(4) IEE for the alternative route and JICA proposed route

Alternative A is the most suitable due to the lowest numbers of Wat and archaeological site within its vicinity from Kok to Ing for the diversion from Kok to Ing.

For the diversion alternative of Ing-Nan section, the Alternative C is the most suitable due to the lowest numbers of Wat and archaeological site within its vicinity.

Generally speaking, it can be concluded that the most suitable diversion alternative from Kok to Ing and Nan is alternative C with only little difference in degree of suitability from Alternative A, B and JICA proposed route.

The project construction activities might cause some adverse impacts on the structure of Wats or archaeological sites in the project vicinity and on religious activities. The impacts expected from the project development comprises mostly noise and vibration etc., impacts from the construction activities. If Wat and archaeological sites which are nearer to the project site, it would be more affected than those located far away.

According to the preliminary study, we could conclude that there is not serious adverse impact for archaeological property. However, it can be concluded that the construction activities of the project would cause rather minimal impact to the archaeological sites except for the diversion canals and culverts which there are a lot of Wat/archaeological sites in this vicinity, especially for diversion canal and culvert of Kok-Ing section.

3.2.4.6 Public Health and Nutrition

(1) Present Health Condition in the study area

a) Introduction

The provision of adequate water supplies and excreta disposal has been acknowledged as an essential public health measure with significant public health benefit. Of the diseases that better water supplies may help to control, the feco-oral infections are greatest worldwide public health importance. The infections include not only cholera and typhoid, but also diarrheal diseases. It is estimated that each year these diseases cause more than 5 million deaths among children in developing countries. Also, diarrheal diseases can remain an important cause of death well into adult life.

In Thailand, diarrhea is by far the highest cause of morbidity. Diarrhea and food poisoning have not been reduced due to lack of water supply, hygienic latrine and food sanitation.

Therefore, the operation of water resources development project could cause either positive or negative health impact. It is necessary to study the existing public health condition before project operation so that careful analysis of causes and problems could be done.

b) Method and Scope of Study

In order to analyse the existing health situation and to recommend mitigation measures, the study has been made. The study includes 1)collection of health data, 2)community health survey including physical examination, clinical nutritional assessment and stool examination, 3) snail, mosquito and fish surveys in the study area. The places survey conducted are as follows:

1) Community health data: Tambon Yod and Tambon Chondan Song Kwae Subdistrict

(King Amphoe), Nan Province

 Physical examination: Ban Yod Tambon and Ban Pang Kom, Tambon Chondan, Song Kwae subdistrict, Nan Province

3) Snail survey:

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- Ban Pang Kom from Kom river, pond and rice field

- Yod river and Yao river (Ban Yod, Tambon Yod)

- Nam Tom stream (Tambon Pha Changnoi, Pong District, Payao Province)
- Yao river at Ban Hae, Tambon Mae Lao, Chiang Kham District
- Lao river at Ban Pee, Tambon Ngao, Thoeng District, Chiang Rai Province
- Ing river at Ban Tung Khao, Theoeng District
- Kok river at Ban Payangmon, Tambon Rob Vieng, Muang District, Chiang Rai Province.

c) Results of the study

Areas selected for study are not far from local health centers which were adequately staffed. Villagers received sufficient health services provided by health centers and a community hospital. Important water-related disease found in the study was malaria whereas encephalitis and hemorrhagic fever were not present in the record. Common malnutrition problems were goitre and anemia.

Stool examination of 172 villagers revealed 53 were positive, 12 opisthorchiasis, 21 strongyloidiasis, 6 hook worms infection, 6 Giadiasis and 3 Entamoeba hystolutica infection. There were 15 snail species collected. *Bithynia (Dignoniostoma) siamensis siamensis* was found at Ban Pong Kom, Ban Muang, and Ban Pee. *Lymnaea (Radix) auricularia rubiginosa* and *Filopaludina (Siamopaludina) martensi martensi* were found almost everywhere, *Pila* spp and *Pomacea* were also collected. No *Neotricula aperta* was found.

d) Assessment

(1) Construction Phase

The main problem is the outbreak of malaria among labors and communities in areas around the tunnel outlet and shaft construction sites. Besides, the spread of AIDS and diarrhea could also be found among sorkers.

(2) Operation Phase

- Snail-born disease: the possibility of wider spread of opisthrochiasis is high due to wide distribution of *Bithynia* spp.
- Mosquito-bom diseases: None or slight changes of problem magnitude of malaria and hemorrhagic fever is expected whereas encephalitis may be increased due to more irrigated areas.

- Schistosomiasis: Though *Neotricula aperta* was not collected in this survey but it was collected at Khong-Ing confluence in Chiang Khong district, Chiang Rai province in the past survey. It is expected that the operation of this project will not affect the occurrence and distribution of this snail since its habit is confined to Khong river.

(2) Recommendation for Further Study

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Findings based on this study was very limited due to time constraint. More comprehensive public health survey is desirable to understand existing problems and to foresee health impact which will be brought by the water resources development project.

(1) First of all, health information relating water-related diseases should be collected from all three Provincial Health Offices. Hopefully, morbidity of these diseases should be analyzed by district or tambon along three rivers. Annual Epidemiological Report (Division of Epidemiology, Ministry of Public Health) indicates that Phayao and Nan rank as provinces with the third and forth highest prevalence of acute diarrhea in the whole Kingdom. As for prevalence of encephalitis, Nan is the top province in 1993.

In addition, study on present situation of sanitation and hygiene such as types of drinking water and latrine is necessary. Most of the health impact studies show that improved access to water in quantity, not quality, brought a significant reduction in diarrheal disease.

(2) In-depth physical examination and interview survey in all three provinces should be made. Interview survey to health staff (both provincial medical officer and staff in health centers) in areas which have high prevalence of water-related diseases at present helps in understanding present problems.

(3) Health education for people in communities is useful to change inadequate health behavior. Select areas which will be most affected by this water resource development project in terms of water supply and sanitation, and then implement health education program in these areas to ensure that the available water is fully used for hygienic purposes, and to minimize fecal contamination of the environment.

Table 3.2.4.1 SUMMARY OF INITIAL ENVIRONMENT OF KOK - ING DIVERSION CANAL

				Magnitude of Impacts	pacts	
Environmental Aspects	JICA's Proposed Route	Recommended	Q	Significant Effect	Effect	ş
		Mitigation Plan	Significant	Significant Small Moderate Major	te Major	Clear
Socio-Economic Impacts Air pollution	Nuisances and health hazards to neighbors, travelers and wildlife	Sprinkling water during construction period		×		
2 Noise and Vibration	Nuisances to neighbors, tarvelers and wildlife	Usage of low noise vibration construction equipment, such as vibro hammer: selection of proper times for construction		×		
3 Archaeological and Historical properties	Loss of cultural properties and increased possibility of these properties being stolen	Rerouting; relocation of properties, if applicable		×		
4 Aesthetic and Tourism	Loss of scenic value	Careful planning to minimize and offset losses	×			
5 Transportation	Adverse impact on the structure of existing road. Disturbance to the nearly community and transportation	Careful planning and scheduling of transportaion of construction material based on the traffic data	· .	×		
Sanitary	Insect Born Disease (Encephalitis, Malana, etc)	Careful planning and managing of construction and operation				×
Drainage	impact on natural water courses or drainage ways	Temporary accomodation of storm water will minimize any problems with regard to drainage		×		
Hazard	Hazard of construction site for local people during construction period, such as unstabilized	Managing and a program of patrolling, fencing and warning will mitigate the Hazard			×	

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			a the set of the Ma	Magnitude of Impacts	acts	
Environmental Aspects	JICA's Proposed Route		No	Significant Effect	fect	Not .
			Effect		Najor	
	earthwork around construction					Γ
	stes					
9 Wäste	Construction waste, surplus soils sludge, and domestic waste wit occur during construction period	Considered deliberately waste place will mitigate the problem		¥-€-₽0-19¥,00-00000×A	×	
10 Resettlement	Relocation of project sites residents	Rerouting; adequate compensation for affected resident	×			
11 Compensation	Acquisition of land	Adequate compensation for affected resident based on proper procedure and their opinion			×	
		-				6.9 4

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Table 3.2.4.2 SUMMARY OF INITIAL ENVIRONMENT EXAMINATION OF KOK DIVERSION DAM

	ICA's Bronsend Brits	Personalist		magnitude	Magnitude of Impacts		
		Mitigation Plan	Significant	Small M	Small Moderate Major		Clear
Socio-Economic Impacts 1 Air pollution	Nuisances and health hazards to neighbors, travelers and wildlife	Sprinkling water during construction period		×			
2 Noise and Vibration	Nuisances to neighbors, tarvelers and wildlife	Usage of low noise vibration construction equipment, such as vibro hammer: selection of proper times for construction		×			
3 Archaeological and Historical properties	Loss of cultural properties and increased possibility of these properties being stolen	Rerouting: relocation of properties, if applicable	×	<u></u>			
4 Aesthetic and Tourism	Loss of scenic value	Careful planning to minimize and offset losses	×				
5 Transportation	Adverse impact on the structure of existing road. Disturbance to the nearly community and transportation	Careful planning and scheduling of transportaion of construction material based on the traffic data			×		-
6 Sanitary	insect Born Disease (Encephalitis, Malana, etc)	Careful planning and managing of construction and operation					×
7 Drainage	Impact on natural water courses or drainage ways	Temporary accomodation of storm water will minimize any problems with regard to drainage		×			
8 Hazard	Hazard of construction site for local people during construction period, such as unstabilized	Managing and a program of patrolling. fencing and warning will mitigate the Hazard		×		-	

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Environmental Aspects	JICA's Proposed Route	Recommended Mitigation Plan	No Significant Effect	Sigr Small A	No Significant Effect Not Significant Small Moderate Major Clear	ajor C
	earthwork around construction sites		-			******
9 Waste	Construction waste, surplus soils sludge, and domestic waste will occur during construction period	Considered deliberately waste place will mitigate the problem		×		
10 Resettlement	Relocation of project sites residents	Rerouting; adequate compensation for affected resident	×			
11 Compensation	Acquisition of land	Adequate compensation for affected resident based on proper procedure and their opinion			×	

(Cont'd)

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Table 3.2.4.3 SUMMARY OF INITIAL ENVIRONMENT EXAMINATION OF ING DIVERSION DAM

				Magnitude of Impacts	acts	
- S. 1. C.	JICA's Proposed Route		1 %	Significant Effect		Not
3421321		Mitigation Plan	Ignificant Effect	Significant Small Moderate Major Effect		Clear
2 01	Nuisances and health hazards to neighbors, travelers and wildlife	Sprinkling water during construction period		×		
22 TB	Nuisances to neighbors, tarvelers and wildlife	Usage of low noise vibration construction equipment, such as vibro hammer: selection of proper times for construction		×		
នទីថ្	Loss of cuttural properties and increased possibility of these properties being stolen	Rerouting: relocation of properties, if applicable		×		
12	Loss of scenic value	Careful planning to minimize and offset losses	×			
r ne Nsp	Adverse impact on the structure of existing road. Disturbance to the nearly community and transportation	Careful planning and scheduling of transportaion of construction material based on the traffic data		×		
ty b	Insect Born Disease (Encephalitis, Malaria, etc)	Careful planning and managing of construction and operation				×
draj draj	Impact on natural water courses or drainage ways	Temporary accomodation of storm water will minimize any problems with regard to drainage		×		
N n Q	Hazard of construction site for local people during construction period, such as unstabilized	Managing and a program of patrolling, fencing and warning will mitigate the Hazard		×		

	(cont d)		And Magnit	Magnitude of Impacts	
Environmental Aspects	JICA's Proposed Route	Recommended Mitigation Plan	No Significant Effect Significant Smail Moderate Major Effect	Significant Effect all Moderate Major	Not Clear
	earthwork around construction sites				
9 Waste	Construction waste, surplus soils isludge, and domestic waste will occur during construction period	Considered deliberately waste place will mitigate the problem	×		
10 Resettiement	Relocation of project sites residents	Rerouting; adequate compensation for affected resident	×		
11 Compensation	Acquisition of land	Adequate compensation for affected resident based on proper procedure and their opinion		×	
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Table 3.2.4.4 SUMMARY OF INITIAL ENVIRONMENT EXAMINATION OF ING DIVERSION CANAL TO ING - YOT TUNNEL

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Magnitude of Impacts Significant Effect	Moderat				·	×		×	
Magnit	Strail	×	×	• ×		****			×
8	Significant Small Moderate Major				×				The second s
Recommended	Nitigation Plan	Sprinkling water during construction period	Usage of low noise vibration construction equipment, such as vibro hammer: selection of proper times for construction	Rerouting: relocation of properties, if applicable	Careful planning to minimize and offset losses	Careful planning and scheduling of transportaion of construction material based on the traffic data Sufficient PR activity will be needed before implementing the project	Careful planning and managing of construction and operation	Temporary accomodation of storm water will minimize any problems with regard to drainage	Managing and a program of patrolling, fencing and warming will mitigate the Hazard
JICA's Proposed Route		Nuisances and health hazards to neighbors, travelers and wildlife	Nuisances to neighbors, tarvelers and wildlife	Loss of cultural properties and increased possibility of these properties being stolen	Loss of scenic value	Adverse impact on the structure of existing road. Disturbance to the nearly community(hilitribe) and transportation	insect Born Disease (Encephalitis, Malaria, etc)	Impact on natural water courses or drainage ways	Hazard of construction site for local people during construction
Environmental Aspects		Socio-Economic Impacts Air pollution	2 Noise and Vibration	3 Archaeological and Historical properties	4 Aesthetic and Tourism	5 Transportation	6 Sanitary	Drainage	8 Hazard

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		Not Clear				н 1. н						
		No Significant Effect Not Significant Small Moderate Major Clear				an a	1					
	Magnitude of Impacts	Significant Effect all Moderate Maj	2	<u></u>				••				
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				gate	be -	· • -						
				Considered deliberately waste place will mitigate the problem	Rerouting; adequate compensation for affected resident	Adequate compensation for affected resident based on proper procedure and their opinion						. •
		ded Plan			ttion fo	ected r I their						
		Recommended Mitigation Plan		waste	pensa	for aff		:				
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				delibe	aupabe	ompen oper p		·		•		
(Cont'd)				Considered the problem	uting; a	uate cr d on pr						
õ				Cons the p	Reroutin resident	Adeq based						
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		atto	tion	is soils ie Mil period	.:					·		
		Sed R	construction	surplu ic wast	t sites	n D				·		
ž		Propo	ð pun	waste, lomest constr	project	land						
		JICA's Proposed Route	ork aro	uction and d furing	tion of tts	ttion of		·				
:			earthwork around sites	Construction waste, surplus soils studge, and domestic waste will occur during construction period	Relocation of project sites residents	Acquisition of land						
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		menta						·				
		Environmental Aspects							. F			:
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. 1				9 Waste	10 Resettlement	11 Compensation	18. ^{11.1} 2.4 2.4	. •				· · ·
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Clear ğ × Significant Small Moderate Major Significant Effect Magnitude of Impacts × × × × × × Effect ŝ × Careful planning and scheduling of transportation of construction material based on the traffic data equipment, such as vibro hammer. selection of Rerouting; relocation of properties, if applicable Careful planning and managing of construction Careful planning to minimize and offset losses minimize any problems with regard to drainage Managing and a program of patrolling, fencing Temporary accomodation of storm water will Sprinkling water during construction period Usage of low noise vibration construction and warning will mitigate the Hazard Mittigation Plan Recommended proper times for construction and operation Nuisances to neighbors, tarvelers Nuisances and health hazards to Adverse impact on the structure of existing road. Disturbance to impact on natural water courses JICA's Proposed Route neighbors, travelers and wildlife local people during construction Loss of cultural properties and Hazard of construction site for increased possibility of these period, such as unstabilized the nearty community and (Encephalitis, Malaria, etc) properties being stolen oss of scenic value Insect Born Disease or drainage ways transportation and widlife 3 Archaeological and Historical properties Environmental Aspects Socio-Economic Impacts 4 Aesthetic and Tounism 2 Noise and Vibration 5 Transportation Air pollution 7 Drainage Sanitary 8 Hazard ဖ

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Table 3.2.4.5 SUMMARY OF INITIAL ENVIRONMENT EXAMINATION OF ING RIVER TRAINING

				Magnitude of Impacts	
Environmental Aspects	JICA's Proposed Route	Recommended Mitigation Plan	No Significant Effect	No Significant Effect Significant Small Moderate Major Effect	Not Jor Clear
	earthwork around construction sites				
9 Waste	Construction waste, surplus soils sludge, and correstic waste will occur during construction period	aste pl	- armontai 10-10-10-10-10-	×	
10 Resettlement	Relocation of project sites	Rerouting; adequate compensation for affected resident	×		<u>,,,</u>
11 Compensation	Acquisition of land	Adequate compensation for affected resident based on proper procedure and their opinion		×	
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Table 3.2.4.6 SUMMARY OF INITIAL ENVIRONMENT EXAMINATION OF ING - YOT TUNNEL

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Mitigation Plan, Significant Small Moderate Major Nuisances and health hazards to heighbors, travelers and wildlife Sprinkling water during construction period X Nuisances and health hazards to heighbors, travelers and wildlife Sprinkling water during construction X Nuisances to neighbors, tarvelers and wildlife Usage of low noise whation construction X Nuisances to neighbors, tarvelers and wildlife Usage of low noise whation construction X Loss of cutural properties and increased possibility of these properties being stolen Rerouting; relocation of properties, if applicable X Loss of scenic value Careful planning to minimize and offset losses X X Adverse impact on the structure to reasting road. Distrutance to the evaluation of construction material based on the traffic data and transportation X X Insect Born Disease Careful planning and scheduling of construction X X Impact on matural water courses Temporany accommodation of storm water will of drainage ways X X Impact on matural water courses Temporany accommodation of storm water will of drainage X X Impact on matural water courses Temporany acconnection X X	Environmental Aspects	JICA's Proposed Route	Recommended	Ŷ	SIG	nificant Effe	a t 10	Not
Nuisances and health hazards to pregibors, travelers and widdle Sprinkling water during construction period X Nuisances to neighbors, tarvelers and widdle Usage of low noise vibration construction and widdle Usage of low noise vibration construction and widdle X Nuisances to neighbors, tarvelers and widdle Usage of low noise vibration construction and widdle X X Loss of cultural properties and increased persublity of these properties being stolen Rerouting: relocation of properties, if applicable X Loss of scenic value Careful planning and scheduling of transportation of existing and. Disturbance to the easity community (Nitribe) and transportation Careful planning and scheduling of transportation of construction X Insect Born Disease Careful planning and managing of construction and operation X X Insect Born Disease Temporary accommodation of storm water will or drainage ways. X X Insect Born Disease Temporary accommodation of storm water will or drainage ways. Y X			Mitigation Plan	Significant	Small	Moderate		Clear
Nutsances to neighbors, tarvelers and wildlife Usage of low noise vitration construction equipment, such as vibro hammer, selection of proper times for construction Vibro hammer, selection of proper times for construction X Loss of cultural properties and increased possibility of these properties being staten Rerouting; relocation of properties, if applicable X Loss of scenic value Careful planning to minimize and offset losses X Adverse impact on the structure of existing road. Disturbance to and transportation Careful planning and scheduling of transportation of construction material based on the traffic data and transportation X Insect Born Disease Careful planning and managing of construction impact on natural water courses Temporary accommodation of storm water will minimize any problems with regard to drainage more the nariage ways X	 Socio-Economic impacts Air pollution 	Nuisances and heatth hazards to neighbors, travelers and wildlife	Sprinking water during construction period		×		·	
Loss of cutural properties and increased possibility of these properties being stolen Rerouting: relocation of properties, if applicable X Loss of scenic value Loss of scenic value Careful planning to minimize and offset losses X Loss of scenic value Careful planning and scheduling of transportation of existing read. Disturbance to the nearty community (hiltribe) and transportation Careful planning and scheduling of transportation of existing read. Disturbance to the nearty community (hiltribe) and transportation X X Insect Born Disease Careful planning and managing of construction insect Born Disease Careful planning and managing of construction and construction site for X X Impact on natural water courses Temporary accommodation of storm water will minimize any problems with regard to drainage X X Impact on astruction site for beriod, such as unstabilized Managing and a program of patrolling, fencing and warming will miligate the Hazard X X		Nuisances to neighbors, tarvelers and wildlife	Usage of low noise vibration construction equipment, such as vibro hammer' selection of proper times for construction		×			
tic and Tourism Loss of scenic value Loss of scenic value Careful planning to minimize and offset losses X Adverse impact on the structure of existing road. Disturbance to the rearty community (hiltribe) and transportation of construction material based on the traffic data the rearty community (hiltribe) and transportation of construction material based on the traffic data the rearty community (hiltribe) and transportation of construction material based on the traffic data the rearty community (hiltribe) and transportation of construction material based on the traffic data the rearty community (hiltribe) and transportation of construction material based on the traffic data the rearty community (hiltribe) and transportation of construction material based on the traffic data the reard of construction insect Born Disease and operation of storm water will minimize any problems with regard to drainage ways in intimize any problems with regard to drainage for and varining will mitigate the Hazard period, such as unstabilized and varining will mitigate the Hazard diffication and varining will mitigate the Hazard diffication and such as unstabilized and period.	3 Archaeological and Historical properties	Loss of cultural properties and increased possibility of these properties being stolen	Rerouting: relocation of properties, if applicable		×			**************************************
ortation ortation deverse impact on the structure careful planning and scheduling of transportation the nearty community (nilitribe) and transportation the nearty community (nilitribe) and transportation insect Born Disease (Encephalitis, Malaria, etc) and operation and operation impact on natural water courses important of storm water will minimize any problems with regard to drainage ways in this period, such as unstabilized period, such as unstabilized in the nearbilized in the nearbilized in the nearbilized in the struction material based on the traffic data of construction material based on the traffic data of construction material based on the traffic data of construction in the nearbilized in the ne	4 Aesthetic and Tourism	Loss of scenic value	Careful planning to minimize and offset losses	×				
Y Insect Born Disease Careful planning and managing of construction (Encephalitis, Malaria, etc) and operation and operation (Enception or drainage Temporary accomodation of storm water will (Coal people during construction site for being and a program of patrolling, fencing X (Coal people during construction and warning will mitigate the Hazard		Adverse impact on the structure of existing road. Disturbance to the nearly community (hilitribe) and transportation	Careful planning and scheduling of transportaion of construction material based on the traffic data			×		
Pe Impact on natural water courses Temporary accomodation of storm water will or drainage ways minimize any problems with regard to drainage Hazard of construction site for local people during construction Managing and a program of patrolling, fencing period, such as unstabilized and warning will mitigate the Hazard	6 Sanitary	Insect Born Disease (Encephalitis, Malaria, etc)	Careful planning and managing of construction and operation					×
Hazard of construction site for Managing and a program of patrolling, fencing local people during construction and warning will mitigate the Hazard period, such as unstabilized	7 Drainage	Impact on natural water courses or drainage ways	Temporary accomodation of storm water will minimize any problems with regard to drainage			×	-	
	8 Hazard	Hazard of construction site for local people during construction period, such as unstabilized	Managing and a program of patrolling, fencing and warning will mitigate the Hazard		×			

	Ciear Ciear		
	Magnitude of Impacts Significant Effect Small Moderate [Ma]	×	
	Magnitu Sign Small N	×	
	Magnitude of Impacts No Significant Effect Significant Small Moderate Major	×	
(Cont'd)	Recommended Mitigation Plan	Considered deliberately waste place will mitigate the problem Rerouting: adequate compensation for affected resident Adequate compensation for affected resident based on proper procedure and their opinion	
	JICA's Proposed Route	earthwork around construction sites Construction waste, surplus soils sludge, and domestic waste will occur during construction period Relocation of project sites residents Acquisition of land	
	Environmental Aspects		
	1	9 Waste9 Waste10 Resettlement11 Compensation	

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Table 3.2.4.7 SUMMARY OF INITIAL ENVIRONMENT EXAMINATION OF FLOOD CONTROL DAM

				Magnitude of Impacts	pacts	
Environmental Aspects	JICA's Proposed Route	Recommended	No.	Significant Effect	flect	Not
		Mitigation, Plan	Significant	Significant Small Moderate Major	e Major	Clear
Socio-Economic Impacts Air pollution	Nuisances and health hazards to neighbors, travelers and wildlife	Sprinkling water during construction period		×		
2 Noise and Vibration	Nuisances to neighbors, tarvelers and wildlife	Usage of low noise vibration construction equipment, such as vibro hammer, selection of proper times for construction		×		
3 Archaeological and Historical properties	Loss of cultural properties and increased possibility of these properties being stolen	Rerouting; relocation of properties, if applicable	and a second of the second of	×		
4 Aesthetic and Tourism	Loss of scenic value	Careful planning to minimize and offset losses	×			
5 Transportation	Adverse impact on the structure of existing road. Disturbance to the nearly community and transportation	Careful planning and scheduling of transportaion of construction material based on the traffic data		×	-	
6 Sanitary	Insect Bom Disease (Encephalitis, Malaria, etc)	Careful planning and managing of construction and operation				×
7 Drainage	Impact on natural water courses or drainage ways	Temporary accomodation of storm water will minimize any problems with regard to drainage		×	uga Arene ta a da a	
8 Hazard	Hazard of construction site for local people during construction period, such as unstabilized	Managing and a program of patrolling, fencing and warning will mitigate the Hazard		×	a	·

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extraction wate, strund correctorion alters Considered deliberately water place will miggate Considered deliberately water place court during construction priod second in the problem resident fraction	Environmental Aspects	JICA's Proposed Route	Recommended Mitigation Plan	<u> </u>	No Si nificant Small ffect	gnificant Eff Moderate		Clear Clear
Constituction waste, surplus aolis Considered deliberately, waste pace will miljgate minnt euologia and constraction peologi seuologia and constraction peologi Recording; adequate compensation for affected residents Adequate compensation for affected residents Adequate compensation for affected residents		earthwork around construction sites			- - - -	-	· · · · · · · · · · · · · · · · · · ·	
Relocation of project sites residents resident Acquisition of land Adequate compensation for affected testident based on proper procedule and their ophian	9 Waste	Construction waste, surplus soils sludge, and domestic waste will occur during construction period	Considered deliberately waste place will m the problem	nitigate	×			
Accurate compensation of land based on proper proceedure and their opinion based on proper proceedure and their opinion	10 Resettlement	Relocation of project sites residents	Rerouting; adequate compensation for affitrestic testing the second s	fected			×	
	11 Compensation	Acquisition of land	Adequate compensation for affected resid based on proper procedure and their opini	tion t			×	
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Significant Effect No: Small | Moderate | Major Clear × Magnitude of Impacts × × × × × × Significant Effect ž × Careful planning and scheduling of transportation of construction material based on the traffic data equipment, such as vibro hammer: selection of Rerouting; relocation of properties, if applicable Careful planning to minimize and offset losses Careful planning and managing of construction minimize any problems with regard to drainage Managing and a program of patrolling, fencing Temporary accomodation of storm water will Sprinkling water during construction period Usage of low noise vibration construction Mitigation Plan and warning will mitigate the Hazard Recommended proper times for construction and operation Nuisances to neighbors, tarvelers Nuisances and health hazards to **JICA's Proposed Route** neighbors, travelers and wildlife Adverse impact on the structure of existing road. Disturbance to Impact on natural water courses local people during construction Loss of cultural properties and Hazard of construction site for increased possibility of these period, such as unstabilized (Encephalitis, Malaria, etc) the nearty community and properties being stolen oss of scenic value Insect Born Disease or drainage ways ransportation and wildlife Environmental Aspects 3 Archaeological and Historical properties Socio-Economic Impacts 4 Aesthetic and Tourism 2 Noise and Vibration 5 Transportation Air pollution Drainage Sanitary Hazard ထ ø ~

Table 3.2.4.8 SUMMARY OF INITIAL ENVIRONMENT EXAMINATION OF YAO RIVER TRAINING

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Environmental Aspects	JICA's Proposed Route	Recommended Mitigation Plan	No Significant Effect Not Significant/Small Moderate Major Clear	Significant Effect Small Moderate Major	t Effect ate Major	Clear
	earthwork around construction sites					
9 Waste	Construction waste, surplus soils sludge, and domestic waste will occur during construction period	Considered deliberately waste place will mitigate the problem		×	ale all fragments and the second s	an tan tan ang
10 Resettlement	Relocation of project sites residents	Rerouting: adequate compensation for affected resident		<u></u>	×	
11 Compensation	Acquisition of land	Adequate compensation for affected resident based on proper procedure and their opinion			×	

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CHAPTER 4 PUBLIC RELATION ACTIVITIES

4.1 Introduction

The RID is advised to take fully into account the views of affected groups, related people, and local NGOs (nongovernmental organizations) in the design and implementation stage of the project, and especially in the preparation of the Environmental Impact Assessment (EIA). The purpose of taking into account the views of the affected groups is to facilitate and strengthen the people's participation in the project, which could contribute to the eventual success of the project. It has been reported that where such views have been incorporated in the design, the projects are more likely to be successful, while community participation has not been found to be an impediment to overall project execution. On the contrary, projects in which affected people's views have been disregarded suffer from more frequent delays and, in the worst case, project suspension.

Collaboration with NGOs also urges us "as a matter of policy" to help the project proceeed smoothly. NGOs are defined as "private organizations that pursue activities to relieve suffering, promote the interests of the poor, protect the environment, or undertake community development."

4.2 Methodology

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The ultimate goal of the project is a sustainable development. In short, implementation of the project should contribute to an improved living standard for the people in the project area through public participation. Thus, public participation from the initial stage is an important strategy for project implementation.

One important principle of Public Relations (PR) activities is to focus on public participation through the use of two-way communications. This permits communication with the help of various media such as newspapers, radio, television, and leaflets to reach all concerned people. The arrangement of seminars in which concerned people can participate is also important to ensure open and accountable public decision-making.

Proposed procedures for PR activities are as follows:

- (1) Preparation stage of PR activities
 - (a) Secondary data collection (March April 1996)
 - (b) Project area survey (May and September 1996)
 - (c) Analyze the target group for PR activities based on secondary data and project site visits.

The above mentioned target groups are:

- The people who are expected to be impacted directly, positive and/or negative.

- Local community leaders.

- Various levels of government officials involved in the project area.

- Local politicians such as provincial representative committee.

- Private sectors such as The Chiang Rai Chamber of Commerce, the Federation of Thai Industries, Chiang Rai Chapter and representatives of shops/stalls/stores/groceries and restaurants.

- Mass media (local and national media)

- NGOs

(d) Media.

- 2 sets of folded printed matters.

- 3 series of Video tapes

- TV channel (Channel 11 and local channel 5) (Details are shown in Table 5.2-1)

Timing	Leaflet	Video	TV	Local Broadcasting
Project	No. 1 ¹	Series 1	Ch 11, 8	One station for each
introduction				province
period (First 6		(Conceptual Planing)		
months, March ~				· · ·
August 1996)			· .	
	· 	For small group meeting		
Feasibility study	No. 2	Series 2	Ch 11, 8	One station for each
and EIA study		(Feasibility study)		province
period (to be		For the first seminar		
scheduled in				
September 1996 ~May 1997)		n de la companya de La companya de la comp		
	. ÷.			
Later stage of EIA	-	Series 3	Ch 11, 8	One station for each
study period (to be				province
scheduled in June				
~November 1997)				
		For the second seminar		

Table 4.2-1 PR activities by media

¹ Leaflet sample is shown at Appendix I.

The PR activities through the seminar and mass media, such as TV and Local Broadcasting, should be carried out under the initiative of the RID.

(2) Implementation stage of PR activities

- Organizing a meeting for project introduction presentation (May - August 1996)

- Organizing meetings with target groups for explanation of the project to all leaders and others (to be held

in October 1996 - January 1997)

- Video tape series 1-3 through TV channel 11 and 8 and local newspaper

- Arrange two seminars

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* 1st seminar after submission of the Interim report (April 1997)

* 2nd seminar after submission of the draft final report (October 1997)

(3) Evaluation stage of PR activities

- Analysis of PR activities through mass media

- Evaluation of the PR activities in terms of strong points, weak points and risks.

- Study of future plans for PR activities after the completion of the EIA study.

4.3 Results and Future Activity Schedule

Brief results of PR activities as of November 1, 1996 are as follows:

Activity	Number of	Period	Media/	Results
	Activities		Method	
	done	- 1	1. I. I. I.	
1. Project area visit	2	April -	Interview	Meet with leader group of
		May		village at project site.
		1996		Hear about life style,
				living standard, etc.

2. Project introduction to community leaders	l (13 villages) ²	May 1996	Explanation / Hearing	Explain the outline of the project to community leader.
 Group meeting: Project orientation (District government officials) 	4 (254 persons)	July- August 1996	Leaflets (350 copies)	Main questions are shown as follows:
 Small group meeting: talk, question and answer (Official, people, local media) 	2 (150 persons)	August 1996	Leaflets (150 copies)	Ditto:

The main questions from provincial-district government officials in the project area, private sector group and local media are as follows:

Chiang Rai Province

- Does the project plan to provide water for them or not?
- What are the impacts expected to derive from the project?
- Will the communities lying along the diversion canal receive the benefit from the project?
- · How will this project generate local benefit / development in the future?

Phayao Province:

- Will the project cause flooding along diversion canal?
- How to prevent flooding, if it occurs.
- Will the communities lying along the diversion canal receive the benefit from the project?
- How will this project generate local benefit / development in the future?

 $^{^{2}}$ Thirteen villages are shown as Appendix II.

Nan Province:

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- Will the project cause flooding along the diversion canal and how to prevent it?
- Will the communities lying along the diversion canal receive the benefit from the project?
- How will this project generate local benefit / development in the future?
 - A future activity schedule is shown in Table 5.3-1.

4.4 Recommendation

PR activities and the schedule planned by the RID are principally in agreement with the World Bank guidelines, "Timing of Project Cycle with Community Participation" (see Table 5.4). However, attention should be paid to the following points in accordance with the progress of the project.

Firstly, correct information should be delivered to affected or concerned people in a timely manner as the project progresses. The residents of the area around the Yao River are likely to receive a more adverse impact than others, while the area where indigenous people such as hilltribes live should also be given special consideration. For these areas, PR activities should be conducted earlier than in the areas which will have less adverse or no impact. The most important point to implementing the project is to foster good relationships between affected people and the RID. Misunderstandings will lead to the collapse of the relationship between both parties and will also impede overall project implementation.

Secondly, during the feasibility study period, it is advisable to initiate preliminary contact with affected people. Most of the public participation activities begin at the start of the Environmental Impact Assessment (EIA) preparation, and at the time the feasibility study begins. Public participation is usually fostered by the EIA team, but the other two environmental disciplines, social and ecological, may be called in if necessary. Where social impacts are large in scale and severeness, or where they are particularly complicated, another social science team familiar with local environment may be required during the project feasibility study.

Although the bulk of the work occurs during the EIA stage, there is still a great deal of social input needed during construction, and somewhat less during operation and thereafter. The affected pesons, local NGOs, and the public at large should participate in project monitoring during the operation stage and assist in a post hoc evaluation.

Table 4.3.-1 PR Activity Schedule

Activities	Mar, Apr.	Proparation Stage	Study & review projects data	Field data study and collection	Primary visits to project area	Visit the project area in detail	Analysis of larget groups	Consult with related parties	Determine PR format	Collect field survey data	Create PR media (leaflet, pictures, VIDEO)	10. Recommend channels for project's information	dissemination	11. Analysis of appropriateness of PR work plan		mplementation Stage 12. Meetings with provincial and dirtrict officials to	introduce the project	13. Meeting with people who are expected to have	direct impacts	14. Distributing leaflets and project's data to mass media	15. Organizing seminars		vaiutuon Slage 16. Evaluation of information direcmination	
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		н. Таба стала стал
Approximate Duration	<u>Borrower's Project Cycle</u>	Public Participation Events
<u>(Years)</u>		
3	Master Plans Sectoral Investment Plans	
0.5		Dissemenation of information Seek views on concept
2-3	Pre-feasibility Feasibility study begins EIA study begins	Scoping begins Selection of EIA studies
	EIA study ends Draft EIA	Review draft EIA studies Revies draft EIA
0.1	Feasibility study complete EIA study complete	Revies final feasibility and EIA studies
0.2		Appraisal team meets people affected
5	Construction	Community input into implementing EIA findings
30	Operation	Community input into monitoring
0.2	Project completion Report (PCR)	Post-hoc evaluations

Table 4.4.-1 Timing of Project Cycles with Community Participation

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Appendix II

Thirteen villages are as follows:

Chiang Rai province

Amphoe Muang Chiang Rai : Ban Pa Yang Mon Wiangchai : Ban Thuing Kong Thoeng: Ban Don Chai Ban Pii Ban Mai

Phayao province

Amphoe

Chiang Kham: Ban Nong Lao Ban Hua Na Ban Sob Sa Ban Pha Daeing

Nan province

Amphoe King Amphoe Song Khwae:

Ban Yod

Ban Pha IhakBan Pang GomBan Wang Sao

APPENDIX LEAFLET FOR PUBLIC RELATIONS

Project History

Since the Kok and the Ing rivers have some surplus water in their basins, together with, the water canal connecting the rivers between the country known as the Mae Khong river, this caused the flowing out of the water from the country, during the rainy season. As the country becomes prosperous in economical and agricultural fields the need of water became higher. The water became an important factor to the agricultural land in the northern part and in Chao Phraya water basins; therefore, diverting of water from the upper basins during the rainy season was brought up as a subject. This is to prevent the water from flowing out of the country.

Since 1992, RID has started this project by taking the surplus water from the developed water basins, and used it in the Kok and Ing water basins cultivation, with full potentiality for the future. These water shall be passed through the water canal, or the natural canal; while, some passes through the pipe and tunnel, diverting into the Sirikit Dam in Changwat Uttaradit. It is to be used for agricultural and water supply for the people living along the river of both sides; such rivers are the Nan and Chao Phraya river

The feasibility study and the environmental impact of the project shall be started as soon as the RID employed the consultant firms. Here, there are Team Consulting Engineer, the leading firm, joined by Panya Consultant Ltd.; Sanyu Consultants (Thailand) Ltd; and Asdecon Corporation Ltd. started in march 1996, with the total study period of 24 months.

Objective

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Kok-Ing-Nan project is located in Changwat Chiang Rai, Phayao, and Nan. The project has a major planning and practice procedure for developing the Kok and Ing water basins. This is to bring the surplus water, from the two water basins into the Nan basins, during the rainy season, by keeping it in the Sirikit Dam temporary. The water is to be made use of during the dry season with the followings purposes:

(1) Consider the feasibility of the project and the development condition stages in developing the Kok, Ing, and Nan water basins, in order, to be used for agricultural and irrigation purpose during the rainy and dry season.

(2) Lessen the flood disater in the Kok and Ing basins, since a large amount of water is caused by the rain from the rainy season. Divert the water into the Nan and Sirikit Dam to help drainage.

(3) Solve the water shortage problem in Nan and Chao Phraya basins caused during the dry season.

(4) Provide more water usage for other activities as such industrial, tourism, and for domestic consumption.

(5) The drained water from the Sirikit Dam that used for electricity production can still be brought back for agricultural purpose.

Steps of Study

Kok-Ing-Nan Project has the following important steps of study:

- Study the present and the future development water uses of the Kok, Ing and Nan basins. Arrange other development projects to prevent water shortage and other problems concerning the water basins.
- (2) Calculate the surplus water in the Kok and Ing basins monthly, including the highest water level, the lowest water level and the yearly mean. Find the amount of water which could be diverted into the Nan basin without damaging the Kok and Ing basins.

(3) Set up the location and the basic design for the control building of Kok and Ing, as well as, the suitable diverting route which will be the canal, pipe and tunnel.

- (4) Study the feasibility of the economic, social, financial, law, the institutes-organizations of the water diversion and other water basins development project.
- (5) Study the negative and the positive points in the environmental impact and find the less distracting outcome for the environment.
- (6) Estimate the catchment resulting from the diverted water and from the developing Kok-Ing-Nan water basins and the lower part of Chao Phraya, used in the agricultural, electricity production, by the Sirikit Dam, and others.
- (7) Arrange the public relation and promote the project by setting up seminar and meeting, to provide the people, media, and other organizations to understand the purpose and the status of the project clearly.

Planning Procedure

The procedure of the study is divided into 3 stages:

- Stage 1 First stage of the investigation took about 7 months. This is to find the most suitable method in diverting the water into the Nan basin, till the selecting of important water basin for development.
- Stage 2 Study the feasibility study and the environmental impact in diverting water into each selected water basin in the project. The investigation took about 13 months.
- Stage 3 Development Plan for the Kok-Ing-Nan water basins, by putting the three stages of studies together, seeing the need in the development, the need of the locality and the feasible principle plan in developing the country. The investigation took about 4 months.

Public Relation

This is the first brochure for this project. There will be another brochure coming up, as there is a progress in the study. The result of the project study will also be publicized through the media in Changwat Chiang Rai, Phayao, and Nan. We also received all public comments, by mail. Mailing address: P.O. Box 5, Bhun Thong Lang, Bang Kapi, BKK 10240 (Kok-Ing-Nan). By Aug. 1996, a suggestion box will be set up at the Irrigation Office in Chaing Rai, Phayao, Nan.







