Thai-New Zealand

Village Based

Water Resource Development Project

PROJECT EVALUATION REVIEW

Ministry of Foreign Affairs

November 1984

CONTENTS

INTRODUCTION

Pursuant to article 6 of the Memorandum of Understanding, a review of the Thai-NZ Village-based Water Resource Development Project (the "Chaiyaphum Water Project") was carried out from 28 October to 9 November 1984. The terms of Reference of the Review are attached as Appendix I.

Members of the Review Mission were:

New Zealand Participants

Dr Ken Graham, Assistant Director, Planning and Evaluation, External Aid Division, Ministry of Foreign Affairs, Wellington

Dr Hugh Thorpe, Engineering Scientist, Hydrology Centre, Ministry of Works and Development, Christchurch

Dr John McKinnon, Lecturer, Department of Geography, Victoria University, Wellington with the assistance of

Ajarn Suriya Smutkupt, Anthropologist, Khon Kaen University

Thai Participants

Mr Amorn Anantachai, Director, Technical Services and Planning Division, Department Local Administration (LAD)

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Mr Mehta Ratanachan, Deputy Governor, Chaiyaphum Province

The New Zealand team met in Bangkok initially with the New Zealand Embassy, LAD/DTEC, PM Office Water Resource Section, and Fisheries Department. In Chaiyaphum the NZ/Thai team visited nine completed weir sites and one proposed site, and inspected one storage tank. It met there with the Governor of Chaiyaphum, Local Administration Department (LAD) Planning Section, Gor Sor Chor Office (Job Creation Scheme) of the PM's Office, Fisheries Department, Royal Irrigation Department

BACKGROUND OF PROJECT

The Chaiyaphum Water Project was originally suggested by the Thai Government to a New Zealand Aid Mission in 1978, and is based on a Project Description Form prepared in November 1980 by a New Zealand Planning Mission. The Project is governed by a Memorandum of Understanding, signed in February 1983 and covering a three-year period December 1982 to December 1985. The project was commissioned by the New Zealand Government to Murray-North International Ltd, Hamilton, and Project personnel arrived in April 1983. The Project Team has three New Zealand personnel: Brian Worboys was Project Director from April 1983 to July 1984 and has been replaced by Alister Lawrence. Warren Wheeler is Design Engineer and Ken Simms is Construction Engineer.

The Review Mission warmly commends the New Zealand Project Team personnel and their spouses for their work to date and their continuing commitment to the cause of economic and social development in North east Thailand. The New Zealand team and families comprise nine of the total "farang" population of eleven in Chaiyaphum, and they carry a high mana for their country.

SECTION 1: DEVELOPMENTAL IMPACT TO DATE DECEMBER 1982 - NOVEMBER 1984

Review of Work Completed

To date, the construction activity of the Team has been as follows:

	Weirs	Tanks
1982/83 construction season	3	4
1983/84 construction season	15	10
Total completed	18	14
Proposed for 1984/85	7	19

The MOU requires the Project to present quarterly reports on i financial developments; and ii construction progress of the project. This has been observed. The Team has also been required to prepare project reports on completion of each project, setting out an impact assessment, working drawings, operation and maintenance manuals, pre and post-project photographs and a statement of construction costs. This has largely been overlooked and the Mission recommends that post-project reports be completed before 31 March 1985 for each of the 18 weirs constructed to date. The Mission recognises that the lack of an Extension Worker thwarts any considered socio-economic impact assessments, but the lack of even a rudimentary assessment such as resources might allow for these reports has to be recognised as a shortcoming of the Project to date. The Mission notes that drafts along these lines for several projects have recently been prepared.

Assessment of Work Completed

a Physical Integrity of Weirs (TOR 2)

The structural design of weirs for the conditions found in Chaiyaphum is relatively simple. Satisfying the functional requirements in terms of appropriate design, however, is not easy. The basic requirements are to store water, to make irrigation easier for the farmer and to pass design floods without risking the integrity of the structure.

The design of the weirs to date has been appropriately conservative and there is no reason to doubt their physical integrity. The design has evolved over the last six years and must be considered to be appropriate to engineering standards.

There remains, however, a basic conflict between the expectation of the farmer who wishes to flood-irrigate the paddy land without expenditure of energy, and the weir designer who wishes to allow flood flows to pass over the weir. It was noted in all cases that the farmers interviewed considered that the weirs were too low for flood irrigation of paddy fields. This conflict could be resolved by skilled management of a gated weir or temporary stoplogs, but these possibilities encounter problems. The farmers are clearly not disposed to accept what they regard as improvised and inadequate devices to raise the water level when in their view that objective can be achieved through a permanent raising of the crest. Gated weirs would require additional cost and considerable training in weir management which is unlikely to be successful in the short term.

The alternative design philosophy would be to set the weir crest high to satisfy the farmer and design for structural stability under these conditions. The effect would be to force the larger flood flows across country (this occurs in some years now). The risk is then that the river would cut a new channel or cause other erosion at a point downstream which would leave the structure high and dry. Some means of restoring the river to the original channel would then have to be found. The increased risks inherent in this approach together with the extra maintenance work on the part of the farmers, are factors that would need to be carefully weighed-up. A judgment would need to be made specific to each site and with due regard to the considerations outlined on page 10 below.

Moderate earthwork damage was observed on one weir, but this will be readily rectified in the coming season and steps taken to prevent any recurrence. Other earthwork damage was minor and will be routinely repaired.

b Developmental Impact (TOR 1 i)

With only one monsoon season since the construction of most of the weirs, it is too early for a considered judgment to be possible of the true developmental impact of the project, particularly the weirs. The Thai rice farmer has shown a strongly conservative, not to say sceptical, attitude towards the utilisation of reservoir water. Experience with the NZ/Khon Kaen University Water Resource Project (1978/79) shows that it can take at least five years before farmers will rely on the availability of the water and thus realise its full potential. Given that a change to established practice is risking their subsistence-based livelihood, such an attitude is not surprising and cannot be changed easily through water-management training. It may take as many years with the Chaiyaphum Project before the developmental impact of each weir/reservoir can be fully assessed.

It has to be acknowledged, however, as the first major conclusion of the Review Mission, that the Project, as at this early stage, shows little demonstrable immediate developmental benefit. In drawing this conclusion the Mission assessed each of the developmental objectives identified in the MOU (article 2a). The assessments are as follows.

i Volume of Water

The Project has fallen short of attaining the first of the two primary development objectives in the MOU, ie to develop year-round village-based water resources of 1000m^3 per family; 100,000m^3 for an average village. The information gleaned by the Mission shows the following:

Sites Visited	Volume Stored Water (m^3)	Number of Villages	Volume per Village	Number of Families*	Volume per Family
Ban Non Wan Plai	187,500	2	94,000	158	-
Ban Non Song Puai	540,000	4	135,000	na	-
Ban Thakhampae	40,000	2	20,000	na	-
Ban Prong Klong	26,000	1	26,000	138	188
Ban Jok	8,000	1	8,000	4	2,000
Ban Fay Nai Khien	25,000	2	12,500	20	1,250
Ban Lat Nua	25,000	1	25,000	5	5,000
Ban Kut Yang	.20,000	1	20,000	5	6,000
Ban Song Khaen	10,000	1	10,000	na	na
	881,000	15	58,766 (ave)		
MOU Recommendation			100,000	(100)	(1,000)

*Direct beneficiaries, ie those whose fields are irrigated. This is a different concept from that of total number of households in the vicinity who might benefit from the reservoir in a broader sense eg access to water for domestic purposes. This latter concept corresponds to the MOU criterion of number of households.

The above sample is regarded by the Project Team as representative of the 18 weirs completed.

In the Mission's opinion, the above data reveals the impracticality of the original volume targets (which were taken from the 1980 AIT Report) rather than any inadequacies in weir construction under the Project. Each weir is surveyed site-specific, and for reasons explored below (para 20) each represents the optimal water level for that site. There is, therefore, no shortcoming of the Project identified here.

ii Usage of Water

With regard to the five uses of water identified in the MOU, the following are the Mission's observations:

Crop Irrigation

Initially the Mission sought to establish a pre-project/post-project differential in the irrigated land area for each weir site. In fact, however, there is very little land area - only a few rai* - currently irrigated directly by the reservoirs formed by the weirs as at November 1984 - the end of the monsoon season. The water area has in most cases simply backed up along the river channel. Even with the larger weirs, the flooded areas are very limited. In these cases it is extremely difficult to distinguish the area served by the reservoir from that served by other water channels. Neither does aerial photography or survey maps assist, given the flatness of the land and consequently wide contour markings. The only practical method of water distribution into paddy fields is by gravity - manual pumps do not transfer a sufficient volume of water and motorised pumps are generally uneconomic. In all but one minor case, no small-scale canal distribution system has been dug. One reason for this is that canals of even 1m width constitute a significant reduction in individual cultivable land area and thus cause property-right difficulties. Another is that farmers display a reluctance to undertake unpaid labour for even such self-interested projects in the expectation that the Government's Job Creation Scheme (Gor Sor Chor) should offer remuneration for this work. The conclusion is, therefore, that there has been only a very minimal increase in irrigated land as a result of the 18 weirs and reservoirs completed to date.

This is not to say that rice production has not benefitted in other ways. First, the weirs extend the rice-irrigation season by several weeks to a month (depending on the early monsoon rain pattern) at the beginning of the season, and by one month at the end. The rice-irrigation season is thus extended from the normal monsoonal rain pattern of 5 months (May to September) to perhaps 7 months. Rice planted in close proximity to the weirs is likely to reflect the more even supply of water by providing higher yields. Double cropping of rice is unlikely. The capture of water at the start, and, in the event of sound cooperative arrangements among farmers (not a constant factor), all rice growers within a village could benefit. Beyond this it is not possible to make

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*1 rai = 0.16 hectare

quantitative comparisons of any improvements in single-crop rice yields for pre-project and post-project periods. Given the unrealiability of precipitation and the fact that most farmers impound run-off in any event, the net impact of a weir is difficult to isolate. Although records of rice yields down to village and farm level are supposed to be lodged with the District Offices, it is unlikely that they could be used to evaluate impact accurately in a conventional quantitative manner, and that comparisons could be made with any confidence.

It needs to be emphasised that perhaps the most significant shortcoming of the project to date has been the lack of development of the potential irrigated land made available by construction of weirs/reservoirs and the failure to maximise storage potential. At most sites visited, farmers translated their disappointment into a demand that the crest level of the weirs be permanently raised by up to 1 metre so that the higher water level of the reservoir would allow gravity irrigation of adjacent paddies Such a demand encounters two serious engineering and hydrological problems. Unless the weir is considerably widened (at greater cost and with land ownership problems), a permanently higher crest would increase the risk of weir collapse to a professionally unacceptable level - a failure perhaps after a peak monsoonal flood every ten years or so. Secondly, a higher crest is likely to cause river re-routing thus rendering the weir useless. Such refined apprehensions appear to be lost on the farmers, accustomed to seeing traditional earthwork dams wash out. There is also the social and "political" problem of a higher water level flooding the paddies adjacent to the weir and rendering them uncultivable. There appeared to be a definite element of personal interest vested in the individual communications often conveyed to the team during site visits in a considerable clamour. Landowners adjacent to sites wanted the water level raised to irrigate their paddies: those further away desired a higher level in full knowledge that their neighbours' land would be flooded. In a sense all information gathered was biased in this manner. The inescapable conclusion is that weir construction has prompted unrealised expectations, and if due regard is given to the social aspects of development, this must be recognised as a serious problem requiring resolution. Both the Thai and New Zealand team members agree that the professional standards of the New Zealand engineering team must not be compromised, but a solution must be found at the social/political level.

It is evident, from the three weirs constructed in 1982/83, that the availability of water during the dry season allows better cultivation of vegetables - cabbage, cucumber, herbs, garlic, chilli, watermelons, maize - but again this could not be quantified.

Crop Processing

Similarly, the Mission saw evidence that creation of a more reliable water storage season made more water available for the retting of kenaf (ie. soaking of kenaf to separate the fibrous bark from the pith for manufacture of sacking). This provides one of the few cash crops for North eastern farmers and is of definite economic benefit. Less retting was done this year than previous years because the 1983 price was low, but the benefit of the extended season is clearly evident. There is an associated problem of water contamination, which will require better community planning and water management.

Livestock

The Mission observed little obvious use of reservoir water by livestock, site visits occuring in the middle part of the day. It was informed that the water is used by water buffalo for wallowing and this is important to the well-being and indeed survival of the animal which is a vital part of village and farm life. The team was also informed that the reservoir water is used (carried by bucket) to water pigs and beef cattle (there is no dairying associated with these sites). Livestock is of relatively less importance than rice cultivation although is still significant: - 22 percent of all households own pigs, 15 percent cattle and 54 percent buffalo. Ducks were observed at several sites. Poultry is abundant in the villages but requires little water. Overall, it would appear that the water is being used by livestock and in the absence of other good watering holes, this is of significant though not major economic benefit.

Fish Farming

Fish, primarily Common Carp and Chinese Carp, occur spontaneously wherever water is available in areas down to small table-sized ponds. Ponds are also stocked by the Government Fisheries Department of the Thai MAF. Natural fish were present in each of the nine reservoirs visited, but a hitherto undiagnosed disease in the recent wet season had prevented widespread consumption.

Only one of the nine reservoirs visited has been stocked with fish this wet season, which in the Mission's view is reasonable in the circumstances.

Fish breeding is carried out at fishery stations in Khon Kaen and Korat. The Khon Kaen Station breeds about 10 million fingerlings each year for Kohn Kaen and Chaiyaphum Provinces and about 3 million of these are made available free of charge to Chaiyaphum. Chaiyaphum Fisheries Office undertakes a survey of ponds and reservoirs each year and usually estimates a demand for about 8 to 10 million fingerlings, less than half of which are supplied. The constraint appears to be at the Khon Kaen end, both budgetary (breeding cost is $0.2, ie NZ$0.02 per 5cm fingerling), and physical (tank and personnel resources). Priority is given to larger natural ponds in Chaiyaphum Province with year-round water so that the fish have more than one season to develop. The fast growing Common Carp (2 kg at 6 months which is a marketable and consumable size) can be reared in single season reservoirs, but the Mission does not expect that any priority should necessarily have been given to the New Zealand reservoirs. To date, however, the developmental benefit in this area has been minimal.

Domestic Use

Domestic use of reservoir water is confined primarily to household washing. Villagers come to bathe and carry water back to houses close by. Drinking water is normally gathered off roofs into "ong" jars or drawn from wells. There is a general shortage of potable water and the 11 ferro-cement storage tanks built by the project team are serving a useful purpose. The $44m^3$ tanks, however, are not appropriate for household use, even on a collective basis, given sensitive water property and management issues that arise. They are better suited to institutions such as schools and temples (wats) and it appeared that the tanks built so far were serving this purpose. In the dry season, it is not unknown for reservoir water to be directly consumed, with serious health problems arising as a result.

The Mission noted that the reservoirs often act as an 'oasis' focal point for village social activity at the day's end. This in itself is of significant benefit in social developmental terms, not least in the dry North east region where water assumes special symbolic importance, and more particularly Chaiyaphum Province which records the least rainfall of any of the 16 provinces of the North-east.

iii General Conclusion

From the above evidence, the general conclusion of the Mission must be that to date, while there is evidence of isolated and limited areas of direct developmental

benefit, the 18 weirs/reservoirs completed have provided very limited economic development to Chaiyaphum Province. In particularly the main intended economic benefit - an increase in irrigated land area for rice cultivation - has not been realised. It is, however, very early days yet, and it is clear that potential benefit exists for the use of reservoir water. Even so, the scale of the project is so limited (a total stored water volume so far of 900,000m^3 for a Province of nearly 1 million people) that its real value must be measured in terms of its success or otherwise as 'technological quality' models which the Thai construction system might use on a widespread scale.

c Transfer of Technology

The second primary objective of the MOU - the transfer of technology - is more problematical. There is no doubt an informal transfer of technology insofar as those with whom the Project Team is directly cooperating - district level and village level officials, private contractors and village labourers - are gaining some knowledge of the techniques of weir construction. But with the possible exception of the contractors, such knowledge and skills will be of no lasting personal professional benefit. Few within the officialdom or village labour force are likely to be involved in weir construction in any permanent, continuing, long-term role. The central mechanism for a genuine achievement of this objective is a proper counterpart in-line agency, and it is to such an agency that article 2(b) of the MOU refers.

i Counterpart Agency

It is apparent that the Project is not working in a counterpart role within the Thai administrative system. The main in-line department for water resource development - the RID - has in the past focussed on large-scale dam construction at national and regional level. This is reflected in its administrative structure: its professionally-qualified staff are not stationed at provincial level (the Chaiyaphum-office has no engineer, but 15 technicians trained at two year diploma level). The RID is "moving down-scale": in the past six years it has built 39 weirs in what it calls the "small-scale" range (ie NZ$80,000 - 300,000, average storage capacity of 50,000m^3), and has plans for 14 more of this size for 1984/85. But this is effectively the next scale up from that of the New Zealand Project, which focuses on weirs in the under NZ$80,000, average size 30,000-40,000m^3 range. There is no permanent in-line agency working at this size. The nominated agency under the Project, ARD, has primary responsibility for the development of the rural

transportation system - roads and bridges, etc. Only 5 percent of its provincial budget in Chaiyaphum was devoted to water resources and that amount was used last year for projects other than weir construction. It has built 13 weirs in the past 15 years in Chaiyaphum, the last construction being completed in the 1983/84 construction season. With no weirs planned for 1984/85 or thereafter, it is logical to infer that the New Zealand team is encouraging ARD to go out of weir construction, which is the very antithesis of the Project's objective. The ARD provincial office has one engineer who is the present operational counterpart to the NZ team, and a water resources section of six technical staff. The Thai and New Zealand counterparts have met only twice in the past 12 months, and have virtually no significant operational coordination. This is noted not as a criticism of either the Thai or New Zealand personnel concerned, but as a shortcoming of the institutional arrangement.

At the smallest end of the scale, the Job Creation Scheme of the PM's Office (Gor Sor Chor), weir construction is proceeding apace, with 47 small weirs completed in the Chaiyaphum Province during the last construction season alone. With a national failure rate through construction collapse of over 80 percent, however, it is evident that a transfer of technology at this end of the scale would be highly valuable, and the Mission welcomes the increasing involvement of the New Zealand Project Team in what is effectively consultancy assistance to Gor Sor Chor in structural design. Yet the problem remains of identifying a permanent in-line agency for small-scale, village-based weir construction: the Gor Sor Chor Scheme, while under the Department of Community Development, is often administered at the district level by LAD officials and is unlikely ever to have a nucleus of permanent staff qualified in civil engineering.

The situation, therefore, is effectively that of a three-tiered administrative arrangement with RID, New Zealand and Gor Sor Chor each maintaining an in-line construction function at identifiably different (though overlapping) scales of weir construction, and the nominated counterpart agency in Chaiyaphum out of the business. This arrangement is a clear shortcoming of the Project.

ii Manuals (TOR 3)

Manuals on weir construction (though not based on the current NZ design) have already been produced by KKU and by the US Peace Corps, and therefore it is

considered that preparation of further manuals should be given a lower priority by the New Zealand team. With respect to an Operations and Maintenance manual, the Mission was informed that RID have prepared a short manual on this topic covering its small scale development projects. The Mission was informed however that not even officials were reading manuals.

iii Villager Involvement/Commitment (TOR 5)

Complaints about crest height indicate that villagers are not sufficiently involved in the planning process. Their expectations have not been wholly met by the New Zealand team which has assumed that projects passed through the normal channels have been fully discussed within the Thai system. This is not always the case.

Apart from the first few weirs built by village labour paid to do the job, most structures have been constructed by commercial contractors. Villager participation has been kept at a level decided by contractors anxious to keep costs down. This has tended to diminish the villagers' sense of ownership and responsibility for maintenance. None of the weirs has yet been formally handed over to the communities in the vicinity. There is a widely recognised need to do so, but there is some uncertainty over precisely what procedures the Thai Government wishes to be followed. This requires some identification.

d Administration of Project

i Financial System (TOR 7)

The financial system appears to have operated reasonably well; with construction funds in most cases being jointly channelled from the Thai Department of Local Administration and the New Zealand side. One problem has been the requirement that Thai funds on a project over NZ$7,825 (Baht 100,000) be let out to a contractor who may not employ local village labour, and that design plans in such cases be approved in advance and adhered to. The inflexibility of this arrangement can work against the objectives of the project and the Mission would welcome some greater flexibility introduced if such arrangements can in some way be relaxed.

The Mission notes that compensatory payments from LAD to the New Zealand Project Team budget in respect of certain payments to support staff have not been forthcoming. The efficiency of project budget utilisation would be improved if this problem can be rectified.

ii New Zealand Project as a Catalyst (TOR 8)

The Mission recognises that the New Zealand financial input into water-resource development in Chaiyaphum Province comprises a very small fraction of the overall budgetary commitment of the Thai Government to that objective. The significance of the New Zealand Project as a catalyst on the release of Thai funds is therefore decidely modest. The potential value of the Project is to be found in its use of 'demonstration models' of what can be done at village level and in the transfer of technology and skill. It is for this reason that a resolution of the counterpart question must be found.

Despite the marginal nature of the immediate developmental benefit of the Project to date and the shortcomings identified, the Mission is confident that the New Zealand development assistance funds are proving cost effective in the Chaiyaphum Water Resources Project. It is too early to enter a final judgment on the value of the Project: most of its value lies in its potential to exploit the water resources which are being established. The means of doing this, and the changes of direction and modifications required in the Project, are set out in the recommendations in Section II.

e Cost Effectiveness of New Zealand Funds (TOR 6)

Despite the marginal nature of the immediate developmental benefit of the Project to date and the shortcomings identified, the Mission is confident that the New Zealand development assistance funds are proving cost effective in the Chaiyaphum Water Resources Project. It is too early to enter a final judgment on the value of the Project: most of its value lies in its potential to exploit the water resources which are being established. The means of doing this, and the changes of direction and modifications required in the Project, are set out in the recommendations in Section II.

SECTION II: RECOMMENDATIONS FOR FUTURE

MOU Period December 1984 - December 1985 (TOR 6 and 9.00)

a Language Training

In any practical development project involving field work and direct working contact with the local people in Thailand, a sound working knowledge of the Thai language is integral to the success of the project. In the Mission's view, the project will benefit in various ways when the Project Co-Director has acquired some greater knowledge of the Thai language. In addition to his communication skills in the field, his and his spouse's general integration in Chaiyaphum society will have a positive effect on their life and work in Thailand and thus to the project. We note that an intensive short-term course was undertaken in December 1984.

b Extension Worker

One of the major problems identified in the Project to date - the disappointment felt by many farmers over the failure of the weirs to irrigate their fields - would be ameliorated to a considerable extent if a professionally - qualified and experienced Thai person were appointed to the Team in a full-time capacity to become involved in the planning process. The role would be to spend time with the farmers discussing the likely impact of a particular weir on irrigable land; and establishing a clear understanding over the measure of agreement extant among farmers before a decision whether or not to proceed with a weir is taken. Such a task would require high professional skills in the sociological field. The role would be restricted to improving communication between farmers, village officials and the New Zealand Team, in an advisory capacity to the latter. It would stop short of active involvement in the Thai decision-making and administrative process. In the Mission's view, the successful performance of such a role is critical to the future success of the Project, and the appointment of a Planning and Extension Worker as envisaged under article 9 a ii of the MOU is strongly recommended.

c Construction Rate

The Project Description Form recommended that the Mission review the annual construction rate established in the MOU (five to ten 'village water resource developments' per engineer in article 5, which implies a rate of 15 to 30 'developments' for the Project each year). It is clear that the recommended construction rate can be achieved if the Team chooses to concentrate on simple structures such as storage tanks, and indeed could probably be achieved even through weir construction itself. But

frenetic construction for construction's sake was undoubtedly not intended in the MOU and in the Mission's view would militate against the broader developmental goals of village-based water-resource development that form the essential rationale for New Zealand involvement in the Project. It is the Mission's view that the rate of construction in 1983/84 was perhaps a little excessive and that some of the shortcomings in achieving the broader goals of planning and training in water use and water management were a direct consequence of this. The Mission notes that the Project Team has lowered the proposed rate of weir construction to a more appropriate level.

d Post-Project Evaluation Activity

Given the 'demonstration model' potential of the Project, the Mission is of the view that greater attention should in future be given to evaluation of the socio-economic impact of each project. Although the Mission is satisfied that a general judgment as outlined in Section I could be made in the two-week review period, each project demands a more specific evaluation. This should take two forms:

i the Project Team should include in its project reporting (referred to in Section I, paragraph 7) as detailed and accurate an evaluation of each project as its resources allow; and the services of the proposed Extension Officer should be applied to this purpose as well; and

ii the Project Co-Director should investigate with KKU Rapid Assessment Team and with the Dean of the KKU Engineering Faculty the possibility of KKU resources being devoted to in-depth evaluations of a small number (perhaps two per year?) of selected projects.

e Transfer of Technology

i Counterpart Development

It was agreed in discussion with senior officials of the Prime Minister's Department, LAD, DTEC, RID and PWD that better counterpart activity at the professional level was a highly desirable part of the project. The solution proposed was that a technical task force be established among the engineers representing the Thai Government line agencies on the Chaiyaphum Provincial Water Resources Committee, together with the New Zealand Team Leader. This task force would meet regularly (bi-monthly?) and would exchange information on their construction programmes, visit each other's sites, discuss engineering problems and establish professional relationships. The agencies involved are ARD, RID, PWD, and LAD.

It was further suggested as a one-off activity the New Zealand Team should present a seminar to RID engineers in the Khorat and Khon Kaen regional offices, explaining the type of work and the general approach to site selection, design philosophy, construction methods and related technical matters. The team could seek comment from RID engineers as appropriate.

As noted in Section I, the New Zealand Team is in the process of preparing standard plans which are primarily intended to assist appropriate district officers in constructing Gor Sor Chor weirs. To increase the prospects of successful use of these plans it may be desirable to encourage appropriate district officers hitherto not directly involved in weir construction to become involved in the process of construction of a New Zealand-built weir. If this is considered impractical, visual aids such as videos or slides could be prepared for further training seminars. If such training seminars are considered to be useful on a broader regional scale they should be organised in conjunction with the Engineering Faculty of KKU.

Transfer of technology at the contractor/artisan level is considered to be satisfactory.

ii Manuals

Manuals are considered to be worthwhile covering two other aspects of this project:

- the preliminary technical/socio-economic investigation of prospective sites; and

- operation and maintenance of the completed structures.

It is desirable that a document intended for villager education be largely pictorial.

The socio-economic manual should be designed to guide those carrying out an inventory of man/land resources. This would enable the Team to measure the impact of their work and anticipate the consequencies of changing the water regime. It will be prepared in consultation with the project engineers by the extension planner. The SETIA Appendix III in the basic Project Description is recommended as a guideline.

f Fisheries Assistance

The Mission recommends that the New Zealand Government allocate an amount of money to supplement the

fish-stocking activity in Chaiyaphum Province. Because of the restraints on the Fisheries Stations referred to on page 12, it would be desirable, and it appears possible, that some modest financial supplementation by New Zealand be offered which would be earmarked to the New Zealand weirs/reservoirs. The villagers at each site visited expressed interest in having fish stocked. The arrangement that appears to be most practical would be for the Chaiyaphum Fisheries Office, with the approval of the Fisheries Division, Ministry of Agriculture and Fisheries, Bangkok, to apply the New Zealand financial assistance to pay the six private fish breeders in the Chaiyaphum Province to provide Common Carp fingerlings. This assistance should, however, be closely integrated with the Fisheries Division's on-going programme, and this should be a responsibility of the proposed Extension Worker. The financial estimates for New Zealand are of modest proportions:

Average size NZ reservoir (area)	5 rai
Number of fingerlings per rai	3,000
Total number of fingerlings per reservoir	15,000
Average cost per fingerling	$0.2
Total cost per reservoir	$3,000 = NZ229.53
Total weirs completed by next wet season	25
Total reservoir cost	$75,000 = NZ$5,738
Plus an amount for transport	(Unspecified)

g Focus of Project

In the Mission's view, the Project would benefit through taking a broader approach on small-scale water resources development in general. Small weir construction should remain the central focus of the Project Team's activity, but with a reduction in the construction rate. There should be scope for, and would be benefit from a broader focus as follows:

- a demonstration canal site-plan gravity distribution of water upstream of the weir could be designed and supervised by the Team for a selected site. If successful, this could encourage emulation by villagers at other sites;

- the Project Team could also investigate the possibilities of a down-stream gravity irrigation system, as distinct from the traditional upstream methods practised by Thai farmers. The Mission was informed of only one small-scale down-stream system adopted at village level in Khon Kaen Province, and this was definitely an exception. RID use downstream irrigation for its major water-shed development systems, however, and the Mission was given to understand that a similar approach at village-level, although novel, would not necessarily be unacceptable to them. The issue would clearly need thorough and careful investigation and would need the professional services of the proposed Extension Worker within the NZ team.

The broader focus, and the demonstration-oriented and exploratory nature of the proposed future activity of the Project demands that the Team, and particularly the Co-Director, establish a more frequent and closer professional relationship with Thai personnel involved in water-resource development, not confined to provincial level (where good contacts have been established) but at inter-provincial and national levels. Specifically, the Mission would envisage regular meetings with the following agencies in order to keep abreast of developments in Thai thinking and policy on water development:

- National Water Resource Development Committee, Bangkok (Secretary, Dr Apichart)
- PM Office (Mr James Ogata)
- RID, Bangkok (Dr Nukool Thongtawee)
- Khon Kaen University Engineering Faculty
- Khon Kaen University
- RID, Korat, Chief Engineer, Mr Padungkarn
- RID, Mobile Centre for Farmers Services, Bangkok
- Australian Project Team in Khon Kaen
- French Project Team in Sarabuchi and Surin.

Extension of Project: Post-December 1985

a Thai Government View (TOR 9 i)

The Mission was informed that the Local Administration Department has a high regard for the assistance being provided under the New Zealand Chaiyaphum Water Project,

and that it wishes to see the Project extended beyond the three-year period established in the MOU.

b New Zealand View

In the Mission's view, the Project should be extended beyond the three-year period for at least an additional two-years to cover the five-year period originally envisaged. The reason for this is that while the Project has yet to demonstrate any major direct developmental benefit, it has obvious potential and further time is essential before this can be realised.

c Other Water Resource Needs (TOR 9 iii)

The water-resource needs in North east Thailand are identified by the Thai Government which is clearly placing increased emphasis on this aspect of its national economic development. Other overseas aid agencies are becoming involved in this process as follows:

i Australia

The Australian project is based in Khon Kaen City and is limited to the Khon Kaen Province. The project budget is unknown. It is narrowly focused on the development of drinking and domestic water supplies, the sources of which are likely to be predominantly ground water or rain water.

The project is less construction-oriented than is the New Zealand work, but with a stronger emphasis on planning processes and project demonstration. To date an extensive survey of the quality of existing potable water supplies has been done and this information has been entered into a micro-computer storage and retrieval system. The survey has enabled the Australian team to define the regions within Khon Kaen province where a particular type of development, eg deep wells, is likely to be successful as a guide to future development which may be undertaken by Thai line agencies.

The Australian terms of reference also include such things as initiation of revolving funds for the construction of household water storage jars and this may possibly be an activity which could be tried in Chaiyaphum also. The Australian team leader also suggested that the New Zealand group might consider making wider use of water stored in reservoirs by means of shallow riparian wells. Such an innovative approach among the Chaiyaphum team is to be encouraged.

ii France

A small-scale water resources development programme is to be based in Saraburi and Surin for the construction of two new ponds and the deepening of two existing ponds (proposal submitted in July 1984, estimated cost US$5m, Thai agency is Ministry of Interior).

iii Japan

The construction of small-scale weirs at Chuay Chom near the Thai-Cambodian border (RID) is envisaged.

iv FRG

- Two long-term and one short-term advisers to RID, including the provision of equipment and study tours and
- a village development programme near the Thai-Cambodian border involving ARD/Public Health/Fisheries Department; a grant of Deutschmark 10m.

v EC

In central Thailand, a four-year development project near Sukothai, estimated cost Baht 295m (NZ$22.57m) (RID).

vi New Zealand Relationship

The Mission is not of the view that the New Zealand Project Team should necessarily become directly involved in these projects. It is consistent with other comments recorded in the Review, however, (paragraph 50) that the Co-Director be encouraged to visit these projects in consultation with the Thai authorities, to explore whether there is scope for similar work being undertaken by the Team in the Chaiyaphum Province that is consistent with the proposed range of work already identified in the MOU (article 3).

SUMMARY LIST OF RECOMMENDATIONS

a Language Training

No New Zealand project personnel should take up on-site duties unless he/she has received a minimum of five weeks full time Thai language training.

b Extension Worker

A planning and extension worker should be appointed as part of the New Zealand project team, pursuant to article 9A(II) of the Memorandum of Understanding.

c Construction Rate

A target rate, lower than that identified in the Memorandum of Understanding (Article 5) should henceforth be observed, although the actual number of constructions should be at the discretion of the New Zealand team leader.

d Post Project Evaluation

i The project team should include in its project reporting as detailed and accurate evaluation of the project as its resources and the data available allow, and the services of the proposed extension officer should be applied to this purpose.

ii The Project team leader should investigate with the KKU rapid assessment team and with the Dean of the KKU engineering faculty, the possibility of KKU resources being devoted to indepth evaluations of a small number of selected projects.

e Transfer of Technology

i A technical task force should be established in Chiyaphum, comprised of New Zealand and Thai executive agencies, to ensure coordination of planning and construction of water resource developments through the exchange of information.

ii The New Zealand team could explore the possibility of presenting a seminar to RID engineers in the Korat and Kaen regional offices, on the type of work the team is doing in water resource development as suggested by Nukool Thongtawee, Director of operations and maintenance, RID.

iii The New Zealand team should investigate the most appropriate ways in which appropriate district officers, in particular the Deputy District Officer for Vocational Promotion, can become more directly involved in New Zealand water resource constructions or otherwise be trained in such construction activity.

f Manuals

A socio-economic manual for villagers on construction, operation and maintenance of weirs should be prepared by the extension worker in consultation with the engineers.

g Fisheries Assistance

The New Zealand Government should allocate an appropriate amount of money for the stocking of fish in the reservoirs created by the New Zealand-built weirs.

h Focus of Project

i Consideration should be given to the designing and supervision of construction of a demonstration canal system for the gravity distribution of water upstream of a selected existing weir.

ii The project team should investigate the possibilities of down-stream gravity irrigation systems.

iii The New Zealand project team and, particularly the team leader, should establish a more frequent and closer professional relationship with Thai personnel involved in water resource development, at the interprovincial and national levels.

i Extension of Project

The project should be extended beyond the initial three year period for at least an additional two years.

j New Zealand's Relationship with other projects

The New Zealand team leader should visit other water resources projects identified in this report, in consulation with the Thai authorities, to explore whether there is scope for similar work being undertaken by the team in the Chiyaphum Province that is consistent with the proposed range of work already identified in the Memorandum of Understanding.

APPENDIX I

TERMS OF REFERENCE

CHAIYAPHUM REVIEW MISSION

Broad Objectives

To undertake an evaluation of the effectiveness of New Zealand's current programme of assistance in Chaiyaphum and its contribution to the development of the agricultural sector in north-east Thailand through the development of a reliable water resource in selected villages of the region.

Specific Terms of Reference

To assess the development impact of the current project, in particular to:

1 Determine the effectiveness of New Zealand's technical assistance with due regard to the objectives of the Memorandum of Understanding, namely:

   i To increase agricultural production and raise living standards by developing year-round village-based water resources equivalent to 1,000 m^3 per family per year or, for a typical village, 100,000 m^3 per year for:

      - Crop Irrigation
      - Livestock
      - Crop Processing
      - Fish Farming
      - Domestic Consumption

   ii To assist with the establishment of a permanent administrative structure through the introduction of technical and management expertise in order to ensure the continuation of the village-based water resource development programme after the completion of the project.

2 Determine the technical appropriateness and the integrity of the structures completed under the project.

3 Consider the effectiveness of manuals, the extent of use by local government officials and villagers and any improvements needed.

4 With due regard to the contribution of the training component of the project in raising the technical and managerial capability of Thai personnel in specific areas of water-resource development, assess the success to date of New Zealand's assistance in ensuring the continuation of self-supporting village-based, water resource development activities in the area covered by the project following termination of New Zealand assistance with specific projects.

5 Determine the degree of village commitment to the project, the degree of villager participation in the construction of the various small-scale water-resource development projects and the extent to which villagers are able and willing to maintain the structures after completion.

6 Examine all elements of both past and proposed expenditure by the New Zealand Government and report on the cost-effectiveness of New Zealand's assistance including any recommendation for increasing the cost-effectiveness of the present phase of the project identified in the Memorandum of Understanding.

7 Consider the adequacy of or hindrances in the financial system to meet the needs of the construction programme.

8 Assess the success of the project in acting as a catalyst for the flow of central government funds to rural irrigation projects at a village level.

9 Consider the desirability of extending the project in the same province, either in its current form or in a modified form, beyond its expiry date of December 1985, in particular to:

i Ascertain the interest of the Government of Thailand in a continuation of the current project and as a measure of this, the interest in similar projects by other donors.

ii Identify and recommend to both the Thai and New Zealand Governments the priority areas for any continuation of the current programme of assistance.

iii Identify, discuss and report on any similar water-resource development needs in NE Thailand which could appropriately be addressed under an extended programme of assistance or in conjunction with some other overseas agency.

MEMORANDUM OF UNDERSTANDING BETWEEN THE GOVERNMENT OF NEW ZEALAND AND THE ROYAL THAI GOVERNMENT CONCERNING THE THAI/NEW ZEALAND VILLAGE-BASED WATER RESOURCE DEVELOPMENT PROJECT

1. This Memorandum sets forth the understanding of the Government of New Zealand and the Royal Thai Government concerning their respective contributions and responsibilities with regard to the village-based water resource development project (hereinafter referred to as "the project") in Chaiyaphum Province.

Objectives of Project

2. In accordance with the guidelines set down in the Fifth National Economic and Social Development Plan of the Royal Thai Government, the development objectives of the project are:

(a) To increase agricultural production and raise living standards by developing year-round village-based water resources equivalent to 1,000m^3 per family per year or, for a typical village, 100,000m^3 per year for: -

  (i) crop irrigation
  (ii) livestock
  (iii) crop processing
  (iv) fish farming
  (v) domestic consumption

(b) To assist with the establishment of a permanent administrative structure through the introduction of technical and management expertise in order to ensure the continuation of the village-based water resource development programme after the completion of the project.

Proposed Works

3. The works undertaken in respect of the project may include the rehabilitation, repair and upgrading of existing systems to meet the project objectives. Water resource development in any particular village may include works from any one or more of the following categories: -

/(a)

(a) Water Storage Structures

For the collection and storage of rainwater and/or for the interception and storage of natural run-off.

Reservoirs	for the impoundment of natural catchments
Tanks	for the impoundment of artificial catchments
Ponds	for the deepening and/or enlargement of natural ponds
Weirs	for the provision of storage in stream channels : may also act as diversion structures
Domestic Tanks	for the collection and storage of rainwater from roof areas

(b) Diversion Structures

Weirs	for the diversion of run-off to storage structures or to irrigation
Canals	for the direction of diverted run-off or pumped water to users : may also act as storage structures

(c) Drainage Structures

Drains	for the removal of surplus water, especially in lowlying areas
Stopbanks	for limiting flooding in villages or agricultural areas

(d) Groundwater Structures

Shallow wells	dug or drilled wells to tap shallow aquifers - generally less than 10 metres in depth
Deep wells	drilled wells to tap main permanent aquifers - generally in range 30 metres to 60 metres in depth

/(e)

(e) Pumps

Well pumps	shallow and deep well pumping including handpumps, windmills and other powered systems
Irrigation pumps	for general raising of water including handpumps, footpumps, rams, windmills and other powered systems

(f) Water Treatment Structures

For the removal of specific mineral contamination such as iron salts and suspended solids from drinking water sources.

Works in this category could include simple household size desalination units but would exclude centralised community water treatment and distribution systems.

(g) Sanitation Structures

For the protection of drinking water sources: the works will be directed to individual household systems and to the prevention of entry of contaminated surface run-off into wells and storage structures.

Works in this category could include privy construction, funded by village committees but would exclude community wastewater and disposal systems.

Training

4. The project will include the training of chosen groups or individuals for each category of works in the management, operation and maintenance of water resource structures and systems.

Construction Rate

5. The rate of completion of village water resource developments should be 5 to 10 per year for each New Zealand engineer plus support staff assigned to the project, depending on the size of the individual developments undertaken.

/Duration

Duration

6. The project will cover a three year period from December 1982 to December 1985. A review of the project will be undertaken in the last quarter of 1984 to determine whether the project should be extended. This review will be carried out by a team consisting of a representative of the New Zealand Ministry of Foreign Affairs, an engineer independent of the firm of New Zealand Consultants engaged to implement the project, and counterpart officials to be designated by the Royal Thai Government.

Extent of Financial Contribution of the Government of New Zealand

7. The project will be spread over New Zealand financial years 1982/83 to 1985/86. The Government of New Zealand is prepared during this period to make available the sum of up to NZ$1.8 million which is to be regarded as a maximum sum and will be subject to the annual appropriations of the New Zealand Parliament.

Management of the Project

8. The responsibilities of the Government of New Zealand with respect to the project will be under the overall control of the New Zealand Ministry of Foreign Affairs and the responsibilities of the Royal Thai Government will be carried out by the Local Administration Department, Ministry of Interior.

Contributions and Responsibilities of the Parties

9. The Government of New Zealand will:

(a) Commission a New Zealand consultancy firm (hereinafter referred to as "the consultants") to undertake the design and supervision of construction of the proposed works of the project. The consultants will:

/(i)

(i) Appoint three engineers (hereinafter referred to as "the team") to be based in Chaiyaphum consisting of:
A Project Co-Director
A Design Engineer
A Construction Engineer

(ii) Appoint, and meet the salary and allowances approved by the Government of New Zealand of, a Thai or a Thai-speaking Planning and Extension Officer.

(iii) Meet the team's establishment costs of up to NZ$130,000 in respect of airfares, transfer expenses, language training, temporary accommodation, heavy furniture and whiteware, and office and service equipment.

(iv) Meet the team's support costs of up to NZ$460,000 annually, in respect of utilities, household assistance, project office expenses, vehicle running costs, insurance, Head Office expenses, salaries and allowances of the New Zealand team, and per diem allowances for Thai project personnel engaged in project field work.

(b) Make an annual contribution to the project construction budget of NZ$120,000 which will be spent on project works in a manner approved by the Project Co-Directors.

(c) Provide three vehicles for use on the project as determined by the Project Co-Directors.

10. The Royal Thai Government will:

(a) Appoint:
(i) a Project Co-Director
(ii) a counterpart Design Engineer
(iii) a counterpart Construction Engineer
(iv) two office staff
(v) two support staff

and meet their salary costs.

/(b)

(b) Provide suitable office accommodation in Chaiyaphum for the team and for Thai personnel.

(c) Provide, subject to the annual appropriations of the Thai Parliament, an annual contribution to the project construction budget through the Local Administration Department of the Ministry of Interior which will be spent on project works. The amount of the contribution will be set at Baht 3 million in the Thai financial year commencing on 1 October 1983. The amount to be contributed in the Thai financial year commencing 1 October 1984 will be no less than Baht 3 million, and the Thai contribution for the year commencing 1 October 1985 will be subject to review as part of the overall review contemplated in paragraph 6.

(d) As appropriate, contribute other funds of the Royal Thai Government, such as funds available under its job creation scheme, for assistance with project works.

Project Organisation and Liaison with Provincial Administration

11. The organisation of the team and its support staff and the organisation of the team's liaison with the Thai provincial administration will be in accordance with Charts I and II attached as Annex II to this Memorandum.

Cooperation

12. (a) The team will work in association with the Provincial Administrative Office to:

(i) conduct socio-economic and technical surveys of proposed project works;

(ii) arrange work schedules and cost estimates within the overall work programme set by the Provincial Water Resources Committee (for the purpose of selecting the works to be undertaken as part of this project, the New Zealand Project Co-Director would be invited to participate in the deliberations of the Committee);

/(iii)

(iii) arrange for the awarding of construction contracts and supervise construction;

(iv) train counterpart staff in design, construction and maintenance of the project works;

(v) assist in establishing permanent administrative arrangements for the continuation of the village water resource development programme after the completion of the project; and

(vi) establish, within the financial rules and regulations of the respective Governments, a system of financial management of funds jointly contributed by the Governments of Thailand and New Zealand.

(b) The Provincial Administrative Office will facilitate the progress of the project by assisting with planning and implementing work programmes, preparing submissions for the Royal Thai Government financial contributions and providing administrative support for the team including the arrangements for obtaining:

(i) visa extensions and re-entry permits;

(ii) identification cards;

(iii) motor vehicle registration and ownership transfers;

(iv) tax clearances;

(v) duty refunds; and

(vi) drivers licences

Privileges and Exemptions

13. The Royal Thai Government will:

(a) Exempt all New Zealand personnel assigned to the project from income tax or any other tax levied by the Royal Thai Government in respect of their salaries and allowances.

/(b)

(b) Exempt New Zealand personnel from the payment of customs and all other duties, taxes and charges on:

(i) personal and household effects including household appliances;

(ii) the import of one motor vehicle for each New Zealand expert assigned to the project for a continuous period of twelve months or more on condition that it is imported within six months of first arrival of each expert and is re-exported or duty paid on its assessed value at time of sale within Thailand.

(c) Reimburse taxes and duties on foodstuffs, including foods for the care of children, imported by New Zealand personnel for their own use.

(d) In accordance with usual practice with regard to Colombo Plan projects, exempt New Zealand personnel from payment of customs and all other duties, taxes, and charges of similar nature on any professional equipment and specialist materials imported into Thailand for the benefit of the project, provided that it is understood that the items referred to in sub-paragraphs (b), (c) and (d) of this paragraph may be re-exported without customs or any other duty, tax or charge in accordance with Thai laws or regulations, or may be disposed of within Thailand to a person who similarly enjoys exemption. If, however, any items which have been exempted from customs duties are subsequently sold or disposed of in Thailand to any person not similarly entitled to customs franchise privileges,

/duty

duty will be paid on items so disposed of according to the condition and value of the goods at the time of disposal.

(e) Subject to this paragraph provide to the team those concessions generally given by the Royal Thai Government to foreign experts in accordance with the DTEC document 'Local Allowances and Privileges Accorded to Foreign Experts under Technical Programmes to Thailand' attached as Annex I to this Memorandum.

(f) Arrange for the protection of New Zealand personnel and their dependants of both person and property and the same repatriation facilities in time of national or international crisis as are provided for other aid personnel serving in Thailand under similar terms.

(g) Through the Local Administration Department, Ministry of Interior, bear claims, if any arise, against the Government of New Zealand or New Zealand personnel assigned to this project or both, resulting from, occurring in the course of, or otherwise connected with their functions covered by this Memorandum of Understanding except those claims arising from wilful misconduct or gross negligence of the New Zealand personnel.

14. Procedures for monitoring the project and assessing and reporting on the project, including financial reporting, will be established in accordance with Chart II of Annex II, and Annex III, attached to this Memorandum.

/15.

15. The Royal Thai Government may request the recall of any member of the team if his work or conduct is unsatisfactory. Before requesting his recall, the Royal Thai Government will first consult with the Government of New Zealand.

16. The Royal Thai Government and the Government of New Zealand will cooperate fully to overcome any problems that may arise during the course of the project.

17. The Annexes attached hereto form an integral part of this Memorandum of Understanding.

18. This Memorandum of Understanding may be amended by consent of both Governments expressed in writing.

19. This Memorandum of Understanding will come into effect on the date of signature.

Signed at Bangkok on 15 February 1983 on behalf of the Government of New Zealand and the Royal Thai Government by their duly authorised representatives.

(Mr. R.L. Jermyn)
FOR THE GOVERNMENT OF
NEW ZEALAND

(Mr. Apilas Osatananda)
FOR THE ROYAL THAI
GOVERNMENT