

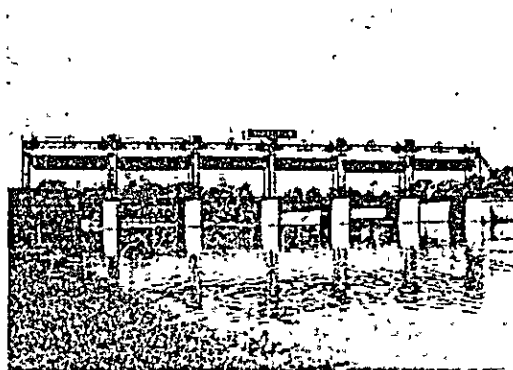
Irrigation School を開設した。当初は2年間の専修校であったが1956年 Pakret の地に移設後3年間の専門学校となり、1958年にはカセサート大学の農学部へ Irrigation Engineering Course となって移管された。当初は40名程度の定数が現在では就職事情から10数名に減っている。RIDの Irrigation School は、1958年の大学への昇格移管後はなかったが、かんがい事業の管理運営部門を中心として中堅技術者の育成確保の必要性が再認識され、Irrigation School は1963年にRIDに再附された。タイ国の学制はほぼ日本と同じであるが、この Irrigation School は高校卒業者が対象で3年半の専門教育を受けるもので、毎年約70名の Technician を輩出のうち大半はRIDに採用されている。

このRIDの Irrigation School はじめ、大学のかんがい事業に関する専門技術のほとんどは英語の文献に拠っている。従って技術力の大前提は語学力となる。

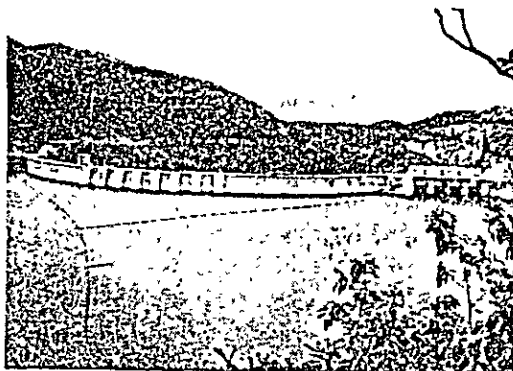
RIDはかんがい事業に関しその行政機関であると同時に建設主体でもある。RIDの創生期には初代局長のオランダ人 Heide や、イギリス人技師 Ward など多くの外国人を招聘して来たが、その技術は必ずしも外国製ではなく、むしろタイへの適正技術であったのではなかろうか。彼等の前任地ジャワ島あるいはインドでの、彼等の先輩がそこで技術の開発を営々と行って来た経験がタイにもたらされ生かされた事であろう。

その後の事業成果が、これを如実に実証するもので、1924年完成のバサック川下流のラマ六世堰や1936年の Mae Fack 事業など多くの事業に秀れた技術を見る事が出来る。

第2次世界大戦後の世界的食糧危機は、1855年のボーリング条件とともに、タイ米の増産需要をもたらした。1950年の世銀借款1,500万ドルによって大チャオピアかんがい事業が始まった。このかんがい支配面積は、チャオピア川の古いデルタと新しいデルタの全域をカバーし、18県、約118万haに及ぶものである。1957年にこの要めとも言うべきチャイナート取水堰が完工すると、そこでつちかわれた建設技術と重機は、チャオピア川支流のピン川のフミボンダムに投入された。RIDはこの水資源開発の多目的事業に果敢にチャレンジした。規模の大きさ、マスコンクリート、アーチダム、タイ国初めての水力発電、長距離高圧送電等、総てが初めてでとてつもなく巨大であった。これはまさに、タイ国における水資源開発の開花期とも言うべく、この世界的にも有数のこのダムの実現にも増して、ここで培われた技術力等波及効果は計り知れないものがある。ダム完成後電力部門の運営にRIDは Yanhee 電力公社を設立した。これは今日の EGAT (タイ発電公社) の前身である。巨大コンクリートダムのセメント需要はタイのセメント業界を確乎たるものに強化した。



写真一 タイ国初の近代のかんがい事業のラマ六世堰、1924年完成



写真二 国王陛下の御名前を冠く BHUMIBOL (ブミボン) DAM 総貯水量 136 億 m³



写真三 タイ国屈指の大ダム、SIRIKIT DAM で女王陛下の御名前を冠する 総貯水量 90億 m³

表一はタイの主要ダムの一覧表である。フミボン・ダムはまさに巨大土木時代の先駆けとなり以降20年の間に総計500億トンの貯水池を次々に用意した。この側面に海外コンサルタンノの働きがあった事は否めない。しかしこれはRIDの技術力を否定するものでなく、外資導入の仕組と的確なる技術者の不足から来るものである。

またかんがい事業は巨大土木工事のみで成功を期する事は出来ない。先にも述べたように当面は貸田貸種など社会的不均衡の是正策が優先されているが、いずれ近いうちに経済性も併せ考慮するバランスのとれた農業開発が重要となろう。そのときに具えての、末端かんがい施設や圃場整備など、経済性と生産性を高める事業手法の開発確立が必要となっている。

ブミボンダムに始まる数々の技術経験はR I D技術者集団に自信と言う最大の資産を与えたが、この自信は必ずや次の課題を着実に解決するものであろう。

あとがき

はじめは、出来れば技術面でもっと掘り下げて、個々の基礎技術の紹介と考察を加える事も考えてみた。しかしながら、タイのR I Dに対するわが国協力は日が浅く、なじみも薄いことからついあれもこれもと総花的な紹介に終始し“R I D物語り”となってしまいました。筆者の勉強不足の至すところでもあります。そこで大いに学び引用させていただいたのが、「タイ国一ひとつの稲作社会」の第3部第1章です。紙面をお借りして海

田能宏氏にお断りお礼申し上げます。

おわりに、タイと日本の相互理解が益々高められ私達の経験がタイ国発展の一助になる事を祈りながら筆をおさめさせていただきます。

【参考引用文献】

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- 5) Irrigation Development during the Chakri Dynasty (1982)
- 6) タイ国一ひとつの稲作社会一：東南アジア研究センター (1975)
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- 8) Plan of Action, RID (1982)

7. 1978~1982年の研修計画及び内容

7-1 研修計画の推移

TRAINING PROGRAMME (From 1978 to 1982)

TRAINING PROGRAMME IN 1978			
No.	Training Course	Month	Number of participants
1.	Training on Modular Design and Structure System	January	26
2.	The 1st Supervisory Training	February	30
3.	The 2nd Supervisory Training	May	30
4.	The 2nd Training on Safety Engineering	April	32
5.	The 1st Training on Filling System	July	28
6.	The 2nd Training on Filling System	August	31
7.	Seminar on Mix Group (The 1st and 2nd) Filling system	October	54
8.	Lecture on Tire and Safety Driving (Chiang Mai)	September	30
9.	Lecture on Tire and Safety Driving (Lam Pang)	September	30
10.	Seminar on Lubrication Oil in Maintenance Machine	October	60
11.	The 1st Training on Management Control through CPM & PERT	October	27
12.	The 2nd Training on Management Control through CPM & PERT	October	26
13.	The 1st Refresher Training Course	November	17
14.	Training on Zone Man of Irrigation Regional Office X	November	137
15.	Seminar on Procurement and property Management	December	320

TRAINING PROGRAMME IN 1979			
No.	Training Course	Month	Number of participants
1.	The 1st Orientation for New Comers	February	61
2.	The 2nd Orientation for New Comers	March	105
3.	The 3rd Training on Management Control through CPM & PERT	June	20
4.	The 3rd Supervisory Training	June-July	22
5.	Retrained on Supervisory Training	October	75
6.	The 1st Workshop on Procurement and Property	October	73
7.	Field Officers of Lam Nam Con Intergrated Rural Development Project	December	156

TRAINING PROGRAMME IN 1980			
No.	Training Course	Month	Number of participants
1.	The 2nd Workshop on Procurement and Property	January	62
2.	The 2nd Symposium on Procurement and Property	January	38
3.	The 3rd Workshop on Procurement and Property	February	76
4.	The 3rd Symposium on Procurement and Property	February	47
5.	The 4th Workshop on Procurement and Property	March	65
6.	The 4th Symposium on Procurement and Property	March	50
7.	The 5th Workshop on Procurement and Property	March	85
8.	The 5th Symposium on Procurement and Property	March	40
9.	The 6th Workshop on Procurement and Management	April	76
10.	The 6th Symposium on Procurement and Property	April	44
11.	The 7th Workshop on Procurement and Property	May	53
12.	The 7th Symposium on Procurement and Property	May	47
13.	The 8th Workshop on Procurement and Property	June	61
14.	The 8th Symposium on Procurement and Property	June	36
15.	The 1st Inspector Training (Phitsanulok Project)	June	60
16.	The 2nd Inspector Training (Phitsanulok Project)	July	66
17.	The 3rd Inspector Training (Phitsanulok Project)	October	66
18.	The 1st General Conference For Vehicle Control Officers	July	23
19.	The 4th Supervisory Training	November	27

TRAINING PROGRAMME IN 1980			
No.	Training Course	Month	Number of participants
1.	The 3rd Orientation for New Comers	January	123
2.	Training on Zone Man and Farmers	January	128
3.	General Conference for Zone Man and Farmers of Phitsanulok Project	April	144
4.	The 5th Supervisory Training	February	27
5.	The 6th Supervisory Training	March	28
6.	The 1st Training for Dradge Officers	June	51
7.	The 2nd Training for Dradge Officers	June	52
8.	The 3rd Training for Dradge Officers	July	51
9.	The 4th Training for Dradge Officers	July	52
10.	The 5th Training for Dradge Officers	August	49
11.	The 6th Training for Dradge Officers	August	50
12.	Seminar for Land Procurement	November	33
13.	Annual General Seminar of the Head Management Support Officers	December	34

TRAINING PROGRAMME IN 1982			
No.	Training Course	Month	Number of participants
1.	The 4th Orientation for New Comers	January	45
2.	The 5th Orientation for New Comers	February	45
3.	The 6th Orientation for New Comers	February	47
4.	The 7th Orientation for New Comers	March	44
5.	The 8th Orientation for New Comers	March	39
6.	The 1st Inspector Training (Mae-Klong Project)	January	49
7.	The 2nd Inspector Training (Mae-Klong Project)	January	73
8.	Seminar for the Head of Regional and Project Chief Machanic	April	53
9.	The 2nd General Conference for Vehicle Control Officers	April	65
10.	The 1st Workshop on Procurement and Property	May	38
11.	The 1st Symposium on Procurement and Property	May	30
12.	The 2nd Workshop on Procurement and Property	May	29
13.	The 2nd Symposium on Procurement and Property	May	21
14.	The 3rd Workshop on Procurement and Property	June	24
15.	The 3rd Symposium on Procurement and Property	June	55
16.	The 4th Workshop on Procurement and Property	June	42
17.	The 4th Symposium on Procurement and Property	June	48
18.	The 1st Training on Official Writing Technique	June	33

TRAINING PROGRAMME IN 1982			
No.	Training Course	Month	Number of participants
			(Estimated)
1.	Seminar for Land Procurement Officers	July	30
2.	The 1st Training on Transactional Analysis	August	30
3.	The 2nd Training on Official Writing Technique	August	33
4.	Seminar on Personal Management for Head of Personal Unit	September	34
5.	The 2nd Training on Transactional Analysis	October	60
6.	The 5th Workshop on Procurement and Property	October	60
7.	The 6th Workshop on Procurement and Property	October	50
8.	The 6th Symposium on Procurement and Property	October	60
9.	The 5th Symposium on Procurement and Property	October	60
10.	The 7th Workshop on Procurement and Property	November	50
11.	The 7th Symposium on Procurement and Property	November	60
12.	The 8th Workshop on Procurement and Property	November	50
13.	The 8th Symposium on Procurement and Property	November	60
14.	The 9th Workshop on Procurement and Property	December	50
15.	The 9th Symposium on Procurement and Property	December	60

7-2 研究コースと主な講義内容

(1) 土木工学

1) 初級コース

- (a) 受講対象者 高卒者にあつては、入省後経験1年以上の者で24才以下、大卒者については入省年度
- (b) 期間・回数 調査法については1週間程度で2回、測量については2週間
- (c) 講義内容
- ・各種の基礎調査法(I) …… 土壌物理調査(1週間)
 - ・各種の基礎調査法(II) …… 水文調査(1週間)
 - ・測量の基礎 …… 測量結果を使う立場からの講義内容(2週間)

2) 基礎コース

- (a) 受講対象者 高卒者にあつては、現場経験5~7年以後にあたる23才~25才から30才以下で入省者を対象、大卒者については受講は不必要
- (b) 期 間 20週間
- (c) 講義内容
- ・応用水理(I) …… 水理学、水文学の基礎
 - ・施 工(I) …… 現場施工の基礎
 - ・構造力学(I) …… 構造力学の基礎コース
 - ・コンピュータ(I) …… プログラミングの基礎
 - ・水理実験 …… 流量、流速測定、不等流
 - ・土質実験 …… 粒度分析、一軸、三軸試験
 - ・材料実験 …… コンクリート配合試験、鉄筋
 - ・各種調査法(II) …… 水文調査、解析

3) 中級コース

- (a) 受講対象者 高卒者にあつては、30才~35才の間に入省者とする。大卒者に対しては、25才~30才とする。
- (b) 期 間 8週間
- (c) 講義内容
- ・頭首工の設計 …… 頭首工の標準設計コース
 - ・ダム設計 …… ”
 - ・水路工の設計 …… ”
 - ・水管理施設の設計 …… ”
 - ・応用水理(II) …… 河海工及び不定法の基礎
 - ・構造力学(II) …… 土質力学、基礎工
 - ・コンピュータ(II) …… 数値解析法
 - ・施 工(II) …… 基礎、マスコンクリート、現場仮設

4) 上級コース

- (a) 受講対象者 高卒者にあつては、35才～40才で入省者、大卒者は30才～35才で100%
- (b) 期 間 合計4週間とし、2回に分け2週間ずつ行う。
- (c) 講義内容
- ・新技術動向Ⅰ) …… 土質、基礎、施工法
 - ・新技術動向Ⅱ) …… 水文、水理

(2) 機械工学

- 1) 初級コース
- ・建設機械概論
 - ・オペレーション
 - ・ゲート・ポンプ概論
- 2) 中級コース
- ・ディーゼルエンジン整備
 - ・ポンプ整備
 - ・モーター整備
 - ・建設機械整備
 - ・農業機械整備
- 3) 上級コース
- ・ゲートの選定基準
 - ・ポンプの選定基準
 - ・建設機械の施工計画

(3) 測 量

- 1) 初級コース
- ・水準測量
 - ・トラバー測量
 - ・測 距
- 2) 中級コース
- ・平板測量
 - ・三角測量
- 3) 上級コース
- ・航空写真入門(主として、発注仕様書の作成)
 - ・カーブセッティング
 - ・リモートセンシング入門

TRAINING PLAN

	COURSE	GRADE	COURSE			PARTICIPANT				
			No. of Trainee	No. of Class	Frequency	Terms (week)	Total	Year	Annual	
CIVIL ENGINEERING	Junior Training	I, II, III(1)	40	2	6	2	5,040	7	720	
	Foundamental	III(2), IV(1)	40	2	2	20	960	6	160	
	Intermediate	IV(2), V(1)	30	1	4	8	600	5	120	
	Senior	V(2)	15	1	2	4	150	5	30	
	Subtotal									1,030
MECHANICAL ENGINEERING	Junior	I, II, III(1)	40	1	4	2	1,120	7	174	
	Intermediate	III(2), IV	20	1	3	8	540	9	60	
	Senior	V	15	1	1	4	105	7	15	
	Subtotal									249
SURVEYING	Junior	I, II, III(1)	40	1	3	2	840	7	120	
	Intermediate	III(2), IV	20	1	2	4	360	9	40	
	Senior	V	15	1	1	2	105	7	15	
	Subtotal									175
	Total									1,454

**CLASSIFICATION OF TRAINING TARGETS BY SPECIALITY & GRADE
(SUMMARY TABLE)**

Category	Office	Salary Grade						Remarks
		Total	V	IV	III	II	I	
1. Civil Engineering Staff	Head	7,500	496	1,171	2,342	2,154	1,337	(Actual)* 50% of above
	(Regional)	(6,365)	(378)	(980)	(1,773)	(1,834)	(1,400)	
	Regional	3,183	189	490	887	917	700	
	Sub total	10,683	685	1,661	3,229	3,071	2,037	
2. Mechanical Engineering Staff	Head	3,537	232	565	1,012	995	733	
	Regional	894	53	132	249	260	200	
	Sub total	4,431	285	697	1,261	1,255	933	
3. Surveyor	Head	1,322	72	209	344	455	242	
	Regional	1,511	80	233	444	448	306	
	Sub total	2,833	152	442	788	903	548	
4. Total	Head	12,359	800	1,945	3,698	3,604	2,312	
	Regional	5,588	322	855	1,580	1,625	1,206	
	Total	17,947	1,122	2,800	5,278	5,229	3,518	

* Regional staff of engineering field in charge of planning, design and/or construction shares about 50%, and shall be the objective of training. Remaining 50% is in charge of operation and maintenance and out of the objective.

**CLASSIFICATION OF TRAINING TARGETS BY SPECIALITY & GRADE
(Total Number of Trainee, Officials)**

Classification	Office	Salary Grade						Remarks
		Total	V	IV	III	II	I	
(CIVIL SERVANT)*								
1. Civil	Head	3,113	277	513	1,025	837	461	
	Regional	1,125	116	194	201	262	352	
	Sub total	4,238	393	707	1,226	1,099	813	
2. Mechanical Engineering	Head	780	95	154	181	164	186	
	Regional	145	16	20	24	35	50	
	Sub total	925	111	174	205	199	236	
3. Surveyor	Head	391	26	71	63	174	57	
	Regional	24	5	8	0	4	7	
	Sub total	415	31	79	63	178	64	
4. Total	Head	4,294	398	738	1,269	1,175	704	
	Regional	1,294	137	222	225	301	409	
	Total	5,578	535	960	1,494	1,476	1,113	

CLASSIFICATION OF TRAINING TARGETS BY SPECIALITY & GRADE
(Total Number of Trainee, Permanent Employee)

Classification	Office	Salary Grade						Remarks
		Total	V	IV	III	II	I	
(PERMANENT EMPLOYEE)**								
1. Civil Engineering	Head	4,389	219	658	1,317	1,317	878	
	Regional	5,240	262	786	1,572	1,572	1,048	
	Sub total	9,629	481	1,444	2,889	2,889	1,926	
2. Mechanical Engineering	Head	2,736	137	410	821	821	547	
	Regional	749	37	112	225	225	150	
	Sub total	3,506	174	522	1,046	1,046	697	
3. Surveyor	Head	921	46	138	276	276	185	
	Regional	1,497	75	225	449	449	299	
	Sub total	2,418	121	363	725	725	484	
4. Total	Head	8,046	402	1,206	2,414	2,414	1,610	
	Regional	7,486	374	1,123	2,246	2,246	1,497	
	Total	15,532	776	2,329	4,660	4,660	3,107	

Note: * Source: Personnel Division, RID, as of February 1983.

** Estimated and analyzed from Table 3-5-1(d) and Table 2-3-3(a). Number of Personnel.

CLASSIFICATION OF TRAINING TARGETS BY SPECIALITY & GRADE
(Detail of Permanent Employee)

Classification of Speciality	Office & Div. concerned **	Salary Grade						Remarks
		Total	V	IV	III	II	I	
I. Speciality Component	Rate	100%	5%	15%	30%	30%	20%	
1. Civil Engineering	Head Office							
	Civil Engg.	4,178	219	658	1,317	1,317	878	
	Mech. Engg.	211						
	Regional Office	5,240	262	786	1,572	1,572	1,048	
	Sub total	9,629	481	1,444	2,889	2,889	1,926	
2. Mechanical	Head Office							
	Civil Engg.	418	137	410	821	821	547	
	Mech. Engg.	2,318						
	Regional Office	749	37	112	225	225	150	
	Sub total	3,485	174	522	1,046	1,046	697	
3. Surveying	Head Office							
	Civil Engg.	418	46	138	276	276	185	
	Surveying	503						
	Regional Office	1,497	75	225	449	449	299	
	Sub total	2,418	121	363	725	725	484	
4. Total	Head Office	8,046	402	1,206	2,414	2,414	1,610	
	Regional Office	7,486	374	1,123	2,246	2,246	1,497	
GRAND TOTAL		15,532	776	2,329	4,660	4,660	3,107	

Note: * Basic figure of permanent employee (Source: Operation and Administration Study, RID, March 1979)

Staff number in division concerned on:

Civil Engineering	8,356
Mechanical Engineering	4,215
Surveying	839
Regional Office	14,970

** Rate of Speciality Components: See Table 3-5-1 (e)

RATE OF SPECIALITY COMPONENT

Unit: %

Speciality	Head Office			Regional Office
	Divisions concerned to Civil Engineering	Divisions concerned to Mechanical Engineering	Survey Division	
Civil Engineering	50	5	0	35
Mechanical Engineering	5	55	0	5
Surveying	5	0	60	10
Others	40	40	40	50
Total	100	100	100	100

8. DOK KRAI-MAB TA PUD WATER PIPELINE PROJECT IN THE EAST COAST AREA

1. PROJECT DESCRIPTION (プロジェクト概要)

I-1. Outline of the Project

(1) Background

The Government of Thailand has planned several huge industrial development projects at the East Coast Area to utilize the gas found at the Gulf of Thailand in order to make a major contribution to Thailand's economy.

The said development plans of various scope in the East Coast Area have been already formulated by the Government and some of these are already under construction.

A prerequisite to the realization of such development plans is the exploitation of infrastructure facilities at the East Coast Area such as state highways, railways, electrical supply, communication system, housings and water supply.

Dok Krai - Mab Ta Pud Water Pipeline Project has been planned and promoted on these background mentioned above, and is one of the Key project to proceed the huge industrial development projects in this area.

(2) Purpose of the Project

Purpose of the Dok Krai - Mab Ta Pud Water Pipeline Project is to convey 57.8 MCM/Year (Max. 2.62 cu.m/sec) of industrial and municipal water from existing Dok Krai Reservoir to planned Mab Ta Pud Receiving Reservoir.

(3) Executing Agency and Other Authorities related

Executing Agency of the Project and other authorities related to the Project are as follows;

Executing Agency : the Royal Irrigation Department
Ministry of Agriculture and Cooperative
Kingdom of Thailand

Related Authorities : * Eastern Seaboard Development
Committee
* NESDB (National Economic &
Social Development Board)
* CIPO (Center for Integrated Plan of Operation)
as for coordination
* IEAT (Industrial Estate Authority of Thailand)
as for operation & Maintenance

(4) Financed Source

Approx. 70 percent of total construction cost of the Project as well as approx. 90 percent of supervisory consulting cost will be financed by the Overseas Economic Cooperation Fund (OECF) of Japan under the Loan Agreement No. TIX-3 made and entered on July 16, 1982 by and between the OECF and the Kingdom of Thailand.

(5) Contractor

Italian-Thai Development Corporation Ltd., addressed 2013 New Petchburi, Bangkok, Thailand, represented by Mr. Chaijudh Karnasuta, Chairman, is the Contractor of the Project under the Contract Agreement made the day of April 15, 1983 between the Royal Irrigation Department.

(6) Supervisory Consultant

The Consultant Joint Venture formed by Sanyu Consultants Inc., Japan, CTI Engineering Co., Ltd., Japan, and Team Consulting Engineers Co., Ltd., Thailand, is the supervisory consultant of the Project under the Agreement made the day of December 24, 1982 between the Royal Irrigation Department.

(7) Construction Cost

The total construction cost contracted is Thai Bahts 178,645,450.— and Japanese Yen 3,789,810.—.

(8) Construction Period

The construction period of the Project is 18 months beginning from April 27, 1983 and to be completed on October 27, 1984.

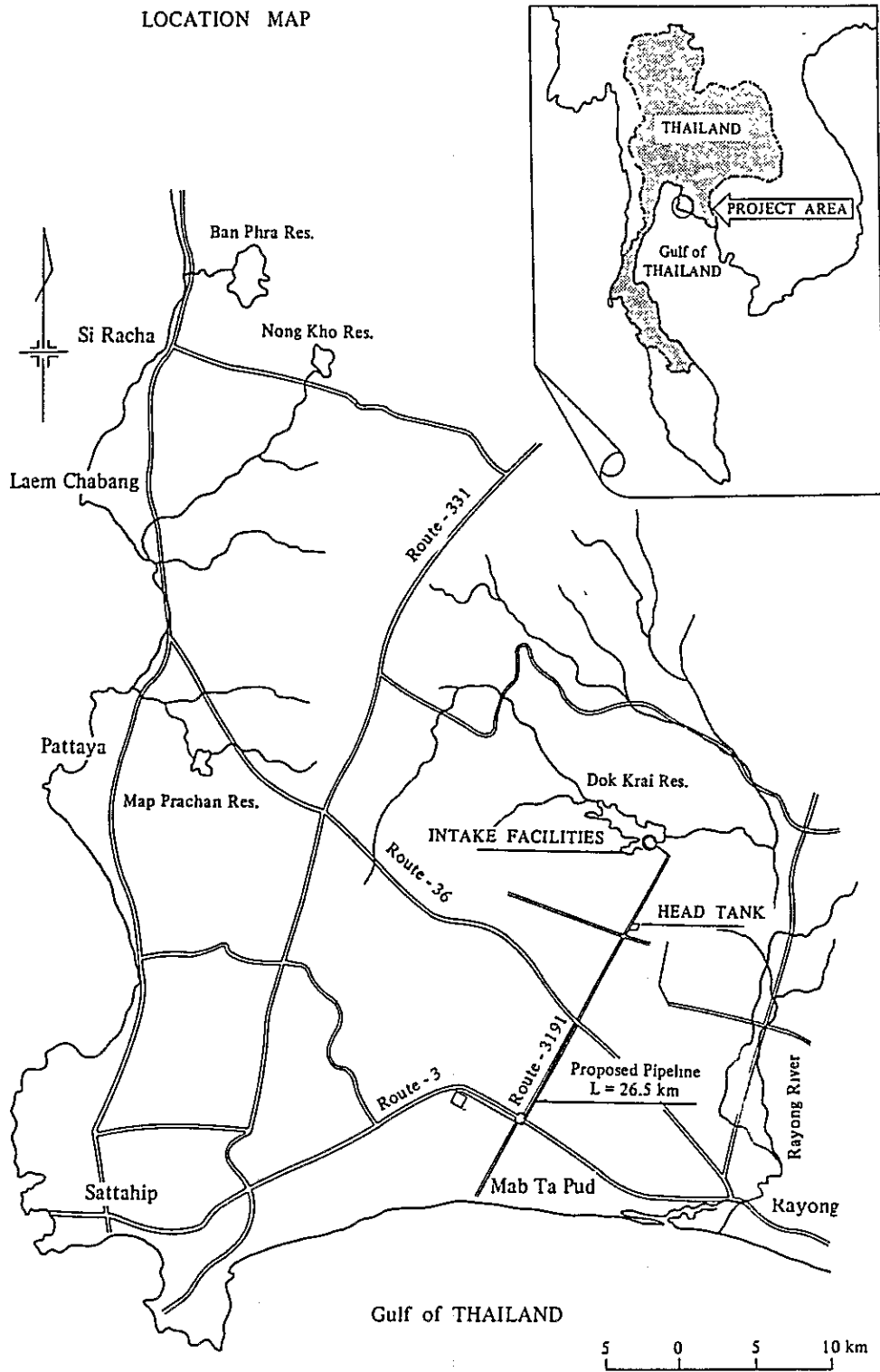
The period of maintenance will be 12 months from the date of issuance of certificate of completion.

(9) Major Component of Contracted Works

Major components of contracted works are supply and construction of following facilities.

- a) General temporary facilities
- b) Intake facilities
- c) Pipeline
- d) Head Tank
- e) Receiving facilities
- f) Control system
- g) Buildings
- h) Test operation & commissioning

LOCATION MAP



SITE MAP

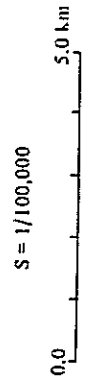
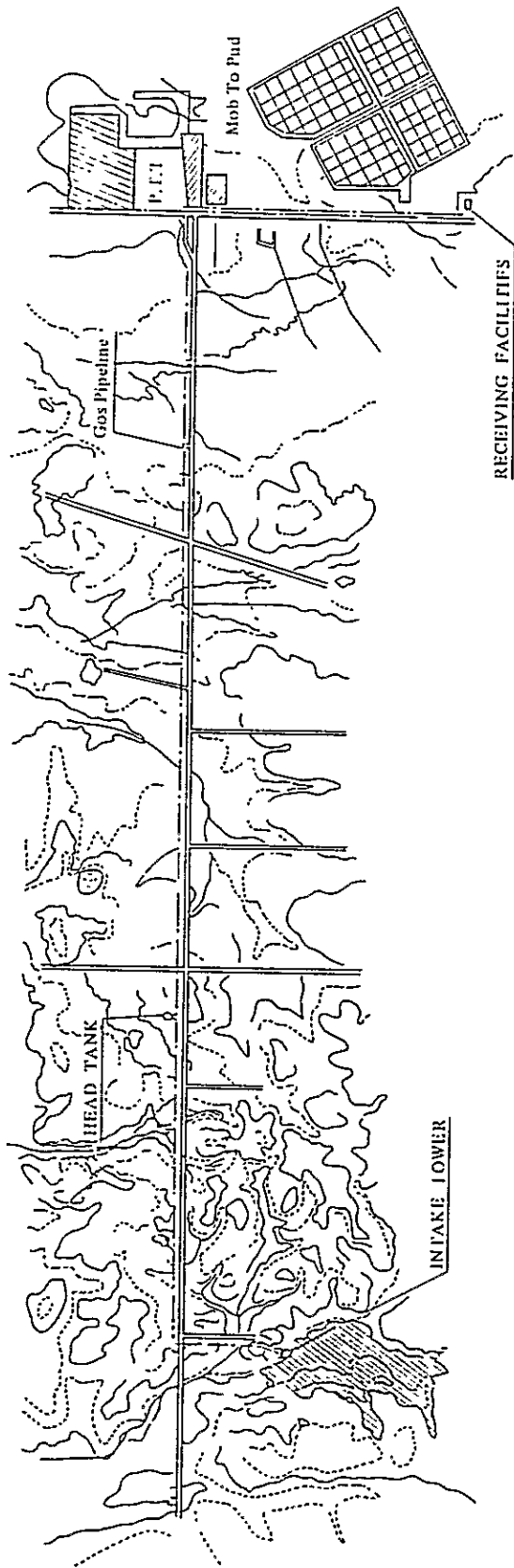
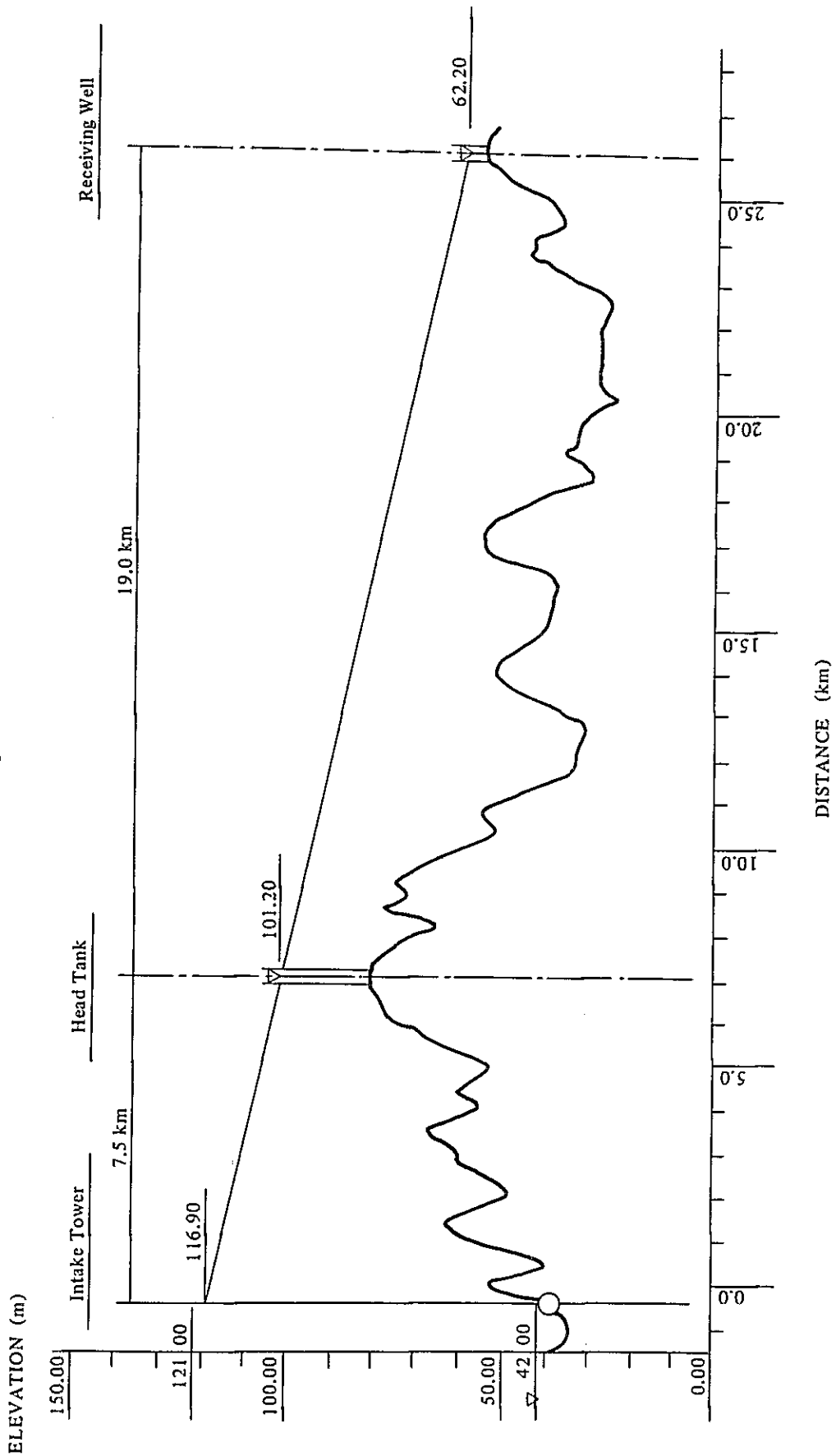


Fig. 3 Pipeline Profile



I-2 Feature of Major Facilities

Features of major facilities of Dok Krai - Mab Ta Pud Water Pipeline Project are as followings.

(1) General Temporary Works

- a) Common Temporary Works : * Site preparation & Temporary access roads.
* Power & water supply.
* Contractor's office, residence and work shop.
* Sanitary measures.
- b) Employer's & Engineers Temporary Facilities : * Employer's and Engineer's office and residence.
* Employer's and Engineer's transportation.

(2) Intake Facilities

- a) Intake Tower : * Concrete caisson at Dok Krai Reservoir, 17 m x 22 m (area) and 20 m (height)
- b) Intake Bridge : * P.C. girder bridge of length, 160 m and width 7.5 m
- c) Intake Yard : * Embanked yard of 35 m x 77 m (area)
- d) Pumping Plants : * Pump & motors, 31.44 cu.m/min x 6 units
* Intake Gate with screen, 1.1 m x 1.1 m x 10 units
* Air chamber : 3 sets
- e) Electrical Facilities : * Substation 22 KV
* Control panels and cabling

(3) Pipeline

- a) Supply of Pipes & Valves : * Steel pipe ϕ 1,350 mm length 26.3 Km thickness 11.9 mm
* Butterfly valves ϕ 1,350 mm, Sluice valves ϕ 400 mm and air valves ϕ 150 mm
- b) Installation of Pipes & Valves : * Steel pipe ϕ 1,350 mm length 26.3 Km
* Butterfly valves ϕ 1,350 mm, Sluice valves 400 mm and air valves ϕ 150 mm
- c) Civil Works for Pipeline : * Earth works for pipeline
* Concrete works for pipeline

(4) Head Tank

- a) Head Tank : * P.C. concrete tower with capacity of 4,900 cu.m ϕ 16 m x 24.4 (height)
- b) Spillway : * P.C. pipe ϕ 900 mm length 450 m

(5) Receiving Facilities

- a) Receiving Well : * Reinforced concrete well with capacity of 1,200 cu.m
- b) Receiving Reservoir : * Earth-filled reservoir with capacity of 27,760 cu.m

I-3 Budgetary Schedule

(1) Budgetary Schedule for Constructional Works

Following budgetary schedule for constructional works has been estimated base on the Detailed Construction Schedule submitted by the Contractor and approved by the Engineer, and will be subject to be revised depending upon the actual constructional progress.

Budgetary Schedule for Constructional Works

Month	1,000 Baht			1,000 Yen		
	Monthly	Accumulated	%	Monthly	Accumulated	%
1983						
JUN	17,865		10.0	378,999		10.0
JUL	—	17,865	10.0	—	378,999	10.0
AUG	—	17,865	10.0	—	378,000	10.0
SEP	7,483	25,348	14.2	105,153	484,152	12.8
OCT	5,353	30,701	17.2	91,128	575,280	15.2
NOV	11,254	41,955	23.5	232,300	807,580	21.3
DEC	12,527	54,482	30.5	236,691	1,044,271	27.6
1984						
JAN	12,417	66,899	37.4	236,073	1,280,344	33.8
FEB	12,213	79,112	44.3	234,853	1,515,197	40.0
MAR	12,774	91,886	51.4	266,706	1,781,903	47.0
APR	10,815	102,701	57.5	266,191	2,048,094	54.0
MAY	12,668	115,369	64.6	289,033	2,337,127	61.7
JUN	13,481	128,850	72.1	390,979	2,728,106	72.0
JUL	11,816	140,666	78.7	290,255	3,018,361	79.6
AUG	10,975	151,641	84.9	264,031	3,282,392	86.6
SEP	5,734	157,375	88.1	87,441	3,369,833	88.9
OCT	—	157,375	88.1	—	3,369,833	88.9
NOV	—	157,375	88.1	—	3,369,833	88.9
DEC	12,066	169,441	94.8	228,266	3,598,099	94.9
1985						
NOV	9,204	178,645	100.0	191,892	3,789,991	100.0

(2) Budgetary Schedule for Consulting Services

Budgetary schedule for consulting services has been estimated as follows, and will be subject to be revised depending upon the actual performance.

Month	1,000 Yen		1,000 Baht		
	Remuneration		Remuneration		Tax Reimbursement
	Monthly	Accumulated	Monthly	Accumulated	Monthly
1983					
JUN	9,792	26,897	71	289	130
JUL	12,361	39,258	98	377	150
AUG	13,564	52,822	124	512	150
SEP	17,606	70,428	130	642	150
OCT	14,995	85,423	131	773	120
NOV	14,515	99,938	130	903	120
DEC	13,595	113,533	131	1,034	110
1984					
JAN	12,634	126,167	130	1,164	570
FEB	13,921	140,088	131	1,295	110
MAR	16,090	156,178	130	1,425	100
APR	15,336	171,514	134	1,559	130
MAY	14,866	186,380	132	1,691	130
JUN	13,831	200,211	127	1,818	130
JUL	18,531	218,742	126	1,944	140
AUG	14,216	232,958	125	2,069	140
SEP	14,033	246,991	123	2,192	100
OCT	10,075	257,066	117	2,309	70
NOV	6,710	263,776	109	2,418	70
DEC	6,660	270,436	117	2,535	60
1985					
JAN	6,820	277,256	117	2,652	480
FEB	3,364	280,620	113	2,765	10
MAR	2,940	283,560	107	2,872	10
APR	983	284,543	162	3,034	
MAY	—	—	202	3,236	(20)
NOV	2,457	287,000	64	3,300	(60)

(August 1982)

II. GENERAL SPECIFICATIONS (全体設計書 (目次))

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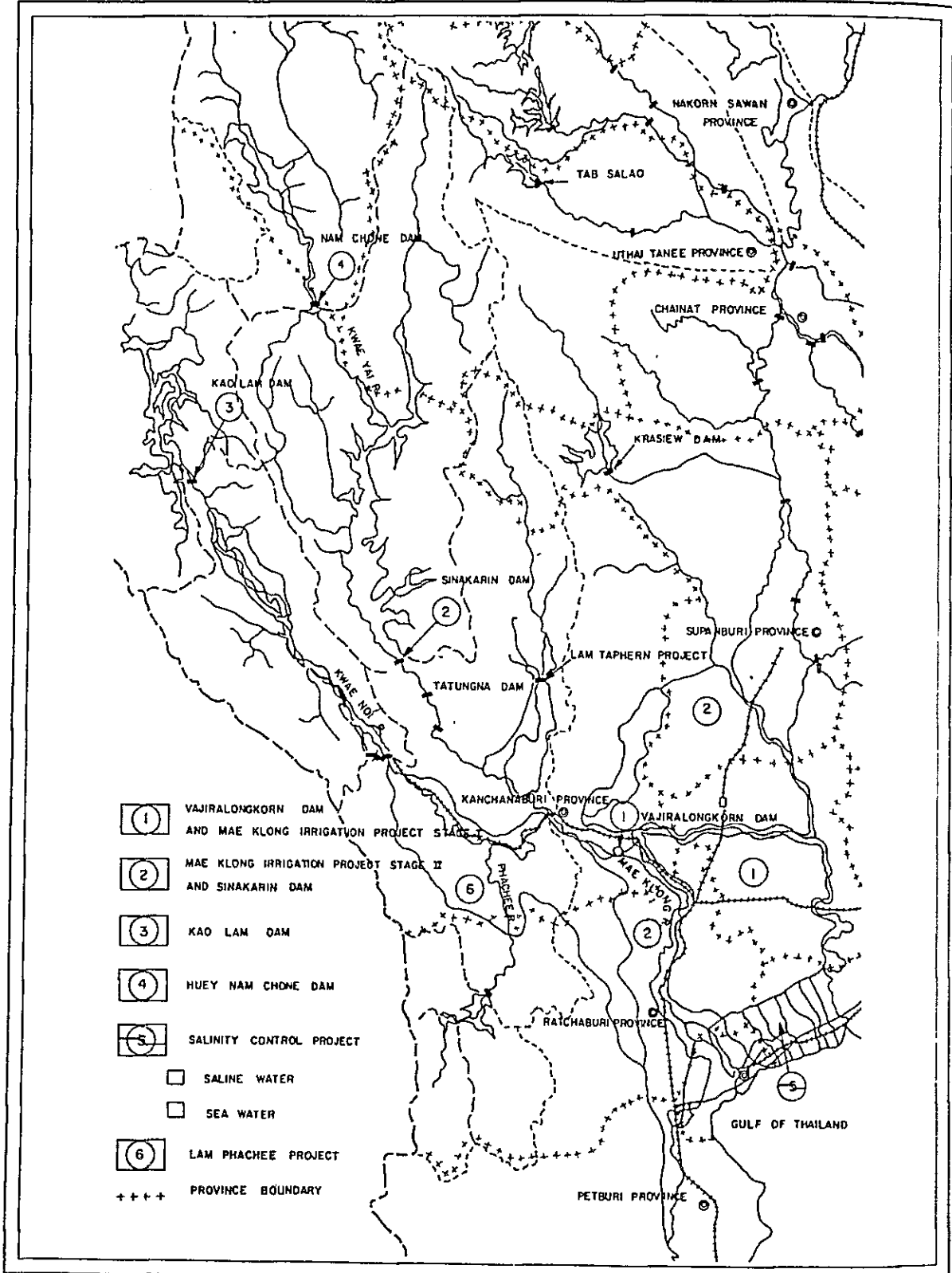
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9. MAE KLONG IRRIGATION PROJECT

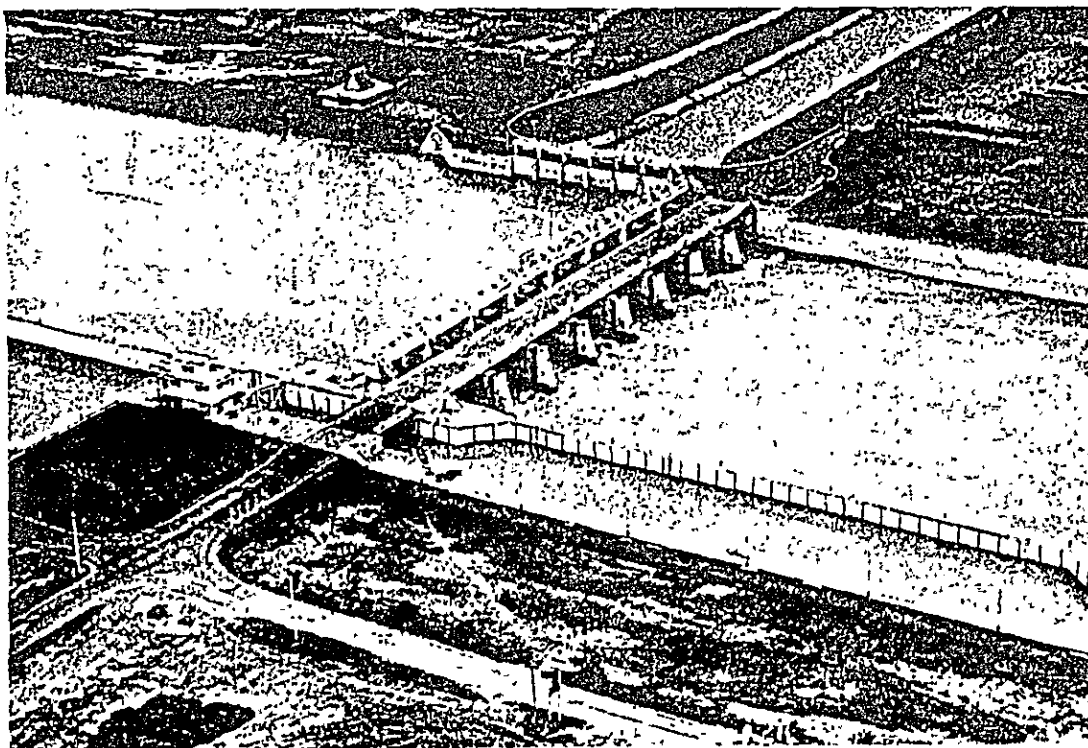
1) プロジェクト概要

Plan of Mae Klong Project



INTRODUCTION

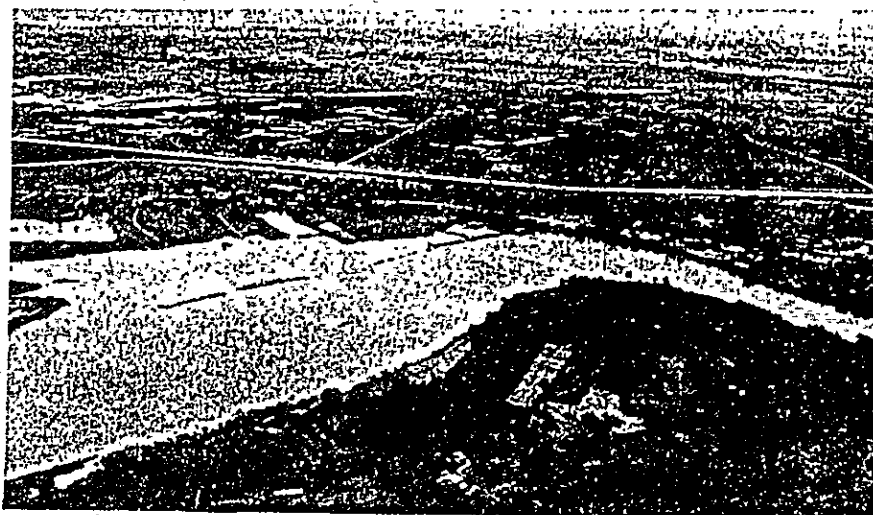
THE MAE KLONG IRRIGATION PROJECT IS A MULTI-PURPOSE PROJECT WITH ITS MAIN PURPOSE FOR IRRIGATION AGRICULTURE OVER AN AREA OF 3,000,000 RAI COVERING PARTS OF SEVEN PROVINCES. TO SERVE THIS PURPOSE THE VAJIRALONGKORN DIVERSION DAM, NAMED AFTER HIS ROYAL HIGHNESS PRINCE VAJIRALONGKORN, WAS BUILT AT TAMBON MUANG CHUM, AMPHOE THA MUANG, CHANGWAT KANCHANABURI.



Topographical Features of Mae Klong River Basin

The Mae Klong river originated at the confluence of the Kwaie Noi and Kwaie Yaf. The latter, characterized by steep slopes interspersed with rapids almost their entire length, rise from the mountain range forming the boundary between Thailand, the Union of Burma and meander through undulated terrain covered with tropical evergreens, deciduous dipterocarps and mixed deciduous forests until they converge at Tambon Pakphrak, Changwat Kanchanaburi to form the course of the Mae Klong river.

From that point, the Mae Klong river flows through Changwat Rachaburi and drains into the Gulf of Thailand at Changwat Samut Songkhram. Its total length is 143 kilometers. The plains on both banks of the river cover the greater part of tract west of Central Plain, the Rice Bowl of Thailand, comprising seven provinces, namely, Changwat Kanchanaburi, Rachaburi, Samut Songkhram and certain parts of Suphanburi, Nakhon Pathom, Samut Sakhon and Phetchaburi to an extent of approximately 3,000,000 rai of fertile land suitable for cultivation. The dominant crops are rice and sugar cane. Crop production depends mainly on rain.



Mae Klong River

As the Mae Klong river is not very much larger than the Kwaie Noi and Kwaie Yai, flood hazards occurring in any or both of the Kwaie rivers will usually overwhelm the Mae Klong and submerge almost every year the cultivated lands on both of its banks especially in August and September when the area is penetrated by the southwest monsoon and typhoon.

Historical Background

Water from the Mae Klong has been used for farming, domestic and municipal purposes. Under the unreliable climatic conditions, however, the people in this area have experienced drought and flood for years. Therefore, from 1903, the following four projects were constructed to minimize such problems and the situation is generally satisfied :

1. **Klong Damnoen Saduak Redredging Project.** The Klong or canal joining the Tha Chin and Mae Klong rivers is still one of the most important navigation routes.

2. **Nakhon Pathom Project.** To redredge the upper part of Klong Tha Pha and divert water from the Mae Klong river to irrigate the area between the Tha Chin and Mae Klong, from the railway to Klong Damnoen Saduak.

3. **Cultivation Project on Both Banks of the Mae Klong River.** To construct the sea water protection dikes, regulators and drains along the canals on both banks of the Mae Klong and Tha Chin rivers.

4. **Tha Lo Project.** To pump and distribute water into canals for cultivation, domestic and municipal purposes for the elevated areas of Tambon Tha Lo, Amphoe Tha Muang and Amphoe Phanom Thuan, Changwat Kanchanaburi.

Subsequently, with the increasing number of population and higher demand in cropping areas, more lands are opened, methods of increasing agricultural production are being sought and more than one crop a year is expected. To this end, water appears to be the most essential factor.

In 1963, M.L. Xujati Kambhu, the Deputy Minister of the Ministry of National Development formulated the whole Mae Klong River Basin Development Plan consisting of four stages :

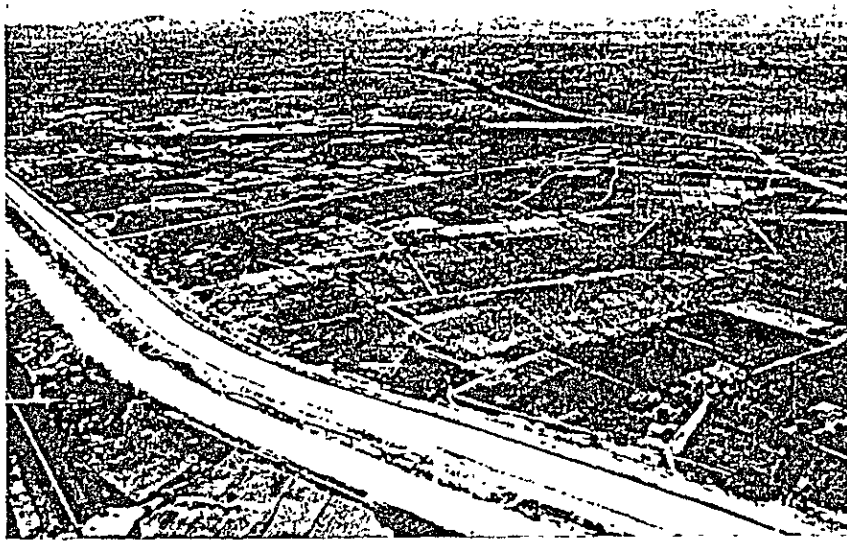
Stage I : Construction of the Vajiralongkorn Diversion Dam and Distribution System over an area of 1,200,000 rai.

Stage II : Construction of a storage dam on the Kwaie Yai and Distribution System over an area of 1,800,000 rai.

Stage III : Construction of a storage dam on the Kwaie Noi, and

Stage IV : Construction of a storage dam on the upper part of the Kwaie Yai.

The Electricity Generating Authority of Thailand is responsible for the storage dam construction and the Royal Irrigation Department is responsible for the construction of a diversion dam and distribution systems. The Project started in 1964 and is known as "The Mae Klong Irrigation Project".



Left main Canal

THE MAE KLONG IRRIGATION PROJECT

Project Features

The Mae Klong Irrigation Project consists of the Vajiralongkorn Diversion Dam and Distribution System, and two other sub-projects, namely, the Irrigation Agricultural Development Project and Salinity Control Project.

Works are divided into two stages :

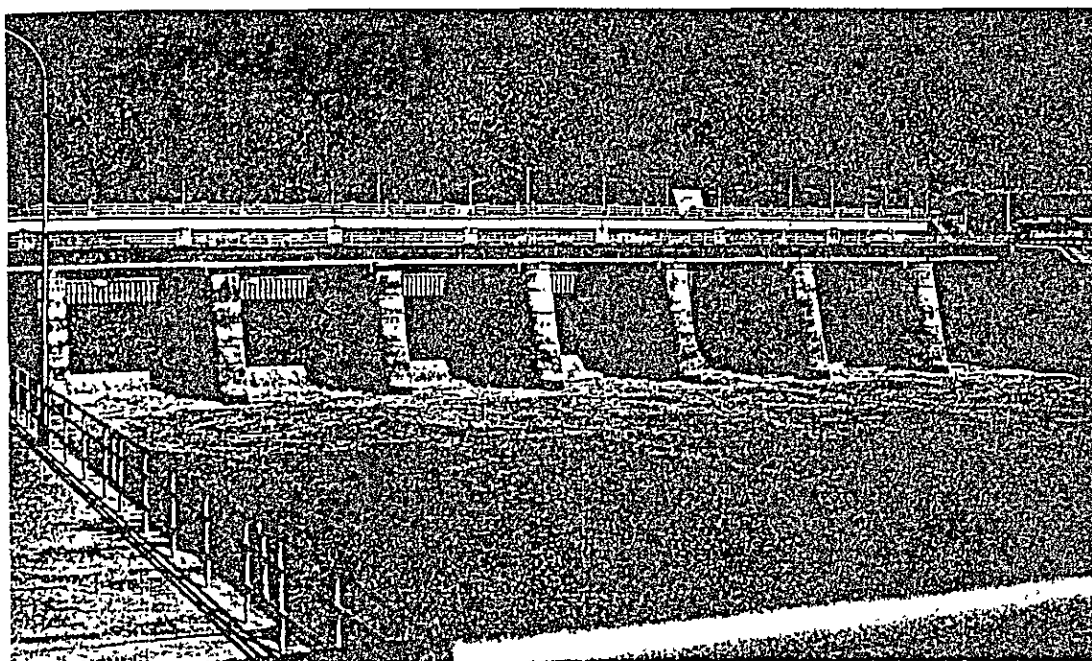
Stage I: Construction of the Vajiralongkorn Diversion Dam and Distribution System on the Lower Left Bank of the Mae Klong over an area of 1,200,000 rai. The construction period is from 1964—1975.

Stage II: Construction of the Distribution System on the Upper Left Bank and Right Bank of the Mae Klong over an area of 1,800,000 rai including the Drainage System and On-Farm Work. The construction period is from 1970—1989.

Stage I:

The Vajiralongkorn Dam Headworks

This dam is considered the nucleus of the Mae Klong Irrigation Project, being constructed at the bend of the Mae Klong river at Amphoe Tha Muang, about 14 km. south of the city of Kanchanaburi, to divert water for cultivation on both banks.



Diversion Dam : 117.50 m. long with 8 openings of 12.50 m. wide each, controlled by a steel radial gate of 7.50 m. high, complete with a superstructure over the whole width for installation of lifting devices and communication bridge, afflux level at El. +22.00 m. (MSL), and maximum discharge of 3,100 m³/sec.

Navigation Lock : Constructed in the cut-off channel close to the right of the dam with one 12.50 m. opening for navigation, a lock basin of 26.50 m. wide by 217.00 m. long, a bascule bridge connecting with the one over the head of the pier upstream, and concrete fender posts extending 100 m. from the main structure to prevent boats and rafts from being drawn by current to collide the dam.

Cut-Channel : Excavated to change the water course and direct water to flow through the Dam, total length 1,650 m.

Earth Closure Dam : Constructed at the bend of the river to change the course of the river to flow past the cut-off channel to the Dam, with dam height of 18.50 m., based width of 180 m. and crest width of 75.00 m., complete with a feeder canal on the left canal from the cut-off channel above the Dam and a feeder road of 8.00 m. wide.

Feeder Canal: Started from the cut-off channel upstream of the Dam to the junction regulator to supply water to the Left Bank, Main Canal of the Distribution System, Stage I and Canals 1L and 2L of Left Bank, Distribution System, Stage II, lying 3.00 km. from the river, being a concrete lined canal of 3.077 km. long with bed width of 15.00 m., max. depth of 4.90 m. and max. discharge at 276 m³/sec.

Feeder Canal Head Regulator: constructed close to the dam to control the water discharged into the canal, complete with 6 openings of 6 m. wide by 5 m. high each, operated by a steel radial gate of 5.30 m. high, with a superstructure of 4.50 m. wide for lifting devices and for vehicles.

Junction regulator: constructed to distribute water to the Left Bank, Main Canal of the Distribution System, Stage I and Canal 2L of the Distribution System, Stage II, complete with 6 openings of 6.00 m. wide by 5.00 m. high, operated by a steel radial gate of 5.30 m. high, and superstructure of 4.50 m. wide for lifting devices and for vehicles.

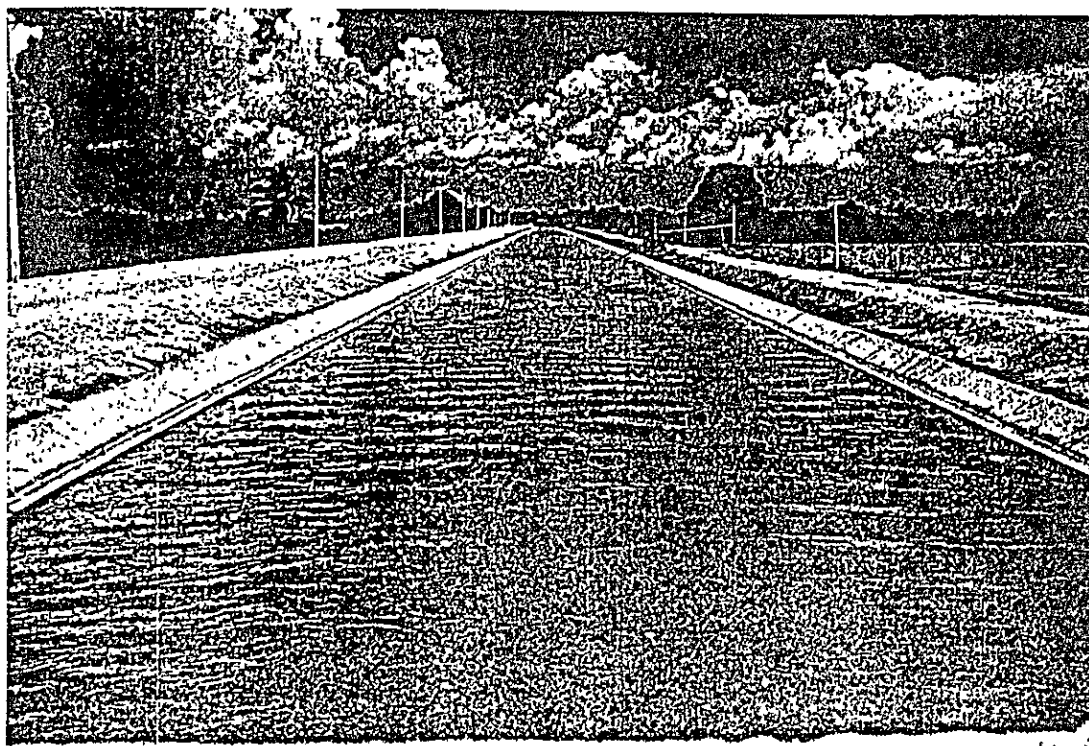
Distribution System

The purpose is to supply water to the area under cultivation, through the irrigation structures such as canals and canal structures regulator within the scope of the Project Stage I, lower left bank of the basin to an extent of approximately 1,000,000 rai. In this connection, four sub-projects are involved:

Kamphaengsan Sub-project	284,300 rai
Nakhon Pathom Sub-project	337,800 rai
Nakhon Choom Sub-project	259,900 rai
Rachaburi Left Bank Sub-project	191,900 rai

The Distribution System, Stage I is now completed (1964-1975). The work includes one main canal of 62 km. long, 63 laterals and sub-laterals for a length of 528 km.

Stage II
Distribution System



Main canal

To supply water to cultivation lands on the upper left bank and the right bank of the Mae Klong river over an area of approximately 1,600,000 rai.

Upper Left Bank covering certain areas of Changwat Kanchanaburi, Nakhon Pathom and Suphanburi. The work consists of 3 sub-projects:

Phanom Thuan Sub-project	332,300 rai
Song Phi-Nong Sub-project	311,750 rai
Bang Len Sub-project	316,350 rai

The construction consists of two main canals for a length of 140 km., 89 laterals and sub-laterals for a length of 720 km.

Right Bank covering certain parts of Changwat Kanchanaburi, Rachaburi and Phetchaburi. The work consists of 3 sub-projects:

Tha Maka Sub-project	283,800 rai
Right Bank, Rachaburi Sub-project	303,600 rai

The construction includes two main canals for a length of 190 km., 62 laterals and sub—laterals for a length of 355 km.

Drainage System

To drain surplus water out of the cultivation and depression areas to the sea, the work covers about 3,000,000 rai.

Area I : on the left bank, covering parts of Changwat Suphanburi, Kanchanaburi, Nakhon Pathom, Rachaburi, Samut Sakhorn and Samut Songkhram, being a total area of 2,400,000 rai, complete with 203 main drain, lateral drains and sub—lateral drains for a length of 1,571 km.

Area II : on the right bank, covering parts of Changwat Kanchanaburi, Rachaburi and Phetchaburi, being a total area of 600,000 rai, complete with 47 main and minor drains for a length of 380 km.

The above Distribution and Drainage System have been commenced since 1970 and are scheduled for completion in 1989.

During the course of construction of the Project Stage—II, the Irrigation Agricultural Development is envisaged in order to raise the standard of living of the farmers by means of irrigation efficiency development: distribution and drainage systems, irrigation at the farm level and salinity control. The work includes:

Irrigation Agricultural Development Project, Stage I — Left Bank

The Vajiralongkorn Dam and Distribution Systems were implemented under the World Bank Loan to irrigate the lower left bank of the Mae Klong river over an area of 1,200,000 rai. The construction was completed in 1975.

After the construction, it is found that the embankments are too narrow to efficiently serve the agricultural transportation purpose. The Government, therefore, requested for and obtained another World Bank Loan for the enlargement of the feeder roads and execution of a demonstration farm as a pilot project in land consolidation work. The Royal Irrigation Department and Central Land Consolidation Office are responsible for the project execution from 1977-1983. The Work Plan of the Stage I - Left Bank, in the areas of Nakhon Pathom and Rachaburi, includes:

- Construction of the feeder roads for a length of 485 km.
- Mapping survey of the Kamphaeng Saen Project covering 300,000 rai.
- Establishment of the land consolidation pilot project on the area of 5,000 rai.
- Procurement of machinery and equipment for construction operation and maintenance work
- Preparation of the preliminary report for Stage II - Left Bank.

The total construction cost is 542 million baht; of which 217 million baht is from the World Bank Loan and 325 million baht is from the Government allocated budget

Irrigation Agricultural Development Project Stage II - Right Bank

After the implementation of the Vajiralongkorn Dam including the Distribution System in Stage I - Left Bank in 1975, the Government realized that the water discharged from the EGAT dams: the Srinakharin Dam on the Kwaie Yai (completed in 1981) and the Kao Laem Dam on the Kwaie Noi (to be completed in 1984) should be utilized to its maximum rather than wasted at sea. In this connection, the World Bank Loan is again obtained to develop the irrigation work at the farm-level to reach its highest efficiency and irrigation capacity. The development covered the area of 412,500 rai in Changwat Kanchanaburi, Rachaburi and Phetchaburi; and the undertakings are as follows:

- Improve and enlarge main canals and laterals for a length of 339 km.
- Construct main canals and laterals for a length of 136 km.
- Construct main drain and lateral drains for a length of 336 km.
- Construct the on-farm irrigation system over an area of 412,500 rai.
- Procure machinery and equipment, and
- Engage a consultant firm charged with the design and engineering work.

The construction period is from 1980-1986 at the cost of 2,740 million baht; of which 1,220 million baht is from the World Bank Loan and 1,520 million baht is from the Government allocated budget.

Irrigation Agricultural Development Project, Stage II, Left Bank, Malaiman-Phase I



Construction

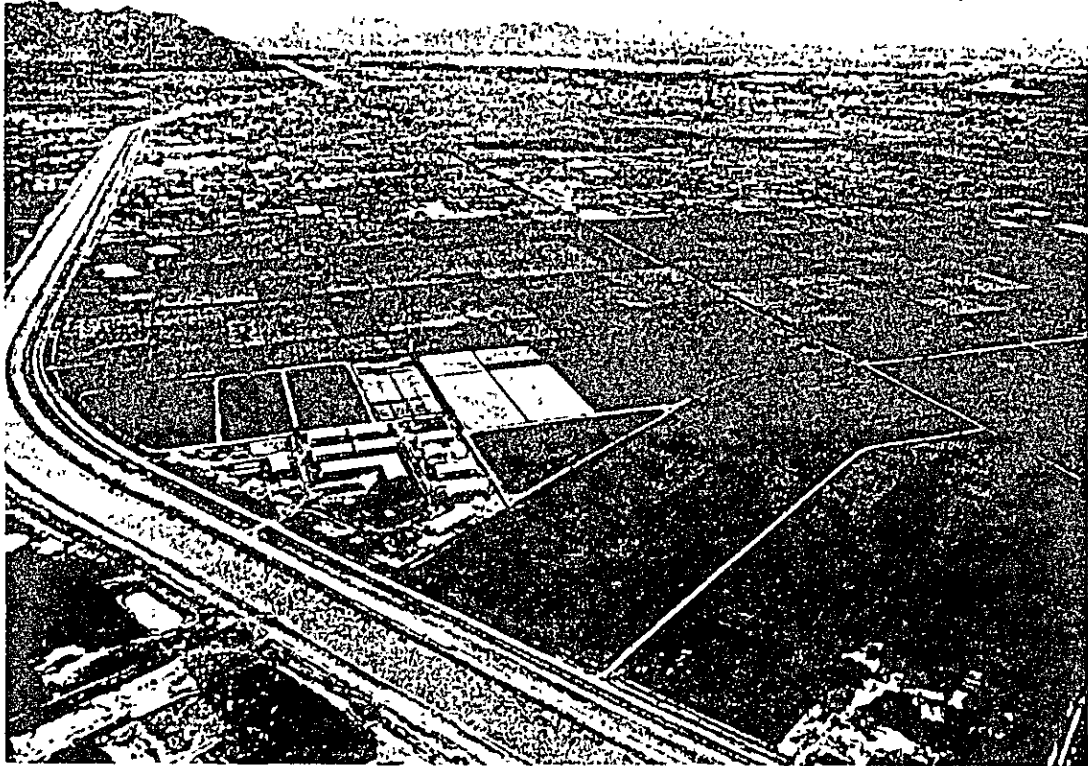
Another Distribution System of the Malaiman area in the Mae Klong basin, covering 1,100,000 rai of land devoted for sugar cane and paddy, has been developed. But due to some limitation on irrigation for sugar cane cultivation the initial stage of the project concentrates solely on paddy areas. The project target is to construct the Distribution and Drainage systems over an area of 169,000 rai in Kanchanaburi and Suphanburi. The work comprises:

- Construction of a main canal together with a feeder road for a length of 19 km.
- Construction of laterals and sub-laterals, and feeder roads for a length of 164 km.
- Improvement and enlargement of laterals for a length of 130 km.
- Construction of farm ditches, ditch drains and farm roads over the area of 160,000 rai, and
- Procurement of machinery and equipment.

The construction period is from 1981—1986 at the cost of 2,300 million baht; of which 1,140 million baht is from the World Bank Loan and 1,160 million baht is from the Government allocated budget. The work is under the responsibility of various agencies including the Royal Irrigation Department, The Land Consolidation Office, the Office of Agricultural Economics, the Department of Agricultural Extension, the Department of Agriculture and the Bank for Agriculture and Agricultural Cooperatives.

Japanese Aid Project

*Mae Klong Land Consolidation
and Trial Farm*



In 1976, the Japanese Government sent a group of experts to investigate and study of the irrigation agricultural development as the following:

— Master Plan Study to establish the priority for development of the whole Mae Klong River Basin.

— Kamphaeng San Feasibility Study in the Kamphaeng San Sub-Project area of about 200,000 rai.

— Land Consolidation work, Pilot Project, No. I covering 2,500 rai of land in Tambon Ban Mai, Amphoe Tha Muang, Changwat Kanchanaburi.

— Land Consolidation work, Pilot Project No. II covering 3,000 rai of land in Tambon Trakhram En, Amphoe Tha Maka, Changwat Kanchanaburi, and

— Construction of Trial Farm over an area of 60 rai.

Salinity Control Project

Samut Sakhon and Samut Songkram provinces are the coastal area in the southern part of the Mae Klong Irrigation Project where intrusion of sea water causes damages to the cultivated area. The government, therefore, has tried to solve this problem and has formulated a long-term plan by classifying the land into three areas :

Area I - the land that should be conserved from sea water intrusion.

Area II - the land where soil has to be reclaimed.

Area III - the land attached to the sea where reclamation cannot be practiced. This area should be made benefit for any other usage besides cultivation.

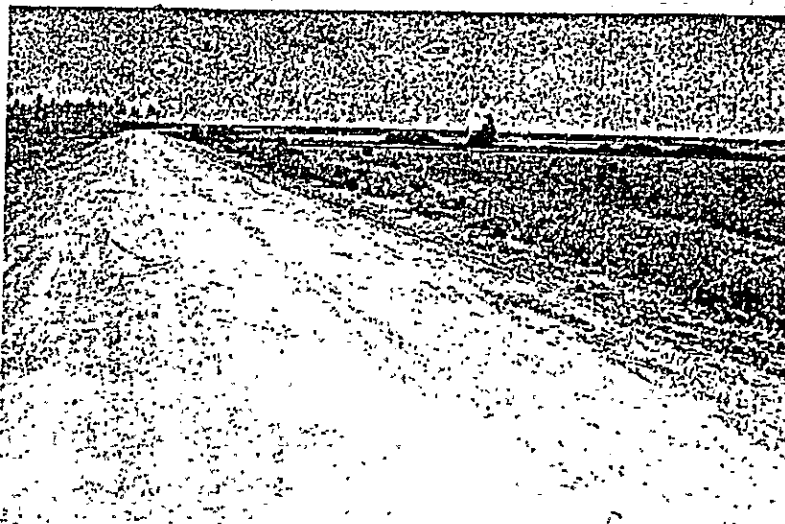
After each area has been classified, line of permanent dikes for sea water protection will be constructed by the Royal Irrigation Department in the area of Samut Sakhon and Samut Songkram provinces. The sequence of construction will be carried out as follows :

Sea Water Protection of the Mae Klong River - Right Bank

— Dike Construction for sea water protection, starting from Bang Khem Railway Station to Thonburi — Paktho Highway, and from Thonburi — Paktho Highway, being a dike itself, through the Mae Klong river to the estuary of the Oom river, being a total length of 36 km.

— Redredging of the Oom river, starting from its estuary at Tambon Bang Bamru to its end at Tambon Mae Nam Oom, being a total length of 18 km., in order to divert fresh water from the Vajiralongkorn Dam to counteract the sea water, and

— Construction of 15 structures of regulator, closure dam, and culvert .



Sea Water Protection Dike

Sea Water Protection of the Mae Klong River—Left Bank

— Dike construction for sea water protection, starting from Bang Nok Kwaek Regulator to the Bang Nok Kwaek—Amphawa Road joining with the Mae Klong —Damnoen Saduak Road, serving as a dike running to Samut Songkram. And from the Ekachai Road, also serving as a dike, to the Phrom Daen Canal. From this point, a dike is constructed along the right bank of the Phrom Daen to the Samut Songkram—Samut Sakhon Railroad which is served as a dike as long as Tambon Bang Sikhot, being the total length to 52 km.

— Construction of 3 navigation locks and regulators :

- . I on the Tha Chin Canal at Tambon Bang Sikhot.
- . I on the Mae Klong Canal at Tambon Bang Rachan, and
- . I on the Amphawa Canal at Tambon Ban Prok.

— Construction of 53 structures of regulator, closure dam and culvert.

The total construction cost is 451 million baht, the construction period is from 1982—1988. During the course of the permanent dike construction, the Mae Klong Irrigation Project has to formulate sea water protection plan by draining water into the Damnoen Saduak Canal and constructing temporary control structures on natural ditches where sea water intrudes.

Construction Period and Cost

The whole construction period of the Mae Klong Irrigation Project is from 1964—1989. The Vajiralongkorn Dam was constructed from 1965—1970.

The total cost of Mae Klong Irrigation Project is 10,303 million baht: of which 2,688 million baht is from the World Bank Loan and 7,615 million baht is from the Government allocated budget.

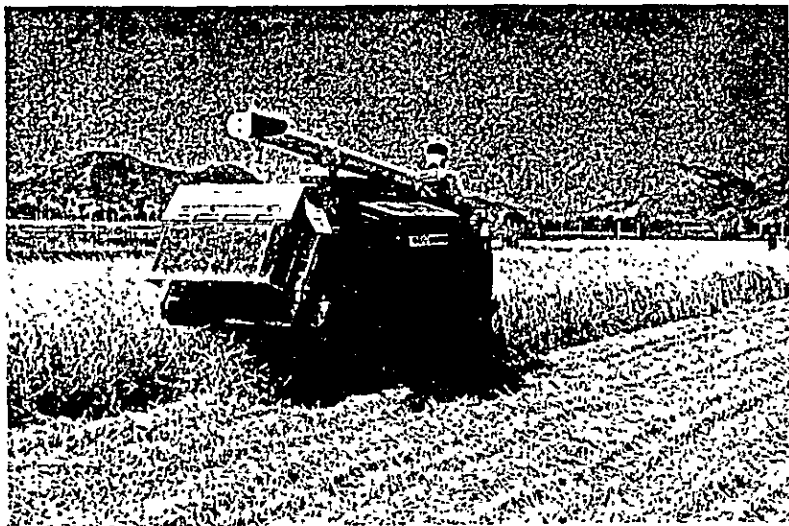


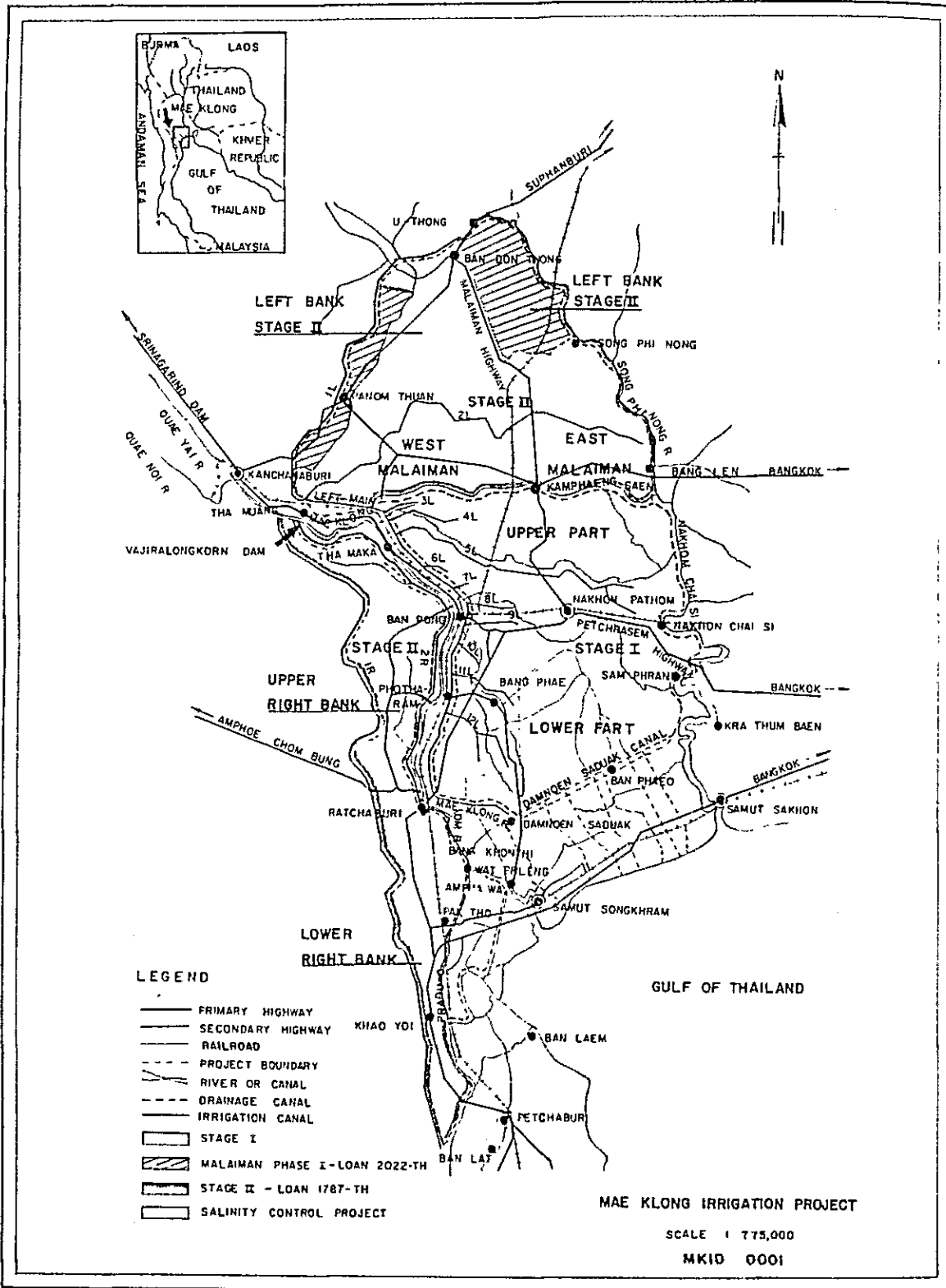
BENEFITS

The Mae Klong Basin development including the construction of storage dams on the Kwaie Yai and Kwaie Noi for adequate water yields and water control on both rivers, will be great advantage to the success of the Mae Klong Irrigation Project as follows:

1. Supplying water for cultivation in both wet and dry seasons over the area of 2,600,000 and 1,500,000 rai respectively. Farmers in the irrigable area can obtain higher yields and income. advantage purpose.
2. Mitigating flood hazards in the plain on both banks of the Mae Klong river:
3. Controlling salinity intrusion in the Mae Klong estuary and coastal canals, and leaching of saline soil for cultivation purpose.
4. Increasing of land and water communication routes.
5. Hydro-power generating and storage of water to be used for agriculture the whole year.
6. It will serve as the recreation area.

The above objectives are the Government goal in bringing happiness and wealth to all farmers in the basin and developing this area as one of the most prominent agricultural spots in Thailand.





Prepared by Mae Klong Irrigation Project
 Royal Irrigation Department
 Sponsored by Japan International Cooperation Agency

2) 水路・構造物の技術設計書目次 (MALAIMAN PHASE I)

ROYAL IRRIGATION DEPARTMENT
BANGKOK, KINGDOM OF THAILAND

MAE KLONG IRRIGATION PROJECT

MALAIMAN PHASE I

CONTRACT NO. L.2022TH-I-1

RID AND CONTRACT DOCUMENTS
VOLUME III – TECHNICAL SPECIFICATIONS

November, 1981

ILACO/EMPIRE M & T
Associated Consulting Engineers
Bangkok, Thailand

VOLUME III – TECHNICAL SPECIFICATIONS

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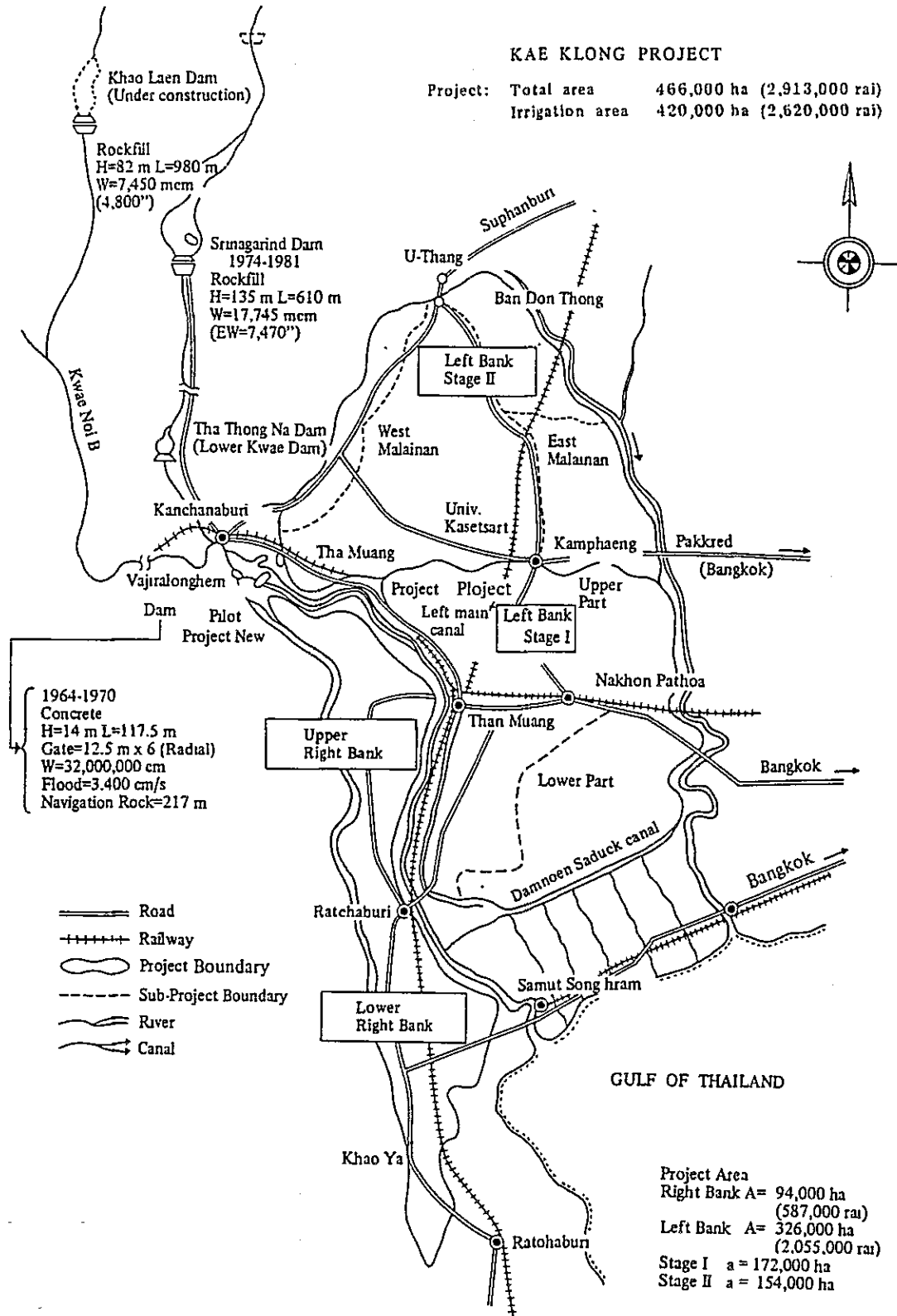
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10. INTRODUCTION OF THE MAE KLONG PILOT PROJECT

1) プロジェクト概要



1. Introduction of the Project

Agriculture in Thailand has been playing a vital role in the national economy, contributing to the improvement of the balance of payment to a great extent. However, the remarkable increase of its population in recent years has been anticipated to press the situation of self-sufficiency in food in the near future. To cope with this situation and in order to develop agriculture, the Thai government has invested in this sector.

In the meantime so-called "on-farm development" has been realized to be prerequisite for steady development of rice production.

Under such circumstances, in February 1976, the Government of Thailand requested the Government of Japan, the one of the most advanced countries in the on-farm development technology, to extend the technical cooperation in the implementation of the on-farm development program.

The Greater Mae Klong Project has its commanding area of 409,600 ha. This land is suitable for irrigated agriculture development because of its fertility. Especially after the multipurpose dams of the Qwae Yai and Qwae Noi Rivers are completely constructed; these plentiful water from those dams will be able to support the cultivation throughout the year. The Thai Government has realized the future prosperity of the Mae Klong Project area which will be the great agricultural products resources for Thailand. The RID, a responsible agency, has been assigned to execute the irrigated agriculture development project with the assistance the World Bank and the Japanese Government.

In the meantime, the experts from both Thailand and Japan had come to the idea of establishing the Pilot Project and the Trial Farm for demonstrating and advising the improved farming to the farmers through on-farm development.

2. Objectives of the project

The project aims at promoting on-farm development works that will enable to increase in rice production by yield increase per unit acreage and expansion of acreage for paddy double cropping, and contributing to improvement and diffusion of farming techniques together with farmers' organizations.

3. Aids from the Government of Japan

3.1 On-farm development works

Since 1977, by the technical assistance of Japan, the pilot area has been established at Amphoe Tha Muang and Amphoe Tha Maka, Kanchanaburi under the RID's responsibility.

- 1.) The pilot project NO.1 is located at Amphoe Tha Muang. The area covers 409 ha. It has been with the intensive method for land consolidation. Beside this, the Trial Farm of 9.9 ha was established and completed in 1981. The government of Japan provided the fund for the construction of the Trial Farm.
- 2.) The pilot project NO.2 is located at Amphoe Tha Maka. The area of 564 ha has been performed by the extensive method. The construction was finished in 1982. In the area 244 ha was constructed by the Japanese fund.

3.2 Granted machinery and equipment (1977 – 1981)

Construction and farming machinery and equipment amounted to about 24 million bahts had been granted by the Japanese Government to perform the pilot projects. They ranged from fertilizers to heavy construction machines.

3.3 Japanese experts (1977 – 1982)

In the meantime, 3 Japanese agricultural civil engineers and 2 agronomists had been dispatched by the Japanese Government. In executing the project work, they have been in close cooperation with the Thai officials concerned.

3.4 Fellowship to Japan

<u>Year</u>	<u>Person</u>	<u>Type</u>
1979	1	Study tour
1981	2	Study tour and observation
1982	1	Group training

4. The Trial Farm

9.9 ha area of Trial Farm is situated within the pilot project No.1. The farm area of 6.4 ha was constructed by the Government of Japan and the building lot area of 3.5 ha was reclaimed by the Thai Government.

4.1 The objectives of the Trial Farm

The Trial Farm has an attempt to implement applicability test, study and analyze the efficient utilization of irrigation water for maximization of agriculture products, reform the farm land for better utilization of water and diversification of crops.

The target yield of paddy which was sought is ranging from 4.0 to 4.4 ton per ha.

4.2 The duties and responsibilities

1. Carrying out applicability tests on crop water requirement experimentations undertaken by various agencies concerned under similar conditions as those of the pilot farms.
2. Carrying out applicability tests on proper cultivation system suitable for farmers in the project area.
3. Demonstrating mechanized agriculture and improved farming techniques to farmers in the project area.
4. Advising and solving problems in cultivation practices on each farmer's farm plots.
5. Being seed multiplication source for farmers in the pilot area and near by.
6. Providing technical coordination on irrigated agricultural techniques in the project area between officials concerned and the overseas experts assisting in the project.
7. Being data, statistical and documentation source for farmers and working officials in the project area.
8. Arrangement of farmers' training to increase product and efficient utilization of irrigation water.
9. Diffusion of improved agricultural techniques to the farmers in the pilot area.

5. Progress of the activities (1979 – Sept. 1982)

5.1 Trial Farm

Construction work

<u>Year</u>	<u>Description</u>
1979	1. Land consolidation of the farming field area of 40 rai 2. Reclamation of the building lot area of 21.8 rai 3. Wire fencing around the Trial Farm
1980	1. Reconstruction of irrigation facility, drainage, farm road and field leveling 2. Deep well dug
1981	1. Construction of 15 buildings 2. Water and electric supply facilities 3. Temporary pumping station construction 4. Flag pole and garden arrangement
1982	1. Additional deep well dug and construction high leveled water tank

5.2 Farming

5.2.1 Dry season crop

Year	Variety	Planted area (ha)	Production (kg)	Yield (kg/ha)
1980	RD - 7	2.08	7,280	3,500
	RD - 9	1.45	4,480	3,090
	Total	3.53	Total 11,760	Average 3,331
1981	RD - 7	3.00	13,429	4,464
	RD - 9	0.49	2,200	4,435
	RD - 11	0.54	2,277	4,429
	Total	4.04	Total 17,906	Average 4,432
1982	RD - 7	3.75	16,350	4,354
	RD - 23	3.53	18,970	5,375
	Total	7.28	Total 35,320	Average 4,852

Remarks: – 1. Year 1980: Yield was very low because of shortage of irrigation water caused by reconstruction work of irrigation facilities and farm roads.
2. Year 1982: Planted area included demonstration field.

5.2.2 Wet season crop

Year	Variety	Planted area (ha)	Production (kg)	Yield (kg/ha)
1979	RD - 7	1.52	7,420	4,881
	RD - 9	0.64	2,520	3,938
	RD - 11	1.28	5,560	4,344
	Total	3.44	Total 15,500	Average 4,506
1980	RD - 7	3.86	17,430	4,561
	RD - 9	0.92	4,200	4,565
	RD - 11	1.10	3,780	3,436
	Total	5.88	Total 25,410	Average 4,321
1981	RD - 7	5.35	23,620	4,415
	RD - 21, 23, 25	0.53	2,460	4,642
	Total	5.88	Total 26,080	Average 4,435
1982	RD - 21	1.23	4,550	3,699
	RD - 23	4.08	20,510	5,027
	Total	5.31	Total 25,060	Average 4,719

Remarks: –1. Year 1979: The field of Trial Fram with 3.1 ha could not planted paddy because of very poor land leveling
2. Year 1981: Approximately 15 % of rice plant damaged by rats' attack.

5.3 Applicability test

Following experiments were executed;

- Effect on different RD varieties and N application,
- Effect on plant density and N application,
- Different quantity of sowing seed and N application on germinated seed direct sowing,
- Response on phosphorus and potassium,
- Effect on herbicide and green manure cultivation
- Effect on G.M.L. (by products of Ajinomoto) application and others

5.4 Seed distribution to the farmers

Dry season, 1981	11.5 tons
Dry season, 1982	22.3 tons
Dry season, 1983	20.98 tons

6. Activities in the pilot area

6.1 Land consolidation

Year	Description	
	Pilot No. 1 (ha)	Pilot No. 2 (ha)
1979	36.9	—
1980	116.8	—
1981	240.0	314.2
1982	—	236.3
Total	393.7	550.5

6.2 Rice cultivation

6.2.1 Dry season paddy crop (Feb. – July)

1.) Pilot No. 1

Year	Cultivable area	No. of farmer	Planted area (ha)	Production (ton)	Yield (kg/ha)		
					Average	Highest	Lowest
1980	36.9	16	17.8	73	4,125	6,100	1,325
1981	153.7	53	102.0	384	3,765	6,250	1 750
1982	367.8	155	284.7	1034	D.3,589	D.5,696	D.2,181
					T.3,660	T.6,042	T.1,259
1983	367.8	155	330.4	1735.63	D.5,444	D.6,804	D.3,710
					T.5,098	T.7,703	T.3,003

2.) Pilot No. 2

1982	314.2	155	224.3	795	D.3,459	D.4,759	D.2,184
					T.3,587	T.5,750	T.2,063
1983	496	369	392	1758.37	D.3,981	D.5,859	D.2,079
					T.4,734	T.6,751	T.3,423

Remarks:— 1. D. = Direct sowing
T. = Transplanting
2. Excluded sugar cane crop
3. Production estimated by crop cutting survey.

6.2.2 Wet season paddy crop (June – Dec.)

1.) Pilot NO. 1

Year	Cultivable area	No. of farmer	Planted area (ha)	Production (ton)	Yield (kg/ha)		
					Average	Highest	Lowest
1979	36.9	16	36.9		– No data available –		
1980	153.7	53	146.8	483	3,301	4,593	2,083
1981	367.8	155	359.9	1186	3,294	4,825	2,165
1982	367.8	155	351.8	1207	3,422		
			RD – Variety – Transplanting		3,442	5,644	1,697
			– Direct sowing		3,808	5,728	2,633
			Local variety – Transplanting		3,350	5,526	1,409

2.) Pilot No. 2

1981	314.2	153	266.0	945	3,556	4,942	2,270
1982	522.5	296	503.0	1880	3,738		
			RD – Variety – Transplanting		3,602	5,550	1,961
			– Direct sowing		4,025	4,608	3,483
			Local variety – Transplanting		3,906	5,284	1,289
			– Direct sowing		3,482	3,702	3,122

Remarks:— 1. D. = Direct sowing
T. = Transplanting
2. Excluded sugar cane crop
3. Production estimated by crop cutting survey.

6.2.3 Transition of planting method and variety adopted by the farmer in the project area
1) Percentage of transplanting and direct sowing rice culture

			1981	1982	1983
Pilot No. 1	Dry season	Transplanting	95.0	90.0	48.0
		Direct sowing	5.0	10.0	52.0
	Wet season	Transplanting	90.0	85.0	—
		Direct sowing	10.0	15.0	—
Pilot No. 2	Dry season	Transplanting	98.0	96.0	65.0
		Direct sowing	2.0	4.0	35.0
	Wet season	Transplanting	95.0	90.0	—
		Direct sowing	5.0	10.0	—

2) RD – Variety (Improved) and Local variety

Pilot No. 1	Dry season	RD-variety	99.0	99.0	98.9
		Local variety	1.0	1.0	1.1
	Wet season	RD-variety	25.0	35.0	—
		Local variety	75.0	65.0	—
Pilot No. 2	Dry season	RD-variety	99.0	99.0	92.0
		Local variety	1.0	1.0	8.0
	Wet season	RD-variety	10.0	51.0	—
		Local variety	90.0	49.0	—

6.3 Benefits

- Double rice crops
- Yield increasing

From 2.2 tons/ha former average yield in this area increased to

In dry season

Pilot No. 1: 5.10 tons/ha (transplanting)
5.44 tons/ha (direct sowing)
Pilot No. 2: 4.73 tons/ha (transplanting)
3.98 tons/ha (direct sowing)

In wet season

Pilot No. 1: 3.42 tons/ha (transplanting)
Pilot No. 2: 3.74 tons/ha (transplanting)

7. Project expenses (up to Sept. 1982.)

Unit: ฿1,000

Kind of works	Allocation		Total
	Thai	Japan	
1. Agricultural Infrastructure Development	12,504	20,282	32,786
2. Agricultural supporting service	9,561	12,092	21,653
3. Project Administration	14,597	279	14,876
4. Total	36,462	32,853	69,315

2) プログレスレポート (1982年6月～1983年8月)

Aug. 25, 1983.

Progress Report
(from June 1982 to August 1983)

Agronomy section
Mae Kong Pilot Project

The activities of Trial Farm are classified as follows:

- Multiplication of the purified paddy seed and its distribution to the farmers in the project
- Execution of applied research works for improving the paddy cultivation techniques
- Demonstration of the improved farming method to the farmers and officials concerned
- Assistance based on close co-operation with agricultural extension section for the agricultural supporting services
- Preparation of the technical reports on the farming especially, paddy double cropping and distribution of them to the officials concerned
- Other activities concerned.

The performance of Trial Farm activities for a period of past one year from June 1982 to August 1983 are summarized as following and the substances of work are remarkably improved more and more every year. In fact, Trial Farm got the position of a core of innovative techniques and playing important role to diffuse improved farming techniques to the farmers on paddy double cropping in the Greater Mae Klong Project.

1. Multiplication and distribution of purified paddy seed

The seed of recommended varieties as RD-21, RD-23 multiplied extending for 2 periods of dry season crop and rainy season crop and distributed to farmers in the project.

The cultivated area classified by varieties, result of production and quantity of seed distributed.

1) Dry season crop (Feb. 1983 - Aug. 1983)

Variety	Planted area (rai)	Production (kg)	Yield	
			Kg/Rai	Kg/Ha
RD - 21	8.31	5688	684.48	4278
RD - 23	23.83	21252	891.82	5574
Others	7.5	5259	-	-
Total	39.64 (6.34 ha)	32199		

Note: Others: - Experiment and varietal demonstration

2) Rainy season crop (June 1982 – Jan. 1983)

Variety	Planted area (rai)	Production (kg)	Yield	
			Kg/Rai	Kg/Ha
RD – 21	7.71	4550	590.1	3688.4
RD – 23	25.83	20510	803.4	5021.0
Total	33.84 (5.42 ha)	25060		

Remarks: RD – 21 planted in rainy season suffered from low temperature injury

2. Applied research work

Extending for 2 periods of dry and rainy season crop, we conducted the following applied experiment and obtained many useful technical data relating to improvement of paddy cultivation for those area in the project.

- The effect of the change of the nitrogen application to the yield of recommended varieties
- The effect of the plant density and the change of the quantity of nitrogen application
- Experiment on the appropriate sowing seed quantity and nitrogen application for the direct broadcasting rice culture
- Fertilizer response of P₂O₅ and K₂O application on the Mae Kong region
- Fertilization response of the G.M.L., the by-product from the process of producing Ajinomoto

Since the result of experiment and analysis of data have been explained in the “Report of the Paddy Cultivation in the Wet Season. 1982” (Annex I) and “Report of the Paddy Cultivation in the Dry season. 1983” (Annex II), we left them out but the important points of the report of the experiment only are summarized as follows:

- 1) Although paddy was cultivated with same fertilization quantity it was shown significant difference among the recommended varieties. It suggests that the selection of variety is one of the most important factor to ensure high yield. At the present, the RD-23 is recommended as an excellent variety for the Mae Klong Project area.
- 2) Should the irrigation water be sufficiently supplied as well as the water management is properly performed, although the paddy is planted without any fertilization, the yield of 3.0 – 3.5 tons/ha can be harvested for dry season crop and 2.5 – 3.0 tons/ha for rainy season crop. Both of the yield are higher than the average yield of paddy in whole Thailand thus it proves that the irrigation water plays quite important role in the growth of paddy. In the same time, the soil is matter of course but it also proves that the quantity of fertilizer from the irrigation water and blue algae naturally supplied are in a situation which should not be over looked.
- 3) In case of cultivation of RD varieties, plant density of 20–30 hills/m² and nitrogen application quantity of 100 kg/ha (16 kg/rai) are considered as most appropriate ways. They plant density of 16 hills/m² (25x25 cm) which are recommended for the region is depending on the fertilization quantity; in case of insufficiency of fertilization quantity, it is hard to expect a steady high yield.
- 4) As to the germinated seed broadcasting paddy culture, to make both of seed and nitrogen quantity applied for about 100 kg/ha (16 kg/rai) are considered as appropriate. As in the present, germinated seed broadcasting rice culture has been faithfully extended in the project area as a new paddy cultivating techniques which not

only improve of labour productivity but also ensure the steady high yield for the double cropping paddy.

- 5) Fertilization response experiment of the P_2O_5 and K_2O was conducted therice in 1982 and 1983. According to the result of analysis, each of the P_2O_5 and K_2O did not show fertilization effect in the dry season crop. On the contraly, the significant difference was noticable in the rainy season crop. So that, we have scheduled to continue this kind of experiment later whether the P_2O_5 and K_2O may show any fertilizer response in the future for the Mae Klong river basin is a quite important and interesting question.
- 6) The by-product from producing Ajinomoto. G.M.L., composed with the organic nitrogen is judged as no inferiority compared with the chemical fertilizer. The quantity applied for 300 l/rai is considered as appropriate.

3. Demonstration of improved agricultural method

Throughout the year, when the occasion came, we performed demonstration, for the following:

- a. For double cropping cultivating paddy
- b. For intensive cultivation of paddy
- c. For mechanized cultivation of paddy

4. Agricultural supporting services

Basing on close co-operation with agricultural extension section, we supplied various data for improving agriculture as well performed 5 times of farmers' training throught both of the dry and rainy season crops and the persons participated in the training course have been about 200 persons. Also water management training course for the water master and zone man have held 2 times throughout the year.

5. Preparation of the technical report and its distribution

A part of the following technical report of leaflet have been completed and distributed to the persons concerned and visitors and another part remained uncompleted and carried over to the following year.

- 1) Report of the paddy cultivation in the wet season. 1982 (See Annex I)
- 2) Report of the paddy cultivation in the dry season. 1983 (under preparation)
- 3) Introduction of the Mae Klong Pilot Project (attached)
- 4) Introduction of the Mae Klong Irrigation Project (attached)
- 5) Report on Agricultural Development Program for Resettlement of Khao Laen Dam
- 6) Direct sowing rice culture on the Mae Klong Project (under writing)

6. Other activities

On the request of Thai Government or Japanese Embassy in Thailand, the co-operation have been given to the following affairs:

- 1) To survey the proposed resettlement area for the farmers in 1800 houses which are submerged owing to the construction of Khao Laen Dam and prepare a plan for agricultural development. (submitted EGAT)
- 2) To survey the site of construction of Mae Klong Farmers' Training Center which will be granted by Japanese by Government and prepare a proposal.(belonging to Department of Agricultural Extension)

- 3) To give co-operation to the program of young farmers' training in Japan. (belonging to Department of Agricultural Extension)
- 4) Proposed site survey for the construction of Kings' project in Regional 9, RID.
- 5) To propel the construction of Mae Klong Water Management Training Centre. (belonging to RID.)

7. Visitors

A accompanying the progress of construction of the project, the visitors including the foreigners have been increased year by year and number of visitors for this year have reached 700 persons.

An addition

1. 3) Seed quantity which was distributed to the farmers
RD - 23 2,100 kg. for dry season crop. 1983.

Aug., 1983.

Cost and Returns
Rice culture on the Mae Klong Pilot Project No. 1
in the dry season, 1983.

1. General situation

– Area planted	2060 Rai (330 ha)		
– Variety	RD – 23 (81%), RD – 7 (17%)		
– No. of cultivator	185		
– Average land holding	11.14	Rai	(1.78 ha)
– Average yield * <u>1</u>			
Direct sowing culture	871 kg/rai (5,444 kg/ha)		
Transplanting culture	816 kg/rai (5,098 kg/ha)		

2. Farming cost (฿ / Rai)

	Direct sowing (฿)	Transplanting (฿)
1) Nursery * <u>2</u>		
– Field preparation * <u>3</u>	–	10
– Fertilizer and chemicals * <u>4</u>	–	10
– Seed * <u>5</u>	45	30
– Wages for management * <u>6</u>	–	40
2) Field		
– Field preparation	200	200
– Fertilizer * <u>7</u>	210	210
– Chemicals * <u>8</u>	200	100
– Wages * <u>9</u>		
Up-rooting of seedlings	–	120
Transplanting	–	150
Broadcasting	20	–
Application of fertilizer and chemicals	30	30
General management	400	240
3) Harvesting		
– Harvesting	150	150
– Threshing * <u>10</u>	105	98
4) Others		
– Irrigation fee	45	45
Total	<u>1,405</u>	<u>1,433</u>

3. Income (฿ / Rai)

	<u>Pilot Project No. 1</u>		<u>Amphur Tha Muang * 11</u>
	<u>Direct sowing</u>	<u>Transplanting</u>	<u>Kanchanaburi</u>
Gross income	2,613	2,448	1,650
Farming cost	1,405	1,433	1,115
Net income	1,208	1,015	525

Paddy price 3 ฿ / kg.	
Yield: Direct sowing	871 kg (5,444 kg/ha)
Transplanting	816 kg (5,098 kg/ha) A
Amphur Tha Muang	550 kg (3,438 kg/ha)

Remarks :-

- * 1 Yield: result of the crop cutting survey (92 plots)
- * 2 Area required for nursery : $\frac{1}{20}$ × planting area
- * 3 Field preparation : ฿ 200, by contract
- * 4 Fertilizer and chemicals for nursery
 Ammophos (16:20:0) 5 ฿/kg ; requirement 20 kg/rai = 100 ฿
 Chemicals (Furadan) 22 ฿ /kg ; requirement 5 kg/rai
- * 5 Seed : 3 ฿ / kg.
 Seed requirement : – Direct sowing 15 kg/rai
 Transplanting 10 kg/rai
- * 6 Wages : 40 ฿ / day (local)
- * 7 Fertilizer : Am.phos (16:20:0) 30 kg × 5 ฿ = 150 ฿ / rai
 Am. sulphate (21:0:0) 20 kg × 3 ฿ = 60 ฿ / rai
- * 8 Chemiclas = Saturn G. (herbicide) 5 kg × 20 ฿ = 100 ฿ / rai
 Furadan (insecticide) 5 kg × 20 ฿ = 100 ฿ / rai
- * 9 Wages : 40 ฿ /man – day
 Up-rooting : – 3 man – day / rai
 Transplanting : – 3.75 man – day / rai
 Broadcasting : – 0.25 man – day rai
 General management : – 8 man – da6 rai
- * 10 Threshing = 40 kg/ton by contract
- * 11 Amphur Tha Muang, Changwat Kanchanaburi
 Cultivable area 437,500 rai
 Planting area 331,707 rai
 Average yield of rice 550 kg/rai (3,438 kg/ha)

Farming cost for rice cultivation / Rai

Seed	30 ฿
Field preparation	300
Transplanting	140
Herbicide	140
Fertilizer	150
Harvesting	140
Weed control and management	105
Threshing	110
Total	1,115

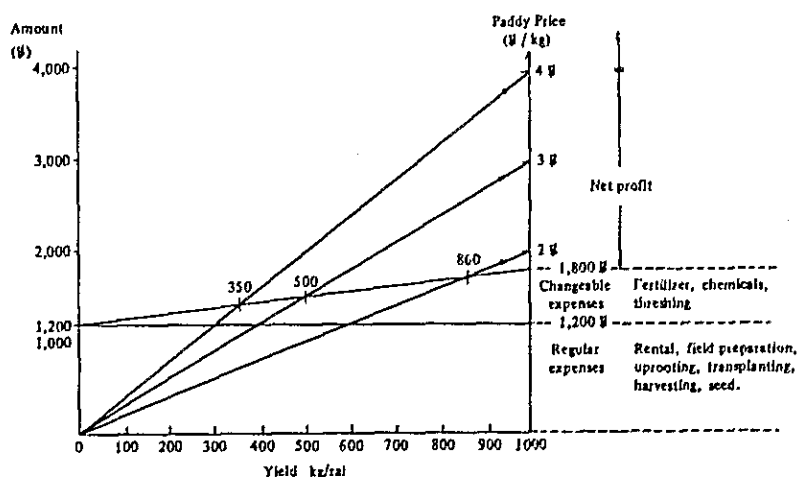
* Excluded farm rent and cost for nursery

Ref.

Paddy yield in average for recent 10 years in Thaniland

	Wet season		Dry season	
	Kg/Rai	Kg/Ha	Kg/Rai	Kg/11a
North	358	2240	480	3000
North East	203	1268	409	2556
Central	301	1882	528	3301
South	271	1696	437	2733

Profit and Loss Turning Point Diagram of Paddy
Mae Klong Pilot Project 1982.



The Loss and Profit Turning Point Diagram of Paddy

This chart is a sign showing relation between a certain paddy yield and various unit price of paddy. By studying the diagram, it's very easy to know how the loss and profit is being.

The base line is a certain yield per rai. On the left side, an amount of money is indicated. And on the right side, there are each unit price of paddy and net profit. Beneath the net profit, Beneath the net profit, there is a production cost dlassified to regular expenses and irregular expenses. The regular expenses composed of an expenditure on seed, field renting, field preparation, uprooting, transplanting and harvesting whereas the irregular expenses composed of the expenditure on fertilizer, chemicals and threshing.

Indicated by crossing lines of irregular expenses and unit price of paddy, the loss and profit in rice production will be varied according to the presence of unit price.

Such an in case of a unit price is 2 ฿ / kg. and if a certain paddy yield is 860 kg/rai. There will be neither profit nor loss. Surely there will be loss if the yield is less than 860 kg/rai.

So if it's possible whether the unit price will be 3 ฿ / kg and yield about 500 kg/rai or 4 ฿ / kg and yield about 500 kg/rai, the farmer probably get a profit.

Finally it can be said that the unit price of paddy is the main factor to encourage the farmer's will in cultivating rice paddy.

December, 1982

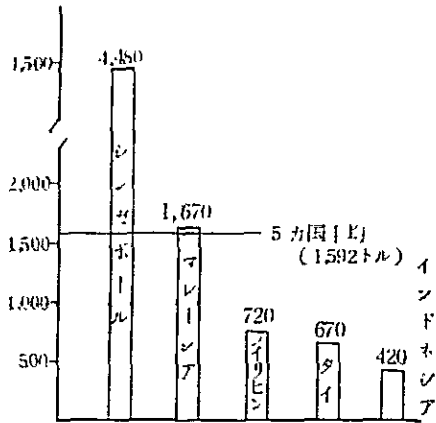
IRRIGATED AGRICULTURE DEVELOPMENT PROJECT
(IADP)

Joint Project between Thailand and Japan

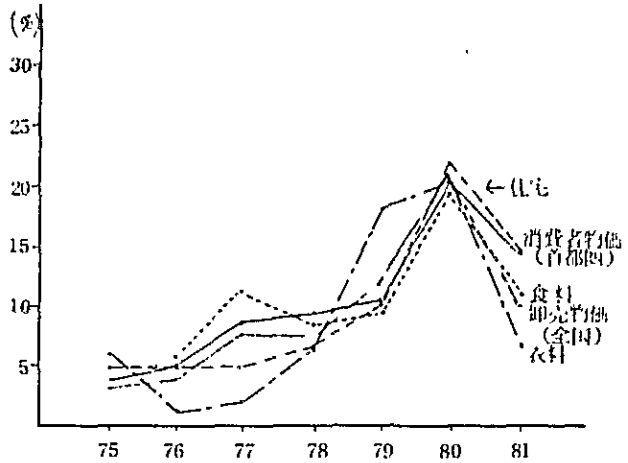
11. タイ国の農林水産業 (タイ国経済概況より)

目で見えるタイ国経済

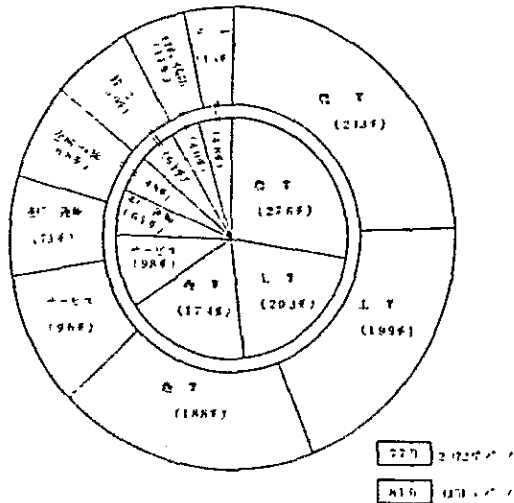
1. ASEAN 5 各国の 1 人当たり国民総生産



4. 物価の推移

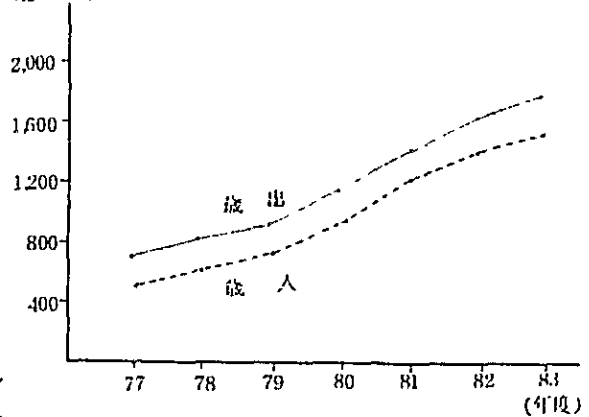


2. 国内総生産 (GDP) とその構成比

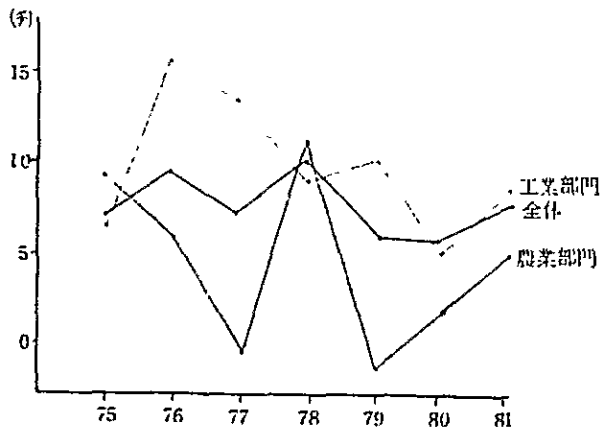


5. 財政規模の推移

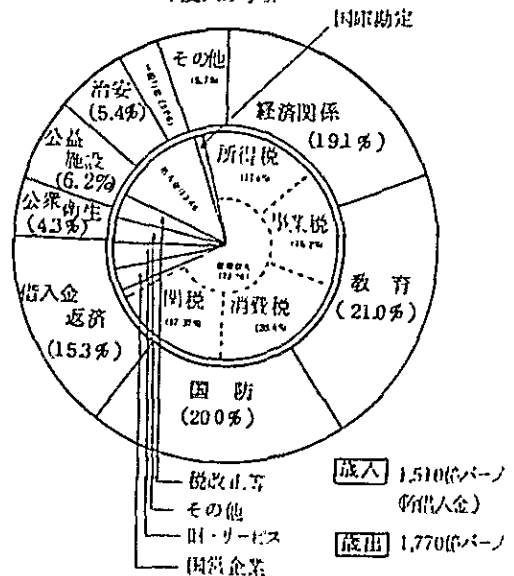
(76~80年度実績, 81, 82年予算) (単位: 億バーツ)



3. 経済成長率 (1972 年価格)

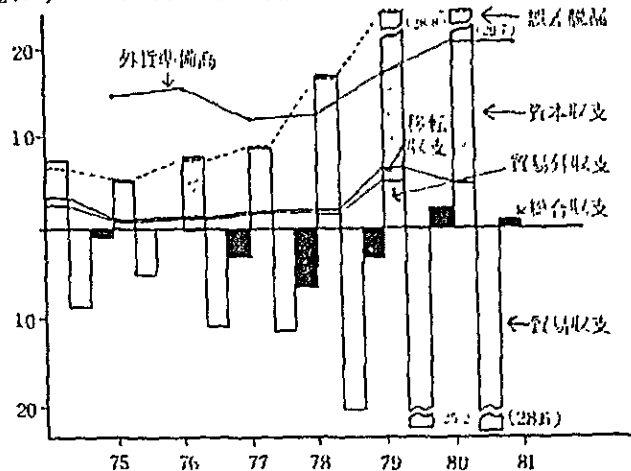


6. 1983 年度国家予算

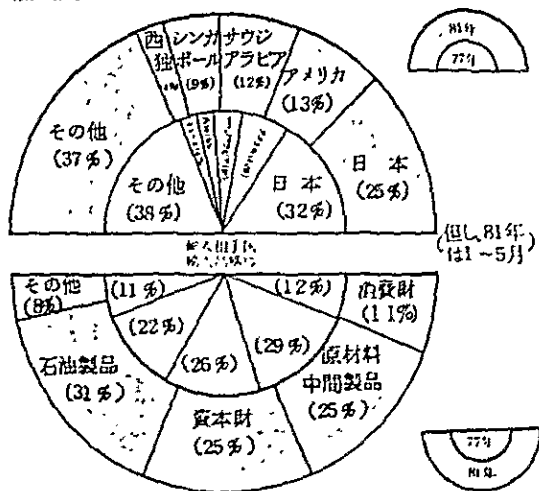


目で見るタイ国経済

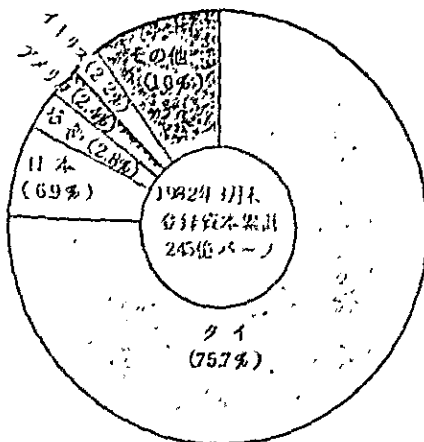
(億ドル) 7 国際収支・外貨準備高推移



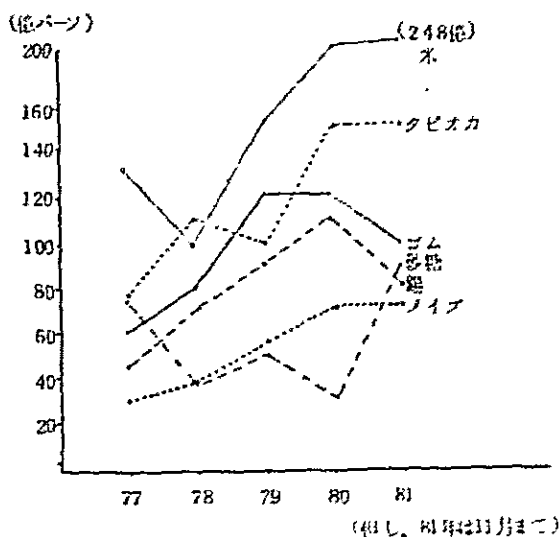
8. 輸入相手国と輸入品構成



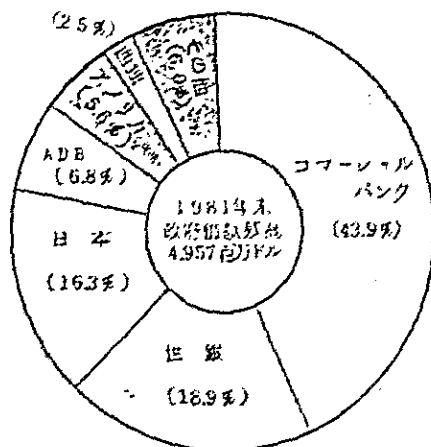
10 B01首可実積の国別投資内訳



9. 外貨獲得商品の推移



11. タイ政府借款受入状況 (政府官設事務を含む)



1. 農林水産業の概要

(1) 農水産業の経済的特色

タイの農水産業は、その生産額が他の産業部門を凌ぎ第1位にあるばかりでなく、商業活動の主要対象品目であり、タイ国の基幹的産業として位置づけられよう。とりわけ、米の輸出額は、タイ国総輸出額の15～20%を占め、最大の輸出産業として今日に至っている。更に、キャッサバ、メイズ、砂糖、天然ゴムなどの農産物も主力輸出商品であり、農産物はタイ国経済をささえる最大の外貨収入源となっている。これら農産物は、いずれも厳しい自由競争のなかで取引される国際商品作物である。しかし、それらの生産様式は、必ずしも近代化した装備を持っている訳でもなく経営規模が大きい訳でもない。むしろ、人力、畜力利用の前近代的な部分が多い。タイの農産物の輸出競争力を支えているものは、熱帯の高温多湿という農産物栽培に適した自然の恵みと農村労働力の低賃金にあるといっても過言ではない。

農林水産業がタイ国経済の中で基幹産業であることを示す指標として次のことを指摘できよう。

① 国内総生産額の24.3%（1981年）を占め、製造業、商業を大巾に引き離し第1位にあること。しかし、そのウエイトは、年々低下しつつある。これは、銀行・保険・不動産及び運輸・通信部門の相対的な成長率の上昇に伴って、農林水産部門のウエイトが低下しているもので、その成長率が低下してゐるわけではない。

② 総輸出額に占める農林水産物は、49%（1981年）を占め、農林水産物を原料とする砂糖、モラセス、缶パイナップルなど加工品を含めると60%強となる。農林水産業が、国家最大の収入源と言われる所以の一つと言えよう。他方、農産物は天候依存度が高く、特に降雨が生産量に大きく影響するとともに国際的な流通量が輸出価格を左右することもあって、タイ経済の不安定な一面を覗かせている。

表 1-1 農林水産物の輸出シェア

(単位: 100万バツ, %)

	1 9 8 0		1 9 8 1		'81/'80
	金額	構成比	金額	構成比	
総輸出額	133,197	100	153,115	100	+150
I 農林水産物及び その加工品	74,466	55.9	92,469	60.4	+24.2
1 農林水産物	64,812	48.7	74,944	49.0	+15.6
(1) 米	19,508	14.7	26,355	17.2	+35.1
(2) タピオカ製品	14,887	11.2	16,428	10.7	+10.4
(3) 天然ゴム	12,351	9.3	10,533	6.9	-14.7
(4) メイズ	7,201	5.4	8,252	5.4	+14.6
(5) 冷凍エビ	1,958	1.5	2,132	1.4	+ 8.9
(6) その他	8,907	6.6	11,244	7.3	+26.2
2 農林水産加工品	9,654	7.2	17,525	11.4	+81.5
(1) 砂糖	2,975	2.2	9,572	6.3	+221.7
(2) 水産缶詰	1,697	1.3	2,142	1.4	+ 26.2
(3) 缶パイナップル	1,432	1.1	2,038	1.3	- 18.1
(4) その他	3,550	2.6	3,773	2.4	+ 6.3
II 鉱物	15,047	11.3	10,828	7.1	- 28.0
III 工業製品	43,684	32.8	49,818	32.5	+ 14.0

出所: タイ国通関統計 1981年は速報値

③ 就業人口に占める農林水産業従事者は71%を占め、製造業8%を大きく引き離している。しかし、労働力の定義が、11才以上とされ、専門家を必ずしも対象としたものでないことなどの統計上の制約に留意する必要がある。

表1-2 1980年労働力調査

総労働者数	22,524千人(100%)
うち 農林水産業	15,943 " (71%)
その他	6,581 " (29%)

出所: National Statistical Office 発行
 "Report of the Labor Force Survey
 1980" から

第5次国家経済社会開発計画では、1986年の産業別労働力構成について、農林水産業部門を18,594千人とし全体の69%に設定し、依然、農林水産業労働力がタイ国労働力の中核となることを明らかにしている。

(2) 農業の基本指標

① 農地

タイ国の国土面積は、日本の1.4倍であるが、日本に比べ山岳が少ないこともあって農地率は36.6%と日本(14.7%)より高く、従って農地面積は、日本の3.4倍となっている。

表1-3 1980年 日・タイ農地比較

1980年	単位	タイ	日本	タイ/日本
A 国土面積	千km ²	514 (5,140万ha)	378 (3,780万ha)	(倍) 1.4
B 農地	千ha	18,816	5,461	3.4
(1) 水田	"	11,657	3,055	3.8
(2) 畑地	"	4,041	2,406	1.7
(3) 樹園地	"	1,767	587	3.0
(4) 草地	"	83	580	0.1
(5) その他	"	1,268	-	-
B/A 農地率	%	36.6	14.7	-

出所: タイ, Agricultural Economic Office,
 農業協同組合省
 日本, 第57次農林水産省統計表
 農林水産省

また、水田面積は、タイの場合、農地面積の62%を占め(日本56%)日本の水田面積に比べ3.8倍の大きさとなっている。他方、タイ国は、乳牛など大家畜の飼養頭数が後述するように少ないこともあって、草地面積が日本に比べ極めて少ない。

② 農家数と一戸当たり農地面積

農家数についてみると日本とタイは、ほぼ近い数字となっている。しかし、タイの場合は、農家数が増加傾向にあるが、日本の場合は、むしろ減少している点が対照的である。

表1-4 1980年の農家数と農地面積
日-タイ比較

		タイ	日本	タイ/日本
農家数	千戸	4,406	4,661	0.95
平均一戸当たり農地	ka	4.27	1.17	3.65

出所： 表1-3に同じ

例えば、過去20年間についてみると、タイの場合1961年に345万戸であったが、1980年には、441万戸と百万戸に近い28%の増加となっているが、日本の場合、逆に1960年の606万戸から1980年には、466万戸(140万戸減)と23%の減少になっている。他方、1戸当たり農地所有面積もタイ国の4.3kaに比べ日本は1.2kaと日本はタイ国の3分1以下の規模になっている。

農地面積の場合も、タイ国は、1961年の1,056万kaから1980年には1,882万kaと78%(826万ka)も増加したのに対し、日本は逆に1960年(607万ka)から1980年(546万ka)の間に10%減少(61万ka)している点も対照的である。

③ 一戸当たり農家所得

一家族当たりの農家所得についてみると、1980年時点で、全国平均23,207パーツとなっている。地域別にみると、東北部が全国平均の約3分2程度の15,057パーツと極めて低い所得となっている一方、中央部が、農業生産環境に恵まれていることもあって42,623パーツとタイ国の中では、高い所得地域となっている。農業所得の中では、各地域共通に稲作収入が基幹となっている。作目別の所得構成をみると、東北部は、稲作37%、キャッサバ24%に対し中央部はそれぞれ37%、7%になってるほか、砂糖きびが21%と稲作に次ぐウェイトを占めている。

東北部の低所得要因の一つは、稲栽培可能地が少なく、低収入のキャッサバ、ケナフなどが多いことである。

表 1 - 5 一戸当たり農家所得（農家所得+農外所得）
（単位：バーツ=約10~11円）

	1975	1976	1978	1980
全 国	9,653	12,224	14,901	23,207
東 北 部	4,829	5,424	7,631	15,057
北 部	9,363	13,256	15,654	22,486
中 央 部	23,069	28,642	30,764	42,623
南 部	7,935	7,766	13,411	20,166

出所: "Agricultural Statistics of Thailand"
Office of Agricultural Economics,
農業協同組合省

④ そ の 他

農地の所有形態別にみると、1978年の農業センサスによれば、自作農は342万戸と農家数402万戸の85%を占めている。残りの15%は、小作農（23万戸）、自小作農（28万戸）、土地なし（借地もしてない）農家（4万8,000戸）となっている。土地なし農家は、いわゆる農業労働者であり、農家全体の1.2%にすぎず極めて少ない。これらの70%は北部及び中央タイの稲作地帯に分布している。土地を持たない借地による農家（4万8,000戸）は全体の6%程度である。

次に、農地の灌漑状況についてみると、表1-6のとおり同センサスでは、農地面積の13%（1,176万ライ）が灌漑されている。灌漑面積の97%が水田であり、水田だけについてみれば全水田面積の19%が灌漑されていることを示している。また、地域別にみると伝統的な水田地帯である中央タイの灌漑は、水田の48%と進んでいるものの、東北タイは、水田の4%が灌漑されているにすぎない。

表 1 - 6

（単位：1000ライ、1ライ=0.164a）

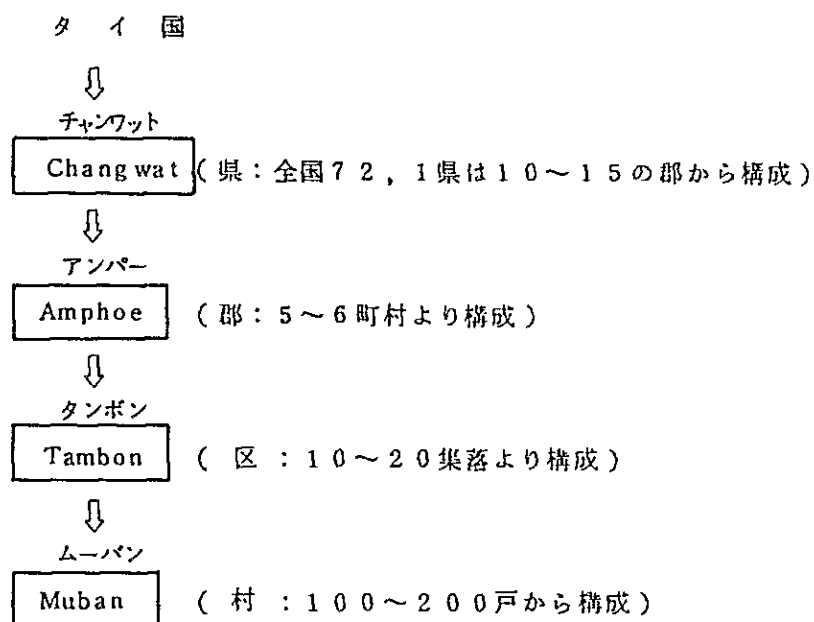
	A 農地面積 うち		B 灌漑面積 うち		灌 漑 率	
	水田	畑	水田	畑	農地	水田
全 国	93466	59959	11760	11385	13%	19%
北 部	19942	13262	3755	3604	19	27
東 北 部	10508	29788	1321	1294	3	4
中 央 部	21998	12833	6340	6145	29	48
南 部	11017	1077	345	344	3	8

出所 1978年農業センサス、国立統計局

(3) 農業生産

① 農業地域の区分

タイ国の行政区分は、首都バンコクを含め73県(1982年9月現在)となっており、以下、郡、区、村に分かれ次のような名称で呼ばれている。



73県(チャンワット)は便宜的に4つの地域に分けられている。この地域区分は農業地域としてばかりでなく他の行政上の配慮から内務省が設定したものといわれる。即ち、タイの国内概況を説明する場合、現在広く利用されている「北タイ」、「東北タイ」、「中部タイ」、「南タイ」の4つである。

一方、農業経済地帯区分として、農業協同組合省では、土壌、雨量、気温、交通網などの諸条件を考慮して19ゾーン(地帯)に区分し、農村振興を図っている。

次に上記の4つの地域について概観してみよう。

「北タイ」：チェンマイを中核とする地域である。チェンマイは、北タイの商業、手工業ばかりでなく観光、文化の中心地であり避暑地でもある。この地域は、年間平均気温が25℃、雨量1,300mm、年間温度格差が20℃程度あり、稲作をはじめ、大豆、タバコ、綿花の産地である。また、北部地方の低地帯はタイにおけるメイズの主産地である。かつては、チーク材の産地としても有名であったが、最近では、山岳地帯の麻桑栽培転換作物として、キングスプロジェクトの下で、柑橘、梨、栗、リンゴなど温帯性の果樹栽培やコーヒー、茶、更には、第三の甘味資源として注目されてる

ステビアの栽培などが行なわれている。

北タイには、ピン川、ワン川、ヨム川、ナーン川の4河川が南下しており、これがバンコック市内を流れ、タイ湾に注ぐチャオピア河の源流となって中央デルタ地帯の一大稲作地を潤している。

「東北タイ」：この地方の行政、教育、文化の中核都市は、コンケンであり、また東北タイの玄関口としてコーラト（ナコンラチャシマ県）がある。東北タイは、コーラト高原と呼ばれ、メコン河に傾斜した台地を形成している。ムン川、チー川の2河川がメコン河に注ぎ、良質土壌を流失させ、ラテライト土壌の多い農作物栽培には、不利な地帯となっている。主要農作物は、タピオカが主力であるが、メイズ、マングピーン、ケナフ、綿などの畑作物も多い。タイの中では、開発が遅れ、所得の低い地域となっている。水牛の多いのもこの地方の特色である。

「中部タイ」：チャオピア河のデルタ地帯に広がる平野は、昔からタイ経済を支えてきた米の一大産地であり、土壌は肥沃である。

この地域は、灌漑組織が発達していることもあり、他の地方に比べ作物の転換などの変化が激しい。

デルタ周辺の畑作地には、メイズ、砂糖きび、キャッサバなどの栽培が行なわれており、東部では、近年キャッサバからゴム園への転換がすすめられている。中央タイのチャンタブリ、チャチュンサオ、ライオンなど7県をまとめ「東タイ」と別に区分することもある。

「南タイ」：この地方の中核都市は、ハジャイ、ソククラである。両都市は、マレーシアとの国境貿易、ゴムの集散地と漁港で栄えている。

南タイは、マレー半島部であり、半島の北側はビルマと国境を接し、タイ湾とアンダンマン海にはさまれ、南はマレーシアに続いている。

雨量が年間2,200mmと多く、平均気温も27.4℃（いずれもソククラ）という気象条件からゴムの栽培に適しており、ゴムの大産地となっている。しかし、マレーシアに比べると、ゴム園の規模は小規模で、平均17ライ（2.7ha）程度である。日本は、天然ゴムの総需要量の75%（1981年）をこの地域から輸入している。

ゴムのほかに水稲、それに多年性作物である果実、ココア、ココナツなどがあり、近年はコーヒー、油ヤシの栽培も普及している。

表1-7 主要作物の生産量

(単位:1000トン)

	1米1期作	米2期作	2メイズ	3キャッサバ	4砂糖きび	5緑豆	6ココナツ	7ケナフ	8天然ゴム
1961	9,864	22	598	1,726	3,984	41	843	239	186
1970	13,570	280	1,938	3,431	6,586	151	596	381	287
1978	15,206	2,264	2,791	16,358	20,561	259	860	338	467
1979	14,646	1,111	2,863	11,101	12,827	251	688	222	534
1980	15,405	1,963	2,998	16,540	19,854	261	735	211	465
1981	15,758	2,017	3,449	17,744	30,200				508
1982	14,774	2,104	3,002	17,788	24,407				560
1983	(15,921)		(3,888)	(19,153)	(21,370)				
	9ソルガム	10綿	11大豆	12落花生	13ガボック	14ひまし	15ゴマ	16タバコ	17ニンニク
1961	-	38	24	108	73	33	12	9	34
1970	69	27	50	125	67	43	20	10	63
1978	216	74	159	128	30	37	30	44	150
1979	199	143	102	109	27	36	22	47	184
1980	237	193	100	129	34	35	27	37	187
1981	274								
1982									

出所: 表1-3に同じ

注: ()内は予想値

表1-8 主要作物の作付面積
(単位:1000ライ, 1ライ=0.164a)

	1米1期作	米2期作	2メイズ	3キャッサバ	4砂糖きび	5緑豆	6ココナッツ	7ケナフ	8天然ゴム
1961	38,549	70	1,916	621	776	229	1,157	1,190	3,080
1970	46,840	620	5,180	1,403	862	1,494	1,978	2,631	7,976
1978	58,410	4,257	8,661	7,282	3,190	2,638	2,574	2,003	9,426
1979	56,864	2,103	9,529	5,286	2,730	2,652	2,591	1,418	9,576
1980	56,882	3,228	8,960	7,250	2,927	2,796	2,602	1,608	9,615
1981	56,392	3,578	9,796	7,940	3,592				
1982									
	9ソルガム	10綿	11大豆	12落花生	13カボック	14ひまし	15ゴマ	16タバコ	17ニンニク
1961	-	358	149	521	238	229	88	97	103
1970	254	193	368	652	318	289	187	143	145
1978	1,098	429	1,010	660	313	271	289	294	252
1979	1,182	750	679	609	335	312	228	315	246
1980	1,546	949	788	658	347	264	245	220	253
1981	1,749								
1982									

出所: Agricultural Economic Office, 農業協同組合省

② 主要農産物の生産量

主要作物の生産量について、1961年から1980年までの20年間の推移をみると表1-7のとおりである。この間の特色として第1に、キャッサバ生産の著しい増加と砂糖きび、メイズの生産量の増加が注目される。これらは、タイの畑作物を代表する3大作物である。キャッサバ及びメイズは、特に奥地の林野を開墾して限界地に普及していったものである。キャッサバは、土壌を選ばず、旱魃に強く、栽培管理をそれほど要しないこともあって急速に拡大しその生産量はこの20年間に10倍という驚異的な成長を示してきた。

第2の特色としてタイ国の輸出商品の要である「米」、「天然ゴム」の着実な生産量の増加をあげることができる。

米の生産量は、改良品種の普及、栽培技術の改良などによって徐々に増加傾向をたどってきたが、灌漑面積の拡大も増産に大きく寄与している。現在1期作(雨期)の米生産(粳)量は1500万トン台に達しており、2期作米(乾期)も200万トン台に達しようとしている。また、天然ゴムの場合も、優良品種への改植と南タイからライオン、チャンタブリなど東タイへの栽培面積の拡大が図られ、生産量は増加をたどっている。

次に栽培面積の動向についてみてみよう。

③ 主要農産物の栽培面積

過去20年間の主要作物の栽培面積についてみると表1-8のとおりである。現在、作付面積が最も大きい作物は米であり、1980年でみると1、2期作あわせて約6,000万ライ(約960万ha)となっている。続いて天然ゴム960万ライ(約150万ha)、メイズ900万ライ(約140万ha)、キャッサバ725万ライ(約120万ha)、砂糖きび290万ライ(約47万ha)の順になっている。

この20年間の特色は、キャッサバ、メイズの飛躍的な拡大は、前述したところであるが、加えて2期作米の作付面積の拡大が注目される。すなわち1961年の7万ライから1980年には320万ライへと大幅に拡大している。今後のタイ米の生産増加は、更に2期作をいかに拡大するかにかかっていると見えよう。2期作は、乾期に播種—移植されるため、用水量及びその施設確保が必要である。しかし、2期作は1期作に比べ、①洪水被害が少ない、②日照時間が多い、③乾土効果が高い、④病害虫被害が少ないなどの点で有利となっており、その単位面積当たり収量は1980年全国平均で1ライ当たり608g(1ha当たり3.8トン粳)と1期作の平均271kg(1ha当たり1.7トン)に比べ、2.2倍となっている。

表1-9 単位面積当たり収量(籾)の比較

	A 1期作	B 2期作	B/A
	kg/ライ	kg/ライ	倍
1976	269	509	1.9
1977	231	532	2.3
1978	261	532	2.0
1979	258	528	2.0
1980	271	608	2.2

出所： 表1-7に同じ

④ 最近の生産動向

作付面積の80%以上が非灌漑地であるため、米をはじめ農作物の最大の被害は、旱魃によるものであり、降雨状況が作柄の重要な決定要因となっている。最近では、1977年の大旱魃で米、メイズ、砂糖きび等は大巾な減産となった。すなわち、同年の米の生産量は、前年に比べ130万トン減少し1,233万トンまで落ち込み、メイズも100万トン減少した。また、1979年にも再び気象災害に襲われ、米をはじめ畑作物は、近来にない打撃を受けた。旱魃に強いとされたキャッサバさえも前年に比べ520万トン減少し、1,100万トン台となり、砂糖きびに至っては、800万トン近い減産となり、砂糖の輸出国が一時的に輸入国となる事態を迎えた。

1981年は、全域的に降雨に恵まれ、逆に近来にない大豊作となり、米の生産量は1期作のみで史上最高の1576万トンを記録し、メイズ、砂糖きび、キャッサバの生産量も史上最高の大豊作を記録することとなった。

(4) 米の生産と輸出

① 生産

タイの場合、米の生産量表示は、籾(もみ)重量であり、日本の場合は、玄米重量である。また、輸出の数量表示はタイの場合、精米(白米)である。その換算率は

○タイの場合 籾(もみ)100 = 66精米

○日本の場合 籾100 = 玄米77 = 精米70

(129) (100) (90.5)

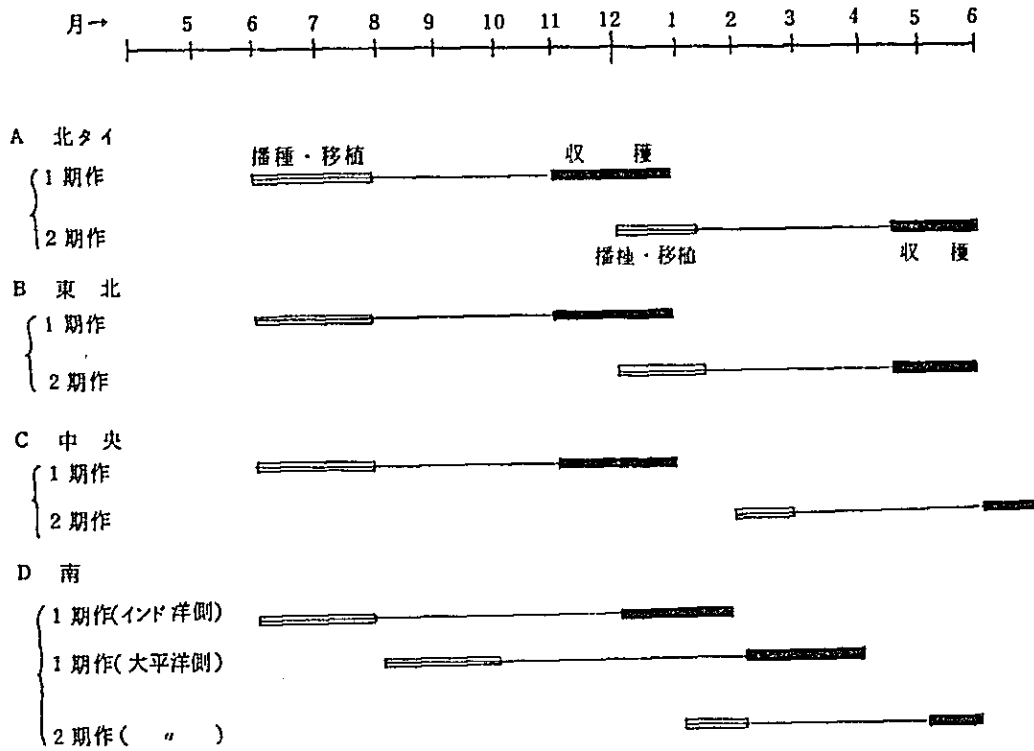
となっている。

米生産には、1期作(雨期)と2期作(乾期)があることは前述のとおりであるが、作期は、地域によりまた稲の品種、直播・移植の相違や(雨を待って田植をするところ

るが多いこともあって)降雨状況によって移動することになる。従って、作期幅は、年により一定しておらず、灌漑地では、田植をいつでも出来るため、作型は多様化している。

各地域の標準的な稲の作型は、表1-10のとおりである。1期作では、雨期の6~7月に田植を行ない、11~12月に収穫するところが多い。

表1-10 水稲の作付時期



出所: Office of Agricultural Economics 農業協同組合省

米の主産地についてみると、かつて生産量では、中央タイが圧倒的なシェアを占めていたが、近年は東北タイの森林開発に伴い、用水可能地は水田、用水不可能地は畑作地へと耕地面積が拡大し、1969年以降は東北タイが米の主産地となり、1980年には全国生産量の3分の1を占めるに至っている。しかし、単位面積当たり収量は、東北タイが最も低く、1980年では、1期作の場合、全国平均271kg/ライに対し、204kg/ライに過ぎない。

また、東北タイの場合は、もち米生産量が多く、1980年1期作についてみると全国のもち米生産量550万トンのうち384万トンと約70%をこの地域で生産している。これに対して、輸出米の主力であるうるち米の生産についてみると、総生産量990万トンのうち約40%にあたる386万トンが中央タイで、また302万トン(30%)が北部タイで生産されており、この両地域がタイ米(うるち米)の輸出を支える産地となっている。

表1-11 米(もみ)生産量の推移 (単位1,000トン)

	合計	北部	東北部	中央部	南部
1940	4,923 (100)	1,103 (22)	1,084 (22)	2,321 (47)	414 (8)
1950	6,782 (100)	1,440 (21)	1,846 (27)	2,896 (45)	600 (9)
1960	9,475 (100)	2,451 (26)	2,775 (29)	3,476 (37)	773 (8)
※ 1970	13,570 (100)	4,070 (30)	4,920 (36)	3,720 (27)	860 (6)
1978	17,470 (100)	5,012 (29)	5,325 (30)	6,060 (35)	1,073 (6)
1979	15,758 (100)	4,385 (28)	5,661 (36)	4,617 (29)	1,094 (7)
1980	17,368 (100)	4,860 (28)	5,811 (33)	5,543 (32)	1,154 (7)

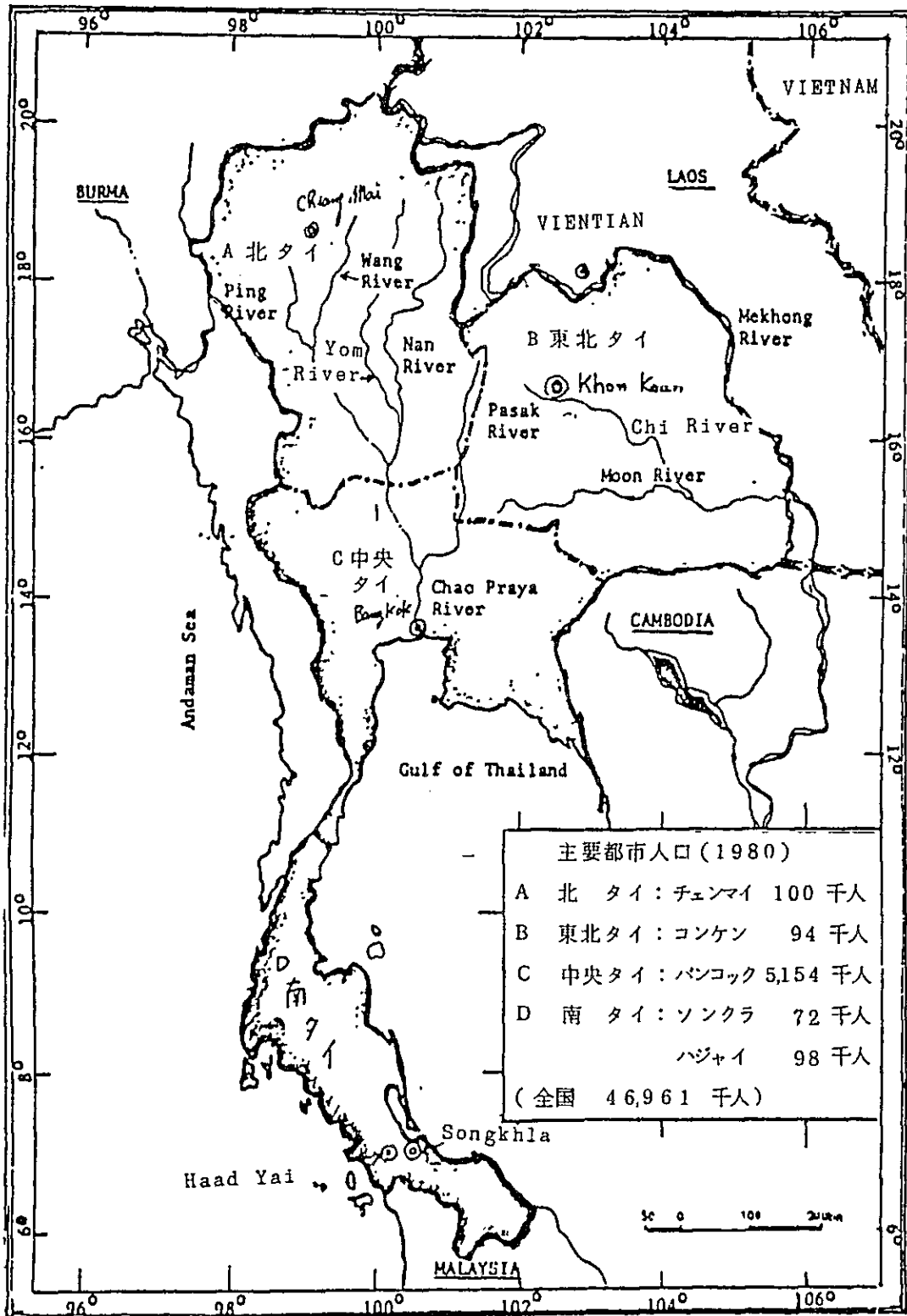
出所: Office of Agricultural Economics

農業協同組合省

注: ※は2期作を含まず

()内は%

地域区分図



農業経済地帯区分
Map of Agro-Economic Zone of Thailand

	(東北タイ)	(中央タイ)
	<u>Northeastern Region</u>	<u>Central Region</u>
	Zone 1 Nakhon Phanom Sakon Nakhon Nong Khai Udon Thani Loei	Zone 10 Lop Buri Sara Buri
	Zone 2 Yasothon Ubon Ratchathani	Zone 11 Chai Nat Nakhon Nayok Nakhon Pathom Nonthaburi Pathum Thani Ayutthaya Suphan Buri Ang Thong Bangkok
	Zone 3 Kalasin Khon Kaen Maha Sarakham Roi Et	Zone 12 Kanchanaburi Prachuap Khiri Khan Phetchaburi Ratchaburi
	Zone 4 Buri Ram Si Sa Ket Surin	Zone 13 Chachoengsao Prachin Buri
	Zone 5 Chaiyaphum Nakhon Ratchasima	Zone 14 Samut Prakan Samut Sakhon Samut Songkhram
	(北タイ)	
	<u>Northern Region</u>	
	Zone 6 Nakhon Sawan Phetchabun Uthai Thani	Zone 15 Chon Buri Rayong
	Zone 8 Kamphaeng Phet Tak Phichit Phitsanulok	Zone 16 Chanthaburi Trat
	Zone 9 Nan Phrae Lampang Sukhothai Uttaradit	(南タイ)
		<u>Southern Region</u>
		Zone 17 Chumphon Nakhon Si Thammarat Phatthalung Songkhla Surat Thani

表1-12 1980年1期作のうるち米ともち米の生産量比較

(単位: 1,000 トン)

	合 計	うるち米	もち米
全 国	15,405 (271)	9,899 (294)	5,506 (237)
北 部	4,663 (371)	3,017 (343)	1,646 (439)
東 北 部	5,749 (204)	1,905 (216)	3,844 (198)
中 央 部	3,871 (322)	3,857 (322)	14 (334)
南 部	1,122 (275)	1,120 (275)	2 (242)

出所: Office of Agricultural Economics

注: ()内は、1ライ=0.16ha当たり収量、単位kg

② 米の価格と流通

米の価格をみるに当たって、まずその流通経路を明らかにしておく必要がある。

粳(もみ)米は、農家で収穫された後、その地域の商人(仲買人)、農家市場公社などの手を経て、精米工場へ運ばれる。ここで粳の品質格付けが工場側によって行なわれた後、更に仲買人を通じて、または、場合によっては直接に卸売業者、輸出業者、小売業者などに販売されている。日本のような食糧検査官の制度はなく、検査はすべて民間で実施されている。この流通の過程で、仲買人による取扱量は圧倒的に多いと見られているが、一部の粳は、政府出資の公社(MOF: Marketing Organization for Farmers)や農協によって買い付けられている。MOFの取扱量は、1980年で120万トン(粳)でこのうち30万トン程度が輸出に向けられている。更に、MOFは各地域にFarmer's Groupと呼ばれる組織を設けているが、その数は全国で4000グループに及んでおり、1グループ平均150戸から構成し、約60万戸の農家がこの組織に属しているといわれる。他方、農協も地域農協を設け、それぞれのルートを通じて粳の買い付けを行なっている。このように官制のMOF、農業団体(農協)、商人グループが入り混って粳の買い付けを行なっているのが米の流通の実態である。

政府は、農家からの粳買付価格、いわゆる生産者価格を設定している。しかし、これは、買い付け者を拘束するものでなく、政府のガイドライン若しくは、目標価格にしかすぎない。これまでの農家の実勢販売価格は、1981年産の場合1級品(グレード1.5%碎米入り)で、トン当たり平均3,435バーツ(1バーツ約10円)で、

取引され、政府指導価格 3,750 パーツを 10% 近く下回っている。実勢取引価格と政府指導価格を比べると表 1-13 のとおり、いつも前者が後者を下回っているのが実情である。

表 1-13 農家販売価格 5% 碎米 (粳)

(単位 : パーツ/トン)

	政府指導価格	平均農家販売価格
1979	3,100	2,501
1980	3,500	2,994
1981	3,750	3,435

出所 : 農業協同組合省資料

農家の実勢販売価格は、輸出価格に大きく影響される。1982年に入って輸出価格の相場は、これまでの最大輸出先であったインドネシアの自給率向上と輸出競合国であるアメリカ・ビルマ・パキスタンを初めとする国際的な豊作から、下落基調にある。たとえば1982年5月の平均輸出価格は、トン当たり297ドル(1ドル=23パーツ)と前年同月価格518.75ドルに比べ40%強の下落となっている。これに伴って、農家販売米価も1982年4月時点で、トン当たり2,887パーツと前年同月比20%の下落となっている。

— MOF (Marketing Organization for Farmers) の概要 —

1974年設立。農業協同組合省の管轄下の政府機関。同省の Department of Extention (DOE) がこの機関を所掌している。1982年4月現在職員数480人。主たる業務活動、①農産物の買入れ(粳、メイズ、綿花、ブラック・マップ等) ②肥料、農薬、種子などの農家への販売 ③穀物サイロ、倉庫運営 ④米、メイズ等の輸出。各県レベルに支所を組織し、現在4,000グループ(1グループ約150戸)60万農家を系列下に置いている。農協(AFCT)との違いは、官制の農民組織であることである。なお、MOFに似た組織として漁業についてFMO (Fisheries Marketing Organization) がある。

— PWO (Public Warehouse Organization) の概要 —

1955年設立。商務省の管轄下におかれている。1981年現在職員数926人。主たる業務活動、①精米の購入及び輸出 ②メイズ、ケナフ、コーヒー、ジュートなど農産物の購入販売、輸出 ③マッチ、ガス、砂糖など日用品の消費者への供給

④穀物倉庫の管理運営等となっている。

いずれも、政府の100%出資による政府企業である。特に、粳や精米の市場価格の低下に際して市場介入し、価格維持に努めることとなっているが、資金量も少なく商業資本に対抗し得る状況にはない。

③ 米の輸出

タイ米の輸出の特色は、品質・規格の多様性にあり、需要国のいかなる要望にも応えられるようになっているといわれる。例えば、うるち米の場合は、100%A, B, C及び各5%, 10%, 15%, 20%, 25%, 35%, 45%, 砕米入りなど10種類に及び、もち米についても5種類、規格が定められている。

タイ米の輸出先国は、アセアン等近隣諸国は勿論のこと、アフリカ・南米・欧州など世界各国に広がっている。

1981年には、総輸出量は300万トンの大台を突破し、タイ米輸出史上最高の記録となった。地域別にみると、シンガポール・マレーシアなどアジア諸国が最大の輸出先であり、全量の42%132万トンがこれら諸国に輸出された。続いて、セネガル・ナイジェリアなどアフリカ諸国で76万トン余を輸出している。

最近の特色としては、アフリカ及びイラン・サウジなど中近東向けが顕著に増加している一方、新たな輸出先としてソ連向けの輸出が急激に増大していることである。1981年の対ソ輸出は28万トンに及び、国別輸出先としては、イランの32万トンに次いで、第2の輸出先国となっている。

他方、インドネシア向けには従来60万トン余を輸出していたが、同国の米自給化に伴って、1981年の輸出量は20万トン弱に減少している。

タイ米の輸出競争国は、ビルマ・パキスタン・アメリカなどであるが、日本の過剰米輸出について最近は極めて敏感な反応を示すようになっている。

表1-14 タイ米の地域別輸出動向

(単位：1,000トン)

	1979	1980	1981	1982
合 計	2,797	2,800	3,143	3,818
1 アジア	1,436	1,307	1,322	1,367
(1) ASEAN	929	983	682	777
(2) インドシナ	153	118	116	26
(3) その他	354	205	523	564
2 太平洋州	3	3	3	4
3 中近東	284	477	572	650
4 アフリカ	620	554	761	1,487
5 北米	10	41	11	42
6 南米	305	63	47	—
7 欧州	134	353	422	214
(1) E E C	57	134	83	100
(2) 東欧	58	210	332	65
(3) その他	19	9	8	48
8 その他	5	3	3	55

出所： Customs Department

一米の輸出価格—

タイ米の輸出価格は、国内卸売市場価格プラス①プレミアム ②輸出税 ③留保米税 ④都市税 ⑤輸出諸掛りから構成されている。

このうち①は、「農民基金」として積み立てられ、Rice Policy Committee（議長：首相）の決定に基づき、農業灌漑施設、旱魃、洪水等災害救済など多目的に利用されている。

表1-15 トン当たり5%精米のプレミアム

(単位：パーツ)

	A 平均輸出価格	B トン当たり プレミアム	B/A (%)
1979	6,791	700	10
1980	8,837	700	8
1981	11,349	400	4
1982	6,781	400 (注)	6

注： '81/10月 ~ '82/4月 400パーツ/トン
'82/5月 ~ '82/11月 500 "
'82/12月 ~ '83/6月 400 "

出所： A； Price Level Div., Business Economic Dept.

B； Rice Div., Foreign Trade Dept.

プレミアムの総収入は、次のとおりである。

1979年	1,421百万パーツ
1980	1,530 "
1981	1,436 "
1982	調査中

出所： 同 上

このライスプレミアム政策は、1955年から実施されているが、国内米価とも関連し経済政策上の一つの論点となっている。すなわち、プレミアムを徴収することによってその分だけ国内米価を低下させ、いわば生産者の負担によって都市労働者の低賃金を維持するとともに米の生産を抑制する結果となっているといった点が問題とされている。プレミアムの金額決定は、国際市況をみながら、その価格が低下したときは、プレミアムを少なくすることにより輸出競争力を維持するという形で調整がなされており、国際価格の動向によりプレミアムの額は、常に変動している。なお、このプレミアム収入は、上記のとおり14億から15億パーツと重要な国家財源となっている。

②の輸出税は、従量税でトン当たり一律5%となっており、1979年の総収入は、6.7億バーツとこれも大きな国家財源の一つとなっている。

③の留保米税は、低所得者向けの米 "Osha rice" の供給財源として輸出量に対して一定の比率の米を現物若しくは、現物相当分の金額で前述したPWOに納付するものである。1981年についてみると、PWOはこれにより5.8万トンの精米を低所得者向けに供給した。しかし、1982年5月以降は、米の国際価格の低下に対処して輸出を促進する必要性とこの "Osha rice" が必ずしも低所得者向けに渡らず不公平であるとの理由から中止され、現在に至っている。

④の都市税は、トン当たり10バーツ(5%精米)と定められており、全体の負担費用からみれば少額である。

表1-16 米(精米5%碎米入り)価格動向

(単位:バーツ/トン)

	卸売価格 (バンコック)	小売価格 (同左)	FOB価格 (同左)
1976	3,939	4,517	5,126
1977	4,045	4,550	5,529
1978	4,495	5,206	7,454
1979	4,609	5,220	6,791
1980	5,785	6,509	8,837
1981	6,818	8,320	11,349
1982	5,734	8,164	6,781

出所: 1. 卸売価格及びFOB価格は、Rice
Committee, BOT(貿易院)
2. 小売価格は、Internal Trade
Department 商業省

注: 5% White rice は日本の標準米に近い。

④ 日-タイ米価比較

日本とタイの米価を比較してみよう。

まず、主食のうるち米の小売価格についてみると表1-17のとおり、1981年では精米トン当たり、タイ産の場合バンコックで8,361.8円に対し、日本(東京)

のそれは、429,000円と日本の小売価格は、タイ産の約5倍となっている。

更に、もち米の小売価格についてみると、表1-18のとおり、1980年でタイの61,683円に対し日本は、543,000円と8.8倍も日本のもち米小売価格は高くなっている。タイの場合、もち米の流通が北及び東北タイ地方に限られ、首都圏の流通量が少ないこともあって、うるち米より価格が安くなっている。

また、生産者価格についてみると表1-19のとおり、日-タイ間比較は、日本の方が1980年で9倍も高くなっている。これは、比較の条件として、タイは初米であり、日本は玄米という比較的単位の相違はあるものの、両国間の差は大きなものがある。

この日-タイ間米価の差は、タイ国が国際市況を反映した米価であり、日本の場合は、政府の強い保護下にあり、その価格は国際価格とは無関係に決定されることによるところが大きい。タイの場合、米の等級格付け検査は、すべて民間レベルで実施され、流通も自由取引となっている。しかも、輸出の際は前述したとおり、政府がプレミアム等の諸税を課して、国内価格より高めに価格を設定している。

従って、肥料、農薬、農業機械等生産資材についても高米価にある日本での稲作関係の生産資材等が必ずしもタイでは費用として投下できる条件にはない。また、生産技術についても同じことが言えよう。

しかし、タイの場合も米生産性向上は、重要な課題であり、低コストで生産量の増加を期待できる技術を求めていることは事実である。

従って、日本の稲作に関する技術及び経済協力もコストの観点に留意しつつ、進めることが肝要であろう。

表1-17 日-タイ米価比較

その1 小売価格(うるち米)

	タイ		(C) 日本	(C)/(B)
	(A) パーツ	(B) 円		
単 位	パーツ/トン	円/トン	円/トン	倍 率
1976	4,517	64,899	344,000	5.3
77	4,550	59,091	379,000	6.4
78	5,206	52,907	403,000	7.6
79	5,220	55,532	408,000	7.4
1980	6,509	72,082	414,200	5.8
81	8,320	83,618	429,000	5.1

出所 タイ: Internal Trade Department,
商務省

日本: 総理府統計局「小売物価統計調査報告書」

注 タイ: 5%碎米入り, 標準米

日本: 東京, 国内産米・中

表 1-18 日-タイ米価比較

その2 小売価格(もち米)

	タイ		(C) 日本	(C)/(B)
	(A) パーツ	(B) 円		
単 位	パーツ/トン	円/トン	円/トン	倍 率
1976	4,448	63,908	445,000	7.0
77	4,306	55,923	449,000	8.9
78	5,803	58,974	572,000	9.7
79	5,959	63,394	550,000	8.7
1980	5,570	61,683	543,000	8.8
81				

出所： 表 1-17 に同じ

注： タイ，5%碎米入り精米

日本，東京，もち米，精米

表 1-19 日-タイ米価比較

その3 生産者価格(うるち米)

	タイ		(C) 日本	(C)/(B)
	(A) パーツ	(B) 円		
単 位	パーツ/トン	円/トン	円/トン	倍 率
1976	2,407	34,583	275,770	8.0
77	2,116	27,481	287,200	10.5
78	2,494	25,346	293,950	11.6
79	2,501	26,606	293,950	11.1
1980	2,994	33,156	299,000	9.0
81	3,435	34,523	—	

出所： タイ, Internal Trade Department

商務省

日本, 農林水産省「農林物価賃金統計」

注： タイ, 5%碎米入り粳

日本, 政府売り支払平均価格

1等 玄米

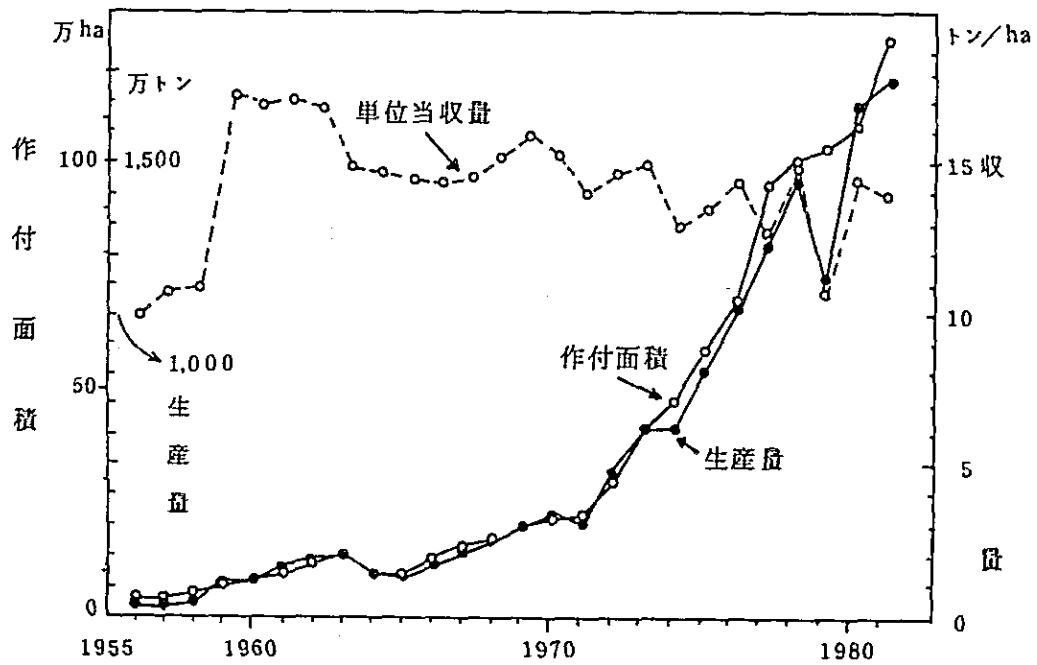
表1-20 円/バーツ 交換レート

1976	0.0696	円/バーツ
77	0.0770	〃
78	0.0984	〃
79	0.0940	〃
1980	0.0903	〃
81	0.0995	〃

出所：Bank of Thailand

注：Selling Price of Baht

表1-21 25年間のキャッサバ生産の推移



(5) キャッサバの生産と輸出

① 生産

キャッサバは、別名タピオカ・マンジョカとも呼ばれ、原産地は南米アマゾン河上流といわれる熱帯作物である。タイ国へは、マレーシアを通じて南タイに19世紀中頃に入ったとされている。

キャッサバは、小灌木で背丈2～3cm、かんしょに似た肥大根を利用する。タイ国では、年間1,600～1,700万トンの生産があり、その主たる用途は食用・飼料・澱粉用である。しかし、タイの場合には、主にEC向けにペレット状態で飼料として年間500万トン程度輸出されている。(タイ以外の生産国、とくに近隣のインドネシア・インド等では、食用として利用されている。)澱粉は、タピオカ・フラワーと呼ばれ、日本では、IQ品目となっており、タイ国から年間5～6万トン輸入している。タイにとっては、日本が最大のタピオカ・フラワーの顧客となっている。

キャッサバの地域別生産状況は、次表のとおりである。

表1-22 キャッサバ生産量

(単位：1,000トン)

	1976	1980	1981
タイ国 合計	10,138 (100)	16,540 (100)	17,744 (100)
北部	272 (2.7)	488 (3)	708 (4)
東北部	4,822 (48)	10,009 (61)	10,046 (57)
中央部	5,044 (50)	6,043 (37)	6,990 (39)
南部	—	—	—

出所： Agricultural Economics Office

農業協同組合省

この20年間(1962/1981)にキャッサバの作付面積は、約10倍、生産量は8.5倍と畑作物では最大の増加率となっている。地域別にみると現在では東北タイが圧倒的なシェアを占めているが、しかし、数年前(1976年)までは、中央タイ、なかでもライオン・チャンタブリなどの東部地方が、最大の生産地であった。近年、道路網の整備とともに東北タイの森林開拓が急速にすすみ、キャッサバ作付面積が拡大してその生産量は東部地方を凌ぐに至った。

このように東北地方にキャッサバが急速に普及した理由は、道路網の整備のほか次のような要因によるものとされる。

- ア 旱魃に強く、やせ地でも栽培が可能である。
- イ 栽培管理コストが安い。(肥料・農薬を要しない。)
- ウ 加工工場(チップペレット)に巨額の投資を要せず製品化が容易である。
- エ ECという巨大市場への接近が可能になった。

このような理由からキャッサバの作付面積は森林の開発が限界に達していると指摘されながらも、留まるところを知らず、今なお、増加を続けている。

表1-23 キャッサバ作付面積
(単位:1,000ライ)

	1976	1980	1981
タイ国	4,373 (100)	7,250 (100)	7,940 (100)
北部	105 (24)	215 (2.9)	294 (3.7)
東北部	2,117 (48.4)	4,535 (62.6)	4,738 (60)
中央部	2,151 (49.2)	2,500 (34.5)	2,908 (36.6)
南部	-	-	-

出所: 同上

② 輸出

タピオカ製品(ペレット、チップ、フラワー)の輸出についてみると、1980年には約520万トン、1981年には約630万トンと大幅に増加し、1981年は過去最大の輸出量を記録した1978年時点の数量を越す勢いであった。

表1-24 タピオカ製品の輸出状況 (単位: 1,000トン)

	1978			1979			1980					
	合計	Pellets	Chips	Flour	合計	Pellets	Chips	Flour	合計	Pellets	Chips	Flour
輸出計	6280 (100)	5796 (100)	256 (100)	235 (100)	3958 (100)	3695 (100)	141 (100)	122 (100)	5216 (100)	4811 (100)	159 (100)	241 (100)
うちEEC向け	5960 (95)	5700 (99)	240 (94)	11 (5)	3810 (96)	3661 (99)	141 (100)	8 (7)	4995 (96)	4759 (99)	159 (100)	76 (31)
1.オランダ	4208 (67)	4059 (70)	147 (58)	2 (1)	2683 (68)	2646 (72)	35 (25)	2 (2)	3667 (70)	3574 (74)	91 (57)	2 (1)
2.西独	436	431	4	1	224	211	42	1	340	324	15	1
3.フランス	473	430	39	4	265	227	37	1	125	120	3	2
4.ベルギー	612	564	47	1	467	400	57	1	787	668	51	68
5.英国	22	19	-	3	5	2	-	3	2	-	-	2
6.イタリヤ	209	206	3	-	166	166	-	-	74	74	-	1
うちEEC向け以外	329 (5)	87 (1)	16 (6)	224 (95)	148 (4)	34 (1)	0	114 (93)	221 (4)	52 (1)	0	168 (69)
7.日本	95	0	1	94	59	6	0	53	59	0	-	59
8.台湾	104	42	1	61	24	-	0	24	59	-	-	59
9.米	33	-	-	33	21	-	-	21	27	-	-	27
10.香港	16	2	0	14	5	0	0	5	2	-	0	2
11.韓国	13	1	12	-	0	-	-	-	1	-	-	1
その他	68	42	3	23	9	28	-	11	73	52	-	21

(注) ()内の数字は%
(出所) 関税局

また、輸出額でも164億バーツ(1バーツ=約10円)と全輸出額の11%を占めている。

このように近年タピオカ製品は米に続く第2の外貨収入源となっており、畑作物としては、メイズ、砂糖、天然ゴムなどの輸出額をはるかに引き離している。

製品別にみると、飼料用のペレット及びチップは1980年でタピオカ製品輸出総額の90%以上を占めており、フラワー(でんぷん)は9%弱にすぎない。飼料用ペレット及びチップの輸出先は、ほぼ全量EC向けであり、タイのタピオカ産業は、EC向け輸出で発展拡大してきたといえる。このようにEC向け輸出が大幅に働いた大きな理由は、ECの共通農業政策によって、域内の穀類生産を保護するため、メイズ、大麦等の飼料原料に対しては高率の関税を課する一方、域内で生産しないタピオカペレット等については穀類の分類には入らず、しかも1971年以前は数量的に100万トン以下と少ないこともあって関税率はCIF価格の6%にしか過ぎなかった。

加えて、飼料としての経済価値からみて、タピオカは優れていることもあって、低関税率に支えられ、急速に拡大してきたものである。

しかし、EC向け輸出が1978年に約600万トンに達するに至って、ECの穀物生産国であるフランスをはじめとして、輸入規制の動きが表面化し、1981年から1986年まで6カ年間に、輸出数量を段階的に縮小するという規制措置がとられることとなった。この問題に関し、1982年5月タイ-EC間で話し合いがなされた結果、現在のところ1981年から1986年までペレットの輸出数量を500万トンと定め、10%以内の誤差を認める。その関税率は6%とし、割当枠を超える分については、30%の関税を課するという取極めになっている。

2. 畜産業

(1) 概要

大家畜についてみると、水牛及び役肉牛が依然と農耕用に利用され、農業生産の重要な動力源となっている。特に東北タイでの飼養が多い。

水牛については、1979年に「バッファロー・バンク(水牛銀行)」が設立され、貧農救済として水牛の貸し出しを行なっている。1982年5月現在、2,283頭を同バンクが保有しており、年間1頭当たり700バーツで貸し出している。肉牛・乳牛などは、草地開発の未発達、乾期の粗飼料確保難、年間を通じた高温多湿気候下での飼養技術などの点で国内需要を満たすだけの供給ができる状態にない。

他方、豚・鶏などは、専ら貴重な国民の動物蛋白質の供給源となっている。なかでも、ブロイラーの飼養は急速に拡大し、食肉としては最も国民に親しまれ、普及して