CDG-SEAPO TECHNICAL REPORT

Overview and Assessment of Rural Water Supply Programs and Projects in Thailand (1987-1993)

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FOREWORD

When the grand designs and great expectations of the Water Decade (1980s) subsided, the fact remains that by 1990, more than 30% of the Asian population lacked access to safe drinking water. By mid-1990s, the water crisis continues to be an intractable problem in Asia. To wit:

> *"Water is the oil of the 1990s," declares John Dixon, principal environmental economist at the World Bank. The United nations predicts water will be the world's most critical natural-resource issue by 2000. Already, Asia's thirst raises concern about the region's ability to sustain economic growth, social development and political stability on the eve of the so-called Pacific Century."*
>
> Far Eastern Economic Review, June 1, 1995
> Vol 158, No 22, pp 54-55

As governments carry out policies to diffuse economic development into the rural areas, the challenge of properly managing rural water supply and demand will be here to stay.

Six years ago, when CDG-SEAPO was in the course of implementing a sizeable project in Northeast Thailand on small-scale rural water resource development, we were confounded with the question of the breadth and depth of the rural water supply program in Thailand and how our project fit into the big picture. We were curious as to, among other things, whether our project duplicated the efforts of others. Thus, we embarked on an informal inquiry as documented in this report, which was originally intended to be for internal purposes only. As we gathered and updated information intermittently through a span of four years, not only did we find the answers to our questions, but also gained some insights into how the pieces combined to make up the whole and, more importantly, where the loopholes lay.

For instance, we have compiled a compendium of the existing rural water projects and activities in Thailand during its 6th National Plan period, which could serve as a comprehensive reference material. We also attempted to reckon the financial costs involved and to analyze the institutional strengths and weaknesses.

We postulate that these facts and insights may be as relevant and useful now as they were then. Thus, we ventured to publicize our findings in order to make available to planners and implementors of rural water programs and projects the valuable lessons we have learned from the Thailand experience.

The Editors
Bangkok, Thailand

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Likewise, we are very grateful to the field and research personnel who got involved at one time or another in the course of the collection and compilation of information. They are Mr. Jason Lu, Mr. Cesar Ting, and Dr. Lokendra Prasad Poudyal.

LIST OF ABBREVIATIONS

AIT	Asian Institute of Technology
ARD	Office of Accelerated Rural Development
AIDAB	Australian International Development Assistance Bureau
BMZ	German Federal Ministry for Economic Cooperation and Development
CCAWRD	Committee for Coordination and Acceleration of Water Resources Development
CDD	Community Development Department
CDG-SEAPO	Carl Duisberg Gesellschaft - South East Asia Program Office
CU	Chulalongkorn University
DOAE	Department of Agricultural Extension
DMR	Department of Mineral Resources
DOH	Department of Health
DOLA	Department of Local Administration
DPW	Department of Public Welfare
DTEC	Department of Technical and Economic Cooperation
FEDRA	Foundation for Education and Development of Rural Areas
FNSt	Friedrich-Naumann-Stiftung
GAA	German Agro Action
GTZ	Gesellschaft für Technische Zusammenarbeit (German Agency for Technical Cooperation)
IDRC	International Development Research Center, Canada
IDWSSD	International Drinking Water Supply and Sanitation Decade
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau (German Development Bank)
KKU	Khon Kaen University
LDD	Land Development Department
MERT	Ministry of External Relations and Trade, New Zealand
NADC	Northern Agricultural Development Center
NESDB	National Economic and Social Development Board
NGO	Non-governmental organization
NRDC	National Rural Development Committee
NRDCC	National Rural Development Committee Coordination Center
NWRC	National Water Resources Committee
PDA	Population and Community Development Association
PWA	Provincial Waterworks Authority
PWD	Public Works Department
PWS	Piped water supply systems
RDF	Royal Forestry Department
RID	Royal Irrigation Department
RTG	Royal Thai Government
SCH	Security Command Headquarters
Thai-Ger Fund	Thai-German Development Foundation
UNDP	United Nations Development Programme
WHO	World Health Organization

An Overview and Assessment of Rural Water Supply Programs and Projects in Thailand (1987-1991)

1. INTRODUCTION

1.1 Background

The financial, institutional, and political commitment of the Royal Thai Government (RTG) towards the development of small-scale water resources aimed at providing drinking and domestic water to the rural population has progressively burgeoned through the decades since the modest initial efforts in the 1960s. The first three National Development Plans (1962-1976) saw the launching of the following programs/projects:

- National Potable Water Program aimed to provide piped water supply to 10,000 villages in 30 years' time (1)
- Potable Water Project (1966-1972), which was financed jointly by the US Agency for International Development and the RTG, focused on 600 insurgency-infested areas (1)
- Rural Water Supply Project, which was created by a Cabinet resolution in 1964, aimed to provide adequate and safe water to all villages in the country all year round (2).

By 1977, the Rural Water Supply Project reported that more than 110,000 water resource facilities, such as shallow wells, deep wells, tube wells, ponds and storage tanks, had been constructed through ten RTG implementing agencies at the cost of about Baht 2,000 million, reaping benefits to 22 million people or 64% of the rural population. In reality, the beneficiaries had been much less than the reported figure since many of the facilities generated very little, if not polluted, water or had broken down due to lack of maintenance and repair. It was assessed that the project benefits were not on par with the investment costs and that solving the water shortage problem in rural areas remained a formidable task for years to come (2).

Perhaps a more realistic estimate of the extent of implementation of rural water supply activities in the country is that given in Table 1.1, showing the target population served and budget allocation from the 1st to the 4th National Development Plan period (3).

Table 1.1 Target Rural Population and Budget Allocation for Rural Water Supply (1962-1981)

National Plan Period	Target Population	% of Rural Population	Budget Allocation
First (1962-1966)	3 million	10%	-
Second (1967-1971)	-	-	Baht 509 million
Third (1972-1976)	5.6 million	15%	Baht 1,165 million
Fourth (1977-1981)	10.4 million	25%	Baht 3,000 million

An important development during the 4th National Plan was the adoption of a strategy for the development of small-scale water resources through a study commissioned by the National Economic and Social Development Board (NESDB) to the Asian Institute of Technology (AIT). Its implementation came under the direct control of the Committee for Coordination and Acceleration of Water Resources Development (CCAWRD), which was established in the same year and chaired by the Prime Minister.

A system of planning and implementing village water projects following a prescribed administrative flow of information and funds, called the P-N (Por-Nor) system, was innovated (4).

At the end of the 4th National Plan period, another related milestone was reached. In mid-1981, the national rural development program was launched, together with the creation of the National Rural Development Committee (NRDC), chaired by the Prime Minister, with the National Rural Development Coordination Center (NRDCC) as its secretariat. This colossal program, which commenced implementation during the 5th National Plan, adopted the G-Ch-Ch (Go-Chor-Chor) system of managing rural development activities, of which rural water supply was a major component. The G-Ch-Ch, which is further discussed in the next chapter, was patterned after the earlier-mentioned P-N system, and had been institutionalized as the standard procedure in initiating and implementing rural water supply projects. By this time, a systematic procedure, a strong political will, and numerous implementing agencies were already in place. However, a breach in the central coordination mechanism became apparent due to the overlapping of the CCAWRD and NRDC functions with respect to small-scale water resources development.

The era of the United Nations International Drinking Water Supply and Sanitation Decade (IDWSSD) from 1981 to 1990 provided additional impetus for the Royal Thai Government to set targets and plan rationally towards the provision of safe and adequate water supply to the rural population. In response to the national need as well as to the international challenge, the task of preparing a *Master Plan for Rural Water Supply and Sanitation* was commissioned by the NESDB to AIT in 1983. It was completed in 1984 and was accepted/approved by the government in 1985 (5). The NESDB later commissioned Khon Kaen University and the Thai-Australian Project to formulate a plan of operations based on the Master Plan, which led to the completion of the Action Plan of the Rural Water Supply Program in 1987 (6). The Action Plan also made some program adjustments and revisions using more recent data.

In 1985, at about the time that the Master Plan was finally accepted by NESDB and, also, while work on the Action Plan was underway, the CCAWRD and the Ministry of Interior launched the National Rainwater Jar Program aimed at providing rainwater collection facilities for 80% of rural households by 1987. This was intended to support the targets of the UN Water Supply and Sanitation Decade as well as to pay homage to His Majesty the King who celebrated his sixtieth birthday in 1987 (7).

Thus, prior to the 6th National Plan (1987-1991), Thailand had laid the foundation, albeit in a fragmented fashion, on which full-scale efforts could be built. But before looking into the 1987-1991 scenario, it is essential to be familiar with the extent of the problem at the start of the period. Since the Master Plan and the Action Plan were done precisely for the purpose of understanding and containing the problem, the following discussions are based on these two documents.

a) The Water Shortage Problem

The extent of the drinking/domestic water shortage is measured by estimating the number of people, villages, or households with inadequate supply. The Master Plan had the inherent weakness of lack of comprehensive nationwide data, which only became available later on. Not surprisingly, the Master Plan and the Action Plan came up with widely different estimates, owing to the fact that different parameters and census data were used, as available in 1982 and 1986, respectively. Table 1.2 shows such disparity.

It should be noted that the Action Plan estimates for drinking water supply demand relied solely on the projected results of the National Rainwater Jar Program which commenced in 1985 as mentioned earlier, with the assumption that once the target number of jars were constructed, then drinking water was as good as available. Such an assumption certainly resulted in an overestimation of the rural population that had access to adequate and safe water supply, i.e. over 31 million people or 75% of the rural population in 1986. This was unrealistic and contradicted the empirical data obtained later on.

Table 1.2 Comparison of Estimates of Rural Population to be Served with Drinking Water Supply

	Master Plan (1982 data)	Action Plan (1986 data)
Rural population as of 1982/1986	35,660 million	41,706 million
Rural population *with* adequate and safe supply as of 1982/1986 (%)	5,200 million (15 %)	31,312 million (75 %)
Rural population *without* adequate and safe supply as of 1982/1986 (%)	30,460 million (85 %)	10,394 million (25 %)
Projected rural population to be served up to 1991	33,008 million	10,709 million

Source Compiled from references (5) and (6)

More accurate baseline data, gathered from a nationwide rural development census done by NRDCC every two years (called NRD2C survey), became available starting in 1984. This was then used in the Action Plan to determine the extent of the shortage of domestic water supply in terms of number of villages. The survey results showed that 61% of rural villages in 1984 suffered from inadequate water supply (6). The subsequent 1986 NRD2C data indicated that 32,584 villages or about 58% of the total number of villages in the country lacked sufficient drinking and domestic water, with almost half of these villages located in the Northeast region (8).

b) The Target Goals

In line with the UN IDWSSD goals, Thailand set forth the following targets to be achieved by the end of 1991 (6):

> **Drinking Water**: *To provide clean water for drinking to 95% of the rural population from water sources within 1 km distance (or within 1 hr time consumed in travelling and waiting) at a rate of 5 liters/person/day*
>
> **Domestic Water**: *To provide acceptable, good quality water for domestic use to 95% of the rural population from water sources within 1 km distance (or within 1 hr time consumed in travelling and waiting) at a rate of 45 liters/person/day*

c) The Water Supply Facilities Needed

The different types of small water resource facilities that are generally used for drinking and domestic purposes as well as for watering garden plots are the following:

- water (incl. rainwater) collection/storage containers
- shallow wells
- deep wells
- piped water supply systems
- ponds
- spring catchment systems

The target number of facilities to be constructed as proposed in the Master Plan and in the Action Plan are shown in Tables 1.3 and 1.4, respectively.

Table 1.3 Types and Number of Water Facilities to be Constructed up to 1991 as Proposed in the Master Plan

	Type of Facility	Unit Cost (Baht)	Total No of Units to be Constructed (1985-1991)
1	Rainwater jars		
	- 1 cu m	280	376,788
	- 2 cu m	470	4,011,000
2.	Spring catchment system	88,700	63
3	Sanitary shallow well	16,000	25,053
4	Deep well	71,100	21,805
5	Small-scale piped water supply system	201,000	1,316
6	Village piped water supply system		
	- slow sand filter	3,476,600	77
	- repid send filter	3,325,300	21
7	Small-scale rainwater supply system	48,100	6,650

Table 1.4 Types and Number of Water Facilities to be Constructed up to 1991 as Proposed in the Action Plan

	Subprogram/Project/Workplan		Number of facilities to be constructed, rehabilitated and maintained					
			1987	1988	1989	1990	1991	Total
1	National Rainwater Collector Provision Project		1,756,000 ← should be increased in number to provide 5L/head/day →					
2	New Facility Construction							
	Deep Well		6,200[1/]	5,450	←	←	←	28,000
	Shallow Well		730	←	←	←	←	3,650
	PWS of DOH		29	←	←	←	←	145
	PWS of PWD		45	←	←	←	←	225
	PWS of REGP		[118]	←	←	←	←	[590]
	Tanks of REGP		[2,640]	←	←	←	←	[13,250]
	Large Pond (15000 cu m)		218	←	←	←	←	1,090
	Small Pond (12000 cu m)		[1,500]	←	←	←	←	[7,500]
	Spring Development (REGP)		[10]	←	←	←	←	[50]
	Water Supply Channel		10	←	←	←	←	50
3	Shallow Well Improvement Project		1,000					
4	Rehabilitation Workplan	Deep Well	7,639	←	←	←	←	38,197
		PWS	-	70	←	←	←	280
		Small Pond (REGP)						
5	Maintenance Workplan	Deep Well	21,750	←	←	←	←	108,750
		PWS						

[1/] Including small tube wells (2" diam)

d) ***The Proposed Program Components***

The Master Plan proposed six components for the rural water supply development program:

- rehabilitation/upgrading of existing facilities
- new construction
- operation and maintenance
- water quality monitoring
- training of personnel
- research and development.

These were revised and reorganized into eight sub-programs or work plans in the Action Plan:

- national rainwater collector construction
- new facility construction
- existing facility improvement
- rehabilitation
- maintenance
- water quality monitoring
- research and development
- monitoring and evaluation.

e) ***The Financial Requirements***

In order to carry out these proposed activities, the Action Plan recommended a budget requirement of more than Baht 3,000 million for the period of 1987-1991, with over Baht 600 million allocation per year. This proposed budget was intended to finance the construction, rehabilitation, and maintenance of various small-scale water resource facilities. It should be noted that the said budget estimate did not include any water quality monitoring, research and development, and program monitoring and evaluation activities. On the other hand, the Master Plan proposed a total budget requirement, inclusive of water quality monitoring and research and development, of over Baht 5,000 million for the same 5-year period (or over Baht 8,000 million for the 7-year period of 1985-1991) This was broken down to about Baht 1,000 million annually.

Furthermore, it was estimated in the Master Plan that about 12% of the total financial requirement could be obtained from foreign funding sources, while the rest could be financed by the government.

f) ***The Implementing Agencies***

The responsibilities for construction, rehabilitation and maintenance activities were to be distributed among various implementing agencies. Among the altogether 16 RTG agencies involved in small-scale water resources development, eight can be regarded as principal implementing agencies with considerable responsibilities in rural water supply. They are the following.

- Office of Accelerated Rural Development (ARD), Ministry of Interior
- Public Works Department (PWD), Ministry of Interior
- Department of Local Administration (DOLA), Ministry of Interior
- Community Development Department (CDD), Ministry of Interior
- Department of Health (DOH), Ministry of Public Health
- Department of Mineral Resources (DMR), Ministry of Industry
- Land Development Department (LDD), Ministry of Agriculture and Cooperatives
- Security Command Headquarters (SCH), Ministry of Defence

It should be noted that neither the Master Plan nor the Action Plan proposed any streamlining or restructuring of agency functions with respect to rural water supply. Both opted for the status quo in order to capitalize on the aggregate experience and resources of each agency. The different roles of these agencies in the rural water supply program are further discussed in the next chapter.

In addition, there ensued during this period (1987-1991) an influx of foreign financial, technical and training assistance from bilateral, multilateral and NGO sources to help Thailand meet its rural water supply goals. Many of these foreign-assisted projects were and are being implemented in cooperation with the RTG agencies mentioned.

1.2 Rationale and Objectives of the Study

One of the foreign-assisted projects, sponsored by the German Government under the aegis of the Carl Duisberg Gesellschaft - South East Asia Program Office (CDG-SEAPO) in cooperation with the Department of Local Administration (DOLA) and Khon Kaen University (KKU), took interest in investigating the possibility of duplication of efforts among these assistance projects. In 1989, CDG-SEAPO conducted a survey of foreign-funded projects in the field of small-scale water resources development in rural areas in Thailand to this effect. The results of this survey are included in the present report. In addition to the 1989 survey, this study was expanded to include those activities directly funded by the Royal Thai Government and implemented by the agencies mentioned above. This was done in order to see the foreign-assisted projects in the context of the entire rural water supply scenario in the country.

The objectives of this study were threefold:

- To investigate how the rural water supply programs and projects in Thailand have been implemented, and to some extent, assess the process of program implementation and its effects.

- To determine the contribution of foreign-assisted projects to the overall rural water supply program.

- To assess whether the small-scale rural water supply activities, both RTG-funded and foreign-funded, are complementary or overlapping, and in cases of overlaps:

  - identify the nature of overlaps
  - determine why overlapping occurred
  - recommend measures in order to avoid or prevent duplication of efforts

1.3 Methodologies Used

The information used in this study was collected from primary and secondary sources. Three surveys were conducted to obtain information at the primary level. The first survey was done in May-June 1989 using a written questionnaire aimed at gathering basic information on foreign-assisted projects in order to gauge any similarities among them. The second survey, which was conducted in September-November 1989, was a follow-up to the first, in particular focusing only on those projects that were deemed to have some similar features. It was aimed at determining whether there were any significant overlaps or not among these projects. Both written questionnaire and person-to-person interviews were employed. The third survey was conducted in February 1993 to update or verify the information gathered in 1989 as well as to collect information on regular government-funded activities. It was mainly conducted through interviews with relevant officials. In all stages of the study, secondary sources of information such as existing literature and reports were consulted.

The first questionnaire was designed to cover aspects such as: project title, type of project, project objectives, implementing agencies, funding source, project duration, target areas, target groups/ beneficiaries, expected results/outputs, current status of implementation, scope of training component (if any), and perception of any overlaps with other known projects. **Annex A** contains a sample questionnaire together with the respective respondents. There were altogether 36 foreign-assisted projects collated from responses in the first survey, the majority of which were irrigation projects.

The more detailed second questionnaire covered specific aspects concerning the scope or components of the projects, extent of each project component, details of any training component, details of target areas as well as target groups, elaboration of project objectives, specifications of project outputs, and opinion on the uniqueness of the project or otherwise its similarity to other existing projects. **Annex B** shows a sample questionnaire, including a list of persons consulted in the detailed survey. This survey focused only on four projects that exhibited the highest degree of similarity.

The interview questions during the third survey involving RTG agencies revolved around the specific role and activities of the respective agencies with respect to rural water supply, the administrative or institutional procedures involved, coordination with other agencies, involvement in foreign-funded projects, and perceptions regarding duplication of efforts. **Annex C** lists the persons consulted and their respective agencies.

1.4 Scope and Limitations

In this study, rural water supply pertains to those small-scale water resource facilities that are used for drinking and domestic purposes, as well as for limited agricultural use such as watering garden plots. The term "rural water supply" is therefore narrower in scope as compared to "small-scale water resources", which also include small-scale irrigation systems. It is deemed that water for such agricultural purposes is under the realm of irrigation, and is not included in the scope of this study.

However, it is difficult, if not impossible, to draw the line where small-scale irrigation systems end and systems for domestic uses begin. Villagers may be using water from an irrigation ditch for bathing, which is a domestic use. Drinking water sources are perhaps easier to separate because facilities are limited to those that meet certain water quality criteria, in most cases. Nevertheless, as it is necessary to set a boundary limit in this report for practical purposes, those facilities that are most often used for drinking and domestic uses were thus selected. These are: water collection/ storage containers, shallow wells, deep wells, ponds, spring catchment systems, and village piped water supply systems.

Admittedly, this study does not qualify to be an evaluation of Thailand's rural water supply program. Such an evaluation, which was yet non-existent but was being planned presently by NESDB, would require a more comprehensive and intensive data gathering and analysis. However, this modest attempt could be regarded as a reconnaissance or an exploratory survey more for the benefit of those who are seeking a bird's-eye-view of the situation. Moreover, such a reconnaissance, corresponding to the first two objectives of the study, is intended to provide sufficient background information for the third objective concerning complementarity or duplication of efforts.

The scenario described in the subsequent chapters was focused on the 6th National Plan period (1987-1991). This period also conveniently coincided with the duration of the CDG-SEAPO/DOLA/KKU project, for which this reconnaissance and comparative study was intended. Moreover, 1987 coincidentally was the year the *Action Plan of the Rural Water Supply Program* was completed and presumably the start of its implementation, while 1991 marked the post-*UN IDWSS Decade* as well as the target period for the Master/Action projections. This period was therefore significant on various counts.

Lastly, the following discussions on the rural water supply program in the country were not confined to the program as defined in the Master/Action Plan. It became apparent during the course

process of this study that it was doubtful whether the said Plans' recommendations and guidelines were indeed followed. Therefore, the "program" hereinafter referred to pertains to the broad measures that the government adopted, including but not limited to the Master/Action Plan proposals.

2. The Water Supply Program during the 1987-1991 Period

The policy measures for developing small water resources for drinking, domestic and agricultural purposes in rural areas during the 6th National Plan (1987-1991) were as follows (8):

- Accelerate construction of small-scale water resource facilities in drought areas.
- Accelerate and continue the village piped water supply projects, with emphasis on cooperation between government and private sectors.
- Promote sustainability and maintenance through people's participation and promote cost-sharing by local administration and users to supplement the government budget.

As stated in this official document (8), the general strategy was to develop two types of facilities: wells, mostly for drinking and domestic purposes; and surface water sources, such as reservoirs, ponds, dams, and ditches for agricultural purposes. The total budget for the five-year period was estimated at over Baht 20,800 million, only 13% of which (Baht 2,729 million) was allocated for groundwater/well development. The more substantial portion (87%) was earmarked for irrigation facilities.

Since this plan did not include the two other types of small water resource facilities, namely rainwater/water collection/storage containers and village piped water supply systems, it did not truly reflect the entire scenario. Moreover, any integration of this program to either the Master Plan or the Action Plan was not explicitly expressed.

Before going into the implementation activities of the various implementing departments, it is necessary first to understand the institutional context in which these activities were performed.

2.1 Institutional Set-up and Implementation Procedures

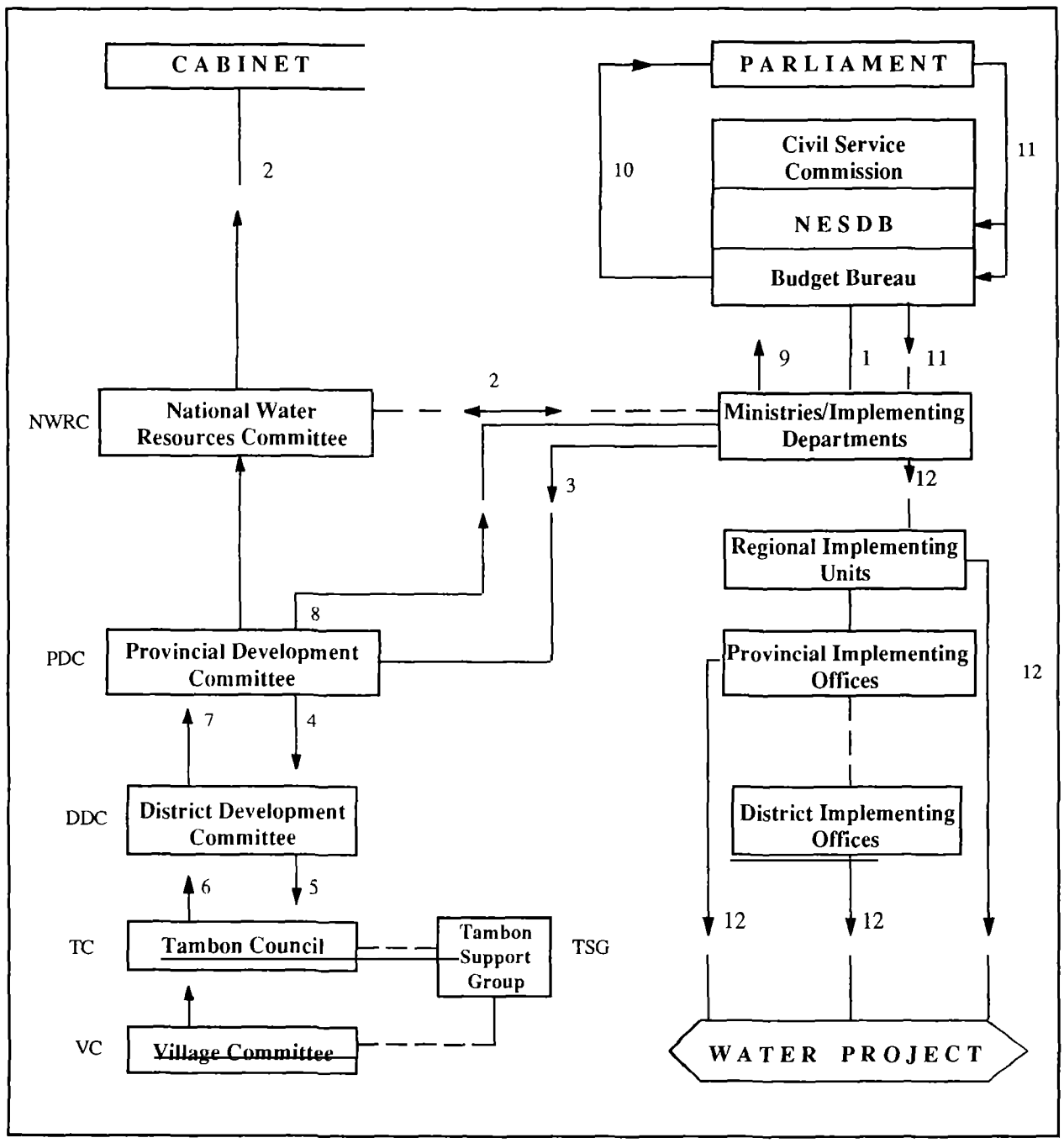
Before the Master/Action Plans were prepared, there was already an existing functional set-up consisting of the G-Ch-Ch system for the bottom-up planning and generation of water projects as well as for the implementation of the water projects. However, an important new element proposed in the Master/Action Plan was the integration, central coordination and monitoring function to be given either to the National Rural Development Committee (NRDC) or the Committee for Coordination and Acceleration of Water Resources Development (CCAWRD). The latter was superseded in 1989 by the National Water Resources Committee (NWRC). The proposed institutional set-up is given in Fig. 2.1, which was adapted from the Action Plan (6) in order to show that the NWRC was given the central coordinating role.

The various actors shown in this institutional structure can be broadly categorized into three groups as follows:

a) Local-level Development Committees

Proposals to develop village water resources, which formed part of the larger village development plan, followed a bottom-up process from the village, subdistrict, district, and then to the provincial level. In accordance with the G-Ch-Ch system of operations initiated in the early 1980s, plans were examined, integrated, and prioritized by the Development Committees at each level of local administration. The

Fig. 2.1 Organizational Structure for Rural Water Supply Program Administration



Functional relationship:

1	National program planning
2	Approval by NWRC and preparation of Ministerial Policy Framework
3, 4, 5	Flow of Policy Framework
6, 7, 8	Provincial planning
9, 10	Budget preparation
11	Budget approval
12	Implementation

implementing departments were duly represented particularly at the provincial and district levels and therefore participated in the planning process through their field or local offices. At the grassroots level, technical and planning assistance was provided by the Tambon Support Group or otherwise called Tambon Advisory Committee, consisting of rural development agents within the community representing the Interior, Health, Agriculture and Cooperatives, and Education Ministries.

Under this set-up, the Provincial Development Plan, which was the end product of the aggregated and integrated district/subdistrict/village plans, formed the basis of water resources development activities undertaken each year in each province. The plan was prepared annually by the Provincial Development Committee and submitted to the respective implementing departments as well as to the NWRC. It has been known to occur that provincial governments have submitted their proposed rural water supply projects to more than one implementing agency in order to be "extra" sure that they could promptly avail of the government services. The implementing agencies did have a way of avoiding duplication of efforts through their field offices either at the regional, provincial, or district levels, which could easily check if any other departments have already serviced the area.

b) Implementing Agencies

Eight principal implementing agencies or departments belonging to five ministries were responsible for small water resources development for drinking, domestic, and limited agricultural purposes. These were the DOH, ARD, PWD, DOLA, DCD, DMR, LDD, and SCH. It should be noted that these departments traditionally have been undertaking small-scale water resources development activities since time immemorial. Through the years, their areas of responsibility and capabilities with respect to rural water supply have expanded, diversified, and some overlapped with one another. However, in order to tap all available resources and capabilities and, perhaps, to avoid disrupting the status quo, no attempt was made either in the Master Plan or Action Plan to streamline their functions. These functions are discussed in detail in the next section.

A ninth agency, the PWA, has been included in this study because of a recent Cabinet resolution concerning its role in rural water supply. Because the PWA is a state enterprise that operates on a water tariff basis, the procedure discussed here does not apply to this agency.

Upon receiving and studying the water project proposals contained in the Provincial Development Plans, the implementing agencies then incorporated these activities in their annual work plan, for which a corresponding budget was submitted to the Budget Bureau and eventually to the Parliament for scrutiny and approval. At this point, consultation and coordination with NWRC was supposed to occur in order to integrate and eliminate duplication of efforts of the various departments involved.

Once the budget has been allocated and approved by Parliament, the implementing departments then delegated their regional, provincial or district offices to carry out the water projects. The different implementing departments gave varying degrees of attention to villagers' participation in the water projects, depending on the nature of the projects. This is discussed in greater detail in the next section.

c) Policy Guidance and Coordinating Body

Crucial to the supposed institutionalization of the 1987-1991 Action Plan and the attainment of its target goals was the activation of the central coordinating body in order to ensure that all activities conformed to the Plan. Its functions, in addition to policy guidance and coordination, included monitoring the program, adjustment of annual plans and targets, and integration of aid programs/projects. In fact, stronger roles were proposed as follows: the Master Plan recommended that the central coordinating body should "take an active part in deciding when and where the construction of rural water supply facilities should take place" (5); while the Action Plan even proposed that the Committee should formulate the Ministerial Policy Framework and should approve first the activities budgeted for by the implementing departments (6).

Both these Plans recommended that the central coordinating and monitoring function be assigned to the NRDC, but indicated that it could as well be given to the CCAWRD. An NESDB report stated that it was NWRC, the former CCAWRD, in fact that was tasked to coordinate the rural water supply program (9). However, this was not verified by the Office of the Secretariat of the NWRC which indicated that no central body *per se* was actually assigned to oversee the implementation of the Master Plan. However, during the government of the former P.M. Chatichai Choonhavan, the NWRC affirmed and formalized its roles and responsibilities as well as drew up policies, strategies and implementation guidelines to the effect that it shall be the policy-making and supervising body with respect to water resources development (10). Thus, during the fiscal year 1990-1991, the NWRC became deeply involved in the coordination of work plans and budget preparation of the various implementing departments. There were no indications that this was continued after the political upheaval and change in government that ensued in 1991.

Discussions with the concerned officials of the various implementing agencies revealed that many of them have not been coordinating with the NWRC regarding rural water resources development, but some (i.e. PWD, CDD) have had contacts with NRDC instead. Moreover, one official at the National Rural Development Coordination Center, the NRDC secretariat, confirmed that it was the job of the NRDC to coordinate with other agencies regarding rural water supply; while another NESDB/NRDCC official declared otherwise, i.e. that the NWRC was given this responsibility. To sum up such a confusing state of affairs, it can only be concluded that the rural water supply program for 1987-1991 was not consistently coordinated and monitored as proposed in the Master Plan/Action Plan.

One principal reason that may account for this condition was the fact that the 1987 to 1991 period witnessed three government turn-overs. These entailed changes in the Prime Ministership and the Cabinet, and therefore in policy decisions and priorities. It can be attributed also to the inability of the bureaucracy to set the stage for a more integrated approach and convince the politicians accordingly.

Nevertheless, the program continued to exist, as more and more government budget for rural water supply activities continued to flow, and as more and more foreign technical assistance and grants were received.

2.2 Locally-funded Programs/Projects/Activities

The Royal Thai Government has spent billions of baht on small-scale water resources development in rural areas, as shown in Table 2 1. Although the figures in Table 2.1 included the budget allocation for small-scale irrigation projects, which comprise, for example, about 70% of the 1991 and 1992 budgets, these annual budget allocations were still far greater than the estimates in either the Master or the Action Plan. This was to show not only the ever growing importance given to this sector, but also the fact that despite accelerated efforts, the rural water shortage problem did not seem to have been ameliorated.

The following discussions expound on what types of activities or projects were implemented by each of the major implementing agencies using the government budget. The quantitative data which provided the basis for these discussions are given in **Annex D**.

(a) Office of Accelerated Rural Development (ARD), Ministry of Interior

The ARD Office was established in 1966 as the government's main implementing arm on rural infrastructure development, one of which was water supply. It has received the largest budget on small-scale water resources development among all the other major implementing agencies (excluding the Royal Irrigation Department). ARD has ten Technical Centers and 72 Provincial Offices all over the country. Its work on rural water supply involved the entire spectrum of construction, rehabilitation, maintenance and repair, and training of operators.

Table 2.1 RTG Budget for Small-scale Water Resources Development in Rural Areas (1983-1992)

Year	Budget (Million Baht)	Annual % Increase
1983	1,612.30	-
1984	1,943.80	20.56
1985	1,754.40	(9.74)
1986	1,382.50	(21.19)
1987	1,921.41	38.98
1988	2,870.47	49.39
1989	3,501.43	21.98
1990	4,967.34	41.86
1991	8,010.00 *	61.25
1992	8,584.00 **	7.16
TOTAL	36,547.65	-

Source The Status of Drinking and Domestic Water in Rural Areas, 1992, NESDB (9) The data were obtained from the Budget Bureau

* Only 28% of this amount (Baht 2,210 million) is for drinking and domestic water supply.

** Only 33% of this amount (Baht 2,766 million) is for drinking and domestic water supply

The rural water supply facilities under the jurisdiction of ARD were shallow wells, deep wells, ponds, and cement tanks. From 1966-1992, ARD had constructed the following:

- 22,643 deep wells (58% of which were done in 1987-1991)
- 10,395 shallow wells (67% of which were done in 1987-1991)
- 67,961 cement tanks (62% of which were done in 1987-1991)
- 1,776 ponds (24% of which were done in 1987-1991).

During the 1987-1991 period, ARD continued to be the focal point for shallow well construction and received the largest budget allocation for this. It also led the other agencies in pond construction, and was second to DMR in number of deep wells built. ARD's budget for rural water supply facilities reached Baht 1,900 million for this 5-year period, not including the small-scale irrigation facilities that yet comprised the greater part of its work and budget. Its annual budget for 1993 had soared to Baht 1,000 million for the same types of facilities (8).

(b) Department of Health (DOH), Ministry of Public Health

The DOH had two divisions directly involved in rural water supply. The Rural Water Supply Division has been tasked with providing clean water to villages, particularly those with less than 3,000 inhabitants. It operated through its central office and rural water supply sections in 12 regional Environmental Health Centers throughout the country. Its work covered facilities for drinking water supply, such as deep wells, shallow wells, and village piped water supply (PWS) systems. On the other hand, the Sanitation Division has been in charge of rainwater collection and storage containers, such as tanks and jars. DOH was not involved in any small-scale water resources development for agricultural uses.

DOH has received the highest budget for the construction of PWS systems and has built over 2,000 units by 1993; 1,317 of which were completed during the 1987-1991 period. Each system was managed by the community in such a way that water charges were collected from the users and the money was used to operate and maintain the system. More than half of the yearly DOH budget was earmarked for PWS, about one-third for deep wells, and the rest was for shallow wells and tanks combined. Its budget for rural water supply during the 1987-1991 period was over Baht 900 million. Yet for 1993 alone, it has been allocated more than Baht 1,000 million (8) for this purpose.

DOH was second only to DMR with respect to deep well construction during the said period. Its shallow well construction program was not very sizeable as compared to all the other major implementing agencies. Aside from construction, DOH was involved in rehabilitation of wells and improvement of water quality through water treatment, such as iron removal and disinfection. Training of volunteer technicians and community leaders in order to develop their water utilization and management skills was also conducted by the Environmental Health Centers.

(c) Public Works Department (PWD), Ministry of Interior

The PWD had two divisions that have been undertaking small-scale water resources development for drinking and domestic purposes. The Water Supply Development Division has taken care of village piped water supply (PWS) systems, including storage tanks, as well as spring catchment systems; while the Deep Well Development Division has been in charge of deep well construction and maintenance. PWD maintained 72 Provincial Offices and 50 District Offices, whose engineers were tasked to oversee PWD's rural water supply activities.

PWD was the first department to develop PWS systems using groundwater source. Since the onset of this program in 1983 up to 1992, more than 1,300 waterworks have been constructed, the majority (37%) of which were in the Northeast region. These systems were equipped with submersible pump and elevated storage tank of various capacities, depending on the number of households being serviced. As with the DOH PWS facilities, these were operated, maintained, and managed by the villagers. PWD has remained second only to DOH in PWS budget and number of units constructed since 1987. With respect to deep wells, PWD's work was almost equal in quantity and budget to those of DOH and ARD during the 1987-1991 period.

PWD's budget for all small-scale water resources development for the entire 5-year period was estimated to be more or less Baht 800 million. All of these were for drinking and domestic water supply facilities, as PWD was not engaged in any irrigation activities. Its budget for 1993 alone has grown to about Baht 680 million, 64% of which was earmarked for PWS (8).

(d) Department of Mineral Resources (DMR), Ministry of Industry

The Groundwater Division of DMR was the lead agency for deep well construction and maintenance. The division had four Regional Offices and a Groundwater Data Center, which maintained groundwater data sets nationwide that other RTG agencies could access.

As of 1993, there were about 48,000 DMR deep wells all over the country, with the majority located in the Northeast. More than 16,000 wells (one-third of total) were constructed during 1987-1991. More than 75% of these wells were equipped with handpumps, while the rest were run by motor pumps or wind energy. The government used to provide to DMR a sizeable budget for pump maintenance, but starting in 1993, all pump maintenance and repair responsibilities were transferred to the Provincial Government.

DMR's total budget for deep well construction and maintenance was around Baht 1,200 million for the 1987-1991 period. Its budget for 1993 was substantially more, at Baht 610 million (8), which included a new responsibility, i.e. PWS construction.

(e) Department of Local Administration (DOLA), Ministry of Interior

The main responsibilities of DOLA with respect to small-scale water resources development for drinking and domestic supply have been defined since the 1966 launching of the government's clean water provision program. These were:

- improvement of shallow wells
- construction of water storage containers
- construction and maintenance of ponds.

It should be noted that the larger part of its water resources development responsibility and budget (e.g. 91% in 1992 and 83% in 1993) involved the construction of small-scale irrigation facilities such as weirs, canals, ditches, etc.

DOLA had direct jurisdiction over local officials and operated mainly through the District and Deputy District Officers, who were key actors in district development planning.

DOLA was the lead agency in shallow well improvement, which involved upgrading of unlined wells by providing liners and concrete platforms. Although pond construction comprised the greater part of its rural water supply budget, DOLA's work on ponds was still less than ARD's or LDD's. Similarly, its water collection container activity was less extensive than ARD's. With respect to maintenance and repair, DOLA followed a cost-sharing scheme whereby it shouldered 60%, the Provincial Government financed 20%, and the villagers another 20% of the total costs

The department's budget for the above activities during the 1987-1991 period amounted to more than Baht 100 million. For 1993 alone, the government has allocated about Baht 40 million for the same activities (8).

(f) Community Development Department (CDD), Ministry of Interior

The CDD was only marginally involved in small-scale water resources development. The drinking and domestic water supply facilities included in its area of responsibility were shallow wells and collection/storage containers For shallow well construction, CDD provided the drilling equipment and technical supervision, while the villagers provided the labor and materials and maintained the facilities. Similarly, peoples' participation in terms of labor inputs was required in its jar/tank construction program, while CDD provided the materials and training assistance.

It had 9 regional Technical Assistance Centers in the country. However, its principal focal point of operations was the Community Development Worker assigned in every tambon or subdistrict, who worked closely with the Tambon Council in formulating its development plan.

CDD was second to ARD in the number of shallow wells constructed in 1987-1991. It has built more cement tanks than PWD or DOH and for a lesser budget. Its 1989-1991 budget for these two activities was only around Baht 25 million. For 1993, its budget allocation for shallow wells and tank construction was Baht 12.8 million (8).

(g) Land Development Department (LDD)

The LDD, under the Ministry of Agriculture and Cooperatives, was included in the rural water supply implementing agencies because it was a major developer of ponds Although these ponds were originally intended for small-scale irrigation, these were also used for domestic water supply purposes. For the 1987-1991 period, LDD constructed a total of 249 ponds, with a total budget of Baht 269 million. This was a good second to ARD's 304 ponds during the same period.

In addition, LDD was also involved in shallow well construction to a very small extent (400 wells between 1987-1991 for a total budget of Baht 1.6 million).

Its total budget for these two activities during the 1987-1991 period was around Baht 270 million. Its budget for 1993 for pond construction was Baht 244 million; no shallow well construction was scheduled for the year. LDD was involved in the construction of other small-scale irrigation facilities such as reservoirs, small dams, and ditches which comprised more than half of its annual budget for 1993 (8).

(h) Supreme Command Headquarters (SCH)

The Ministry of Defence had a long history of rural development work in sensitive areas, i.e. those plagued by insurgency in the 1960s as well as the border areas with neighboring countries such as Laos and Cambodia. In these areas, the SCH coordinated all small-scale water resource development for both drinking/domestic use and irrigation purposes, in collaboration with other implementing agencies, particularly ARD Unlike the other RTG agencies discussed earlier, the SCH water projects and their corresponding annual budgets for 1987-1991 (even up to 1993) had been variable.

Among the rural water supply facilities, deep wells and shallow wells have been regularly part of SCH's work, with deep well construction reaching its peak of more than 5,000 units in 1991, which was 94% of the total number of deep wells constructed in the 5-year 1987-1991 period. SCH's shallow well activity was more constant at about 300 wells/year and was greater than DOH's in volume and budget. Pond construction was recorded only in 1987 and in 1991, with 4 and 88 units respectively. Cement tank construction had been more actively engaged in during the 1991-1992 period.

From 1987 to 1990, SCH's total 4-year budget was only Baht 27 million (for deep wells and shallow wells). This burgeoned to more than Baht 500 million in 1991 alone (including ponds and cement tanks). In 1993, its budget shrank back to Baht 22 million for deep well and shallow well construction (8).

(i) Provincial Waterworks Authority (PWA)

The PWA had been traditionally involved only in constructing piped water supply infrastructure and only in provincial centers and main municipalities that were able to pay the imposed water tariffs. As of 1992, a total of 213 waterworks were managed by 10 Regional Offices of PWA all over the country. PWA services did not reach remote rural areas because it was not financially feasible to do so. However, a Cabinet resolution in April 1989 instructed PWA to take over rural waterworks from the local authorities in order to improve the deteriorating and poorly maintained public utility systems. Only 214 out of a total target of 600 water supply systems have been taken over on a voluntary basis as of 1991. The government has subsidized the improvement of some of these systems after they were handed over to PWA. This subsidy amounted to Baht 209.5 million in 1991 (11)

2.3 Foreign-funded Projects

There were altogether 23 foreign-assisted projects relating to small-scale water resources development during the 1987-1991 period. A compendium of project briefs is given in **Annex E** which contains the most pertinent information on each of these projects. This compendium is a compilation of information gathered from the 1989 survey as updated in 1993 combined with the records from the Department of Technical and Economic Cooperation (DTEC). These projects represented about 50% of all foreign-assisted small water resources development in the last decade, the rest being small-scale irrigation and provincial waterworks projects. [Information on these other projects gathered through the survey is compiled in **Annex F**.] Eighteen of these 23 projects were launched within the 6th National Plan period in 1987-1991, mostly at the beginning of the plan period, while 5 were initiated earlier (in 1984,

1985, or 1986) but continued into the 6th National Plan era. By 1993, 5 projects were still in progress, while the majority have been completed already.

The total foreign funding for these projects amounted to over Baht 900 million, excluding Thailand's counterpart contribution. The said amount was estimated to be around 10% of the total RTG budget for small-scale water resources development minus the irrigation component for the same period.

Thirteen of these projects (57%) were in the form of technical assistance which included the provision of technical experts and/or equipment. In this type of project, the implementation was a joint effort of the donor and recipient agencies. On the other hand, 10 projects (43%) could be classified as grant or financial assistance in which the project implementation and fund management were carried out by the recipient agency.

Most of these projects, irrespective of type, were a *combination* of two or more of the following project elements:

- construction or maintenance of facilities
- expert or specialized services
- training
- development/demonstration of prototypes.

However, some of these projects consisted of only a *single* type of activity, as follows:

- construction (3 projects)
- research (2 projects)
- training (1 project)
- credit window facility (1 project)
- purchase/installation (1 project)
- information center (1 project).

Fourteen projects (61%) specifically targeted the provinces in the Northeast region, either entirely or in combination with provinces in other regions, while 5 projects covered areas outside the Northeast. The rest did not have any particular target areas. The most common implementing agencies were the departments responsible for rural water supply, sometimes in partnership with universities. Fifteen projects (65%) had such government linkage, including one project in collaboration with a state enterprise. On the other hand, 5 of the projects (22%) were channeled through the non-governmental organization (NGO) sector, while 3 projects (13%) were carried out by the academic sector.

These foreign-funded projects varied widely as to the size of the budget as follows:

- Less than Baht 10 million - 12 projects
- Between Baht 10-100 million - 8 projects
- More than Baht 100 million - 3 projects

There were basically three types of donors:

- Bilateral agencies - 14 projects
- NGOs - 6 projects
- UN specialized agencies - 3 projects

(a) Bilateral Projects

Five countries, namely Japan, the Federal Republic of Germany, New Zealand, Australia, and Canada, have provided support for projects on rural water supply in Thailand during the 1987-1991 period.

Among the donor countries, Germany had the most number of and the most diverse aid projects. In terms of financial contribution, Japan was the biggest donor, accounting for 60% of the total foreign inputs during this period. The levels of assistance in terms of number of projects and financial contribution of the various bilateral funding sources are shown in Table 2.2.

Table 2.2 Extent of Bilateral Support of Various Donor Countries

Donor Country	Executing Agency	Number of Projects	Donor Contribution (Million Baht)	Percent Contribution
1. Japan	JICA	3	574.69	59.8%
2. Federal Republic of Germany	BMZ c/o:	7	~334.93	34.8%
	KfW	2	~219.-	
	CDG-SEAPO	2	~82.-	
	GAA	2	~21.93	
	GTZ	1	~12.-	
3. New Zealand	MERT	1	24.75	2.6%
4. Australia	AIDAB	1	22.78	2.4%
5. Canada	IDRC	2	3.91	0.4%
T O T A L		14	~961.06	100.0%

Following is a description and comparison of these projects:

JAPANESE-SPONSORED PROJECTS:

JICA:	"*Drinking Water Provision Program*" (**DWPP**)	1988-1992
JICA:	"*Accelerated Groundwater Development in Rural Areas in the Northeast*" (**AGD**)	1989-1993
JICA:	"*New Village Development Program*" (**NVDP**)	1988-

The JICA-sponsored projects consisted of two technical assistance projects (DWPP and AGD), and one financial assistance project (NVDP). The former were the top two foreign-assisted projects in terms of budget, each with a donation value of over Baht 200 million. Combined, these three Japanese-sponsored projects comprised 60% of the total foreign aid to Thailand involving small scale water resources development during the 6th National Plan period. All these projects started almost in the same year, i.e. 1988, and all of them involved groundwater development. The salient features of each of these projects is discussed below.

The **DWPP** was a five-year technical assistance project that involved the acquisition of tube well drilling and support equipment as requested by the Deep Well Drilling and Development Division of PWD. The project was intended to result in increased drilling capacity of PWD from 1,300 wells to 2,000 wells per year in order to alleviate the drinking water shortage in rural areas all over the country, particularly in drought areas. The project cost amounted to about Baht 229 million, which was utilized entirely for equipment procurement.

The **AGD** project was very similar to the DWPP. It was also in the form of technical assistance involving the provision of deep well drilling equipment amounting to Baht 270 million. It was a five-year project that started in 1989 (although it was inaugurated in 1988) and was scheduled to be completed in 1993. This project was administered by the ARD, and it was confined to the Northeast region only.

The **NVDP**, by contrast, was a program and not a project on integrated rural infrastructure development, of which water supply was one of the components, and was confined to the Thai-Lao border areas. It was launched in 1988 and was very much patterned after its predecessor, the German-sponsored "Village Development Program" that covered the Thai-Cambodian border areas. Aside from small water resource development, the NVDP involved rural road construction, health care, and agricultural development. The water supply component included groundwater survey and well drilling activities. The implementation of the project was coordinated by the SCH of the Defence Ministry and it involved other government agencies such as the ARD. The financial grant for this program amounted to Baht 74 million.

GERMAN-SPONSORED PROJECTS:

KfW:	"*Village Development Program II*" (**VDP II**)	1985-
KfW:	"*Village Development Program IV*" (**VDP IV**)	1988-
CDG-SEAPO:	"*Thai-German Self-help Training Project on the Development of Small Water Resources in Rural Areas, Phase I*" (**SWRD I**)	1987-1990
CDG-SEAPO:	"*Thai-German Self-help Training Project on the Development of Small Water Resources in Rural Areas, Phase II*" (**SWRD II**)	1990-1994
GAA:	"*Water Resources Development Project*" (**WRDP**)	1988-1990
	Thai-Ger Fund Projects (**TGF**)	-
GTZ:	"*Revolving Fund for Rural Communities Water Supply Rehabilitation Project*" (**RF**)	1985-1998

The six German-sponsored projects ranged from medium to large-scale projects, one of which was over Baht 100 million while the rest were between Baht 10-100 million. Most were grants, except CDG-SEAPO's two SWRD training/technical assistance projects. The four projects going on until 1993 that were implemented through the government/state enterprise channels were relatively long-term projects ranging from 7 years (i.e. SWRD I through II) to an indefinite period of time (i.e. VDP II & IV). One project (i.e. WRDP) channeled through the NGO sector was of a shorter duration of 2 years.

The **VDP series**, consisting of seven phases, was a multi-sectoral financial assistance package devoted to rural infrastructure development, covering roads/bridges, drinking/domestic water supply, irrigation, housing, health care, fisheries, and agriculture - confined to the Thai-Cambodian border areas that have been affected by the influx of Cambodian refugees. Although the VDP was not solely a water supply project, water resource development was a sizeable component of VDP II, initiated in 1985, VDP IV in 1988, and the latest VDP VII in 1992. The VDP II and VDP IV budgets amounted to about Baht 219 million (the total commitment of the German Government to the entire program was Baht 1,305 million). Unlike projects, these programs did not have any time boundary, but rather were terminated when the funds ran out. The water resource development activities undertaken were construction of deep wells, ponds, and jars, as well as maintenance of wells. The SCH of the Ministry of Defence coordinated the inputs of involved RTG agencies, one of which was the ARD Office responsible for the water supply component of the program.

The **SWRD I and II** were basically training projects that were aimed at fostering self-reliance among villagers in solving their water shortage problems. The training courses were designed to upgrade

the capability of the target groups in analyzing their water problems, in generating and evaluating solution options, and in formulating water resources development plans. This type of training was given to various levels of local administration officials from the provincial to the village level, with the district level trainees serving as trainers of village leaders. To the village technicians, special hands-on technical training was offered concerning the construction of mortar tanks (training on shallow well and jar construction was also conducted under the project in the past). SWRD I (1987-1990) was confined to two provinces in the Northeast, namely Ubon Ratchathani and Nakorn Ratchasima. It was extended to all the provinces in the Northeast region in SWRD II (1990-1994), covering 2,543 villages or 9.2% of the total villages in the region. Khon Kaen University (KKU), DOLA, and CDG-SEAPO jointly implemented and managed the project, with KKU providing the technical expertise, DOLA the institutional support and financial outlay for the implementation of the villagers' water projects after the training, and CDG-SEAPO the training expertise and financial outlay for the training activities.

The **WRDP**, on the other hand, was a two-year NGO grant project covering four provinces in the Northeast. Completed in 1990, it primarily involved construction of water resource facilities such as weirs, piped water supply systems, shallow wells, deep wells, and storage tanks. The project had a training component related not only to construction, but also in order to strengthen the capability of user committees with respect to utilization, maintenance, and management of the facilities, including fund administration. In addition, the project engaged in introduction of two new technologies (small mortar tank and piped distribution system) in selected villages. The implementor of the project was the Population and Community Development Association (PDA), while the Baht 17.3 million grant from BMZ was administered by the German Agro Action (Deutsche Welthungerhilfe).

The **TGF** Projects in 1987-1991, which were funded also through the German Agro Action, consisted of 30 small water projects with budgets ranging from Baht 27,000 to Baht 300,000. As listed in Annex E, all these projects involved construction of water resource facilities, most of them done in the Northeast region. Eighteen of these projects were intended for villages or communities, while 12 were constructed for schools and temples. Of the 18 village or community projects, only five were exclusively for irrigation purposes. The remaining 13 involved construction of ponds, jars, tanks and piped water systems as well as development of groundwater. The total budget spent during the 1987-1991 period was Baht 4.63 million.

Lastly, the GTZ-sponsored **RF** project, was implemented by the PWA in collaboration with the Thai Farmers Bank. The project was a credit window facility to assist rural communities in rehabilitating village piped water supply systems. Beneficiaries could avail of a low 4% interest rate, a maturity period of 10 years, and a one-year grace period. As of 1993, twelve communities have borrowed a total of Baht 11.6 million from the Fund. Although this project attempted to encourage users to assume ownership of and responsibility for their water supply systems, the loan guarantor issue had become a major problem as village headmen were invariably reluctant to take the risk because, in reality, the water facility was not considered a personal asset. This was compounded by the uncertainty surrounding who should take responsibility for these facilities.

NEW ZEALAND-SPONSORED PROJECT:

MERT:	"*Thai-New Zealand Small Watershed Development Project*" (**SWDP**)	1988-1991

The **SWDP** was a Baht 24.75 million technical assistance project co-implemented by the Water Resources and Environment Institute of Khon Kaen University and DOLA. The project aimed to develop small watersheds through systematic planning and construction of weirs, reservoirs, deep wells, and other facilities. The main result of the project was the formulation of a small watershed planning and management model using two Northeastern provinces, namely Nakorn Ratchasima and Ubon Ratchathani, as pilot study areas. This pilot study involved: (a) the development of a computer-based geographic information system to aid RTG agencies in planning and managing the development of small watersheds;

(b) construction of weirs, deep wells, reservoirs, etc.; and (c) technical, management, and training support for existing water resources development programs that foster voluntary participation of villagers. Aside from the villagers, the local administration officials such as the District Officers, Deputy District Officers, and District Technicians were the recipients and beneficiaries of technical, management, and training support activities. After the project was completed, it was
envisaged that the pilot model resulting from the project would be adopted and applied to all small watersheds nationwide.

AUSTRALIAN-SPONSORED PROJECT:

AIDAB:	*"Thai-Australian Northeast Village Water Resource Project, Phase II"* (**VWRP**)	1986-1991

The **VWRP** was a Baht 22.78 million, multi-agency, technical assistance project for the Northeast that was coordinated by NESDB and involved ARD, DOLA, CDD, DOH, DMR, PWA, RID, DAE, LDD, RFD, and Khon Kaen University. Its long-term objective was to provide planning, coordinating, technical, and training assistance to these RTG agencies and local institutions for the implementation of small water resources development activities, and as such, to contribute to institutional development. The project activities were divided into four categories: *(a) water resources management* - involved the development of coordinated planning procedures and management information system (called the Water Information System for Provincial Planners, WISPP) to enable planners to easily prioritize water resource development needs; it also involved the preparation of a user-friendly Groundwater Probability Map; *(b) water facilities development* - involved mainly the extension of village piped water supply systems; *(c) water use and sanitation* - involved raising of people's awareness on proper water utilization and hygienic/sanitary practices, for which water quality monitoring and a study of water-borne diseases were conducted; and *(d) agricultural water management* - involved improving the utilization and management of small irrigation facilities, and to some extent, assist in the construction of facilities. All these project measures involved training of government officials and/or villagers as well as incorporated sociological considerations.

CANADIAN-SPONSORED PROJECTS

IDRC:	*"Evaluation of Rainwater Quality"* (**ERQ**)	1986-1988
IDRC:	*"Transfer of Self-reliant Technology for Rural Communities in Thailand with Special Reference to Water Technology and Sanitation"* (**TST**)	1987-1989

The two IDRC-financed projects were both research-related grants given to requesting universities. The **ERQ** was a project of Khon Kaen University aimed at studying the route of rainwater contamination, as well as the effects of water handling/usage practices and of collection/storage systems on the level of contamination in order to develop recommendations on reducing contamination and improving the quality of rainwater for drinking. The project sites were Khon Kaen in the Northeast and Samut Songkhram in the Central region. The donor contributed about Baht 2.9 million.

The **TST**, on the other hand, was a combined research, technology transfer, and training project conducted by Chulalongkorn University in three selected villages in Prachuap Khirikhan Province in the Central region. The project involved the introduction of two types of facilities: PVC-lined pond and pour-flush latrines. The villagers were mobilized in the planning and implementation of the project and were trained on how to construct the facilities. The effectiveness/weaknesses of the technology transfer process were studied. The IDRC grant amounted to Baht 1 million.

(b) NGO-funded Projects

The two NGOs that sponsored small water resources development projects during the 6th National Plan were the Catholic Relief Services and the World Concern. These projects were relatively small in terms of budget and area coverage. They were highly localized and were mostly technical assistance projects involving the dispatch of technical advisers, except for one financial aid project. The levels of assistance of these NGOs in terms of number of projects and financial contribution is shown in Table 2.3.

Table 2.3 Extent of Foreign NGO Support

Donor NGOs	Number of Projects	Donor Contribution
Catholic Relief Services	5	Baht 0.862 million
World Concern	1	Baht 0.795 million
T O T A L	6	Baht 1.657 million

CATHOLIC RELIEF SERVICES-SPONSORED PROJECTS:

"*Ban Peu Water Jar Project*" (**BPeu**)	1987-1988
"*Development of Water Resources and Integrated Farming in Don Kok Village*" (**DKV**)	1987-1990
"*Gravitational Water Supply for Hmong Hilltribes in Petchabun*" (**GWS**)	Feb-Aug 1988
"*Water Tanks for Nine Border Village Schools*" (**WT**)	May-Oct 1988
"*Ban Prachao Water Jar Project*" (**BPra**)	1988-1989

The above-listed projects supported by the Catholic Relief Services (CRS) were not only target village-specific, but also very specific as to the types of water facilities constructed or procured. The donor contributions ranged from Baht 43,000 to Baht 530,000. All were technical assistance projects that involved construction and training of villagers, except the **WT** project in which the water tank facilities were simply purchased and installed. The **BPeu** and **BPra** projects were very similar in that both entailed the construction of rainwater jars and of appropriate roofing for collection of rainwater as well as the training of villagers on these construction activities and on health and sanitation aspects. They were located in Northeastern provinces, one in Udon Thani and one in Khon Kaen, and both were co-implemented by local Catholic NGOs. The main difference was the size or coverage of the project as Ban Peu's budget was about six times larger than Ban Prachao. On the other hand, the **DKV** project, implemented in collaboration with a missionary group and the village training center, was a combined drinking and agricultural water project in a village in the Northeastern province of Nongkhai. It was CRS' largest project in terms of scope and financial contribution, which amounted to Baht 530,000. Lastly, the **GWS** project, which together with the earlier mentioned **WT** project was of a very short duration of half a year and was requested by a government agency (DPW and Police Department, respectively), involved the construction of storage tanks and gravitational pipeline. This water supply system has benefitted a hilltribe village in Petchabun of the Northern region.

WORLD CONCERN-SPONSORED PROJECT:

"North Village Water Distribution Project" (**NVWD**)	1989-1992

The **NVWD** was a more recent technical assistance project completed in 1992 in collaboration with the DPW. It involved the construction of a piped distribution system in order to provide drinking water supply to the hilltribes in the Northern provinces of Chiang Mai and Chiang Rai. It was quite similar to the abovementioned GWS project but of a longer duration of three years and a much larger budget of Baht 795,000.

(c) UN-funded Projects

There were three UN-supported water resource development projects that were implemented during the 6th National Plan, two of which were in cooperation with the United Nations Development Program (UNDP) and one was sponsored by the World Health Organization (WHO). The UNDP support was in the form of technical assistance to relevant government agencies, while that of WHO was a grant to a joint university-government research project. All of these projects were completed in 1989. Although the donors' budget range (between Baht 235,000 to over Baht 5 million) was higher than the NGO-sponsored projects, they were still small compared to most of the bilateral assistance projects. Table 2.4 shows the levels of support given by the respective UN specialized agencies in terms of number of projects and financial contribution.

Table 2.4 Extent of United Nations Support

Donor UN Agencies	Number of Projects	Donor Contribution
UNDP	2	Baht 9.499 million
WHO	1	Baht 0.235 million
T O T A L	3	Baht 9.734 million

UNDP-SPONSORED PROJECTS:

"*Groundwater Data Center*" (**GDC**)	1984-1989
"*Development of Standard Handpumps and Community Maintenance System in Rural Water Supply*" (**DSH**)	1987-1989

UNDP co-financed two technical assistance projects during the 6th National Plan period. The **GDC** project, which actually started in 1984 and was completed in 1989, was to support the establishment of a computer-based groundwater data storage and retrieval system stationed at the DMR. All the agencies involved in groundwater development could avail of the center's services. The project entailed expert technical advice, hardware and software support, as well as in-house training of DMR staff. UNDP contributed Baht 5.269 million out of the total Baht 7.395 project cost.

The **DSH** project, on the other hand, was a multi-agency assistance project that involved the participation of DOH, PWD, ARD, and DMR in collaboration with KKU and UNDP/World Bank experts. The project resulted in the development and installation of a number of standardized deep-lift and low-lift handpumps that can be maintained and repaired at the village-level and also manufactured in the country. The demonstrations were located in Khon Kaen province. Training was also a major project component aimed at propagating the principles and techniques of community-level maintenance of pumps. The training program consisted of training of trainers from the concerned implementing agencies who in turn trained the village technicians. Of the total project cost of Baht 6.146 million, Baht 4.23 million was borne by UNDP.

WHO-SPONSORED PROJECT:

"*Research Project for Community Management of Water Supply*" (**CMWS**)	1988-1989

The **CMWS** was a small research project financed by WHO that was commissioned by the DOH to Chulalongkorn University. The research involved the survey and analysis of management and operating procedures of government agencies providing piped water supply services. Certain guidelines were recommended towards more effective planning and management of village water supply systems. The one-year research project cost Baht 235,000.

3. ASSESSMENT OF WATER SUPPLY PROGRAMS AND PROJECTS

Based on the survey and interview findings discussed in the previous chapter, an assessment of some selected aspects of the rural water supply program during the study period was attempted. The assessment was focused on the following factors:

- coordination: occurrence of duplication or complementarity of efforts
- contribution of foreign-funded projects
- effectiveness of program implementation

Efficiency of the program implementation process would be an interesting factor to evaluate. However, the tools and methodologies employed in this study were not sufficient or rigorous enough to suit such a process evaluation.

3.1 Duplication or Complementarity of Efforts

The coordination factor, or lack of it, is almost always the greatest bottleneck in the implementation of programs that involve not only many government agencies but also a number of foreign aid agencies. One of the unwanted results of lack of coordination is overlapping of activities in a particular location benefitting the same target groups. This is a major concern, not only to foreign donors but also to national planners, because such duplication of efforts invariably entails wastage of valuable money, time, and effort.

Duplication of efforts in the context of this study must be qualified first. Having a similar type of water resource development activity alone does not constitute an overlap if this activity is done in different areas or if it benefits different groups or individuals. Thus, in this study, the **target area** and the **target group** parameters were considered as the preliminary indicators of overlap at the reconnaissance level. Only if some overlap at this level was detected would it be worthwhile to examine in detail the types of **project activities or components** undertaken, as related to the **project objectives**. The other parameters that were considered afterwards were the partner institutions and time frame.

In the same token, RTG implementing agencies engaged in the same type of activity would not be considered as duplicating each other's efforts for as long as they conduct it in different areas benefitting different people. However, the assessment of duplication of the nature of work or responsibilities *per se* among the several RTG agencies with respect to small water resources development constituted a separate inquiry on institutional efficiency evaluation, which was not included in this investigation.

Three types of comparisons are discussed in this section: i.e. among RTG-funded programs, projects, or activities; among foreign-funded projects; and between RTG- and foreign-funded activities.

a) Among RTG-funded Programs/Projects/Activities

All the RTG implementing agency officials interviewed in this study consistently claimed that no overlapping of water projects in rural areas usually occurred because the G-Ch-Ch system effectively prevented duplication. The system had a built-in mechanism that allowed for scrutiny and integration of village water resource development plans at various levels of local administration. Once the villagers have prepared their plan with the help of the Tambon Advisory/Support Group, the plan was evaluated by the District Development Committee. The various village development plans were integrated into a district development plan that was further assessed by the Provincial Development Committee, which finally produced the provincial development plan. At each stage of review, overlapping activities could be spotted and eliminated. Moreover, the implementing agencies were represented at either the district or provincial level and themselves served as members of the respective development committees. These committees therefore acted as the focal point of inter-agency coordination at the local level.

However, this system was not fool-proof. The G-Ch-Ch system was based on the principle of decentralization of development planning to the local administration, in particular to the province. It was sound in principle, but whether it was practised as effectively and efficiently as it was planned was arguable. The effective execution of this policy depended primarily on two factors: the ability and willingness of the local administration and leaders to take on the responsibility, and the seriousness of the central government to empower the local authorities. The realization of these two factors may be in question since it had been observed that "provinces do not participate in determining the policy for solving water problems in their own area" (9). Even if this phenomenon did not directly bear upon the issue of prevention of duplication of efforts, it seriously raised doubts on the effective integration and assessment of water development plans at the local level.

Another systemic constraint occurred when politicians, academics or powerful advocate groups have been known to concentrate and facilitate pet water projects in particular areas that may have been serviced already by the implementing departments or aid projects. Sometimes, the concentration of small water resource development activities by various agencies in certain areas was due to the availability of and easy access to either groundwater or surface water sources there. Paradoxically, those that needed immediate assistance were the areas without easily available water supply sources.

Another overlapping possibility could happen when provincial authorities intentionally submit small water resource development proposals to more than one implementing department. However, this latter case did not pose serious overlapping problems because it could be detected and ameliorated at the local level when representatives of the concerned departments inspected the site before implementation.

Many of these loopholes point to a particular gap: the lack of a functional and effective central coordinating body that will oversee the entire program, from policy framework formulation to monitoring and evaluation of the implementation process. **What has happened for the past ten years was that, at every government turn-over, there had always been strong policy directives advocating small water resources development for rural areas; however, these policy statements had not been accompanied by a coordinated and efficient implementation strategy overseen by a central interdepartmental body or a task force that aimed at achieving end results.**

One symptom of this gap was the lack of monitoring and evaluation activities. Year after year, implementing departments proposed rural water supply activities for which millions of baht were allocated; yet no central government body was monitoring or evaluating whether the funds had been well-spent or not. Piles of data had been collected and available for such monitoring and evaluation tasks. For instance, NESDB is the home base of the biennial NRD2C census data; moreover, NWRC compiles the annual outputs of implementing agencies down to the district level. But since it was not clear which agency was responsible for the central management of rural water resources development, the monitoring and evaluation had been overlooked. Another symptom was the lack of an operational master plan by which to direct the implementation process, as well as measurable targets by which to assess accomplishments.

This policy-implementation gap became apparent in the process of interviewing the respective department officials. When asked whether they were guided by or required to follow any "master plan" or "action plan", or whether they were coordinating with any inter-departmental body, their answers were invariably 'no'. This only showed that there had been no concerted effort to execute either the Master Plan or the Action Plan or, if they were not deemed feasible, other concrete alternative directional framework.

Despite these constraints that may pose potential duplication of efforts, it was the contention of all parties consulted that duplication of work was not a serious concern because the demand for water in the rural areas was yet so great and the amount of development work that still needed to be done was so enormous that the occurrence of overlapping was somehow immaterial. The fact that the combined efforts and resources of all the RTG implementing agencies had not been sufficient to saturate the water demand implied that there was little if no room for overlapping of work, except in isolated cases. In other words, it was professed that there was enough work for every agency.

b) Among Foreign-funded Projects

Among the foreign-funded projects, those that were sited in the Northeast region benefitting certain provinces had the greatest potential for overlapping. These projects were the following:

- *Thai-German Self-Help Training Project on the Development of Small Water Resources in Rural Areas, Phases I and II* (CDG-SEAPO/DOLA/KKU)
- *Thai-New Zealand Small Watershed Development Project* (MERT/DOLA/KKU)
- *Thai-Australian Northeast Village Water Resource Project, Phase II* (AIDAB/NESDB/ ARD/CDD/DOLA/DOH/DMR/PWA/RID/DAE/LDD/RFD/KKU)
- *Water Resources Development Project* (GAA/PDA)
- *Accelerated Groundwater Development in Rural Areas in the Northeast* (JICA/ARD)

These constituted the largest and most extensive rural water supply projects of all those investigated in this study, and it was not surprising that they were all targeted at the Northeast region where the need was greatest.

At first glance, the Thai-German (Phase I) and the Thai-New Zealand Projects would seem to have overlapped owing to the selection of Nakorn Ratchasima and Ubon Ratchathani as the pilot provinces in both projects and the similarity of target groups, i.e. both involved the Deputy District Officers, District Technicians, and the villagers. Moreover, the co-implementing agencies in the two projects were the same, i.e. DOLA and KKU. However, a closer look at the project activities revealed that they were essentially different. The Thai-German (Phase I) Project mainly involved training on community planning and participation in small water resources development as well as technical training on the construction of rainwater jars and shallow wells. These activities actually coincided with and supported the activity realm of DOLA in the **drinking water supply** program. On the other hand, the Thai-New Zealand Project focused primarily on development of **irrigation** systems, notably weirs, in small watersheds. In terms of planning and management support, the said Project concentrated on the establishment of management models and information support for **provincial and RTG agency administrators**, whereas the Thai-German Project was focused more on **grassroots level** planning and decision making. Thus, with respect to the water facilities developed and the capability-building approach, these two projects can in fact be considered as strongly complementing each other. Curiously, one may question why these projects could beautifully complement each other in the same provinces involving the same local partner agencies. Circumstances indicated that Nakorn Ratchasima and Ubon Ratchathani were well-endowed with foreign assistance during this time period as compared to other Northeastern provinces in dire need of water. Thus, the process of priority setting in terms of which province should receive assistance would need to be looked into. In this situation where a central mechanism to coordinate and arbitrate this issue had been apparently lacking, local politics could be the determining factor.

The Thai-Australian and the Thai-New Zealand Projects had one common activity: that of the development of "management information systems". Upon closer inspection, it was noted that the former was involved in groundwater mapping, which was technically a component of the latter's geographic information systems. Thus, another case of complementarity. The Thai-Australian Project, although sharing similar features with the Thai-German Project in terms of project objectives and some training activities, could be considered as belonging to a different type because it was primarily an institutional strengthening endeavor that in principle involved all the major RTG agencies responsible for rural water supply. These three projects, operating and based in Khon Kaen at one time, had the advantage of **close local linkages and informal coordination**, as pointed out by the respective project managers interviewed.

The GAA/PDA Project, an NGO collaboration, was the most focused and straightforward in terms of project objectives and expected results. It was intensive as to the concentration of target areas in only four provinces, and yet extensive as to the types of water resource facilities constructed which included a number of drinking/domestic water as well as irrigation facilities Comparing the GAA/PDA Project with the abovementioned three other projects, general commonalities could be detected in terms of target provinces, project components such as training and construction, and some types of water facilities constructed. Indeed, there was a great potential for serious overlaps, although the respective respondents denied any. In fact, a more detailed site investigation, which was outside the scope of this study, should be able to reveal if duplication has occurred at the village level within the four common provinces. Similar to the case of the RTG implementing agencies with overlapping water resource development responsibilities as discussed earlier, much of the **preventive and remedial measures depended on the field staff operating at the local level** who were familiar with the site conditions. It was noteworthy that the GAA/PDA Project (Phase III) and Thai-German Project (Phase II) have been "informally" collaborating and participating in each other's activities, which not only in effect prevented duplication of efforts but also synergistically supplemented each other's efforts. Once again, such informal linkages had automatically bridged any gaps in coordination mechanisms at the central or regional level.

The JICA/ARD Project was viewed as more of strengthening the deep well construction work of ARD in the Northeast using the drilling and support field equipment donated by JICA. Any site overlaps with the other projects or with the same activities of other RTG agencies would have been prevented or remedied by the ARD field staff.

There were three other small projects, sponsored by the Catholic Relief Services, that were exclusively confined to specific villages in three Northeastern provinces. These were only three of the thousands of villages whose water shortage problems had been yet unsolved or untouched by government and/or foreign aid efforts. Whether they were assisted at all would be the issue, and not whether duplication of efforts did occur.

One UNDP-sponsored project, also conducted in the Northeastern province of Khon Kaen, used the village sites only for handpump operation and maintenance demonstration purposes. This project was significant because it led to the standardization and local manufacture of four types of handpumps, which were later propagated by DOH, PWD, ARD, DMR and KKU. Therefore it had far-ranging effects in terms of utility, and clearly addressed the technological gap with respect to sustainability of pumps. Discounting the location of demonstration sites, this project was in many respects unique thus rendering the question of overlapping rather immaterial.

The other remaining foreign-assisted projects sited in other parts of the country were either confined to specific areas or of general application. They presented no overlapping problems since most of them were unique projects in terms of types of activities or target areas.

*c) **Between RTG- and Foreign-funded Activities***

The common reasoning given by government officials interviewed when asked about any possible incidents of overlapping between RTG- and foreign aid activities was that the areas lacking or with

insufficient water supply were too many, that the water shortage problem was far greater than what RTG and external sources could address such that the point of saturation whereby duplication of efforts could occur was still very remote. In fact, the relationship between RTG- and foreign-funded projects had been invariably one of complementarity. In several cases, the foreign-sponsored projects were intended to supplement the activities of the respective RTG agencies that requested for such support. For example, most of the foreign-aided research and development projects were done in order to improve either the technology options or to improve implementation of government programs. Many of the technical assistance projects in partnership with RTG implementing departments were also seen in the same light. For instance, the Thai-German Project that concentrated on capability-building with respect to planning and implementing water projects at the grassroots level was in support of the overall G-Ch-Ch system of rural development planning and management. The Thai-Australian Project was intended to strengthen the competence of the principal RTG implementing agencies. The two JICA technical assistance projects concerning groundwater development were to enhance the well drilling outputs of PWD and ARD.

On the other hand, those conducted solely by NGOs without government agency involvement may have some potential overlap with government activities. However, since local NGOs were well attuned to local conditions and to the needs of villagers, the projects selected were to address the most pressing needs that had not reached the attention of government agencies. Likewise, they usually had strong civic connections with the local administration body that enhanced information and coordination flow at the local level. Thus, whether small or large, these NGO projects had reliable built-in mechanisms at the planning and implementation stages that precluded overlapping with similar work by the government sector.

3.2 Contribution of Foreign-funded Projects

This was not intended to measure the overall impact of the foreign-assisted projects but, rather, to identify the contributions of these projects to the country's rural water supply program. Not all of the government officials consulted believed that the foreign aid projects were essential as these tasks could have allegedly been done by Thai experts and funds just as well. This opinion was more pronounced among a few officials from agencies that had rather limited involvement in foreign-funded projects. On the contrary, those whose departments had received ample benefits, whether in terms of technology transfer, technical assistance or grant, even suggested that the existing level of foreign cooperation was still inadequate. Those officials have recognized and acknowledged the limitations of the government sector's capacity to address all the water resources development needs.

The contributions of the localized projects, mostly involving small water facilities and infrastructure, were very tangible at the village level even though many were relatively small projects. These small localized projects included the six implemented mostly by local NGOs. Also among the village-specific activities were the three large village development programs coordinated by the military along the sensitive border areas. These were likewise characteristically high-impact projects as far as village beneficiaries were concerned.

The projects with much greater scope, i.e. at the regional or multi-provincial level comprising aggregates of selected villages, were the Thai-German, Thai-New Zealand, Thai-Australian, and the GAA/PDA Projects. These projects had greater impact at the provincial level not to mention the tangible contributions at the respective target villages where water facilities had been developed. In particular, these projects were very visible in the following provinces where most of the operations were concentrated: Nakorn Ratchasima, Ubon Ratchathani, and Khon Kaen. These four giant projects for the Northeast contributed considerably not only to the development of thousands of small water resource facilities in these areas, but also to human resources development in terms of training thousands of local officials and villagers. As mentioned earlier, these projects complemented and supplemented the work of the concerned RTG departments and local administration bodies. Through these projects, the construction of water

facilities as well as management support and training activities in the Northeast were hastened and improved.

Of particular note was the thrust of the Thai-German project to people's participation and empowerment, the impact of which may not be easily measurable, but could perhaps be more significant than the physical infrastructure developed. Using a unique training methodology called the project casework approach that guided villagers through the entire process of planning for small water resources development in their village, this project had enhanced the villagers' problem-solving capability and gave them access to information, i.e. technical, financial, and institutional, that otherwise would remain inaccessible or unfathomable. The training process required the villagers to generate their own options and make their own decisions, with limited help from the Tambon Advisory Committee/Group. The ensuing plans had been submitted to the proper channels, but realizing that government services would take time, the Project had collaborated with NGOs such as PDA and Thai-Ger Fund to provide financial assistance for the execution of the villagers' plans. This training project, although could not go much into actual implementation of villagers' plans, had provided the basic ingredient for government and other efforts to build upon, i.e. informed and empowered villagers. Because they were the main actors in the planning process as well as co-investors in the implementation of the plan, the villagers did have a strong sense of ownership over their completed water facilities. Moreover, the project incorporated management training and training of trainers as well for provincial and district officials who served as co-implementors of the project.

The Thai-New Zealand and the Thai-Australian Projects, on the other hand, primarily had direct usefulness to the local administration and to the respective RTG implementing departments in terms of information systems, management prototypes, as well as technical assistance in a wide variety of water resources development activities. The benefits derived, in effect, trickled down to the villagers in the project sites. The Thai-Australian Project, in particular, provided technical assistance in the assessment, maintenance, and rehabilitation of water facilities; in developing procedures and information systems to improve the water resources planning capability of the concerned RTG agencies; as well as in initiating health and sanitation activities, including training and interagency and NGO coordination. All this relevant technical assistance rendered to NESDB and RTG implementing departments during the project life was very valuable. However, whether or not a well-rooted and long-lasting institutional strengthening and coordination, which the project intended to catalyze, was achieved was not evaluated in this study. Concerning the Thai-New Zealand Project, tangible technical inputs were given by the project to people's volunteer programs with respect to small irrigation systems. In addition, the farmers and inhabitants in the project sites in two provinces directly benefitted from the pilot studies, not to mention the local water resource planners and managers. One interviewee mentioned that there was a move to adopt and apply the small basin management model formulated through this project to all small watersheds throughout the country. This, however, encountered strong opposition in the Cabinet and was not approved.

The UNDP's Groundwater Data Center, the WHO's Development of Standard Handpumps, and JICA's two groundwater technical equipment assistance projects proved to be very useful to the intermediate beneficiaries - the requesting agencies, namely the DMR, DOH, PWD, and ARD. By enhancing the technical capability of these key departments through equipment support and expert assistance, they were better able to improve the performance of their respective duties. In the case of DMR, it acquired the capacity to store, transform and retrieve groundwater data all over the country and its information services were made available to other departments as well. The DOH and other agencies responsible for installing handpumps propagated locally-manufactured, easily-maintained models, to the benefit of water users. Likewise, through the newly procured drilling equipment of PWD and ARD, they were able to increase their well-drilling capacity.

The GTZ/PWA Revolving Fund for Community Water Supply Rehabilitation Project and the WHO/CU/DOH Research Project for Community Management of Water Supply were one-of-a-kind projects intended to support villagers who were operating their own piped water supply systems. The former has provided credit to specific communities to finance the rehabilitation of their water supply

systems. Only twelve communities could avail of the credit facility as this was all the grant of Baht 12 million could accommodate. On the other hand, the WHO-sponsored research project commissioned by DOH to Chulalongkorn University came up with some guidelines and recommendations on how to improve the planning and management of village piped water systems with maximum participation by the community. This research project was prompted by the intention to decrease the government expenditure in the repair of constructed water supply systems. The ultimate utility of this research, together with the two other research projects funded by IDRC, depended not only on the soundness of its findings, but also on the adoption and execution of these findings.

3.3 Effectiveness of Program Implementation

Between 1987 and 1991, the financial outlay for the small water resources development program for rural areas was over Baht 20,000 million. As of 1990, there had been 20,430 small-scale surface water projects and 79,100 small-scale groundwater projects throughout the country (10). The **effectiveness** of all these efforts, inclusive of all government, NGO, and foreign-supported activities, could be seen in its **effect or outcome** pertaining to the alleviation of the water shortage problem, and not by the number of water projects or facilities constructed.

One way to measure the effect is to **compare the situation with the target goals.** The government's target for drinking and domestic water supply was set at providing at least 50 liters/person/day of water to 95% of the rural population by the end of 1991. Another government target cited by NESDB was to provide adequate and safe drinking water to 95% of rural households and adequate domestic water to 75% of households. Based on 1990 NRD2C census data, 37.17% of rural households or 2,547,370 households did not have sufficient drinking water supply, while 25.18% or 1,739,663 households did not have sufficient domestic water. In other words, by 1990, 62.83% of households had access to adequate drinking water, while 74.82% had sufficient water for domestic use (9). These figures indicated that the set target for domestic water supply had been met largely, whereas drinking water supply was still below target level, i.e. 32% of rural households still had to be provided with drinking water in order to meet the target.

Another way of measuring the effectiveness of the program execution is to **compare the situation before and after the program.** In 1986, the NRD2C census data indicated that 32,584 villages did not have sufficient drinking and domestic water supply, with half of these located in the Northeast (8). In 1990, the number of villages without sufficient water was 35,529 or 61.2% of the total villages in the country, 47% of which were in the Northeast (9). It was apparent that the water shortage problem had not been effectively abated at the village level and, as the numbers showed, had become even worse. This apparent lack of progress in solving village water shortage problems indicated that providing water facilities may not be the prime factor after all. In fact, based on reports of RTG implementing departments, the number of water facilities had steadily increased as annual budgets for development of rural water supply were consumed. Despite such intensive efforts and huge expenditures in constructing water facilities, the percentage of villages suffering from lack of water seemed to have been fixated at the 61% level!

The problem had remained intractable due to a number of reasons. One was that supply cannot cope with the demand due to **rapid population increase.** As a result, the number of villages that required water supply had increased by almost 10% from 1984 to 1990. Another reason that could largely account for the continuing shortage scenario was that existing water facilities were **not efficiently utilized.** It had been calculated that the total number of existing facilities theoretically could service more than the entire rural population (9). However, for one reason or another, a large number of existing water facilities were rendered useless or incapacitated. The following utilization pitfalls were identified:

- Many existing water facilities were localized in areas where water sources were easily available
- The drought-stricken villages were usually in remote places where groundwater was not available in the right quantity and quality, and far from any surface water sources
- Some water facilities were constructed in areas without sustainable water sources and have therefore become useless
- Some people didn't like to drink rain water and used it only for domestic purposes
- Decrease in groundwater and other sources
- Many water facilities were out of order or damaged (e.g. broken pumps, etc.)

Some of these pitfalls were due to external physical constraints and sociological factors, while one was rooted to lack of maintenance and repair. It was quite interesting to note that most of the utilization problems could be traced back to **weaknesses in the planning process**. Even though the G-Ch-Ch could provide the avenue for broad-based participation in the planning process, it could not ensure that a sound and feasible plan will be implemented to produce the needed results, which very much depended on the capacity and attitude of the local stakeholders, from the village to the province.

Another factor that may have affected program effectiveness and that should be studied further is implementation efficiency. "Too many cooks may have spoiled the broth". Diffusing the work responsibilities, budget, and other resources to so many implementing departments may not have been the most efficient implementation approach. This concern was recognized by NWRC in 1989 and assigned its Secretariat to propose measures to reduce the number of agencies involved (10).

To recapitulate, despite the outlay of billions of baht during the 6th National Plan, there were still more than 2.5 million rural households in over 35,500 villages that did not have access to adequate water supply as of 1990. This problem scenario was not very different from that in 1986, despite the continuous construction and rehabilitation of numerous small water facilities. The conclusion that could be drawn is that such efforts have not resulted in the alleviation of the water shortage problem. This situation caught the attention of the former P.M. Anand Panyarachun's government in 1991, and prompted it to look at new policies and approaches to solving the lack of water in the rural areas.

3.4 What's Ahead

By the end of the 6th National Plan period, two new strategies were put forward to and approved by the Cabinet. Both expediently received budget allocation and got underway by 1992. These were as follows (9):

The first strategy was to accelerate the construction of village piped water supply systems as source of drinking water for 70% of rural villages by the year 2001 (end of 8th National Plan). This would correspond to about 41,000 villages with waterworks in 2001 from a starting point of less than 8,000. The immediate target for 1993 was 3,154 villages with a budget of over Baht 1,700 million. By 1996 (end of 7th National Plan), 40% of the villages will have been serviced. The agencies assigned to implement this accelerated piped water supply program were PWD, DOH, DMR, and PWA.

The second strategy was the devolution of responsibility and authority to solve water shortage problems to the respective provincial governments, requiring them to prepare a provincial water master plan. A budget of Baht 24 million was allocated in 1992 for the preparation of master plans by 72 provinces. The 5-year master plan should consist of the following elements: identification of problem areas, proposed solutions, implementing/responsible agencies, and budget. For this task, the provinces would need the necessary baseline data on existing water facilities and water utilization. Data collection started in April 1992 in addition to the biennial NRD2C survey. These data would be available to the provincial planners. Moreover, an additional Baht 2,000 million was earmarked for distribution to the

relevant RTG implementing agencies between 1993-1996 in order for these agencies to implement the water projects that will be incorporated in the master plan. The central government was cited as responsible for national policy formulation, monitoring, budget distribution, and technical assistance. This decentralization scheme was envisaged to be predicated on the promotion of self-sufficiency in the operation and maintenance of water facilities, so that in the long-run, the government will not have to spend for these.

These new policies and strategies, compared to those at the start of the 6th National Plan, were indeed setting a new direction towards more clear-cut and focused actions. However, some fine-tuning efforts would need to be further considered. Concerning the first strategy, the thousands of newly-constructed piped water supply systems once again could fall into the all too common trap of management, operation and maintenance problems. As confirmed in the WHO/CU/DOH research project, lessons from past experience indicated that many existing community water supply systems were not being managed and maintained optimally. In fact, as discussed earlier, PWA had been requested to take over some of the systems so that they could be rehabilitated and operated/maintained properly. Moreover, according to the experience in the GTZ/PWA Revolving Fund project, the sense of ownership and stewardship was still not yet fully appreciated by many villagers and this had presented some implementation setbacks in the processing of loans. It can be noted that some parallel support projects initiated in the current 7th National Plan are being undertaken to address this issue. For instance, the Community Development Department revealed that it has launched a training project on "Effective Utilization of Water Resources". Again, the success of this new policy will depend on concerted efforts from all parties concerned.

The second strategy concerning the mandatory provincial water master plans is full of promise. The devolution of water resource planning and problem-solving responsibility to the provinces relieves the central government of such load. (A national master plan was attempted in 1983 but implementation did not materialize as planned.) However, it doesn't at all relieve the central government of some backstopping functions with respect to policy formulation, monitoring, budget allocation, and technical advice as mentioned earlier. In order to avoid repeating the institutional ambiguity in the past, which may have been partly responsible for the lackluster results, the central agency to perform these functions should be identified and equipped with the necessary resources. Although the coordination function will be delegated now mostly to the provincial administration, this central body would still be needed most especially for expert and unbiased arbitration and advice as well as for overall monitoring and evaluation purposes. Another possible pitfall that needs to be looked into is the lack or inadequacy of capable manpower in many provinces to plan and manage their own water resources development. This program presents the opportunity to build the capability of provincial personnel and strengthen the local administration system.

On a last note, these new strategies should be seen as initiatives taken by the temporary caretaker government of former P.M. Anand Panyarachun before the next elected government took control. It remains to be seen whether or not this program will succumb to political change as usual.

4. CONCLUSIONS AND RECOMMENDATIONS

The political will to solve the water shortage problem had been evident in the government policy as stipulated in the 6th National Development Plan. However, there had been a number of planning and implementation gaps that hampered the attainment of ultimate goals. This period was characterized by intensive small water resources development efforts and huge outlay of funds, both from RTG and foreign sources. But although thousands of various water facilities were constructed, **the problem situation has not been alleviated at all**, even in the Northeast region where the bulk of RTG and foreign-assisted projects were focused. As at the start of the study period, more than half of all the rural villages in Thailand still lacked adequate water supply.

Corollary to this, most of the small water resources development projects and activities had **not been sustainable because of either poor planning or ineffective utilization of water facilities.** This had led to the situation wherein there were theoretically more than enough water facilities to supply adequate water for the entire population, but most of these facilities were either not operational (due to damage/poor maintenance/depleted or non-existent water source), or operating below capacity, or supplying water of unacceptable quality. These problems were already well-recognized by both RTG and foreign-funded project proponents, and attempts to address these weaknesses had been undertaken all throughout the 6th National Plan period. However, it was clear that sustainable solutions were still lacking.

Moreover, **the policy statement in the 6th National Plan did not materialize into a cohesive and coordinated "program"**, despite the existence of a national Master Plan/Action Plan for rural water supply, which anyhow did not become institutionalized and did not effectively take root in the system. Such a program remained largely fragmented because the **central coordinating body was the weak, if not missing, link.** This was sorely missed in situations that required intervention and backstopping at the central level, e.g. prioritization and, to some extent, coordination of foreign-assisted projects, monitoring and evaluation of the effectiveness and efficiency of RTG implementing departments in carrying out their tasks, integration of work and budget allocation for the implementing agencies. The designation of the central coordinating entity was riddled with uncertainty that may have been caused by the many government turn-overs during the 1987-1991 period.

Overlapping or duplication of activities among RTG implementing departments was not a significant problem and could be prevented easily within the local procedure of rural development planning, which entailed the review and integration of water resources development plans at each level of local administration. Despite the lack of a central coordinating body, another key factor that precluded overlapping was the **effectiveness of local informal linkages among project proponents,** whether from the government, NGO or academic sector, or from individual project staff.

In assessing whether any overlapping did occur among the various foreign-funded projects identified during the study period, the degree of similarity among these projects was analyzed based on target areas and target groups/beneficiaries as parameters for the first screening. If similarities were detected, then a detailed investigation of project activities and components was made, also taking into account any similarities in project objectives, partner agencies and time frame. Five foreign-assisted projects targeted at a number of Northeastern provinces or at the entire region were subjected to such detailed analysis. Notwithstanding similarities in some aspects, these projects were found to be not overlapping, but rather **complementing** one another. It was not so much a case of duplication of efforts, but rather of overlapping or concentration of development projects in certain provinces. This was a case that underscored the need for an active central coordinating body.

The foreign-funded projects during the 6th National Plan period amounted to about 10% of the total government expenditure on rural water supply. They contributed significantly to meeting the needs of particular villages, local governments, and/or implementing departments, especially in the Northeast region and in the border areas with neighboring countries. Those executed in partnership with RTG implementing agencies were naturally designed to supplement the activities of the respective partner agencies. Those conducted independent of RTG agencies, i.e. by NGOs and academic institutions, complemented the work of the government departments in certain areas where the needed services were lacking. Nevertheless, on a macro scale, the significance of these tangible and intangible contributions seemed minute when seen against the backdrop of absence of measurable progress as far as the ultimate goal of alleviating the drought problem was concerned.

The following recommendations were focused on three weak points, i.e. planning, utilization, and institutional aspects:

1. **Enhance the planning and management capability of provincial and local units.** Well-planned water projects are likely to be sustainable. A sound plan depends on sound appraisal of

resources and constraints, a task that requires information and capable manpower. Information is already available or will be available; capable manpower to generate and assess technical options may not as yet be enough. Thus the present government policy/strategy to make water master planning mandatory at the provincial level needs to be supported by training and technical assistance. The provincial planners would be well-advised to take stock, not only of state-of-the-art technical options, but also of indigenous know-how and insights that the villagers incorporate in the respective village plans. It goes without saying that sound planning should entail due consideration of village water development plans as well as broad consultation with the villagers who will utilize the water facilities.

The planning process could be improved by adopting simple rational measures that should totally obviate some of the utilization pitfalls identified earlier. For instance, the planners should conduct the situation appraisal as scrupulously as possible, including thorough investigation of priority sites that are particularly problematic, systematic identification of problems and available resources, as well as assessment of future demand and development potential. The problems identified can then be translated into appropriate objectives that can be achieved realistically with the available resources and within a specific time frame. Only then can suitable water development options be formulated. These options should be approached in an integrated manner and not simply confined to particular activities that respective implementing departments are mandated to do. Again, more involvement and participation of the water users would be essential.

As far as management is concerned, the most critical function is coordination of the work of RTG implementing agencies and private firms, if any, to ensure that no overlapping or duplication of efforts occurs. Devolving authority and responsibility to the provincial administration is a farsighted and practical move; however, it must be taken into account that this situation might also increase the corruption potential at the local level if checks and balances are not set in place. One such mechanism is the parallel empowerment of the villagers. Other regulatory and manpower development mechanisms in order to professionalize the civil service should be taken into account as well.

2. **Ensure proper utilization of water facilities.** Instead of concentrating on the supply side by constructing more and more water facilities, it is about time that planners pay attention to the management of the "demand" side, i.e. optimize the use and maintenance of existing utilities in order to reduce the demand for more.

   In particular, the new strategy to spread piped water supply systems to 70% of all rural villages nationwide will entail relatively more complex operation and maintenance requirements. Village technicians should be trained to tackle technical maintenance and repair problems. Community preparation and participation as early as the conception stage should be done because the users will be the principal determinants of the ultimate success and utility of each water project. Additionally, the most effective and workable water management approach should be studied. Options should be left for villagers to consider and decide upon. Should they opt for community management of the facility, then the concerned villagers should be trained on proper operation and maintenance techniques as well as financial administration and water quality control.

3. **Balance bottom-up and top-down approaches.** Strengthening community users' groups and provincial administration in sound planning/coordination and efficient utilization is not enough. Leaving a vacuum at the central level - the absence of a propelling force that will champion and steer the program forward - would be repeating the old mistake. It is necessary to designate a body or agency responsible for overall monitoring, evaluation, policy and technical advice, and backstopping. The latter is very important in containing the potential problem of overlapping or duplication of efforts, whether involving government or foreign aid projects. The proposed National Water Board to be established under the National Water Act under preparation will fulfill these functions eventually, if and when the Act is passed by the Parliament. In the meantime, it

should be made clear whether the National Rural Development Committee or the National Water Resources Committee is mandated to consolidate and spearhead the program. Measures should be taken to equip the responsible body with the necessary manpower and budget in order to discharge its duties most efficiently.

Since overlapping or duplication of efforts is always imminent and is a major concern in this study, separate specific recommendations in order to curb this situation are suggested:

1. Whether at the provincial or central level, the designated coordinating or backstopping entity should take the initiative to organize periodical roundtable meetings among the managers of foreign-assisted projects, concerned implementing department representatives, and local leaders in order to share information and experiences and learn from one another. This is a potentially effective medium to agree on project/work boundaries and avoid overlaps.

2. Aside from the aforementioned formal mechanism, informal linkages among project proponents should be promoted. Establishing good relations and cooperation among different project proponents could even bring about synergistic and mutually beneficial results, while conserving costs and resources.

3. The backstopping or coordinating agency should be party to the formulation and negotiation of foreign-assisted projects in order to ensure that these projects have a particular niche in the entire program and do not overlap with one another.

4. In preparing project plans, it should be the joint responsibility of requesting agencies and foreign donors to review and take into account the existing and planned small water resources development projects in the project area with the view to consciously avoiding duplicating the work of others.

5. The current roles and responsibilities as well as the performance and capabilities of all RTG implementing departments as far as small water resources development is concerned should be evaluated. It might be necessary to restructure and streamline their functions to minimize, if not eliminate, duplication of work as well as conserve and consolidate resources.

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Annex A

Preliminary Survey Questionnaire

and Respondents

RURAL WATER SUPPLY DEVELOPMENT PROJECTS IN THAILAND

1. Project title: _____

_____

2. Project type:

_____ technical assistance
_____ training
_____ research and development
_____ others (please specify) _____

3. Project objectives: _____

_____

_____

4. Implementing agency(ies): _____

_____

_____

5. Funding agency(ies): _____

_____

_____

6. Project period: _____

7. Target area(s): _____

8. Target group(s)/beneficiary(ies): _____

_____

_____

9. Project status/implementation stage: _____

_____

10. Expected results/outputs: _____

_____

11. Outputs so far: _____

_____

12. Is any sizable training component involved?

_____ Yes _____ No

If yes, to what extent? _____

Who is/are carrying out the training? _____

13. Do you see any overlapping with any other German-funded water resources development projects in Thailand?

_____

_____

_____

Or with any other foreign-assisted projects in Thailand?

_____

_____

_____

Name of respondent: _____ Date: _____

Agency: _____

- THANK YOU -

Mailing List and Respondents in the Preliminary Survey

(The respective positions and offices indicated in this list were as of 1989)

1.	Dr. Bernd **Abtmaier** Consultant Provincial Waterworks Authority (PWA) 72 Chaeng Wattana Rd. 1 Laksi, Bangkhen, Bangkok 10210	[Responded by phone]
2.	Mr. Geoffrey **Anderson** Project Manager Thai-Australian Project P.O. Box 70, Khon Kaen	[Responded by mail]
3.	Dr. Chris **Brandner** Team Leader SIP Project, Royal Irrigation Department P.O. Box 100 Khon Kaen 40000	[No response]
4.	H.E. Mr. Richard **Butler** AM Ambassador Extraordinary and Plenipotentiary The Australian Embassy 37 Sathorn Tai Rd., Bangkok 10100	[Response given by Ms. June Lee, Second Secretary, Technical and Economic Cooperation]
5.	Mr. Prachoom **Chomchai** Officer-in-Charge Interim Committee for Coordination of Investigations of the Lower Mekong Basin Mekong Secretariat, Pibultham Villa Kasatsuk Bridge, Bangkok 10500	[Responded by mail]
6.	Dr. Prinya **Chindaprasirt** Dean, Faculty of Engineering Khon Kaen University, Khon Kaen	[Responded by mail]
7.	Dr. John R. **Eriksson** Mission Director U.S. Agency for International Development - Thailand 37 Soi Somprasong 3 Petchaburi Rd., Bangkok 10400	[Response given by Mr. Narintr Tima]
8.	H.E. Mr. Harle **Freeman-Greene** Ambassador Extraordinary and Plenipotentiary The New Zealand Embassy P.O. Box 2710 93 Wireless Rd., Bangkok 10500	[Response given by Mr Yan Flint]
9	Dr. Wanchai **Ghooprasert** Assistant Governor for Planning and Finance Provincial Waterworks Authority (PWA) 72 Chaeng Wattana Rd. 1 Laksi, Bangkhen, Bangkok 10210	[Responded by mail]

10. Mr. A. **Haag** [Responded by mail]
Consultant, TN-NEADP
Euroconsult c/o Mr. Blanker
P.O Box 124, Khon Kaen 40000

11. Mr. F G. **Heim** [Responded by mail]
Food and Agriculture Development Center
German Foundation for International Development (DSE)
Wielinger St. 52, D-8133 Feldafing
Federal Republic of Germany

12. Mrs. Karin von **Herrath** [Referred to GTZ Project Leaders]
GTZ Project Administration Services (PAS)
PDA Bldg., 7th Fl.
8 Sukhumvit 12, Bangkok 10110

13. Prof.Dr. K. **Hofius** [Responded by mail]
Federal Institute of Hydrology
Kaiserin-Augusta-Anlagen 15-17
P.O. Box 309, D-5400 Koblenz
Federal Republic of Germany

14. Mr Volker **Karl** [Responded by phone and mail]
GITEC Consult GmbH
Technic Bldg., 4th Fl.
48 Soi Lertpanya, Sri Ayuthaya Rd.
Bangkok 10400

15 Mr. Chetpan **Karnkaew** [Responded by mail]
Director, Rural Water Supply Division
Department of Health (DOH)
Ministry of Public Health
Devaves Palace, Samsen Rd.
Bangkok 10300

16. Sub-Lieut. Danai **Ketusiri** [No response]
The Governor
Provincial Office
Amphur Muang, Ubon Ratchathani

17. Dr. Klaus **Lindner** [Responded by mail]
Irrigation Improvement Program Advisor
GTZ-Advisory Services to RID
Project Planning Division
Royal Irrigation Department (RID)
811 Samsen Rd., Bangkok 10300

18 Mr. Rainer **Loof** [Responded by mail]
Associate Professor
Water Resources Engineering Division
Asian Institute of Technology
P O. Box 2754, Bangkok 10501

19.	Mr. Visith **Nolphan** Director-General Department of Mineral Resources (DMR) Ministry of Industry 75/10 Rama VI Rd., Bangkok 10400	[Response given by Mr. Gharu-Udom Ruangsuwan, Deputy Director- General]
20.	Mr. Sawai **Prammanee** The Governor Provincial Office Amphur Muang, Nakorn Ratchasima 3400	[Responded by mail]
21.	H.S.H. Prince Bhisatej **Rajani** Director, Royal Project 27 Soi Pramuan, Bangkok 10120	[No response]
22.	Second Lieut. Pin **Ratana** Director, Sanitation Division Department of Health (DOH) Ministry of Public Health Devaves Palace, Samsen Rd. Bangkok 10300	[No response]
23.	Dr. Michael **Ruedenauer** Senior Advisor Thai-German Land Settlement Promotion Project Department of Public Welfare (DPW) Krung Kasem Rd , Bangkok	[No response]
24.	Dr. Tsutomu **Saito** Director Japan International Cooperation Agency - Thailand 1674/1 New Petchburi Rd., Bangkok 10310	[No response]
25.	Mr. Wanchai **Sirirattna** Director-General Department of Technical and Economic Cooperation (DTEC) Krung Kasem Rd., Bangkok	[Responded by mail]
26.	Mr. Wolfgang **Schunke** German Volunteer Service P.O. Box 4-98, Bangkok 10400	[No response]
27.	Mr. Mechai **Viravaidya** Secretary General Population and Community Development Association (PDA) 8 Sukhumvit 12, Bangkok 10110	[Response given by Mr. Tavat-chai Traitongyoo, Deputy Executive Director]
28.	Mr. Kwanchai **Wasawong** Director Department of Local Administration (DOLA) Ministry of Interior Asdang Rd., Bangkok 10200	[Responded by mail]

29. Dr. Prakob **Wirojanagud**
Director
Water Resources and Environment Institute (WREI)
Faculty of Engineering
Khon Kaen University, Khon Kaen

[Responded by mail, also submitted the replies of Mr. Amnat Apichartwallop and Mr. Sanguan Patamathamkul of WREI]

30. Dr. Claus-Peter **Woerner**
Counsellor (Economic Cooperation)
The Embassy of the Federal Republic of Germany
9 Sathorn Rd., Bangkok 10120

[Response given by Mrs. Helga Huss]

Note: 22 respondents out of 30 = 73.33% response

Annex B

Detailed Survey Questionnaire

and Interviewees

RURAL WATER SUPPLY DEVELOPMENT PROJECTS IN THAILAND

1. Project Theme

a. What is the general theme or coverage of your project?

b. What specific aspects of water resources development are covered by your project? large-scale/medium-scale/small-scale?

c. To what extent do you cover small-scale water resources development?

___ extensively
___ moderately
___ minimally
___ not at all

d. What are the specific water needs addressed by your project?

___ drinking
___ domestic
___ agricultural/irrigation

2. Project Type

a. What are the activities of the project? Is there any training involved?

___ research and development
___ technical assistance
___ information systems
___ training
___ others (specify)

b. Is the training aspect the most significant activity of your project? Y or N

c. Approximately what percentage of activities is devoted to training? _____

3. Type of Training

a. Please comment on the contents of your training.

b. Please comment on the methodology of your training activities Do you use the same method for all the target groups? Y or N

c. Does your training involve a purely technical approach relating to construction of water resources facilities? Y or N

d. Does your training involve a participatory problem-solving approach? Y or N

To what extent?

___ extensively
___ moderately
___ minimally
___ not at all

If yes, were actual data and conditions used during the problem-solving process? Y or N

To what extent?

___ extensively
___ moderately
___ minimally
___ not at all

Do you require the trainees to develop alternative solutions using case information? Y or N

Please elaborate.

Do the trainees work in groups during the training? Y or N

Is active participation of the trainees encouraged? Y or N. How?

e. Are seminar-type lectures the main component of your training programme? Y or N

Is field training included in your program? Y or N

f. Is there any specific training model being used in your project? Y or N

If yes, please expound on the model.

g. Please elaborate on the training staff, their number, composition and expertise.

h. What is your position in the project and what are your responsibilities?

4. Target Areas

What regions are covered by your project? provinces? districts? sub-districts? villages?

5. Target Groups

a. Please identify all the overall target groups or beneficiaries of your project. Are they any of the following?

___ District Officers
___ Deputy District Officers
___ District Technicians
___ Village Technicians
___ Villagers
___ others

b. Does the training component involve any of the following target groups?

___ District Officers
___ Deputy District Officers
___ District Technicians
___ Village Technicians
___ Villagers
___ others

c. Are all the target groups trained at the same time and by the same training staff? Y or N

6. **Project Objectives**

a. Does your project aim to develop/strengthen the target groups' capability in planning for and problem-solving in water resources development in their areas? Y or N

b. Does your project aim to enable the target groups to construct, operate and maintain small water resources facilities even without government or other agencies' support? Y or N

c. Does your project aim to develop/upgrade the target groups' skills and knowledge on the sound management of water resources? Y or No

d. In case training is a project component, does you project aim to enable trainees to acquire the necessary skills and knowledge so as to be trainers in future training activities? Y or N

If yes, please identify the target group level being trained to be trainers?

7. **Project Outputs**

a. Are any small scale water resources facilities expected to be built after the training? Y or N

b. If yes, which of the following facilities are to be contructed?

		Number	Design
___	Jars		
___	Storage tanks (concrete)		
___	Shallow wells		
___	Deep wells		
___	Weirs		
___	Village piped water supply system		
___	Ponds		
___	Others (specify)		

Will the construction of these facilities be initiated by the villagers or will they be provided by the project as decided upon by project personnel?

c. In case training is a project component, how many people are expected to be trained?

8. **Project Period**

a. When did the project start? _____ Year _____ Month

b. When will the project end? _____ Year _____ Month

c. Do you expect any possible extension? Y or N

9. **Project Partners/Co-Implementing Agencies**

Please name the implementing agencies involved in the project and the persons involved in each agency To what extent is each agency involved?

10. **Funding Agency**

What is the specific foreign government/non-government agency that provides the financial support in this project?

11. **Can you comment on the difficulties or obstacles that you have encountered in the implementation of your project?**

What do you think is the uniqueness or difference of your project from other water resources development projects that you know?

What are the similarities?

-THANK YOU-

List of Interviewees for the Detailed Survey

Thai-German Self-Help Training Project on the Development of Small Water Resources for Rural Areas:

Dr. Prinya Chandaprasirt
Project Director
Dean of Faculty of Engineering
Khon Kaen University

Ms. Nisa Attanandana
Training Specialist
South East Asia Program Office
Carl Duisberg Gesellschaft

Thai-New Zealand Small Watershed Development Project:

Dr. Prakob Wirojanagud
Project Leader
Director of Water Resources and Environment Institute
Faculty of Engineering
Khon Kaen University

Thai-Australian Northern Village Water Resource Project:

Mr. Geoffrey Anderson
Project Manager
Ministry of Public Works, Australia

Mr. Ron McMahon
Project Agricultural Engineer
Ministry of Public Works, Australia

Ms. June Lee
Second Secretary
Technical and Economic Cooperation
Australian Embassy, Bangkok

Water Resources Development Project, Phase II:

Mr. Wilas Techo
Manager
Operations Division
Population and Community Development Association

Royal Thai Government Agencies:

Mr. Winat
Department of Local Administration
Ministry of Interior

Dr. Sacha Sethaputra
National Econumic and Social Development Board

Annex C

List of Agencies Consulted

in 1993 Survey Update

List of Agencies Consulted

1. Rural Water Supply Division
   Department of Health
   Ministry of Public Health

2. Water Supply Development Division, and
   Groundwater Development Division
   Public Works Department
   Ministry of Interior

3. Department of Local Administation
   Ministry of Interior

4. Technical Assistance & Planning Division, and
   Socio-Economic & Environmental Development Division
   Community Development Department
   Ministry of Interior

5. Groundwater Data Center
   Department of Mineral Resources
   Ministry of Industry

6 Water Resources Development Division
   Office of Accelerated Rural Development
   Ministry of Interior

7. International Cooperation Section
   Provincial Waterworks Authority

8 Center for National Rural Development Coordination
   Rural Development Division
   National Economic and Social Development Board

9. Office of the National Water Resources Committee

10. Technical Services Division
    Department for Technical and Economic Cooperation

11. Japan International Cooperation Agency

12. Social Research Institute
    Chulalongkorn University

Annex D

Summary Data on RTG-funded

Rural Water Supply Activities

(1987-1993)

Table D1. Summary of Small Water Resource Development for Budget Years 1987-1991 Showing Target, Budget and Result

Item	1987			1988			1989			1990			1991			5-Year Total		
	Target (Units)	Budget (Million B)	Beneficiaries (Village) (Household)	Target (Units)	Budget (Million B)	Beneficiaries (Village) (Household)	Target (Units)	Budget (Million B)	Beneficiaries (Village) (Household)	Target (Units)	Budget (Million B)	Beneficiaries (Village) (Household)	Target (Units)	Budget (Million B)	Beneficiaries (Village) (Household)	Target (Units)	Budget (Million B)	Beneficiaries (Village) (Household)
1 Dug Wells	7,895	383.91	7,831 374,073	9,200	426.51 (9.91)	8,942 456,355	10,613	475.84	10,379 513,555	14,180	641.60	13,059 627,212	16,775	821.88	15,820 800,226	58,663	2,729.54	56,031 2,771,421
1.1 Deep wells	6,129	353.01	6,388 288,649	6,801	413.84	6,745 323,355	7,940	460.36	7,940 379,115	10,419	615.73	10,016 416,190	12,720	793.86	12,435 556,830	44,009	2,636.59	43,524 1,984,139
1.2 Shallow wells	1,749	10.86	1,426 84,070	2,113	12.15	1,911 118,178	2,344	14.46	2,110 113,055	3,401	24.89	2,883 187,622	3,695	27.03	3,025 219,996	13,302	89.39	11,155 722,921
1.3 Tube wells	17	0.04	17 1,354	286	0.72	286 14,822	329	0.82	329 21,385	360	0.99	360 23,400	360	0.99	360 23,400	1,352	3.56	1,352 84,361
2. Other Water Resources	1,864	1,688.08	989,565 303,413	2,877	2,654.08	998,250 396,840	3,573	3,181.75	1,009,629 594,092	7,363	4,815.94 (2.05)	1,414,129 1,117,102	8,506	5,734.20	1,423,633 1,074,512	24,183	18,074.05	5,835,206 3,485,959
2.1 Water reservoirs	484	735.84	314,231 154,038	877	1,067.81	226,706 184,141	626	1,159.24	225,366 131,587	774	2,043.94	247,054 117,205	828	1,668.89	251,378 71,745	3,389	6,675.73	1,264,733 658,716
2.2 Ponds	512	97.44	29,109 78,816	618	120.13	45,820 127,062	1,014	183.46	42,891 156,481	1,819	277.64	38,632 246,773	1,938	663.42	58,549 140,486	5,699	1,342.09	215,001 749,418
2.3 Dams	287	501.70	359,431 44,828	759	814.42	302,889 53,157	968	1,038.93	478,875 263,210	3,914	1,472.02	832,304 703,916	3,951	1,884.65	819,622 798,795	9,879	5,711.73	2,793,121 1,863,904
2.4 Ditch cleaning	493	312.72	269,056 22,687	556	384.99	216,083 26,619	772	524.59	110,437 37,089	712	749.58	90,120 42,310	1,349	945.86	194,849 55,955	3,882	2,917.73	880,545 184,660
2.5 Others	88	40.37	17,738 3,246	267	266.72	208,752 5,861	193	275.52	152,060 5,725	344	272.78	206,019 6,898	442	571.38	99,237 7,531	1,334	1,428.77	681,808 29,261
TOTAL	9,759	2,081.99	7,831 989,565 677,486	12,077	3,080.59	8,942 998,250 853,195	14,186	3,657.39	10,379 1,009,629 1,107,647	21,543	5,457.54	13,059 1,414,129 1,744,314	25,281	6,556.69	15,820 1,423,633 1,874,738	82,846	20,803.59	56,031 5,835,206 6,257,380

Source: Budget Document No 5 (1991), Budget Bureau

Remarks:

1. *Beneficiaries of dug wells:*
   units are number of villages (upper number) and number of households (lower number)
2. *Beneficiaries of other water resources:*
   units are rai (upper number) and number of households (lower number)

D-2

Table D2. Summary of Dug Wells and Ponds
Showing Target, Budget and Result, Classified According to Responsible Organization

Item	1987			1988			1989			1990		
	Target (Units)	Budget (Million B)	Beneficiaries (Village) (Household)	Target (Units)	Budget (Million B)	Beneficiaries (Village) (Household)	Target (Units)	Budget (Million B)	Beneficiaries (Village) (Household)	Target (Units)	Budget (Million B)	Beneficiaries (Village) (Household)
Total	7,895	383.91	7,831 374,073	9,200	426.51	8,942 458,355	10,613	475 64	10,379 513,555	14,180	641 60	13,059 627,212
1 Deep Wells	6,129	353 01	6,388 288,649	6,801	413 64	6,745 323,355	7,940	460.36	7,940 379,115	10,419	615 73	10,016 416,190
Supreme Command Headquarter (SCH)	150	7 13	150 4,500	50	2 38	50 1,500	70	3 33	70 2 100	100	5.32	100 5,500
- Department of Public Welfare (DPW)	1	0.31	1 44	-	-	-	2	0 33	2 140	6	0 62	5 450
- Public Works Department (PWD)	1 145	65.20	1,260 63,960	1,228	70 12	1,374 68,700	1,600	89.21	1,600 80 000	2,250	126.28	2,250 80 000
- Office of Accelerated Rural Development (ARD)	1,455	80 33	1,599 111 930	1 711	94.30	1,509 105,630	1,840	100.28	1,840 128,800	2,244	121.56	1,850 137,200
- Department of Health (DOH)	997	42.25	997 24,925	1,097	52.96	1,097 27,425	1,291	68.82	1,291 32,935	2,262	115 83	2,262 57,210
- Department of Mineral Resources (DMR)	2,379	156.37	2,379 83,265	2,688	190.53	2,688 114,300	2,900	198.89	2,900 130,400	3,500	241.84	3,500 135,000
2. Shallow Wells	1,749	10 86	1,426 84,070	2,113	12.15	1,911 118,178	2,344	14 46	2,110 113,055	3,401	24.89	2,683 187,822
Supreme Command Headquarter (SCH)	300	2.10	150 4,500	200	1 40	100 3,000	300	2 10	150 4,500	400	2 80	200 6,000
- Land Development Department (LDD)	100	0 04	100 1,000	100	0 40	100 1,000	100	0 40	100 1,000	100	0 40	100 1,000
- Community Development Department (CDD)	-	-	- -	374	0 83	374 25,958	526	1 32	526 36,805	1,113	7 77	738 77,879
- Department of Public Welfare (DPW)	6	0.26	- 50	-	-	- -	6	0 04	6 60	10	0 09	10 200
- Office of Accelerated Rural Department (ARD)	1,010	6.12	910 63,700	1,011	6 65	952 66,640	900	7.20	900 63,000	1,370	10.98	1,350 94,500
- Department of Health (DOH)	100	0.60	100 2,000	200	1 20	200 4,000	200	1 40	200 4,000	200	1 40	200 4,000
3 Tube Wells	17	0 04	17 1,354	286	0 72	286 14,822	329	0.82	329 21,385	360	0 99	360 23,400
- Community Development Department (CDD)	17	0 04	17 1,354	286	0 72	286 14,822	329	0 82	329 21,385	360	0.99	360 23,400
- Department of Public Welfare (DPW)	-	-	- -	-	-	- -	-	-	- -	-	-	- -
4 Ponds	512	97 44	29,109 78,816	618	120 13	45,820 127,082	1,014	183 46	42,891 156,481	1,619	217.64	38,832 248,773
- New	233	81 00	13,378 43,564	252	102 00	26,955 85,138	386	147 00	23,236 95,756	1,095	238 00	17,232 185,942
- Expansion	107	9 81	3,500 16,500	200	12.23	7,000 26 000	249	16 10	8,715 32,370	252	24.63	8,820 32,760
- Maintenance	172	6 57	12,233 18,552	166	5 60	9,865 15,924	379	20 08	10,940 26,355	272	14.54	12,580 28,071
4 1 Supreme Command Headquarter (SCH)	4	0 66	100 100	-	-	- -	-	-	- -	-	-	- -
- New	4	0.66	100 100	-	-	- -	-	-	- -	-	-	- -
4.2 Land Development Department (LDD)	57	43 14	11,039 28,627	38	31.24	13 450 6,632	27	29.67	3,726 5,717	49	69.55	3,498 10,134
- New	57	43 14	11,039 28,627	38	31.24	13,450 6,632	27	29.67	3,726 5,717	49	69.55	3,498 10,134
4.3 Department of Local Administration (DOLA)	63	2.31	9 450 1,890	62	2.32	9,300 1,860	172	14.92	9,750 1,950	62	5.53	10,500 2,000
Maintenance	63	2.31	9,450 1,890	62	2.32	9,300 1,860	172	14 92	9,750 1,950	62	5.53	10,500 2,000
4 4 Department of Public Welfare (DPW)	3	0.69	- 153	7	1.23	- 455	9	0 94	- 710	-	-	- -
- New	3	0 69	- 153	6	1 01	- 395	4	0.38	- 315	-		
- Maintenance	-	-	- -	1	0.22	- 60	5	0.56	- 395	-	-	-
4.5 Office of Accelerated Rural Development (ARD)	31	8.27	4,370 311	25	8 85	1,820 115	103	53 49	8,810 624	50	40 05	6,653 469
- New	29	7.89	2,087 149	24	8.51	1,555 111	101	52.91	8,620 614	40	35.04	5,573 398
Maintenance	2	0.38	2,283 162	1	0 34	65 4	2	0 58	190 10	10	5 10	1,080 71

Source Budget Document No 5 (1991), Budget Bureau

Table D3. Summary of Water for Drinking and Domestic Use, 1991-1993
Showing Target, Budget and Result, Classified according to Responsible Organization

Responsible Organization	1991				1992				1993			
	Target	Budget (Million B)	Beneficiaries		Target	Budget (Million B)	Beneficiaries		Target	Budget (Million B)	Beneficiaries	
			Household	Village			Household	Village			Household	Village
Total	**128,038**	**8,010.0**	**1,728,265**	**618,361**	**151,396**	**8,584.0**	**1,208,643**	**220,445**	**156,385**	**9,793.7**	**1,264,397**	**102,957**
1. Public Works Department (PWD)	14,878	254 8	134,750	2,366	17,940	436.2	185,150	3,257	21,365	666 4	247,350	4,100
2. Department of Health (DOH)	10,219	432 4	315,525	-	16,190	584.5	473,970	-	18,685	597 4	538,840	-
3 Office of Accelerated Rural Development (ARD)	45,636	2,078 0	586,800	560,346	52,659	2,413.3	55,425	153,661	58,638	2,791.9	66,284	28,579
4 National Security Command (NSC)	1,551	248.5	71,201	1,360	712	236 0	25,440	712	-	-	-	-
5 Civic Action Center Second Army Area 2	2,199	499.3	116,650	1,988	8,034	376 5	147,900	4,797	-	-	-	-
6. Civic Action Center Eng'g Dept. Royal Thai Army	3,146	307 1	156,800	-	15	37.2	-	-	-	-	-	-
7. Department of Mineral Resources (DMR)	39,696	416 9	-	35,853	42,632	509.2	-	38,215	44,596	493 6	-	40,300
8 Community Development Department (CDD)	1,506	12 6	108,575	1,489	701	12 4	70,413	644	644	9 5	68,737	644
9 Department of Local Administration (DOLA)	7,899	620 1	96,010	13,818	11,104	674.3	114,300	18,280	11,175	1,437.9	189,950	28,390
10 Land Development Department (LDD)	273	353.5	32,459	272	377	342 0	30,570	10	677	560.0	49,081	-
11 Royal Irrigation Department (RID)	1,033	2,768 8	109,495	869	1,030	2,943 1	105,475	869	605	3,237 0	104,155	944
12 Office of the Permanent Secretary for Agriculture & Cooperative (PSAC)	1	5 0	-	-	1	5 9	-	-	-	-	-	-
13 Chem Department Royal Thai Army	1	13 0	-	-	1	13 0	-	-	-	-	-	-

Source: Budget Document No.5 (1992), Budget Bureau

Table D4. Details of Water for Drinking and Domestic Use, 1991-1993
Showing Target, Budget and Result, Classified according to Responsible Organization

Item	1991				1992				1993			
	Target	Budget (Million B)	Beneficiaries		Target	Budget (Million B)	Beneficiaries		Target	Budget (Million B)	Beneficiaries	
			Household	Village			Household	Village			Household	Village
1 Deep Wells	17,382	1,214 3	429,925	11,429	14,055	1,032.0	257,650	10,805	13,515	981 3	201,350	10,308
1 1 Size 2 5 inches diam.	200	1 7	4,000	-	200	1 7	4,000	-	280	2 4	5,800	-
Public Works Department (PWD)	200	1 7	4,000	-	200	1 7	4,000	-	280	2 4	5,800	
1 2 Size 4 inches diam	7,548	438 4	190,450	5,256	7,997	524 4	209,350	5,221	7,995	535 7	187,250	5,148
- Public Works Department (PWD)	1,942	120 6	94 100	1,842	2,350	150.2	117,000	2,300	2,450	156 0	121,000	2,400
- Department of Health (DOH)	2,068	128 0	52,200		2,600	168.2	65,000		2,650	177 4	66,250	-
Office of Accelerated Rural Development (ARD)	2460	130.9	-	2,356	2,500	170.9	-	2,374	2,895	202.3	-	2,748
- National Security Command (NSC)	801	42.6	31300	801	-	-	-	-	-	-	-	-
Royal Thai Army (RTA)	257	16 4	12,850	257	547	35 0	27,350	547	-	-	-	-
1 3 Size 6 inches diam	2,925	200.3	-	2,925	2,850	228.2	-	2,850	3,500	280.8		3,500
- Department of Mineral Resources (DMR)	2,925	200.3	-	2,925	2,850	228.2	-	2,850	3,500	280 6	-	3,500
1 4 Size 8 inches diam	6,709	573 6	235,475	3,248	3,008	277 7	44,300	2,734	1,740	162.7	6,500	1,680
Public Works Department (PWD)	235	22.2	11,750	235	350	33.5	17,500	350	400	38.3	6,500	400
Department of Health (DOH)	323	27.9	8,075	-	274	23.8	6,850	-	80	6.9	2,000	-
- Office of Accelerated Rural Development (ARD)	225	16 4	-	225	240	20 8	-	240	260	24 4	-	260
- Royal Thai Army (RTA)	1177	103.3	58,850	1,175	399	35 0	19,950	399	-	-	-	-
- Royal Thai Army (RTA)	3,136	280.2	156,800	-	-		-	-	-	-		-
- Department of Mineral Resources (DMR)	1,813	123.6	-	1,813	1,745	164 7	-	1,745	1,000	93 0	-	1,000
2. Shallow Wells	5,689	32.4	127,941	5,632	5,110	52.3	66,022	4,469	5,125	33 8	71,822	4,829
2 1 Size 1 meter diam	1,270	10.2	-	1,270	1,400	18.8	-	959	1,400	18 1	-	1,329
- Office of Accelerated Rural Development (ARD)	1,270	10.2	-	1,270	1,400	18.8	-	959	1,400	18.1	-	1,329
2.2 Size 1.2 meter diam	4 062	18.3	114 016	3,845	3,710	35.5	66,022	3,510	3,725	15.8	71,822	3,500
- Department of Health (DOH)	200	1 4	4,000	-	200	2.0	4,000	-	225	2.3	4,500	-
- Community Development Department (CDD)	1,409	9 6	97,751	1,392	500	4.5	52,322	500	500	4.5	52,322	500
- Department of Local Administration (DOLA)	2,453	7.3	12,265	2,453	3,000	9 0	9,800	3,000	3,000	9 0	15,000	3,000
- Land Development Department (LDD)	-	-	-	-	10	20 0	100	10	-	-	-	-
2.3 Size 1.8 meter diam.	557	3.9	13,925	517		-	-	-	-	-	-	-
- National Security Command (NSC)	557	3.9	13,925	517	-	-	-	-	-	-	-	-
3 Ponds	481	463.9	48,076	436	442	458 1	56,883	456	582	618 0	71,257	596
3 1 New	481	463.9	48 076	436	442	458 1	56,883	456	582	618.0	71,257	596
Office of Accelerated Rural Development (ARD)	110	107.3	18,500	-	120	175.8	18,000	-	139	204.0	20,850	-
- Royal Thai Army (RTA)	88	110 8	-	-	8	1.8	4 000	8	-	-	-	-
- Department of Local Administration (DOLA)	95	14.2	4,750	190	140	14.0	7,000	280	200	20.0	10,000	400
- Land Development Department (LDD)	78	95.2	7,831	78	64	128 1	10,988	-	122	244 0	20,832	-
- Royal Irrigation Department (RID)	110	136 4	16,995	168	110	136 4	16,995	168	121	150.0	19,775	198
4 Piped Water Supply	997	340 7	80,840	874	1,677	529 7	119,160	927	2,300	743.6	158,380	1,820
4.1 New	423	261.5	60,140	-	750	368.5	83,260	-	770	385.0	88,630	-
- Department of Health (DOH)	422	260.2	60 140	-	750	368.5	83,260	-	770	385 0	88,630	
- Land Development Department (LDD)	1	1.2	-	-	-	-	-	-	-	-	-	
4.2 Expansion	574	79.3	20,700	259	507	153 7	35,900	507	1,030	348.5	68,750	1,520
- Public Works Department (PWD)	259	73 7	20,700	259	507	153 7	35,900	507	1,030	348.5	68,750	1,020
- Department of Mineral Resources (DMR)	315	5.6	-	315	420	7.5	-	420	500	10.0	-	500
5 Maintenance	64,852	310 1	736,800	44,769	79,689	391.2	328,368	52,138	86,972	432 1	398,009	51,726
5 1 Deep wells	22,788	33 7	712,250	14,721	33,562	54 8	302,050	20,138	36,060	62.5	368,949	17,846
- Public Works Department (PWD)	242	0.5	-	-	302	1 4	-	-	365	1 7	-	-
- Department of Health (DOH)	7,126	10 7	178,150	-	12,306	17 8	301,900	-	14,800	21.8	368,500	-
- Office of Accelerated Rural Development (ARD)	14,420	18.5	534,100	13,721	16,754	26.5	150	15,938	19,495	33.2	2,449	16,346
- Royal Thai Army (RTA)	-	-	-	-	3,000	3.6	-	3,000	-	-	-	-
- Department of Mineral Resources (DMR)	1,000	4 0	-	1,000	1,200	5.5	-	1,200	1,300	6.0		1,300
5.2 Piped Water Supply	60	4.2	12,960	-	60	4.2	12,960	-	60	4.2	12,900	-
- Department of Health (DOH)	60	4.2	12,960	-	60	4.2	12,960	-	60	4.2	12,900	-
5.3 Pump equipment	41,938	49.9		30,000	46,047	68 1	-	32,000	50,400	74 4	-	34,000
- Public Works Department (PWD)	11,938	14.3		-	14,047	21 1	-	-	16,400	24.6	-	-
- Department of Mineral Resources (DMR)	30,000	35 6	-	30,000	32,000	47 0	-	32,000	3,400	49.8		3,400
6 Cement tanks	21,847	70 9	53,889	11,828	31,054	144 1	140,040	10,807	29,444	125.5	78,300	10,804
- Public Works Department (PWD)	20	1 1	2,700	15	50	2.5	5,750	50	300	17 7	40,500	240
- Office of Accelerated Rural Development (ARD)	18,622	49.3	-	8,734	23,000	81 7	1,275	4,990	25,000	88.2	1,385	5,420
- Royal Thai Army (RTA)	419	10 1	29,390	298	3,860	42.9	98,600	623	-	-	-	
- Community Development Department (CDD)	73	2.2	8,214	73	144	5.0	16 415	144	144	5.0	16,415	144
- Department of Local Administration (DOLA)	2,713	8 1	13,565	2,708	4,000	12 0	20,000	5,000	4,000	14.8	20,000	5,000

Source. Budget Document No 5 (1992), Budget Bureau

Table D5. Summary of Water for Drinking and Domestic Use, 1993
Showing Facility, Target, and Budget, Classified according to Responsible Organization

Responsible Organization	Deep Wells (Unit) (Million B)	Shallow Wells (Unit) (Million B)	Ponds (Unit) (Million B)	Piped Water Supply Systems (Unit) (Million B)	Cement Tanks (Unit) (Million B)	TOTAL (Million B)
Security Command Headquarters (SCH)	300 19.2	400 2.8	- -	- -	- -	- 22.0
Public Works Department (PWD)	3,300 202.1	- -	- -	1,250 436.0	300 17.6	- 655.7
Office of Accelerated Rural Development (ARD)	3,400 201.9	1,420 171.1	162 348.8	- -	31,424 488.9	1,086.95
Department of Health (DOH)	2,930 195.6	225 2.4	- -	1,339 746.0	344 50.6	- 994.6
Department of Mineral Resources (DMR)	4,673 392.1	- -	- -	781 218.7	- -	- 610.8
Office of National Primary Education Commission (NPEC)	-	- -	100 12.0	220 30.0	- -	- -
Agricultural Land Reform Office (ALRO)	107 14.4	117 1.2	56 15.3	- -	- -	- 223.6
Cooperatives Promotion Department (CPD)	- -	190 1.6	1,831 81.3	2 1.2	10 12	- 109.2
Department of Social Welfare (DSW)	59 5.3	59 0.5	14 3.8	24 2.8	- -	- 12.4
Department of General Education (DGE)	- -	-	90 66.6	90 58.4	- -	- -
Royal Irrigation Department (RID)	- -	-	148 333.0	- -	- -	- -
Department of Local Administration (DOLA)	- -	2,000 10.0	169 17.0	- -	3,000 12.6	- 39.6
Land Development Department (LDD)	- -	- -	122 244.0	- -	- -	- 244.0
Community Development Department (DCD)	- -	890 8.9	- -	- -	391 3.9	- 12.8
Department of Forestry (DF)	- -	65 0.6	- -	- -	- -	- -
Provincial Waterworks Authority (PWA)	- -	- -	- -	200 550.0	- -	- 550.0
(Quantity) TOTAL (Baht)	14,409 1,030.6	5,386 45.1	2,692 1,121.8	3,906 2,043.1	35,469 674.8	- 13,435.4

Source Budget Document No 5 (1993), Budget Bureau

Annex E

Compendium of Foreign-funded

Rural Water Supply Projects

(1987 - 1991)

1. **Project Title:** The New Village Development Program

2. **Type of Aid:** Financial Assistance (Grant)

3. **Project Components:**
   - Construction
   - Provision of basic services

4. **Scope of Training:** NA

5. **Project Objectives:**
   - To construct road network from village to village and to the district
   - To survey groundwater and to drill wells
   - To improve overall health care
   - To improve productivity of poor farmers

6. **Implementing Agencies:**
   - Joint Operations Centre, The Supreme Command Headquarters, Ministry of Defence
   - Office of Accelerated Rural Development, Ministry of Interior

7. **Funding Source:** Japan International Cooperation Agency

8. **Project Duration:** 1988 - indefinite

9. **Target Areas:** Villages in Thai-Lao border areas

10. **Target Groups/Beneficiaries:** Villagers and farmers

11. **Results/Outputs:** -

12. **Project Budget:** Baht 74.042 million

1. **Project Title:** Drinking Water Provision Program

2. **Type of Aid:** Technical Assistance

3. **Project Components:** Provision of equipment

4. **Scope of Training:** NA

5. **Project Objective:** To improve the drilling capability of the Public Works Department's tube well drilling implementation

6. **Implementing Agency:** Public Works Department, Ministry of Interior

7. **Funding Source:** Japan International Cooperation Agency

8. **Project Duration:** 1988 - 1992

9. **Target Areas:** Nationwide

10. **Target Groups/Beneficiaries:** PWD and recipients of PWD tube well projects

11. **Results/Outputs:** Increased tube wells drilled from 1,300 (in 1987) to 2,200 per year

12. **Project Budget:** Baht 228.830 million (Yen 1,400 million from donor)

1. **Project Title:** Accelerated Groundwater Development in Rural Areas in the Northeast

2. **Type of Aid:** Technical Assistance

3. **Project Components:** Provision of equipment

4. **Scope of Training:** NA

5. **Project Objective:** To improve the drilling capability of the Office of Accelerated Rural Development

6. **Implementing Agency:** Office of Accelerated Rural Development, Ministry of Interior

7. **Funding Source:** Japan International Cooperation Agency

8. **Project Duration:** 1989 - 1993

9. **Target Areas:** Northeast region

10. **Target Groups/Beneficiaries:** ARD and recipients of ARD deep well projects

11. **Results/Outputs:** Increased number of deep wells drilled

12. **Project Budget:** Baht 271.82 million (Yen 1,339 million from donor)

1. **Project Title:** Village Development Program II

2. **Type of Aid:** Financial Assistance (Grant)

3. **Project Components:** Construction

4. **Scope of Training:** NA

5. **Project Objectives:**
   - Water Supply Component: To construct and improve water resources both for drinking/domestic consumption and agricultural purposes
   - Road Component: To construct ARD standard-type roads

6. **Implementing Agencies:**
   - The Supreme Command Headquarters, Ministry of Defense
   - Office of Accelerated Rural Development, Ministry of Interior

7. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by KfW

8. **Project Duration:** 1985 - indefinite

9. **Target Areas:** Villages in Thai-Cambodian border areas in Chantaburi, Trat, Buriram, Prachinburi, Sisaket, Surin, and Ubon Ratchathani Provinces

10. **Target Groups/Beneficiaries:** Villagers and farmers

11. **Results/Outputs:** Water Supply Component completed:
    - 186 deep wells
    - 15 ponds
    - 7,048 water jars

12. **Project Budget:** Baht 143.52 million
    (DM 10 million from donor and Baht 9 million from implementing agencies)

1. **Project Title:** Village Development Program IV

2. **Type of Aid:** Financial Assistance (Grant)

3. **Project Components:**
   - Construction
   - Training

4. **Scope of Training:** Training of villagers on well maintenance

5. **Project Objectives:**
   - Well Maintenance Component: To rehabilitate, repair, and maintain deep wells and shallow wells in the project areas
   - Housing Component: To construct new houses and repair old ones for resettled families

6. **Implementing Agencies:**
   - The Supreme Command Headquarters, Ministry of Defense
   - Office of Accelerated Rural Development, Ministry of Interior
   - Department of Public Welfare, Ministry of Interior

7. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by KfW

8. **Project Duration:** 1988 - indefinite

9. **Target Areas:** 172 villages in Thai-Cambodian border areas in Buriram, Prachinburi, Sisaket, and Surin

10. **Target Groups/Beneficiaries:** Villagers

11. **Results/Outputs:** Well Maintenance Component: rehabilitation, repair and maintenance of wells as well as training of villagers are being implemented

12. **Project Budget:** -
    (DM 5 million from donor, plus counterpart contribution from implementing agencies)

1 **Project Title.** Thai-German Self-Help Training Project on the Development of Small Water Resources in Rural Areas (Phase I)

2 **Type of Aid:** Technical Assistance

3 **Project Components** Training

4 **Scope of Training:**

- *Action training* consisting of 3 main components
  - Planning and decision making (*Project Casework* approach)
  - Technical know-how and hands-on training on suitable technical options (construction, operation & maintenance)
  - Training and communication skills (training of trainers)
- *Multi-layered training packages* with intended snowballing effects
  - Level A district staff [trained by Core Training Team]
    - A 1 Deputy District Officers (DDO)
    - A 2 District Technicians (DT)
    - A 3 Assistant District Technicians (ADT)
  - Level B village technicians [trained by level A teams with further assistance from Core Training Team]
  - Level C village leaders [trained by levels A & B teams with gradually decreasing involvement by Core Training Team]
- *Self-help oriented*

5 **Project Objective:** To provide technical, planning/decision-making and, partly, training know-how and skills to 5 types of trainees (deputy district officers, district technicians/assistants, village technicians, villagers) on development of small scale water resources in rural areas in order to alleviate the perennial water problems for drinking, domestic and also agricultural purposes through the villages' own efforts, i e **Self Help** activities

6 **Implementing Agencies:**

- Department of Local Administration, Ministry of Interior, Bangkok
- Faculty of Engineering, Khon Kaen University, Khon Kaen
- Carl Duisberg Gesellschaft-South East Asia Program Office, Bangkok

7 **Funding Sources:**

- *Project planning and implementation* German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by CDG-SEAPO
- *Project utilization/extension* Thai Ministry of Interior/provincial administration/villagers' own contributions

8 **Project Management Bodies:**

- *Policy support* Steering Committee
  Chairman Hon Phisarn Moolasartsathorn, Permanent Secretary, Ministry of Interior
- *Strategic project management* Coordinating Committee
  Chairman. Guenter Tharun, Head, Carl Duisberg Gesellschaft-South East Asia Program Office
- *Operational project management* Project Administration/Core Training Team
  Project Manager Dr Prinya Chindaprasirt, Dean, Faculty of Engineering, Khon Kaen University

9 **Project Duration:** 1987 - 1990

10 **Target Areas:** Selected villages of Ubon Ratchathani and Nakorn Ratchasima provinces in the Northeastern region of Thailand

11 **Target Groups/Beneficiaries:**

- Ultimate target groups are the villagers, especially the village leaders, to enable them to satisfy the basic water needs in their communities,
- Intermediate target groups are the Level A and B participants to reach out to grassroots level

12 **Expected Results/Outputs:**

- *Direct* 13,500 villagers, 675 village technicians, 135 district technicians/assistants and deputy district officers trained until the end of 1989,
- *Indirect* water shortage problems in target villages, i e 25% of pilot provinces, to be resolved through villagers' own initiatives and contributions until the end of 1990, with additional support from Thai government agencies

13 **Project Budget.** Baht 23 million (DM 1 62 million)

1 **Project Title:** Thai-German Self-Help Training Project on the Development of Small Water Resources in Rural Areas (Phase II)

2 **Type of Aid:** Technical Assistance

3 **Project Components:** Training

4. **Scope of Training:**
- *Action training* consisting of 3 main components
  - Planning and decision making (*Project Casework* approach)
  - Technical know-how and hands-on training on suitable technical options (construction, operation & maintenance)
  - Training and communication skills (training of trainers)
- *Multi-layered training packages* with intended snowballing effects
  - Level 1: Provincial Management Training (trained by Core Training Team)
  - Level 2: District Team Training (trained by Core Training Team)
  - Level 3: Tumbon/Village Leaders and Technicians Training (trained by Level 2 with assistance from Core Training Team)

5. **Project Objective:** To provide planning/decision-making, technical and training know-how and skills to 4 types of trainees (provincial administrators, district officers, tumbon officers/village leaders and village technicians) on development of small water resources in rural areas in order to alleviate the perennial water problems for drinking, domestic and also agricultural purposes through the villagers' own efforts, i e **Self-Help** activities

6. **Implementing Agencies:**
- Department of Local Administration, Ministry of Interior, Bangkok
- Faculty of Engineering, Khon Kaen University, Khon Kaen
- Carl Duisberg Gesellschaft-South East Asia Program Office, Bangkok

In cooperation with
- Department of Non-Formal Education, Ministry of Education
- Population and Community Development Association
- Thai-German Development Foundation

7. **Funding Sources:**
- *Project planning and implementation*: German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by CDG-SEAPO
- *Project utilization/extension*: Thai Ministry of Interior/provincial administration/villagers' own contributions

8 **Project Management Bodies:**
- *Policy support*: Steering Committee
  Chairman: Permanent Secretary, Ministry of Interior
  Co-Chairman: Mr Franz G Ronde
- *Strategic project management*: Coordinating Committee
  Chairman: Deputy Director-General (Provincial Affairs, DOLA)
  Co-Chairman: Mr. Guenter Tharun, Head, Carl Duisberg Gesellschaft-South East Asia Program Office
- *Operational project management*: Project Administration/Core Training Team
  Project Manager: Dr Prinya Chindaprasirt, Dean, Faculty of Engineering, Khon Kaen University

9 **Project Duration:** 1990 - 1994

10 **Target Areas:** Selected villages in the 17 provinces of Northeast Thailand

11. **Target Groups/Beneficiaries:**
- Ultimate target groups are the tumbon and village leaders, to enable them to satisfy basic water needs in their communities,
- Intermediate target groups are the Level 1 and 2 participants to reach out to grassroots level

12 **Expected Results/Outputs:**
- *Direct*: 29,497 tumbon/village leaders, 6,807 village technicians, 1,265 district officers and 119 provincial administrators trained until the end of 1994,
- *Indirect*: After Level 3 training, 75% of the participating villages will have formulated or proposed their own water resource development/maintenance plan and 50% of participating villages will have implemented their proposed water resource development/maintenance plan to effectively solve water shortage problems

13 **Project Budget**: Baht 59 million (DM 4 million)

1. **Project Title:** Water Resources Development Project (Phase II)

2. **Type of Aid:** Financial Assistance (Grant)

3. **Project Components:**
   - Construction
   - Research and development
   - Training

4. **Scope of Training:** Training constitutes about 20% of project activities (while construction is about 60% and R&D is 20%). Village leaders and/or volunteer village technicians are trained on construction as well as aspects related to community organization and mobilization of villagers. Participatory training approach is used.

5. **Project Objectives:**
   - To maximize community utilization of the water resources infrastructure constructed in Phase I by strengthening the community institutions which manage the infrastructure
   - To expand construction of effective technologies
   - To introduce new promising technologies

6. **Implementing Agency:** Community-Based Appropriate Technology and Development Services Bureau, Population and Community Development Association (PDA)

7. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by German Agro Action (Deutsche Welthungerhilfe)

8. **Project Duration:** 1988 - 1990

9. **Target Areas:** Buriram, Khon Kaen, Mahasarakham, and Nakhon Rachasima Provinces of Northeastern Thailand

10. **Target Groups/Beneficiaries:** Villagers who live under poor conditions relative to the rest of the region

11. **Expected Results/Outputs:** Construction of :
    - 12 weirs
    - 2 piped water supply systems
    - 100 deep wells
    - 200 shallow wells
    - 3 rotary-type tanks
    - 20 small mortar tanks
    - 30 IMB tanks
    - 200 reinforced concrete tanks
    - Committee members managing all facilities constructed during Phase I trained in proper utilization, maintenance, and fund administration and management

12. **Project Budget:** Baht 21.59 million (Baht 17.3 million from donor)

1. **Project Title:** Thai-Ger Fund Projects *

2. **Type of Aid:** Financial Assistance (Grant)

3. **Project Component:** Construction

4. **Scope of Training:** NA

5. **Project Objectives:**
   - To provide funds for the construction of drinking water supply facilities, either for individual households or for the community, in rural villages
   - To provide funds for the construction of small reservoirs for agriculture

6. **Implementing Agency:** Thai-German Development Foundation (Thai-Ger Fund)

7. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by German Agro Action (Deutsche Welthungerhilfe)

8. **Project Duration:** One month to two years

9. **Target Areas:** Various provinces but mostly in the Northeast region

10. **Target Groups/Beneficiaries:** Villages in rural and remote areas

11. **Expected Results/Outputs:** Construction of various small water resource facilities as indicated in attachment

12. **Project Budget:** Total of Baht 4.63 million

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* The Thai-Ger Fund Projects supported by GAA consisted of 30 construction projects between 1987-1991. These are given in the attached list

Thai-Ger Fund Projects

			Budget	Duration
1.	Improvement of Village Pond Project, Khon Kaen	Baht	153,430	Jul-Oct 87
2	School Shallow Well Project, Ubon Ratchathani		34,630	Dec 87
3.	School Water Reservoir Project, Nakhon Ratchasima		122,500	Feb-Mar 88
4	Ham Hee School Pond Project, Maha Sarakham		47,000	Feb-Mar 88
5	Water Reservoir and Earthen Jar Project, Ubon Ratchathani		73,040	Mar-Apr 88
6	School Reservoir Project, Chiang Mai		63,645	Mar 88-Nov 89
7	Ban Huaysai Thungmon School Water Tank Project, Khon Kaen		39,600	Apr 88
8	Lam Huay Sai Baat Weir Project, Khon Kaen		233,089	Apr-May 88
9	Huay Sang Irrigation Dam Project, Sakon Nakhon		286,171	May-Jun 88
10	School Water Reservoir and Water Tank Project, Roi Et		89,975	May-Jul 88
11	Water Reservoir Huay Rong Wa for Irrigation Project, Ubon Ratchathani		231,000	Jun 88
12	Ban Sai School Rain Water Tank Project, Ayutthaya		64,146	Jun 88
13	Ban Nongbua School Water System Project, Loei		30,500	Aug-Oct 88
14	Kok Krathin Irrigation Canal Project, Nakhon Sawan		300,000	Sept-Dec 88
15	Ban Don Yai Water Reservoir Project, Nakhon Ratchasima		220,000	Dec 88-Jan 89
16	Ban Doo School Rain Water Tank Project, Maha Sarakham		27,900	Feb 89
17	Ban Lao School Pond Project, Maha Sarakham		71,570	Mar-May 89
18	Wat Nikhom Kasem Pond Improvement Project, Ubon Ratchathani		90,042	Apr-May 89
19	Ban Than Pradu & Ban Na Mun Pond Improvement Project, Khon Kaen		95,000	May-Jun 89
20	Ban Khlong Khian Concrete Pond Project, Phang Nga		88,496	May-Jun 89
21	Construction of Field Outlets for Irrigation Project, Chiang Mai		198,000	May-Jun 89
22	Ban Non Samran Pond Project, Maha Sarakham		152,570	Aug-Oct 89
23	Tambon Khambok Piped Water System Project, Mukdahan		300,000	Sept-Oct 89
24	Small Scale Ground Water Drilling Project, Lampang		299,500	1989-1991
25.	Tambon Wangdong Groundwater Development Project, Kanchanaburi		160,000	Mar-Apr 90
26	Improvement of Village Piped Water Project, Mukdahan		266,000	
27	Kaeng Nua Pond Digging Project, Ubon Ratchathani		300,000	
28	Ban Thai Niyom Pond Project, Udon Thani		300,000	
29	Wat Sawang Sila Pond Project, Udon Thani		200,000	
30.	Ban Chong Sai Concrete Water Tank Construction Project, Chumphon		97,000	Nov 91
	TOTAL	Baht	4,634,804	

1. **Project Title:** Revolving Fund for Rural Communities Water Supply Rehabilitation Project

2. **Type of Aid:** Technical Assistance

3. **Project Components:** Credit facility from which the target groups could borrow at a 4% interest rate with a 10-year payment term

4. **Scope of Training:** NA

5. **Project Objective:** To provide a Revolving Fund to be used as a credit facility for rehabilitating and expanding rural communities water supply systems in order to provide adequate and safe water supply and reduce water-borne diseases

6. **Implementing Agency:** Provincial Waterworks Authority

7. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by GTZ

8. **Project Duration:** 1985 - 1992

9. **Target Areas:** Accessible to rural communities accross the country who are managing their own village water supply systems

10. **Target Groups/Beneficiaries:** Rural communities that need financial assistance in rehabilitating their village piped water supply systems

11. **Results/Outputs:** Loans provided to applicants; borrowed funds used in rehabilitation and expansion work of village piped water supply systems

    Status: 12 communities have borrowed from the Fund

12. **Project Budget:** ca. Baht 12 million

1. **Project Title:** Thai-New Zealand Small Watershed Development Project

2. **Type of Aid:** Technical Assistance

3. **Project Components:**
   - Expert services
   - Development of pilot models and information systems
   - Construction
   - Training

4. **Scope of Training:** Around 40% of project budget is slated for training which is intended to support existing voluntary water resources development program. The training is carried out by project staff and DOLA officials.

5. **Project Objectives:**
   - To establish an appropriate model for use by provincial government administrators as well as concerned government agencies in planning and managing the development of small watershed areas in the Northeast
   - To provide technical assistance to relevant nationwide programs, such as the People's Volunteer Weir Program, People's Well Drilling Program, Farmers Participation in Small Scale Irrigation Systems Project, etc.
   - To set up an information system for small watershed development planning for Northeastern Thailand

6. **Implementing Agencies:**
   - Department of Local Administration and Provincial Authorities
   - Khon Kaen University

7. **Funding Source:** New Zealand Ministry of External Relations and Trade

8. **Project Duration:** 1988 - 1991

9. **Target Areas:** Northeast Thailand, especially Nakorn Ratchasima and Ubon Ratchathani

10. **Target Groups/Beneficiaries:** District Officers, Deputy District Officers, District Technicians, Villagers

11. **Results/Outputs:**
    - Efficient implementation of the People's Volunteer Weir Project
    - Two pilot small watershed development models in Nakorn Ratchasima and Ubon Ratchathani
    - Geographic and management information systems completed

12. **Project Budget:** Baht 24.75 million (NZ $ 1.8 million)

1. **Project Title:** Thai-Australian Northeast Village Water Resource Project (Phase II)

2. **Type of Aid:** Technical Assistance

3. **Project Components:**
   - Expert services
   - Construction
   - Training

4. **Scope of Training:** Training is an integral part of all project components, and comprises about 20% of project activities (Expert services in planning and development of management tools accounts for 80% project activities). An interagency training program has been developed consisting of five courses, namely Planning, Communications, Water Quality, Maintenance, and Appropriate Technology, designed for three levels of trainees at provincial, district, and sub-district levels.

5. **Project Objective:** To provide planning, coordinating, technical, and training assistance to relevant government agencies and local institutions for the implementationof small water resources development activities in order to contribute to the Royal Thai Government's programs for the development of safe and dependable drinking and domestic water supply in rural villages in the Northeast region. In 1989, the project was expanded to include small scale agricultural water as well as rural sanitation.

6. **Implementing Agencies:**
   - National Economic and Social Development Board (lead agency)
   - Ministry of Interior - Office of Accelerated Rural Development, Community Development Department, and Department of Local Administration
   - Ministry of Public Health - Department of Health
   - Ministry of Industry - Department of Mineral Resources
   - Provincial Waterworks Authority
   - Ministry of Agriculture and Cooperatives - Royal Irrigation Department, Department of Agricultural Extension, Department of Land Development, and Department of Fisheries
   - Khon Kaen University - Faculty of Engineering

7. **Funding Sources:** Australian International Development Assistance Bureau

8. **Project Duration:** 1986 - 1991

9. **Target Areas:** All 17 provinces of the Northeast

10. **Target Groups/Beneficiaries:**
    - Villagers
    - Implementing agencies responsible for rural water supply

11. **Results/Outputs:**
    - Development of management packages and information system for use by RTG agencies in planning and implementation of water resource development projects in rural areas
    - Preparation of groundwater probability maps
    - Cost-effective utilization of water for agricultural use
    - Extension of piped water facilities
    - Completion of Action Plan of the Rural Water Supply Program
    - Water quality monitoring and study of water-borne diseases

12. **Project Budget:** Baht 22.783 million

1. **Project Title:** Evaluation of Rainwater Quality

2. **Type of Aid:** Financial Assistance (Grant)

3. **Project Components:** Research

4. **Scope of Training:** NA

5. **Project Objectives:**
   - To determine the natural route of contamination of rainwater from the point of collection, storage, and final consumption in the household
   - To investigate the effect of water handling and usage practices on the level of contamination
   - To investigate the effect of collection and storage systems on the quality of rainwater collected in terms of bacteriological and heavy metal contamination
   - To develop recommendations to reduce the levels of contamination in order to improve the quality of rainwater for drinking

6. **Implementing Agency:** Khon Kaen University

7. **Funding Source:** International Development Research Center

8. **Project Duration:** 1986 - 1988

9. **Target Areas:** Khon Kaen, Samut Songkhram, Muang

10. **Target Groups/Beneficiaries:** -

11. **Results/Outputs:** -

12. **Project Budget:** Baht 3.588 million
    (Can $ 135,000 from donor and Baht 692,000 from implementing agency)

1. **Project Title:** Transfer of Self-reliant Technology for Rural Communities in Thailand with Special Reference to Water Technology and Sanitation

2. **Type of Aid:** Financial Assistance (Grant)

3. **Project Components:**
   - Technology transfer
   - Research
   - Training

4. **Scope of Training:** Training of villagers on pond and latrine construction

5. **Project Objectives:**
   - To conduct a baseline survey on the socio-economic conditions and water and sanitation facilities in 3 study communities
   - To mobilize and involve community leaders and villagers in the planning and implementation of the project
   - To demostrate to and train the villagers on how to construct a PVC lined pond and pour-flush latrines
   - To study and observe the effectiveness and weaknesses of the process of technology transfer to the community

6. **Implementing Agency:** Chulalongkorn University

7. **Funding Source:** International Development Research Center

8. **Project Duration:** 1987 - 1989

9. **Target Area:** Prachuap Khirikhan

10. **Target Groups/Beneficiaries:** Villagers

11. **Results/Outputs:** -

12. **Project Budget:** Baht 1.44 million
    (Can $ 47,000 from donor and Baht 422,000 from implementing agency)

1. **Project Title:** Ban Peu Water Jar Project

2. **Type of Aid:** Technical Assistance

3. **Project Components:**
   - Construction
   - Training and education

4. **Scope of Training:** Training of villagers on water jar construction and on health and sanitation

5. **Project Objectives:**
   - To provide at least 2 liters of drinking water per person per day
   - To provide at least one jar per household
   - To educate the villagers in order to improve their hygienic drinking water habits
   - To reduce the incidence of water-borne diseases by 5%
   - To train 25 villagers to become experts and trainers in water jar construction

6. **Implementing Agency:** The Diocese of Udon Thani

7. **Funding Source:** Catholic Relief Services

8. **Project Duration:** 1987 - 1988

9. **Target Area:** Ban Peu in Udon Thani Province

10. **Target Groups/Beneficiaries:** Villagers

11. **Results/Outputs:** Villagers trained in jar construction; water jars constructed; grass roofing on houses were replaced with iron roofs; villagers trained on health and sanitation

12. **Project Budget:** Baht 410,000
    (Baht 109,000 from donor and Baht 301,000 from implementing agency)

1. **Project Title:** Development of Water Resources and Integrated Farming in Don Kok Village

2. **Type of Aid:** Technical Assistance

3. **Project Components:**
   - Construction
   - Training

4. **Scope of Training:** Training of farmers to maximize use of new water facilities constructed through the project

5. **Project Objectives:**
   - To improve water resource facilities for drinking and agricultural activities
   - To promote appropriate agricultural management
   - To increase self-reliance and economic independence through crop and income diversification

6. **Implementing Agencies:**
   - Village Training Center
   - Maryknoll Missioners

7. **Funding Source:** Catholic Relief Services

8. **Project Duration:** 1987 - 1990

9. **Target Areas:** Don Kok Village in Nongkhai Province

10. **Target Groups/Beneficiaries:** 229 villagers in 53 households in target village

11. **Results/Outputs:**
    - Construction of 2 command water resources and 1 reservoir completed
    - Farmers trained on how to use the infrastructure

12. **Project Budget:** Baht 849,000
    (Baht 530,000 from donor and Baht 319,000 from implementing agencies)

1. **Project Title:** Gravitational Water Supply for Hmong Hilltribes in Petchabun

2. **Type of Aid:** Technical Assistance

3. **Project Components:** Construction

4. **Scope of Training:** NA

5. **Project Objectives:**
   - To assist in the development of a gravitational water supply system for Huey Nam Kao Village
   - To provide at least 1.5 liters of drinking water per person per day to the villagers

6. **Implementing Agency:** Department of Public Welfare, Ministry of Interior

7. **Funding Source:** Catholic Relief Services

8. **Project Duration:** February - August 1988

9. **Target Area:** Huey Nam Kao Village in Petchabun Province

10. **Target Groups/Beneficiaries:** Villagers

11. **Results/Outputs:** Two storage tanks and main pipeline constructed

12. **Project Budget:** Baht 105,000
    (Baht 55,000 from donor and Baht 50,000 from implementing agency)

1. **Project Title:** Water Tanks for Nine Border Village Schools

2. **Type of Aid:** Financial Assistance (Grant)

3. **Project Components:** Installation of facilities

4. **Scope of Training:** NA

5. **Project Objective:** To purchase and install water tanks for nine schools in order to provide clean drinking water and additional source for agricultural purposes

6. **Implementing Agency:** Royal Thai Police Department, Ministry of Interior

7. **Funding Source:** Catholic Relief Services

8. **Project Duration:** May - October 1988

9. **Target Areas:** Chumphon, Trung, Nakhon Sri Thammarat, Songkhla, Surat Thani

10. **Target Groups/Beneficiaries:** Pupils

11. **Results/Outputs:** 27 water tanks purchased and installed

12. **Project Budget:** Baht 122,000

1. **Project Title:** Ban Prachao Water Jar Project

2. **Type of Aid:** Technical Assistance

3. **Project Components:**
   - Construction
   - Training

4. **Scope of Training:** Training of villagers on hygienic use of water

5. **Project Objectives:**
   - To provide at least 2 liters of drinking water per person per day
   - To educate the villagers in order improve their habits on hygienic use of drinking water
   - To reduce the incidence of water-borne diseases and improve the villagers' quality of life

6. **Implementing Agency:** Viriyanuchon Boys Home of Khon Kaen

7. **Funding Source:** Catholic Relief Services

8. **Project Duration:** 1988 - 1989

9. **Target Area:** Ban Prachao in Khon Kaen Province

10. **Target Groups/Beneficiaries:** Villagers

11. **Results/Outputs:** Water jars provided; grass roofing on houses were replaced with tin roofs; gutters for collection of rain water were installed

12. **Project Budget:** Baht 63,000
    (Baht 46,000 from donor and Baht 17,000 from implementing agency)

1. **Project Title:** North Village Water Distribution Project
2. **Type of Aid:** Technical Assistance
3. **Project Components:** -
4. **Scope of Training:** -
5. **Project Objectives:** -
6. **Implementing Agency:** Department of Public Welfare, Ministry of Interior
7. **Funding Source:** World Concern
8. **Project Duration:** 1989 - 1992
9. **Target Areas:** Hill tribes in Chiang Mai and Chiang Rai
10. **Target Groups/Beneficiaries:** Villagers
11. **Results/Outputs:** -
12. **Project Budget:** Baht 795,000

1. **Project Title:** Groundwater Data Centre

2. **Type of Aid:** Technical Assistance

3. **Project Components:**
   - Expert services
   - Computer hardware and software
   - Training

4. **Scope of Training:** In-house of training of DMR staff

5. **Project Objective:** To establish a national computer-based groundwater data centre capable of storing and retrieving all national groundwater data in usable form in order that the national planning and use of groundwater resources in Thailand can be improved.

6. **Implementing Agency:** Department of Mineral Resources

7. **Funding Source:** United Nations Development Programme

8. **Project Duration:** 1984 - 1989

9. **Target Areas:** NA

10. **Target Groups/Beneficiaries:** DMR primarily and other government agencies involved in groundwater development

11. **Expected Results/Outputs:**
    - Mapping/plotting of groundwater data
    - Staff trained
    - Report on feasibility of using computer assisted devices for the handling and presentation of groundwater data

12. **Project Budget:** Baht 7.395 million
    (US$ 207,000 or Baht 5.269 million from donor and Baht 2.126 million from implementing agency)

1. **Project Title:** Development of Standard Handpumps and Community Maintenance System in Rural Water Supply

2. **Type of Aid:** Technical Assistance

3. **Project Components:**
   - Development and demonstration of prototypes
   - Training

4. **Scope of Training:** Training of trainers from implementing departments who in turn trained village caretakers; the training program consisted of village-level maintenance of pumps, their sanitary use, and on project reporting

5. **Project Objectives:**
   - To develop and demonstrate standard handpumps for dug wells and boreholes capable of village-level maintenance and repair for manufacture and use in Thailand
   - To institute community-level maintenance and repair for standard high-lift and low-lift handpumps in Thailand

6. **Implementing Agencies:**
   - Department of Health
   - Public Works Department
   - Office of Accelerated Rural Development
   - Department of Mineral Resources
   - Khon Kaen University
   - IBRD-UNDP/World Bank Water and Sanitation Program

7. **Funding Source:** United Nations Development Programme

8. **Project Duration:** 1987 - 1989

9. **Target Areas:** Khon Kaen and Muang

10. **Target Groups/Beneficiaries:** Villagers, village handpump caretakers, government technicians, village headmen

11. **Results/Outputs:**
    - Demonstration Component: installed 29 Korat 608 CTS (THAI 2530) deep-lift handpumps, 10 Dempster deep-lift handpumps, 3 TP.60 deep-lift handpumps, and 20 ESARN low-lift handpumps
    - Training Component: trained 11 government technicians/trainers from DMR, PWD, DOH, ARD, and CDD who trained 126 village handpump caretakers

12. **Project Budget:** Baht 6.146 million
    (US $ 166,200 from donor and Baht 1.916 million from implementing agencies)

1. **Project Title:** Research Project for Community Management of Water Supply

2. **Type of Aid:** Financial Assistance (Grant)

3. **Project Components:** Research

4. **Scope of Training:** NA

5. **Project Objective:** To analyze the existing managerial models and operating procedures of various government agencies providing piped rural water services

6. **Implementing Agencies:**
   - Chulalongkorn University Social Research Institute
   - Department of Health, Ministry of Public Health

7. **Funding Source:** World Health Organization

8. **Project Duration:** 1988 - 1989

9. **Target Areas:** 24 provinces, adequately representing all regions of the country

10. **Target Groups/Beneficiaries:** Department of Health, Department of Public Works, Provincial Administrative Council; rural communities serviced by these agencies

11. **Results/Outputs:** Recommendations on guidelines/model for effective planning and management of village piped water supply systems, covering design and cost of construction, operation and maintenance, water quality, and effective community organization, in order to induce a clearer government policy formulation process concerning water supply services in rural areas

12. **Project Budget:** Baht 235,000

Annex F

Compendium of Other Foreign-funded

Small Water Resource Development Projects

(1987 - 1991)

IRRIGATION PROJECTS

1. **Project Title:** Expert Services: Nam Pong Stage II Project

2. **Type of Aid:** Technical Assistance

3. **Project Components:**

   - Advisory services
   - Training

4. **Project Objectives:**

   - To provide advisory services in the training of RID personnel in the operation of irrigated water, and DOAE personnel and farmers in agricultural extension, farm demonstration and marketing
   - To provide advisory services to study cultivation of rice alternatives

5. **Implementing Agencies:**

   - Royal Irrigation Department
   - Department of Agricultural Extension

6. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by KfW

7. **Project Duration:** 1989-1993

8. **Target Areas:** Khon Kaen and Mahasarakham

9. **Target Groups/Beneficiaries:** RID and DOAE officials and farmers in target areas

10. **Results/Outputs:** -

1. **Project Title:** Farmers Operation and Maintenance Project

2. **Type of Aid:** Financial Assistance (Soft Loan)

3. **Project Components:**

   - Advisory services
   - Maintenance/improvement of infrastructure
   - Training

4. **Project Objectives:**

   - To develop a concept for changing the present rice cultivation into a diversified crop production including large-scale agricultural field trials
   - To develop a concept for marketing and promotion of local processing industries
   - To implement physical improvement of irrigation infrastructure
   - To train government staff and farmers

5. **Implementing Agencies:**

   - Royal Irrigation Department
   - Department of Agricultural Extension

6. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by KfW

7. **Project Duration:** 1990-1993

8. **Target Areas:** Khon Kaen and Mahasarakham

9. **Target Groups/Beneficiaries:** Farmers in target areas

10. **Results/Outputs:** -

11. **Project Budget:** Baht 70 million (DM 5 million)

1. **Project Title:** Small-Scale Irrigation Measures

2. **Type of Aid:** Financial Assistance (Soft Loan)

3. **Project Component:** Construction

4. **Project Objective:** To provide irrigation, especially during the dry season, to limited areas in five provinces in Northeast Thailand in order to generate additional income for the farmers

5. **Implementing Agency:** Royal Irrigation Department

6. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by KfW

7. **Project Duration:** ?-1991

8. **Target Areas:** Northeast Thailand

9. **Target Groups/Beneficiaries:** Farmers in target areas

10. **Results/Outputs:** Construction of 30 small reservoirs and weirs

11. **Project Budget:** Baht 150 million (DM 10 million)

1. **Project Title:** Maintenance of Irrigation Projects, Stage I

2. **Type of Aid:** Financial Assistance (Grant and Soft Loan)

3. **Project Components:**

   - Consultancy services
   - Equipment procurement

4. **Project Objective:** To provide consultancy services in the preparation of a long-term plan for maintenance of large-scale and medium-scale irrigation projects in the Northeast, in assisting RID in procuring maintenance equipment with loan funds, and in improving RID operation capacity

5. **Implementing Agency:** Royal Irrigation Department

6. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by KfW

7. **Project Duration:**

   - Advisory Component - 1983-1990
   - Equipment Procurement - 1986-1991

8. **Target Areas:** Khon Kaen, Nongkhai, Mahasarakham, Loei, and Udonthani

9. **Target Groups/Beneficiaries:** RID and farmers in the target areas

10. **Results/Outputs:** Criteria for determining maintenance requirements and procedures for the organization and implementation of maintenance measures established; this will form the basis for similar maintenance programs to be carried out by RID throughout the country

11. **Project Budget:** Baht 354 million (DM 17.6 million)

1. **Project Title:** Maintenance of Irrigation Projects, Stage II

2. **Type of Aid:** Financial Assistance (Grant and Soft Loan)

3. **Project Components:**

   - Consultancy services
   - Equipment procurement

4. **Project Objective:** To adjust and apply the maintenance management concept developed in the Northeast to other regions of Thailand

5. **Implementing Agency:** Royal Irrigation Department

6. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by KfW

7. **Project Duration:** 1989-1993

8. **Target Areas:** Northern, Central, and Southern Thailand

9. **Target Groups/Beneficiaries:** RID and farmers in the target areas

10. **Results/Outputs:** Determination of maintenance requirements, annual budget needs, organizational and institutional adjustments and determination of maintenance equipment requirements

11. **Project Budget:** Baht 49 million (DM 3.5 million)

1. **Project Title:** Irrigation Improvement Program: Advisory Service for the Royal Irrigation Department

2. **Type of Aid:** Technical Assistance

3. **Project Components:**

   - Consultancy services
   - Training

   Scope of Training: Scholarship program and short training courses either abroad or locally

4. **Project Objective:** To help the Royal Irrigation Department with the preparation and development of an Irrigation Improvement Program and with further training of RID personnel

5. **Implementing Agency:** Royal Irrigation Department

6. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by GTZ

7. **Project Duration:** 1987-1989

8. **Target Areas:** Nationwide

9. **Target Groups/Beneficiaries:** Farmers in large and medium scale irrigation projects and RID officials

10. **Results/Outputs:** Irrigation infrastructure improvement projects and O&M improvement projects prepared

1. **Project Title:** Management of Irrigation Projects

2. **Type of Aid:** Technical Assistance

3. **Project Component:** Training

   Scope of Training: One-month certificate training course in Germany on management concepts and practices for irrigation managerial personnel

4. **Project Objectives:**

   To train target groups to:
   - be familiar with basic management concepts for irrigation systems
   - be able to recognize and assess the interaction between local conditions and successful management
   - be better able to assess the role of water users and their participation in management
   - be able to analyze and assess the goals of affected groups and individuals
   - understand the importance of interaction among the groups involved in irrigated agriculture
   - be able to develop a successful participatory management concept closely tailored to local conditions and the goals of affected groups

5. **Implementing Agency:** Food and Agriculture Development Center (ZEL) of the German Foundation for International Development (DSE)

6. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by DSE

7. **Project Duration:** -

8. **Target Areas:** Southeast Asia

9. **Target Groups/Beneficiaries:** Managerial personnel of irrigation projects, and teachers/lecturers working in the field of irrigated agriculture

10. **Results/Outputs:** -

1. **Project Title:** IRDP Upper North (NADC)
Agricultural Development Project (FEDRA)

2. **Type of Aid:** Technical and Financial Assistance

3. **Project Components:**

- Training and skills development
- Improvement of village infrastructure

Scope of Training: Training given to pilot farmers concerning maintenance and servicing of Diesel-operated irrigation pumps, as well as maintenance of project-funded irrigation works (weirs and canals)

4. **Project Objectives:**

- To increase the supply of irrigation water for cultivation of rice and cash crops
- To make potable water available in the villages
- To control the flood problem

5. **Implementing Agencies:**

- Northern Agricultural Development Center (NADC)
- The Foundation for Education and Development of Rural Areas (FEDRA)
- Friedrich-Naumann-Stiftung (FNSt)

6. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by FNSt and Brot fuer die Welt

7. **Project Duration:**

- NADC - 1975-1988
- FEDRA - 1986-1992

8. **Target Areas:**

- Samoeng, Prao, Mae Taeng and Mae Rim Districts in Chiang Mai
- Tung Hua Chang District in Lampoon

9. **Target Groups/Beneficiaries:** Villagers and pilot farmers in project areas

10. **Results/Outputs:**

- Supply of twelve 3" Diesel and petrol pumps
- 5 weirs constructed
- About 7,000 m of irrigation canals constructed
- 16 wells constructed for potable water supply
- 9 locally made handpumps (7m lift) installed
- Water wheel to supply potable water to 120 families installed
- Pilot farmers trained on how to maintain handpumps and irrigation works as well as to operate and service Diesel/petrol pumps

11. **Project Budget:** Baht 970,000

1. **Project Title:** On-Farm Water Management Project

2. **Type of Project:** Technical Assistance

3. **Project Components:**

   - Inventory of irrigation system
   - Development and monitoring of irrigation water rotation schedules
   - Training and training material development
   - Establishment/strengthening of water user groups
   - Development of demonstration plots

   Scope of Training: Three courses for RID's zonemen and one course for farmer leaders. The training courses are conducted by RID, KKU, and Agricultural Research Station

4. **Project Objectives:**

   - To enhance sound water management procedures at all levels of the irrigation system, but with special emphasis on the tertiary irrigation and drainage system
   - To improve water application at farm level
   - To investigate and promote crop diversification in the dry season

5. **Implementing Agencies:**

   - Royal Irrigation Department
   - Thai-Netherlands Northeast Agricultural Development Program

6. **Funding Sources:**

   - Dutch Government
   - Royal Thai Government

7. **Project Duration:** Originally 1987-1989, but postponed to 1990-1992

8. **Target Areas:** Three pilot areas of 1000 rai each in Kalasin

9. **Target Groups/Beneficiaries:** Farmers in the pilot areas

10. **Results/Outputs:**

    - Increased crop production and improved water management
    - Repair/improvement of irrigation canals

1. **Project Title:** On-Farm Water Management Project, Phase II

2. **Type of Project:** Technical Assistance

3. **Project Components:**

   - Strengthening of water user groups
   - Technical advice and coordination of on-farm irrigation systems improvement
   - Development of demonstration area

4. **Project Objectives:**

   - To improve the use of irrigation water at farm level
   - To promote crop intensification and diversification in the dry season
   - To increase crop yields and quality in both dry and wet seasons

5. **Implementing Agencies:**

   - Royal Irrigation Department
   - Thai-Netherlands Northeast Agricultural Development Program

6. **Funding Sources:**

   - Dutch Government
   - Royal Thai Government

7. **Project Duration:** 1990-1993

8. **Target Areas:** Kalasin

9. **Target Groups/Beneficiaries:** Farmers in the pilot areas

10. **Results/Outputs:**

    - More efficient use of irrigation water
    - Repair/improvement of irrigation canals

1. **Project Title:** Mekong Irrigation Program

2. **Type of Aid:** Technical Assistance

3. **Project Component:** Consultancy services

4. **Project Objectives:**

   - To improve water management, farmers organization, agricultural practices and agricultural support services in pump irrigation schemes in NE Thailand and the Lao PDR
   - To enlarge the pump irrigation area on the bank of the Mekong river in the Vientiane area, Lao PDR
   - To identify effective low-cost investment support and credit facilities for irrigated agriculture in NE Thailand
   - To identify alternative development scenarios for selected hardship areas in NE Thailand, based on low-cost water resources development and agricultural investment options, to support further planning and decision-making such as in the Green Esarn project.

5. **Implementing Agency:** DHV Consultants of the Netherlands in association with Thai and Lao consultants, in cooperation with Thai and Lao Government agencies, and supervised by the Mekong Secretariat

6. **Funding Source:** Government of the Netherlands

7. **Project Duration:** 1988-1991

8. **Target Area in Thailand**: Northeast Region

9. **Target Groups/Beneficiaries:** Poor farmers

10. **Results/Outputs:**

    - Water management support program in pump irrigation areas along the Chi and Mun basins
    - Study and pilot project for investment support and credit facilities for 7 selected irrigated agricultural areas in the Northeast
    - Study on a water resources development plan for Northeast Thailand with scenarios for low-cost development in selected hardship areas

1. **Project Title:** Northeast Small Scale Irrigation Project

2. **Type of Aid:** Financial Assistance (Grant)

3. **Project Components:**

   - Technical and extension services
   - Institutional development
   - Training

   Scope of Training: On-the-job and classroom training of RID and DOAE personnel as well as farmers

4. **Project Objective:** To establish a replicable approach and institutional capability for increasing agricultural incomes for small farmers within command areas of existing tank irrigation systems in Northeastern Thailand

5. **Implementing Agency:** Royal Irrigation Department

6. **Funding Source:** U.S. Agency for International Development

7. **Project Duration:** 1980-1989

8. **Target Areas:** Irrigation areas of seven reservoirs in Roi Et, Kalasin, Ubon Ratchathani, Mukdahan, Buriram, and Nakorn Ratchasima

9. **Target Groups/Beneficiaries:** The rural farm population within the target areas

10. **Results/Outputs:**

    - The irrigated area at the project sites will have expanded by at least 100% and net farm income will have increased by a minimum of 75% on average
    - A viable organizational and training system will have been institutionalized to extend the project approach throughout the Northeast Region

1. **Project Title:** Farmers Participation in Small Irrigation Systems

2. **Type of Aid:** Technical Assistance

3. **Project Components:**

   - Training
   - Management support

   Scope of Training: Training of participating farmers by RID staff and provincial officials

4. **Project Objective:** To increase participation of farmers in the planning, construction and management of small irrigation systems

5. **Implementing Agency:** Royal Irrigation Department

6. **Funding Source:** Ford Foundation

7. **Project Duration:** 1985-1990

8. **Target Areas:** Northeastern Thailand

9. **Target Groups/Beneficiaries:** Participating farmers and RID officials

10. **Results/Outputs:** More participation of farmers and improved efficiency of the management of small irrigation systems

1. **Project Title:** Dams Panel Project

2. **Type of Aid:** Technical Assistance

3. **Project Components:**

   - Expert services
   - On-the-job training

   Scope of Training: On-the-job training of RID engineering staff in dam planning, design, inspection and maintenance techniques

4. **Project Objective:** To make available to the RID specialist engineering expertise in connection with design, construction, operation and maintenance of storage dams and structures in order to assist them in reaching sound decisions concerning:

   - the solution of engineering problems in connection with existing dams and reservoir structures
   - the solution of engineering problems in connection with dams and reservoir structures in planning/design stage or under construction

5. **Implementing Agency:** Royal Irrigation Department

6. **Funding Source:** United Kingdom

7. **Project Duration:** 1988-1991

8. **Target Areas:** Chiang Mai, Suphan Buri, Sisaket, and Udonthani

9. **Target Groups/Beneficiaries:** RID engineers

10. **Results/Outputs:**

    - Improved RID capability in planning, design, construction, operation and maintenance of storage dams and structures
    - Better and safer practices and procedures for the inspection, operation and maintenance of dams and reservoirs
    - RID engineers trained in dam planning, design, inspection and maintenance techniques

1. **Project Title:** Sukhothai Groundwater Development Project

2. **Type of Aid:** Technical Assistance

3. **Project Components:**

   - Construction
   - Training

   Scope of Training: Local training program provided to irrigation and agricultural extension staff, RID operation and maintenance staff, and pump operators. The training is conducted by Kasetsart University.

4. **Project Objective:** To increase food production, farmers' income and rural employment by the provision of controlled supplies of irrigation water drawn from aquifers occurring in recent sedimentary deposits in the Yom tributary river basin

5. **Implementing Agency:** Royal Irrigation Department

6. **Funding Source:** European Economic Community

7. **Project Duration:** 1983-1987

8. **Target Areas:** Sukhothai and Swankhalok

9. **Target Groups/Beneficiaries:** Farmers in the project areas

10. **Results/Outputs:** Construction of 65 wells to service about 1,000 farm holdings, each well supplying about 58 ha. through a buried pipe distribution system

1. **Project Title:** Bang Nara Irrigation and Drainage Project

2. **Type of Aid:** Technical Assistance

3. **Project Components:**

   - Feasibility study
   - Training

4. **Project Objectives:**

   - To review the agricultural studies related to Bang Nara river basin and its tributaries
   - To conduct a feasibility study on irrigation and drainage in the basin
   - To undertake on-the-job training of government officials in the course of study

5. **Implementing Agency:** Royal Irrigation Department

6. **Funding Source:** Japan International Cooperation Agency

7. **Project Duration:** 1985-1991

8. **Target Areas:** Narathiwat Province

9. **Target Groups/Beneficiaries:** Residents and farmers in the project area

10. **Results/Outputs:**

    - Feasibility study on irrigation and drainage completed
    - RID and other government officials trained

1. **Project Title:** Water Management System and Monitoring Program in the Chao Phraya River Basin

2. **Type of Aid:** Technical Assistance

3. **Project Component:** Expert services

4. **Project Objectives:**

   - To review present water management system for irrigation and drainage
   - To execute an intensive observation and data collection at selected key hydrological stations
   - To formulate a monitoring system for water management
   - To formulate a data management system considering the future function of the Irrigation Engineering Center
   - To identify water management system for irrigation and drainage

5. **Implementing Agency:** Royal Irrigation Department

6. **Funding Source:** Japan International Cooperation Agency

7. **Project Duration:** 1986-1989

8. **Target Areas:** Chao Phraya River Basin

9. **Target Groups/Beneficiaries:** Farmers and residents in project area

10. **Results/Outputs:**

    - Water management monitoring system completed
    - Data management system completed

PROVINCIAL WATER SUPPLY PROJECTS

1. **Project Title:** National Waterworks Technology Training Institute Project

2. **Type of Aid:** Technical Assistance

3. **Project Components:**

   - Construction of Institute building
   - Expert services
   - Training

   Scope of Training: Training courses for MWA and PWA middle-level engineers and technicians in planning, design, construction, operation and maintenance of water supply facilities as well as proper management of waterworks. Training of Thai counterparts in Japan is also part of the program.

4. **Project Objectives:**

   - To establish the National Waterworks Technology Training Institute for the purpose of upgrading the technical capability of MWA and PWA personnel through training
   - To assist and advise Thai counterpart personnel in conducting the training courses by means of dispatch of Japanese experts, training of Thai counterpart personnel in Japan, and by providing equipment.

5. **Implementing Agency:** Metropolitan Waterworks Authority

6. **Funding Source:** Japan International Cooperation Agency

7. **Project Duration:** 1985-1990

8. **Project Sites:** Bangkok, Bangkhen, Khon Kaen, and Chiang Mai

9. **Target Groups/Beneficiaries:** MWA and PWA engineers and technicians

10. **Results/Outputs:**

    - Building constructed and equipment provided
    - Training courses developed and conducted
    - Experts dispatched and Thai counterpart staff trained in Japan

1. **Project Title:** Chonburi Water Supply Project

2. **Type of Project:** Financial Assistance

3. **Project Component:** Consultancy services

4. **Project Objective:** To prepare the Master Plan and Feasibility Study to rehabilitate and expand water supply systems in Chonburi to increase water supply from 60% to 75% of the population served

5. **Implementing Agency:** Provincial Waterworks Authority

6. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by KfW

7. **Project Duration:** 1983-1985

8. **Target Areas:** Chonburi Province

9. **Target Groups/Beneficiaries:** Residents and commercial/industrial establishments in Chonburi

10. **Results/Outputs:** Master Plan and Feasibility Study completed

1. **Project Title:** Udonthani Water Supply Project

2. **Type of Aid:** Financial Assistance

3. **Project Component:** Consultancy services

4. **Project Objective:** To prepare the Master Plan and Feasibility Study to rehabilitate and expand the existing water supply system in the town of Udonthani

5. **Implementing Agency:** Provincial Waterworks Authority

6. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by KfW

7. **Project Duration:** 1984-1989

8. **Target Areas:** Udonthani Province

9. **Target Groups/Beneficiaries:** Residents and commercial/industrial establishments in Udonthani

10. **Results/Outputs:** Master Plan and Feasibility Study completed

1. **Project Title:** Ubon Ratchathani Water Supply Project

2. **Type of Aid:** Technical Assistance and Financial Assistance (Loan)

3. **Project Components:**

   - Consultancy services
   - Construction
   - Training

   Scope of Training: A small component of the project is on-the-job training of PWA staff by consultants on detailed design of the water supply system.

4. **Project Objectives:**

   - To rehabilitate existing water supply system in Ubon Ratchathani
   - To expand source and distribution system to meet the province's water demand up to the year 2000 (Stage I)

5. **Implementing Agency:** Provincial Waterworks Authority

6. **Funding Sources:**

   - Japan International Cooperation Agency for technical assistance component (Master Plan and Feasibility Study)
   - OECF for loan component (Engineering Design for Stage I and Immediate Improvement Works)

7. **Project Duration:** 1989-1991 (Stage I)

8. **Target Areas:** Warin Chamrap Municipality and surrounding area, Ubon Ratchathani Province

9. **Target Groups/Beneficiaries:** Residents and commercial/industrial establishments

10. **Results/Outputs:**

    - Increased water volume and improved water quality through completion of Immediate Improvement Works and System Expansions
    - Improved health and sanitation of served population, which will be 99,440 in the year 2000 (Stage I) and 134,600 in 2010 (Stage II)

1. **Project Title:** Master Plan and Feasibility Study for Hat Yai-Songkhla and other Towns Water Supply

2. **Type of Aid:** Technical Assistance

3. **Project Component:** Consultancy services

4. **Project Objective:** To prepare the Master Plan and Feasibility Study to improve the water supply in nine provincial centers in selected provinces

5. **Implementing Agency:** Provincial Waterworks Authority

6. **Funding Source:** Government of Italy

7. **Project Duration:** 1986-1989

8. **Target Areas:** Hat Yai, Songkhla, Sadao, Chumphae, Kanchanaburi, Mukdahan, Ban Phai, Chonnakot, and Amnat Charoen

9. **Target Groups/Beneficiaries:** Residents and commercial/industrial establishments in target areas

10. **Results/Outputs:** Master Plan and Feasibility Study completed

1. **Program Title:** Management Advisory Services to the Provincial Waterworks Authority, Phase III

2. **Type of Aid:** Technical Assistance

3. **Project Component:** Consultancy services

4. **Program Objectives:** To improve PWA's efficiency in order to reduce administration and operational costs

5. **Partner Agency:** Provincial Waterworks Authority

6. **Funding Source:** German Federal Ministry for Economic Cooperation and Development (BMZ) as administered by GTZ

7. **Program Duration:** 1988-1990

8. **Target Areas:** NA

9. **Target Group/Beneficiary:** Provincial Waterworks Authority

10. **Results/Outputs:**

    - Recommendations on standardization of the audit programs; a final audit manual has been prepared
    - General ledger system and billing and sales ledger system have been computerized and implemented successfully at HQ and Chonburi Waterworks
    - A management information report schedule has been recommended
    - A tariff workshop training has been prepared and conducted
    - A new store management procedure has been implemented, together with a store management manual and stores catalogue
    - New procurement procedures, together with manual, have been implemented
    - A computerized model for PWA's distribution and stores network has been developed, but not yet completely implemented
    - A cost-effective and practical distribution network has been identified.

WATERSHED DEVELOPMENT PROJECTS

1. **Project Title:** Mae Chaem Watershed Development Project

2. **Type of Aid:** Technical Assistance

3. **Project Components:** -

4. **Project Objectives:**

   - To establish a self-sustaining upward trend in real income and access to social services for the rural households of the Mae Chaem watershed, with emphasis on the landless poor
   - To reverse the deterioration in environmental quality within the watershed

5. **Implementing Agencies:**

   - Office of the Permanent Secretary, Ministry of Agriculture and Agricultural Cooperatives
   - Royal Forestry Department
   - Land Development Department
   - Department of Agriculture
   - Department of Agricultural Extension
   - Cooperatives Promotion Department

6. **Funding Source:** U.S. Agency for International Development

7. **Project Duration:** 1981-1989

8. **Target Areas:** Chiang Mai Province

9. **Target Groups/Beneficiaries:** Residents of Mae Chaem district

10. **Results/Outputs:** -

1. **Project Title:** Feasibility Study of Sebai-Sebok Basin Development

2. **Type of Aid:** Technical Assistance

3. **Project Component:** Consultancy services

4. **Project Objectives:**

   - To review and develop the water resources development plan, mainly for agriculture
   - To recommend the stage of development, as well as the scale and priorities of projects
   - To recommend an institutional development plan and other necessary support services

5. **Implementing Agency:** Royal Irrigation Department

6. **Funding Source:** Japan International Cooperation Agency

7. **Project Duration:** 1987-1989

8. **Target Areas:** Ubon Ratchathani Province

9. **Target Groups/Beneficiaries:** Residents in the basin

10. **Results/Outputs:** Feasibility Study completed

1. **Project Title:** Hydrology of Rainfed Paddy Land

2. **Type of Aid:** Financial Assistance (Grant)

3. **Project Component:** Research

4. **Project Objective:** To study the characteristics of hydrologic processes in small watersheds predominantly composed of rainfed paddy land through field measurements, experiment, and conceptual/mathematical modelling

5. **Implementing Agency:** Khon Kaen University

6. **Funding Source:** U.S. Agency for International Development

7. **Project Duration:** 1988-1990

8. **Target Areas:** Small watersheds in Northeast Thailand

9. **Target Groups/Beneficiaries:** Findings of research work will be simplified into guidelines for water resources development planning, especially at district level

10. **Results/Outputs:** Models of hydrologic processes in small watersheds