講師リスト

LIST OF TEACHERS AND SUBJECTS

NO.	SUBJECTS	TEACHERS			
A.	GENERAL SUBJECT				
1.	Indonesian Langauge	: 1.	(IKIP)	2. Drs. V.Silitonga	(BPLPD)
2.	Mathematics & Physics	: 1. Drs. G.Tinungki	(BPLP -UP.)	2. Luther Ansa	(BPLPD)
3.	Educational of teaching Technology	: 1.	(IKIP)	2.	(IKIP)
B.	SPECIALIZED SUBJECT				
1.	Deck Work & Ship Maintenance	: 1. Emrun	(BPLP UP)	2.	(BPLPD)
2.	Meteorologie & Oceanography	: 1. Ir.Sudjono	(Meteorology)	2. Kristya B.N.Tyas	(BPLPD)
3.	Ship Struct.&Ship Building	: 1. Ir.Soewarno	(Staf of Harbour-Master)	2. K.Budi N.Tyas	(BPLPD)
4.	Navigation along Coast & Chart work	: 1. Capt.Taslim	(Kanwil Hubla)	2. Y.B.Setiyawan	(BPLPD)
5.	Cargo and Basic Stability	: 1. Capt.Syaiful	(Jakarta Lloyd)	2. Bambang Poernomo	(BPLPD)
6.	International Regulation for-Preventing Collisions at Sea (1972)	: 1. Capt.E.W.Manikome	(BPLP-UP)	2. CAPT. NADEAK	(BPLPD)
7.	Basic Nav. Equipment	: 1. Turiman M.	(BPLP-UP)	2. Syahrier Y.	(BPLPD)
8.	Manoeuvre	: 1. Capt.Abrial	(BPLPD)	2.	(BPLPD)
9.	Automatic control System, Hydr.Electric Hydr. &nElect. Pneumatic	: 1. Y. A b e	(Expert JICA)	2. C/E. Toga Tambunan	(BPLPD)
10.	Laws & Regulation related - to Ship	: 1. Oetama SH.	(Kanwil Hubla)	2. CAPT. A. ODASHIMA	(BPLPD)
11.	Sea Survival & Fire Fighting	: 1. Capt.Yusuf	(Harbour Master)	2. Team of BFFT/BSST	(BPLPD)
12.	First Aid Kid	: 1. Dr.J.D.Bunda	(Port Trading)	2. Dr. Nurdin M.	(BPLPD)

13. .....

No.	Subject	Teacher			
13.	S i g n a l	1. Capt. Abrial	(BPLPD)	2. Kafaillah Arif	(BPLPD)
14.	Internal Combustion Engine	1. R. Pakasi	(BPLP UP)	2. M.Tahir Usemahu	(BPLPD)
15.	Engine Work	1. M.Tahir Usemahu	(BPLPD)	2. I.Made Sudipa	(BPLPD)
16.	Boiler & Steam Machinery	1. M.U.Hutagalung	(BPLP UP)	2. Muh.Yusuf	(BPLPD)
17.	Auxiliary Machine	1. M.U.Hutagalung	(BPLP UP)	2. Muh.Yusuf	(BPLPD)
18.	Marine Electricity	1. Triyuswoyo	(BPLP UP)	2.	(BPLPD)
19.	Strength of Materials	1. C/E.Toga Tambunan	(BPLPD)	2. C.Palembangan	(BPLPD)
20.	Ship Construction	1. Ir.Suwarno	(Staf of Harbour-Master) (BPLPD)	2. C.Palembangan	(BPLPD)
21.	Engine Drawing	1. I.Made Sudipa		2.	(BPLPD)
22.	Labour & Safety Knowledge	1. Triyuswoyo	(BPLP UP)	2. C.Palembangan	(BPLPD)

C. ACTIVITY

1.	Study tours	1. Team of BPLPD
2.	Discipline and Activity	1. Team of BPLPD

Team of Barombong Fire Fighting Training (BFFT)

1. C/E. Toga Tambunan	(Leader)
2. Y.B.Setiyawan	(Co-leader)
3. Capt. Abrial	(Member)
4. Muh.Yusuf	(Member)
5. C.Palembangan	(Member)
6. Mahading M.K.	(Member)
7. Arlizar Jamaan	(Member)
8. Daeng Sidjaya	(Member)
9. Abd.Kadir	(Member)
10. Aminullah	(Member)
11. Yopie A.Bokau	(Member)

Team of Barombong Sea Survival Training (BSST)

1. Bambang Poernomo	(Leader)
2. Kafaillah Arif	(Co-leader)
3. Capt.Abrial	(Member)
4. Y.B.Setiyawan	(Member)

Team of BPLPD

1. Capt. Abrial	(Leader)
2. C/E.Toga Tambunan	(Co-leader)
3. Luther Ansa	(Member)
4. I Made Sudipa	(Member)
5. Y.B.Setiyawan	(Member)
6. Drs.V.Silitonga	(Member)
7. Bambang Poernomo	(Member)

教科書リスト

インドネシア第三回研修（船員訓練）の教科書

航　　海　　科	機　　関　　科
1. Indonesian language	1. Indonesian language
2. Mathematics	2. Mathematics
3. Physics	3. Physics
4. Educational of teaching technology	4. Educational of teaching technology
5. Fire fighting and sea survival	5. Fire fighting and sea survival
6. Deck work and ship maintenance	6. Laws and regulation related to ship
7. Manoeuvre	7. First aid
8. Meteorologie and oceanography	8. Automatic control system electric hydraulic and pheum
9. Ship structure and ship bilding	9. Engine drawing
10. Navigation along coast and chart work	10. Marine electricity
11. Basic navigation equipment	11. Internal combustion engine
12. International regulation preventing collisions at sea, 1972	12. Engine work
13. Cargo and basic stability	13. Boiler and steam machinery
14. Auto control system, electric hydr and elect pneumatic	14. Auxiliary machine
15. Signals	15. Material
16. Laws and regulation related to ship	16. Ship construction
17. First aid	17. Labour and safty knowledge
18. Discipline and activitiy	18. Discipline and activity

実習費用の細目

ENGINE DEPARTMENT PRACTICE

MATERIAL	$ 20
ELECT. WELDING MATERIAL	$ 10
GAS WELDING (02 & Acetylin)	$ 15
TOOLS (Lathe, Drill, Saw)	$ 10
F.O. & L.O. for ENGINE	$ 12 ($ 3 × 4 times)
OPE RATING COST FOR T.S.	$ 30 ($10 × 3 times)
WASTE & MISCELANEOUS	$ 3
TOTAL	$ 100

- - - - -

FIRE FIGHTING

FIRE FIGHTING - THEORY	$ 19
- PRACTICE	$ 35
FUEL OIL (HSD & PREMIUM)	$ 25
WOODDEN MATERIAL	$ 10
RECHARGING AIR BOTTLE	$ 20
EXTINGUISHER (FOAM, CO2, CHEMICAL)	$ 25
MAINTENANCE OF TOOLS/EQUIPMENTS	$ 10
MISCELANEOUS	$ 3
TOTAL	$147

DECK DEPARTMENT PRACTICE

1.	MANILA ROPE	$ 10
2.	NYLON ROPE	$ 10
3.	WIRE ROPE	$ 15
4.	CANVAS	$ 5
5.	PALEM/NIDLE	$ 5
6.	TARN	$ 5
7.	DECK KNIFE	$ 5
8.	HAND GLOVES	$ 5
9.	NAVIGATION STATIONARY	$ 10
10.	TRANSPARANT PIPER	$ 5
11.	PAINTE EQUIPMENT	$ 15
12.	RAG	$ 5
13.	GRESS	$ 5
		$ 100

SEA SURVIUAL

1.	INFLATABLE LIFE RAFT	$ 20
2.	SMOKE SIGNAL	$ 5
3.	STAR SIGNAL	$ 5
4.	PARACHUTE SIGNAL	$ 5
5.	HAND FLARE	$ 5
6.	RE-CHARGE FEE CO_2 LIFE RAFT	$ 5
7.	RE-CHARGE FEE CO_2 LIFE JACKET	$ 5
8.	BATTERY FOR TRANSCEIVER	$ 6
9.	TRANING SHIP COST	$ 5
10.	MOTOR LIFEBOAT COST	$ 5
		$ 66

3. 灌漑排水（研修管理）概要

3.1 経　緯

食糧の増産と安定供給は大きな課題で、とりわけ灌漑網の整備を中心とした農業基盤整備の拡充に努めることは重要である。

しかしながら、当該分野の技術者及び技術力の不足は、灌漑の新規開発はもとより、水利施設の整備を進める上で問題となっている。このような途上国の現状に対応するため、インドネシアにおいて1981年よりプロジェクト協力を進めてきた灌漑排水施工技術センターを実施機関とする第三国研修（灌漑排水）を行なう構想が出来上がりつつあったが、1985年6月クアラ・ランプールでのアセアン拡大外相会議においてアセアン太平洋人造り協力・緊急行動計画（32件）が決定され、インドネシアにより灌漑排水技術の研修がその一つとして提唱されたところ、第三国研修により対応すべく1985年3月に事前調査団、同年9月に実施協議調査団を派遣しR/Dの署名まで了した。その後研修開始までの準備期間が短かったこともあり、割当国の定員を満たさなかったが、周辺国より7名、国内より9名の参加を得て昭和61年2月24日から本研修が実施された。そこで、初年度コースの評価及び次年度以降通常二国間の第三国研修として実施される予定である本研修の次年度計画につき協議するため研修管理調査団を派遣することとなった。

3.2 研修実施計画（初年度）

(1) タイトル

灌漑排水

"International Training Course in Irrigation Engineering"

(2) 目　的

灌漑排水及び関連技術に係る知識と実用的技術を修得・向上させ、各国の諸問題を解決することに貢献する。

(3) 期　間

1986年2月24日より同年3月28日まで

(4) 割当国

アセアン及び南太平洋諸国とする。

(5) 定　員

周辺国　10名

実施国　5名

(6) 研修対象者

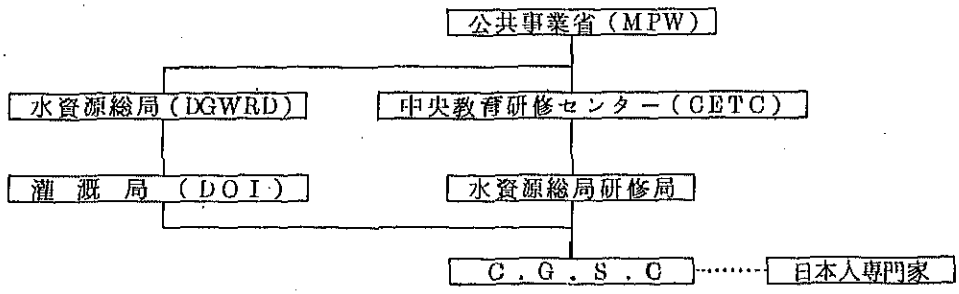
大卒または同程度の知識、５年以上の実務経験を有し、現在も灌漑技術に関すを業務に従事する者、年令は４５才以下。

(7) 実施機関

灌漑排水施工技術センター

(Construction Guidance Service Centre, CGSC)

図 1. 実施機関関連組織図



(8) カリキュラム

	講義	日数	実習	日数	セミナー	日数	研修旅行	日数	厚生行事
1	WRDの紹介	0.5	リモートセンシング	1.0	カントリーレポート	1.0	ジョクジャカルタ	1.0	到着 (2/23)
2	灌漑事情	1.0	土質実験	0.5	パネルディスカッション	1.0	バリ	3.0	開講式 (3/24)
	(インドネシア・日本)		コンクリート実験	0.5					オリエンテーション
3	リモートセンシング	1.0	水理実験	1.0					研修員紹介
4	灌漑計画	1.5							閉講式 (3/27)
	(調査・基準・計画)								帰国 (3/28)
5	土質工学	0.5							
	(概論)								
6	頭首工	0.5							
7	水路工	0.5							
8	コンクリート工学	1.0							
	(概論)								
9	水理施設	0.5							
10	ダム (設計・施工管理・基礎)	3.0							
11	施工・管理	2.0							
12	施設管理	1.0							
13	プロジェクトマネージメント	1.0							
14	水管理	1.0							
合計		15.0		3.0		2.0		4.0	
割当		62		18		8		17	

3.3 研 修 実 績

(1) 参加研修員

周辺国7名（フィリピン3名、マレーシア2名、タイ2名） インドネシア9名

〔別添資料(1)参照〕

(2) 研修指導体制（講師リスト） 〔別添資料(2)参照〕

(3) 実施スケジュール（研修日程） 〔別添資料(3)参照〕

3.4 評 価

(1) コース運営管理

① 研修員受入

(i) G.I.の送付が遅いため、カントリーレポート、渡航手続き等の準備に支障を生じた。

(ii) 応募研修員数が十分でなく、選抜できなかったため研修員構成が年令、実務経験、学歴の面で多岐にわたった。

② 研修コース名

(i) 研修内容に排水工学も含まれているので、コース名を現在のタイトル"Drainage"を含め、"International Training Course in Irrigation & Drainage Engineering"にしてはという意見が研修員から指摘されたが、現在のタイトルでも広義の解釈では"Drainage"も含んでいるのであえて変更する必要はないものとした。

③ 研 修 員 数

「イ」側運営委員会では研修員数は、16人が実習運営の面から適当であり、12名が他国研修員で4名が主催国であれば、適性班別に望ましいと評価した。

④ 研 修 期 間

半分以上の研修員は適当と考えているが、約30%の者は、長すぎるとの意見を持っている。

⑤ 研 修 環 境

(i) 宿泊施設、食事、友好的なスタッフ、その他のサービスに大方の研修員は満足している。このことはこのような短期の研修では特に重要と思われる。

(ii) スポーツ施設は良かったが、屋内のトレーニング施設及びビリヤード等のゲーム室を備えてほしいとの要望が研修員より出された。

(iii) CGSCはジャカルタから遠隔地にあるため、送迎サービスや交通費の支給等を研修員は希望している。

(iv) 通信施設の改善、特に電話の利用ができるよう研修員から強い要望があった。

⑥ 研修アレンジ、コーディネーション

ＣＧＳＣ及び研修旅行における研修アレンジは満足すべきものであったとする研修員が多い。

※ 研修環境に関する調査結果

Your evaluation conceming facilities and services	ANSWER		
	Good	Fair	Poor
Training implementation / management	16		
Training equipment (Audio visual aid, film etc.).	14	2	
Training Supplies/Text book, hand out, etc.	13	3	
Accommodation and services	14	2	
Lighting in the dormitory and study room	15		1
Lobby / waiting room	12	3	1
Menu (Meals)	15		1
Service hours for meals/Snacks.	14	2	
Cleaning Service for dormitory/Study Room	13	3	
Training environment	15	1	
合　　計　　（割合％）	141(88)	16(10)	3(2)

(2) 研修内容について

① コースカリキュラム

(I) 多くの研修員は、カリキュラム構成は研修の目的に沿ったものであるがつぎに記す課題が含まれるべきであると述べている。

排水計画、コンピューターの紹介、地下水、圃場整備、プロジェクト評価、建設機械、水文、畑地灌漑、作物生育環境、工事積算、測用，整図

(II) 又以下に記す課題は可能な限り時間を延長すべきであると述べている。

リモートセンシング（適地選定）、灌漑計画、プロジェクトマネージメント、施工の実防、水管理、ダムの基盤、水路工

(III) ある課題は不必要であると述べている者もいるが意見は様々であり、集約することは困難である。

(IV) 実験・実習では、ＣＧＳＣの最新の施設が非常に役立ち有益な研修を実施することができた。

⑧ 講師、指導者

(I) 経験豊かな者もいるがなかには語学の面で指導に難がある者もあった。テキスト類は

大旨十分なものであった。

(11) 講義時間が長すぎる講師がいたが、研修員は3時半から4時までに終了することを希望した。

⑨ カントリーレポート発表セミナー

大変興味深いものとなり、討議を通じて幾つかの問題について可能な限りの回答を導き出すために、各国の研修員は応用可能な考え方、経験、技術を提供した。

⑩ "Irrigation Application and its prospects" に係るセミナー

アセアン各国における灌漑開発に関する幾つかの示唆に富んだ考えで結論づけた。今後このような形式を取るセミナーは本研修コースの重要な部分を担うことになると思われる。

※ 研修内容に関する調査結果

アンケート項目	評価		
	Excellent	Good	Poor
1. Value of this training in relation to my job.	8	8	
2. The usefulness of the subject matter content.	8	7	1
3. The presentation methods used.	3	12	1
4. Trainer's ability to transfer knowledge.	1	10	5
5. Atmosphere conducive to active participation.	5	10	1
6. Opportunities to express my views.	6	10	
7. Value of the required readings.	2	14	
8. Use of Audio-Visual aids.	6	9	
9. Duration of this training (割合%)	Too long 5 (31)	Appropriate 10 (63)	Too short 1 (6)
No 9.を除く 合 計 (割合%)	39 (30)	80 (63)	9 (7)

※　研修課題別調査結果

アンケート項目	評価		
	Excellent	Good	Fair
1　講　義			
(1)　WRDの紹介	4	14	
(2)　インドネシアの灌漑事情	6	8	
(3)　日本の灌漑事情	2	8	4
(4)　リモートセンシング	4	10	
(5)　灌　漑　計　画	10	4	
(6)　土　質　工　学	5	8	1
(7)　頭　首　工	5	9	
(8)　水　路　工	5	8	1
(9)　コンクリート工学	6	8	
(10)　水　理　施　設	3	8	3
(11)　ダ　ム	4	8	2
(12)　施　工・管　理	4	10	
(13)　施　設　管　理	2	10	2
(14)　プロジェクトマネージメント	12	2	
(15)　水　管　理	3	9	2
2.　実　習			
(1)　リモートセンシング	4	10	
(2)　土　質　実　験	2	11	1
(3)　コンクリート実験	4	9	1
(4)　水　理　実　験	7	7	
3.　セミナー			
(1)　カントリーレポート	2	7	2
(2)　パネルディスカッション	2	7	
4.　研修旅行			
(1)　ジョクジャカルタ	4	4	
(2)　バ　リ	5	3	
5.　厚生行事			
(1)　開　講　式	3	1	
(2)　オリエンテーション	7	1	
(3)　エバリエーション	1		
(4)　閉　講　式	1	1	

⑪ 研修旅行（ジョクジャカルタ方面、バリ方面）

2回の研修旅行は研修員に大変好評であったが、実施機関にとって研修員が希望する研修内容及び見学先について比較対照し検討するのに良い事例となったようだ。研修員からは以下のような要望が出ている。

(I) 旅行期間は4日間より1週間程度に延長すべきだ。

(II) 見学先のプロジェクトは可能ならば施工段階から維持管理の段階までの一貫したプロジェクトマネージメントの経過を示すようにしてほしい。

(III) 見学先のプロジェクトに関する技術情報を出発に先立って2、3日前に研修員に配布してほしい。

(IV) 見学先のプロジェクトがかかえる問題点及び現場における解決方法について十分な討議が研修員との間で、できるよう配慮してほしい。

※ 研修旅行に関する調査結果

アンケート項目	目的地	評価				
		Poor	Fair	Good	Very Good	Excellent
1. Do you think the field trip relevants to the class works?	ジョグジャカルタ			4	12	
	バリ			2	12	2
2. Do you think the field trips object gives some clarification and comparative idea about irrigation enginering you got during the course.	ジョグジャカルタ		1	6	8	1
	バリ			3	12	1
3. Do you think the instructional approach of this field trip will encourage the active participation of the trainee ?	ジョグジャカルタ	1	1	6	6	2
	バリ			7	8	1
4. Do you think the time allocation for this field trip adequate ?	ジョグジャカルタ	2	4	4	6	
	バリ	1	3	5	6	1
5. Do you consider the projects staff explanation meet your information requirement ?	ジョグジャカルタ		2	8	5	
	バリ		1	5	10	
合計（割合）	ジョグジャカルタ	3(4)	8(10)	28(35)	37(47)	3(4)
	バリ	1(1)	4(5)	22(28)	48(60)	5(6)

(3) 総合評価及び次年度研修計画

以上の評価から第一回の灌漑排水コースは研修開始までの準備期間の不足、割当国がアセアン・南太平洋に限られていた等の理由で周辺国からの参加7名、国内からの参加が9名と

変則的な形でのスタートとなったが、ＣＧＳＣの所長以下スタッフの努力、日本人専門家の協力、整備された研修施設、国内外研修員の協力、技調委他関係省庁の協力を得て、概ね、成功裡に終了したと言えよう。

今年度の結果から次年度においても、同様の研修内容を実施することが適当と考えられるが、次年度計画を作成するにあたっては以下のような修正を加え、適切な準備を進める必要がある。現地側としても早期にコース実施に向けて準備を始めるためには、何らかの公的文書を必要としたため、協議の結果、修正点を盛り込んだ、ノンコミッタブルベースのSUMMARY OF DISCUSSIONに署名を交すことにした。〔別添資料(5)参照〕

修　正　点

1. 研修時期

雨期が本格化しない１１月中旬から約１カ月とする。

2. 割当国

周辺国のニーズ、及び研修コースの割当国数を参考にして以下の１２カ国とする。

タイ、フィリピン、マレーシア、ブルネイ、ビルマ、スリランカ、インド、ネパール、パキスタン、バングラディシュ、パプアニューギニア、タンザニア。

3. 定員

原則として周辺国からの研修員は１０名を越えないものとする。

原則としてインドネシア研修員数は５名を越えないものとする。

4. 日本人専門家

ダム工学及び圃場整備の科目を指導できる専門家を１名ずつ送る。

5. カウンターパート

コーススタッフで技術系のインストラクターに対して、日本でのカウンターパート研修のための枠を１名分設ける。

研修員リスト

THE FIRST INTERNATIONAL TRAINING
COURSE IN IRRIGATION ENGINEERING

LIST OF PARTICIPANTS FOR THE FIRST INTERNATIONAL
TRAINING COURSE IN IRRIGATION ENGINEERING

NO.	NAME/HOME ADDRESS	NATIONALITY/ RELIGION	DATE/PLACE OF BIRTH?AGE (YEARS)	PRESENT POST	NAME/ADDRESS OF ORGANIZATION	UNIVERSITY/ YEAR OF GRADUATION
1	2	3	4	5	6	7
1.	JULIAN SARIANO / Katedfuan, Cabacan, North Catabato, Philippines.	Philippines/ R. Catholic	Mangaldan, Pangasina, Philippines June 19, 1938 (48 Years)	Division Manager, Engineering Division	National Irrigation Administration (NIA) Region XI Davao City, Philippines.	Mapua Institute of Technology BSCE, 1965.
2.	OLIVER A. CERVANTES/ NIA, Bago City, Negros, Philippines.	Philippines/ R. Catholic	Jamuay, Iloilo Philippines, August 24, 1947 (38 Years)	Irrigation Superintendent	National Irrigation Administration Region XI, Bago City, Philippines.	University of Iloilo BS Civil Engineer, 1970.
3.	JOSEPHUS C. TARRANZA 309 Araullo St. Pagadaian City, Philippines.	Philippines/ R. Catholic	Cebu City, Cebu Philippines, June 26, 1956 (29 Years)	Officer in charge Regional Agri - culture Engineering Center.	MAF, Regional IX Pagadaian City Zamboangan Delsur.	Mindanao State University B.S Agriculture Engineer, 1978.
4.	MOH.YAZID BIN ABDULLAH, No. 1 QRS, JPT, 17500 Tanah Merah Kelantan, Malaysia.	Malaysia / Islam	Kelantan/Malaysia June 3, 1957, (29 Years)	District Drainage and Irrigation Engineer.	JPT, Tanah Merah Kelantan, Malaysia.	University of Tech - nology, Malaysia Civil Engineer.
5.	ZULKEFLI BIN HASSAN 421, Taman Sri Setia, Teluk Intan, Perak Malaysia.	Malaysia / Islam	Perak/Malaysia August 3, 1957 (29 Years)	District Engineer (O & M)	Jabatan Parit Tali Air, 45300 SE Besar, Malaysia.	New Castel University United Kingdom (BSc). Civil Engineering.

1	2	3	4	5	6	7
6.	THAWAT SINGH-POO 123/163 T. Sila Amuang KhonKaen, Thailand, Phone : 236499.	Thailand / Bhudism	Chachoensao Thailand, October 10,.1948 (30 Years)	Assistant Professor.	Faculty of Engineer- ing. Khonkaen Univer- sity, KhonKaen, Thailand Phone : 236119.	Kaset sart Univer - sity, Water Resour- ces Development.
7.	PREECHA PAIJIT RASUKON 12-6, Royal Irriga- tion Departement, Pakret, Nonthaburi Province, Thailand Phone : 2776980.	Thailand / Bhudism	Bangkok, February 14, 1951 (35 Years)	Irrigation Engineering Level - 5 Rehabilitation Project Manager.	Division of Operation & Maintenance, Royal Irrigation Departe - ment, Bangkok, Phone : 2413069.	Kaset Sart Univer - sity Irrigation Engineering (4 Years)
8.	YUSUF. S.A. Jln. Salak Tengah II/6 Madiun.	Indonesia / Islam	September 15, 1947 Garut - West Java. (38 Years)	Design Assistant of Madiun Irri - gation Project.	Madiun Irrigation Project , Jln.May.Jen. Panjaitan No. 9. Madiun - East Java.	University of Dipo- negoro, Semarang Civil Engineer, 1985.
9.	PANGUHALAN SILITONGA. Jln. Let.Jen.Joni No. 121 Jatibarang - Indramayu - Jabar.	Indonesia / Cristian	Sayurmatinggi, Feb. 9, 1953 (33 Years) .	Site Engineer of Cirebon Rentang Project.	Cirebon Rentang Irrigation Project Jl.Let.Jen.Joni Cirebon - West Java.	University of Suma- tera Utara, Civil Engineering 1980.
10.	BAMBANG HARGONO Proyek Bendung Wadas Lintang, Pos Prembun.	Indonesia / Islam	April 25, 1954 Surakarta, Central Java, Indonesia. (32 Years)	Assistant Sub. Project Manager of Wadaslintang	Kedu Selatan Project Gombong - Cen Java.	I H E - D E L F T Hydraulic Engineer 1983.
11.	MANAHAN TAMPUBOLON. Jln. Cijagra I/36. Bandung.	Indonesia / Protestan	September 29, 1944 Balige, North Sumatra. (41 years)	Staf of Sub. Directorate Plan & Design DOI I.	Directorate of Irri- gation I, Jln. Braga 137, Bandung, West Java.	I H E _ D E L F T Land and Water Development, 1980.
12.	BONAR SINAGA, Jln. Cijagra I Kompl.Pengairan 25, Bandung.	Indonesia / Protestant.	June 25, 1949 Medan, North - Sumatera, Indonesia. (36 years)	Staf of Sub. Directorate Plan & Design DOI I.	Directorate of Irri- gation I, Jl. Braga 137, Bandung - West Java.	University of Para- hyangan, Civil Engineer Bandung - 1980.

1	2	3	4	5	6	7
13.	S A R D J O E N O Jln. Ir. H. Juanda No. 384, Bandung.	Indonesia / Islam	April 11, 1932 Boyolali, Center Java. (54 Years)	Chief of Designer PT.Isuda Parama Consulting Engineers.	PT. ISUBA PARAMA Consulting Engineers Jln.Sukarno - Hatta No. 24/206 A. Bandung - West Java.	ITB Civil Enginee- 1963, . & Mathematical Statistic 4 year Regional Housing Centre Bandung - 1961.
14.	BAGUS TRIYONO. Jln. Tampomas 21, Bandung.	Indonesia / Islam	Madiun, East Java Indonesia, May 30, 1958. (28 years)	Design Engineer INDEC Consulting Company.	INDEC Consulting Company, Jln. Diponegoro 28, Bandung.	Brawidjaja Univer - sity Civil Engineer 1984.
15.	FRANS SELAWINATA, Jln. Kedoya Akasia III-B9/11. Taman Kedoya Baru, Jakarta.	Indonesia / Chatolic.	Cilacap, Central Java, Indonesia, Juli 1, 1949. (36 Years)	Irrigation Engineer/Div. Engineering II PT. DACREA Design & Enginee- ring Consultant.	PT.DACREA Design & Engineering Consul- tant, Jln. Bendu - ngan Hilir Raya Kav. 36 A, Blok B 8, Jakarta Pusat.	U N P A R Civil Engineer,1979.
16.	YANDI HERMAWAN. Jln. Taruma Negara - Blok C 1 - 22, Cimanggu Permai, Bogor.	Indonesia / Chatolic	Tangerang, July 17, 1952, (34 Years)	Irrigation / Hydraulic Engi - neer- Pesero PT.VIRAMA KARYA Consulting Engineer.	PT. VIRAMA KARYA, Consulting Company Jl. Rasuna Said Kav. 85 Jakarta.	Civil Engineer Atmajaya University Yogyakarta, 1980.

講師リスト

LIST OF LECTURERS FOR THE FIRST INTERNATIONAL TRAINING COURSE IN IRRIGATION ENGINEERING

No.	N A M E	LECTURE/SUBJECT	P O S I T I O N	OFFICE ADDRESS
1.	Ir. Soebandi Wirosoemarto	Introduction to government policy on WRD	Special Assistant to Minister of Public Works in Irrigation Development.	Jl. Pattimura 20/7 Kebayoran Baru Jakarta.
2.	Ir. Soewasono	Irrigation in Indonesia	Director of Irrigation I, DGWRD Ministry of Public Works.	- do -
3.	Ir. T.B. Haedar Ali	Remotesensing Technology	Director of Data Processing and Mapping Ministry of Public Works.	- do -
4.	Drs. Soeroso M. Djojo Soeharto	Application of Thematic Map	Chief Division of Remotesensing Ministry of Public Works	Jl. Braga-Bandung
5.	Ir. Soenarno, MSc.	Irrigation Planning	Chief of Sub Directorate Planning, Directorate of Irrigation (DOI) I.	- do -
6.	Ir. Sarbini Ronodibroto	Seminar (Country Report) Discussion on Irrigation	Director of Planning and Programming, DGWRD, Ministry of Public Works.	
7.	Ir. Gunawan Budhihartanto	Soil Mechanics	Chief of Soil Mechanics Section Water Resources Development Research Institute	Jl. Ir.H.Juanda - Bandung
8.	Ir. Rafnilla Affan	Soil Mechanics and Concrete (Laboratory observation).	Executing chief of Material, Soil and concrete Laboratory, CGSC Projec	Jl. Cut Mutiah PO Box 47 - Bekasi
9.	Ir. Mashudi, Dip. HE.	Hydraulic Structures (Head Works)	Chief of Sub Directorate Planning DOI - II, DGWRD.	Jl. Dr. Panjaitan Kav. 12/13 Jakarta Timur

No.	N A M E	LECTURE/SUBJECT	P O S I T I O N	OFFICE ADDRESS
10.	Ir. Soekrasno, Dip. HE.	Hydraulic Structures (Canal)	Chief of Section I, Sub Directorate Planning, DOI I, DGWRD.	Jl. Braga Bandung.
11.	Ir. Amir Miryadi, Dip.HE	Hydraulic Structures (Revetment Works)	Chief of Sub Directorate Planning, Directorate of River, DGWRD.	Jl. Pattimura 20/7 Kebayoran Baru Jakarta Selatan.
12.	Ir. Moch. Memed, Dip. HE	Hydraulic Structures (Laboratory observation)	Chief of Sub Directorate Hydraulic, Water Resources Development Research Institute.	Jl. Ir. H. Juanda Bandung.
13.	Ir. CD. Sumarto, Dip.HE.	Concrete Engineering (General)	Director of PT. Indra Karya Company. (CONTRACTOR)	Jl. Surabaya No.34 Malang.
14.	Suprapto, M.E.	Construction Management (Temporary - Works)	Executing Manager of Brantas Abipraya Company.(CONTRACTOR)	
15.	Ir. Sumarno, Dip. HE.	Construction Management (Scheduling)	Manager of Citanduy River Project.	Jl. H. Sutami No.1 Banjar.
16.	Ir. Gatot Sumarjo	Construction Supervision for Irrigation Project	Chief of Sub Directorate of Construction Guidance for East Region, DOI I, DGWRD.	Jl. Pattimura 20/7 Kebayoran Baru Jakarta.
17.	Ir. Kusdaryono	Seminar (Panel Discussion on Irrigation).	Director of Irrigation II, DGWRD, Ministry of Public Works	Jl. DI. Panjaitan Kav.12/13 Jakarta Timur.

18. .....

No.	N A M E	LECIURE/SUBJECT	P O S I T I O N	OFFICE ADDRESS.
18.	Drs. Hamudji Waluyo, BIE.	Irrigation Water Management	Chief of Sub Directorate for Operation and Maintenance - DOI I, DGWRD.	Jl. Pattimura 20/7 Kebayoran Baru Jakarta Selatan.
19.	Ir. Achmad Lanti, M.Eng.	Project Management	Manager of Jakarta Flood Controll Project	Jl. DI. Panjaitan Kav. 12/13 Jakart Timur.
20.	A. Hafied A. Gany, Ph.D.	Orientation (Guidance of CGSC and others)	Project Manager of CGSC.	Jl. Cut Mutiah PO Box 47-Bekasi.
21.	Ir. Sutiyadi Sutomo	Operation and Maintenance (Facility - Management.	Chief O & M Section, DOI I, DGWRD.	Jl. Pattimura 20/7 Kebayoran Baru Jakarta Selatan.
22.	M. T. Sakamoto	General Condition of irrigation in Japan	Japanese Colombo Plan Senior Expert DOI I, DGWRD.	Jl. Pattimura 20/7 Kebayoran Baru Jakarta Selatan.
23.	Mr. I. Iwai	Construction Management of Dam.	Guest lecturer from JICA headquarter, Tokyo	JICA, Shinjuku Tokyo.
24.	Mr. Kawaguchi	1. Hydraulic Structures (design of Dam). 2. Foundation and Geology of Dam.	Guest lecturer from JICA headquarter, Tokyo.	JICA, Shinjuku Tokyo.

The First International Training Course in Irrigation Engineering

(Activity Schedule)

Date		Subject	Session	Lecturer	Remarks
23	Sun	Arrival in Indonesia			Direct move to CGSC (Bekasi).
24	Mon	- Opening ceremony - Orientation (Guidance of CGSC and others)	Morning Afternoon	Mr.A.Hafied A.Gany	CGSC ditto
25	Tue	- Introduction to Gov.policy on WRD - Introduction of participants	Morning Afternoon	Mr.Soebandi W.	ditto ditto
26	Wed	- Irrigation in Indonesia - General Condition of Irrigation in Japan	Morning Afternoon	Mr.Soewasono Mr.T.Sakamoto	ditto ditto
27	Thu	- Concrete Engineering (General) (Continuation)	Morning Afternoon	Mr.C.D.Soemarto ditto	ditto ditto
28	Fri	- Irrigation Planning (Development Procedure) - Hydraulic Structure (Revetment works)	Morning Afternoon	Mr. Sunarno Mr.Amir Muryadi	ditto ditto
1	Sat	- Hydraulic Structure (Laboratory Observation) (Continuation)	Morning Afternoon	Mr.Moch.Memed ditto	ditto ditto
2	Sun	F r e e			Recreation to TMII
3	Mon	- Seminar *) (Country Report/Disccussion on Irrigation) - Continuation)	Morning Afternoon	Mr.Sarbini R. ditto	C G S C ditto
4	Tue	- Irrigation Planning (Criteria and Standard) (Continuation)	Morning Afternoon	Mr.Soenarno ditto	CGSC ditto
5	Wed	- Soil Mechanics (General) - Soil Mechanics (Laboratory Observation)	Morning Afternoon	Mr.Gunawan B Mrs.Rafnila A	ditto ditto

1		2	3	4	5
6	Thu	- Hydraulic Structure (Head works) - Hydraulic Structure (canal)	Morning Afternoon	Mr. Mashudi Mr.Sukrasno	ditto ditto
7	Fri	- Remotesensing Technology (General, Reading Image) ditto (Production of Thematic Maps)	Morning Afternoon	Mr.TB.Haedar Ali ditto	ditto ditto
8	Sat	ditto (Application of Thematic Maps) (Continuation)	Morning Afternoon	Mr.Suroso ditto	Site at RSC Jakarta ditto
9	Sun	F r e e			City Tour to National-Monument and Museum.
10	Mon	- Concrete Engineering (Laboratory Observation) F r e e	Morning Afternoon	Mrs.Rafnila A.	CGSC
11	Tue	- Hydraulic Structure (Design of Dam) (Continuation)	Morning Afternoon	*Mr.Kawaguchi. ditto	ditto ditto
12	Wed	- F r e e			Recreation to Fantasy Land
13	Thu	- Construction Management of Dam (Continuation)	Morning Afternoon	*Mr.T.Iwai ditto	CGSC ditto
14	Fri	- Foundation and Geology (Foundation of Dam) (Continuation)	Morning Afternoon	*Mr.Kawaguchi ditto	ditto ditto
15	Sat	- Construction Management (Temporary works) ditto (Form works)	Morning Afternoon	Mr.Soeprapto ditto	ditto ditto
16	Sun	- F r e e			

* Japanese Short Term Expart

1		2	3	4	5
17	Mon	- Construction Management (Scheduling) - Construction Supervision for Irrigation Project	Morning Afternoon	Mr.Soenarno Mr.Gatot Soenarjo	ditto ditto
18	Tue	- Irrigation Water Management (Continuation)	Morning Afternoon	Mr.R.Hamudji W. ditto	ditto ditto
19	Wed	- Observation Tour			Jakarta to Yogyakarta.
20	Thu	ditto			Yogyakarta to Bali.
21	Fri	ditto			B a l i
22	Sat	ditto			Bali to Jakarta
23	Sun	F r e e			Perparation for report writing
24	Mon	- Operation and Maintenance (Facility Management) (Continuation)	Morning Afternoon	Mr.Sutiyadi ditto	CGSC ditto
25	Tue	- Seminar **) (Panel Discussion on Irrigation) (Continuation)	Morning Afternoon	Mr.Kusdaryono ditto	ditto ditto
26	Wed	- Project Management (Project Cycle, strategic choice) ditto (Management uncertainty, Commitment Package, Human aspect in Project Management)	Morning Afternoon	Mr.Achmad Lanti ditto	ditto ditto
27	Thu	- Evaluation Clossing Ceremony	Morning		ditto
28	Fri	- D e p a r t u r e			

LEGEND

Morning session : 08:30 a.m. - 10:00 a.m.
10:30 a.m. - 12:00 p.m.

(except Friday until 11:30 a.m.)

Afternoon session : 13:30 p.m. - 15:00 p.m.
15:30 p.m. - 17:00 p.m.

(except Saturday until 15:00 p.m.)

*) Theme of Seminar : Present Condition of Irrigation and Problems in Irrigation Development in Home Country.

**) Theme of Seminar : Irrigation Application and its Prospect.

(All lecturers, Instructors and resource persons are expected to participate in the above seminars).

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GUIDELINE FOR SEMINAR & DISCUSSION

I. Country Report

1. Each participant is expected to present his country report concerning " Present Condition of Irrigation and Problems in Irrigation Development in Home Country " (The paper should be submitted to the Organizing Committee upon arrival in CGSC for mulplication and distribution).
2. In principal, one paper is expected to represent each participating country, and two from Indonesian participants. However, other interesting papers are also welcome, as far as the papers are not repeating the similar points.
3. The participants are expected to answer any questions concerning the papers from the audience or other participants.
4. All paper will be compiled by the organizing committee of the course, together with the final report.

II. Panel Discussion

1. The participants will be devided into two discussion groups.
2. Each group should by it self prepare a seminar paper inline with the implementation of the course, which should be based upon the material, lecture, observation, information, evidence etc. adapted or given during the term of the course.
3. The Topic of the paper in " Irrigation Application and Its Prospect ".

4. The paper should be prepared, discussed and compiled by the respective group it self step by step following the whole process of the course. Thus, the participants should organize / appoint its team and assign there of, to take any measures to prepare, to present and to defend the paper.

5. Each paper should at least be presented within 30 minutes by one or more represented persons of the group.
   (The use of overhead projector, slide projector, and other audio visual aids are welcome).

6. The represented group should defend the paper against the comments, critisism, sugestion, recommendation, etc. from the opponent group.

7. The Moderator will take action to confirm and conclude the discussion for the confenience of both participanting group.

8. The organizing committee will assist in the way of provision of facilities for discussion printing materials, copying facilities etc. The final paper will be compiled together with the final report.

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International Training Course
in Irrigation Engineering

Some Highlight of the Training Implementation
(Based on the evaluation of the Organizing Committee)

A. FOREWORDS

This preliminary information of the training implementation is intended to give a general look on the major aspects of the course from the point of view of the executing agency, to enable to give some impression concerning the implementation condition, training effectiveness, problems etc., while preparing the final report which will take a little time.

The majority of information presented in this report is projected from the reflection of the participants' responses with some impression observed by the organizing committe during the implentation of the training course.

B. Recruitment of Training Participants

1. The training participants responded that they were facing problem to prepare application procedures, country report, travel document as well as other necessary preparations, owing to the fact that the course information was too late to reach them.
2. The compositon of the participants were a little diversified interm of their ages, experiences and their educational background, due to the fact that the number of candidates were not possible to give much selection alternatives.

C. Terms of the Course

1. Some participants suggested to modify the name of the course to be " International Training Course in Irrigation & Drainage Engineering " instead of " International Training Course in Irrigation Engineering", because they consider that drainage engineering is also part of the course.
2. The majority of the participants considered the duration of the course to be just-right (one month), however, some other participants stated to be a little longer and suggested to deduct one week.
3. With regard to the field trip, the majority of the participants stated that time allocation should be extended to preferably one week instead of four days. Some other participants suggested to

implement "fifty-fifty" percent interms of comparative duration of the classical works(verbal techniques) and field trip/practices on actual working condition.

D. Number of Participants

1. The majority stated that the number of participants were "just-right", however, the composition should be equal or balance from the participating country. Some suggestion stated to have 60% foreign participants and 40% host country participants out of 16 participants.
2. From the point of view of the organizing committee 16 participants are preferable for practical reasons. It is more preferable if the composition consisted of 12 foreign participants and 4 host country participants for proper grouping assignment.

E. Course Curriculum

1. The majority stated that the curriculum composition has met the training requirement, however, some topics should be included such as ; Drainage Planning, Introduction to Computer, Ground Water, Land Consolidation/Land Reformation, Engineering Economics,Construction Equipments, Hydrology, Upland Irrigation(other than rice),Agricultural-environmental aspects, Contract Administration, quantity surveying, Survey and Mapping
2. Others stated that some topics regarded as least valuable, but it is rather difficult to quantify due to the fact that the opinion are somewhat too diversified.

F. Lecturers & Instructors

1. Some lectureres are considered to be well experienced professionals, however,some others considered to be a little ability to articulate the topics in good English. The lecture notes, anyhow, are considered to be good enough.
2. Lecturing time is consider a little too long (untul 5:00 pm), some suggested to stop at 3.30 pm or 4:00pm.

G. Implementation Condition

1. In general, the course participants satisfy with the training implementation both the arrangement of the program and accommodation facilities and services during their stay in Bekasi & field trip.

2. The majority of the foreign participants satisfy with the hospitable responses of organizing committee members in particular and other people they met during their stay in general.
3. The training program has been successful one, the study method is good and effective, the material given during the course are of great use to the participants, and the study covers almost all subjects deal with irrigation engineering so suitable for irrigation engineers.
4. The advantage of the course is the equipment and facilities are latest technology, it helps very much especially on the laboratory works.
5. The majority stated to be very confortable to stay in CGSC, good accommodation, good meals, good services, staffs are friendly, those factors are important to maintain consistently for the short course like this one.
6. With regard to the implementation of seminar/discussion on the country report, it has been very interesting and provide some exchangeable ideas, experience and technology from the participating country, as well as some possible solution of problems concluded by the discussion.
7. With regard to the implementation of seminar/panel discussuion concerning "Irrigation Application and its Prospects", it was considered to be very successful, encouraging, and concluded some suggested ideas concerning irrigation development, particularly in the ASEAN country. Besides, the seminar is also considered to be one of the important part of the training course.
8. Field trip and study tour in Yogyakarta and Bali were considered to be very interesting, encouraging, and gave some relevant topics as well as comparative ideas about the content of the course and object the participants required to observe. However, some suggestion have been proposed by the participants, namely:
   - Duration of the field trip should be extended to seven days instead of four days, currently apply.
   - The project to visit is expected to demonstrate the process of project management from the construction stage to operation and maintenance stage if possible.
   - Technical information concerning the project to visit, should be distributed to the training parvicipants several days before field trip, so they may have time to study and to prepare them-

selves to discuss the interesting part of the project. Adequate discussion about problems and practical solution of the project to visit is expected by the participants.

II. Others

1. Communication facilities are suggested by the participants to render further improvement, especially telephone facilities.
2. Recreation programs were considered to be very satisfactorily conducted by the organizing committee, they were very interesting and enjoyable.
3. Sport facilities are also good, however, the participants suggested to provide indoor sport and games, such as billiard facilities, physical excercises-set etc.
4. All resource persons should be appointed officially and provided with transportation costs as well as honorarium, due to the fact that the course location is somewhat remote.
5. During the field trip, staff from agricultural extension is suggested to explain about agricultural aspects of project to visit.
6. Some topics are requested to give more time to allow full treatment as follows :
   - Remote sensing(for land evaluation)
   - Irrigation Planning
   - Project Management
   - Construction management (Not too specific)
   - Water Management (not too specific)
   - Foundation of dam
   - Hydraulic structure (canal)

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Bekasi, March 27, 1986
Organizing Committee.

DISCUSSION NOTES

(Conducted in Bekasi on March 27 1986 between Indonesian side and Evaluation Team for TCDC Program, JICA.)

1. Mr. Husein from Setkab. explained about the historical background of the Training Course to the audience.
   Proposal : The second program for International training course in Irrigation engineering is suggested to operate under the regular TCDC Program with the support of the Government of Japan, so the course open to other countries out of APC region.

2. Explanation of chairman of the organizing committee (Please see the attached report).

3. Some topics to be discussed:

   3.1. Title of the course : "The International Training Course in Irrigation Engineering"

   3.2. Duration of the course is suggested to apply 4 weeks, including one week field trip.

   3.3. Timing : Mid November to Mid December (First Alternative)
   Mid January to Mid February (Second Alternative)

   3.4. Number of participants :
   . 10 foreign participants and 5 local participants. (Alt. I)
   . 12 foreign participants and 4 local participants. (Alt.II)

   3.5. Japanese experts:
   . Dam engineering (Including all aspects of dam engineering)
   . Land Consolidation/land reformation

   3.6. Counterpart: One counterpart will be expected to attend training of trainor in Japan prior to the second training course implementation. (Not in the administrative field).

   3.7. Curriculum/qualification of participants will be discussed later.

   3.8. Objective of the invited country will be discussed on the next meeting.

   3.9. For the next training course, no more budget for training equipment will be allocated by JICA, because such equipment has already prepared in the first training course.

4. The implementation planning and schedule of the second training course will be discussed on March 29, 1986.

SUMMARY OF DISCUSSION

SUMMARY OF DISCUSSIONS FOR THE INTERNATIONAL TRAINING COURSE IN IRRIGATION ENGINEERING

The Evaluation Team headed by Mr. Kazuo Ishii, Japan International Cooperation Agency, visited the Republic of Indonesia from March 24 to April 3, 1986 for the purpose of evaluating the International Training Course in Irrigation Engineering (hereinafter referred to as the Course) in the fiscal year 1985, and discussing the framework of the Course in the fiscal year 1986.

During its stay in the Republic of Indonesia, the Team had a series of discussions with the authorities concerned of the Government of the Republic of Indonesia with respect to the framework of the Course in the fiscal year 1986.

The document attached hereto is the summary of discussions on the tentative framework of the Course in the fiscal year 1986.

The implementation programme of the Course will be officially decided by the Government of Japan in accordance with the formal proposal of the Government of the Republic of Indonesia, which will be prepared and submitted to the Government of Japan.

April 3, 1986

Mr. Kazuo Ishii
Head of Japanese Evaluation Team, Japan International Cooperation Agency.

Ir. Soebandi Wirosoemarto
Assistant to the Minister for Irrigation Development, Ministry of Public Works.

Attached Document - I

TENTATIVE FRAMEWORK OF THE COURSE

1. Title of the Course :
   The International Training Course in Irrigation Engineering

2. Duration :
   From the middle of November to the middle of December, 1986 for a period of one (1) month

3. Number of Participants :
   The number of participants from the invited countries shall not exceed ten (10), and that from Indonesia, in principle, shall not exceed five (5)

4. Invited Countries :
   The Phillippines, Malaysia, Thailand, Burma, Bangladesh, Sri Lanka, Brunei, Pakistan, India, Nepal, Papua New Guinea, and Tanzania

5. Qualifications for Applicants :
   Participants will be selected with the same qualifications as that in the fiscal year 1985

6. Japanese Experts :
   Two (2) short-term experts will be dispatched in the appropriate period in the fields of " Dam Engineering " and " Land Consolidation / Land Reformation "

7. Counterpart Training in Japan :
   One (1) technical counterpart training in Japan is available for the technical instructor of the Course.

TENTATIVE SCHEDULE OF COURSE OPERATION

MONTH	INDONESIAN SIDE	JAPANESE SIDE
April, 1986	1. Submission of Proposal 2. Submission of Form A - 2.3	1. Decision of Implementing Programme
M a y, 1986	1. Preparation of G.I. 2. Submission of Form A-1	
J u n e , 1986	1. Distribution of G.I. & Application Form	1. Recruitment of Experts
September, 1986	1. Submission of Bill of Estimate 2. Receipt of Application Form	1. Submission of Form B-1
October, 1986	1. Notification of Selection of Participants	1. Remittance of Expenses
November, 1986	1. Implementation of Course	1. Dispatch of Experts
January, 1987	1. Submission of Statement of Expenditures 2. Submission of Course Report	

閉講式における団長スピーチ

SPEECH BY MR. K. ISHII
CHIEF OF 1ST TRAINING DIVISION, TRAINING AFFAIRS DEPARTMENT,
JICA TOKYO
ON THE OCCASION OF
THE CLOSING CEREMONY OF 1ST INTERNATIONAL TRAINING COURSE
IN IRRIGATION ENGINEERING ON MARCH 27, 1986

Ir. Y. Sudaryoko, Director General of Water Resources Development, Ministry of Public Works,

Ir. Soebandi Wirosoemarto, Assistant to the Minister for Irrigation Development,

Dr. A. Hafied A. Gany, Project Manager of Construction Guidance Service Center,

Distinguished Guests, Participants, Ladies and Gentlemen,

On behalf of Japan International Cooperation Agency, it is my great pleasure and honour to say a few words on the occasion of Closing Ceremony of the 1st International Training Course in Irrigation Engineering.

First of all, I would like to offer my hearty congratulations to all the overseas and Indonesian participants who have successfully completed the Training Course with your strenuous efforts and willingness. And I would like to express my deep appreciation to all the officials and lecturers concerned who have given their fullest cooperation during the whole period of the Training Course, without which this Training Course could not have proved to be so successful.

Dear Participants,

I believe you have obtained some up to date or advanced knowledge and technologies in Irrigation engineering through this Training Course and I sincerely hope that this Training Course would contribute to your own job so as to improve and develop agricultural infrastructure, and that the knowledge and technologies which you gained here would be extended to the persons related to irrigation works as much as possible.

As you know, however, the progress of the technologies in the field of irrigation engineering as well as those in other fields are remarkably rapid, and what you learnt through this Course is not the whole, which is necessary to deal with problems existing in your each country, but some of the aspects considered to be in much demand presently, generally and practically. In this context, I would like to wish you to make strenuous efforts in order to develop more appropriate and applicable technologies which will meet actual situation in your own place.

I found the other important meaning of this Training Course in the fact that seven overseas participants, nine Indonesian participants and lecturers from Indonesia and Japan as well as other officials concerned have stayed, learned and discussed together for as long as 32 days. The friendship which you have built up during this 32 days should be strengthened more and more by maintaining the close communication among you. I am sure that it will benefit each other very much.

Today it is the end of this Training Course, but it does not mean the end of our cooperation. JICA is ready to continue our cooperation to this Training Course next fiscal year, with improvement to some extent on the basis of the results of evaluation of the 1st Course, which was jointly conducted this morning prior to this closing ceremony between the Indonesian officials concerned and JICA's evaluation mission. As regards to the implementation programme of the 2nd Course, it is to be discussed among the persons concerned on March 29, the day after tomorrow.

Finally, I would like to take this opportunity once again to express my sincere thanks to all the lecturers and officials concerned of the Department of Public Works and Secretariat Cabinet, for their wholehearted cooperation and on behalf of my Agency, I would like to ask for the same cooperation for our activities of technical cooperation in the future.

Goodbye for now, and offering my sincerest prayers for your continuous health and prosperity and a very pleasant journey to your beloved hometowns.

Thank you very much.

Certificate 例

THE DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
MINISTRY OF PUBLIC WORKS
AND
THE JAPAN INTERNATIONAL COOPERATION AGENCY

CERTIFICATE

This is to certify that

MANAHAN TAMPUBOLON

HAS SUCCESSFULLY COMPLETED THE
INTERNATIONAL TRAINING COURSE IN IRRIGATION ENGINEERING

HELD AT THE

CONSTRUCTION GUIDANCE SERVICES CENTRE

BEKASI – WEST JAVA – INDONESIA
FEBRUARY 24 – MARCH 27, 1986

HIDEO ENDO
RESIDENT REPRESENTATIVE OF JICA

Y. SUDARYOKO
DIRECTOR GENERAL OF
WATER RESOURCES DEVELOPMENT

インドネシア灌漑排水施工技術センタープロジェクトの概要

1985. 5. 1
Construction Guidance
Service Center Project (CGSC)

プロジェクト区分	ＪＩＣＡ農業開発プロジェクト
プロジェクト名	インドネシア灌漑排水施工技術センター計画
プロジェクトの目的	インドネシア国の灌漑排水事業の施工技術力の向上を通じて事業の効率的遂行を促進し、食糧増産に寄与するため、施工技術センターを設置し、政府機関の灌漑技術者へ、施工技術の知識とその管理手法の技術移転を行う。
協力期間	無償援助：建物、主要設備の建設、総額１５億円 技術協力： E/N July 17, 1980 Construction Works Dec. 1980 - Mar. 1982. R／D、１９８１．２．１９ 協力期間：５ケ年、１９８１．４．１～１９８６．３．３１
協力相手機関	公共事業省水資源総局灌漑第一局 灌漑排水施工技術センター
協力拠点、所在地	灌漑排水施工技術センター 西部ジャワ州、ブカシ（Bekasi）市 （ジャカルタ東方３０km）

技術協力の内容

1. 活動計画

R／Dのマスタープランに次のような6項目に係るセンターの主要活動テーマが定められている。

(1) 灌漑排水事業の実施に係るオーバーオールなモニタリングシステムの開発と運用
(2) 事業実施に係る技術者への技術情報サービスシステムの開発と運用
(3) 施工の基準化
(4) 施工に係る業務の電算化
(5) 施工材料並びに施工法に係る調査、試験、水理構造物の調査、試験
(6) 施工に係る現場技術者の研修

2. 専門家派遣

長期派遣専門家6名の他、必要に応じて短期専門家が派遣されている。

長期専門家リスト

氏　名	専門分野	派　遣　期　間	国内所属機関
石坂　仁兵	総　　括	S.56.10.16～S.61.3.31	日本農業土木総合研究所
坂口　康雄	積　算　施　工	S.59.11. 1～ 61.3.31	農林水産省
溝口　昌宏	コンピューター	S.57.10. 1～ 60.9.28	農林水産省
大木　　巌	材　料　試　験	S.57. 6.27～ 61.3.31	ＪＩＣＡ
土岐　昭義	水　野　造　構	S.59.10. 1～ 61.3.31	農林水産省
大久保雅彦	業　務　調　整	S.57. 4.16～ 61.3.31	ＪＩＣＡ

短期専門家派遣実績

年度	人員	備　　考
５７	５人	施工管理、ポンプ、ゲート、機械、モニタリング、マイクロフォト
５８	７人	試験機械据付３人、モニタリング、マイクロフォト、情報システム２人
５９	９人	マイクロフォト、電気機械、コンピューター（ハードウェアー）、コンピューター（ソフト）、研修計画、情報システム、試験機器据付３人
６０	８人	（計画）研修計画、情報検索、ポンプ、コンピューター（ハード）、応用水理、施工２人、試験機器メンテナンス

3. カウンターパート受入研修実績

年度	人員
５６	３人
５７	４人
５８	４人
５９	４人
６０	６人

4. 技術協力供与機材

専門家活動に必要な機材として協力期間中総額２億５千万円が予定され、逐次実施されている。

5. 其他ローカルコスト支援事業

(1) 屋外水理実験施設の建設（５７年度モデルインフラ整備事業２千７百万円）

(2) 中堅技術者養成対策等による定期技術者研修の支援（Ｓ５７～）、施工に従事する現場担当技術者を対象に初級、上級の２コースを毎年定期的に実施している。（現在までの受講者総数333名）

(3) 建設機械施工試験トレーニングランドの整備（５９年度応急対策事業250万円）

(4) 以上の他技術普及広報費、現地語教科書作成費等の支援を行い移転技術の普及浸透を図っている。

カントリーレポート一例

TRAINING COURSE IN IRRIGATION ENGINEERING
24th FEBRUARY - 28th MARCH 1986
INDONESIA

COUNTRY REPORT
MALAYSIA

PRESENT CONDITIONS OF IRRIGATION AND PROBLEMS OF IRRIGATION DEVELOPMENT IN MALAYSIA

DRAINAGE AND IRRIGATION DEPARTMENT
MALAYSIA

I. INTRODUCTION

1.1 Irrigation in Malaysia mainly refers to flood irrigation for cultivation of rice crops. Like any other Asian countries rice is a staple food for Malaysian with average consumption of about 270 lb. (123 kg.) per person per annum. For centuries rice was grown near community settlements along trade waterways of Malaysia, but proper irrigation development only took place at the turn of this century.

1.2 During the trade depression of 1930 when prices of export crops like rubber and coconut were at very low level, the need to grow more food became evident. The Government, realising the danger of over dependence on other countries for basic food requirements initiated measures to encourage rice cultivation. The Drainage and Irrigation Department was established in 1932 to deal with land and water resources development with particular emphasis on rice production.

1.3 In 1930, rice production in Malaysia amounted to only 250,000 tons meeting about 30% of the Nation's requirement. By 1980, the annual production has increased to 1,200,000 tons reaching a level of 85 - 90% self sufficiency. The increase in rice production was brought about by the provision of irrigation facilities to former rain-fed padi areas as well as the opening up of new land for padi cultivation.

1.4 The total land area under wet padi cultivation in Malaysia is currently estimated at 1.3 million acres (526,000 ha.) out of which 787,800 acres have been provided with irrigation infrastructure comprising of 596,500 acres for double cropping while the balance are single cropped. The average yield of padi land in Malaysia is about 1 ton per acre per crop which is significantly below the average yields attained in many other Asian Countries. There is considerable scope for improvement in the yield if the farmers are properly educated in water management techniques at farm level and the proper usage of input etc.

2. Stages in Irrigation Development in Malaysia

2.1 Following the establishment of the Drainage and Irrigation Department in 1932 padi growing areas were steadily provided with irrigation facilities. Up to about 1960 the majority of the irrigation schemes were mainly designed to provide reliable irrigation water supply in order to supplement the rainfall throughout the padi growing season for single cropping. By 1960 a total of 527600 acres of padi land were provided with this type of irrigation facilities.

2.2 The next stage of irrigation development commenced in the early 1960's. This took place subsequent to the successful trials on double cropping. The thrust of the irrigation development programme was directed towards the development of water resources and provision of major engineering works for the cultivation of a second crop of padi during the drier period of the year. The major engineering components comprised of reservoirs, pumping installations, distributory and drainage systems. For areas where basic facilities were already provided for single cropping and where the water resources are adequate the existing reticulation systems were improved for double cropping. In rainfed areas, irrigation systems and structures were provided to replace rudimentary facilities constructed by farmers themselves. By 1975, all the major rice growing areas in the country were provided with the necessary irrigation facilities to enable the double cropping of padi.

2.3 The expansion of the acreage under double cropping coupled with the introduction of high yielding varieties and proper application of inputs had contributed significantly to the rapid increase in padi production in recent years. However to realise the full potential of these varieties, improvements to distribution system becomes necessary to facilitate proper water management at farm level. Recognising the need for better water management, current and future irrigation developments works in the country

will be directed towards the improvement of distribution system comprising of construction of tertiary irrigation facilities and rehabilitation/upgrading of existing irrigation infrastructures.

3. Evaluation of Performance of Some Irrigation Projects in Malaysia

3.1 The majority of farm lots in padi areas in Malaysia are very irregular in shape and size and not more than ten percent of these farm lots in existing padi lands are parcelled into regular rectangular shape. Existing irrigation and drainage facilities serve blocks of padi land ranging in sizes from 10 hectares to 50 hectares within which irrigation water flows over several lots in a row making the most of topography. The performance of these facilities have been far from satisfactory.

3.2 Evaluation on the performance of the some existing irrigation projects in this country has revealed several shortcomings, amongst them are the lack of drainage facilities and irrigation terminal facilities. In many irrigation projects, the lack of facilities for direct water supply and drainage to individual lots has brought about poor on-farm water management and this has subsequently resulted in lower crop productivity. Apart from the low canal/farm area ratio which has a direct bearing on water management, the low farm road density has to a large extent constrained the introduction of farm mechanisation and the mobility of farm machinery and thus resulting in high production cost.

3.3 In spite of shortcomings in irrigation facilities, the use of high yielding varieties and proper usage of farm inputs has accounted for the significant increase in padi production. Presently an average yield of 2½ tonnes per hectare has been achieved; however yields exceeding 3.0 tonnes per hectare are being obtained in areas equipped with better irrigation facilities.

4. Engineering Measures to Improve Performance of Irrigation Projects

4.1 Prior to the advent of double-cropping, paddy was grown during wet season and irrigation was only required to supplement rainfall so as to ensure a reliable water supply throughout the season. The irrigation system normally consists of a network of canals with distributaries spaced out at regular intervals. Field offtakes are generally unregulated and this has led to high wastages of irrigation water.

4.2 Distribution of water on the farm is left entirely to the individual farmers and in-field water level control is achieved generally by means of field bunds. This system of irrigation had worked reasonably well with one wet-season crop planted with traditionally long-term varieties and irrigation was only required to supplement rainfall.

4.3 However, with the introduction of double-cropping and the adoption of short-term high yielding varieties, coupled with the popular acceptance of mechanisation, the old supplementary type of irrigation need to be improved. A more positive system of water distribution and control in the fields becomes necessary to ensure optimum efficiency and to meet the more rigid planting schedule resulting from double cropping.

4.4 To achieve the agronomically desired level of efficiency in water distribution and control, provision of additional on-farm irrigation and drainage facilities have to be incorporated into many existing irrigation schemes. Such upgrading works include the improvement and rehabilitation of existing irrigation infrastructure to facilitate the optimum usage of the facilities to meet the requirements of modern agricultural technology. Amongst the improvements undertaken are:-

i) Upgrading of canal and distribution system with capacity designed to provide peak demand during the initial pre-saturation period;

ii) Construction of tertiary and quaternary system for irrigation and drainage complementary to the existing primary and secondary system to provide a more efficient distribution of irrigation water supply in the required time and quantity;

iii) Construction of control structures and offtakes incorporated with measuring devices to facilitate control and regulation supply to the fields according to requirement;

iv) Construction of on-farm access along tertiary canals and drainage channels, and separate farm roads which not only facilitate transport of product from farm to market and agricultural inputs and services but also provide quick access throughout irrigation areas for the field irrigation staff operating irrigation system.

4.5 A typical ongoing project on upgrading of irrigation facilities is currently being implemented in the Muda Irrigation area covering a total padi area of about 236,000 acres. Primary irrigation infrastructures comprising of storage reservoirs, conveyance canals, main and secondary canal network for the Muda area were first completed in the 1970's and the area have been successfully double-cropped since then. However, with secondary canals spaced at 1200 to 2000 m intervals, only about 10% of the

farm holdings have direct access to either a canal or a drain. This has resulted in time lag of up to 40 days in planting schedules within each block (area served by a terminal offtake) resulting in unsatisfactory water distribution, control and farm management.

Under the Muda Stage II project, tertiary and quaternary irrigation facilities will be introduced. Existing irrigation block (500 - 1000 ha) will now be divided into four to six Irrigation Service Areas, each of 100 - 200 ha. served by a tertiary canal. Each of the Irrigation Service Area is further subdivided into irrigation service units of 15 to 20 ha. which follow uniform cropping schedule. Staggering of irrigation supply between irrigation service units is proposed in order to reduce peak water demand and also to spread the demand for labour and farm machineries. With the completion of tertiary and quaternary facilities, the Muda scheme will be upgraded to a canal density of 20 m/ha and it is further estimated that about 80% of the farm lots will have direct access to tertiary/ quaternary canal, drains and farm roads while the remainder will only be separated by one lot.

4.6 Completed Irrigation works requires a planned programme of operation and maintenance in order to ensure optimum performance for crop production. This calls for a full complement of operation staff who physically operate the numerous structures as well as complementary supervisory and regulatory staff of Inspectors, overseers and technicians who provide the extension service link with paddy farmers relating to water management procedures and techniques.

4.7 To ensure performance of an irrigation system according to its design efficiency, emphasis must be given to its operation. Amongst many other controls and measures, the operator of any irrigation scheme must devote attention to:-

i) ensure strict adherence to irrigation schedule;

ii) setting all irrigation structures to maintain designed FSL (Full Supply Level) and to regulate design water supply according to water budgetting format;

iii) maintaining water levels in the drains at appropriate levels to ensure optimum system drainage efficiency;

iv) training farmers on water control and management techniques to cut down wastages of irrigation water at farm level.

4.8 For the proper operation of the irrigation system, the individual components forming the overall systems needs regular maintenance in order for it to function according to its original design. Where defective, repairs and modifications are necessary from time to time depending on the condition of the works. Such regular maintenance activities may comprise of:-

a) Periodic inspection, cleaning and topping up of earth bunds and embankments, inclusive of repairs to leaks and slips;

b) Periodic cleaning and desilting of canals and drains to ensure their hydraulic efficiency;

c) Regular inspection of structures to ensure proper functioning. Removal of debris and silt accumulated at structures;

d) Periodic Topping up and resurfacing of farm roads to maintain its all weather access function.

4.9 Provision of adequate staff and fund is essential in order to ensure sustained operation and maintenance of irrigation schemes to optimum efficiency thereby enabling optimum water management toward maximising agricultural production. Failure to carry out the necessary maintenance work will result in undesirable conditions of overgrowth and hydraulically inefficient conveyance system and mal-functions in structures all leading to speedy deterioration of the entire system resulting in high capital investment later in reconstruction works. The immediate effect is that agricultural production in these areas will be greatly impaired due to lack of irrigation water or flooding, not to mention also the host of complaints received from farmers.

5. Management and Non-Engineering Measures

5.1 The success of any agricultural development project depends not only on engineering infrastructures but also on the provision of agricultural supporting services such as extension, organisation of farmers, credit supply, input supply, processing, storage and marketing of farm produce. There are a number of different Government agencies dealing with the above services and details of their functions are given in Appendix I.

5.2 The integrated approach to agricultural development is commonly adopted in all large scale irrigation development project in this country. To coordinate the planning, implementation and evaluation of the work/services of the various agencies involved in the project, a centralised integrated organisation and management system is essential. This is provided by the establishment of a project office headed by a project coordinator or project manager whose main duty is to coordinate the inputs of the relevant agencies to ensure success of the project.

5.3 Proper field organisation of farmers into groups also contribute to optimum performance of irrigation projects. In one of the large irrigation project in this country farmers are organised into farmer groups on the basis of tertiary canals and drains to facilitate farmer group action on water distribution, maintenance and adherence to pre-determined planting schedule. Each of the farmer group consists of about 40-65 farmers operating on area of about 60 hectares and is managed by one group leader assisted by two assistant leaders and four subgroup leaders. Agricultural extension workers comprising of Agricultural Technicians, Assistants as well as operation staff of other relevant agencies will visit the farmer group on regular schedule to ensure the integrated delivery of services needed by the farmers. The above approach was well received by farmers and has contributed to the high performance of the project.

5.4 There are other measures which could contribute to improved performance of irrigation projects, of which, land consolidation and land levelling appear to have potential for further development. In Malaysia, padi farm holdings are generally small with an average of about 1.25 hectare. There are large number of small uneconomic holdings and the problem is further compounded by irregular shape and layout of farm lots which results in high cost of tertiary system development and unsatisfactory water and farm management. The apparent solution is to consolidate these uneconomical holdings into optimum size and shape to permit the economic utilisation of these land. Land consolidation programme however is difficult to implement due to individual right of land ownership and a long term solution has yet to be found. In the meantime, to demonstrate the potential benefits of improved cultural practice in irrigation project, attempts have been made through pilot projects to try out block or group cultivation by communal effort.

5.5 In some of the padi lands situated on coastal alluvial plain, the micro-topography is quite variable and there could be considerable amount of undulating terrain which hinder the smooth flow of irrigation water. This usually results in water shortage on the higher ground and ponding in the depression area, leading to wastage of irrigation water and reduced crop yield. The introduction of tertiary/quaternary irrigation system will to a large extent overcome the above problem but further improvement in irrigation efficiency can be expected through a programme of levelling the fields to a more uniform fall and grade. However, land levelling incur very high cost and suitable machineries for this type of work are not readily available.

6. Conclusion

6.1 Malaysia adopts a two pronged strategy for increasing rice production, comprising of:-

i) upgrading and improvement of irrigation facilities to achieve better yields in existing padi areas;

ii) reclamation and development of new areas with irrigation facilities for double cropping of padi.

6.2 Greater emphasis is given to the first strategy because recent experience shows that such upgrading/improvement works requires relatively modest increment in financial investment to give an attractive return in terms of additional yield. The increase in productivity also results in higher income to the farmers and hence contribute to the social-economic development of padi farmers who form the largest poverty group in this country.

6.3 The improvement of performance of irrigation projects is hence crucial to the achievement of Malaysia's target for self sufficiency in rice production. Comprehensive programmes for improvement should include engineering, managerial, agricultural, socio-economic and institutional measures. The integrated approach to project planning and implementation provide the tool to the achievement of the above national objective as well as the development of a viable and modernised agricultural sector in this country.

MAJOR GOVERNMENT AGENCIES INVOLVED IN MANAGEMENT OF INTEGRATED IRRIGATION DEVELOPMENT PROJECTS

Name of Agency	Functions
Project Manager Office	To coordinate the functions of the various line agencies involved in the construction and operation of the project.
Drainage and Irrigation Department (DID)	i) Design, construction of all engineering and civil works. ii) Operation and maintenance of completed works. iii) Training of farmers in operation and use of irrigation system and good water management technique.
Department of Agriculture - DOA	i) Training of farmers on improved agronomic practices. ii) Post surveillance and crop protection services. iii) Soil analytical services. iv) Supply of improved seeds and planting materials.
Farmer Organisation Authority (FOA)	i) Responsible for supply of inputs tractor service, local marketing and agribusiness activities. ii) Organisation of farmer to undertake agricultural activity.
Bank Pertanian Malaysia (BPM)	i) Responsible for providing credit facilities. ii) Train and supervise the farmers in the proper utilisation of credit facilities.

Name of Agency	Functions
Malaysian Agricultural Research and Development Institute (MARDI)	i) responsible for research programme to develop appropriate improved technology for agriculture.
Federal Agricultural Marketing Authority (FAMA)	i) Marketing of agricultural produce.
Fisheries Department	i) Providing subsidy, infrastructures and training and extension services to fish farmers.
Veterinary Department	i) Providing subsidy, infrastructures training and extension services to livestock smallholders.

パネルディスカッション用資料一例

IRRIGATION APPLICATION AND ITS PROSPECTS

By

Bagus Triyono	Indonesia
Bambang Hargono	Indonesia
Frans Selawinata	Indonesia
Josephus C. Tarranza	Philippines
Julian V. Soriano	Philippines
Moh. Yazid bin Abdullah	Malaysia
Preecha Paijitrasukon	Thailand
Yusuf S.A.	Indonesia

IRRIGATION APPLICATION AND ITS PROSPECTS [1)]

1. GENERAL

Irrigation which is defined as an artificial way to supply water to be used for agricultural purposes has been applied since our ancestor time.

The development of technology has brought about modern era for irrigation. The main purpose of development of irrigation is to increase food production, since it is the primary need of human being.

High growth rate in some countries in the world, especially in South East Asia, requires application of high technology to fulfill higher demand of food. Rehabilitation of irrigation system, application of new techniques education program for farmers and beneficiaries, also intensification of water user organization are introduced.

Extension of productive land is required. Development of drainage system is intensified, also other efforts such as reclamation and resettlement. Campaign for transmigration is followed by development of new areas to attract people in the resettlement program.

Environment policy is established to prevent the degradation of watershed. Land conservation becomes very urgent when people extend their land and manage them in such a way resulting in high degree of erosion and flood.

The use of water becomes broader and broader. Incorporation of electric power generator becomes common phenomenon in irrigation system. Even in navigation, people need regulation of provision of water supply to meet dept requirement of the canals.

All those mentioned above are presented in this paper as descriptions of current practice of irrigation technology and its prospects in the future. Some problems appear and described in the last part of this paper.

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1) Paper presented during International Training Course in Irrigation Engineering, CGSC, Bekasi, Indonesia
February 24 - March 27, 1986

2. IRRIGATION APPLICATION

2.1. Increase Food Production

Irrigation is the "life blood of agriculture"to maximize food-production. No matter how much other farm inputs be applied to plants if water requirements is not supplied, production yield will diminish. Therefore, the intensification of irrigation development program is a milestone success to overcome the food demand against the population explosion of the country/world. The ASEAN countries like Indonesia, Philippines, Malaysia, Thailand and others have of least population growth of 2,3 % per year with rice consumption of 140 kgs per capita per year.

At present, Indonesia has a population of 160,000,000 more or less with total rice consumption of 22.400 million kgs. Philippines also has 54,000,000 population with rice consumption of 7.56 million kgs more or less. Meanwhile, the present rice production is 24 million ton and 9,6 million ton per year, for Indonesia and Philippines respectively, hence both countries have a little surplus of rice production.

Malaysia has attained only 60 % rice sufficiency. Thailand is the only rice exporting country among the group.

Furthermore, paddy areas are very limited. Also the fertility of the soil and production yield decreases with the age of the area, unless land consolidation will be implemented through scientific agriculture and proper irrigation application.

Today, the irrigation development program have generated/irrigated million of hectares within the above mentioned ASEAN countries with at least two to three croping of rice per year, with an assured production yield of 9000 to 12000 kgs per hectare. Moreover, many countries are now irrigating other crops than rice, e.g. banana, orchards, sugar cane vegetables and others. Furthermore, some countries have already introduced combined paddy- fish culture in the irrigated areas.

Also the constructed reservoirs are being used for fishery.

This diversified farming solved famine and malnutrition of the people.

At present, irrigation development program is vision to maximize the utilization of water thru integrated development scheme with hydro-electric power plant, flood control, domestic water supply, farm to market roads, drainage system and others.

2.2. - Hydro - Electric Power Plants :

Generally, the present development of irrigation project is the construction of high dam/reservoirs, in order to store

the rainfall during rainy season and release gradually through out the year.

To maximize the use of water, hydro-electric power plant are integrated in the design of the reservoirs. This provides electricity for household, industries, for electric motor train and others.

2.3. Flood Control :

The storage of the rain water during rainy season with the construction of high dams/reservoirs prevent flash floods in the low level areas.

Also internal drainage system within the irrigation system up-to the outlet channels are being constructed or rehabilitated. This constructed drainage system absorbed the run - off water and excess water within service area of the system. Thus, prevent the over flooding and damages to the crops, fishpounds and other properties. Also waterlogged area are reclaimed and become additional new areas for production.

The construction of good drainage system will also minimize deseases which usually appear after flood time, hence it improves health condition of the people.

2.4. Domestic Water Supply :

With the urban development program in every country, population increse rapidly in this areas. It also follows that big volume of water is needed for domestic use, fire fighting and other purposes.

Therefore, domestic water supply is also integrated with the irrition project wich are found effective, efficient and economical.

2.5. Promotion of inland transportation and navigation.

In some cases constructed drainage are used as a navigable transport ways of ordinary and motorized bancas . But at some place along the canals they are obstructed by existing canal structures as per design requirements.

Nevertheless, access and service roads along the irrigation canals are being constructed for inspection and farm to market road.

With the above mentioned development scheme, eventually transportation and communication system improved simultaneously.

2.6. Trasmigration Programme.

The construction of irrigation system in a locality give an assurance to the development of agriculture, domestic water supply, electric power and other facilities which are the basic needs of

human life. Therefore, the people who are hard up in the congested thickly populated areas will be convinced to resettle in this new areas.

However, resettlement will be accelerated more if the following additional motivating factors will be provided by the government.

1. Good land reform program and implementation.
2. Construction of good resettlement facilities e.q. houses, schools, medical buldings and services;
3. Good security and police powers.
4. Probationary food supply for at least one to two years be given to the settlers.
5. Good trasportation and communication systems.
6. Intensive institutional programs, organization of farmers association and training programs.

2.6. Forest Conservation :

Construction of an irrigation system demand good forest conservation in order to avoid heavy sedimentation in the reservoir, canals and even in the irrigated areas Also to conserve water for continuous supply. In this regard, the government authorities and also the farmer beneficiaries of the irrigation system become concious with the value of water and forest, hence help implement forest conservation in the watershed areas.

2.7. Irrigation Promote Social Reforms :

Construction of irrigation projects/system improves land consolidation and crop production. Thus the small farmers are given a chance to have self employment with increased per capita income. It also follows that their living standard also improve. They become self reliance and even be able to educate their children. It also improves trades, and commerce, and peace and order condition that means "Hungry People are Angry People" or "Satisfied People are Peace Loving People".

2.8. Land Consolidation :

Land consolidation or on-farm development, is an essential follow-up to the major irrigation and drainage works that have been constructed or are under construction.

Its objective is to improve the physical production conditions, with emphasis on water control, in order to reach the agricultural development objectives of increasing the wet season rice production, initiating or expanding dry season cultivation and creating additional rural employment opportunities.

Land consolidation can be defined as an integrated, technical method of land development at farm and inter farm level, with the emphasis on water control. It comprises the construction of a minor irrigation and drainage system and of a network of farm roads, a certain amount of land levelling and also a limited amount of reparcelling to reduce fragmentation caused by the system of water courses and farm roads.

3. FUTURE PROGRAMS / PROSPECTS

If the current conditions of implementing irrigation system do not improve, it is possible that some of the irrigation project/programs will fail in the future. Also it is certain that more losses will be incurred if participation of beneficiaries /clientele is not shared. But there are also chances of saving it from finally lossing.

3.1. MAXIMUM WATER UTILIZATION

This constitutes the following considerations :

3.1.1. Increase Food Production and income of farmers

A traditional rice-rice cultivation pattern combined with low water utilization efficiency (WUE) will not generate sufficient income among farmers. Alternative cropping pattern (rice-legume-rice, rice-vegetable-rice, rice-root crops-rice, etc.) and water management will assist in making irrigation system economically variable. Rice based cropping system is very much reasonable to increase production and income.

Also, abundance of water supply does not mean that irrigating land for crop production is the terminal point. The optimum utilization of water requires attention in the sense that other commodity/ies in the service and watershed areas can be raised.

In the case of watershed area, fruit trees and other perennial crops can be planted and fish can be raised in the water impounding area. Similarly, service area can incorporate rice with fish production by constructing small ponds in the rice field and rear the house. Therefore, farmers will no longer buy fish thereby reducing their expense and gain sufficiency in food.

3.1.2. Increase Area for Cultivation.

For excess water to be utilized, consideration of upland areas to be served during short term irrigation is beneficial. Shifting to upland cultivation in dry season will encourage farmers to utilize water efficiently. The water requirement for upland crops

can be supplied by few irrigation at longer intervals, and it is clearly possible to increase the area cropped by planting upland crops.

3.2. IMPROVEMENT OF IRRIGATION SYSTEMS

This item considers the following :

3.2.1. Participation of Beneficiaries

Before the implementation of irrigation system, a thorough knowledge about this, should be brought to be beneficiaries. Educational programs which include technology dissemination/transfer should be tought to farmers who are water users. Policies in running the operation and maintenance of the system should be considered. These can only be attained if there is intensification of water users organization(WUO) by taking their commitment in supporting the system.

3.2.2. Construction of Tertiary and Quarternary Canals.

The need to construct canals (tertiary and quarternary) will lead to clustering of areas for effective water distribution. Big service areas showed some difficulty in distributing water where in some of the farmers can not receive the service. Subdivision of areas into small service units is guaranted to reduce peak-water demand. With this, the system will have a smooth operation by considering it in design stage.

3.3. RECLAMATION AND DEVELOPMENT OF NEW AREAS

In A S E A N countries Indonesia, Malaysia, Philippines and Thailand there are still considerably large area of arable land that have not been developed. Some of these area are very potential but lack of drainage and irrigation facilities. For example in Indonesia there are 16,8 million hectares alluvial soil (4%) land and 38 million hectares swampy soil (9%). These two types of soil are very important and potential to be developed by providing drainage and irrigation facilities. Without the irrigation and supported by drainage program, these land will give small benefit to the country. There are pressing need of the development of new land now and in the future due to various reasons:

a. Produce sufficient food to catur the need of the country. The food including rice as main staple food, soybeans, maize, wheat, livstocks, fish, sugar, ground and barley, peas, potatoes, vegetables, tobacco etc.

b. Produce required raw materials such as rubber, cooking oil (from oil palm and coconut), coconut, cocoa, coffee, groundnut, cotton, sesame, san-hemp for various industry in the country and the surplus can be exported to increase the wealth of the country.

c. To support transmigration programme. As we know in Indonesia the population density of the various island are not in balance. Java and Bali are dense populated islands. More than 60 % of the Indonesian population live in Java and Bali which are only about 7 % of the total area of Indonesia. Therefore the transmigration program is considered very important to reduce unemployment, increse the people income and to reduce / or at least to maintain the population of Java and Bali.

Sometimes population stay at the unsafe areas such as flood prone area, volcano area or dam impounding area need to be resettled to other safer areas.

Then the need of new lands for settlement are undeviable fact.

The development of new areas will normally follow by the development of watershed area especially when a dam is constructed. the watershed and pounding areas can be managed for the combination of goods and services, timber, agriculture, livestock, fisheries, recreations and others. The construction of dam also provided access road to the remote area which will encourage the development of the area.

To select sufficient areas of agriculturally suitable lands from the vast land in the new areas, an integrated system consisting of remote sensing techniques (as tool for data and information collection); and computer system (as a tool for data and information processing) will be very useful to be planned and developed.

This system can be used in practice to select agriculturally suitable areas at pre-master planning level.

3.4. INDUSTRIAL PROGRAMME

The development of irrigation should be combined with the generation of hydroelectrical power and, water supply for domestic and industry and flood control. With these basic industrial requirements, together with the availability of raw materials and labours (eg. seasonal unemployed paddy farmers) will help the growing new industries in the surrounding areas.

3.5. OTHER AGRICULTURAL RELATED PROGRAMME

As we know the success of an irrigation development project depends not only on engineering infrastructure, but also on the provision of agricultural supporting services such as extension, organization of farmers, farm machineries, crediet and subsidy supplies, processing, storage, transportation and marketing of farm product. So, the development of irrigation will aumatically stimulate the development of those related services and will open new dimension to the people.

4. PROBLEMS AND RECOMMENDATION

4.1. Food Production / Agricultural Aspects

In applying modern technology of irrigation there are some criteria to be followed, for example , within one irrigation scheme using rotation system, a certain variety of rice adopted. However, people find that traditional rice variety is more valuable in the market. They need more water but due to the system, the supply is not enough. The result is, that illegal diversion is made by farmer which is entailed in a condition of inefficient water utilization.

It is clearly understood that implementation of new technology is to be carried out simultaneously with establishment of water user organization. Training campaign, education, socialization program should be carried out to meet the criteria required by the new system.

4.2. Engineering Aspects.

In principal, there should be no difficulty in implementing new technology. Human aspects, in most cases are decisive. Management of a system, such as proper distribution of water, waste disposal regulation, proper management of watershed and others, will help avoid failure of the system.

In many cases, very advanced technology can not be applied, due to budget availability, level of education of the people/beneficiaries, and others. To guarrantee that a system is succesful, an appropriate technology should be applied. This will also overcome unemployment problems, utilization of local product, and budget problems.

Other problem regarding the engineering aspects is operation and maintenance. Operation and maintenance of irrigation system is not merely in the canal.

Siltation, erosion and other phenomena which influence discharge capacity of the canal mainly are caused by mismanagement of watershed.

Proper watershed management will be of much help to the system. Application of high technology such as design of stable channel, sediment trap, hydraulic model- test etc, will also reduce the maintenance cost.

Regarding the small irrigation system, there is still a dilemma in determining the one responsible for the operation and maintenance.

In principle, Indonesian farmers or water user are responsible the construction, operation and maintenance of tertiary system. The system which was usually built by the farmer did not meet the design criteria. When finally the government constructed the system they also were not ready for the proper operation and maintenance. Even they lean on the government for they though that all the system is government responsibility.

Eventually government decided to carry out the construction of tertiary system providing that water user organization who is responsible for the operation and maintenance of the system is founded.

Application of such system is not simple in other countries such as Malaysia and Philippine, since they take irrigation fee from the water user for the revenue. If the capacity of the system is decreasing due to deterioration,

Poor collection of the recovery cost will influence the capacity of maintenance activity.

4.3. SOCIO - ECONOMIC ASPECT

Regarding the financial aspects of the program, in the most cases existing funds is decisive.

Financial policy such as credit supply, cooperation with other country, banking system etc, should be well established.

The success of any agricultural development project depends not only on engineering infrastructures but also on the provision of agricultural supporting service such as extension, organization of farmers, credit supply, input supply, processing, storage and marketing of farm product.

Among the ASEAN countries, only Malaysia having a policy of 60 % self sufficiency of rice production. Other ASEAN countries have achieved their self sufficiency of rice. Even Thailand is a rice exporting country. Due to storage problems, Indonesia plans to increase its rice production only 1,4 % for next budget year (1986/1987)[1]. It appears that exporting policy for rice

1). Harian Umum A.B., 20 March 1986, Produksi beras dikendalikan agar tidak terjadi surplus berlebihan, Jakarta, Indonesia.

has yet been established, after the achievement of self sufficiency of the production. There is still problem regarding the low income of farmer.

The low income among others due to the following :

- High growth rate
- High production cost due to expensive fertilizer, high labour cost etc.
- Government policy which keeps rice price in a stable (low) condition.
- Small land ownership.

In some countries this situation results in high rate of urbanization.

To overcome the problem, Malaysia has decided that they only fulfil 60 % self sufficiency of rice. They consider that importing rice is cheaper than their production cost.

Indonesia has their transmigration program to enlarge the land ownership.

However, since rice is main staple food in South East Asia and other countries as well, encouragement of adapting new-technology in rice production is required.

4.4. Political or Administrative Aspects.

"Hungry people is Angry People". Although sometimes it is not economically feasible, irrigation program must go on. Pumping system, which is high cost investment, sometimes should be implemented in a relative small irrigation area. In this case, municipal water such as drinking water supply, flushing facilities wich regard to the health of the people is more decisive.