5.5 Spoil Utilisation

(1) Introduction

This section presents a spoil utilisation plan that suggests means by which communities along the water diversion route might perhaps benefit from the spoil to be generated in their area. The construction activities would have a substantial effect on these communities and this plan aims to provide some degree of compensation and to aid in the rural development of the area.

The underlying principles of the spoil utilisation plan are of:

- community participation; and
- the substantial influence of the Tambon Administrative Organisation (TAO) on spoil use and selection of spoil disposal and stockpiling sites.

In addition, the community would gain control of the rehabilitated spoil heap on completion of its construction.

Though targeted on the main Ing-Yot tunnel, the scope of this section also includes other parts of the water diversion route where substantial quantities of spoil would be expected to be generated. Where the diversion comprises a canal, excavated topsoil will be made available for agricultural purposes and not used for embankments. Where the canal bottom is close to the existing land surface, fairly small quantities of other spoil would be generated and these would be spread along the rights of way that would follow the canal. However, in other areas it will be necessary to construct either a tunnel or a canal in a deep cutting. In all there would be four tunnels, of one to fifty kilometres in length, and three reaches where construction of a canal or culvert would generate substantial amounts of spoil. This section concentrates on these tunnels and cuttings, proposing alternatives for spoil disposal at each construction site.

The study on spoil utilisation comprises the following elements:

- identification of diversion route, especially with respect to local communities and protected areas (reserve forests, classified watersheds and national parks);
- an assessment of the legal context of the tunnelling and spoil disposal proposals, and of legal ownership of the spoil;
- an assessment of the nature and usefulness of the spoil material as removed at each of the construction sites;
- a review of the possible market, and of disposal alternatives;
- an economic analysis of the options;
- design of a spoil utilisation plan.
-
- This part of the environmental study has been accomplished through the following activities:
- a review of relevant legislation and a legal analysis of ownership, compensation, protected areas, and other relevant issues;
- verification of protected area coverage with respect to the planned diversion route;
- a meeting with the provincial director of the Royal Forestry Department with respect to protected areas;
- meetings at the Bangkok and provincial offices of the Department of Mineral Resources;
- discussions with the tunnelling engineer, geologist and others in the engineering section of the JICA study team;

- a review of data on current sources of similar material, and a visit to a local quarry and crushing plant operator (ChiangRaiLand Associates), so as to assess the market;
- an assessment of the likely nature of the spoil as removed at each of the construction sites;
- visits to each of the sites;
- formal meetings with local representatives of villages that would be affected by a number of these sites;
- an assessment of their concerns, and of possible opportunities for use of spoil;
- an economic analysis of the disposal options, and of the opportunity to sell the spoil;
- recommendations for spoil disposal;
- review of recommendations with RID.

The analysis at this stage of project definition is necessarily conceptual. A more detailed assessment of spoil material, its potential uses and market, would need to be carried out at a later stage, with the full involvement of local people and their representatives at village, tambon and provincial levels.

(2) Diversion Route

The locations of the diversion route tunnels, with respect to villages affected and protected areas, are summarised in Tables 5.5.1 and 5.5.2, and illustrated in Figures 5.5.1 to 5.5.4. Very significant quantities of material would also be generated along certain sections of the canals, so these too are included in the tables. Further information on land use is presented in the *Supporting Report*. The first tunnel on each of the two sections will only be excavated from the entrance end, the second Kok-Ing tunnel from both ends, and the main Ing-Yot tunnel from both ends and from seven adits.

The route begins in non-reserve land where water is diverted from the Kok River. As the entrance of the first Kok-Ing tunnel is approached, the route enters the economic zone of the Huai Sak and Mae Kok (right bank) National Forest Reserve (RF 41). The tunnel passes under the economic zone (or 'economic forest') and then under the conservation zone (or 'conservation forest') into which it emerges, within a class 3 watershed; the spoil heap would be located within the conservation forest, class 3 watershed. The route continues as a canal, reaching non-reserve farming land, becoming a conduit and then entering the second Kok-Ing tunnel. The tunnel passes under non-reserve land and then conservation and agricultural zones of two Chiang Rai National Reserve Forests: Huai Sak and Mae Kok (right bank) as before, and Khun Huai Ngew, Chieng Kien and Khun Huai Pong (RF 15). The spoil heap is located within the conservation forest in a class 2 watershed. The tunnel emerges within the agricultural zone and continues as a canal. The agricultural zone has been transferred to the Office of Land Reform for Agriculture. The canal continues in non-reserve land, crossing an area of class 4 watershed and eventually reaches the River Ing.

The diversion from the Ing River begins in non-reserve land and then enters the economic zone of the Doi Tha and Doi Boe Som National Forest Reserve (RF 43), Chiang Rai Province. The short Ing-Yot tunnel appears to actually begin within an exclusion from the reserve but immediately passes beneath the conservation zone and then emerges into the economic zone. One of the two spoil heaps is within the conservation forest and a class 4 watershed. The canal passes immediately into non-reserve land.

The main Ing-Yot tunnel begins in non-reserve land but then continues under the proposed Phu Sang National Park and a series of reserve forests:

- Nam Ngaw (left side) (RF 34), Chiang Rai Province;
- Nam Puei, Nam Yuan and Nam Lao (RF 1), Phayao Province; and
- Nam Yao and Nam Suad (RF 15), Nan Province.

The tunnel emerges into the conservation zone of Nam Yao and Nam Suad National Forest Reserve. In addition, the adits emerge into economic, agricultural and conservation zones of the above-listed reserves.

Table 5.5.1. Administrative and cartographical location of key spoil-generating activities (villages identified are those most likely to be affected by spoil disposal).

Section	Village	Tambon	Amphoe	Changwat	Map Sheet	Co-ordinates
Kok-Ing first canal section (reach 1)	Thung Mon	Rob Wiang	Muang Chiang Rai	Chiang Rai	4948 I	594000 2201000
	Mai Don Ruang	Wiang Nua	Wiang Chai	Chiang Rai	4948 I	599300 2199700
Kok-Ing Tunnel no. 1 (BJT1) entrance	Don Mun	Muang Chum	Wiang Chai	Chiang Rai	4948 I	601500 2198000
Kok-Ing Tunnel no. 1 exit	San Ngon Thai	Pha Ngam	Wiang Chai	Chiang Rai	5048 IV	604100 2196800
Kok-Ing deep canal section (reach 2)	San Ngon Thai, Nong Bua Pha Bom	Pha Ngam	Wiang Chai	Chiang Rai	5048 IV	605100 2195800 to 606000 2191100
	Don	Don Sila	Wiang Chai	Chiang Rai	5048 IV	608200 2192400
Kok-Ing Tunnel no. 2 (B) entrance	Thung Khong	Don Sila	Wiang Chai	Chiang Rai	5048 IV	609200 2190200
Kok-Ing Tunnel no. 2 exit	Huai Kang	Mai Ya	Phaya Meng Rai	Chiang Rai	5048 IV	614500 2188300
Ing-Yot short tunnel (entrance)	Thung Khan Chai	Wiang	Thoeng	Chiang Rai	5048 III	626500 2174200
Ing-Yot deep canal section (reach 4)	Pa Chi, Tha Kham	Ngao	Thoeng	Chiang Rai	5048 II	633500 2173600
Ing-Yot tunnel (N) entrance	Don Chai	Ngao	Thoeng	Chiang Rai	5048 II	635900 2174300
Adit no. 1	Pha Lat	Ngao	Thoeng	Chiang Rai	5048 II	640500 2174200
Adit no. 2	That Phu Sang	Phu Sang	K.A. Phu Sang	Phayao	5048 II	645200 2173000
Adit no. 3	Hua Na	Thung Kluai	Chiang Kham	Phayao	5048 II	648100 2169800
Adit no. 4	Huai Pum	Rom Yen	Chiang Kham	Phayao	5048 II	648700 2159700
Adit no. 5	Pang Tham	Rom Yen	Chiang Kham	Phayao	5047 I	654200 2155800
Adit no. 6	Yao Ton Phung	Rom Yen	Chiang Kham	Phayao	5047 I	657200 2155200
Adit no. 7	Yot	Yot	Song Khwae	Nan	5147 IV	665500 2146600
Ing-Yot tunnel exit	Pha Lak	Yot	Song Khwae	Nan	5147 IV	669100 2144800

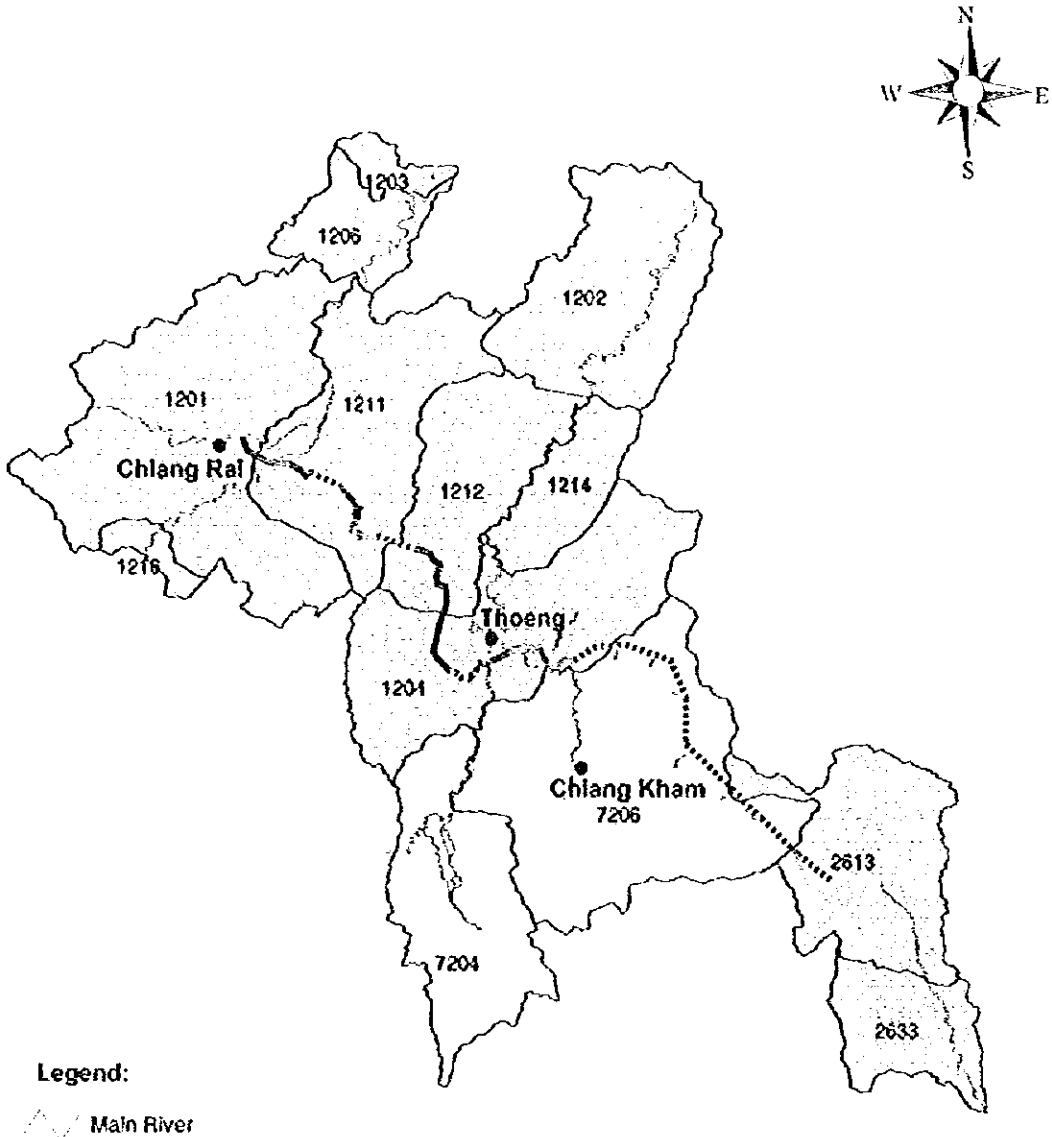
Table 5.5.2. Protected-area locations and accessibility of key spoil-generating activities.

Section	watershed class *	forest reserve class (code) **	Accessibility (approximate description)
Kok-Ing			
First canal section (reach 1)	Not	Not	
Tunnel no. 1 (BJT1) entrance	4	E (RF 41)	highway 1173; 2km dirt road to be < 1km or 2km tarmac road to be 1.5km along canal to tunnel
Tunnel no. 1 exit	3	C (RF 41)	highway 1152; 1.5km tarmac /graded & chipped;
- spoil heap:	3	C	2km dirt track; canal crosses the graded road
Canal section (reach 2)	4	C, then not	highway 1152
Conduit section (reach 2)	Not	Not	
Tunnel no. 2 (B) entrance	Not	Not	highway 1152, then laterite branch
- spoil heap:	2	C	
Tunnel no. 2 exit	Not	A (RF 15)	tarmac road (1174 branch) near site now continues across hills to Chiang Rai
Ing-Yot			
Short tunnel (entrance)	Not	E (RF 43)	highway 1021; tarmac road to Ban Thung Khan
- spoil heaps	4, not	C, not	Chai, where canal crosses, 500m from cutting
Conduit section (reach 4)	Not	Not	highway 1021
Tunnel (N) entrance	Not	Not	highway 1021 to Ban San Ton Pao; 1km new
- spoil heap	4	C / A	tarmac (4m wide) road to Ban Don Chai where canal passes; 500m across paddy to tunnel (or village loop road to entrance)
Adit no. 1	4	A (RF 34)	highway 1021 to Ban San Ton Pao; 5km graded
- spoil heap	4	E	dirt road (wide) to Ban Pha Lat Luang; 1.5km poor dirt track
Adit no. 2	Not	E (RF 1)	highway 1093; 1km dirt track
- spoil heap	4	E (RF 1)	
Adit no. 3	3	Not	highway 1093 to within 200m of site; dirt road
- spoil heap	4	E (RF 1) / not	
Adit no. 4	3	C (RF 1)	highways 1021/1148 to Chiang Kham; ~9km
- spoil heap	3?	C (RF 1)	tarmac / concrete (4+m wide) road (1210) to Ban Sop Sa; 7km poor dirt road (1160); 5km very poor dirt road with tree-trunk bridges
Adit no. 5	3	C (RF 1)	highways 1021/1148 to Chiang Kham; ~9km
- spoil heap	2	C (RF1)	tarmac / concrete (4m wide) road (1210) to Ban Sop Sa; ~13km poor dirt road (1160)
Adit no. 6	3	C (RF 1)	highways 1021/1148 to Chiang Kham; ~9km
- spoil heap	2	C (RF 1)	tarmac / concrete (4m wide) road (1210) to Ban Sop Sa; ~13km poor dirt road (1160); no road for 3-4km
Adit no. 7	3	C (RF 15N)	Highway 1148; ~4km tarmac road; ~1km laterite
- spoil heap	4	C	road
Tunnel exit	4	C (RF 15N)	Highway 1148; ~2km from highway; dirt road to
- spoil heap	2	C	within 200m

* watershed classes (further elaborated in the Supporting Report): 1 - primary headwaters; 2 - secondary headwaters; 3 - commercial forestry, mining & agriculture (fruit trees); 4 - upland crops; 5 - agriculture, especially rice farming.

** forest reserve classes: C – Conservation, E – Economic, A – Agricultural.

** forest reserve codes: RF 1 - Nam Puei, Nam Yuan & Nam Lao National Forest Reserve, Phayao Province; RF 15C - Khun Huai Ngew, Chieng Kien & Khun Huai Pong National Forest Reserve, Chiang Rai Province; RF 15N - Nam Yao & Nam Suad National Forest Reserve, Nan Province; RF 34 - Nam Ngaw (left side) (Phung Sai) National Reserve Forest, Chiang Rai Province; RF 41 - Huai Sak & Mae Kok (right bank) National Forest Reserve, Chiang Rai Province; RF 43 - Doi Tha & Doi Boe Som National Forest Reserve, Chiang Rai Province.



Legend:

Main River

Diversion Route

- Along River path
- Culvert
- Open canal
- Tunnel
- Tunnel adit

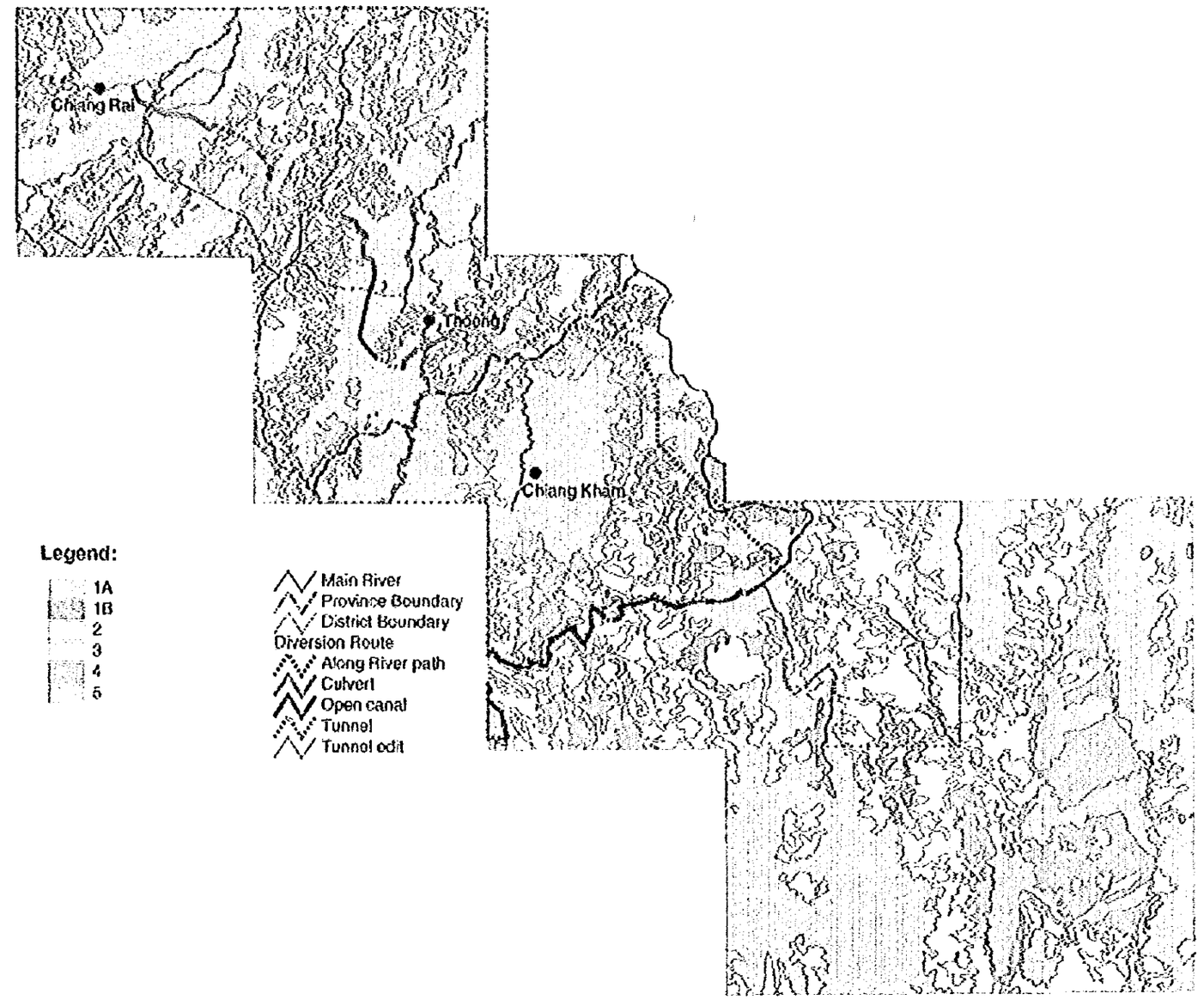
Province

- Chiang Rai
- Nan
- Phayao

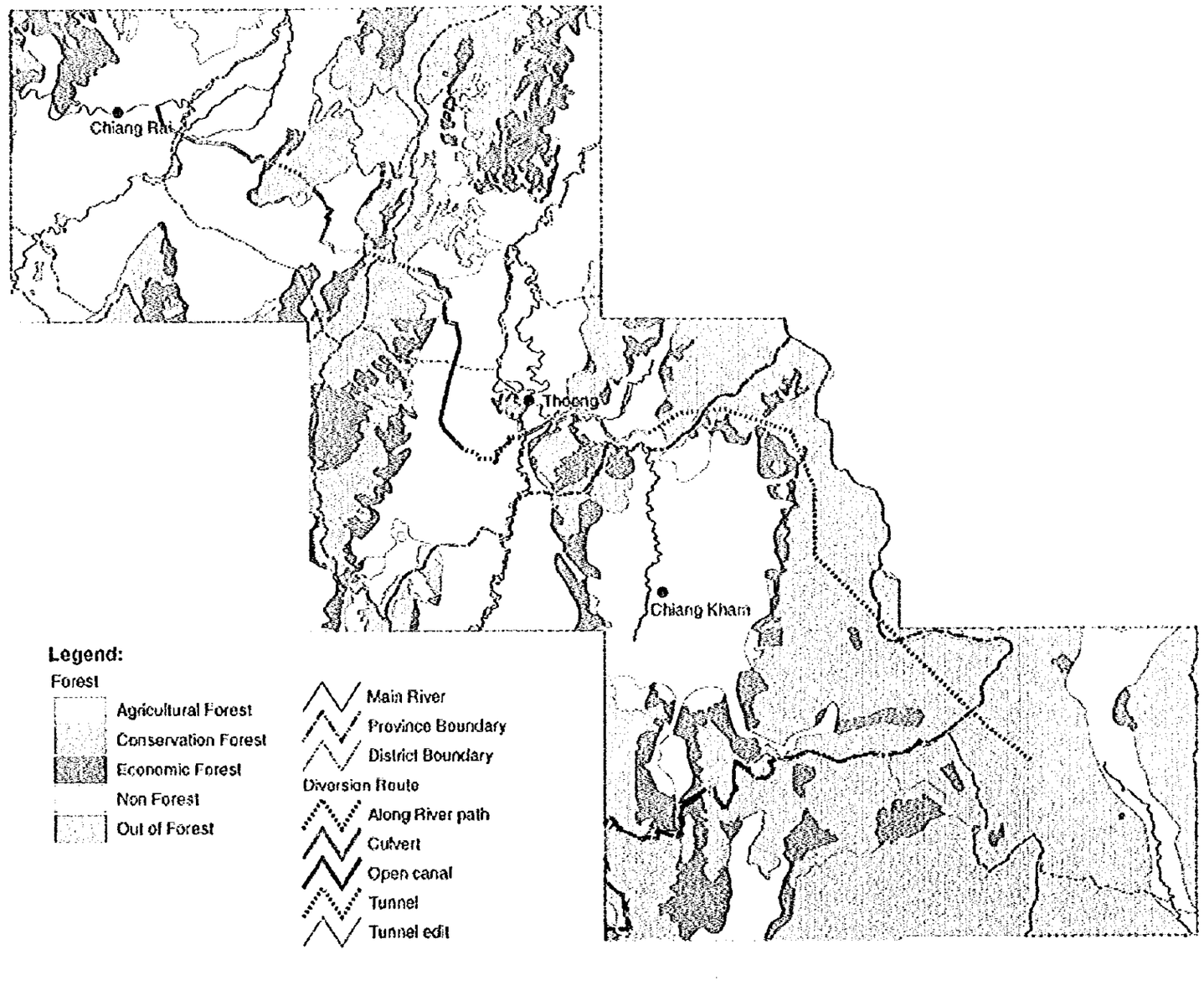
Province	District	Code
Chiang Rai	Chiang Saen	1203
	Wiang Chai	1211
	Muang Chiang Rai	1201
	Chiang Khong	1202
	Phaya Meng Rai	1212
	Thoeng	1204
	Khun Tal (king amphoe)	1214
	Mae Lao (king amphoe)	1216
	Mae Chan	1206
Phayao	Chiang Kham	7206
	Phu Sang (king amphoe)	7204
Nan	Song Khwae (king amphoe)	2613
	Tha Wang Pha	2603

0 10 20 Kilometres

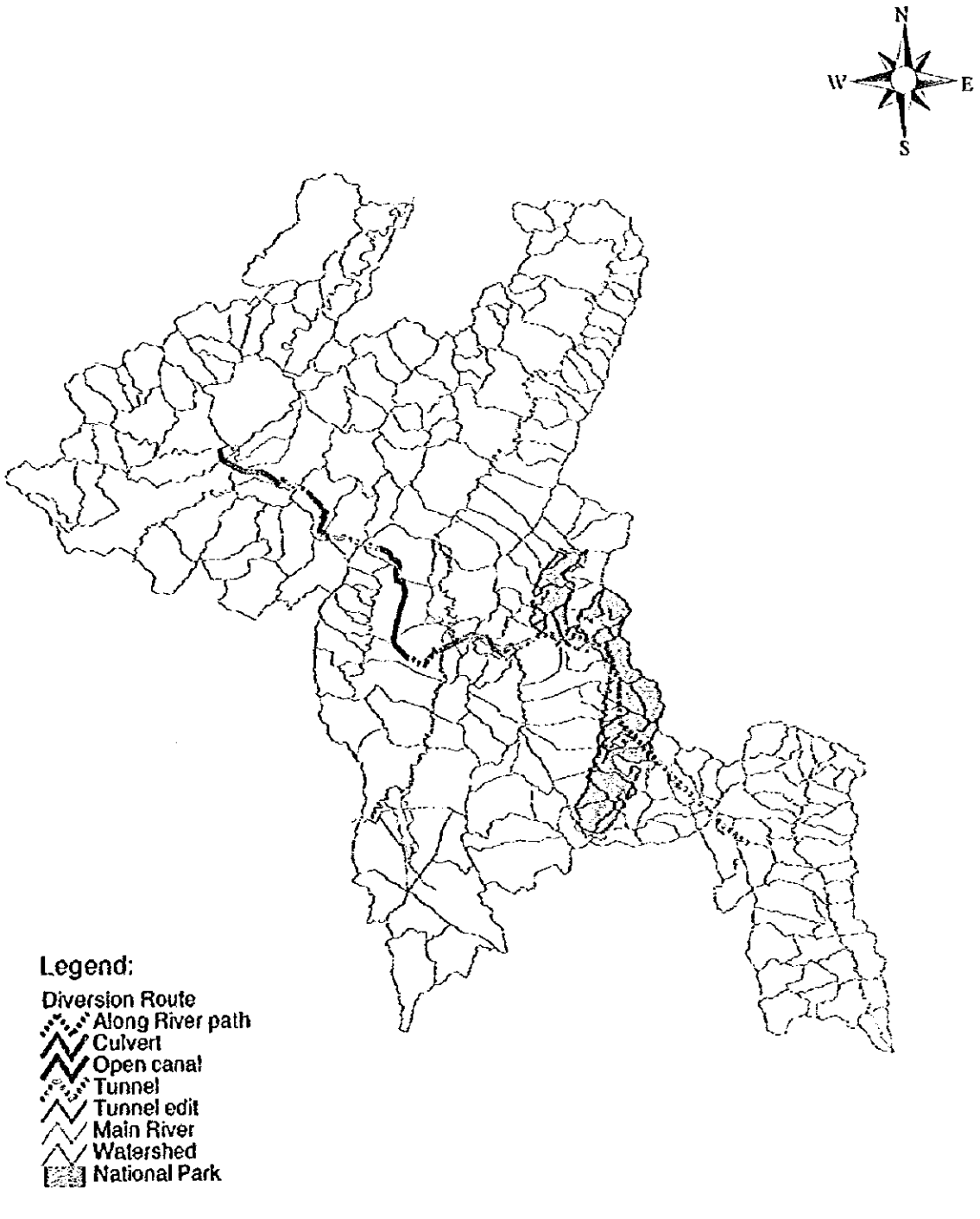
ENVIRONMENTAL STUDY THE KOK-ING-NAN WATER DIVERSION PROJECT	**Figure 5.5.1. Administrative Areas**
JAPAN INTERNATIONAL COOPERATION AGENCY	



ENVIRONMENTAL STUDY THE KOK-ING-NAN WATER DIVERSION PROJECT	**Figure 5.5.2. Classified Watersheds**
JAPAN INTERNATIONAL COOPERATION AGENCY	



ENVIRONMENTAL STUDY THE KOK-ING-NAN WATER DIVERSION PROJECT	**Figure 5.5.3. Forest Reserves**
JAPAN INTERNATIONAL COOPERATION AGENCY	



ENVIRONMENTAL STUDY THE KOK-ING-NAN WATER DIVERSION PROJECT	**Figure 5.5.4. National Park**
JAPAN INTERNATIONAL COOPERATION AGENCY	

Various sections of the water diversion route pass through classified watersheds, but only tunnel sections (Kok-Ing number 1 tunnel and Ing-Yot main tunnel) pass through (or rather under) class 1A and 1B watersheds.

Initial proposals for spoil heaps include locations conservation zones of forest reserves, as well as in agricultural (and economic) zones. The location of the spoil heap for adit number 4 of the main Ing-Yot tunnel is particularly sensitive (in terms of land classification, isolation, population and topography), and those for adits 5 and 6 and the tunnel exit only slightly less so. It is recommended that further studies be carried out into alternative locations. For example, adit number 4 might be redirected due west into the economic zone of the reserve forest.

In all cases, site land-use surveys should be carried out, and fertile or productive land and conservation forest avoided where possible. Public consultation and a detailed Environmental Impact Assessment will be needed for each construction site, spoil heap, adit and access route. Compensation (and removing cost) procedures should be discussed with those to be affected. Environmental mitigation and monitoring measures will be necessary (see Table 5.5.7).

(3) Legal Context

This sub-section presents information on three key legal issues related to spoil disposal: operations in protected areas, spoil ownership and royalty payments, and compensation payments.

(a) Operations in Protected Areas

The proposed water diversion route passes under or through a number of protected areas. For example, the main Ing-Yot tunnel passes below the (Doi) Phu Sang National Park currently being established, and under class 1A watersheds. In addition the route and associated sites are located in conservation forest reserves on the surface. The legal constraints on activities in each of these situations are as follows:

- Operations in watersheds of classes 1A and 1B, conservation zones of reserve forests and in national parks may take place if unavoidable and the MOAC gives its permission and the Cabinet its consent;
- Operations in economic zones of reserve forests require permission from RFD while those in agricultural zones require permission from the Office of Agricultural Land Reform;
- These are no restrictions on operations in watersheds of classes 2, 3, 4 or 5; and
- Operations on (or under) private land require purchase of the land under the Land Act.

There are only two short sections of tunnel under private land (at the beginning of the second Kok-Ing tunnel and of the main Ing-Yot tunnel). Either these areas of land would have to be purchased, or agreement reached with the land-owners to allow operations without purchase, or an act passed allowing RID operations below private land without the land being purchased. The second option would appear the most attractive. The option of a specific act is not without precedent; two similar acts are currently being processed, one for the Bangkok underground railway, the other for major mining operations below private land. Such an act would also give RID ownership of the spoil removed.

(b) Spoil Ownership & Royalties

Royalties will be payable according to who owns the land from which material is being removed, and what is being done with the material. Section 1355 of the Civil and Commercial Code of Thailand states that "subject to the provision of this code or other laws, the ownership of land extends above and below the surface" so, for example, spoil removed from below a

reserve forest[47] or national park[48] will belong to the state and are in fact classified as 'forest products'. Sale of forest products requires payment of charges, fees and royalty to the RFD, though rates for spoil arising from tunnel construction have not been defined. A similar situation prevails for agricultural land reform areas.

It is recommended that RID seek cabinet permission to (a) take ownership of spoil, and (b) use it in construction or transfer it to the local community or to another government agency. Under the Land Act of 1954, the RID will have to purchase privately-owned land even if the diversion is through a tunnel below the private land (but see the previous section).

If spoil material is not removed from the site but disposed of in a spoil heap, there is no royalty payable. However, if the spoil is sold or used (whether by RID or the community), a licence is required[49] and a royalty is payable[50]. At present the royalty is 2.8 baht per tonne, of which 30% is payable to the tambon and 70% to the state.[51]

The project feasibility study submitted to Cabinet for approval should describe clearly the management system, ownership and anticipated use of the excavated materials. RID will need to negotiate spoil ownership and trading restrictions with the RFD, the Office of Agricultural Land Reform and the Department of Mineral Resources (DMR).

(c) Compensation

Compensation is perhaps the most important and contentious issue in the eyes of those affected by development projects in Thailand. For those with land title, compensation is payable to the occupiers of land in accordance with the Immovable Property Expropriation Act B.E. 2530 (1987). Section 11 of the Government Irrigation Act[52] provides that:

> *Immovable property required for the purpose of irrigation shall be subject to expropriation in accordance with the law on expropriation of immovable property, if the transfer thereof has not been agreed to otherwise.*

Section 5 of the Expropriation of Immovable Property Act, B.E. 2530 (1987) states that when it is necessary to acquire immovable property for the public benefit, the expropriation of such property is to be done under this Act. Public benefit includes public utilities, land reform, acquisition of natural resources, town and country planning, agricultural or industrial development, State defence and others. The expropriation requires a Royal Decree that must include the objective of the expropriation, identification of the official body undertaking the expropriation, and specification of the boundary of the area to be expropriated. Expropriation through this method is a lengthy process, and direct agreement with land owners is always preferred.

Direct agreement is achieved by a Compensation Committee, which is established according to MOAC regulations. The Committee's responsibilities are to survey properties to

---

[47] National Forest Reserve Act 1964 and the Agricultural Land Reform Act 1975.

[48] National Park Act 1961.

[49] The Minerals Act B.E 2510 (1965) as amended by the Minerals Act (No. 2) B.E. 2516 (1973) and the Minerals Act (No. 3) B.E. 2522 (1979) state that by-products may be sold on receipt of a licence from the Director-General of the Department of Mineral Resources (section 73(1)), and mining waste may only be removed from the mining area if a licence is obtained (section 74).

[50] Section 104 of the above Act, as amended.

[51] Ministry of the Interior ministerial sub-decree.

[52] Government Irrigation Act B.E. 2485 (1942), as amended by: Government Irrigation Act (No. 2) B.E. 2497 (1954), Government Irrigation Act (No. 3) B.E. 2507 (1964), Government Irrigation Act (No. 4) B.E. 2518 (1975) and Government Irrigation Act (No. 5) B.E. 2530 (1987).

be affected, to determine and negotiate compensation amounts, and to pay agreed compensation. Compensation covers structures (housing, shelters, etc.), trees and crops (of which the type and age are taken into consideration) and land (held with documents). The Committee is chaired by the Provincial Governor with an RID official as secretary. The Provincial Forestry Office and Land Department are represented on the Committee, together with the Local Administration in the form of District Officers.

A Cabinet resolution of July 1989 also allows RID to make payments (termed "removing costs") to people occupying public land or forest reserves marked for reservoir projects even if they cannot produce land documents. The Compensation Committee is also responsible for negotiating purchase of such land; the amount (per rai) is generally lower than that paid to those with land documents. A recent example is of some villagers affected by the Khong-Chi-Moon water diversion project, who eventually received up to 32,000 baht/rai for land despite it being impossible to determine prior use or occupancy of the land as it had already been flooded.[53] The Government has also allowed payment of "opportunity costs" in some recent cases.

(4) Spoil Material and Uses

It is not possible to determine exactly the nature of spoil to be removed from the diversion route because (a) only limited samples can be taken, and (b) it is difficult to interpret accurately seismic data used to assess more remote areas. For example, the main Ing-Yot tunnel is as much as 1200 m below the land surface, so direct sampling is not possible and seismic data are imprecise. In particular, though seismic survey may identify the rock as being, say, sandstone, this is not sufficient to determine its suitability for use in, say, construction. Furthermore, it is unwise to assume that spoil material would be removed from the tunnel in a useful form, and a cautious approach to possible spoil use is therefore proposed.

The geological investigations indicate the materials shown in Table 5.5.3 may be removed from the excavation sites, with approximate total quantities and possible uses indicated in Table 5.5.4. (The data are presented in more detail in the accompanying *Supporting Report*.) The range of possible uses of spoil material includes:

- project construction, e.g. Yao reservoir,
- construction of local roads and small irrigation dams,
- making concrete blocks, bricks and tiles, and
- sale as aggregate.

Alternatively, the spoil might be disposed of close to the site, or removed from the area and disposed of elsewhere. Similar major construction projects in the past have favoured, on economic grounds, disposal close to the site where the spoil is generated. A range of local community views on spoil use and related issues are summarised in Table 5.5.5, with further information presented in the *Supporting Report*. Generally it is suggested that spoil heaps be designed to allow easy removal of potentially useful material, while providing permanent storage for useless material, possibly overlain by a community forest or recreational area. Local community use of spoil should be encouraged and facilitated, on the principle of 'people's participation'.

[53] Source: 'Controversy could have been avoided', in *Bangkok Post*, 30 November 1998.

Table 5.5.3. Anticipated spoil material and quantity to be removed from each source. (Canal spoil assumed spread along canal right of way or given away.)

Spoil source	Nature of spoil	Quantity (1000 m^3)
Kok-Ing intake	Sand, silt, gravel (& red soil)	146
Kok-Ing reach 1 - siphon	Sand, silt, gravel (& red soil)	38
Kok-Ing tunnel no. 1 (entrance)	Top soil, talus, alluvium	36
	Rhyollite, tuff	75
	Sandstone, shale, tuff	143
	Total	**254**
Kok-Ing reach 2 - culvert	Sand, silt, gravel (& red soil)	295
Kok-Ing tunnel no. 2 (entrance)	Sandstone, shale, tuff, limestone	199
	Limestone	27
	Total	**226**
Kok-Ing tunnel no. 2 (exit)	Sandstone, shale, tuff, limestone	67
	Basalt	7
	Sandstone, shale, tuff	148
	Total	**222**
Kok-Ing reach 3 - culvert	Sand, silt, gravel (& red soil)	73
Ing-Yot intake	Sand, silt, gravel (& red soil)	104
Ing-Yot reach 1 - culvert	Sand, silt, gravel (& red soil)	23
Ing-Yot tunnel no. 1 (entrance)	Conglomerate sandstone	189
Ing-Yot reach 2 - culvert & siphon	Sand, silt, gravel, red soil, over sandstone & shale	592
Ing-Yot tunnel no. 2 (entrance, construction division 1)	Sandstone, shale, tuff, lapilly tuff	85
	Andesite, rhyolite, dacite, tuff, agglomerate	67
	Sandstone, tuff, interbedded with shale	150
	Meta-sandstone interbedded with slate	170
	Total	**472**
Adit 1 (construction division 2)	Meta-sandstone interbedded with slate	297
	Slate, quartzite, interbedded with sandstone foliated	222
	Total	**519**
Adit 2 (construction division 3)	Slate, quartzite, interbedded with sandstone foliated	514
	Meta-sandstone interbedded with slate	84
	Total	**598**
Adit 3 (construction division 4)	Slate, quartzite, interbedded with sandstone foliated	766
	Meta-sandstone interbedded with slate	13
	Total	**779**
Adit 4 (construction division 5)	Slate, quartzite, interbedded with sandstone foliated	374
	Meta-sandstone interbedded with slate	117
	Andesite, rhyolite, dacite, tuff, agglomerate	251
	Limestone	1
	Total	**743**
Adit 5 (construction division 6)	Limestone	147
	Sandstone, tuff, interbedded with shale	574
	Total	**721**
Adit 6 (construction division 7)	Sandstone, tuff, interbedded with shale	720
Adit 7 (construction division 8)	Sandstone, tuff, interbedded with shale	571
Ing-Yot tunnel no. 2 (exit, construction division 9)	Sandstone, tuff, interbedded with shale	305
	Limestone	158
	Total	**463**
	GRAND TOTAL	**6.5 million m^3**

Table 5.5.4. Spoil, total volume and possible uses if good quality (to disposal site if poor quality).

Specific types indicated by maps and survey	Volume ($1000 m^3$)	Potential uses - if good quality
Soil, sand, silt and gravel: *Sand, silt, gravel (& red soil). Some over sandstone and shale.* Top soil, talus, alluvium: *Talus, loose sand, clay.*	1,306	Soil and silt for agricultural uses, landscaping. Sand and gravel in construction, concrete.
Andesite, rhyolite, dacite, **tuff,** agglomerate: *Greenish-grey, tuff, lapilly tuff, hard, intruded with porphyrite. Some fine grain containing lapilly. Some dacite interbed. Hard, massive.* Rhyollite, tuff: *Rhyolite & tuff, medium hard to soft, moderately to slightly weathered, intensely fractured.*	393	Low-quality aggregate.
Basalt: *Basalt, black-dark grey, hard, intensely fractured.*	7	High quality aggregate, road chippings.
Limestone: *Limestone dark grey to grey, fresh, dense, medium hard to hard, interbed with thin shale layer.* Limestone: *Faulted.*	333	If limestone can be separated, may be used to make concrete blocks (with sand & cement) or as aggregate in construction (by project or local community). If can be separated and very good quality, may be used for lime.
Conglomerate **sandstone**: *Conglomerate sandstone. Greenish-grey to purple, moderately to highly weathered, medium hard to hard, intensely fractured.* Meta-sandstone interbed with slate: *Yellowish-brown, brownish-grey, dark grey to light grey slate or shale interbed with sandstone, or with thin layer of meta-sandstone. Some limestone, shale, tuff, calcareous shale, quartzite, quartz vein. Foliated texture, fresh, soft to hard, break along latent crack along bedding and slaty cleavage. Highly to moderately weathered shale. Moderately to intensely fractured. Soft to hard, silicified.* Sandstone, shale, tuff: *Black shale/partly sandstone interbed, easily broken along bedding plane. Slightly to highly weathered, soft cracky. Moderately to intensely fractured. Hard, massive.* Sandstone, shale, tuff, lapilly tuff: *Reddish-brown to reddish-purple shale, sandstone, tuff alternation. Easily breakable along bedding planes. Weathered.* Sandstone, shale, tuff, limestone: *Shale (slate) interbed with thin sandstone layer, frequently dark grey, fresh, partly quartzite and limestone, foliated and slaty cleavage formed, break along bedding and slaty cleavage. Weathered.* Sandstone, tuff, interbed with shale: *Dark grey sandstone, sandy tuff, fine to medium-grained interbed with thin layer of shale very frequently, fresh, hard, massive. Sometimes greenish-greyish-brown shale, interbed with sandstone and tuffaceous sandstone. Slightly to moderately weathered, intensely to moderately fractured.*	3,832	If sandstone can be separated and is of good quality, may be crushed to aggregate or sand. If shale or slate can be separated and is of very good quality it can be used for bricks or tiles (it will require testing). If it can be separated and is good quality, may be used as aggregate.
Slate, quartzite, interbed with sandstone foliated: *Light grey, dark grey to black slate interbed with thin layer of sandstone. Some or mainly muscovite, quartzite and quartz, with quartz vein. Fresh, medium hard (slate), hard (sandstone), foliated slate structure, breakable along bedding plane, sometimes slicken side along bedding plane. Slight metamorphis. Slightly to highly weathered, intensely fractured. In places perhaps porphyrite.*	1,876	If shale or slate can be separated and is of very good quality it can be used for bricks or tiles (it will require testing). If it can be separated and is good quality, may be used as aggregate.

Table 5.5.5. Local community views (Source: consultations 15 and 16 November 1998).

Issue	Views
Kok-Ing-Nan project	• some people anti-project, others resigned to it - "no" if a choice • one community quite positive about it (perhaps because the spoil-heap site is farmed by people from the next amphoe) • complain that in Chao Phraya they have two crops whereas here it is only one • would like job opportunities • would want to use water in the tunnel! • want more RID input, plus meeting with RID, NGOs, consultants and community all together
Compensation and ownership	• generally happy if compensation payments high enough • owner might want land back on completion of the spoil-heap • would want other land as compensation - not much/no land available • will drive people to slash and burn if they are not being compensated • disposal site may be suitable for agriculture, so prefer it further up the mountain • no land title
Construction activities	• access roads must be repaired • noise and dust of disposal site or of trucks passing through village • transport of people through the village is acceptable • explosions (blasting) (shock to livestock, human danger) • sediment running into paddy fields
Longer-term impacts	• water quality (in watercourses and in paddy fields) • water quantity (drought and flooding) • loss of water because of surface water disappearing into tunnel • fisheries • landslide (including risk to paddy) • loss of land, trees and wildlife • deforestation leading to soil erosion
Possible spoil uses	• make disposal site available to the community, e.g. as community forest, or ownership the community for it to rent out • separate useful materials and keep these accessible as a community resource • would want RID to crush the spoil to a useful form • would want limestone for concrete village roads • also interested in making concrete blocks as an industry • construction of small irrigation dams and canals • could use spoil if had a factory • want good roads to spoil sites (spoil sites inaccessible so difficult for them to imagine using the spoil -- expensive to transport)

See Community Consultation section within the chapter on Spoil Utilisation in the *Supporting Report* for more details of the consultation process.

(5) Potential Market and Economic Analysis

To dispose of the spoil generated by the proposed water diversion project, spoil material might be:

- used locally;
- dumped on site, with the negative impacts that implies;
- dumped off site, with the negative impacts that also implies;

- sold by the project; or
- passed to the community or a private contractor to sell.

In deciding how best to dispose of the spoil, a number of issues need to be considered:

- suitability for use (as a function of the spoil composition and its structure once removed from the point of excavation);
- transport costs;
- processing costs;
- ownership, and royalty payments;
- sale price;
- impact on existing markets;
- impact of transport on locality;
- impact of temporary stockpiling on locality; and
- impact of disposal on locality.

At present, the total aggregates market in the three provinces is of the order of seven million tonnes per annum,[54] though there has been a decline recently. (The *Supporting Report* provides a prediction of construction aggregate demand, lists designated areas of quarry operations and identifies crushing plants in the region.) This may be compared with about twelve million tonnes (6.5 million m^3) anticipated to be generated over the construction period of six or seven years, i.e. approximately two million tonnes per annum. Thus the market might be able to absorb all the material available if it is of suitable quality, but to the detriment of existing operators and with a major effect on prices. However, the market is not necessarily close to the tunnel route, nor even in the urban areas identified in the analysis that follows. Material might be sold to crushing plants rather than being crushed on site.

The following assessment is very approximate and is based on a categorisation of material according to the results of the geological survey. This is the best guess with the information available, with what is intended to be a realistic prediction of spoil usefulness. Spoil is expected to be without a market if it is described in the geological survey as "highly weathered", "brittle", "soft", "cracky", "easily broken" or "breakable", "calcareous shale", or as being an alternation or "interbed" of shale and sandstone.

Calculations are summarised in Table 5.5.6 (with more detailed data provided in the *Supporting Report*). Values are based on the following assumptions:

- 1 m^3 of solid rock weighs 1.8 tonnes;
- 1 m^3 of solid rock will occupy 1.1 to 1.2 m^3 once extracted;
- crushing (55 to 60 baht/tonne)[55] and royalty (2.8 baht/tonne) together add up to about 60 baht/tonne;
- transport costs 1.5 baht/tonne/km (see the *Supporting Report* for an example of commercial charges) with material being taken to the largest potential market identified in each case;
- material believed sellable is sold at 110 baht/tonne,[56] except soil at 20 baht/tonne,[57] though sales may distort the market price substantially;[58]
- income is spread evenly over a six-year period.

---

[54] Department of Mineral Resources.
[55] Source: ChiangRaiLand Associates Co. Ltd.
[56] Mixed aggregate price (source: ChiangRaiLand Associates Co. Ltd.).
[57] Laterite priced at 40 baht/tonne by Construction Costs Expert, JICA Study Team.
[58] Aggregate sold by the project may be very price competitive in isolated areas along the main tunnel as the alternative for buyers is to pay a substantial sum for delivery.

This scenario results in vast quantities of spoil being marketed. The 2 million m^3 identified comprises 1.3 million m^3 of soil and other 'lighter' material and 0.7 million m^3 of rock. However, transport costs and the distance to market make it unlikely that 0.3 million m^3 of the soil from the Kok-Ing canal and the limestone from the main Ing-Yot tunnel exit could be sold. In the latter case, the material could be used for construction of the Yao dam and reservoir. Nonetheless, 58 million baht might be raised, or 10 million baht per annum (see Table 5.5.6). These figures are extreme estimates. Though the economic case for selling the material may appear fairly weak, the alternatives may also be unattractive:

- the cost of disposal on site has been estimated[59] at 40 baht/m^3, plus the loss of land to the local community, environmental impacts on remote areas, ...;
- the cost of disposal off-site would include transport costs, disposal-site management costs, ...

Indeed the threshold distance for economic benefit is quite large. Consider 1 tonne of spoil. If it is sold it will obtain the sale price of 110 baht/tonne, less the royalty and crushing costs of 60 baht/tonne, and save 40 baht/m^3 (i.e. 20 baht/tonne) disposal costs. So the total value of 1 tonne of spoil is 110 minus 60 plus 20, i.e. 70 baht/tonne. At 1.5 baht/tonne/km, economically it is worth transporting the material up to 70/1.5, i.e. 45 km, if it can then be sold. For soil, the distance is less, at about 60 baht/tonne (40 minus 2.8 plus 20), equivalent to 40 km. At this distance there is no benefit for the local community, except better access roads, though also far less disbenefit. RID would spend money transporting the spoil rather than creating spoil heaps. This would almost double the income from sales if RID contributes the alternative disposal cost (Table 5.5.6).

It must be reiterated that there are a large number of uncertainties affecting sale of material:

- the nature of the spoil removed, and its suitability for use;
- the availability of a market close to the site of generation;
- the impact of a flood of material on prices.

(6) Spoil Utilisation Plan

It might at first seem most equitable and most in keeping with the country's aspirations of community participation and empowerment that excavated spoil be given to the community (tambon) to use or sell. Similarly, the community should gain control of the rehabilitated spoil heap on completion of its construction.

However, the material to be extracted from each site would vary. A site producing useful material might benefit the local community through sales and a smaller residual spoil heap; in addition, RID could compensate the community through environmental works paid for from the saved money, e.g. new roads, tree planting, domestic water and electricity. A site producing useless material would not benefit the local community, no money would be saved so there would be no major compensatory works, and there would be a large spoil heap. This is inequitable.

It is therefore proposed that the project attempt to dispose of all material that can be sold. Though this will impact on existing suppliers, it will also preserve other quarry sites. RID could offer, say, 100 baht/m^3 to a private contractor to dispose of the material from all sites so as to avoid having the disposal sites, but there would then be little control over the contractor who might simply create an

[59] Construction of a typical disposal site is estimated to cost approximately 25 baht/m^3 (source: *Supporting Report* to the *Interim Report* on the Feasibility Study). If a typical site is assumed to occupy 0.5 km^2 or 300 rai, costing 32,000 baht/rai (a typical land cost) and to store 700,000 m^3, as generated at the adits, the cost including land purchase is increased to approximately 40 baht/m^3. Previous estimates of disposal costs exceeded 100 baht/m^3 and it is not clear why this has been reduced to only 25 baht/m^3.

uncontrolled dump nearby. If the local community proposes uses for material (e.g. road building) then the project could supply those projects, even if it costs RID to do so, within the alternative disposal cost limit (estimated 40 baht/m^3).

Table 5.5.6. Possible volumes of sellable material.

Location	Possible sellable material	Volume ($1000 m^3$)	Transport distance (km)	Possible profit (1000 baht/yr)	Possible profit including alternative disposal (1000 baht/yr)
Kok-Ing intake	Sand, silt, gravel to Chiang Rai.	146	10	96	972
Kok-Ing reach 1	Sand, silt, gravel to Chiang Rai.	38	15	0 *	168
Kok-Ing tunnel no.1	Top soil, talus, alluvium to Chiang Rai.	36	20	0 *	78
Kok-Ing reach 2	Sand, silt, gravel to Chiang Rai.	295	30	0 *	0 *
Kok-Ing tunnel no.2 entrance	Limestone generated. Crushing plant is close by at Pha Mae Ok Ru, about 10 km distant, and Chiang Rai about 30 km.	27	30	38	200
Kok-Ing tunnel no.2 exit	Basalt to Phaya Meng Rai.	7	15	57	99
Kok-Ing reach 3	Sand, silt, gravel to Thoeng & Ban Sawan.	73	10	48	486
Ing-Yot intake	Sand, silt, gravel to Thoeng & Ban Sawan.	104	10	1,083	1,707
Ing-Yot reach 1	Sand, silt, gravel to Thoeng & Ban Sawan.	23	10	239	377
Ing-Yot reach 2	Sand, silt, gravel to Thoeng & Chiang Kham.	592	15	4,831	8,383
Ing-Yot tunnel no.2 entrance	Andesite, rhyolite, dacite, tuff agglomerate to Thoeng & Chiang Kham.	67	15	547	949
Ing-Yot tunnel no.2 adit 4	Andesite, rhyolite, dacite, tuff agglomerate to Chiang Kham. New road necessary for which some material used.	251	15	2,048	3,554
Ing-Yot tunnel no.2 adit 5	Limestone and sandstone to Chiang Kham, with a new road necessary. Some material to be used for this purpose.	161	25	589	1,555
Ing-Yot tunnel no.2 exit	Limestone may be suitable for use in construction of Yao reservoir. Markets too distant.	158	80	0 *	0 *
Totals	(million baht per annum)			9.6	18.5

* transport costs make it uneconomic to sell

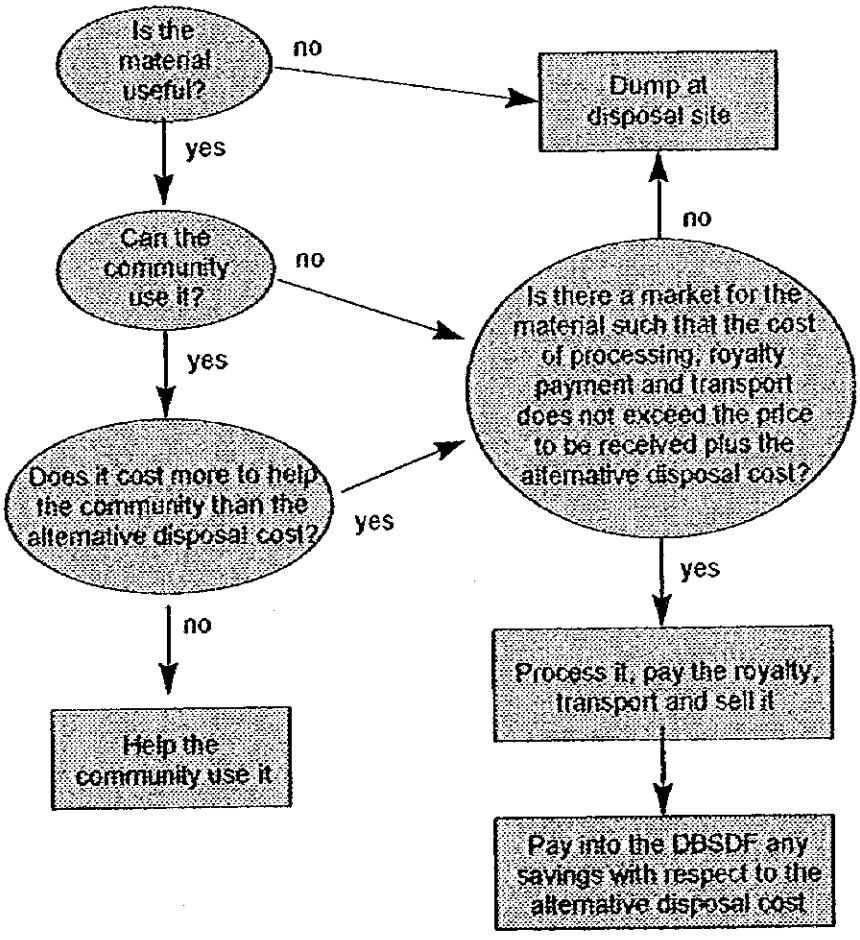
Any savings RID is able to make against the alternative disposal cost for each site would be passed to the Donor Basin Sustainable Development Fund, the DBSDF (Section 5.7). Where disposal on site is necessary, the disposal area should be chosen with care, properly rehabilitated as, say, a community forest, etc., and passed to the TAO. Tambons thus afflicted would receive preferential treatment by the DBSDF.

This plan is free of any assumptions about the market or the usefulness of the spoil. There will be a simple set of questions to be asked as material is removed, as shown in Figure 5.5.5. The amount that might be paid into the DBSDF would thus depend on the material generated and the current market conditions.

In the above scenario, all material that could be sold would be sold (unless given to local communities or used by the project itself), as long as it is not at an overall loss, as indicated in Figure 5.5.5. If we assume that material identified above does prove sellable, the amount payable into the DBSDF could be a substantial 113 million baht, or 19 million baht a year over six years (see the *Supporting Report* for detailed data).

Environmental mitigation measures and a monitoring plan will be necessary for spoil removal, stockpiling, transport and permanent disposal; indicative mitigation measures and monitoring requirements are shown in Table 5.5.7. No budget estimations have been provided at this stage. All monitoring results should be publicly available, with monitoring undertaken on behalf of RID by TAOs, RFD, qualified consultants or RID itself.

Figure 5.5.5. Spoil Use Plan.



Any savings RID is able to make against the alternative disposal cost for each site would be passed to the Donor Basin Sustainable Development Fund, the DBSDF (Section 5.7). Where disposal on site is necessary, the disposal area should be chosen with care, properly rehabilitated as, say, a community forest, etc., and passed to the TAO. Tambons thus afflicted would receive preferential treatment by the DBSDF.

This plan is free of any assumptions about the market or the usefulness of the spoil. There will be a simple set of questions to be asked as material is removed, as shown in Figure 5.5.5. The amount that might be paid into the DBSDF would thus depend on the material generated and the current market conditions.

In the above scenario, all material that could be sold would be sold (unless given to local communities or used by the project itself), as long as it is not at an overall loss, as indicated in Figure 5.5.5. If we assume that material identified above does prove sellable, the amount payable into the DBSDF could be a substantial 113 million baht, or 19 million baht a year over six years (see the *Supporting Report* for detailed data).

Environmental mitigation measures and a monitoring plan will be necessary for spoil removal, stockpiling, transport and permanent disposal; indicative mitigation measures and monitoring requirements are shown in Table 5.5.7. No budget estimations have been provided at this stage. All monitoring results should be publicly available, with monitoring undertaken on behalf of RID by TAOs, RFD, qualified consultants or RID itself.

Figure 5.5.5. Spoil Use Plan.

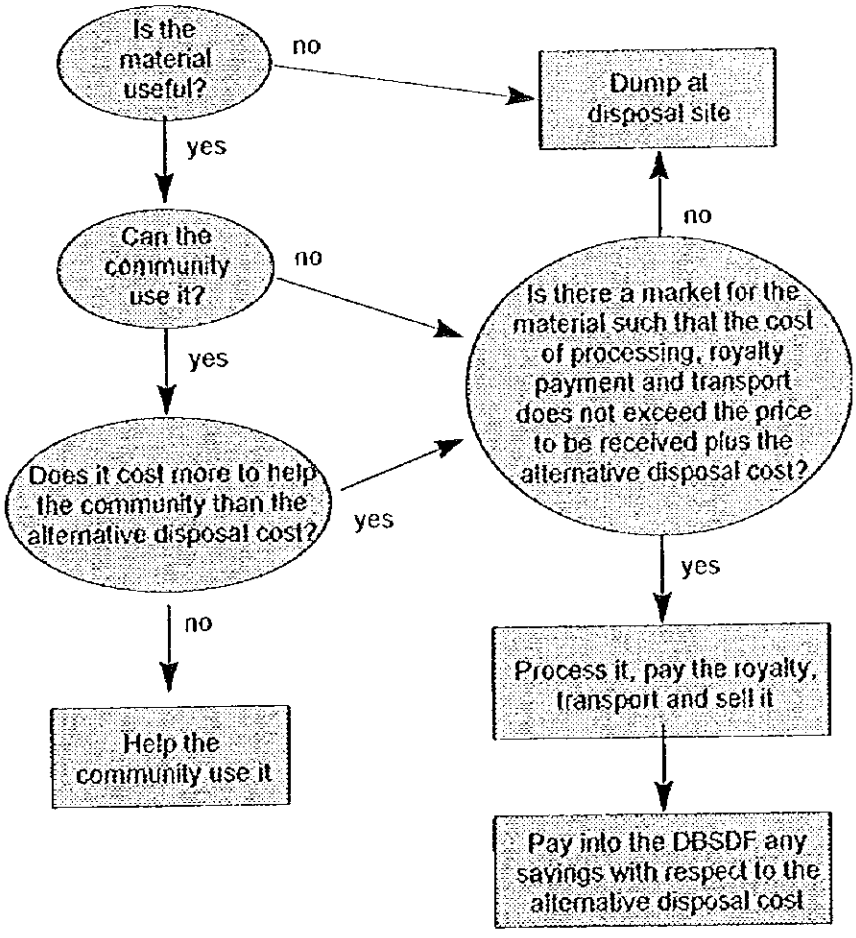


Table 5.5.7. Mitigation measures and monitoring requirements.

Component	Transport	Disposal	Mitigation	Monitoring
Geology & seismology		•	Disposal site (and to lesser degree stockpile) should be designed to assure stability even during seismic activity.	Monitoring of stability during and post construction, for at least 5 years, at least annually.
Water		•	Potential impact on water from stockpile/disposal site is substantial, primarily because of sediment loads but maybe also (acid) contamination. Require effective control of runoff with silt traps and settling ponds. If acid drainage results (though this would appear unlikely from the initial description of the route geology), lagoons may be necessary together with active management. Toilet facilities provided.	Runoff from all disposal sites should be monitored on a regular and frequent basis (at least quarterly) covering suspended and dissolved solids, acidity/basicity (pH), metals, carbonates, oxygen demand, etc. Sediment control structures must be inspected and maintained regularly, at least quarterly. Receiving waters and potentially-affected drinking-water supplies should be monitored pre-project, throughout construction, and post-construction for at least 5 years, at least quarterly.
		•	Surface drainage will be altered substantially. Natural drainage may be canalised (or diverted through a culvert) and this canalisation should be designed to prevent contamination from the spoil heap (by-passing the spoil-heap drainage), and to maintain the pre-existing (natural) flow regime. Lost aquatic habitat should be re-created as far as possible.	Natural drainage flows, quality, fauna (fish, plankton, benthic organisms) and flora (aquatic plants) to be monitored before, during and after (5 years) construction.
		•	Vehicles should be properly maintained so as to minimise risk of oil/fuel leaks, refuelling carried out so as to prevent spills, fuel stored in bunded area, spill management measures defined, staff trained and equipment provided. Spills contained.	Site drainage to be monitored for oil & grease during construction (at least monthly). Spills recorded.
	•		Provision/improvement of bridges or culverts where transport routes cross waterways. Bridges removed post-construction where access routes are to be removed.	Regular inspection (at least monthly).
Soil		•	Top soil would be cleared from the site	

Component	Transport	Disposal	Mitigation	Monitoring
			before use for disposal, then reapplied on completion. More than the 0.5-0.7m of soil suggested in the EIA would be necessary, as drainage through the spoil is likely to be over-effective. Topsoil should be seeded/planted as soon as possible after replacement. Surface drainage may be necessary to prevent erosion, as may terracing.	Soil moisture should be monitored occasionally post-construction.
		•	As for oil/fuel impacts on water. Spills cleaned up.	Regular and frequent inspection, particularly of fuel storage/refuelling area during construction (at least monthly). Spills recorded.
	•	•	So as to minimise erosion, major earth-moving activities, including development of access routes, should not take place during rainy season and should always be limited in extent. Stockpiled top-soil should be seeded until replaced on top of spoil.	
Air	•		Roads (whether dirt or tarmac) should be watered to prevent dust generation. Loads may need to be covered and handling carried out so as to minimise dust generation. Transport routes should be selected to minimise nuisance to villagers, and route selection adhered to. Vehicles should be properly maintained so as to minimise exhaust emissions.	Road-side air quality monitoring particularly for dust but also for truck emissions during construction period. Complaints monitoring.
Landscape		•	Either landscaping of spoil heap or screening as appropriate. The permanent spoil heap should be left as either farmland or a community forest.	Vegetation growth should be monitored for at least 5 years after construction has been completed.
Noise	•		Vehicles should be properly maintained, and route selected and adhered to. No vehicle movements at night.	Road-side noise monitoring during construction period. Complaints monitoring.

Component	Transport	Disposal	Mitigation	Monitoring
Fauna & flora	•		No vehicle movements at night. Extra forest guards to prevent hunting by construction workers. Contractual commitment by workers not to hunt; offenders to be dismissed. Access routes to remote spoil heaps should be removed on completion of construction to prevent subsequent use. Spoil heaps planted with natural, endemic forest vegetation unless being reverted to farmland.	Random checks on vehicle movements. Hunting activity monitored by forest guards. Wildlife surveys in surrounding forests, pre-, during and post-construction.
	•	•	Removal of vegetation for spoil heaps and access routes should be minimised.	
Land use	•	•	Minimise land take for spoil heaps and access routes.	
Traffic	•		Route selected and adhered to, no night driving or speeding and vehicle weights controlled. Disciplinary measures defined for non-compliance. Careless driving punished, or to result in dismissal. Co-operation with local traffic police. Maintenance of selected routes.	Traffic counts, accident records, checking of vehicle weights and speeds, and drink and drugs testing. Complaints monitoring.
Socio-economic		•	As for the project as a whole: – Genuine public participation throughout the project period; – Minimise displacement and nuisance; – Promote sustainable rural development; – Pay fair compensation, or provide appropriate resettlement or restored land, in an open and transparent manner and before land is occupied; – Maximise employment opportunities for local people; – Provide safe working environment and necessary personal protection equipment; – Prevent creation of health hazards, e.g. standing water; and – Minimise disturbance of local people by construction workers, with strict code of conduct.	Household surveys pre-construction and throughout construction period, covering attitude towards project, compensation, nuisance, health. Disbursements and complaints monitoring. Record accidents.

5.6 Environmental Regulations, Policies & Institutions

(1) Introduction

This section presents a review of the project's institutional and regulatory context, in support of the environmental study. An emphasis is placed on issues of community participation. The section comprises:

- methodology,
- policy,
- legislation,
- institutions, and
- conclusions.

The methodology for this part of the environmental study was:

- a review of economic, social and environmental policy;
- a review of relevant legislation;
- an examination of the legal institutional and administrative structure, with an emphasis on de-centralised local authorities and on their relationship with central government;
- identification of protected areas impinged upon by the proposed Kok-Ing-Nan project;
- identification of communities impinged upon by the proposed Kok-Ing-Nan project;
- a review of information on potentially-affected communities;
- an examination of the organisations active in selected potentially-affected communities, whether legal administrative bodies (e.g. Tambon Councils) or informal groups (e.g. water users groups, NGOs); and
- an analysis of institutional weaknesses and obstacles to rural development; and
- review of recommendations with RID.

(2) Policy

This sub-section comprises a summary of the key government policy statements, including:

- Eighth National Economic and Social Development Plan,
- Twenty-year National Environmental Quality Promotion Plan,
- National Watershed Management Master Plan,
- Five-year Environmental Quality Management Plan (national),
- (annual) Provincial Environmental Quality Management Action Plan, and
- Sustainable Development report.

However, perhaps the most important policy is the King's land and agricultural management initiative ('New Theory'), as illustrated by His Majesty's speech on a community-based or self-sufficient economy: "It is not important for Thailand to become an economic tiger. The important thing is that Thais should live a life that leaves them enough to eat, and that they should rely on their own economy."[60]

The Eighth National Economic and Social Development Plan B.E. 2540-2544 (1997-2001) recognises the inequity of development in Thailand, with Bangkok and the surrounding provinces benefiting far more than the more remote provinces. The plan sets the following relevant objectives:

[60] Address of 4 December 1997.

- To [...] promote increasing community participation.
- To promote stable and sustainable growth, and empower people to play a greater role in the development process and receive a fair share of the benefits of growth.
- To utilise, preserve and rehabilitate the environment and natural resources [...].
- To reform the system of public administration so as to allow greater participation of non-governmental organisations, the private sector, communities and the general public in the process of national development.

The Plan also includes the following targets:

- Upgrade and expand infrastructure provision in the regions and rural areas.
- Reduce the incidence of poverty [...].
- Preserve and rehabilitate forest areas [...].
- Increase awareness of sustainable alternative agricultural methods, and increase opportunities for their application.
- Promote investment in the rehabilitation and protection of urban, regional and rural environments.

The Plan recognises that "The public sector [...] is subject to a number of restraining factors, particularly those related to the very centralised power structure, administrative inefficiency, lax law enforcement, lack of popular participation, unethical and unfair use of administrative power, lack of administrative accountability and lack of continuity in policy and implementation to meet the demands of national development plans." The Plan states that "Local people and community organisations should be urged to play an increasingly active role in the management of natural resources and environments."

The Plan has a number of parts, the relevant ones are reproduced in the *Supporting Report* and summarised in Table 5.6.1.

The OEPP's *Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality 1997-2016* contains a number of relevant objectives, goals and policies, as well as clearly identifying a number of the issues that have caused environmental degradation.

The three objectives of the Plan are to:

1. Protect and rehabilitate environmental quality for enhancement of quality of life and better health of human beings.
2. Conserve natural resources to be the resource base for sustainable development, by rehabilitating degraded natural resources for future development, by preserving and sustainably using non-renewable resources.
3. Boost institutional capacities to administrate and manage environmental quality, in addition to decentralising power to provincial and local authorities.

The overall OEPP policy on natural resources includes the following elements:

- Increase efficiency in the use of natural resources; co-ordinate any utilisation of natural resources and reduce conflicts; and accelerate rehabilitation of degraded natural resources to be the basic inputs for sustainable development.
- Enhance administration and management of natural resources by systematic decentralisation of power and authority from central offices to regional offices, in addition to strengthening relationships among government agencies, the private sector, NGOs and local people.
- Support the application of resource economics for effective management of natural resources and establishment of social justice.
- Amend the legal and regulatory framework enabling support for more effective administration and management of natural resources, and recognition of rights and responsibilities of local people to demonstrate ownership of resources.

Table 5.6.1. Summary of relevant parts of the Eighth National Economic and Social Development Plan B.E. 2540-2544 (1997-2001).

Issue	Objectives	Targets	Strategies
Enhancing the development potential of the regions and rural areas to promote a better quality of life	• To enhance the development potentials of people and communities in regional and rural areas, so that they can participate in the process of local development. • To encourage popular participation in the conservation [...] of natural resources and environments, and ensure natural resources are utilised economically and efficiently, with the minimum environmental impact. • To increase the roles of people's organisations and local administrative and government units so that they can work together to achieve regional and rural development [...] responsive to the needs of people living in those areas.	• Provide rural people working in the agricultural sector with a wider range of non-agricultural employment options. • Encourage communities to play a greater role in the conservation [...] of local natural resources and environments. • Empower all local communities to deal effectively with their own problems. [...]	Promote popular participation in local development and encourage communities to develop their own capabilities to that end.
Natural resource and environmental management	• To ensure utilisation of natural resources is counter-balanced by rehabilitation and protection programmes. • To promote more effective management, involving collaboration of various different sectors of society, so as to achieve greater balance in ecosystems and environments. Opportunities will be provided for local people and organisations to play a greater role in natural resource and environmental conservation in their own communities, with support from the public sector, academic experts, NGOs and business enterprises.	Promote proper natural resource management systems for community forests so as to protect the environment and develop the quality of life of local people.	• Rehabilitation of natural resources and environments. • Promotion of the participation of local people and communities. • Proper management of natural resources and environments.
Development of popular governance	To encourage all social sectors to participate in government activities, especially in managing national development.	Guarantee the people's right to play a greater role in state, social and community activities [...].	Creating opportunities and an enabling environment to support the participation of all sectors in the development process.
Managing implementation of the eighth plan	To enhance popular participation in development administration, and to increase the efficiency of development efforts on the basis of a people-centred holistic approach to development and the promotion of development partnerships.	Empower development partnerships and local communities in order that they can participate effectively in the implementation [...].	• Revising the development administration system in such a way as to facilitate implementation [...]. • Promoting popular participation in implementation.

The key goals and policies relevant to this study, and the Plan's appreciation of past causes of environmental degradation, are presented in Table 5.6.2 for water resources, forest resources, and soil and land use.

The draft *Five-year Environmental Quality Management Plan (national) 1997-2001*, according to Chao Phraya report,[61] includes two thousand or more small- to medium-scale development projects, eight thousand or more projects for restoring water resources, and

- emphasises the basin approach to management;
- the establishment of a management plan for the twenty-five basins;
- consistency between surface and ground water management; and
- development of a mechanism to reflect the real value of water.

However, as with the NESDB Plan, the mechanism is intended for non-agricultural water uses.

The central tenet of the *National Watershed Management Master Plan* is community participation, as in the NESDB five-year plan, not surprisingly as it was commissioned by the NESDB.

Thailand's Action for Sustainable Development,[62] the country's submission to the UN Commission on Sustainable Development, recognises that "Thailand clearly needs a more efficient water management system." The report also reports on the five-year programme "to encourage farmers in the Chao Phraya Plain to convert from a second rice crop to other economic crops that require less water"; the Kok-Ing-Nan Water Diversion Project would appear to encourage a reversal of this programme. The degree of confusion with respect to rice cultivation is elegantly illustrated by the urging of farmers to refrain from rice growing during the early-1999 water shortage and, simultaneously, substantial interventions to shore up rice prices.

The National Security Council, responsible for policy overview in security areas, produced a *Master Plan for the Development of Highland Areas* that specifies that villages in class 1A watersheds are to be resettled. OEPP's policy is that resident populations should now be managed *in situ*.

The RID's *Water Resources Development Master Plan (1997-2006)* concentrates on the development potential of Thailand's twenty-five main river basins.

(3) Legislation

The legislation relevant to the Kok-Ing-Nan Water Diversion Project can be grouped as:

- water (supply, resources and quality),
- land ownership, use and expropriation (and compensation),
- environment, and
- other (including health and safety).

Certain aspects of the legislation have been discussed elsewhere in this report and will not be repeated in such detail here. In particular land expropriation and compensation is discussed in Section 5.5 on spoil utilisation, and fisheries law in Section 5.4. The discussion below therefore concentrates on water, land ownership and use, and the environment. International conventions and agreements to which Thailand is a party are listed in the *Supporting Report*. At the very local level, villages often have a set of 'village rules'; two example sets are also presented in the *Supporting Report*.

[61] *Chao Phraya Basin Water Management Strategy* final report (October 1997) to NESDB, RID and PCD.
[62] March 1997, MOSTE.

Table 5.6.2. Summary of relevant parts of *The Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality 1997-2016.*

Issue	Problems	Goals	Policies
Water Resources	Water resource problems "have resulted from degradation of forest resources and watersheds; poor administration and management of water resources; no limitations on water consumption; ineffective water resource conservation; and poor measures for water conservation."	Goal : Systematically develop, conserve and rehabilitate water resources, both surface and ground water, in all watersheds in order to ensure sufficient quantity and acceptable quality, and for sustainable use.	Policy 1 : Systematically develop and conserve surface and ground water sources at the basin level, taking into consideration socio-economic factors and environmental impacts. Policy 2 : Improve administration and management of surface water resources to have integrity and to be efficient. Policy 3 : Promote effective utilisation of surface water resources to maximise benefits and minimise environmental impacts. Policy 4 : Promote effective administration and management of ground water. Policy 5 : Promote effective utilisation of ground water while minimising environmental impacts.
Forest Resources	"The degradation and encroachment on forests occurred for many reasons including: land speculation; low agricultural production; ineffective implementation of government policies; [...] ineffective enforcement of natural resource management laws and regulations; conflict between national forest policy and national land policy; ineffective implementation of the water classification system [...]."	Goal 1 : Forests will cover 50% of the country [...]. Goal 2 : Utilise forest areas in a manner that will retain the natural balance of the ecosystem and environmental quality. Goal 3 : Conserve and sustainably utilise biodiversity.	Policy 1 : Increase forest cover to 50% of the country [...]. Policy 2 : Utilisation of forests must be in accordance with natural resources conservation practices. Policy 3 : Protect remaining natural forest areas from encroachment. Policy 4 : Reduce conflict over utilisation of forest resources and other resources in forest areas. Policy [5] : Protect, preserve and conserve flora, fauna, aquatic life and other living organisms in forest areas.
Soil and Land Use	"Soil and land resource problems have arisen for many reasons including lack of co-ordination in the implementation of land-use policy; lack of effective administration and management; improper enforcement of land-use plans; uncontrolled expansion of settlement; and lack of appropriate urban-development planning. In addition, previous land policies did not ensure security of land holdings nor justly allocate land occupation rights."	Goal 2 : Conserve, rehabilitate and develop degraded soils and land to be a resource base for sustainable development [...].	

(a) Water

Thailand has an abundance of water-related laws, with "confusion as to their validity, interpretation and enforcement, thus causing ineffective implementation and lack of proper administrative water control."[63] The legislation is administered by numerous government departments, often with overlapping responsibilities and duplication of activities. In addition, many government agencies without legislative responsibilities are also active. Thus for water supply, the following are active: MWA, PWA, Municipalities, Changwat Administrative Organisations, Industrial Estate Authority of Thailand, Department of Energy Development and Promotion (DEDP), Department of Public Works (in MOI), Department of Health (in MOPH), Military Mobile Unit (in MOD) and Department of Mineral Resources (DMR in MOInd) - see Table 5.6.3. The last four mentioned generally only construct small rural systems comprising a well, pump, elevated storage tank and public or private taps.

Similarly for water resources, the following seven organisations have legal responsibilities: MWA, PWA, EGAT, RID, National Energy Authority, Agricultural Land Reform Office and Department of Mineral Resources (MOInd). In addition the following nine organisations are active, but without legal responsibilities: ARD (in MOI), Public Works Department (MOI), Department of Health, Department of Local Administration (DOLA in MOI), Department of Community Development (DCD in MOI), Military Mobile Unit, Department of Public Welfare (in MOLSW), Department of Land Development (in MOAC) and Department of Fisheries (in MOAC). There is no specific order of priority for these users, with most working independently. The draft Water Resources Act proposes that the National Water Resources Committee (NWRC) have the power to define the order of priority.

An example of the degree of duplication is that DMR, ARD, Department of Public Works, Department of Health, DOLA, DCD and the Mobile Military Unit all provide access to groundwater for rural communities.

Water resources management and planning is carried out by administrative region rather than hydrological basin, and generally from centralised government departments with a bias towards the Chao Phraya Basin. The key ministries are MOAC, MOTC, MOInd, MOI, MOPH and MOSTE. Within these ministries, RID, DMR and PCD are of particular importance, broadly addressing surface water, groundwater and water quality, respectively. There are also a number of national boards responsible for policy and planning, including NESDB, NEB and NWRC (National Water Resources Committee).

The complexity of the legislative and institutional water-management context is a hindrance to the interpretation and enforcement of the law, and to the efficient use of both water resources and government budget. What is clear is that there are numerous administrative and legal gaps and overlaps in the water sector, and a lack of comprehensive, overall management. Enactment of the proposed Water Resources Act, and rationalisation of government agencies active in water resource development and supply, would go a long way towards overcoming these problems. It might be noted that a 1991 report[64] stated that NWRC's progress in establishing a comprehensive water code might be slow; eight years later this can be confirmed, with enactment still not imminent.[65] The lack of co-ordination and common interest, and RID's relatively important role, are illustrated in Figure 5.6.1.

---

[63] *Water Supply Master Plan Region 3 : Water Legislation Report*, Carl Bro International for PWA and World Bank, February 1991.

[64] *Ibid.*

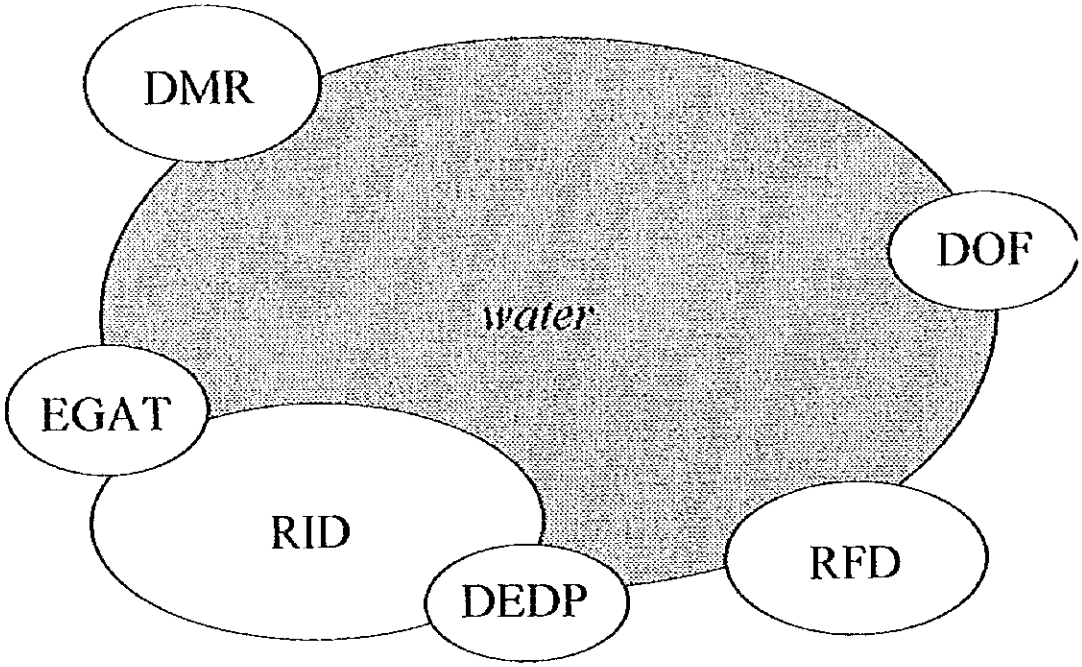
[65] The Minister of Agriculture and Co-operatives recently declared that it would be "difficult" for the government to enact the Water Resources Law before April 2000 (Source: ' "No charge" for using river water', in *Bangkok Post*, 13 January 1999) and, though it may be submitted to Cabinet in February 1999 (Source: 'Water fee to be charged

Table 5.6.3. Institutions involved in the water sector.

Institution	Water Supply	Water Resources	- with legal responsibility	- e.g. groundwater in rural areas	Water Management
Ministry of Agriculture & Co-operatives					•
Royal Irrigation Department		•	•		•
Department of Fisheries		•			
Department of Land Development		•			
Agricultural Land Reform Office		•	•		
Office of Prime Minister					
Electricity Generating Authority of Thailand		•	•		
Office of National Economic & Social Development Board					•
National Water Resources Committee					•
Ministry of Interior					•
Metropolitan Waterworks Authority	•	•	•		
Provincial Waterworks Authority	•	•	•		
Municipalities	•				
Changwat Administrative Organisations	•				
Department of Public Works	•	•		•	
Office of Accelerated Rural Development		•		•	
Department of Local Administration		•		•	
Department of Community Development		•		•	
Ministry of Science, Technology & Environment					•
Department of Energy Development & Promotion	•				
Pollution Control Department					•
National Energy Authority		•	•		
Office of National Environment Board					•
Ministry of Public Health					•
Department of Health	•	•		•	
Ministry of Industry					•
Department of Mineral Resources	•	•	•	•	•
Industrial Estate Authority of Thailand	•				
Ministry of Transport & Communications					•
Ministry of Labour & Social Welfare					
Department of Public Welfare		•			
Ministry of Defence					
Military Mobile Unit	•	•		•	

for agricultural purposes', in *Bangkok Post*, 15 January 1999), it may be some time before it passes through Parliament.

Figure 5.6.1. Illustration of lack of co-ordination and common interest between selected government agencies active in the water sector.



There is no specific legislation covering ownership of water. However, the Civil and Commercial Code of Thailand has been interpreted as meaning that water belongs to the State, held in trust for the public benefit:[66]

> *Section 1304. - The public domain of the State includes every kind of State property which is in use for the public interest or reserved for the common benefit, such as [...] property for the common use of the people, e.g. river banks, waterways, highways, lakes [...].*

This interpretation is supported by the draft Water Resources Act that specifies "Water resources are the state's common property".[67] Section 1304 also implies that all have the free right to use water, and that all have equal rights: "common use". However, there are certain restrictions on use, including:

> *Section 1355. - A riparian landowner has no right to withdraw water in the amount exceeding his reasonable need to the prejudice of other land abutting the same waterway.*

However, the upstream user's "reasonable need" can prevent other users' reasonable needs being satisfied, thus leading to conflicts.[68] A similar provision is included for surface run-off:

[66] *Special Assistance for Project Sustainability for Mae Kuang Irrigated Agriculture Development Project: Legal and Institutional Issues*, Dr Amnat Wongbandit for OECF, January 1998.

[67] Version of 23 September 1997 (unofficial translation).

[68] It is for this reason that the draft Water Resources Act includes the provision that one user's right should not prejudice the rights of others using the same water resources (section 8).

Section 1339. - [...] water that flows naturally on to lower land and is necessary to such land may be retained by the owner of the higher land only to the extent as is indispensable to his land.

The Civil and Commercial Code also states that "subject to the provision of this code or other laws, the ownership of land extends above and below the surface" (section 1355). Thus the land below belongs to the owner of the land at the surface. However, this does not apply to water passing through or across the land, to which the land owner only has a right to use.

The Private (or People's) Irrigation Act, B.E. 2482 (1939), requires that all private irrigation projects obtain permission from the authorities. This too might appear to constrain water use but it only applies to water used in agriculture and to farms larger than 200 rai, and there is no provision for charging. Even in the case of commercial irrigation projects, water users pay the operator a fee but the operator does not have to pay anything to anyone. In principle a people's irrigation system is protected as use of water must not obstruct the system's operation, but there are no legal penalties for abuses.

The Royal (or Government) Irrigation Act, B.E. 2485 (1942), provides for RID regulating, allocating and managing water in government irrigation canals. RID decides on how much and to whom water is to be allocated, for agricultural, industrial and municipal uses. Though RID does not "own" the water in the irrigation canal, it has effective control and can charge users a fee. However, both these factors are limited: farmers and others sufficiently desperate or well-connected are often able to interfere with RID's water management;[69] and water fees are rarely collected. Water fees are provided for in the Royal Irrigation Act[70] as reproduced in Sub-section 4.7(3)(a) below.

A very limited sum has been collected through water fees on non-agricultural users;[71] the idea of imposing such charges on farmers is considered "political suicide" given the strength of the lobby of the poor farmer.[72] The Minister of Agriculture and Co-operatives recently restated government opposition to making farmers pay for water use,[73] while the Permanent Secretary suggested that only planters of 'economic crops' (sugar cane and durian were cited) would be liable.[74] Such major abstractors as the Provincial Waterworks Authority (generally) do not pay a fee as they are seen as using the water for public purposes and are exempted by the Director General of RID. In turn, the PWA's charges to the consumer are limited by the Government and are not expected to reflect the "value" of the water, only the costs of treatment and supply from the point of abstraction. Further provisions of the Royal Irrigation Act are reproduced in the *Supporting Report*. A range of water legislation is summarised in Table 5.6.4.

---

[69] *Special Assistance for Project Sustainability for Mae Kuang Irrigated Agriculture Development Project: Legal and Institutional Issues*, Dr Amnat Wongbandit for OECF, January 1998.

[70] Government Irrigation Act B.E. 2485 (1942), as amended by Government Irrigation Act (No. 2) B.E. 2497 (1954), Government Irrigation Act (No. 3) B.E. 2507 (1964), Government Irrigation Act (No. 4) B.E. 2518 (1975) and Government Irrigation Act (No. 5) B.E. 2530 (1987).

[71] Ministerial Regulation No. 11 (1975), MOAC.

[72] *Special Assistance for Project Sustainability for Mae Kuang Irrigated Agriculture Development Project: Legal and Institutional Issues*, Dr Amnat Wongbandit for OECF, January 1998.

[73] Source: ' "No charge" for using river water', in *Bangkok Post*, 13 January 1999.

[74] Source: 'Water fee to be charged for agricultural purposes', in *Bangkok Post*, 15 January 1999.

Table 5.6.4. Summary of water legislation and competent agencies (Source: Based on the *Water Supply Master Plan Region 3 : Water Legislation Report*, Carl Bro International for PWA and World Bank, February 1991).

B.E. Year	Legislation	Competent agency	Field(s) of interest *		
			R	S	Q
2446 (1903)	Canal Maintenance Act	MOAC	•		•
2456 (1913)	Water Hyacinth Elimination Act	-	•		•
	Navigation in Thai Waters Act	Harbour Department			•
2482 (1939)	People's Irrigation Act, amended in 1980 and 1983	Amphoe and Changwat committees, and MOAC	•		
2485 (1942)	Government Irrigation Act	RID (MOAC)	•		•
2490 (1947)	Fisheries Act, amended 1953, '85	MOAC			•
2496 (1953)	Municipality Act	Municipalities (MOI)		•	
	National Energy Authority Act	National Energy Authority (MOSTE)	•		
2498 (1955)	Changwat Administration Act	Changwats (MOI)		•	
2505 (1962)	Dikes and Ditches Act	RID (MOAC)	•		
2510 (1967)	Minerals Act	DMR (MOInd)	•		•
	Metropolitan Waterworks Authority Act	MWA (MOI)	•	•	
2511 (1968)	Electricity Generating Authority of Thailand Act	EGAT (Office of Prime Minister)	•		
2515 (1972)	Revolutionary Party Notification No. 58, on Commercial transactions of public utilities	Public Works Department (MOI)		•	
	Revolutionary Council Announcement No. 286, on creation of the Land Allocation Control Committee	Land Allocation Control Committee, and NEB			•
2517 (1974)	Land Consolidation for Agriculture Act	MOAC	•		
2518 (1975)	Land Reform for Agriculture Act	Office of Land Reform for Agriculture (MOAC)	•		
2520 (1977)	Groundwater Act	Ministry of Industry	•		
2521 (1978)	National Economic and Social Development Board Act	NESDB (Office of Prime Minister)	•		
2522 (1979)	Provincial Waterworks Authority Act	PWA (MOI)	•	•	
	Building Control Act	MOI			•
	Industrial Estate Act	Industrial Estate Authority (MOI)		•	
2526 (1983)	Waterworks Canal Maintenance Act	MWA and PWA (MOI)	•		•
2535 (1992)	City Cleanliness and Tidiness Act	-			•
	Enhancement and Conservation of National Environmental Quality Act	NEB (Office of Prime Minister), and MOSTE			•
	Factories Act	Department of Industrial Works (MOInd)			•
	Public Health Act	Ministry of Public Health			•

* Fields of interest: R - Resources S - Supply Q - Quality

Turning to sub-surface waters, the Groundwater Act B.E. 2520 (1977) amended 1992 governs the use and recharge of groundwater. However, the Act does not apply to government agencies (and state enterprises) responsible for domestic and agricultural water supply. Furthermore, though the Department of Mineral Resources is empowered to require other users to obtain a (transferable and revocable) permit and to pay a fee, the DMR has insufficient resources to ensure compliance.[75] The fee is linked to the local piped-water rate and is limited to 3.50 baht/m^3, with a 25% discount in areas where there is no surface-water alternative.[76]

With respect to water quality, the Enhancement and Conservation of National Environmental Quality Act, B.E. 2535 (1992) contains the main legal provisions concerning water quality and pollution control. However, numerous other legislative acts include relevant provisions:

Penal Code	*Nobody shall be allowed to pollute a public watercourse*
Minerals Act B.E 2510 (1965) as amended by the Minerals Act (No. 2) B.E. 2516 (1973) and the Minerals Act (No. 3) B.E. 2522 (1979)	*Section 67 - The mining licence can proscribe excess sediments in watercourses.* *Section 68 - The licensee must ensure sediment in watercourses does not cause waters to become shallow or be detrimental to their use.*
Navigation in Thai Waterways Act B.E. 2535 (1992)	*Nobody, except with permission of the Harbour Department, shall be allowed to deposit stone, gravel, sand, soil, mud, ballast or any other substances except oil and chemical substances into river, canals, swamps, reservoirs, lakes that could cause sludge, and sedimentation. Nobody shall be allowed to deposit oil and chemical substances or any other into river, canals, swamps, water storage, reservoirs, lakes that could cause pollution or create risk to navigation.*
Maintenance of Canals Act B.E. 2446 (1903)	*Nobody shall be allowed to dump cobweb, dust or dirt in the canal and it is forbidden to dump such things in the watercourses which flow into the canals*
Act on Conservation of Water Supply Canals B.E. 2526 (1983)	*General prohibitions against allowing waste disposal or drainage into the canals.*
Royal Thai Irrigation Act B.E. 2485 (1942)	*Section 28 - No person shall discard any rubbish, carcass, remnant of plant, ashes or filth into the irrigation waterway or do any act causing the water to be harmful to cultivation or consumption.* *No person shall release any water which shall cause the natural water to become poisonous or release any toxic chemical into the irrigation waterway which may thereby cause the water therein to be harmful to agriculture, consumption, utility or health.*

The National Administration Act 1991 included creation of the Ad Hoc Commission for Solving Water Problems, chaired by the Prime Minister, which deals with floods, droughts and water quality degradation. A National Hydrology Board advises the NESDB regarding the water resource development potential of Thailand's twenty-five major river basins.

---

[75] *Ibid.*

[76] Ministerial Regulation No. 6 (1994).

With respect to international agreements, the document of most immediate relevance is the Agreement on the Co-operation for the Sustainable Development of the Mekong River Basin. The Agreement is between the Kingdom of Thailand, Kingdom of Cambodia, Lao People's Democratic Republic and the Socialist Republic of Vietnam. The Agreement's Joint Commission has also established a dialogue with the People's Republic of China and the Union of Myanmar.

Article 5 of the Agreement states that "on tributaries of the Mekong River [...] inter-basin diversions shall be subject to notification to the Joint Committee." To this end, the proposed Kok-Ing-Nan water diversion project was officially notified to the Joint Committee at the special session held on 20-21 November 1995 in Ho Chi Minh city, Vietnam, for commencement of the feasibility study. The minutes of the special session acknowledge notification (item 42) and requested the Sub-committee on Article 26 to prepare the details of "format", "content" and "procedures" for the purpose of facilitating notification as stipulated in the agreement, and to submit them to the Joint Committee for its consideration (item 43). The minutes of the session are included in the Conceptual Planning Study : Supporting Report (JICA, March 1997), and the Supporting Report reproduces the key Agreement articles.

Under the Agreement, the parties also agree

Article 3. Protection of the Environmental and Ecological Balance - To protect the environment, natural resources, aquatic life and conditions, and ecological balance of the Mekong River Basin from pollution or other harmful effects resulting from any development plans and uses of water and related resources in the Basin.

Article 6. Maintenance of Flows on the Mainstream - To co-operate in the maintenance of flows on the mainstream from diversions, storage releases, or other actions of a permanent nature [...]

A. Of not less than the acceptable minimum monthly natural flow during each month of the dry season [...]

Article 7. Prevention and Cessation of Harmful Effects - To make every effort to avoid, minimise and mitigate harmful effects that might occur to the environment, especially the water quantity and quality, the aquatic (ecosystem) conditions, and ecological balance of the river system, from the development and use of the Mekong River Basin water resources [...]

The term acceptable minimum monthly natural flow is not adequately defined in the Agreement. It is interesting to note that Article 5 (Reasonable and Equitable Utilisation) requires that the parties "utilise the waters of the Mekong River system in a reasonable and equitable manner in their respective territories"; presumably it is intended that the equity be between the parties to the Agreement, rather than between people in different parts of a member country, i.e. equity between the Kok/Ing and Chao Phraya areas.

(b) Land Use

Three legislative acts allow compulsory agricultural land reform and development: the Dikes and Ditches Act, the Agricultural Land Consolidation Act and the Agricultural Land Reform Act. In each case a Royal Decree needs to be issued before action can be taken. Further acts provide for land-use control.

The Dikes and Ditches Act B.E. 2505 (1962) provides RID with a means to force landowners to construct dikes so as to retain irrigation water and ditches to allow flow. Though

the legislation envisages landowners bearing the cost of such works, they are more commonly executed by RID at the Government's expense.[77]

The Agricultural Land Consolidation Act, B.E. 2517 (1974), was passed to allow consolidation of land plots that prevent the implementation of efficient irrigation systems or the movement of farm products. The Act includes provision for purchase of land and resort to the Immovable Property Expropriation Act. The Provincial Land Consolidation Committee is responsible for determining land values, defining consolidated plots and common use areas, and constructing common infrastructure. The Land Department then issues title deeds or other documents; subsequent transfer of title or change of use is restricted. The legislation allows for most consolidation costs to be recouped from landowners; in practice most (80%) costs are borne by the Government.[78]

The Agricultural Land Reform Act, B.E. 2518 (1975), was enacted to tackle the dual issues of (a) farmers having no land or insufficient land to support their family, and (b) vast land-holdings of absent landowners. The Act allows the Office of Agricultural Land Reform (ALR) to buy or expropriate (under the Immovable Property Expropriation Act) land, and to allot the land through either a lease or a hire-purchase agreement. Again, subsequent transfer of title is restricted, but not change of use.

The Agricultural Land Lease Act, B.E. 2524 (1981), allows for the creation of Agricultural Land Lease Committees that can set a maximum rent, restrict cropping and help settle tenancy disputes. The Act also has a provision allowing those with no or insufficient land to apply to the relevant committee to lease under-utilised land belonging to an absentee landlord.

The Town & Country Planning Act, B.E. 2518 (1975), governs land-use control in general, but it has generally only been applied to urban areas until recently.[79] The Act defines two types of plan that may be prepared by the Town and Country Planning (T&CP) Department (TCPD in MOI) or the local administration: the Comprehensive Plan and the Specific Plan. In both cases a Royal Decree has to be issued to define the area of the plan.

A Comprehensive Plan is devised through a process of survey, public hearing, public scrutiny, approval by the T&CP Committee, approval by the Minister of Interior and issue of a ministerial regulation. The Plan defines zones prescribing prohibited and allowed land-use activities, including activities that may take place in a small proportion of the zone, e.g. industry within a predominantly agricultural zone. Though the Act includes penalties for non-compliance with the Plan, local authorities tend not to enforce.[80] The Specific Plan is similar to the Comprehensive one but it allows for greater restrictions to be placed on land use, requires two public hearings and allows for expropriation (under the Immovable Property Expropriation Act) for T&CP purposes. However, a Specific Plan has to be implemented by a parliamentary act and is therefore more difficult and slower to apply.

The TCPD intends to revise plans every five years, though about a third of those that have been prepared have now expired and many urban areas have never had any land-use planning rules.[81] Rural areas are not generally covered by T&CP plans, so private landowners can use their land as they see fit. Public land is subject to Cabinet resolutions as well as legislation such as the Forest Act; here the constraint on land-use control is one of implementation and enforcement.

---

[77] *Ibid.*
[78] *Ibid.*
[79] *Ibid.*
[80] *Ibid.*
[81] Source: 'Town planning in legal limbo', in *Bangkok Post*, 20 December 1998.

As noted earlier, the Civil and Commercial Code states that land ownership extends both above and below the surface.

(c) Environment

Article 74 of the Constitution refers to the protection and preservation of the environment. Generally environmental legislation is fragmented, sectoral and out of date. However, the Enhancement and Conservation of National Environmental Quality Act B.E. 2535 (1992) does provide a more modern framework for environmental legislation, though its enforcement has been very limited to date. Key sections of the Act are as follows:

- *Section 6* addresses public participation, including the right to environmental information, and the right "to be remedied or compensated by the State in case damage or injury is sustained as a consequence of dangers arisen from contamination by pollutants or spread of pollution, and such incident is caused by any activity or project initiated, supported or undertaken by government agency or state enterprise";
- *Section* 8 allows environmental NGOs (as registered under section 7) to request government assistance or support in various activities;
- *Section* 35 relates to the formulation of an Environmental Quality Management Plan by the NEB;
- *Section* 37 relates to the formulation by Changwat Governor of a Changwat Action Plan for Environmental Quality Management if any environmentally-protected or pollution-control areas are within the Changwat;
- *Section* 43 provides for designation of environmentally protected areas, e.g. fragile ecosystems, watershed areas; and
- *Sections* 46-49 cover environmental impact assessment (as discussed in *Chapter 1*).

A large number of environmental standards have been defined, as listed in the *Supporting Report*. Most standards date from the past five years, including those for air quality, effluent, surface water classification, vehicle noise, solid waste, toxic substances and nuisance; the relevant exceptions being standards for noise in the workplace (1970s) and drinking water (1978-81).

With respect to liability, there are provisions in the water quality legislation discussed above, in section 6 of the Enhancement and Conservation of National Environmental Quality Act, and in the Hazardous Substances Act B.E. 2535 (1992). The last-mentioned relates to the control of hazardous substances (including explosives and flammable substances), duties and liabilities.

There are a number of statutes relating to national parks and forest reserves. However, classified watersheds are defined only in Cabinet resolutions,[82] and such resolutions are only applicable to government agencies. Thus RID has to respect watershed classifications and forest reserves whereas private individuals need only respect forest reserves. Forest reserves are covered by:

- the Forest Act B.E. 2484 (1941), the enabling legislation for RFD. Article 4(1) : use requires permission of authorities, otherwise in violation of articles 11 & 73; clearing needs permission, otherwise in violation of articles 54 and 74 *tri*, and articles 9 and 108 of Land Act 1954; and

[82] For example, the Cabinet resolution concerning the classification of land and forest use within the national forest reserves.

- the National Forest Reserves Act B.E. 2507 (1964) which amended the law on the protection and reservation of forest.

The establishment and management of national parks is provided for by the National Parks Act B.E. 2504 (1961). The Act includes a provision stating that "in the area of the National Park, nobody shall be allowed to dump solid waste or other things in any place that is not provided {for that purpose}". Protected area classifications are summarised in the *Supporting Report*.

The draft Community Forest Act has suffered similar delays to the Water Resources Act, having been in preparation for at least seven years. The draft Act has been opposed by certain NGOs, academics and government departments, particularly with respect to collaborative forestry management and the acceptance of the presence of hill-tribes within protected forest areas. No agreement appears inminent.[83]

Finally, with respect to wildlife, the Wild Animals Preservation and Protection Act B.E. 2535 (1992) is a law for the preservation and protection of wild animals, listing preserved and protected species. The TEAM/JV EIA did not note any preserved species, but did identify many protected species.

(d) Other

The present, sixteenth Constitution (1997) aims to enhance and promote the citizen's right to be involved in and participate in local administration (section 9). Local administrative organisations are empowered to have freedom in deciding which development projects in their community meet the local needs. Local administration is described in sections 282 to 290, defining the creation, duties and responsibilities of local administrative organisations:

Creation:

- any local community that is capable of being self-sufficient may set up its own administrative organisation;
- the local administrative organisation is run by the local council and local executive group or a governor; and
- local council members are to be elected directly by the local population. Local executive group members or a governor are to be elected by the local population or selected by the local council. The term of office of a local council member, local executive group member or governor is four years.

Duties and responsibilities:

- central government releases duties and responsibilities to local administrative organisations in two main areas: duties and responsibilities for public services, and the collection of taxes and fees for local use, as identified by related laws;
- definition of administrative and personnel management policy and a fiscal and budgetary plan for its duties;
- responsibility for maintenance of local art, tradition, intellect and culture; right to manage education and occupational training that meets local needs;
- in order to enhance and protect the local environment:
  - management, maintenance and use of natural resources and the environment within the administrative area;

[83] Source: 'Rival groups clash over forest bill', in *Bangkok Post*, 13 January 1999.

- participation in maintenance of natural resources and the environment outside its administrative area so as to prevent potential adverse impacts on the population of its administrative area; and
- participation in consideration of any projects to be executed outside its administrative area that may have an adverse effect on the health or hygiene of the population of its administrative area, or on its environmental quality.

The Constitution only addresses the principle of local administration, with the practical details provided by the Tambon Council and Tambon Administrative Organisation Act 1994 and other legislation. For example, section 67 of the Act allows TAOs to undertake activities related to the protection and conservation of natural resources. TAOs may also enact local bylaws. Though TAOs must be consulted by government agencies proposing development projects, they do not have a right of veto.

Village committees are regulated by the Village Committee Administration Act, B.E. 2526 (1983).

Turning to mineral rights, the Minerals Act B.E 2510 (1965), as amended by the Minerals Act (No. 2) B.E. 2516 (1973) and the Minerals Act (No. 3) B.E. 2522 (1979), includes the following relevant provisions:

- *Section* 43 requires that a licence (*prathanabat*) be obtained for mining in an area;
- *Section* 44 states that a mining area may not exceed 300 rai;
- *Section* 62 requires that specific permission is given to mine within 50m of a highway or public waterway;
- *Section* 72 states that pit or shaft must be filled and land restored, unless otherwise specified in the licence;
- *Section* 73(1) allows by-products to be sold on receipt of a licence of the Director General of the DMR; and
- *Section* 74 states that mining waste may only be removed from the mining area if a licence is obtained.

Other statutes of relevance include:

Labour Protection Act B.E. 2541 (1998)	Ministry of Labour can promulgate standards for safety at work and for occupational health.
Factory Act B.E. 2535 (1992)	The minister may adopt various rules, including safety measures (section 8(4), 8(8), ...), and standards and methods of controlling the discharge of wastes and pollutants (section 8(5)).
Public Health Act B.E. 2535 (1992)	Any action that causes noise or dust, for example, may be deemed a source of nuisance (section 25).
Investment Promotion Act B.E.2520 (1977)	The Board of Investment has a One Stop Service Centre through which foreign investors can submit an EIA and have it reviewed quickly (section 19).
Labour Relations Act B.E. 2518 (1975)	Relates to labour relations and unions.
State Information Act B.E. 2540 (1997)	Right of access to public information held by government agencies.

(4) Institutions

There are three levels of administration in the Kingdom of Thailand: Central, Regional and Local. Central Administration comprises the Prime Minister's office, ministries and government departments. Charts of selected organisations are presented in the *Supporting Report*.

The Regional Administration can be described as de-concentration, rather than de-centralisation. Central administration officials are posted to the regions so as to respond better to the needs of people in the regions. They remain under the direction and supervision of the central administration. The centrally-appointed Provincial Governors and District Officers are part of this system.

Local Administration is a genuine attempt at decentralisation of power whereas, historically, government has been highly centralised. Local Administration is empowering local inhabitants through locally-elected representative organisations, notably in communes (*tambons*), villages and municipalities, though also through provincial councils. Though there is a reasonable degree of independence in theory, in practice this independence is constrained by limited budget and technical knowledge, and other factors.

(a) Central Administration

The Royal Thai Government is responsible for making and implementing policy and controlling administration. It comprises the Office of the Prime Minister, Ministries, and Departments or government offices. There are fourteen ministries at present:

- Ministry of Agriculture and Co-operatives (MOAC)
- Ministry of Interior (MOI)
- Ministry of Science, Technology and Environment (MOSTE)
- Ministry of Industry (MOInd)
- Ministry of Transport and Communications (MOTC)[84]
- Ministry of Public Health (MOPH)
- Ministry of Finance (MOF)
- Ministry of Education (MOEd)
- Ministry of University Affairs (MOUA)
- Ministry of Labour and Social Welfare (MOLSW)
- Ministry of Justice
- Ministry of Commerce (MOC)
- Ministry of Foreign Affairs
- Ministry of Defence (MOD)

The first three ministries listed above (MOAC, MOI and MOSTE) are of particular relevance to this environmental study: the relevant sections of their internal structure are shown in organisation charts in the *Supporting Report*. Certain other government departments are important to the project, e.g. the Department of Mineral Resources (DMR) within the Ministry of Industry. Some departments have already been mentioned in the above discussion on legislation and policy; further information on relevant departments is provided in Table 5.6.5.

(b) Administrative Divisions

The non-central administrative structure is as shown in Figure 5.6.2. There are rules defining how the divisions are formed. For example, a new tambon can be created if the

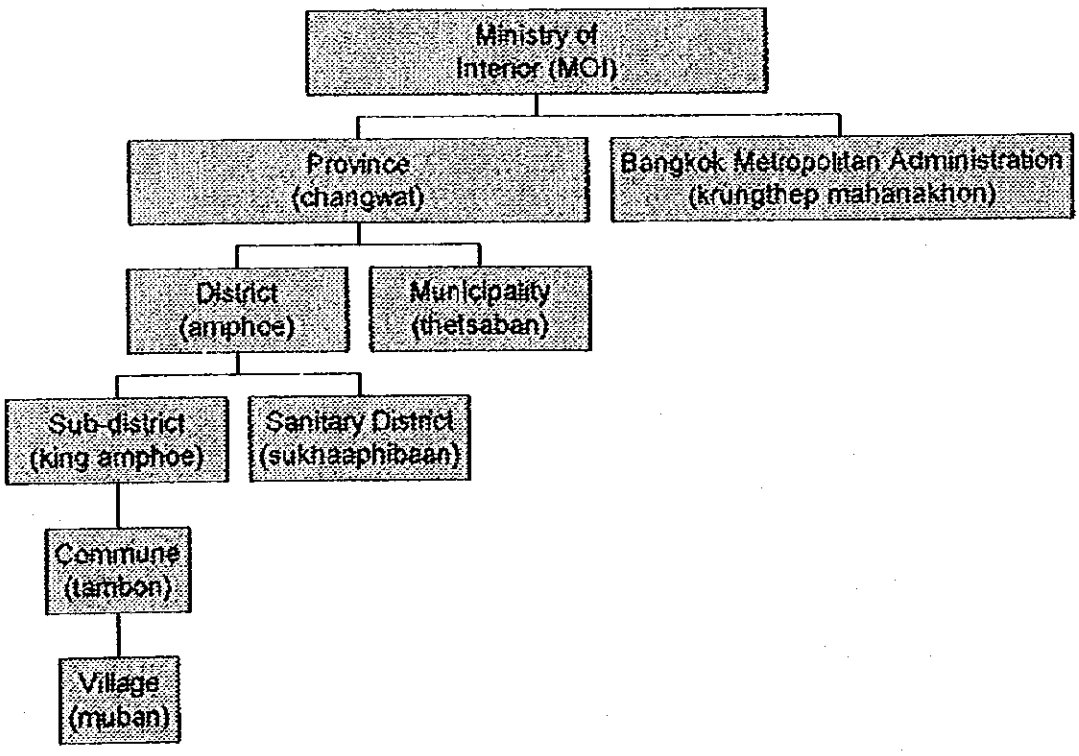
[84] Soon to become the Ministry of Transport when communications agencies are privatised.

population of the new area exceeds 3,200, it will include more than eight villages and approval is given by tambon and district heads.[85]

The relationship between administrative organisations at the different levels focuses on co-operation and co-ordination in formulating local plans for local development and project implementation. At the highest level, the National Rural Development Committee (NRDC, *Kor Chor Chor Phor*) defines policies and plans for rural development, how development is to be distributed across the provinces, and rural development roles and duties of government offices, state enterprises and the private sector. The provincial committee (*Kor Phor Chor*) has to define its own policies and guidelines, and assure that provincial development plans comply with NRDC policy and with the National Economic and Social Development Plan. Similar relationships exist at the lower levels (via the amphoe *Kor Phor Or* and tambon *Kor Sor Tor*), down to the village committee (*Kor Mor*).

There are two budgeting systems operating at the province and sub-province level: departmental budgets that are submitted to Bangkok and the provincial budget for local development. Government departments and their local manifestations initiate most projects and programmes. However, there is now a degree of bottom-up planning that can tap into either of these two types of budget. Thus, a village committee can submit a project proposal, e.g. for a water supply project, to the local office of a government department, e.g. ARD, via the TAO and the District Office. Alternatively a project can be submitted as part of the tambon development plan, to be scrutinised by the budget committees at district and province levels and submitted to the Provincial Rural Development Committee for consolidation. If approved, the budget can then be passed back down to the TAO for it to manage the project.

Figure 5.6.2. Non-central administrative structure.



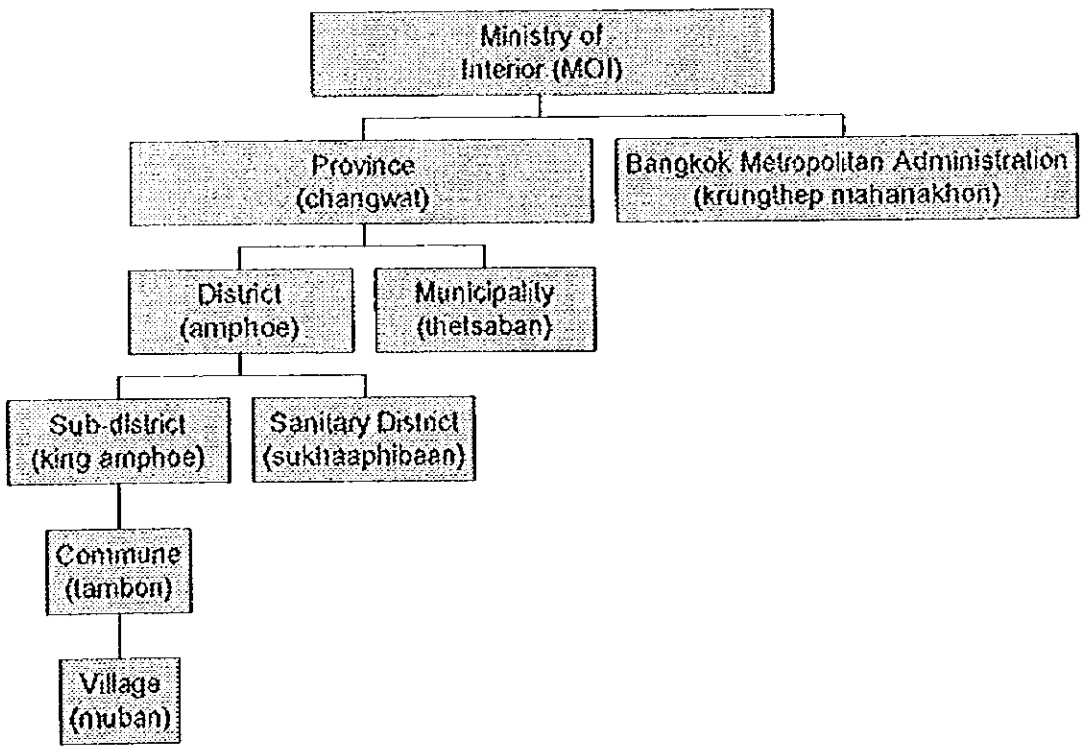
[85] Procedure proposed by the Ministry of Interior and approved by Cabinet 1 November 1983.

population of the new area exceeds 3,200, it will include more than eight villages and approval is given by tambon and district heads.[85]

The relationship between administrative organisations at the different levels focuses on co-operation and co-ordination in formulating local plans for local development and project implementation. At the highest level, the National Rural Development Committee (NRDC, *Kor Chor Chor Phor*) defines policies and plans for rural development, how development is to be distributed across the provinces, and rural development roles and duties of government offices, state enterprises and the private sector. The provincial committee (*Kor Phor Chor*) has to define its own policies and guidelines, and assure that provincial development plans comply with NRDC policy and with the National Economic and Social Development Plan. Similar relationships exist at the lower levels (via the amphoe *Kor Phor Or* and tambon *Kor Sor Tor*), down to the village committee (*Kor Mor*).

There are two budgeting systems operating at the province and sub-province level: departmental budgets that are submitted to Bangkok and the provincial budget for local development. Government departments and their local manifestations initiate most projects and programmes. However, there is now a degree of bottom-up planning that can tap into either of these two types of budget. Thus, a village committee can submit a project proposal, e.g. for a water supply project, to the local office of a government department, e.g. ARD, via the TAO and the District Office. Alternatively a project can be submitted as part of the tambon development plan, to be scrutinised by the budget committees at district and province levels and submitted to the Provincial Rural Development Committee for consolidation. If approved, the budget can then be passed back down to the TAO for it to manage the project.

Figure 5.6.2. Non-central administrative structure.



[85] Procedure proposed by the Ministry of Interior and approved by Cabinet 1 November 1983.

Table 5.6.5. Summary of relevant government departments.

Ministry	Department, Board, etc.	Relevant responsibilities
Office of the Prime Minister	National Economic & Social Development Board (NESDB)	Policy framework for government in five-year plans, including economic development, and environmental and natural resource management policy issues.
	National Environment Board (NEB)	Policy for environmental management and regulatory (pollution control) functions.
	National Water Resources Committee (NWRC)	Policy for water resources development and construction.
	National Rural Development & Decentralisation Committee (NRDDC)	Policies and plans for rural development, how development is to be distributed across the provinces, and rural development roles and duties of government offices, state enterprises and the private sector
	Electricity Generating Authority of Thailand (EGAT)	Electricity generation and transmission.
Ministry of Agriculture & Co-operatives	Royal Irrigation Department (RID)	Construction, management and maintenance of irrigation infrastructure. Water distribution for agriculture, energy, public utility, industry. Flood and navigation control with irrigation areas.
	Royal Forestry Department (RFD)	Mandate is to manage and protect natural resources and wildlife in the country's forests. Watershed Management Units preserves and protects forests in watershed (upland) areas, are directed from Bangkok and are independent of the provincial Forestry Office
	Department of Land Development (DLD)	Land classification and single-sector land-use plans; land soil conservation.
	Office of Agricultural Land Reform (ALR)	Implementation of land reform policy and the Agricultural Land Reform Act.
	Department of Fisheries (DOF)	Responsible for fresh and sea-water fisheries and aquaculture.
Ministry of Interior	Department of Community Development (DCD)	DCD is responsible for improving the quality of life and sustaining the environment in rural areas. These objectives are pursued through human development works, especially education. Formally, DCD's mission[86] is 1. to promote and develop the learning process for individuals, families and communities; 2. to promote occupational and local fund development; 3. to develop the potential of people's organisations, volunteers and local leaders, and to promote their role in community development management; 4. to establish and develop a network of people's organisations; 5. to encourage the role of local leaders in human resources.
	Town & Country Planning Department (TCPD)	Physical planning; production of regional, provincial, district and local plans.
	Department of Local Administration (DOLA)	Supervision of 'de-concentrated' Regional (Provincial and District) administration, including provision of Provincial Governors and District Officers.

[86] Source: *DCD* pamphlet, 1998.

Ministry	Department, Board, etc.	Relevant responsibilities
	Office of Accelerated Rural Development (ARD)	Responsible for accelerating the development of physical infrastructure and enhancing social activities so as to improve the rural standard of living. Main activities are (ARD public relations pamphlet, May 1992): • Construction and maintenance of rural access roads (e.g. village to village) and drainage systems. • Construction and maintenance of small- and medium-scale water resource systems. • Encouragement of social activities to improve the rural standard of living, notably through development of agri-businesses, youth training and promotion of water users' groups. • Natural disaster relief, in co-operation with other agencies.
	Land Department	Land survey and registration of land tenure.
	Department of Public Works (DPW)	Undertaking of public works.
	Provincial Waterworks Authority (PWA)	Water supply, outside Bangkok.
	Metropolitan Waterworks Authority (MWA)	Water supply in Bangkok metropolitan area.
Ministry of Science, Technology & Environment	Office of Environmental Policy & Planning (OEPP)	Environmental policy, planning and co-ordination. Assists in establishing long-term policy for forestry and watershed management sector, including development of watershed classification. Co-ordinate natural resource management and environmental quality planning.
	Pollution Control Department (PCD)	Responsible for implementing, promoting and enforcing the pollution control provisions of the environmental legislation (primarily the National Environmental Quality, Public Health, Factory and Hazardous Substance Acts of 1992), and the environmental standards.
	Department of Environmental Quality Promotion (DEQP)	Public education and extension. Provision of environmental information. Support of environmental research and training.
	Department of Energy Development and Promotion (DEDP)	Promotion and development of energy sources, and promotion of energy efficiency.
Ministry of Industry	Department of Mineral Resources (DMR)	Provision of basic geological and mining data. Provision of conditions conducive to domestic and foreign participation in the mining sector.
Ministry of Public Health	Department of Health (DOH)	Provision of health services.

The importance of bottom-up planning has increased substantially over recent years. For example, over 40% of DCD's 1997 budget for Chiang Rai province was spent on tambon development projects. Indeed, DCD is taking the leading governmental role in the development of local democracy in the form of the TAO. The Community Development District Team is key to the strengthening of TAOs at the grass-roots level. The District Team helps the TAOs write their Five-year Development Plans, to a standard format; these are then submitted to the Provincial DCD for approval. DCD also works on the annual amphoe action plan.

However, in addition to co-operation and assistance there are direction and control measures that enable central government to limit local autonomy.[87] These measures can be classified as administration and personnel, finance and operation:

- *Administration and personnel*: the Minister of Interior can dissolve local councils, dismiss local administrations, dismiss or appoint councillors, and control local administrations and local government officials;
- *Finance*: the central government defines regulations for financial control covering tax and revenue collection, assets, loans, disbursements, auditing. It also provides subsidies; and
- *Operation*: the governor, representing central government, can veto local government laws.

Local government is also dependent on central government for technical input.

(c) Provincial Administration

The Provincial Governor (*phuu waa raatchakan*) is appointed by the Ministry of the Interior (MOI), is an official under the Office of the Permanent Secretary for Interior (MOI), and is head of the Provincial or Changwat Administrative Organisation (CAO). The Governor controls all government officials of all ministries and departments within the province or *changwat* (*jangwaat*), and is supported by provincial officials paid from the provincial budget. The superior provincial officer is the Permanent Secretary under the Department of Local Administration (MOI). The governor may be assisted by deputy or assistant governors who are similarly officials under the Office of the Permanent Secretary.

The Provincial Council consists of elected representatives of the province's districts. The council is a legislative body having the following powers and duties:

- formulating policies and making decisions on the conduct of CAO activities;
- controlling the CAO's performance;
- issuing ordinances; and
- appointing committees.

As well as preparing, reviewing and approving development plans, provinces also prepare a Provincial Investment Plan. This plan is aimed primarily at providing private investors with basic socio-economic information, and to guide their investment activities.

Various central government units are present at the provincial level (Table 5.6.6), with their heads assisting the Provincial Governor. Though the Provincial Governor controls all government officials of all ministries and departments present in the province, the degree of control varies. The head of a central government department, e.g. DCD, is at the same level of seniority as the Provincial Governor, but the Provincial Governor is more familiar with the local situation so many departmental heads wish to pass control to the Provincial Governor. However, this varies between departments.

[87] Source: *The Study on the Functions of Local Administration in Thailand*, TIS Consultants for OECF, March 1994.

Table 5.6.6. Central Government Units accountable to the Provincial Governor (Source: after the *Western Seaboard Regional Development Master Plan: Institutional Report*, Nippon Koei for JICA, June 1997).

Unit at Provincial level	Superior unit in Central Government	Main function
Office of the Governor	MOI	Governor's Secretariat Office and planning staff
Local Administration Office	DOLA, MOI	Supervision of district and local government activities
Land Office	Department of Land, MOI	Land survey and registration
Community Development Office	DCD, MOI	Support of self-help community development activities
Public Works Office	DPW, MOI	Construction of provincial roads, bridges and reservoirs
Accelerated Rural Development Office	ARD, MOI	Construction of rural roads, bridges, water supply, weirs and promotion of village co-operatives
Police Office	Police Dept., MOI	Upkeep of law and order
Labour & Social Welfare Office	MOLSW	Representative of the Ministry
Employment Office	Dept. of Employment, MOLSW	Mediation between employers and employees
Public Welfare Office	Dept. of Public Welfare, MOLSW	Delivery of social services
Social Security Office	Office of Social Security, MOLSW	Administration of the Social Security Fund
Labour Welfare & Protection Office	Dept. of Labour Welfare & Protection, MOLSW	Inspection and advice on workers' welfare
Education Office	MOEd	Representative of the Ministry, co-ordination of education affairs, and promotion of culture and religion
Public Health Office	MOPH	Representative of the Ministry
Industry Office	MOInd	Representative of the Ministry
Land Transportation Office	Dept. of Land Transportation, MOTC	Registration and control of vehicles
Commerce Office	MOC	Representative of the Ministry
Agricultural Extension Office	Dept. of Agricultural Extension, MOAC	Promotion of major cropping
Livestock Office	Dept. of Livestock, MOAC	Control of livestock diseases
Forestry Office	RFD, MOAC	Management and protection of natural resources and wildlife. Registration of timber traders and movement of timber.
Fishery Office	DOF, MOAC	Promotion of fisheries and aquaculture. Registration & control of fishing.
Irrigation Office	RID, MOAC	Operation and maintenance of irrigation canals and facilities
Co-operatives Office	Dept. of Co-operatives Promotion	Promotion and supervision of all kinds of co-operatives
Treasury Office	MOF	Representative of the Ministry, and safe deposit and supply of public funds
Revenue Office	Dept. of Revenue, MOF	Collection of revenue
Excise Office	Dept. of Excise, MOF	Collection of excise taxes
Public Land Office	Dept. of Public Land, MOF	Administration of public funds

Indeed, the degree of co-operation between local representation of government departments and the provincial authorities varies from department to department and province to province. For example, ARD and DCD work closely with provincial authorities (all MOI), whereas RFD and RID (both MOAC) have far less contact and co-operation.

Two examples serve to illustrate how the strength of the link varies. The Chiang Rai office of the Department of Fisheries (DOF) is part of the Ministry of Agriculture and Co-operatives, and is located in a building on the outskirts of the city, distant from the provincial government buildings. The director need only apply to the governor for permission to spend more than 2 million baht or to leave the province. The DOF works in loose co-operation with other government departments, notably RFD and RID (both sister departments in the MOAC), but the links with provincial government appear weak.

In contrast, the Chiang Rai office of the Department of Community Development (DCD) is part of the Ministry of Interior, to which the governor is also answerable. The Provincial DCD has its office in the provincial government building.

In both cases, the provincial director (of DCD or DOF) reports to both the Governor and to his/her own departmental head. Both these local offices propose their own budget, have it approved by the Governor who then passes it to the relevant department in Bangkok for its approval; the department then allocates the budget via the province.

The picture is further complicated by situations such as that prevailing in RFD where the provincial Forestry Office works independently of Watershed Management Units also active in the province, and these in turn work independently of the local communities.

On certain matters, local offices of government departments will work together. Thus, for example, DOF, RID and RFD (all MOAC) are all involved in developing Changwat environmental action plans.

As well as provincial units of central government agencies that should (in theory) be accountable to the Provincial Governor, there are also central government units that report directly to their superiors in Bangkok and have few contacts with the provincial authorities. These are listed in Table 5.6.7.

(d) District Administration

The District Officer (*nai amphoe*) is also appointed by the MOI, and is an official under the Department of Local Administration (DOLA). The District Officer is responsible to the Provincial Governor for administrative activities within the district (*amphoe*). The CAO empowers the District Officer as the superior officer at the district level, in charge of provincial administration within the district. This responsibility is not set out in the legislation, but is vested in the District Officer by the CAO. Again, various central government units are represented at the district level, with their heads assisting the District Officer but answerable to their provincial superiors. For example, the Department of Community Development is present at the district level.

In certain instances a sub-district (*king amphoe*) may be set up so as to facilitate contact with district officials.

(e) Tambon Administration

A commune typically comprises ten to thirty villages. The elected head of the commune (*tambon*) is the *kamnan*, who chairs the Tambon Council. The Tambon Council approves

central-government development projects, carries out administrative tasks assigned by the Provincial Governor, and co-ordinates or co-operates in works with related agencies. The Tambon Council has often been controlled by the District Officer.

However, this is now changing. The powers of tambons have been greatly increased under the new Constitution (see above), which allows a Tambon Council to achieve local government status as a Tambon Administrative Organisation (TAO or *aboto*)[88], once it has satisfied a number of criteria, notably income exceeding 150,000 baht per annum for three consecutive years. The TAO receives some local taxes and it is later intended that some government departmental budget should be transferred to the TAO. In principle, all Tambon Councils should now have been converted into TAOs, though this has yet to be completed.

Table 5.6.7. Central Government Units reporting directly to Bangkok (Source: after *Western Seaboard Regional Development Master Plan: Institutional Report*, Nippon Koei for JICA, June 1997).

Unit at Provincial level	Superior unit in Central Government	Main function
Statistics Office	National Statistics Bureau, Office of the Prime Minister	Collection of statistics
City Planning Office	Dept. of City Planning, MOI	Preparation of city plans
Minerals Office	DMR, MOInd	Control of mining licences
Highway Maintenance Unit	Dept. of Highways, MOTC	Maintenance of highways
Co-operative Auditing Office	Dept. of Co-operative Auditing, MOAC	Audit of co-operatives' accounts
Labour Skill Development Office	Dept. of Labour Skill Development, MOLSW	Training of labour
Post and Telegraph Office	Dept. of Post and Telegraph, MOTC	Postal services
Electricity Authority Office	Provincial Electricity Authority, MOI	Electricity services
Water Supply Office	PWA, MOI	Water supply services
Telephone Office	Telephone Organisation of Thailand, MOTC	Domestic telephone services
Telecommunication Office	Telecommunications Authority of Thailand, MOTC	International telephone services
Elementary Education Commission	National Elementary Education Commission, MOEd	Administration of public elementary education
Secondary Education Commission	Dept. of Secondary Education, MOEd	Administration of secondary education
Non-Formal Education Centre	Dept. of Non-Formal Education, MOEd	Administration of non-formal education
Vocational colleges and schools	Dept. of Vocational Education, MOEd	Administration of vocational education
Regional and provincial hospitals	Dept. of Medical Science, MOPH	Hospital services

Budget administration is taken over from the district by the TAO, though the tambon continues to be guided and supported by the district, by government departments and by NGOs. An example of this is the TAO five-year plan, which the amphoe representative of the DCD helps the TAO write, and which is submitted to the provincial governor for approval.

[88] There is frequent confusion in the use of the term *aboto* (or 'Or Bor Tor'), with it sometimes being used to denote either a Tambon Council or a TAO. For this reason, the acronym TAO will be used in this report, rather than the term *aboto*.

The TAO board includes two elected representatives and a headman, from each village in the tambon, together with the TAO leader (*kamnan*) and the tambon medical officer. The TAO executive committee comprises the kamnan, and two headmen and four other board members elected from the TAO board.

The Provincial Governor may still dissolve the TAO or remove from office a member who acts unlawfully, if so advised by the District Officer (section 91 of the 1994 Tambon Council and Tambon Administrative Organisation Act). The District Officer may also require information from the TAO and review its reports (section 90), but it is intended that there be far greater day-to-day local independence than under the Tambon Council system.

The Tambon Council and Tambon Administrative Organisation Act of 1994 defines the following responsibilities (section 67):

- Maintain land and water resources;
- Maintain roads, waterways, footpaths and public areas, and eliminate waste;
- Control and prevent the spread of infectious diseases;
- Prevent and relieve public risks;
- Promote education, religion and culture;
- Promote development of women, children, youth, and the old and disabled;
- Protect, care for and maintain natural resources;
- Undertake other government assignments.

The Act also lists the following activities to be executed by the TAO (section 68):

- Provide water for human consumption and agriculture;
- Provide and maintain electrical supplies;
- Provide and maintain drainage;
- Provide and maintain the meeting place, sports, leisure and public spaces;
- Provide and promote an agricultural group and co-operative activity;
- Promote family industries;
- Promote and maintain local careers;
- Promote, care for and maintain national properties;
- Profit from the TAO's assets;
- Provide a market, pier and ferry;
- Provide trade.

Furthermore, a government department must seek and take into consideration the views of any TAO whose tambon may be affected by the department's proposed development activities (section 69), though without the TAO having an veto.

(f) Village Administration

The elected head of the village (*muu-baan*) is the Village Headman (*phuu yai baan*) who carries out administrative tasks and heads the Village Committee. The Assistant Village Headman for Administration and the other five to nine village committee members are elected by the villagers. The committee is expected to ensure co-ordination of government agencies active in the village, as well as improving efficiency of the village administration. Committee duties include project identification and plan operation, and concurring with government projects and plans. Again, the Village Committee was often controlled by the District Officer in the past, but this is changing under the TAOs.

The village committee appoints 'activity groups', typically for Village Development, Administration, Security, Finance, Public Health, Education and Social Welfare. Other village groups of importance are the Housewife's Group, the Village Death Fund and water users organisations (see below).

(g) Other Local Administration

Local administration is thus carried out by the CAOs and TAOs (discussed above), special systems for Pattaya City and the Bangkok Metropolitan Authority, and the Municipality and Sanitary Districts.

There are three classes of municipality (*thetsabaan*):

- Town (*Tambon*) Municipality;
- City (*Muang*) Municipality, having between 10,000 and 50,000 inhabitants and more than 3,000 people per square km; and
- Metropolitan (*Nakhon*) Municipality, having more than 50,000 inhabitants and more than 3,000 people per square km.

The municipal administration is supported by the Municipal Assembly and the Municipal Council. The assembly is equivalent to the Parliament at the national level, being the legislative body and with members being directly elected. The Municipal Council is equivalent to the Cabinet at the national level, acts as the administrative body and comprises municipal councillors. The council is led by the elected Mayor (*naiyok thetsamontrii*).

The Sanitary District (*sukhaaphibaan*) has only a Sanitary Board acting as the legislative and administrative body. The District Officer is the *ex officio* chair of the Sanitary Board, which plans development projects. The Sanitary District plan, comprises such development projects, has to be approved by both the Sanitary Board and the Provincial Governor.

(h) Water User Organisations

The People's Irrigation System (PIS), or *Muang Fai*, is believed to have existed in northern Thailand for a millennium. Muang Fai includes a diversion weir and primarily serves wet-season irrigation, though year-round water supply is sometimes provided. The weir, or *Fai*, blocks a stream, diverting water into the paddy fields through an irrigation system. The water is taken off the canals through water dividers (*Keang* or *Dae*). (Muang Fai is described further in Section 5.3 above.) Muang Fai works because of the commitment of the system's users. This commitment is expressed in a written agreement that is read out to the members of the Water Users Group (WUG) at the beginning of each growing season as a reminder.

The Muang Fai system is administered by a committee led by the weir chief (*Kae Fai*), a respected and knowledgeable member of the community, elected by the water users. The weir chief's responsibilities include organising meetings, system construction and maintenance, water allocation, conflict resolution and penalising offenders. There are no legal sanctions, only social sanctions and peer pressure can be used to penalise a member who violates the rules. The canal chief (*Kae Muang*) is responsible for sub-irrigation systems, and the *Laam Muang* provides liaison with the water users.[89]

Muang Fai have sometimes become part of RID's water management. As such, PIS weir chiefs are RID common irrigators, limited to a two- to four-year term. In certain larger PISs, the District Officer has become weir chief. The users are now only responsible for the local

[89] Description source: Kannika Promsao, 1992.

infrastructure, not the whole system. Repairs costing less than 5,000 baht remain the responsibility of the users, 5,000 to 100,000 baht the changwat and over 100,000 baht RID. There is therefore an incentive for users to allow the system to degrade so that repair costs exceed the 5,000 baht threshold. Under the People's Irrigation Act, PISs have to be certified by the District Officer, though in reality this is not always the case.

RID has attempted to develop Water Users Associations (WUAs) to administer larger areas of irrigation, but these have not generally been successful primarily, it would appear, because they are simply too large and the administrators too distant from the farmers. This situation is exacerbated by the frequent absence of zone men[90] to act as intermediaries, because of insufficient funds. In addition, non-members can take water from the irrigation canals and there is no guarantee of water availability for members who have to pay a fee.

Furthermore, all types of water user organisation have suffered from changes in social structures as people leave the land to work in cities, and as agriculture (especially paddy) becomes relatively less lucrative. As farmers leave, those that remain bear a greater responsibility for the irrigation system, thus making their lives even harder.

Water User Co-operatives (WUCs) are usually formed in RID and DEDP irrigation areas and in land consolidation areas. The Department of Co-operatives Promotion is generally active supporting creation and operation of co-operatives. However, WUCs suffer from similar problems to WUAs. The *Supporting Report* presents a comparison of the various types of water users organisation.

(i) Non-governmental Organisations

NGOs generally represent legitimate community concerns that are best responded to by open discussion and recognition of negative project impacts. Ways can then be sought to mitigate or reduce impacts, or to compensate those affected. Table 5.6.8 lists a selection of relevant NGOs that might be consulted and with whom co-operation might be sought.

Table 5.6.8. A selection of relevant NGOs.

- Asian Elephants of Thailand Foundation
- Asian Society for Environmental Protection
- Bird Conservation Society of Thailand
- Campaign for Popular Democracy
- Community Ecological Development Programme (Chiang Rai)
- Forum of the Poor
- Friends of Nature
- Green World Foundation
- Kanchanaburi Conservationist Group
- Law Society of Thailand
- Phayao for Development Project
- Project for Ecological Recovery
- Raindrop Association
- Siam Environmental Club
- Sueb Nakhasathien Foundation
- Thailand Information Centre for Environmental Foundation
- The Siam Society
- Union for Civil Liberties
- Wildlife Fund Thailand
- World Vision Foundation of Thailand

(5) Recommendations

The institutional structure "can best be described as complex, with duplication of purpose, overlapping jurisdiction and with no clear mandate for co-ordination, co-operation or

[90] A zone man is responsible for a canal sub-system of 10,000 rai within a medium-sized or large irrigation system. As such he has more direct contact with water users than the system's RID administration.

accountability."[91] It is not clear that the empowering of the TAOs will necessarily lead to the improvement of the central and provincial government structure, though they may assure greater efficiency. However, a greater degree of planning would certainly help, particularly water-resource and land-use planning. The draft Water Resources Act requires, and various reports recommend, river basin committees to actively manage the resources available, rather than simply meeting demands in a rather *ad hoc* manner. Such committees, and the appropriate legislation, would provide a starting point for integrated water supply, demand and quality management, through co-ordination of the activities of the existing government departments.

A similar criticism might be appropriate of land-use planning where there appears to be continuing uncontrolled construction and agricultural expansion even in low-land areas. It could be said that this lack of land and water management is at the base of the two key resource issues that underlie this environmental study: meeting weakly-controlled water demands in the Chao Phraya delta and protecting upland areas in the donor basins.

Documents such as OEPP's *Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality 1997-2016* show that there is already a clear understanding of the institutional limitations and of a way forward, at a national level. The conclusions presented in this sub-section simply reinforce the same message, and provide some local variations on the theme of particular relevance to the proposed project.

Recommendations are made below on the topics of water management, rural development and local democracy, and project implementation.

(a) Water Management

> "Government resistance to institutional change, especially the use of economic instruments for demand management in Thailand is not a result of neglect of efficiency criteria but mainly a result of the fear of political pressure from affected stakeholders. Two types of political pressure need to be recognised: political pressure from farmers usually considered to be the poorer group who could be affected by institutional change, and political pressure from various stakeholders affected by water development projects, including land owners, dam refugees, environmentalists, etc. The [latter] type of pressure results from the lack of a transparent process for negotiations and dialogue and acceptable principles for compensation."[92]

The OEPP five-year plan and the NESDB plan both show that there is still a lack of political will to make farmers pay the *real* price of water. As long as this basic problem is not tackled seriously, demand will not be managed and supply-side management will only be tinkering with the problem. From the demand-side aspect, the improvement of irrigation efficiency or the review of tariff structure for water charges, etc. will be considered. There is a similar reluctance to increase domestic and industrial charges despite studies showing that MWA's income would *increase* if prices were increased to prompt a reduction in demand, though there are public health and welfare considerations.[93] Ultimately, demand would best be managed through the use of water fees reflecting the real price of water.

If at least farmers pay for operation and maintenance then they begin to appreciate the value of water and they also have the right to expect a certain level of service. At present, if

---

[91] This description was used in the *Chao Phraya Basin Water Management Strategy* final report (October 1997) to NESDB, RID and PCD, to describe the institutional structure that manages water in Thailand, but it would appear an appropriate description of the country's institutional structure as a whole.

[92] *Chao Phraya Basin Water Management Strategy* final report (October 1997) to NESDB, RID and PCD.

[93] *The Chao Phya : River in Transition*, Steve Van Beek.

RID decides to maintain an irrigation canal at a time of year inconvenient to the farmers, the farmers have no 'right' to complain.

Demand could further be controlled in the long term through assigning water rights, most appropriately group water rights, though these are difficult to administer and protect. Demand management in the Chao Phraya Basin is addressed in detail in the *Water Management Strategy* submitted to NESDB, RID and PCD.[94]

Improved river basin management has been examined in detail in the report to OEPP *Institutional Arrangements for the Administration and Management of Natural Resources and Environment of Watersheds in Thailand*.[95] The report identified three key obstructions to basin management:

- the lack of co-ordination between government agencies;
- the use in planning of administrative boundaries rather than basins; and
- the centralisation of management.

The report proposes institutional changes at the central, regional and local levels, notably creation of a separate environment ministry, decentralisation of power and strengthening of local administration (especially with respect to provincial development and environmental action plans), and preparation of basin management plans. The recommendations are illustrated in Table 5.6.9.

Much could be done by enactment of the Water Resources Act, its implementation, efficient use of the powers provided (including water charges) and effective enforcement of its provisions. The proposed Act would erode the obstructions listed above:

- it would provide a means of co-ordination via the river basin committees;
- these committees would provide planning at the basin level; and
- basin management would be decentralised to the major basin level.

The committees' effectiveness might be limited by budget, but much could be achieved by a more efficient use of funds through improved co-ordination between the many agencies active in the water sector. Certain agencies might be discouraged from activity in the sector, there being no reason why so many agencies are active in exploiting groundwater for village water supplies, for example. Indeed, there are already numerous committees responsible for inter-ministerial co-ordination. What is now needed are more consistent and cohesive structures, policies and planning procedures within the three key ministries: MOAC, MOI and MOSTE.

Ultimately, RID needs to change, perhaps with its focus changing from one of essentially promoting and supporting riziculture, to one of wise use and conservation of all water resources, including both natural and artificial water bodies. A new name, the "Royal Water Department" for example, a new law and a new set of duties and responsibilities would then be necessary, but these would give the Department a modern role.

[94] *Chao Phraya Basin Water Management Strategy* final report (October 1997).
[95] By the Faculty of Law, Thammasat University, November 1996. 'Watershed' is used here to mean 'river basin'.

Table 5.6.9. Institutional changes for improved river basin management (Source: *Institutional Arrangements for the Administration and Management of Natural Resources and Environment of Watersheds in Thailand*).

	Central administration	Regional administration	Local administration
short term	• Internal administrative adjustments under current structure by adhering to the concept that planning is based on the basin. • Creation of a management co-ordinating body, or use of an existing one, e.g. NEB, by Cabinet resolution.	• Strengthening of Provincial Administration staff. • Creation of environment sub-committee to screen projects and plans. • Diversification of membership of Provincial Development Committee. • Organisation of public hearings for projects and plans. • Preparation of basin management plans.	• Training in environmental management. • Creation of local organisations and networks. • Financial and technical support for basin management plans.
long term	• Adjustment (decentralisation) of functions and powers of central administration. • Creation of a Natural Resources and Environment Ministry.		• Decentralisation of functions, powers and finance. • Local law enforcement (via the existing criminal justice system).

Groundwater resources are likely to become increasingly important in the north so they need to be monitored and protected in terms of quality and quantity. Groundwater systems need to be better understood. Though groundwater systems do not respect river basin boundaries, river basin committees should lead the way in encouraging greater co-ordination between the different agencies exploiting groundwater, DMR, and OEPP and PCD. In the short-term, a Cabinet resolution is needed to require all government agencies to obtain abstraction licences from DMR for their past and future resource developments.[96] Ultimately, a new Groundwater Act will be required and more money spent on monitoring and ensuring compliance. Abstraction charges need to be linked with surface water (including irrigation water) charges.

All discussion of watershed (upland) management is equated with soil erosion control, but the water quality impact of more intensive agriculture employing greater quantities of fertilisers and biocides needs to examined. This issue can be expected to become increasing important, and will impact on the long-term viability of any water diversion, on the health of the local population and on the environment. The river basin committees should encourage analysis of and action on this problem by OEPP, PCD, RFD, DOF and RID, among others.

Historically, Muang Fai provided effective irrigation water management. Though these systems have suffered more recently, because of rapid social, economic and cultural changes, there is a general consensus that irrigation systems are best managed by the communities that benefit from them, hence establishment of Water Users Organisations (particularly the more "grass roots" Water Users Groups) should be encouraged. Local management, financed locally,

[96] The MOInd issued a Ministerial Announcement to this effect, 31 May 1978, but there appears to be limited compliance.

should provide more efficient water use, though it may be resisted by farmers used to having centralised services and free water.

(b) Rural Development and Local Democracy

Many government agencies and others are already active in rural development in the donor areas. It is therefore essential that any rural development activities sponsored, supported or initiated by the project be planned in co-ordination with other government agencies and local authorities. Furthermore, such activities must fit into the appropriate set of development plans (from provincial down to village). The Government has already expressed its desire that there be greater co-ordination between rural development departments so as to improve efficiency.[97]

It is vital to motivate and encourage local participation in any rural development activities associated with the project. "The TAO would be the key local administration to effect participatory development. Better input responding to bottom-up needs should be fed into the planning process at this level. The province would be the key administrative level for effective co-ordination of project proposals by the tambon and governmental offices at the provincial and district levels." [98] At present, TAOs are not financially, administratively or technically autonomous, and there have been incidents of corruption that need to be countered by greater public participation and scrutiny.[99] The highly centralised form of government leads to very poor co-ordination between ministries and departments (or even within government departments) at the local level, and with local administrative organisations. A clear example of the poor co-ordination is between TAOs, RFD's Watershed Management Units and the provincial Forestry Office.

Local capacities in land and water resources planning and management need to be improved. Ultimately land and T&CP legislation need to be rationalised and a statutory requirement for public consultation introduced. Local administrative organisations (both CAOs and TAOs) will require finance and qualified staff to implement and enforce land development legislation, and to implement and manage development projects.

Land tenure problems underlie many socio-economic and environmental problems in the region. The enactment of a Community Forest Act may ease problems within protected forest areas.

(c) Project Implementation

Though transparency of process may appear to make RID more vulnerable to criticism, and though there are undoubtedly those who will use against RID information provided by the Department, transparency is essential in negotiations and dialogue with affected communities, particularly with respect to compensation and other payments. A lack of openness may provide short-term benefits but numerous examples show the possible long-term financial, economic and political costs. A lack of openness is also taken to imply that there is something to hide and thus encourages opposition. If the project proceeds it should be because it is in the national interest *overall*, and there should be an honest acknowledgement that there would be losers as well as winners at the local level. A properly-funded public relations process should be initiated as soon as possible and it should provide clear and non-partisan information.

The Kok-Ing-Nan Water Diversion Project would be an RID project, run from an RID project office in the region. The office would cover activities in all three river basins. The

---

[97] Source: *The Nation*, Sunday 29 November 1998.
[98] *Western Seaboard Regional Development Master Plan : Institutional Report*, Nippon Koei for JICA, June 1997.
[99] See, for example, *Bangkok Post*, 10 January 1999.

project office will require many highly skilled and trained engineering and environmental staff, with expertise in project management, environmental and river basin management, agency co-ordination and public relations. The office would have a number of roles, primarily

- co-ordination, supervision and management of construction, including implementation of mitigation measures;
- consultation and co-ordination with RID (provincial and central), National Water Resources Committee, River Basin Committees, RFD (provincial and central), construction engineers, OEPP, PCD, provincial governments (CAOs), TAOs, local Health Offices, District Civic Forums, other NGOs, individual members of the public, ...;
- monitoring and evaluating environmental (including health and socio-economic) impacts, responding to unanticipated impacts, and providing relevant information as required to OEPP, PCD, NGOs and affected communities; and
- public relations, specifically dissemination of information (facts), eliciting public views, and response to community concerns.

The group of staff working on social and environmental aspects of the project need to be distanced from the engineers, and located in an 'Environmental Management Office', as proposed in Section 3.6. This is necessary to promote independence and to enable local communities to view the group as more sympathetic to their concerns.

Inevitably the main local concern will be compensation (and 'removing costs') payments, so the RID project office will need to work closely with the Land Department, the MOAC Compensation Committee and local communities. RID also needs to work with the Agricultural Land Consolidation Office to resolve problems of land dislocation resulting from the project. It is essential that the compensation process be transparent and that it be clearly stated from the start what rights and payments arise from which land documents (*Sor Kor 1*, *Nor Sor 2*, *Nor Sor 3*, *Cha Nod*, *Por Bor Tor 5*, etc.).

The RID project office should also work with the proposed Office of the Kok-Ing-Nan Project 'Donor Basin Sustainable Development Fund' (Section 5.7), and with others involved in the Fund.

RID needs to look at ways of making the most of the newly diverted water through its efficient use, whether in the Chao Phraya Delta or in the donor areas. To improve efficiency RID should again work with the Agricultural Land Consolidation Office. In addition, RID might require that certain measures be employed in new irrigation areas, such as concrete lining of irrigation canals, use of sub-surface irrigation, and creation of fee-charging user organisations that would themselves be charged for water use. The farmers might at least be expected to pay into a fund to cover operation and maintenance costs.

All the above activities need properly-trained staff and this training needs to be begun well in advance. Training needs include environmental and socio-economic monitoring, project management and public relations. In addition, good working relationships need to be established in advance with the other government agencies involved so that mitigation measures, monitoring and the project itself can be implemented smoothly.