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Impact Assessment of the Minor Tank Development Programme

Report

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List of Tables

Summary

Minor irrigation tanks play a vital role in irrigated agriculture in Sri Lanka. The minor tank is the backbone of the village economy. Paddy cultivation is to a largely extent subsistence based. It ensures the household and village food security and livelihood. In Trincomalee district about 200 minor schemes from a total of about 450 tanks are suitable for irrigation agriculture. Almost 20 years of conflict has resulted in the neglect of maintenance of structures. The lack of support services has weakened the capacity of the local farmer organisations. The yields are low and the returns from paddy cultivation hardly cover the costs of production.

The Integrated Food Security Programme Trincomalee has supported the Department of Agrarian Development and the local farming community in rehabilitating and developing 50 minor tanks over a period of almost five years. The minor tank development programme not only aimed at the rehabilitation and development of basic structures, but also addressed the self-organisation capacities of the farmer organisations. The socio-economic dimension was considered the key for sustainable use and maintenance of the rehabilitated and developed schemes.

This study assessed the impact of the minor tank development programme with a focus on the technical, economic, social and organisational aspects. The study was carried out from July 2002 to June 2003 to cover a minimum of two cultivation seasons after development. The methodology included the analysis of secondary data, a detailed GPS mapping, on-site observations, and discussion with office bearer of a number of farmer organisations and officers from the Department of Agrarian Development as well as IFSP and finally, a cross-sectional survey of a sample of beneficiary farmers.

The development process was participatory in nature. The farmers were regularly consulted at all stages of planning and development. They contributed through both food-for-work and cash-for-work approaches for unskilled and skilled labour respectively. Female participation varied significantly among the tanks. The farmer contribution amounted to about 20% of the total cost of development. The project officers, farmer organisation leadership and the farmers unanimously expressed that food-for-work and cash-for-work encouraged their participation and contribution.

The development work included largely improvements to tank bunds, sluices, spills, channels and access roads. The development of the head works in most cases was satisfactory. The downstream development, however, which is to be done by the individual farmers through their respective farmer organisation, left much to be desired.

The training that was provided to farmer organisations on leadership development, technical aspects and financial management has contributed to strengthening and proper functioning of these organisations as revealed by the data relating to the situations before and after development of the tanks. However, it was generally observed that the irrigation structures of the developed tanks were not maintained to the extent desired. The channels were not cleared from overgrown vegetation leading to comparatively high conveyance losses. Also, the situation with respect to the agri-support services that are necessary to reap the benefits of tank development was rather poor even after tank development.

The majority of the minor tanks had a benefit-cost ratio of more than one. Although it is too early to make assessments as only one year has passed after development of the tanks, the impact on employment and incomes earned through paddy cultivation is very significant. This had been achieved through both increased extents of cultivation as well as through higher net incomes per acre. It could, therefore, be concluded that the farmers had definitely benefited through increased water availability due to the development of minor tanks although this observation is not equally applicable to all the tanks developed.

1.0 Introduction

1.1 Integrated Food Security Programme Trincomalee

The Integrated Food Security Programme Trincomalee (IFSP) commenced in August 1998 through the District Planning Secretariat in close cooperation with the North-Eastern Provincial Council. This programme was sponsored by the Federal Republic of Germany through the German Technical Cooperation (GTZ) and the Democratic Socialist Republic of Sri Lanka through the then Ministry of Plan Implementation (since January 2002 Ministry of Eastern Development and Muslim Religious Affairs).

IFSP supports and encourages people who are war affected and face seasonal and structural food deficits. Emphasis is on the diversification and intensification of local and regional food and income sources, improvement of nutrition and health care and promoting the concept of nutrition and food security as a programmatic priority of partner institutions. IFSP aims at contributing to stability and conflict mitigation and is actively promoting a peaceful co-existence of the regional communities. Target groups of IFSP Trincomalee are subsistence farmers, specialised farmers, small farmers, fishermen and landless wage labourers, internally displaced persons, women headed households, orphans and unemployed youth. All three communities, viz. Sinhala, Tamil and Muslim are treated adequately.

Although IFSP is working in all eleven DS Divisions of the district, project activities concentrate in the following six selected divisions selected based on war affectedness, food deficit and poverty: Padavisiripura (Sinhalese), Morawewa (Sinhalese), Gomarankadawela (Sinhalese), Kuchchaveli (Tamils and Muslims), Muthur (Muslims and Tamils) and Eachchilampattai (Tamils). The IFSP focuses on development rather than relief, adopting a people centred approach by emphasising active participation and contribution of the beneficiaries in all stages of the programme cycle. The programme activities are implemented not directly by the IFSP itself but through the existing government institutions, non-government organisations and the community-based organisations. This is expected to result in the integration of food security into the regular programmes of the partner institutions and organisations leading to a higher degree of sustainability beyond the IFSP.

1.2 Minor Tank Development

Irrigated agriculture is an important aspect of Sri Lankan agriculture. While irrigation can be divided into major, medium and minor on the basis of the acreage served by the irrigation scheme (command area), in terms of the total extent and the total number of farmers served in the country, minor irrigation often referred to as village irrigation occupies an important place. There are about 450 such minor irrigation tanks in Trincomalee district. The majority of these tanks dates back to several centuries, hydrological interconnected in a cascade system and are often affected by the vagaries of rainfall.

A large number of the minor tanks have been abandoned for many years due to the conflict situation and the displacement of the residents. The storage and delivery efficiencies are drastically affected by the extent of damage of the different irrigation structures. Some farmers have, however, continued to cultivate under risks and uncertainties and others are slowly returning to their abandoned lands. They, somehow, manage to maintain the minor tanks at a very sub-optimal level, earn a living under difficult circumstances and poverty is an ever-present phenomenon.

The minor tanks do not only provide water for irrigation but are more or less the centres of the village life. Minor tanks by regulating the local water table are vital for ensuring the supply of drinking water. They are ‘owned’ by the local community. Tanks are meeting points for

bathing and for washing clothes. Their effect on the local community extends far beyond paddy cultivation.

It was estimated that about 200 such minor tanks needed to be developed. But, due to the limited hydrological potential for cultivation, not more than 120 tanks were considered worthy of development. The minor tank development programme was agreed in June 1999 between the IFSP and the Department of Agrarian Development (DoAD, formerly Department of Agrarian Services).

The concept to rehabilitate and develop a sizeable number of minor tanks in Trincomalee district was developed as the result of an assessment of the capacities of the government institutions of the 'green sector' in October 1998[1]. The minor tanks were identified as the core potential for sustainable household and village livelihood. The organisational analysis revealed severe constraints, however, also potential for supporting the then Department of Agrarian Services.

During the course of the year 1999 IFSP deployed six civil engineers and two draughts persons and also supplied the department with equipment. The aim was to significantly strengthen the technical and institutional capacity to better address the needs and potential of the farming community and at the same time get a larger scale rehabilitation and development programme off the ground. The IFSP Engineers were integrated into the structure of DoAD. In cooperation with the Technical Officers and the Assistant Commissioner they were expected to contribute to 'blue print planning', apply and improve DoAD's standardised approaches and accelerate the mobilisation of FOs.

The focus was not only on the technical aspects of repair and reconstruction but also more importantly on the socio-economic aspects. The aim was first to bring the command area back under cultivation, which in turn was expected to contribute to increased production leading to food security at the household and village level, increased employment and income. It was also envisaged to increase the capacity of the farmer organisations to play an active role in the process of development of the tanks and in the proper maintenance of these tanks after development.

For the above purpose, 89 minor tanks were originally inventorised by IFSP-DoAD in 1999[2] and 75 of them were later identified by the DoAD during the latter part of the year from the seven DS Divisions of Kuchchaveli, Padavisiripura, Gomarankadawela, Morawewa, Muthur, Eachchilampattai and Thampalakamam where IFSP commenced its field activities. The development process started in early 2000. During the course of the years 2000 and 2001 a number of the identified tanks were allocated to other projects such as NEIAP, ACF and the DoAD itself under WFP funding. Consequently 40 selected tanks were excluded from the list and 15 other tanks were newly included. Thus the total number of tanks planned to be developed was 50.

The list of these tanks, the command areas, the number of farm families and the development work done are given in Annex 2. Out of these 50 tanks, 19 had been completed, 20 are in various stages of completion and the development of the balance 11 are planned to be finalised until end of October 2003. Cultivation had already been done under 16 completed tanks for at least one Maha and one Yala season after their development.

Following the participatory needs assessment applied by the IFSP, the tank development has been related to a number of activities to promote village livelihoods such as water supply

[1] Agrarian Services in Trincomalee District, Assessment and Proposals for Implementing the Integrated Food Security Programme (IFSP), Eberhard Bauer, C. Sivayoganathan, Trincomalee and Berlin, November 1998, IFSP Working Paper 1
[2] 75 Minor Tank Rehabilitation Programme: Preliminary Assessment Survey, N. Nadarajah, Trincomalee, March 2000 IFSP Technical Paper 2

and sanitation, mid-day meal for school children and agri-business, all aiming at improving the short- and medium-term food and nutrition security.

1.3 Impact Assessment

The overall purpose of the impact assessment was to review the approach, performance and experience to date with respect to the minor tank development programme (Annex 1, TOR). The specific areas covered were:

i) Technical aspects including selection of tanks, planning, design and quality of physical works,

ii) Economic aspects including costs for and returns from the additional area brought under cultivation and the additional employment created,

iii) Social dimensions including the perceptions of farmers and the village communities about the support received from IFSP, the types of activities implemented and the accrued benefits of these activities, and

iv) Organisational aspects of the DoAD and the farmer organisations.

The assessment was carried out by a team comprising of three external experts (Agricultural Extensionist, Social Scientist and Irrigation Engineer), IFSP staff (Civil Engineers and Community Mobilisers) and officers from DoAD (Technical Officers) during the period July 2002 to June 2003. The study methodology included the following:

i) Analysis of secondary data – reports, records, etc. Discussion with relevant officers viz., IFSP Project Director, IFSP-GTZ Team Leader Assistant Commissioner Agrarian Development, Engineers and Technical Officers, Community Mobilisers,

ii) Detail GPS mapping guided and commented by the farmers for all 16 completed tanks and some other tanks coming under the cascade system; the resulting maps were intended to show the bund and its structures, the tank bed and details of the paddy field indicating the internal physical structures and the plots cultivated by the different farmers,

iii) Observation of the tanks, physical structures and channels,

iv) Discussion with office bearers of the respective farmer organisations, and

v) Cross sectional survey of a sample of beneficiary farmers.

Two separate schedules were prepared to collect the necessary data from the engineers / technical officers and office bearers of the farmer organisations as well as from the beneficiary farmers. These schedules were initially prepared by the study team, pre-tested and finalised in consultation with the project staff. These schedules are presented as Annex 4 and 5. Only the 16 completed tanks in which cultivation had been done at least for one Maha season and one Yala season after development had been considered for the assessment.

The engineers and technical officers involved in the development of the above 16 tanks filled the relevant schedules providing the data regarding the development process, technical and economic aspects. This was done by referring to the office records and by counting on their perceptions of the work done and the related experience of the development process. Data were also collected from the office bearers (Chairperson, Secretary and / or Treasurer) of the

respective 16 farmer organisations, regarding the functioning of the farmer organisation, its involvement in the process of tank development, and their perceptions of the development process and its impact. Several visits were made to the tank sites by the assessment team and especially the expert engineer inspected the physical structures. Finally a field survey was conducted with a total sample of 97 beneficiary farmers drawn randomly from six selected tanks and for the farmer organisations respectively, using a comprehensive schedule. These six tanks were selected by considering the geographical location, the number of beneficiaries and their ethnicity. The farmer interviews were conducted in private either in their homes or in their farms. The selected tanks and the respective sample sizes are given in Table 1.

Table 1: Tanks selected for the farmer survey and the sample sizes

Tank	DS Division	Farm Families	Sample
Palaimunaikulam	Muthur	25	10
Keerandankulam	Muthur	120	25
Karagahawewa	Gomarankadawela	38	16
Rotawewa - Thimbiriwewa	Morawewa	52	15
Paranamadawachchiwewa	Padavisiripura	22	17
Puthuvelikulam	Kuchchaveli	15	14
Total		272	97

2.0 Personal and Situational Characteristics

The objective of this section is to provide clues for socially evaluating the relevance of the selection of tanks in the IFSP programme in order to bring about a change from vulnerability to sustainability. Then it is proposed to check whether the beneficiaries conform to criteria of vulnerability at the social level and whether the selection of the given tanks has been relevant for the tank rehabilitation programme.

The criteria of vulnerability imply the selection of a population at risk, in need of tank rehabilitation for better asserting the food security. The criteria further imply an evaluation of internal factors such as the potential of participation and motivation from the community of beneficiaries; and external factors such as the global structures expected to link the target group to the market (input availability, selling power, etc.).

While assessments are usually done through PNA at the village level with specific criteria, there is a need to draw some preliminary remarks concerning the community of farmers supposed to be benefited by tank development.

i) The tank-related population of cultivators does not comprise the whole village but only one part of the village. Moreover, the said community can be scattered over several villages, thus the tank rehabilitation will have a relative direct impact on the village needs.

ii) According to the PNA criteria, it appears that several villages are classified under the same poverty code, e.g. Vulnerability-Poverty Code 3, but it seems obvious that communities of farmers benefited by, respectively, Palaimunaikulam, Keerandankulam, and Rotawewa-Thimbiriwewa do not display the same kinds of indications of vulnerability. Here, the vulnerability-poverty level would give a better insight. However, since the vulnerability-poverty assessment done by IFSP focuses on villages and not on households, it is quite obvious that the differentiation in villages might be high.

iii) The question of the motivation and participation of concerned cultivators is related to several other questions such as: Who will be the beneficiaries, i.e. the individual farm families? Are they vulnerable and impoverished, how and to what extent? Are they from the site? I.e. residing in the nearest village or closely related?

The impact assessment was be particularly concerned with the following question:
What does the sample display concerning the programme selection? In respect of vulnerability-poverty: beneficiaries as cultivators, from the village, at low income and in need. In respect of sustainability: motivation, impact, possible extensions, relevance of the external structures asserting a satisfactory input and access to the market.

This section will focus on the social profile of the cultivators and the land use pattern under the six sampled tanks.

2.1 Demographic Features of the Respondents

More and more in official literature and in day-to-day practice (DO offices, IFSP and NGO reports), the word 'families' is substituted to 'beneficiaries'[3]. But in fact, two persons of a same household or family could be separate owners of the same paddy field. They may be husband and wife, as it happens in Sinhalese villages such as Karagahawewa and Paranamadawachchiwewa. They can hardly be accounted as representing two 'families'. Thus, term 'owner' or even 'cultivators' will be preferred to 'family'. The pattern of land-ownership (described in Section 2.3) will also show that the superimposing of nuclear family and / or with beneficiary is not really adequate.

Profile of the cultivators
In a general way the stated owners were in an age group capable of doing their own cultivation, males in most of the cases (but see below for ownership in right, and the shares pertaining to women), usually already married with children, and cultivating a paddy-land plot of some two acres under the given tank and nowhere else. We did not not exactly find here absentee landowners, nor big landowners having lands scattered over various locations. Nonetheless, these characteristics were easily found in neighbouring locations in Tamil sites.

Residence
The owner-cultivators of the sample were all residing in the nearest village or villages associated with the tank, whatever the community. But, in Palaimunaikulam there were no other tank associated with the village, while there were some additional tanks in the five other locations, i.e. one village, several tanks.

Origin
The cultivators considered here, and whatever the community they belonged to, were all originating by birth from the tank-related village, most of the time with their spouses. Moreover, their parents and grandparents too were generally born in the same village, otherwise in a very neighbouring village, and tilling the same land. Thus, most of the landowners in the sample could be considered as legally in their right of being entitled to the land they were cultivating as their parents did. However, in some cases the ownership could not be proved. Many settlements dated back to the time before the conflict, whatever the community was.

[3] In the common expression of government institutions, local NGOs, INGOs and agencies the term 'beneficiary' addresses conflict affected families or individuals, i.e. people who cannot take care of their livelihoods and who receive help, aid or any kid of welfare. The term implies that vulnerability and dependency are the outcome of 'help'. Contrary, development with and for conflict affected communities encourages passive recipients and beneficiaries to become actors in development.

2.2 Assets and Other Income

Housing
The owner-cultivators had often a basic house with brick walls and tile roof, and surrounding garden, cultivated or not. For Palaimunaikulam, more cultivators stated living in mud and Cadjan houses, and sometimes also at Keerandankulam. The cultivators for Puthuvelikulam were living in the town of Pulmoddai.

Assets
They generally had a bicycle, less often a motorcycle. A few of them in Karagahawewa had a tractor; otherwise the others hired the tractor available in the village or in a neighbouring village.

Electricity was available in “uncleared” areas (quite recently and with special arrangement), in Pulmoddai, which is a township, and in Paranamadawachchiwewa, which is situated on the main road to Pulmoddai. But Rotawewa, where resides the farmers cultivating under Thimbiriwewa, was still totally deprived of electricity even though it is situated on the main road Trincomalee-Horowapathana and the electricity cables were passing high over their heads. Karagahawewa also was deprived of any electricity supply while the very neighbouring villages (also Sinhala settlements) had electricity available for domestic consumption.

Inputs and paddy-selling
In all the locations, the cultivators stated that they could not rely on official institutions or structures either for getting the inputs for the cultivation supplied or for selling their paddy. They had to rely on private shopkeepers. No official mechanism was working. No credit and no insurance scheme were made available.

Other income
In most of the locations, few cultivators stated having other sources of income. Some had a shop, or worked as masons. Anyhow the paddy fields related to all sample tanks except one (Palaimunaikulam) were cultivated continuously for the past years, however, during the Maha season only. Indeed, many cultivators worked as hired labour on other lands, especially in the Yala season, or even during Maha and got engaged in their own cultivation later during the season. Not even half of them did home gardening or highland cultivation. Cattle were rare, and non-existent in a location like Karagahawewa because there was no place for grazing. It was impossible at Palaimunaikulam too because no one could afford owning a herd.

In Karagahawewa 25% of the cultivators were home guards. In Palaimunaikulam, the cultivators being not landowners would hire themselves or maintain their traditional occupations such as seashore fishing honey collecting. In Keerandankulam, the cultivators could work as manpower under the adjoining lands placed under Mahaweli scheme.

In Pulmoddai more owner-cultivators were engaged in activities related to town life, e.g. shops, teaching, factory work. In such cases, they participated only partly in the cultivation of their lands and assigned the bulk of the work to a close family member (uncle, brother, son) rather than a tenant.

2.3 Land Use Pattern

Very seldom were there cultivators who could retain or regain any kind of deed over their lands. As stated above, and with the exception of Palaimunaikulam, the vast majority of them were cultivating lands which already belonged to their parents at least, whatever the community.

In Palaimunaikulam, the big and absentee landowners had disappeared and people from the neighbouring village started to cultivate the paddy fields under this tank. In the two Sinhalese locations, lands had been officially recognised after independence, and amply before the conflict, according to early Agrarian Reforms. While in the Muslim and Tamil locations, land was traditionally transmitted generally from the mother's side and in priority to the daughter at the occasion of her wedding. The vast majority of owners in all locations stated that they themselves were cultivating, or cultivating through a very close family member, but not through a tenant external to the family.

Concerning the range of owned land, or the size of the plots, the average acreage owned by an owner over the six paddy fields of the sample was around 2 acres, and varied between 1.5 and 2.5 acres. Knowing that 75% of the owners had land only in one location under one tank, this suggests that ¾ of the total population of owners concerned here had not more than 2 or 2.5 acres available for cultivation and only in the Maha season. As mentioned, most of them complemented their income essentially by hiring themselves in others' lands not only in the Yala but also in the Maha season.

Concerning the fragmentation, the size of the plot itself, however, not only the owned acreage can be as reduced as 0.25 acres as in Karagahawewa, and as a consequence of dividing-up through inheritance by several siblings from the same parents, from generation to generation. In such a case, the same cultivator would own several tiny plots.

Anyhow, it is also striking that in all the locations, land was inherited only according to the condition that the inheriting child would remain in the village and would personally cultivate it, or through the spouse, or at least through a very close relative. Those who leave the village, by marrying or working elsewhere, generally male children, do not inherit and cultivate. Thus the land over all the communities is essentially retained through daughters and wives[4].
If migrating was a way of coping at the family level by limiting the fragmentation which was already at a critical stage in terms of sustainability of a household, another way of compensating the same fragmentation, as in Karagahawewa, consisted of buying some complementary tiny plots here and there in the field, probably from other small owners who could not sustain any more the cultivation and gave it out.

2.4 Possible Extension

If the tank development focused on re-building or even developing the bund, and thus was essentially aimed at increasing the water capacity of the tank, then the possible extensions in terms of irrigated cultivation could be the following:

i) Ensuring sufficient water security for a better harvest, an increased crop in the main Maha season: the water security is the first function of the tank
ii) Regaining the full extent of the irrigated paddy field
iii) Channelling better the water inside or alongside the paddy field for a better flood control
iv) Better channelling for a better sharing of the water between the community of owners of the same paddy field (and before resorting to making available any extra water from this tank to any other location)
v) Irrigating additional or reservation lands
vi) Sometimes proceeding to a partial Yala cultivation, with paddy or any other food crop
vii) Channelling excess water and diverting it towards the paddy field of another tank in the same cascade and / or cluster system
viii) Storing the excess water in any tank situated below in the cascade system.

[4] The traditional land heritage pattern ensures food security and livelihoods along the line of maintaining the reproduction capacity of the extended family: the man could find work here and there, the owned land via the women's family line would guarantee cultivation and livelihood security for her and her children.

2.5 Beneficiaries

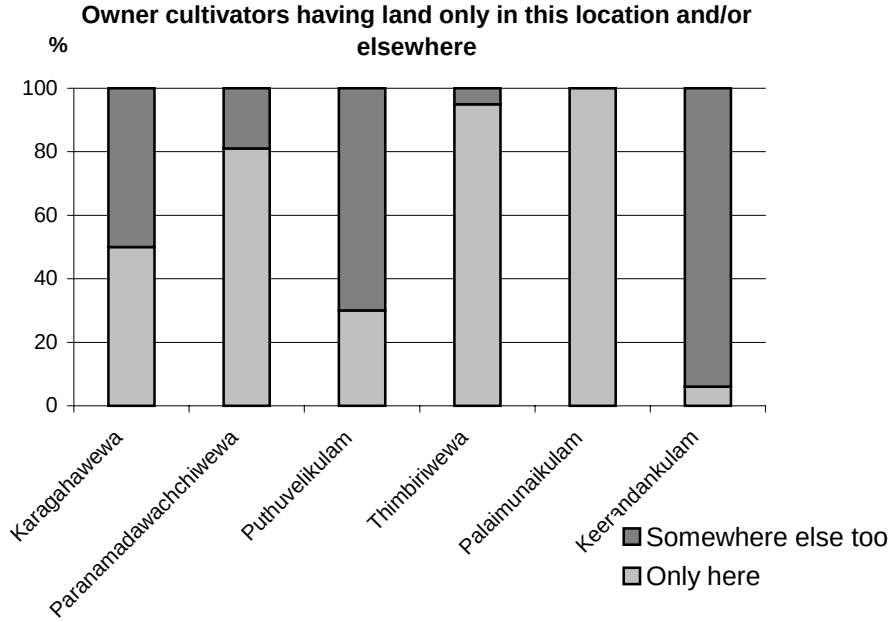
The decisive aspect of the rehabilitation project concerns the identification of the owners and cultivators as beneficiaries. As already mentioned, the tank related population is different from the overall population of the village; it is only a part of it. Anyhow in all the six samples the cultivators were effectively residing in the nearest village and / or the same location, which was far from being the case in all the locations of the programme.

The criteria of vulnerability, and then selection of a tank for rehabilitation or development and in defining the village, were not exactly the same as that of defining the tank related population. In the latter, the beneficiaries were cultivating a land, and they did it by themselves which was associated with a certain prestige, and which was supposedly a privileged position in terms of income. Otherwise it was assumed that the rehabilitation and development could also have an overall impact on the village, because some other categories of people could draw a benefit from it, sometimes in a lower position, as for the hired manpower, sometimes in a collateral position, as for the tractor-owners and sometimes in a higher position, as for the shopkeepers, money-lenders or the like.

Anyhow, the general inefficiency of the official structures relating to the provision of inputs and paddy marketing in all the locations retained the farmers vulnerable with respect to the merchants and other benefit oriented individuals, from the village or from elsewhere. Moreover, the permanent insecurity due to the prevailing conflict situation until the MOU was signed in February 2002 is such that producing farmers remained the potential prey of any levying parties. These last two aspects could annihilate any improvement in their way of life and food security even after any rehabilitation.

The fact that some 75% of the overall population of cultivators envisaged in the sample had an irrigated paddy land only under one tank (Figure1) would suggest that they would be more ready and more willing to contribute to or to follow the development process, and probably the maintenance. But, the necessary and complementary condition is a good relationship with the FO, a high level of membership, and a satisfactory representativeness or openness of the FO towards the concerned farmers. In fact, on the ground it was obvious that there were conflicts in each of these FOs, even though for varied reasons.

Figure 1: Proportion of owner cultivators having land only under one tank



An extreme case is that of Palaimunaikulam where no one from the cultivators was a member of the FO. No one was even consulted for the development. A big FO covering several tanks had undertaken it. The farmers were said to be too poor, and outcaste, and on their side they did not feel much concerned even with heavy works such as levelling their own plot. These farmers, in fact, were not available for consultation during the commencement of development.

Genderwise, it had been understood that ownership and transmission of the land went essentially through women, and this in all the communities. But, during the processes of inquiries, assessments, and development, FO and men declared the lands under their names as owners, instead of their wives. As all records had been destroyed due to the conflict, there was a risk of eventually spoliating women from their traditional ownership. One such case was observed where a widowed man spoliated his daughter to the profit of children from a second bed.

3.0 Development Process

3.1 Tank Selection

The majority of beneficiary farmers (70%) belonged to the vulnerability-poverty code 3 indicating medium poverty level and at the same time a certain degree of potential needed for getting actively involved in development works. Tanks belonging to the poorest group of farmers (poverty code 4 or 5) were not identified for development. The DoAD in the selection of tanks could not initially consider the poverty level as they were only developed during the year 2000. However, the basic criteria lay down by the DoAD for the selection of tanks had been generally adhered to.

The criteria of command area (>8ha), number of beneficiaries (>10) and the willingness of community based organisations (CBOs) to contribute more than 10% of the total cost of the project were satisfied in all the 16 projects studied. The criterion on pro-rata cost, which is < Rs. 20,000 per acre of rehabilitated and / or developed command area was satisfied with respect to 14 tanks. Also, though it was expected to exclude the tanks that had been developed during the past ten years, the records revealed that some urgent development work needed to be done in three of the selected tanks.

3.2 Procedures and Activities

In developing the tanks, IFSP basically followed the standard procedures of the DoAD, which included preliminary investigations, dialogue with farmers, feasibility studies, agreements with farmer organisations. This was followed by development works and formal handing over to the respective farmer organisations. The activities performed and the average times taken for such activities are given in Table 2.

In the case of three tanks, the selection of the tank and the initial visit to these selected tanks had been undertaken on the same day whereas in six other cases a period of over 150 days had lapsed between these two activities. On the average, it has taken 73 days to visit the tank after selection. Another activity that has taken a long time is the preparation of feasibility reports based on the feasibility studies carried out in the field. The time lapse between the approval of the preliminary investigation report (PIR) and the submission of the feasibility report (FR) ranged from 15 to 240 days with seven tanks taking more than 180 days.

The negative values in Table 2 reflect the implementation of a subsequent activity before the completion of the preceding activity. For example the minimum value of –39 in column 1

indicates that pending approval, the contract was signed 39 days before the approval of the FR. Similarly the value of –108 in the same column indicates that the work commenced 108 days before formal signing of the contract. In fact, this had happened only on three occasions where the commencement of work had to be adjusted to suit the weather conditions.
In all the other tanks the work commenced within 30 days of signing the contract. Even after commencement of work, it had taken, on the average, about 433 days to complete all the activities. Two tanks were completed within 90 days while six other tanks took more than 365 days.

Table 2: Development activities and number of days in the process

Activities	Number of days between activities		
	Minimum	Maximum	Mean
Selection of tank and initial visit	0	218	73
Initial visit and submission of PIR	2	160	42
Submission of PIR and approval	0	181	23
Approval of PIR and submission of FR	15	240	133
Submission of FR and approval	1	76	24
Approval of FR and signing of contract	-39	68	18
Signing of contract and commencement of work	-108	32	-2
Commencement of work and completion of work	82	1,245	457
Submission of PIR to completion of work	229	1,432	631

With respect to the whole development process, the time taken between the submission of PIR and the completion of work averaged nearly 631 days, which is very high compared to the time taken for minor tank development carried out under other projects.

The time it finally took to complete the rehabilitation and development works is due to a number of factors. The particular approach adopted under IFSP is described in section 3.3. Other important aspects were the very low capacity of DOAD at all levels, which resulted in a considerable lack of support the programme has achieved in 2001/2002. The comparatively very high work load of the IFSP civil engineers, which not only addressed minor tank development but quite a substantial number of other village infrastructure projects, e.g. rural road network, drainage systems and irrigation channels, water supply and sanitation, school buildings and community centres, house for returning IDPs etc. was a additional striking factor. Finally, overall weather conditions required the organisation of collective maintenance through the framers organisations. The IFSP engineers who cooperated closely with the Development Officers (DO) of the DOAD shouldered these tasks.

The very dominant additional factor responsible for the comparatively long time it took to complete the development works was the security situation in the district. Many of the minor tanks developed were located in the remote villages in the district where the security restrictions were strictly followed. Mobility of food items, building materials and staff of the supporting institutions were highly restricted by the ‘security pass’ system. Frequent displacement of the farming community compelled them to cope with their livelihoods with other income sources. Even after the Memorandum of Understanding, only a few of the displaced farmers returned to their original villages. Many of the Sinhalese farmers displaced from the villages in Morawewa, Gomarankadawela and Padavisiripura joined the home guard service with an attractive remuneration.

3.3 Farmer Consultations and Contributions

The minor tank development was based on participatory approach and the farmer organisation as a community-based organisation played the major role in the implementation. Awareness meetings were held with the beneficiary farmers in the selected tank areas.

These meetings were organised and conducted by the Dos and Technical of DOAD, IFSP Community Mobilisers and the Project Engineers in 81.3% (13) of the tanks studied. The purpose of the meeting was to inform the farmers about the project and to solicit their involvement in implementing the same successfully. Most of these meetings were conducted in the focal village itself as reported by 84.6% of the officers responsible for the above meetings. The other officers conducted the awareness meetings in a nearby village as many of these farmers cultivating in the tank command area came from the surrounding villages. The lack of qualified staff of DOAD and the experienced security restrictions compelled IFSP to step in on many occasions.

It is gratifying to note that 83.5% of the sample farmers reported that they attended the awareness meetings. Realising that mere attendance at meetings was not an adequate measure of participation in decision-making, the farmers were specifically asked as to whether they were consulted regarding the development of the tank and all of them answered in the affirmative. According to the officers, the number of farmers who participated in the awareness meetings ranged from 12 to 70 with a mean of 29.7. The frequency distribution of the number of participants who attended the awareness meetings shows that the highest proportion of such meetings (38.4%) was attended by 21 to 30 farmers (Table 3). Office bearers of the FOs also confirmed that these meetings were held and according to them 53.8% of the meetings were attended by more than 20 farmers. On the whole, the number of participants ranged from 10 to 50 with a mean of 32.

Table 3: Farmer participation at awareness meetings

No. of participants	No. of meetings	% of meetings
< 20	4	30.8
21 – 30	5	38.4
> 31	4	30.8
Total	13	100.0

The IFSP employed a combination of food-for-work (FFW) and cash-for-work (CFW) approaches for unskilled and skilled labour respectively. FFW in particular was applied to encourage farmer participation in and contribution to the development activities. This in turn was expected to promote ownership leading to proper maintenance of the tanks after development.

Farmers were involved as unskilled labour mainly for earthwork related to raising of bunds, turfing and clearing bunds and channels. The shadow wage price for unskilled labour in the area was about Rs. 150 per day over time (1999-2000), depending on the season and availability of outside work opportunities. At the early stages of the project, farmers were compensated with 3.5 kg of rice for a day's labour tasks worth Rs.90. The balance of Rs.60 was considered as their contribution towards tank development. Later, instead of rice, a food basket at a slightly increased value consisting of 2 kg of rice and 0.2 kg each of Dhal, Green Gram, Black Gram or other, sugar and one cake of soap per person per week was provided. From 2001 onwards, a cash component of Rs. 50, and in exceptional cased Rs. 80 to Rs. 100 was added to the food basket to balance its value against the increased shadow wage rate, which had risen to about Rs. 250 per day and to maintain FFW and CFW an attractive option. Thus, IFSP had been continuously adjusting the FFW / CFW programme based on the feedback received from the farming community. FFW and FFC were in fact tools to promote rural assets through community participation. The term 'Food-for-Assets' was introduced to create a higher degree of awareness and acceptance amongst communities[5]. Although at the early stages, the project relied entirely on the farmers for earthwork, from 2001 onwards heavy equipment had been contracted since it was realised that a labour

[5] Food-for-work – connecting villages to markets, IFSP news 19, June / July 2002; Lessons Learnt - Best Practices, Nikolaus Schall, Eberhard Bauer, K. Shanmugalingam, B. Sivapiragasam, Trincomalee, Berlin, Usingen April 2003, IFSP Working Paper 52

intensive approach could not be implemented in certain locations. This was because the concentration of a comparatively low village population in certain areas and the distance between the populated areas and the tank locations hardly allowed the achievement of the targets by relying entirely on manual labour.

Data on the involvement of villagers in the development of the 16 tanks through the FFW activity are summarised in Table 4 and the details with respect to each tank are given in Table 5. There was no female participation in the development work in 9 out of the 16 tanks studied. All these tanks were in areas where the farmers were either Tamils and / or Muslims. Sinhalese women, on the other hand, participated very much in the earthwork. In fact, of the seven tanks where the farmers were predominantly Sinhalese, the number of women who participated in the FFW activity was higher than the number of men. Also, the actual number of women days (mean of 1,238) was higher than the number originally planned (mean of 891). At the same time, the actual number of man days (mean of 3,071) was very much lower than the number originally estimated and planned (mean of 4,204).

The total number of person days actually effected per tank ranged from a minimum of 1,500 in Sinnamoddaiyandikulam to a maximum of 7,000 in Keerandankulam with a mean of 4,310. It is worth noting that the number of persons involved in the FFW / CFW programme ranged from a minimum of 35 to a maximum of as high as 344 indicating that the FFW had attracted not only the beneficiary farmers but also others in the nearby villages. More than 75% of the sample farmers reported that they had engaged themselves by contributed labour for the tank development activities by participating in the FFW programme.

Table 4: Summary of the farmer involvement in food for work (N =16)

Person days	**Minimum**	**Maximum**	**Mean**
No. of man days (estimated and planned)	1,600	12,900	4,204
No. of man days (actual)	1,080	7,000	3,071
No. of men involved	25	163	656
No. of woman days (estimated and planned)	0	3,170	891
No. of woman days (actual)	0	4,438	1,238
No. of women involved	0	240	44
Total no. of person days (estimated and planned)	1,600	12,900	5,095
Total no. of person days (actual)	1,500	7,000	4,310
Total no. of persons involved	35	344	110

All the farmers who participated in the FFW programme reported that it was beneficial to them, especially in bridging the food deficit during difficult times, mainly before the harvest, but also in situations where security restrictions prevailed. Table 5 provides details about the allocation of FFW for the 16 tanks under survey. Altogether 69,000 person days of FFW were completed. 71% of the FFW activities were done by men and 29% by women. The food baskets sustained 1,800 families for a period of up to three month.

Table 5: Details of food for work effected in the 16 developed tanks

Tank	Man days (no.)		Men working (no.)	Woman days (no.)		Women working (no.)	Total person days (no.)		Total persons working (no.)
	Planned	Actual		Planned	Actual		Planned	Actual	
Ehalawewa	4,920	4,198	25	2,000	2,722	30	6,920	6,920	55
Karagahawewa	2,000	1,520	25	1,765	2,205	45	3,765	3,725	70
Madugahawewa	2,050	1,640	41	2,050	2,460	61	4,100	4,100	102
Behethkawawewa	3,170	1,902	104	3,170	4,438	240	6,340	6,340	344
Galkadawela – Kumbukwewa	2,275	1,080	78	2,275	2,520	182	4,550	3,600	260
Rotawewa – Thimbiriwewa	3,500	1,575	84	0	1,925	101	3,500	3,500	185
Puthuvelikulam	5,356	4,666	163	0	4	4	5,356	4,670	167
Sinnamoddaiyandikulam	1,600	1,500	40	0	0	0	1,600	1,500	40
Pulavankulam	2,870	2,550	35	0	0	0	2,870	2,550	35
Vembadithottamkulam	3,300	2,800	65	0	0	0	3,300	2,800	65
Solaipallakulam	8,940	6,000	80	0	0	0	8,940	6,000	80
Ithikulam	4,000	3,000	35	0	0	0	4,000	3,000	35
Keerandankulam	12,900	7,000	130	0	0	0	12,900	7,000	130
Paranamedawachchiwewa	2,479	1,910	34	3,000	3,540	43	5,479	5,450	77
Periamoddaiyandikulam	4,100	4,000	60	0	0	0	4,100	4,000	60
Palaimunaikulam	3,800	3,800	50	0	0	0	3,800	3,800	50
Total	67,260	49,141	1,049	14,260	19,814	706	81,520	68,955	1,755

The responses of the project officers and the office bearers of the FOs regarding the benefits of the FFW programme are given in Table 6. The IFSP staff and the DOAD officers and the FO leadership were unanimous in reporting that the FFW / CFW really helped them to encourage farmer's participation and the contribution of unskilled in labour in particular. This contribution. in fact, provided employment at difficult times, thus ensuring food security during off seasons.

Table 6: Benefits of the food-for-work programme (N = 16)

Benefits	**Percent reporting**	
	Project officers	FO office bearers
Encouraged farmers to contribute unskilled labour	75.0	100.0
Provided employment between Maha and Yala seasons	100.0	100.0
Bridged the seasonal food gap	93.8	92.9

Although the FFW was by and large very useful, the officers had to face some problems in fitting it into the seasonal work schedule. Soils need to be excavated and compacted manually during two time periods. Firstly, during the probable gap between the first rains in end of September or beginning of October and the commencement of the heavy rains thereafter. This is, however, also the period that the farmers begin to prepare their paddy lands for Maha cultivation and / or their highlands for vegetable or Chena cultivation. Secondly, during the period between mid the January and mid April rains. In some areas subsistence farmers, tenants, and wage labourers seek employment elsewhere during this period and the outside labour wage is much higher than the value of the FFW. Therefore, the response from the farmers for the FFW programme during this period is rather low.

Between May and September the farmers in the minor tank areas rely on other temporary and diversified sources of employment and income such as gardening, firewood trade, migrating for wage labour, small trade, etc. Since their income from these activities is comparatively low, they are prepared to work for the food basket. However, during this time period the soil is dry and very difficult to handle manually.

4.0 Technical Assessment

4.1 Tank Parameters

The distribution of the developed tanks within their catchment area is given in Table 7. The area ranges from 70 ha to 750 ha with a mean of 240 ha. Nearly one third of the tanks had a catchment area of over 300 ha. The vegetation in the catchment area consists of thick jungle (6 tanks), thick jungle and shrub jungle (8 tanks) and shrub jungle and Chena lands (2 tanks).

Table 7: Distribution of tanks by their catchment areas

Catchment area (ha)	**No.**	**Percentage**
70 – 199	6	37.6
200 – 299	5	31.2
300 – 750	5	31.2
Total	16	100.0

The history of the tank with respect to the frequency of spilling and the previous rehabilitation work done was considered to be useful in deciding the potential of and the need for further development work. The distribution of the selected tanks by the number of spillings over the past ten years is given in Table 8 shows that 6 tanks had spilled annually.

Table 8: Distribution of tanks by the frequency of spilling

No. of spillings	No. of tanks	Frequency of spilling
1 – 4	5	31.2
5 – 9	5	31.2
>10	6	37.6
Total	16	100.0

No rehabilitation work had been done in 12 tanks over the past ten years while in the other 4 tanks only some minor works such as strengthening of bunds, repairs to sluices had been done, thus meriting development work under the IFSP.

4.2 Planning Documents

The procedures of DOAD required that during the planning stage of the minor tank development programme, two important documents were prepared namely Preliminary Investigation Report (PIR) and Feasibility Report (FR). In order to prepare these reports, preliminary investigation surveys had to be done followed by actual physical surveys and the preparation of physical and cost estimates. Self-evaluation of the PIR and FR was done by the respective IFSP engineers and technical officers responsible for the tank development work. This was supplemented by an assessment of these reports by the expert engineer.

Most of the project engineers (>88%) were of the view that both PIR and FR contained all the necessary information, while 25% observed that these reports also had some additional unwanted information. 56% of the engineers and technical officers reported that realistic values were used in the preparation of the above reports. In the opinion of the expert engineer, the PIR and FR reports were of satisfactory quality. However, some shortcomings that needed to be rectified are given below:

i) Some values used for estimating the costs of production, amounts of production and market prices appeared to be unrealistic,

ii) Some PIR and FR lacked proper operation and flood studies. It is imperative to note that, to assess the cultivable land under each tank and to fix the full supply (crest) level of the tank, proper operation study is required. To determine the spill length and the bund top level (spill design), proper flood study is required. Both studies need data unique to each tank. The essential data required for each scheme are incorporated in the elevation – area capacity diagram of the tank. Also, in some cases, when the flood study was done, the results were not incorporated into the design parameters due to various reasons.

iii) Quality control was not initially adhered to in certain tanks such as Vembadithoddam and Sinnamoddaiyandikulam. These quality parameters were attended to during the initial stage of development and / or maintenance.

iv) In certain schemes the time frame for development needed advancement because during Maha rains headwork and similar earthwork could not be done, and

v) Ideas for better on-farm water management practices to optimally use the available water for irrigation were not included in some cases.

4.3 Development Work Done

Table 9 shows the distribution of tanks by the type of development work done. The details of

work done in each tank are given in Annex 1. The tank bunds had been improved in all the tanks studied. Also, construction of and improvements to spill, sluice and channels were undertaken in most of the tanks developed.

Table 9: Distribution of tanks by the type of development work done

Type of work	Proposed by farmer	Recommended by engineer	Actually implemented
Deepening tank bed	5	1	1
Improvement to tank bund	16	16	16
Construction of and / or repair to sluice	14	14	12
Construction of and / or improvement to spill	16	16	14
Improvement to channels	16	16	14
Construction of access road	6	6	6
Construction of turn-outs	4	4	3
Construction of bathing steps	4	4	3
Construction of anicuts	1	1	1

4.4 Quality of Work Done

The quality of work done was assessed by recording the perceptions of the different actors involved viz. engineers and technical officers who directly supervised the development work, FO office bearers and the beneficiary farmers by comparing the before and after situations. This was supplemented by the judgement of the expert engineer regarding the quality of the developed structures.

The data given in Table 10 regarding the self evaluation by the project engineers and technical officers of the development work undertaken under their supervision reveal that they were very much satisfied with the work in relation to the tank bund, the sluice and the spill as reflected by the number of responses at the good to very good level after the development compared to the before development situation. They, however, did not perceive the downstream development to be as significant as the development of the headwork. It is worth noting that the downstream development is expected to be undertaken by the farmers.

Table 10: Distribution of **officers** by their responses on the condition of irrigation structures before and after development

	Before*				After*			
	1	2	3	4	1	2	3	4
Tank bed	1	8	6	1	0	6	9	1
Tank bund	11	5	0	0	0	3	7	6
Sluice	9	6	1	0	0	2	9	5
Spill	10	6	0	0	0	2	8	6
Spill channel	9	6	1	0	1	8	5	2
Irrigation channel	8	7	1	0	1	6	5	4
Drainage system	6	10	0	0	1	7	5	3

* 4 – very good, 3 – good, 2- satisfactory, 1 - poor

The data given in Tables 11 and 12 reveal that there is general agreement between the self evaluation of the engineers and technical officers regarding the quality of the tank development work done by them, the perceptions of the beneficiary farmers and their FO leadership. Over 75% of the beneficiary farmers as well as the FO office bearers reported the condition of the tank bund, sluice and the spill as either good or very good after development. Almost the same proportion of respondents, however, reported the condition of these structures as poor before development.

Table 11: Distribution of **FO office bearers** by their responses on the condition of irrigation structures before and after development

	Before*				After*			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Tank bed	4	9	3	0	1	10	5	0
Tank bund	14	2	0	0	1	3	6	6
Sluice	11	4	1	0	3	2	4	7
Spill	13	2	1	0	2	1	7	6
Spill channel	9	7	0	0	4	7	3	2
Irrigation channel	14	1	1	0	5	3	3	5
Drainage system	6	10	0	0	5	10	1	0

* 4 – very good, 3 – good, 2- satisfactory, 1 - poor

As for the condition of the irrigation channel, half the FO office bearers and nearly one-third of the beneficiary farmers reported it as either good or very good after development, compared to nearly 86% of the FO office bearers and 61% of the beneficiary farmers reporting it as poor before development.

Observations of the expert engineer regarding the irrigation structures viz. bunds, sluices, spills and channels with respect to each tank studied are given in Annex 3 [6].

Bund: The quality of bunds varied very much from tank to tank. In some tanks the bunds were in very good condition, formed to profile with fair compaction and good turf while in the other tanks the bunds were not constructed to a good profile and seemed very weak with depressions in between. Runners were observed which could have been avoided by building brims on the bunds until the turf took root.

Table 12: Percentage distribution of **farmers** by their responses on the condition of irrigation structures before and after development

	Before*				After*			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Tank bed	71.1	28.9	0	0	1.0	49.5	46.4	3.1
Tank bund	80.4	17.5	2.1	0	0	15.5	77.3	7.2
Sluice	75.3	24.7	0	0	0	7.2	89.7	3.1
Spill	88.7	11.3	0	0	10.3	13.4	73.2	3.1
Spill channel	82.5	17.5	0	0	25.8	37.1	35.1	2.1
Irrigation channel	60.8	38.1	1.0	0	14.4	48.5	34.0	3.1
Drainage system	81.4	17.5	1.0	0	55.7	34.0	10.3	0
Bathing steps								

* 4 – very good, 3 – good, 2- satisfactory, 1 - poor

Some bunds were not made out of correct material. It was impervious and thereby seepage occurred. In order to ensure that the correct material was used for bund construction, the following tests should have been done:

i) In situ moisture content, ii) Atteberg limits, iii) mechanical analysis, and iv) proctor compaction

In the case of some tanks in Gomarankadawela and Morawewa the borrow pits for bund material were near the toe of the bund. This is against the specification accepted and practised for safety of the dam. According to the specifications of the Construction Industry Training Project (CITP):

[6] It was only after the MOU that machinery could be employed. The combination of manual and machinery work allowed that the technical quality increased significantly and that good engineering standards were met. Most of the shortcomings identified by the expert engineer were rectified until mid / end 2003 when the programme came to an end (Annex 3).

i) Borrow areas, as far as possible, shall not be located on the downstream of the dam, and

ii) Borrow areas located near the dam shall be at a distance not less than three times the height of the dam (between the toe of the dam and the edge of borrow area?).

Sluice: In some tanks the sluice rods were missing (removed by farmers and taken to other tanks). The sluices, in general, were leaking. This leakage was sometimes caused by hindered closure by obstacles. The leakage definitely wasted the water continuously resulting in reduced output of tank development. It appeared as if the farmers were either unaware of the measures to be taken to arrest the leakage of water or not interested in the same.

Spill: It was generally observed that the spillway and spill approach were not cleared properly. The trees and boulders hindered the flow resulting in narrower effective spill that endangered the tank bund during flood times. The construction of crest wall in some tanks (for example Karagahawewa) lacked workmanship and, therefore, leaked beneath the full supply level resulting in enormous loss of water. In this case the previous layer of spill should have been chipped to make sufficient bondage to the new layer and also adequate vibration should have been given to the concrete work to make it leak proof. In some cases the bund top level was very much higher than the crest level. The results could have been achieved more economically through longer spills (to reduce afflux) and lower bunds.

Channels: It was observed in a few cases that the proper structures were not built immediately after the opening of the sluice. Water inundated in the entire area near the sluice and got wasted. The channels, in general, were not maintained well by the farmers resulting in higher conveyance losses.

5.0 Mobilisation and Institutional Strengthening

5.1 Strengthening of Farmer Organisations

One significant feature in all the tanks developed under the project was the presence of FOs , which were formally registered with the DoAD. These FOs are held responsible for organising work on the channels as well as the tank bund and other structures, and for maintaining the same. They are also responsible for implementing the decisions made at the seasonal meetings. These seasonal meetings are important decision-making fora where all farmers cultivating under the tank are expected to meet together, discuss and make collective decisions regarding cultivation and water use in a democratic manner.

It was, however, observed that the FOs were not strong enough to fulfil the expectations regarding the operation and maintenance of the tanks. Many factors, both external and internal, determined the strength and sustainability of the FOs. The external factors included the support of agencies involved with FOs, the existing legal framework and socio-economic factors encompassing the local social organisations.

The internal factors included the origin of the FO, the constitution and the internal group dynamics within the FOs. Many traditional FOs were guided by profit-oriented leaderships and were used to contracts with profit margin. They were basically managed by one man and lacked teamwork, cooperation and transparency in financial dealings. The farmers were new to the contributory packages of the IFSP and there was less initiative to undertake responsibility as a group.

The IFSP had to, therefore, embark on a programme of capacity building of these FOs

through convincing dialogues and material assistance. The major factors constraining the growth and functioning of the FOs were addressed under the project in order to increase their strength and sustainability.

When asked as to whether any assistance was received from the IFSP to strengthen their organisation, office bearers of half the FOs (8) answered in the affirmative. The financial viability of the FOs was enhanced by the project as the FOs were able to save some money through the contracts given to them for the various tank development activities. The office bearers of 4 out of the 16 FOs studied reported that their organisations were revived and strengthened also through other projects such as construction of access roads implemented by the IFSP through contractual agreements with them.

Another important input planned under the minor tank development programme was the training of the FO office bearers and the farmer members at large. Two types of training were expected to be conducted by the project officers viz. engineers and technical officers, community mobilisers, divisional officers and other external resource persons:

i) Technical training to enhance the capacity of the FO to implement the tank development project as well as to ensure proper operation and maintenance of the project in the future, and

ii) Leadership training to increase the managerial capability and the organisational capacity. This training includes leadership development, maintenance of records, administrative procedures and financial management.

According to the technical officers of DOAD, the above technical training had been conducted to the FOs responsible for 5 of the 16 tanks developed and the number of farmers who participated in these training classes was reported to range from 10 to 20 and they thought that the training was useful to them. When crosschecked with the FO office bearers, however, it was revealed that such technical training was conducted only in one of the 16 tanks developed. Leadership training was apparently not conducted for the FOs responsible for any of the 16 developed tanks. Thus the training capacity of DOAD appeared to be rather weak and IFSP was only in a limited way in a position to counterbalance this shortcoming.

5.2 Functioning of Farmer Organisations

The structure and functioning of the FOs were examined in relation to the situations both before and after the development of the tanks. The FO membership is formally based on land ownership or legal tenancy of paddy land in the command area of the tank. More than one member of the household could become member of the FO. However, membership fees had to be paid for each member individually.

According to the information collected from the FO leadership, the membership of FOs ranged from 20 to 150 with a mean of 60 before the development of the tanks. Active involvement of farmers in the development process resulted in the growth of the organisation. Consequently, at the post-development stage, the membership ranged from 21 to 250 with a mean of 114. But, the sample survey of the selected tanks revealed only a marginal increase in membership with 69 % of the interviewed farmers reporting as members before and 72% after the development of the tanks. At the same time, 17.5% of the sample farmers reported that either the wife or a child was also a member of the FO.

The office bearers of the FO include the President, the Secretary and the Treasurer. When asked as to how the office bearers were selected, all the interviewed office bearers indicated that the member farmers democratically elected them. At the same time, although two-thirds of the sample farmers agreed that they democratically elected the office bearers of their FOs,

the balance one-third reported that the office bearers were just nominated by some influential people in the village.

The office bearers in 10 FOs had a satisfactory or good knowledge and 6 FOs had poor knowledge of the rules and regulations of the FOs as embodied in the constitution. Also, similar proportion of the sample farmers (65%) had satisfactory or good knowledge of the constitution. The mobilisation of farmers and their participation in the tank development activities did not, somehow, seem to have had a significant impact on their knowledge and understanding of the constitution.

The types and frequencies of the meetings conducted by the FO reflect its level of functioning and the extent of involvement of people both in decision-making about and implementation of its activities. The details of meetings conducted, as reported by the office bearers are given in Table 13.

Table 13: Frequency of FOs by the types of meetings conducted by them

Type of meeting	**Number of meetings per year**							
	Before development				After development			
	None	1 - 11	12	Mean	None	1 - 11	12	Mean
Executive committee	3	5	8	6.6	0	7	9	8.1
With member farmers	3	12	1	2.0	0	15	1	2.3
With all villagers	5	10	1	1.4	2	13	1	1.6

It is very clear from the information provided in Table 13 that the activities undertaken by the FOs for tank development have really activated the farmers. In fact, the mobilisation activities undertaken by the IFSP staff helped reorganise the leadership of some of the malfunctioning FOs. In the case of 3 FOs, no executive meetings or meetings with member farmers were held before the development of the tank. After the development of the tanks, however, at least some meetings were held in all FOs at all levels except for 2 FOs where no meetings were held with the villagers (non-members) even after the development.

When asked as to whether they participated in the meetings conducted by the FOs, 60% of the sample farmers reported that they participated in these meetings regularly while 8% reported that they participated only in some of the meetings while the balance 31% never participated. It is more important to know whether the members were really consulted in decision making as well as whether they actively participated in implementing those decisions. It is gratifying to note that 59% of the sample farmers reported that their views were always respected and considered in decision making and also that they regularly participated in all activities of the FOs. At the same time, 10% of the farmers were of the opinion that they were consulted only sometimes in making important decisions and that their participation in the FO activities was irregular. This situation apparently did not change significantly due to the development of the tanks. The office bearers of 12 out of the 16 FO s confirmed that the participation of farmers in implementing their activities was satisfactory while in the other 4 FOs the farmer participation was considered to be poor even both during and after the development of the tanks.

Another important factor in the functioning of the FOs is the type of relationship between the FO office bearers and the members as well as the villagers at large. Office bearers of the majority of the FOs (14) perceived that the relationship was satisfactory while in the case of the other 2 FOs the relationship was perceived to be good. On the other hand, as high as 42% of the sample farmers perceived the relationship between the office bearers and the members was good and 48% perceived it to be satisfactory. It is significant to note that only 9% were of the view that the relationship was rather poor.

The financial strength of the FO is an important determinant of the sustainability of the

organisation. The membership fees and the money earned through various contractual activities constitute the total fund available with the organisation. Nearly two-thirds of the sample farmers reported that they paid the membership fees regularly. The actual percentage of farmers who reported paying the membership fees ranged from 65% before tank development to 69% after the development of the tank. The total fund available with the FO ranged from Rs.1,500 to Rs. 45,000 with a mean of Rs.13,188 before the development of the tank and from Rs.10,000 to Rs.173,000 with a mean of Rs. 63,187 after the development of the tank. Thus the involvement of the FO in tank development work had improved significantly its financial status.

The training given by the IFSP officers to the FO office bearers on handling funds has helped create a better image of the FO with respect to this activity. Although audited annual account statements had been exhibited by 10 of the 16 FOs before tank development, all 16 FOs did so after the development of the tank thus increasing the confidence of the members in their FOs. This was reflected by the high proportion of the sample farmers (91%) who expressed satisfaction with the financial dealings of their FOs.

5.3 Strengthening of Department of Agrarian Development

The Department of Agrarian Development (DoAD) formerly the Department of Agrarian Services is the government agency responsible for the minor tanks in Sri Lanka. The Assistant Commissioner of Agrarian Development (ACAD) is the district head of the DoAD. Technical Officers (TO) and Agrarian Development Officers (ADO) are the field staff who work closely with the farmers. The prime duties of the ADOs with respect to the FOs and the management of the minor tanks are:

i) To support the activities implemented by both the central and the provincial governments for developing the agricultural and livestock sectors especially by supporting the agricultural extension and farmer development programs.
ii) To establish and to operate the local Agrarian Service Centres for the sale of agricultural inputs and for arranging farm machinery hire at competitive prices.
iii) To manage the FOs, Agrarian Development Societies, water management bodies, etc.
iv) To establish farmers' fund, agriculture levy and other revenue sources.
v) To establish, maintain and update a database of farmers, extents of land cultivated, inputs used, yields obtained, etc.

The main tasks of the TOs were to supervise the management of the minor tanks, and to propose and facilitate the implementation of the necessary remedies either through Department fund or through the contributions made by the farmers.

The DoAD with its limited resources in terms of funds, equipment, staff and transport facilities bears an unmanageable task beyond its capacity. Even though the finances for development and maintenance of the tanks can be partly fulfilled through the various support projects implemented in the district, the available staff is rather inadequate to establish and maintain close relationship with the farming community so as to improve their self-help capacity. Recognising the overall poor capacity of the DoAD for implementing its mandate and the minor tank development in particular program and hence the need for capacity strengthening, the IFSP supported the Department by providing the following:

Funds for minor tank development
The annual government allocation to the Trincomalee DoAD for all the developmental activities was not even adequate to attend to the emergency repairs in the tanks, channels, agriculture roads and the DoAD buildings. The IFSP agreed to support the DoAD to develop the minor tanks that needed immediate improvement. The German fund was utilised for use of machinery, FFW and for materials other than cement, reinforcements and planks for which

the domestic fund (consolidated fund) was used,

Technical support (engineers, draftsmen, cascade studies, etc.)
In 1999 when the IFSP signed the agreement with the DoAD, there were only two TOs working in the entire district. In order to accelerate the tank development program, the IFSP recruited six engineers. These engineers worked for minor tank development as well as for the other IFSP supported infrastructure development projects. Two draftspersons were employed and they were engaged mainly in tank development work and also supported the Department in other projects.

The IFSP supported the cascade analysis studies for Trincomalee district, conducted by a team of Sri Lankan professionals associated with the International Water Management Institute. The technical document produced by the study team can be used as an effective guideline to make realistic decisions with respect to minor tank development in the district[7].

Equipment and mobility
The services of the technical staff and the ADOs of the DoAD were made available to remote areas where many of the developed tanks were located by providing mobility facilities (motor bikes) to them. Computers, printers, plotter, air conditioners, telephone, stationery, drawing equipment, drawing boards and furniture were given to the DoAD to expedite the office work related to tank development. Rammers, plate compactor, roller compactor, levelling equipment and global positioning system (GPS) were made available to the tank development programme.

Incentives / allowances for DoAD staff
The request made by the DoAD staff (TOs, ADOs, clerks and office assistants) for allowances / incentive payments on account of their involvement in the tank development work was favourably considered by the IFSP. The payment was, however, made according to and within the limits of the departmental financial regulations and norms.

Training to DoAD staff
Many clerical staff, technical staff and ADOs of the Department were trained by IFSP since mid 1999. Some ADOs underwent training on participatory needs assessment conducted by international experts. The clerical staff was trained in English language and in computer literacy with IFSP financial support, including CAD design. The ACAD also followed a short–term foreign training on project management sponsored by the IFSP.

6.0 Irrigation and Water Management

6.1 Operation and Maintenance Activities

The tanks that are developed and handed over to the farmer organisations should be maintained properly for long-term sustenance and to reap the maximum benefits from the investment on development. For this purpose the DoAD prepared a maintenance plan and the FO members were trained to carry out most of these activities. The activities included in this plan and the expected frequencies of performance of these activities are given in Table 14. Depending on the type of activity, the frequency of expected performance ranged from once in two years to twice a year.

[7] 75 Minor Tank Rehabilitation Programme: Preliminary Assessment Survey, N. Nadarajah, Trincomalee, March 2000 IFSP Technical Paper 2; The inventory included the establishment of comprehensive planning maps for watersheds, micro catchment, cascade and cluster of tanks.

Table 14: Frequency of maintenance activities according to the maintenance plan prepared by the Department of Agrarian Development

Activities	**Frequency**
Cutting shrubs along tank bund	Twice a year
Earthwork on tank bund	Once a year
Removal of anthills on bund	Once a year
Lubricating sluice gates	Twice a year
Painting sluice gates	Once in two years
Clearing spill channel	Once a year
Weeding irrigation channels	Twice a year
Earthwork on channels	Once a year

The responses of officers (IFSP project engineers and the DoAD technical officers) and the office bearers of the farmer organisations regarding the actual performance of the maintenance activities are given in Tables 15 and 16 respectively.

The data show that there is general agreement between the officers and the FO office bearers regarding the frequency of performance of these activities both before and after the development of these tanks except for activities such as earthwork on tank bund, painting sluice gates and clearing spill channels where officers, as against farmer organisation leadership, reported that these were not carried out in 6 to 8 tanks even after development.

Table 15: Distribution of tanks by the frequency of maintenance activities performed: Responses of officers

Activities	**Before***				**After***			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Cutting shrubs along tank bund	6	9	1	0	2	13	1	0
Earthwork on tank bund	11	4	0	1	7	8	0	1
Removal of anthills on bund	10	5	0	1	5	10	1	0
Lubricating sluice gates	10	4	1	1	2	12	1	1
Painting sluice gates	12	4	0	0	6	9	0	1
Clearing spill channel	10	6	0	0	8	7	0	1
Weeding irrigation channels	2	14	0	0	1	15	0	0
Earthwork on channels	3	13	0	0	2	14	0	0

1-never, 2-once a year, 3-twice a year, 4-more than twice a year

Table 16: Distribution of tanks by the frequency of maintenance activities performed: Responses of FO office bearers

Activities	**Before***				**After***			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Cutting shrubs along tank bund	5	11	0	0	0	14	2	0
Earthwork on tank bund	9	7	0	0	2	14	0	0
Removal of anthills on bund	10	6	0	0	2	14	0	0
Lubricating sluice gates	7	9	0	0	1	12	1	2
Painting sluice gates	11	5	0	0	2	12	2	0
Clearing spill channel	11	5	0	0	4	12	0	0
Weeding irrigation channels	4	12	0	0	0	14	2	0
Earthwork on channels	3	13	0	0	0	13	3	0

*1-never, 2-once a year, 3-twice a year, 4-more than twice a year

Activities such as clearing shrubs on tank bund, and weeding and earthwork on irrigation channels had been carried out in the majority of tanks once a year even before the development of the tanks. The other activities related to the maintenance of the tank bund, spill and sluice gates had never been carried out in the majority of the tanks before development. It is, however, encouraging to note that all the maintenance activities had been

carried out at least once a year in most of the tanks after development. All the sample farmers also indicated that most of the maintenance activities were carried out once a year confirming the responses given by the project officers and the FO leadership.

6.2 Persons Responsible for Operation and Maintenance

The persons responsible for the operation and maintenance of the developed tanks as reported by the officers (IFSP and DOAD) and FO office bearers are presented in Tables 17 and 18 respectively. As anticipated, the data clearly show that the farmers have taken over greater responsibility in the operation and maintenance activities of the developed tanks. Preparation of water delivery schedules and the distribution of water along the channel are determined and managed by the FO leadership along with the Vattavithanai who is respected and trusted by most of the villagers.

According to the reports of both the officers and the FO leadership, the number of tanks in which farmers had been actively involved had increased after development with respect to each and every operation and maintenance activity. Also, according to the FO office bearers, unlike in the pre-development situation, after the development of the tanks, the responsibility for each and every activity had been vested with someone, either the farmers or officers or both.

Table 17: Distribution of tanks by the persons carrying out the operation and maintenance activities: Responses of officers

Activities	**Before***				**After***			
	1	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Maintenance of the bund	9	0	1	6	11	0	2	3
Maintenance of spill and spill channel	7	0	0	9	9	0	1	6
Maintenance of sluice	13	0	1	2	14	0	2	0
Deciding cultivation dates**	8	10	1	3	9	5	0	2
Operation of sluice	12	0	3	1	14	0	2	0
Preparation of water delivery schedule	5	2	2	7	7	2	3	4
Distribution of water along the channel	12	0	2	2	14	0	2	0
Maintenance of channels	11	0	2	3	13	0	2	1

*1-FO, 2-DO, 3-others, 4-none; **Multiple responses

Officers responsible for developing some tanks, however, maintained that some activities such as maintenance of bund (3), maintenance of spill and spill channel (6), deciding cultivation dates (2) and preparation of water delivery schedules (4) were not assigned clearly to someone and consequently not carried out properly.

Table 18: Distribution of tanks by the persons carrying out the operation and maintenance activities: Responses of FO office bearers

Activities	**Before***					**After***				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Maintenance of the bund	9	0	2	2	3	15	0	1	0	0
Maintenance of spill and spill channel	10	0	0	0	6	16	0	0	0	0
Maintenance of sluice	10	0	2	1	3	14	0	2	0	0
Deciding cultivation dates**	9	13	1	0	2	10	15	1	0	0
Operation of sluice	8	0	5	1	2	11	0	4	1	0
Preparation of water delivery schedule**	8	5	4	1	2	12	5	3	0	0
Distribution of water along the channel	7	0	6	1	2	11	0	5	0	0
Maintenance of channels	7	0	2	5	2	9	0	1	6	0

* 1-FO, 2-DO, 3-Vattavithanai, 4-others, 5- none; **Multiple responses

6.3 Process of Farmer Participation

In order to carry out the operation and maintenance activities the farmers had to be selected and assigned responsibilities. In the case of 8 tanks the officers and the FO leadership reported that the farmers were selected and responsibilities assigned to them at the seasonal meetings held at the beginning of each season where the details of water issues and cultivation dates were decided. In 4 other tanks, the farmers were nominated for various activities by the farmer organisation' leadership and the respective responsibilities were assigned to them. According to the officers in the other 2 schemes, Shramadana campaigns were organised by the FO to carry out the many operation and maintenance activities. At the same time, the FO leadership in 8 tanks also maintained that they organised Shramadana campaigns to carry out some of the maintenance activities.

The officers rated the level of farmer participation in the operation and maintenance activities as poor in 6 tanks and as satisfactory in the other 10 tanks. At the same time, the FO office bearers reported that the farmer participation was satisfactory in 13 tanks and good in the other 3 tanks. Various sanctions were imposed on those farmers who did not participate in the above activities. These included stoppage of water issues (9) and payment of penalty fees (5).

The majority of farmers (84%) reported that they experienced problems related to water issues. These included tail-enders not receiving enough water, domination by some influential farmers, etc. There were also conflicts among farmers with respect to the timing of cultivation. These conflicts were, however, rare as reported by most of the farmers (94%). Only 4.3% of the farmers reported that these conflicts were frequent. Conflicts were generally resolved through discussions in which the Vattavithanai played a significant role.

6.4 State of Maintenance

The views of the project officers, FO office bearers and the farmers were sought regarding the state of maintenance of the bunds, the channels and the other irrigation structures. The project officers and the FO office bearers in 12 of the 16 developed tanks reported that some defects / damages were already observed in the irrigation structures. These included damage to bund by elephants and cattle (5), leakage in bund (2), bad culverts (2) and absence of sluice gate (1). At the same time, only 24% of the farmers reported observing defects. The defects reported by them were leaking sluice gate (16%) and minor defects in the bund (8.).

Of those project officers and the FO office bearers who reported defects, only one third responded that these defects were attended to satisfactorily. Similarly, of those farmers who reported defects and damages, only 19% indicated that these defects were attended to. 90% of the sample farmers maintained that they themselves attended to these defects without waiting for government support. When asked as to who should really attend to these defects and damages, the majority of farmers did not respond while 24% said that it was the responsibility of the FO and 6% were of the view that the IFSP should attend to these damages.

However, it is worth noting that all the sample farmers claimed that they and not the government owned the tank and 92% of them were willing to pay for the maintenance of the developed tank.

The study team observed, in general, that the irrigation structures of the developed tanks were not maintained satisfactorily. The bunds were not maintained properly. Runners were seen in some tanks (for example, Keerandankulam) and anthills were commonly seen in most of the tanks and the bunds were overgrown with shrubs. In some tanks the sluice rods

were missing (Ithikulam, Palaimunaikulam) and in others water was leaking through the sluice gates (Karagahawewa, Madugahawewa). The spill approach and spillway were not cleared adequately (Vemabadithoddam, Karagahawewa). In most of the tanks the channels were not maintained well. Farmers did not seem to be interested in maintaining the profile. The channels were not cleared from overgrown vegetation leading to comparatively high conveyance losses.

On the other hand, the perception and expectation of the farmers that government was obliged to do maintenance after the rehabilitation and development works were completed but not the farming community, appears a common phenomena not only in Trincomalee district, but countrywide. Farmers only maintain structure if they need them, i.e. parallel to preparing for cultivation and for water management in particular. The common view that government was to perform maintenance is to a certain extent the result of over regulation and 'over aiding', but at the same time reflects risk aversion on the side of the farming community. IFSP was engaged in supporting a first round of organised maintenance backed-up by capacity building and consequently, always addressed FOs that they take over the responsibilities they had confirmed when signing the official agreement with the DOAD.

7.0 Agri-support Services

It is imperative to note that the provision of irrigation water is necessary but not sufficient to bring about agricultural development. Technological change is necessary and the farmers have to adopt new practices in agriculture to increase the production and income levels. Intensification of agricultural production is necessary to reap the maximum benefits from the investment on minor tank development. A modernised agriculture depending largely on purchased inputs and producing for the market requires continuous changes in the institutions related to the provision of agri-support services. The main agri-support services required are: i) agricultural credit, ii) agricultural inputs, iii) agricultural extension and, iv) agricultural marketing.

The responses of the sample farmers and the FO office bearers regarding the availability of the above agri-support services are given in Tables 19 and 20.

Table 19: Percentage distribution of farmers by their responses regarding the availability of agri-support services

Agri-support service	Before*			After*		
	1	2	3	1	2	3
Formal agricultural credit	72.2	26.8	1.0	71.2	27.8	1.0
Seed paddy	3.1	57.7	39.2	4.1	56.7	39.2
Other seeds and planting material	42.3	57.7	0	42.3	57.7	0
Livestock breeds	27.8	71.2	1.0	27.8	71.2	1.0
Inorganic fertiliser	24.0	50.0	26.0	4.2	45.8	50.0
Pesticides and weedicides	17.7	55.2	27.1	2.1	47.9	50.0
Agricultural information	75.3	20.6	4.1	75.3	20.6	4.1
Agricultural marketing facilities	49.0	24.0	27.0	49.0	26.0	25.0

* 1 - poor, 2 - satisfactory, 3 - good

7.1 Agricultural Credit

Agricultural development through both extensive (increase in cultivated extents) and intensive (increase in per acre output) cultivation greatly increases the demand for agricultural credit. This arises from the need for higher investment on new seed varieties,

agri-chemicals and mechanical technologies.

Table 20: Distribution of FO office bearers by their responses regarding the availability of agri-support services

Agri-support service	Before*			After*		
	1	2	3	1	2	3
Formal agricultural credit	14	2	0	13	3	0
Seed paddy	15	1	0	8	8	0
Other seeds and planting materials	13	3	0	13	3	0
Livestock breeds	14	2	0	14	2	0
Inorganic fertiliser	13	3	0	11	5	0
Pesticides and weedicides	14	2	0	14	2	0
Agricultural machinery	15	1	0	13	3	0
Agricultural information	14	2	0	9	7	0
Agricultural marketing facilities	15	1	0	15	1	0
Network among service agencies	12	4	0	11	1	4

* 1 - poor, 2 - satisfactory, 3 - good

The availability of formal institutional credit was rated as poor by nearly three fourths of the sample farmers and the FO office bearers both before and even after the development of the tanks. Only less than 10% of the farmers reported borrowing agricultural credit from the banks and only about 15% borrowed credit even from the non-institutional sources such as traders, boutique keepers, middlemen, friends and relatives. There was no significant difference between the pre and post development situations regarding the use of agricultural credit.

Most of the farmers (72%) reported that their FOs did not assist them in anyway to obtain agricultural credit either from the institutional sources such as bank or in any other informal way. Almost all the office bearers (15 out of 16) also agreed that they did not help their members in this regard before the development of the tanks. However, 19% of the FO office bearers indicated that they helped their members to obtain agricultural credit after the development of the tank. It is commonly observed that farmers do not repay their cultivation loans. Almost every year state banks are confronted with high default rates of cultivation loans. On recommendation of the District Coordination Committee, politicians and the Department of Agriculture such loans are waived. Such practice does not encourage farmers to repay their loans as agreed upon.

7.2 Agricultural Inputs

The material inputs required by farmers include seed paddy, other seeds and planting material, inorganic fertiliser, agri-pesticides and weedicides. The main crop cultivated in the study areas is paddy. It is imperative that good quality seeds of new paddy varieties are made easily available to the farmers in time. Most of the farmers (96%) reported the availability of seed paddy as either satisfactory or good both before and after the development of the tanks. This is because, in many cases, they used their own harvest as seed paddy. Only 8% of the farmers purchased seed paddy either from the government or non-government organisation. On the other hand, the FO office bearers reported that the availability of good quality seed paddy to the farmers was poor both before (15 out of 16) and even after (8 out of 16) the development of the tanks. The supply of seed paddy, however, is expected to be improved with the functioning of the newly established Seed Processing and Sorting Centre in Muthur, which was established by DOA with the support of IFSP under a seed paddy out-growing programme.

As for the other seeds and planting materials, 42% of the farmers reported their availability as poor before the development of the tanks. The situation did not seem to improve even

after development. The picture portrayed by the FO office bearers was even worse, 13 out of 16 reported the availability as poor. It is imperative that these seeds and planting materials are made available to farmers if they are to be encouraged to diversify their cropping.

The farmers were generally satisfied with the availability of agri-chemicals such as inorganic fertilisers, pesticides and weedicides. About half the respondents reported their availability as satisfactory and another quarter as good before the development of the tanks. The situation appeared to have improved further after the development of the tanks with 47% of the farmers reporting the availability as satisfactory and another 50% as good. Most of the farmers (over 85%) purchased the agri-chemicals from shops while only 10% reported purchasing fertiliser from government organisations. Nearly three fourths of the FO office bearers, on the other hand, were of the view that even after the development of the tanks, the availability of the agri-chemicals was rather poor.

7.3 Agricultural Extension

The role of agricultural extension is to raise the living standard of farmers by encouraging them to adopt modern technology in farming through a non-formal educational process. The extension workers disseminate the information on modern agricultural practices to farmers by employing various individual, group and mass extension methods.

More than 50% of the farmers reported that they were aware of the extension officer of the Department of Agriculture. The majority of the farmers (75%), however, considered the agricultural extension activities such as farmer training classes, agricultural demonstrations, individual farm visits by extension worker as inadequate. Consequently, they also rated the availability of extension information as rather poor. The balance 25% perceived the agricultural extension service to be either satisfactory or good. This perception varied significantly from tank to tank, might be depending on the qualities and commitment of the extension worker working in the area concerned.

According to the majority of farmers the situation of agricultural extension did not change after the development of the tanks. As for the FO office bearers, although the majority reported the agricultural extension service as poor before development, nearly 50% reported that in their areas it had improved after the development of the tanks and was currently satisfactory. The FO office bearers in 4 out of the16 tanks studied, in fact, indicated that they also assisted the farmers in various ways to obtain the necessary information regarding the modern agricultural practices.

7.4 Agricultural Marketing

Marketing is identified as an important activity of identifying and satisfying customer requirements. The FO office bearers in most of the tanks studied (15 out of 16) and nearly half the sample farmers (49%) reported that the facilities in their areas for marketing the surplus agricultural produce as rather poor both before and even after the development of the tanks.

99% of the farmers reported selling their surplus paddy to private traders. The marketing knowledge of the farmers was grossly inadequate. It was selling that took place in these areas and not marketing and the farmers accepted whatever price offered by the buyers who were very well organised. In fact, when asked as to whether they received a reasonable price for their produce, only 15.5% of the farmers answered in the affirmative. The farmers had to sell their paddy to these traders, as there was no other alternative available to them.

Other field crops such as onions, chillies, vegetables etc. were not produced in a larger scale

in the study areas and consequently the marketing of these products was reported by only less than 15% of the farmers and they too sold these products at the village market or to other private traders. None of the FOs assisted their members in any way to market their surplus agricultural produce at reasonable prices.

Overall the situation with respect to the agri-support services is rather poor and it is disheartening to note that the agencies responsible for these services viz. government, non-government and private are not organised properly to provide these much needed services to the farmers. The overall situation is to a large extent the outcome of the conflict, where hardly any investment into agri-business and services promotion happened. The poor infrastructure in the area and the comparatively low intensity of agriculture contribute to the weak market position of the farming community.

8.0 Socio-economic Impact of Tank Development

8.1 Costs of Development

The planned and actual costs of tank development and the percentage contributions made by the agencies involved in the development of the different tanks are given in Tables 21 to 23. Total average cost for the development of one hectare is Rs. 23,200 or US$ 230. This compares well with recommended FAO and WB standards of around US$ 500 to 750.

The actual total cost incurred for the development of a tank ranged from a minimum of Rs. 340,500 in the case of Sinnamoddaiyandikulam to a maximum of Rs. 2,005,500 in the case of Keerandankulam and the mean total cost incurred per tank was Rs.1,015,288. Considering the contributions made by the different agencies towards meeting the above costs, the GTZ-IFSP had the highest share (mean of 72.5%, with a range of 63.2% in the case of Paranamadawachchiwewa to 100% in the case of Ithikulam).

It is encouraging to note that the second highest contribution came from the beneficiary farmers. Their contribution ranged from a minimum of nil (0.0%) in the case of Ithikulam to a maximum of 29.9% in the case of Puthuvelikulam with a mean of 20.6%. The farmer's contribution was received in the form of labour except in Puthuvelikulam where the development work was undertaken fully by using machinery.

The contribution from the Sri Lankan government through the DF-IFSP and the DoAD was rather low. Out of the 16 tanks studied, no money was released through the DF-IFSP and the DoAD for the development of 4 and 3 tanks respectively. The contributions from the DF-IFSP and the DoAD for the overall development of the 16 tanks were as low as 5.6% and 1% respectively.

Table 21: Planned and actual costs of tank development in Rs. '000

Agency	Minimum	Maximum	Total	Mean
GTZ-IFSP, planned	278	1,900	13,448	840
GTZ-IFSP, actual	230	1,552	11,787	737
CF-IFSP, planned	0	93	560	35
CF-IFSP, actual	0	345	985	62
DoAD, planned	0	25	35	3
DoAD, actual	0	28	163	10
Farmers, planned	0	600	3,827	239
Farmers, actual	0	350	3,310	207
Total, planned	387	2,591	17,870	1,117
Total, actual	340	2,005	16,245	1,015

Table 22: Distribution of agencies by their percentage contribution to the costs of development of the different tanks

	% Total Costs (actual)			
Tank	**GTZ-IFSP**	**DF-IFSP**	**DoAD**	**Farmers**
Ehalawewa	74.4	3.1	0.5	22.0
Karagahawewa	85.4	0.0	1.9	12.7
Madugahawewa	75.0	6.4	0.6	18.0
Behethkawawewa	71.7	0.0	1.9	26.4
Galkadawela – Kumbukwewa	73.4	6.1	0.7	19.8
Rotawewa – Thimbiriwewa	68.3	10.4	1.5	19.8
Puthuvelikulam	70.1	00	00	29.9
Sinnamoddaiyandikulam	67.6	6.0	4.4	22.0
Pulavankulam	64.7	8.8	0.3	26.2
Vembadithodamkulam	68.9	6.5	1.9	22.7
Solaipallakulam	66.5	5.5	0.7	27.3
Ithikulam	100.0	0.0	0.0	0.0
Keerandankulam	77.3	4.9	0.3	17.5
Paranamadawachchiwewa	63.2	20.6	0.0	16.2
Periamoddaiyandikulam	67.7	8.5	2.6	21.2
Palaimunaikulam	64.7	5.3	2.1	27.9
Total	72.4	5.6	1.1	20.6

Table 23: Contribution of different agencies to the total costs of tank development

Agency	**% of Total (planned)**	**% of Total (actual)**	**% (Actual/Planned)**
GTZ-IFSP	75.3	72.4	96.1
DF-IFSP	3.1	5.6	180.6
DoAD	0.2	1.1	550.0
Farmers	21.4	20.6	96.3
Total	100.0	99.7	99.7

8.2 Benefits of Development

The tank water is used mainly for irrigation. Almost all the farmers (98%) reported that after the development of the tanks they were using the tank water to a great extent for irrigating their paddy fields. However, only 79% reported that they did so before the development of the tanks. The other purposes for which the tank water was used were for bathing and washing clothes, and for rearing livestock. All the farmers reported that they used the tank water for the above purposes at least to some extent. The percentage of farmers reporting the use of tank water to a great extent for livestock rearing increased from 12% to 28%, and for bathing and washing the increase was from 32% to 55%. Also, fish fingerlings were introduced into three of the tanks studied to stimulate the organised rearing of tank fish in minor irrigation schemes under the IFSP-NAQDA aquaculture programme and the villagers benefited immensely from this activity.

Overall, development was expected to increase their capacity of the tanks and consequently resulted in an expansion of the irrigable command areas under all these developed tanks. More water was available mainly during the Maha season, but also in the Yala season for a number of tanks.

The data presented in Table 24 as given by the officers responsible for the development of the tanks reveal that the total capacity of the 16 developed tanks was increased from 179 to 281 ha/m (ha in metres, expresses the water carrying capacity of the tank) was expected to increase from 299 ha before development to 442 ha after development during the Maha sea

son. The corresponding increase in the Yala season was expected to be from 16 to 44 ha.

Table 24: Irrigable command areas before and after tank development

	Before Development			After Development		
	Tank capacity (ha. m)	Irrigable area in Maha (ha)	Irrigable area in Yala (ha)	Tank capacity (ha. m)	Irrigable area in Maha (ha)	Irrigable area in Yala (ha)
Minimum	3	0	0	8	10	0
Maximum	40	50	12	58	76	24
Total	179	299	16	281	442	44
Mean	11.2	18.7	1.0	17.5	27.6	2.7

Only paddy was cultivated in the command areas of all the 16 tanks both before and after development. It is worth noting that no farmer reported cultivating any other field crops. In order to determine the real impact of tank development on cultivation, the actual extent of paddy land cultivated, and the yields and incomes obtained in all the 16 tanks during both the Maha and Yala seasons just before and just after development were obtained from the office bearers of the respective FOs (Table 25).

Before development of the tanks, paddy cultivation was undertaken during the Maha season in all but one of the 16 tanks studied and only under one tank during the Yala season. After development, paddy was cultivated under all these developed tanks during the Maha season and only under three tanks during the Yala season.

The total extent of paddy land cultivated in Maha under the 16 tanks studied was 261 ha and the area cultivated per tank ranged from >0.1 to 40 ha before development. After development, however, the total paddy land cultivated increased to 407 ha and the area cultivated per tank ranged from 10 ha to 76 ha. As for the Yala season, the total extent of paddy land cultivated increased from 12 ha to 33 ha. Thus, a substantial increase in the extent of paddy land cultivated was effected in the Maha season due to the development of the tanks.

The sample data given in Table 26 reveal that the mean extent of paddy land cultivated per farmer during the Maha season increased only marginally from 0.92 ha before development to 0.94 ha after development. The corresponding values for the Yala season were 0.05 ha and 0.06 ha. Thus the overall increase in the paddy land cultivated after development was more due to additional farmers undertaking cultivation rather than the already cultivating farmers increasing their extents of cultivation.
According to the FO office bearers, during the Maha season the mean paddy yields obtained ranged from 2,500 kg to 4100 kg per ha with a mean of 3,052 kg per ha before development and from 2,800 to 5,150 kg per ha with a mean of 3,399 kg after development for all 16 tanks studied. During the Yala season the mean paddy yield obtained under one tank cultivated was 2,500 kg per ha and the corresponding mean paddy yield obtained after tank development was 3,300 kg with a range of 3,050 to 4,100 kg per ha amongst the three tanks under which paddy cultivation was undertaken during the Yala season.

At the same time, data collected from the sample farmers (Table 26) reveal that the mean yield of paddy increased from 2,761 kg per ha before development to 3,490 kg after development during the Maha season. The corresponding values for the Yala season were 4,083 kg and 4,691 kg per ha.

According to the aggregate data provided by the FO office bearers, of all the 16 tanks studied (Table 25), the mean net income earned through paddy cultivation in Maha increased from Rs.10,544 per ha before development to Rs. 20,392 after development. The corresponding values for the Yala season were Rs. 12,500. and Rs. 25,497 per ha. At the

same time, the data collected from the sample farmers (Table 26) show that the mean net income from paddy cultivation increased from Rs. 6,283 per ha before development to Rs. 22,861 ha after development during the Maha season. The corresponding values for the Yala season were Rs. 5,442 to Rs. 15,073 per ha. In fact, some farmers reported incurring losses of up to Rs. 20,000 before development and up to Rs. 5,200 per ha after development during the Maha season.

On the whole, although it is too early to make assessments as only one year has passed after development, the impact of the development of the tanks on the incomes earned through paddy cultivation appears to be very significant. According to the data collected from the FO office bearers, the mean net income earned in Rs. per ha is higher in Yala than in Maha both before and after development and the mean net income had almost doubled after the development of the tanks. However, the data collected from the sample of individual farmers reveal that the mean net income earned in Rs. per ha is higher in Maha than in Yala both before and after development and it has increased almost three times after the development of the tanks. This difference may be due to lower records given by farmers due to their 'hedging' attitude, but also due to the comparatively small acreage cultivated during Yala compared to the comparatively higher yield an hence, higher return per ha.

The impact of tank development on incomes earned by farmers had been two fold:

i) Higher extents of paddy cultivated due to increased availability of irrigation water, and

ii) Intensification of cultivation through greater investments on other agri-inputs such as seed paddy, fertiliser, pesticides and weedicides due to the assured supply of irrigation water resulting in higher yields and net incomes per ha.

Table 25: Paddy cultivation under the 16 tanks studied: Extent and income (data provided by the FO office bearers)

Item	**Before Development**				**After Development**			
	Minimum	Maximum	Total for all 16 tanks surveyed	Mean	Minimum	Maximum	Total for all 16 tanks surveyed	Mean
Extent of paddy cultivated in Maha (ha)	0	40	261	16.3	10	76	407	25.4
Extent of paddy cultivated in Yala (ha)	0	12	12	0.75	0	24	33	2.1
Extent of paddy harvested in Maha (ha)	0	40	246	15.4	10	76	383	23.9
Extent of paddy harvested in Yala (ha)	0	12	12	0.75	0	24	33	2.1
Yield of paddy in Maha (kg/ha)	2,500	4,100	796,700	3,052	2,800	5,150	1,383,525	3,399
Yield of paddy in Yala (kg/ha)	2,500	2,500	30,000	2,500	3,050	4,100	108,900	3,300
Gross income in Maha (Rs/ha)	2500	44,000	8,228,400	31,526	36,000	58,800	17,373,625	42,687
Gross income in Yala (Rs/ha)	27,500	27,500	330,000	27,500	39,000	57,400	1,436,200	43,527
Cost in Maha (Rs/ha)	12,500	27,500	5,476,500	20,983	15,000	31,250	9,074,000	22,295
Cost in Yala (Rs/ha)	15,000	15,000	180,000	15,000	15,000	27,500	595,000	18,030
Net income in Maha (Rs/ha)	1,375	23,000	2,751,900	10,544	14,000	34,000	8,299,625	20,392
Net income in Yala (Rs/ha)	12,500	12,500	150,000	12,500	24,000	32,400	841,200	25,497

Table 26: Paddy cultivation under the 6 sampled tanks: Extents and incomes (Data provided by the sample farmers)

Item	**Before Development**				**After Development**			
	Minimum	Maximum	Total for all 16 tanks surveyed	Mean	Minimum	Maximum	Total for all 16 tanks surveyed	Mean
Extent of paddy cultivated in Maha (ha)	0	3.60	89	0.9	0	4	91	1
Extent of paddy cultivated in Yala (ha)	0	2.00	5	0.05	0	2	5	0.06
Extent of paddy harvested in Maha (ha)	0	3.60	87	0.9	0	3	91	1
Extent of paddy harvested in Yala (ha)	0	2.00	5	0.05	0	2	5	0.06
Yield of paddy in Maha (kg/ha)	750	6,640	246,658	2,761	1,250	8,333	318,727	3490
Yield of paddy in Yala (kg/ha)	2,045	5,175	20,418	4,083	2,437	6,037	25,332	4,691
Gross income in Maha (Rs/ha)	6,000	66,400	2,133,410	23,8871	17,500	116,667	4,203,885	46,031
Gross income in Yala (Rs/ha)	16,360	51,750	169,209	34,710	24,375	72,450	261,393	48,406
Cost in Maha (Rs/ha)	2,000	51,166	1,572,000	17,594	3,000	65,000	2,116,000	23,171
Cost in Yala (Rs/ha)	10,000	37,500	142,000	28,400	16,667	42,500	180,000	33,333
Net income in Maha (Rs/ha)	-20,000	42,500	561,410	6,283	-5,200	66,667	2,087,885	22,861
Net income in Yala (Rs/ha)	-8,640	18,867	27,209	5,442	-625	34,950	81,393	15,073

8.3 Food Production and Household Consumption

The majority of FO office bearers reported that the development of the minor tanks has contributed to a great extent towards household food security. The data regarding the sample farmers provided in Table 27 show that consequent to increased paddy production after tank development, although the average amount of paddy consumed per family had increased, the amount consumed as a percentage of production had decreased resulting in higher incomes earned by the sale of the balance paddy.

Table 27: Paddy production and household consumption among the sample farm families (N=97)

	Before development		After development	
	Maha	Yala	Maha	Yala
Mean production (kg)	2,543	210	3,286	261
Mean consumption(kg)	823	65	862	73
Consumption / production (%)	32.4	30.9	26.2	28.0

8.4 Benefit – Cost Analysis

The benefit-cost analysis for each minor tank was done using a standard software package. Total cost of the project, cultivation cost before development, expected cultivation cost after development, production before development, expected production after development, market price, and irrigable area in Maha and in Yala seasons before and after development, current rate of interest were the basic information needed as input for the package. Some of the information was based on assumptions. The analysis was first done during the preliminary investigation. It was verified during feasibility studies with crosschecked data.

Benefit – cost analysis before development
The following assumptions were made:

i) Total cost of the project did not violate the estimate and development was to be completed within the scheduled period (+/- one year).

ii) Cultivation cost after implementation was predicted regarding the factors influencing it; availability of inputs and agri-support services, possible price escalations, possible reduction in expenditures by development were considered.

iii) Production before development: Actually this value had to be derived from the statistics of the past four years. Average of annual weighted average was the most realistic value. During the awareness meetings, this value was estimated through discussions. Statistics of productivity of each farmer's allotment was not available with the DOs.

iv) Production after development: It was assumed concerning the water availability with 75% probability rainfall, availability of inputs, agri-support services and due support from the staff of respective agencies. It was also assumed that the farmers were trained in water management techniques and adoption of modern farm practices.

v) Market price: The market price for paddy was highly unpredictable as it was influenced by many factors like seasons (Maha and Yala), unexpected rain or drought, import of rice, conflict etc. Anyhow, it was assumed that no drastic decline occurred after development of the tanks.

vi) Irrigable area: The catchment was measured according to the topography. The cascade relationship and effects of development activities affecting the inflow was analysed and assessed. Overall inflow to the tank with 75% probability rainfall was

calculated. According to the standard Maha and Yala water demand, the possible irrigable area was estimated. Issues of land ownership of present cultivators were not considered.

Benefit – cost analysis after development:
The analysis was done again for the completed tanks with the actual data collected from the staff involved in the tank development, FO office bearers and from the sample of farmers through the questionnaire.

Table 28 reveals that the actual benefit-cost ratios ranged from 0.26 to 3.69. However, the majority of the tanks (10 out of the 16 tanks developed) had a benefit-cost ratio of more than one. In some cases the ratios were less than one indicating lower benefits from the development. This was largely due to the following reasons:

i) Escalation in total project cost:
   (a) The project could not be completed within the scheduled implementation period
   (b) Farmers' demand for additional structures
   (c) Limited results of work done through FFW, which had to be partly re-done by machinery
   (d) Top-up cash of Rs. 50 was selectively introduced to encourage manual labour in the FFW programme.

ii) Failed assumptions:
   (a) Actual yield was reported to be less than the expected values for various reasons
   (b) Price for paddy was highly fluctuating
   (c) Additional expected acreage could not be achieved after development fully
   (d) Factors like natural disasters, security situation, lack of land ownership deterred farmers from successful cultivation
   (e) Cultivation cost escalated beyond the assumed value.

Table 28: Benefit-cost ratios: Estimated and actual

Tank	**Benefit / Cost Ratio**		
	PIR	FR	Actual
Ehalawewa	1.13	-	1.03
Karagahawewa	1.19	-	2.38
Madugahawewa	2.04	2.11	0.52
Behethkawawewa	4.00	4.00	1.24
Galkadawela – Kumbukwewa	1.48	1.08	0.34
Rotawewa – Thimbiriwewa	-	1.69	1.77
Puthuvelikulam	1.05	1.01	0.26
Sinnamoddaiyandikulam	1.08	1.88	1.85
Pulavankulam	1.25	1.17	2.16
Vembadithoddamkulam	1.41	1.36	1.31
Solaipallakulam	1.09	1.95	1.55
Ithikulam	1.28	-	1.21
Keerandankulam	1.10	3.91	3.69
Paranamadawachchiwewa	2.16	1.33	0.79
Periamoddaiyandikulam	1.54	-	0.55
Palaimunaikulam	2.80	2.74	0.57
Average	1.64	2.02	1.33

Limitations of the analysis:
Statistics needed to calculate weighted average were not available and, therefore, either assumed or managed with minimum available data collected through discussions with farmers. The non-quantifiable benefits through the development of tanks were not included,

such as increment in the rearing of livestock, possibility of inland fishing with the additional water available between November and June, use of water for domestic purposes especially during the dry season and the contribution to ground water storage and control of flood damage. It is felt that a factor of 1.3 would be adequate for the benefit-cost calculation.

9.0 Conclusions and Recommendations

Based largely on the major findings of the study and supplemented by the literature reviewed and the experience of the researchers, the following conclusions are drawn and recommendations made for improving the tank development process and to reap maximum benefits from this activity:

1. The majority of farmers were cultivating under one tank only. They were cultivating only paddy but no other field crops. The land use pattern did not change even after development. In most cases they were residing in the nearby village and were cultivating by themselves without using much hired labour.

2. The criteria for the selection of tanks for development should be clearly laid down at the beginning and strictly followed. The vulnerability – poverty level of the beneficiary farmers should be laid down as one of the main criteria for such selection.

3. The land ownership rights should be confirmed well in advance to avoid the development of tanks with encroached command area. The cascade approach as adopted by IFSP facilitated the selection of tanks for development.

4. The planning stage in the development process had taken too much time and consequently the number of tanks actually developed was less than what was planned. Although many factors were responsible for the delay, streamlining of the initial planning and documentation would help avoid such delays.

5. The farmers were consulted from the beginning and they contributed in a big way in the whole development process, from planning to implementation. The farmers participated actively in decision-making and by contributing labour through the FFW programme, which was continuously adjusted to suit the farmer needs.

6. Female participation in the development work varied significantly among the schemes. The Sinhalese women, as against the Tamil and Muslim women, participated even more than the men in the earthwork.

7. In some cases sole reliance on FFW programme resulted in undue delays as well as poor quality work. Thus, while encouraging farmer participation through FFW, it is recommended that suitable machinery be used wherever necessary.

8. In general the planning documents viz. PIR and FR were of satisfactory quality. These reports should, however, be improved by using realistic values and time frames, and by incorporating the mode of quality control based on proper operation and flood studies. Well-organised meetings with the majority of farmers under each tank would be useful in collecting realistic data at the preliminary and detailed investigation stages.

9. The IFSP engineers and the technical officers and the farmers were generally satisfied with the quality of the irrigation structures constructed or repaired under the programme. The quality of the bunds, however, varied very much from tank to tank. The sluices in general were leaking and in some cases the sluice rods were missing. Quality control needs to be introduced in construction work, especially in material selection. The missing sluice rods should be fitted and brims have to be constructed at the edges of the bunds to avoid erosion.

10. The irrigation structures of the developed tanks were not maintained properly. Runners and anthills were commonly observed on the bunds, which were generally overgrown with shrubs. Also, the channels were not cleared from overgrown vegetation. In general, the farmers did not seem to be interested in maintaining the channels.

11. The FOs were not strong enough to fulfil the expectations regarding the operation and maintenance of the tanks. Some FOs had profit-oriented leadership with little interest in the welfare of the farming community.

12. Whatever training programmes conducted by the IFSP to compliment DoAD were not adequate. The FOs should, therefore, be further motivated and trained to attend to the following maintenance activities: usage of and fine repairs to sluices, uprooting of tree trunks and removal of anthills from the bunds, clearing of the spillway and approach channel, and maintenance of the main irrigation channels.

13. The DoAD is not in a position to support the operation and maintenance of all the minor tanks in the district. The DoAD has to rely heavily on the FOs to implement the operation and maintenance activities specified in the FRs. It is recommended that the IFSP support the maintenance activities of the tanks developed by the project for at least one year.

14. The situation with respect to the agri-support services was rather poor both before and even after the development of the tanks thus preventing the reaping of maximum benefits from the investment on minor tank development. The government, non-government and private agencies should be organised properly to provide these much needed services such as agricultural credit, agri-inputs and marketing to the farmers. The FOs could play a major role in linking these service agencies to the farmers.

15. The agricultural extension service should play a major role in encouraging the farmers to diversify their cropping pattern by growing other field crops at least during the Yala season when there is shortage of irrigation water. The farmers should also be advised on proper on-farm water management methods.

16. Even though the employment of the FFW programme resulted in extended time periods and higher costs, the overall cost of tank development under this programme is low compared to the other minor tank development projects implemented in the district. The GTZ-IFSP contributed 72.5% of the total costs and the farmer contribution was valued at 20.4%. The farmers had, thus, contributed significantly to the development work.

17. A substantial increase in the extent of paddy land cultivated was effected in the Maha season through the development of the tanks. This was largely due to additional farmers undertaking cultivation rather than the already existing farmers increasing their extents of cultivation.

18. Although it is too early to make assessments as only one year had passed after development of the tanks, on the whole, its impact on the incomes earned through paddy cultivation is very significant. This had been achieved through both increased extents of cultivation as well as through higher net incomes per ha.

19. The benefit-cost ratios were generally high for most cases although in some cases the ratios were less than one. It should, however, be noted that the benefits from activities other than paddy cultivation namely livestock rearing, inland fishing, domestic usage and contribution to local ground water source were not considered in the benefit-cost analysis.

20. Finally it could be concluded that the farmers had definitely gained through water availability due to the development of the minor tanks although this observation is not equally applicable to all the tanks developed.

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Abbreviations

ACF	Action contre la Faim (Action against Hunger)
ADO	Agricultural Development Officer
AI	Agricultural Instructor
CBO	Community Based Organisation
CM	Community Mobiliser/Community Mobilisation
CFW	Cash-for-Work
DO	Divisional Officer / Development Officer
DoA	Department of Agriculture
DOAD	Department of Agrarian Development
DS	Divisional Secretariat
FFW	Food for Work
FO	Farmer Organisation
FR	Feasibility Report
GIS	Geographical Information System
GN	Grama Niladari
GO	Government Organisation
GPS	Global Positioning System
GS	Grama Sewaka (GS Division is the smallest administrative unit, Grama Sewaka is an officially appointed village head person)
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit, GmbH
IFSP	Integrated Food Security Programme Trincomalee
MoED	Ministry of Eastern Development and Muslim Religious Affairs
MPCS	Multi Purpose Cooperative Society
NEIAP	North Eastern Irrigated Agriculture Project
NGO	Non-Government Organisation
PIR	Preliminary Investigation Report
PNA	Participatory Needs Assessment
TO	Technical Officer
TOR	Terms of Reference
WFP	World Food Programme