2 and the following:

Rehabilitation and augmentation of major irrigation schemes should be planned in such ways as to integrate minor schemes and augment their capacities wherever possible and not to weaken or eliminate them.

12. 6 Project funding (Phase I)

It appears that NIRP is a possible source of partial funding. NORAD supported BIRRP and the future IRDP for Batticaloa should treat rehabilitation of irrigation schemes as a high priority area. Other bilateral and multilateral development aid agencies may also be approached. Mobilisation of funds and other resources for rehabilitation and reconstruction requires a dynamic and competent leadership. This has to come from the government at the provincial and central levels. Moreover, the governmental authority dealing with this subject should have sufficient degrees of freedom to approach external agencies for support.

13. 0 Concluding remarks

This paper has explained the need for and the objectives of a strategy for rehabilitation of the irrigation infrastructure in Batticaloa district. A conceptual elaboration of the rehabilitation process has also been provided. The paper argues that rehabilitation is not only possible but necessary in the present context to stabilise household economies and community life, reduce displacement, induce displaced farmers to return to their farms, and to promote rural development. It suggests that a strategy consisting of three phases should be formulated linking rehabilitation with reconstruction and development. Phase I, which is the main concern of the present exercise, has been conceptualised in greater detail and a framework of criteria and some practical suggestions provided. A wide range of low risk interventions exists. Planning and implementation of this phase can and should commence immediately. However, the logistical problems have to be solved. The scope for rehabilitation in Phase I can be considerably expanded if the agencies engaged in it can reach an understanding with the Sri Lankan military officials and the LTTE.

There is growing tension in Batticaloa as the balance of military forces keeps changing. An escalation of armed conflict cannot be over ruled. If this

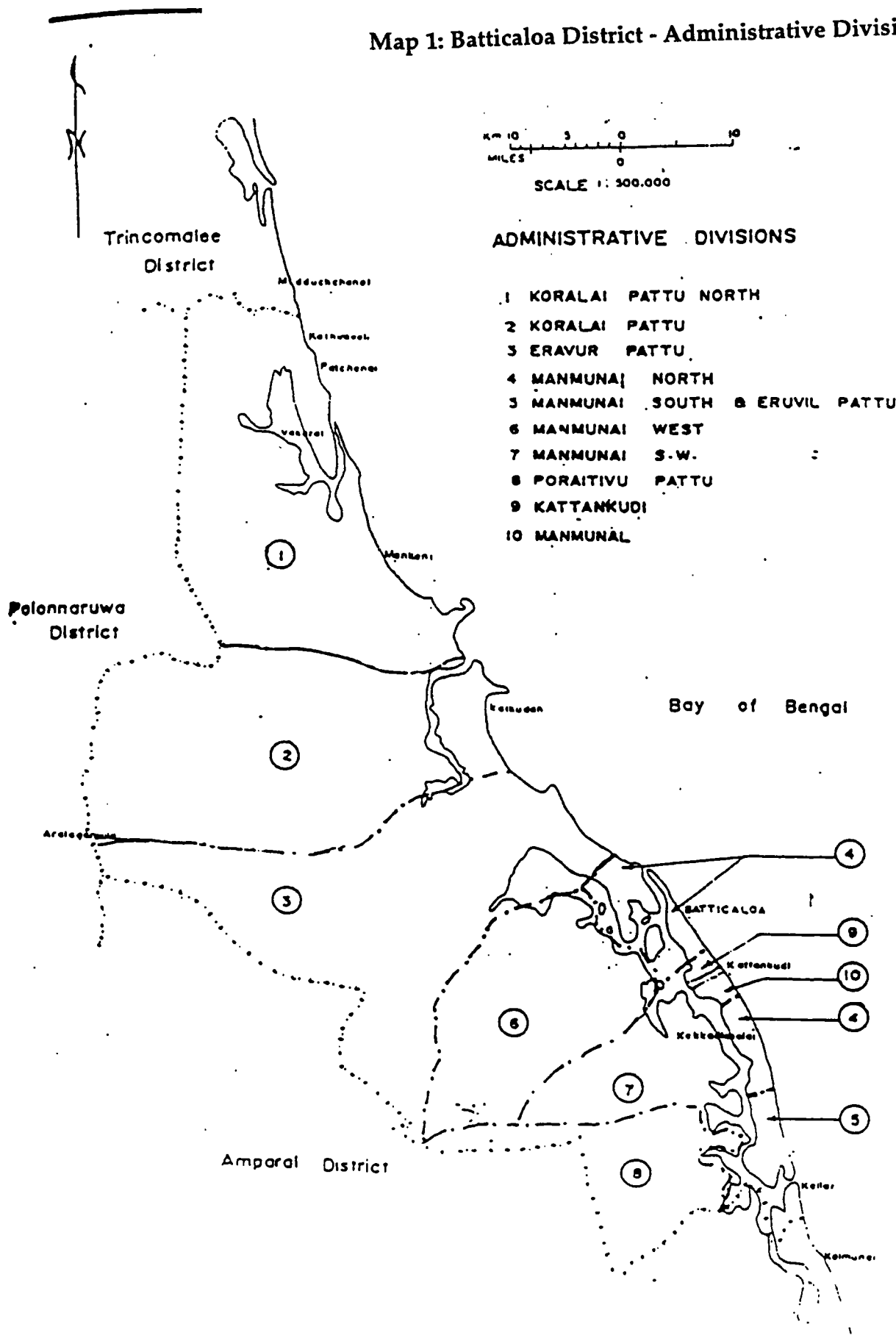
happens, rehabilitation work will necessarily become limited to activities of Phase I. It would also mean that Phases II & III will have to be postponed even though their planning can go on.

Appendix: The East-West Dichotomy in the Batticaloa District

While Batticaloa is among the less developed districts in the country, there is a growing east-west gap within the district. Historically, the areas in and around the towns in the eastern part, particularly the narrow strip of land lying between the sea and the lagoon made more significant progress than the rest of the district in terms of commercialisation, public investment and other development interventions. The east-west dichotomy has been further reinforced in the past decade as the west suffered more severely from the civil war. Prior to the outbreak of armed hostilities, the vast area lying to the west of the lagoon displayed the basic characteristics of relative economic and social backwardness: poorer social and economic infrastructure, a lower level of commercialisation of agriculture, inadequate marketing and credit facilities, and a lower level of human capital formation. The war has continuously weakened even the limited infrastructure that existed in the west and caused mass displacement of the population with serious social and economic consequences. The displacement of people led to their migration towards the east. This has added to the already rising pressure on the infrastructure and land and other resources like the lagoon in the east. It has also in all probability aggravated environmental degradation including pollution of the lagoon.

However, the in-migration of the displaced people from the west and the relative peace in the east seem to have given a fillip to commercialisation and new development interventions in the form of externally funded projects. The refugees from the west are a reserve of cheap labour and their participation in the labour market and the relief operations have promoted the economy of the east. From a short-term perspective, it is more rational to invest in business in the east as there is greater stability and a growing market for consumer goods. Yet the rather temporary aspects of the relatively more stable situation in the east and its infrastructural and environmental constraints should not be lost sight of by an agency concerned with sustainable development. Moreover, the immediate and long-term needs of rehabilitation of the west to enable the return of the displaced people and their participation in reconstruction are fundamental to a programme concerned with a spatially and socially equitable and ecologically sustainable development process in the district.

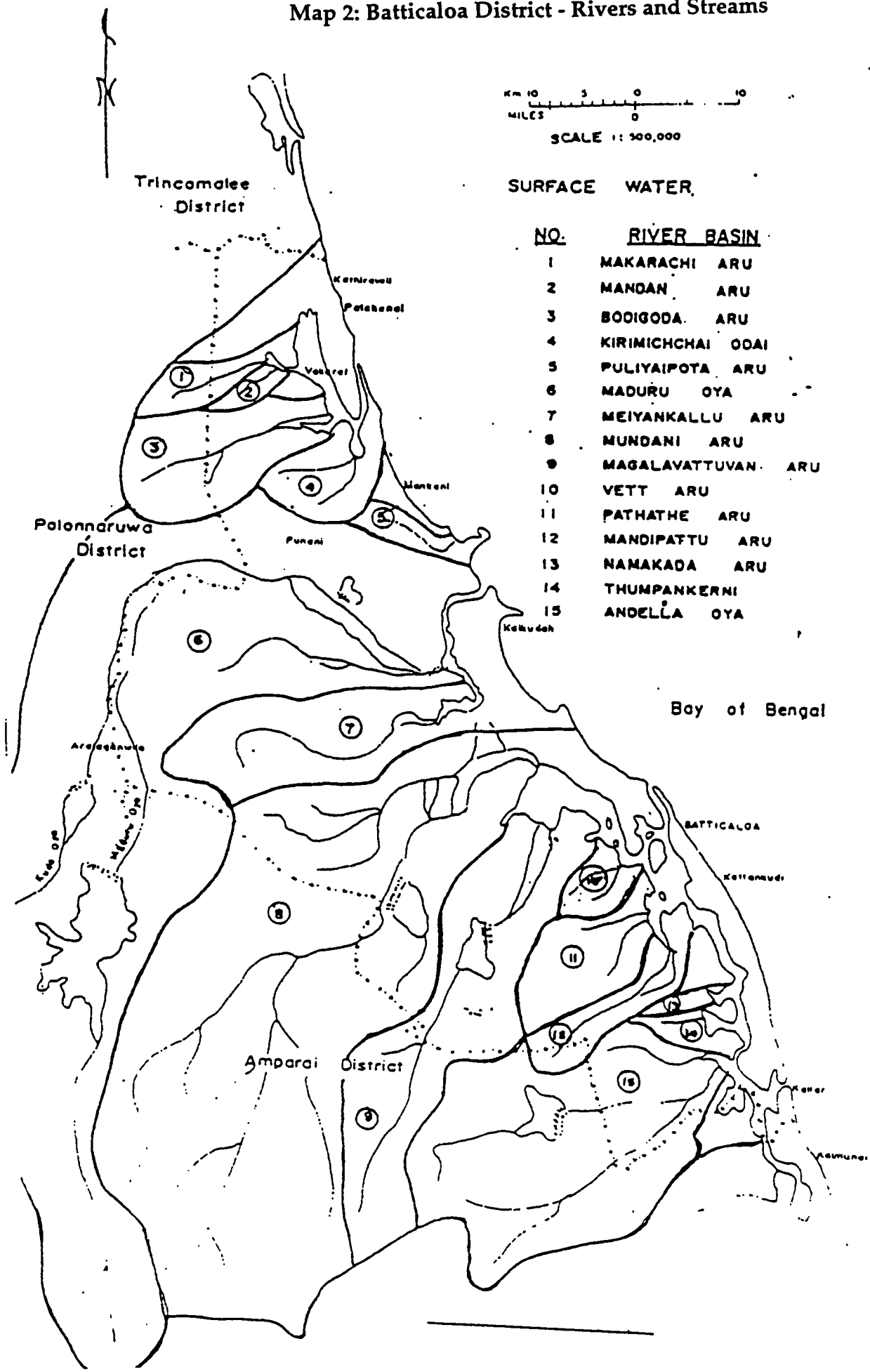
Map 1: Batticaloa District - Administrative Divisions



ADMINISTRATIVE DIVISIONS

- 1 KORALAI PATTU NORTH
- 2 KORALAI PATTU
- 3 ERAVUR PATTU
- 4 MANMUNAI NORTH
- 5 MANMUNAI SOUTH & ERUVIL PATTU
- 6 MANMUNAI WEST
- 7 MANMUNAI S.W.
- 8 PORAITIVU PATTU
- 9 KATTANKUDI
- 10 MANMUNAI

Map 2: Batticaloa District - Rivers and Streams



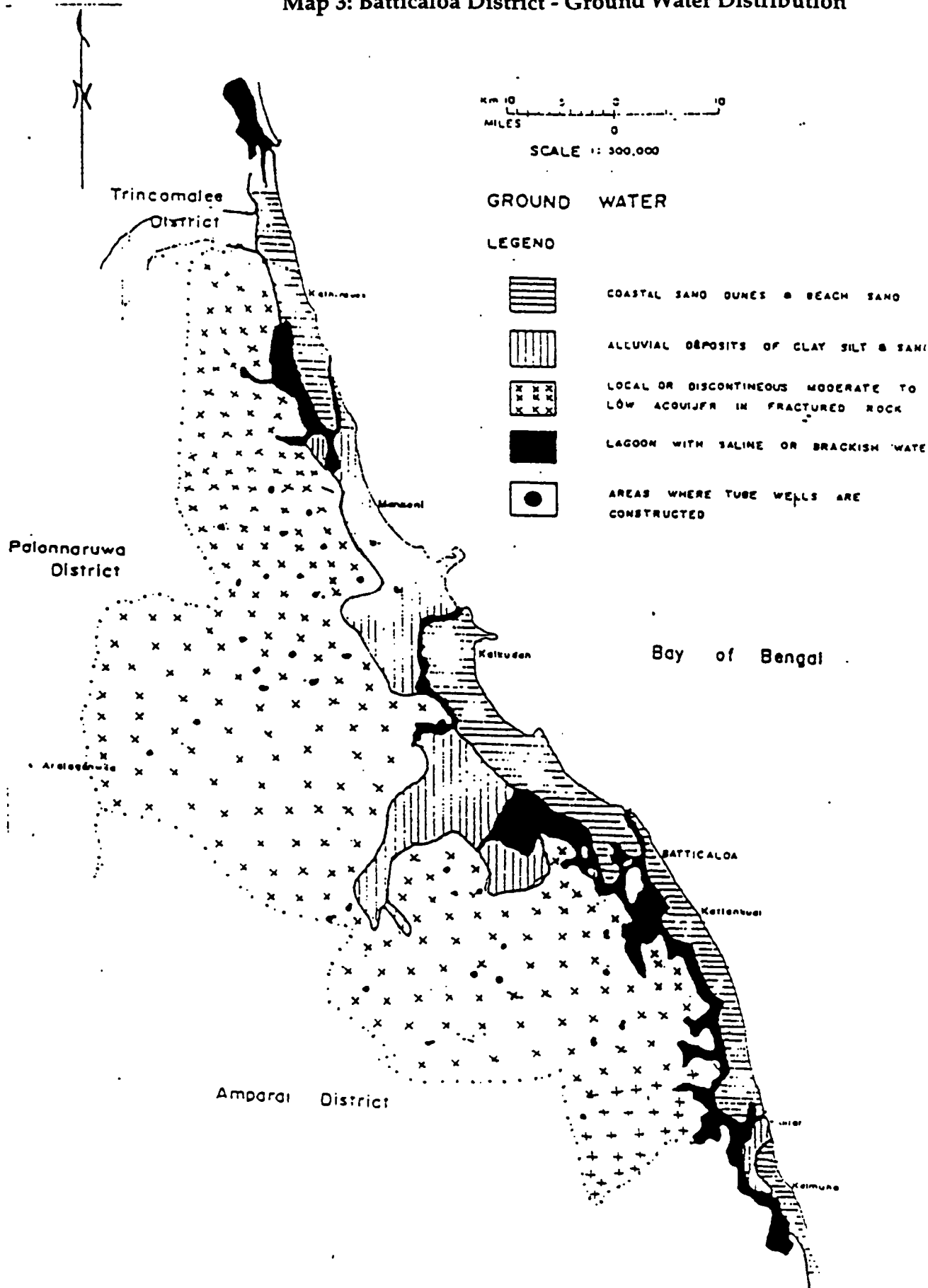
Km 10 5 0
MILES 0 5 10

SCALE 1 : 500,000

SURFACE WATER

NO.	RIVER BASIN
1	MAKARACHI ARU
2	MANDAN ARU
3	BODIGODA ARU
4	KIRIMICHCHAI ODAI
5	PULIYAIPOTA ARU
6	MADURU OYA
7	MEIYANKALLU ARU
8	MUNDANI ARU
9	MAGALAVATTUVAN ARU
10	VETT ARU
11	PATHATHE ARU
12	MANDIPATTU ARU
13	NAMAKADA ARU
14	THUMPANKERNI
15	ANDELLA OYA

Map 3: Batticaloa District - Ground Water Distribution



10 5 0 5 10
KM MILES

SCALE 1: 300,000

GROUND WATER

LEGEND



COASTAL SAND DUNES & BEACH SAND



ALLUVIAL DEPOSITS OF CLAY SILT & SAND



LOCAL OR DISCONTINUOUS MODERATE TO LOW AQUIFER IN FRACTURED ROCK



LAGOON WITH SALINE OR BRACKISH WATER



AREAS WHERE TUBE WELLS ARE CONSTRUCTED

Bay of Bengal

Ampara District

Palonnaruwa District

Trincomalee District

BATTICALOA

Kataragama

Manasa

Kattudun

Kattankudi

Kalmunai

Aradikulama

Map 4: Batticalo District - Land Use

