Part II. Results of Project Implementation

This part of the report presents a summary review of the results of implementation activities conducted under the project. Results are organized under four chapters, with each chapter covering one of the four major components of the project, as introduced in part I.

3. *Component 1.* Developing sub-basin level participatory watershed management models

The first major component of the project focused on participatory development of sub-basin level action plans and organizational models for long-term participatory management of natural resources and the environment in pilot sub-basins, including elements addressing related livelihood and public health issues. Thus, the first section of this chapter focuses on the process through which the set of three pilot sub-basins were selected. The second section turns to results of efforts under the project to identify long-term organizational models and development processes, and the third section summarizes results of project efforts to facilitate implementation of these processes in each of the three pilot sub-basins.

3.1. Pilot sub-basin selection

The project aimed to select three Ping River sub-basins where intensive pilot projects would develop, establish and test "model" participatory sub-basin management systems. Results from these pilot sub-basins are then to be applied to assist management efforts in other sub-basins in the Ping River Basin.

In order to maximize the potential relevance of results in the pilot basins for application elsewhere in the larger basin, the three pilot sub-basins needed to represent a reasonable range of conditions present in the Ping River Basin. Thus, from a technical point of view, sub-basin selection needed to focus to a large degree on sampling issues, and particularly on sampling those conditions that are likely to affect the nature of sub-basin management organization structure, composition and participatory processes, as well as the range of potential and actual natural resource management problems that need to be addressed.

At the same time, there is substantial variation among sub-basins in the complexity and difficulty of building effective participatory management organization. While the sample needed to avoid selecting only the easiest cases, which would limit their relevance for other sub-basins, it also needed to avoid a focus on only the most difficult cases, which would make it unlikely that significant results could be achieved within the limited time frame of the pilot projects.

3.1.1. Technical criteria and recommended indicators

Although it is an intellectually interesting exercise to imagine innovative conceptual approaches for criteria that could help inform selection of pilot sub-basins (*aka* "micro-watersheds") under this project, reality called for a far more pragmatic approach. Indeed, the approach needed to be able to build on existing data from readily available secondary sources, to be relatively easy to implement within a very short time horizon, and to be simple enough to be readily communicated to a wide range of stakeholders in the Ping Basin. At the same time, however, it had to be reasonably rigorous, quantitative, logically sound, and able to address major issues that underlie motivation for initiating, conducting and providing funding support for this project.

In order to help articulate an approach that could meet as many of these divergent needs as possible, the project requested the participatory watershed management consultant to develop and evaluate a set of technical criteria and indicators that would be appropriate for selecting three pilot sub-basins. The project implementation consultants then selected elements of this approach to merge with their own ideas, which were then to be presented to representatives from all sub-basins in the Ping River Basin. This was seen as a means for helping to inform the participatory decision making processes through which the pilot sub-basins were to finally be selected.

Major Divisions of the Ping River Basin

Project design documents stated that the three pilot sub-basins should be selected so that "lower, middle and upper" sections of the Ping River Basin are represented by one sub-basin each. This was initially interpreted by the project implementation consultants (and others) to mean southern, middle, and northern portions of the Ping River Basin. After considerable discussion among consultants and ONEP staff, it was agreed that other interpretations would be considered.

The watershed consultant proposed an alternative approach for interpreting the "lower, middle and upper" sub-basin issue that is based on the physical characteristics of sub-basins. Many conditions and issues differ between what have been called "upper tributary watersheds" and their more "lowland-dominated mainstream" counterparts. One of the major characteristics that helps distinguish between these types of watersheds is the relative proportions of the area that is located within different altitude zones. Three major altitudinal zones have commonly been recognized around the region, corresponding to what can be characterized as: lowland, midland and highland zones. Indeed, this distinction is so basic that distinct terms in the Lao language [Lao loum, Lao theung, Lao soung] have been used for generations to refer to the people whose history and culture is most closely associated with each zone.

In northern Thailand, natural forest and ecological conditions vary among similar types of altitude zones, as do the traditional (before about 1960) land use systems and associated ethnic groups. While current land use and settlement patterns often deviate from traditional ones due to a variety of government policy, economic and social forces that have brought change to this region during recent decades, many important characteristics of natural resource and environmental management issues remain closely related to these altitude zones.

It was widely agreed that the "lower" portion of the Ping River Basin should refer to sub-basins located below the Bhumibol Reservoir, since this structure fundamentally affects conditions and issues associated with watershed management in those sub-basins, and because this distinction has been in use since construction of the reservoir was completed in 1964.

But distinctions between "middle" and "upper" portions of the Ping River Basin appear to be more appropriate when made on the basis of the relative distribution of land among altitude zones. Thus, altitudes of 600 and 1,000 m.a.s.l. were used to distinguish lowland, midland, and highland zones in the Ping River Basin, and GIS tools were used to calculate the relative amounts of area in each sub-basin that fall into each of these zones. Simple weights were then used to calculate a "lowland zone area bias score" for each sub-basin, which allowed ranking and classification of sub-basins. Results of this classification process are shown in Figure 3-1 and values of sub-basin scores are included in Figure 3-8.

To help assess the degree to which this altitude zone-based process for establishing sub-basin groupings can really differentiate groups with significantly different characteristics, an analysis of secondary data summarized in Figure 3-2 showed these general patterns:

- ***Lower Sub-Basins*** include a quite balanced 27 percent of the area, 28 percent of the people, and 26 percent of the total income of the Ping River Basin. They have a disproportionately large share, however, of the urban people (39%), industry (53%), and agriculture – both total (50%) and irrigated (48%) – due largely to their high concentrations in two larger sub-basins (Ping part 4, Lower Ping) through which the Ping River's main channel flows. Perhaps not surprisingly, they also account for disproportionately low shares of the Ping River Basin's total forest cover (19%), protected conservation forest (19%) and watershed (14%) forest zones, about half of which is located in three smaller tributary sub-basins. Their shares of runoff and soil erosion are roughly proportionate to their share of overall basin area.
- ***Middle Sub-Basins*** account for 31 percent of the area, but 51 percent of the people and 56 percent of the total income of the Ping River Basin. They also have more than half (51%) of the people living in urban areas, and 41 percent of the listed industries in the Ping Basin. These high shares are largely due to concentrations of these features in the Ping part 2 and Mae Kuang sub-basins. The grouping has a roughly area proportionate overall share of agriculture (29% of total, 30% of irrigated), upland ethnic minorities (31%), total forest cover (29%) and total forest lands (28%), but a somewhat lower share of protected conservation (23%) and watershed (22%) forest zones, runoff (26% annual, 25% dry season), and estimated soil erosion (22%).
- ***Upper Sub-Basins*** cover 42% of the area, but include only 21% of the people and 18 percent of the total income of the Ping River Basin. They account for only 9% of urban people and 6% of industry, but they have a share of agriculture (20% of total, 22% of irrigated) proportionate to their share of total population. Their disproportionately large shares are in upland ethnic minority populations (62%), total forest cover (52%), protected conservation (58%) and watershed (64%) forest zones, total state forest lands (49%), runoff (49% of annual, 52% of dry season), and estimated soil erosion (55%). Their spatially proportionate share of degraded forest (39%) is due to a concentration in the Ping part 1 sub-basin, whereas estimated soil erosion is disproportionately high in Mae Tuen and Mae Khan sub-basins.

Thus, this assessment confirmed significant differences among lower, middle and upper sub-basins of the Ping River Basin based on land area distributions among altitude zones.

Figure 3-1a. Lower Sub-Basins

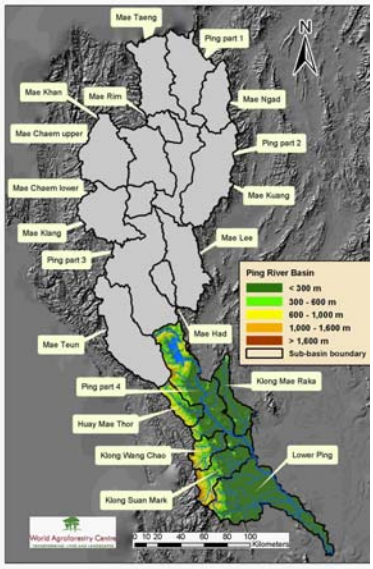


Figure 3-1b. Middle Sub-Basins

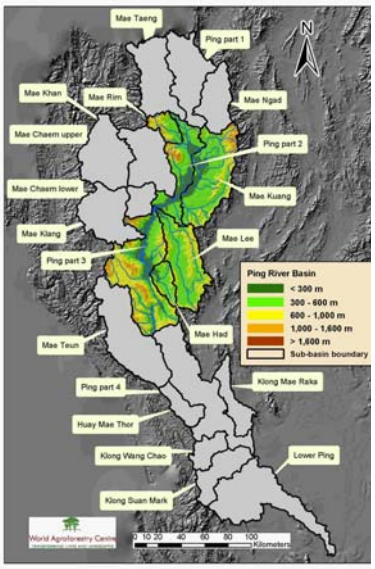


Figure 3-1c. Upper Sub-Basins

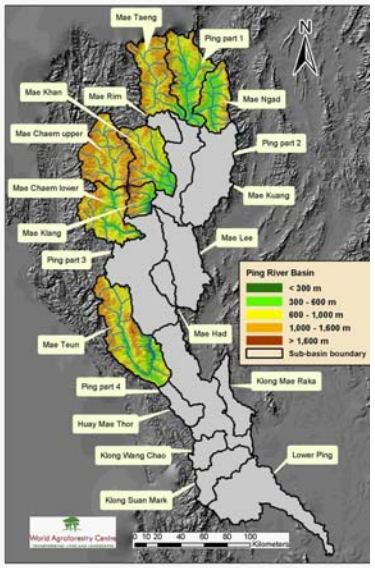


Figure 3-2. Sub-Basin Shares of Major Ping River Basin Characteristics

Sub-Basin	Terrain	Land		People, Settlement, Income						Cropped Area		Forest Cover Area			State Forest Zone Area			Soil Loss	Water		River
	Lowland Bias	TOTAL AREA	URBAN AREA	POP Density	TOTAL PEOPLE	UPLAND MINORITY	URBAN PEOPLE	NO. OF INDUST	OVERALL INCOME	TOTAL AGRIC	IRRIG AGRIC	SCRUB FOREST	DEGRAD FOREST	TOTAL FOREST	FOREST LANDS	PROTECT FOREST	WS 1AB ZONE	TOTAL EROSION	ANNUAL RUNOFF	DRY SEAS RUNOFF	STREAM LEVEL
unit:	score	% total		per km2	Percent of total Ping Basin					% total		% total			% total			% total	% total		score
602 **Ping part 1**	2.24	6	3	*40*	3	7	1	0	2	4	1	1	21	5	6	11	7	7	6	6	*3*
603 **Mae Ngad**	2.27	4	3	*52*	3	2	1	0	3	2	4	1	2	4	4	9	5	4	4	4	*2*
604 **Mae Taeng**	1.59	6	3	*37*	3	6	1	1	2	4	7	0	2	7	7	11	11	6	7	8	*2*
608 **Mae Khan**	1.95	5	5	*59*	4	8	4	2	4	3	5	9	2	6	6	2	6	7	5	6	*2*
610 **Mae Klang**	1.87	2	1	*72*	2	5	2	2	2	1	1	3	1	2	2	4	2	3	3	3	*2*
612 **Mae Chaem** upper	1.43	6	1	**	**	**	0	0	**	1	**	0	1	8	7	0	11	**	**	**	*2*
613 **Mae Chaem** lower	1.88	5	1	*25*	4	21	0	0	4	2	2	1	2	7	6	11	8	13	13	16	*2*
615 **Mae Teun**	1.93	8	1	*18*	2	12	0	0	2	3	2	0	7	12	10	10	14	15	11	9	*2*
Upper Sub-Basins	***1.88***	***42***	***15***	*36*	***21***	***62***	***9***	***6***	***18***	***20***	***22***	***16***	***39***	***52***	***49***	***58***	***64***	***55***	***49***	***52***	
605 **Ping part 2**	2.80	5	26	*404*	25	4	40	29	32	8	7	8	8	2	2	2	2	2	4	4	*3*
606 **Mae Rim**	2.32	1	2	*153*	3	2	2	2	3	1	1	0	2	2	2	1	2	4	3	4	*2*
607 **Mae Kuang**	2.63	8	20	*108*	12	2	7	9	12	10	13	13	9	6	6	3	5	5	9	6	*2*
609 **Mae Lee**	2.59	6	6	*71*	6	12	1	1	6	5	6	17	6	6	5	1	3	4	3	2	*2*
611 **Ping part 3**	2.33	10	5	*23*	3	10	1	0	1	4	0	20	3	12	11	14	8	4	5	5	*3*
614 **Mae Had**	2.73	2	1	*84*	2	1	1	0	2	1	3	1	1	2	2	1	1	3	4	5	*2*
Middle Sub-Basins	***2.54***	***31***	***60***	*117*	***51***	***31***	***52***	***41***	***56***	***29***	***30***	***58***	***29***	***29***	***28***	***23***	***22***	***22***	***26***	***25***	
616 **Ping part 4**	2.81	9	8	*57*	7	1	6	8	6	8	6	20	19	7	7	6	5	6	6	6	*3*
617 **Huay Mae Thor**	2.54	2	0	*25*	1	1	1	1	1	0	0	0	3	2	2	2	2	2	1	1	*2*
618 **Klong Wang Chao**	2.53	2	0	*31*	1	2	0	1	1	2	0	0	3	2	2	3	2	2	2	2	*2*
619 **Klong Mae Raka**	2.99	3	1	*31*	1	0	2	1	1	4	2	4	5	2	2	0	0	1	2	2	*2*
620 **Klong Suan Mark**	2.55	3	1	*60*	3	0	0	2	2	4	2	0	1	3	4	5	3	4	4	4	*2*
621 **Lower Ping**	2.94	9	14	*121*	15	4	30	40	15	32	38	2	0	2	5	3	2	7	10	8	*3*
Lower Sub-Basins	***2.80***	***27***	***25***	*72*	***28***	***8***	***39***	***53***	***26***	***50***	***48***	***26***	***32***	***19***	***23***	***19***	***14***	***23***	***25***	***23***	
Ping Basin	**2.33**	**100**	**100**	*70*	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	
data source:	ICRAF	ONEP	CMU	calc	Panya	MOI	Panya	Panya	Panya	Panya	Panya	CMU	CMU	CMU	KUFF	KUFF	ONEP	Panya	Panya	Panya	CMU

** These data for Mae Chaem cannot be split into upper and lower sub-basins – overall data listed under lower Mae Chaem

Disproportionately large share Disproportionately small share

Based on this analysis and agreement by leaders from Ping River sub-basins during the "water forum" event (discussed below), the project adopted the groupings of sub-basins shown in Figure 3-1 as the definition of "lower", "middle" and "upper" portions of the Ping River Basin for activities conducted under this project.

Previous priority rankings of Ping sub-basins

Project implementation consultants and the project watershed management consultant reviewed several other recent efforts to assess conditions in the Ping River Basin and rank sub-basins according to priorities used in their studies. Of particular relevance were: (1) a study commissioned by the Department of Environmental Quality Promotion; (2) a study conducted by Chiang Mai University for the Office of Natural Resource and Environmental Policy and Planning, and (3) a study conducted by Panya Consultants for the Department of Water Resources.

The scope of these studies and the approaches they used for assessing, scoring and ranking sub-basins were considered and compared with processes developed under this project. Results of priority rankings from those studies for sub-basins according to the three groups used under this project are shown in Figure 3-3.

Figure 3-3. Previous rankings of Ping sub-basins

Sub-basin	DEQP	CMU	DWR
Upper sub-basins			
Ping Part 1 (upper Ping)	2	1	3
Mae Ngad	7	3	2
Mae Taeng	1	2	5
Mae Khan	4	5	1
Mae Klang	5	7	4
Mae Chaem – upper	3	6	7
Mae Chaem – lower	6	4	7
Mae Teun	8	8	6
Middle sub-basins			
Ping Part 2	1	1	2
Mae Rim	4	2	4
Mae Kuang	2	3	1
Mae Li	3	5	3
Ping Part 3	5	4	6
Mae Had	6	6	5
Lower sub-basins			
Ping Part 4	5	1	2
Huay Mae Thor	2	4	6
Klong Wang Chao	1	3	4
Klong Mae Raka	3	5	3
Klong Suan Mark	4	2	5
Ping Part 5 (lower Ping)	6	6	1

DEQP – Department of Environmenal Quality Promotion
CMU – Chiang Mai University
DWR – Department of Water Resources

Criteria & indicators from watershed management consultant

The overall structure of the criteria and indicators proposed and evaluated by the watershed management consultant are shown in Figure 3-4. The first criterion was directed at how sub-basins should be placed into lower, middle, and upper river basin groups, as discussed in the section above. Three additional major criteria are proposed, and each is broken down into sub-criteria that focus on important elements that can be measured. Specific indicators were then developed for each sub-criterion, taking into consideration data that was available for the project. A brief background for each of these three major criteria can be summarized as:

1. ***Severity of natural resource issues***. Biophysical dimensions of perceived natural resource degradation in the Ping River Basin are a central focus of concern regarding the sustainable provision of important environmental services, and especially biodiversity and watershed functions. In addition to their implications for maintenance of biodiversity and general ecosystem 'health', conservationists are linking deforestation and deterioration of forest quality with decreased infiltration of rainfall into natural soil water and groundwater storage reservoirs, and thus disruption of seasonal stream flows and increased downstream flooding and dry season water scarcity. They also believe changes in soil properties associated with deforestation and agriculture in sloping lands are resulting in increased soil erosion and

Figure 3-4. Sub-basin selection criteria & sub-criteria proposed by watershed consultant.

1 Groupings of Middle and Upper Sub-Basins within the Ping River Basin should be made according to the relative bias in distribution of land area among lowland, midland and highland zones.

2 NATURAL RESOURCE ISSUES. Selected sub-basins should include conditions where issues will likely arise related to forest and land degradation, natural hazards, and water use.

- 2.1 **DEGRADATION.** Priority should be assigned to sub-basins where conversion of forest to agriculture and other uses is substantial, and where deterioration of remaining forest and soil erosion rates are relatively high.
- 2.2 **HAZARDS**. Priority should be assigned to sub-basins where conditions indicate there are high risks of flooding and/or landslides.
- 2.3 **WATER USE**. Priority should be assigned to sub-basins where high proportions of irrigated agriculture are associated with low dry season stream flow and high rates of groundwater use. Highest priority should apply in selecting the middle sub-basin.

3 SOCIO-ECONOMIC ISSUES. Selected sub-basins should include areas where poverty and health problems are relatively high, where land use is restricted and conflict is likely, and areas where upland minorities or urban populations should play significant roles.

- 3.1 **POVERTY**. Priority should be given to areas with relatively low incomes and overall conditions are indicative of economic and social difficulties.
- 3.2 **LAND USE COMPETITION.** Priority should be given to areas where legal restrictions constrain local land-based livelihoods, and where agriculture is occurring in conflict with those restrictions. This priority should be highest for the upper sub-basin, but some presence would also be desirable in other sub-basins.
- 3.3 **MINORITY & URBAN POPULATIONS**. The upper sub-basin should give priority to areas with strong upland ethnic minority presence, and other sub-basins should give priority to inclusion of densely settled areas.
- 3.4 **HEALTH.** Priority should be given to sub-basins with relatively high levels of health problems associated with clean water supply, waste management, and use of toxic chemicals.

4 SOCIAL ORGANIZATION CAPACITY & SIMPLICITY. Selected sub-basins should have reasonable levels of local organizational capacities and relevant skills, but avoid areas where excessive administrative complexity may prevent adequate testing of model approaches within the project timeframe.

- 4.1 **CAPACITY.** Priority should be given to sub-basins where local communities have high levels of participation in community activities, where they are experienced with local group organizations, and where they are actively involved in community learning processes. A reasonable mix of capacities of supporting local (sub-district) government should be included
- 4.2 **SPECIALIST KNOWLEDGE**. Priority should be given to sub-basins with relatively widespread presence of relevant local knowledge specialists, as well as a strong cadre of local people who have received relevant training from outside organizations and agencies.
- 4.3 **SIMPLICITY**. Priority should be given to sub-basins with relatively lower requirements for coordination across administrative units

landslides, with especially serious consequences in local sub-watersheds, but also in contributing to siltation of large reservoirs and water infrastructure at more distant downstream locations. Increased use of water for intensive agriculture and other human activities at various positions in watershed landscapes are seen as further exacerbating water scarcity problems by contributing to low dry season stream flows and groundwater depletion. Sub-basin management organizations will need to develop effective means for addressing these issues and concerns. Thus, three sub-criteria and 8 indicators were developed, evaluated, and summarized on a scale of 0 to 3, giving the final results shown in Figure 3-5.

2. ***Severity of socio-economic issues***. Many social and economic aspects of natural resource management, use and deterioration in the Ping River Basin are related to equitable social distribution of benefits and costs of natural resource use and management. Rural poverty is widely believed to be both a cause and an effect of resource degradation, and reduction of rural poverty is a clear objective of government policies and of this project. But rural poverty is linked with inequitable access to resources and social and financial services, and especially with secure access to use of the land upon which their livelihoods depend.

Figure 3-5. Natural Resource Indicator Scoring for Ping Sub-Basins

	2. Overall Natural Resource Issues			2.1. Degradation			2.2. Hazards		2.3. Water Use		
				2.1.1.	2.1.2.	2.1.3.	2.2.1.	2.2.2.	2.3.1.	2.3.2.	2.3.3.
				Forest Conversion Score	Forest Deterior Score	Soil Erosion Score	Flooding Risk Score	Landslide Risk Score	Agric Irrigation Score	Groundwater Use Score	Low Dry Season Flow Score
Sub-Basin	Score	weighted total	*source:*	CMU	CMU	Panya	Panya	<<N/A>>	Panya	Panya	Panya
Upper Sub-Basins				***0.4***	***0.5***	***1.8***		-	***1.8***	***0.1***	***1.4***
			weight:	*1.0*	*1.0*	*1.0*	*1.0*	*0.0*	*1.0*	*1.0*	*1.0*
602 Ping part 1	**2.5**	8		0.6	2.4	1.6	1.4	-	0.7	0.0	1.4
603 Mae Ngad	**2.7**	8		0.6	0.3	1.6	1.2	-	2.3	0.1	2.2
604 Mae Taeng	**3.0**	9		0.7	0.2	1.4	2.8	-	2.7	0.0	0.8
608 Mae Khan	**2.8**	8		0.5	0.4	1.8	1.4	-	**3.0**	0.5	0.7
610 Mae Klang	**1.9**	7		0.5	0.5	2.3	1.6	-	1.5	0.0	1.0
612 Mae Chaem upper	*	*		*	*	*	*	-	*	*	*
613 Mae Chaem lower	**0.0**	6		0.3	0.1	1.6	1.6	-	0.9	0.0	0.9
615 Mae Teun	**2.2**	8		0.2	0.4	2.3	1.3	-	1.1	0.0	2.4
Middle Sub-Basins				***1.0***	***0.9***	***1.0***		-	***1.9***	***1.3***	***1.8***
			weight:	*1.0*	*1.0*	*1.0*	*1.0*	*0.0*	*1.0*	*1.0*	*1.0*
605 Ping part 2	**3.0**	13		2.0	**3.0**	0.7	1.5	-	1.5	2.2	1.9
606 Mae Rim	**1.2**	8		0.6	0.6	**3.0**	1.1	-	1.7	0.1	0.8
607 Mae Kuang	**2.9**	13		1.3	1.1	0.9	0.8	-	2.5	**3.0**	**3.0**
609 Mae Lee	**2.1**	10		0.8	1.1	0.9	2.2	-	1.7	1.0	2.5
611 Ping part 3	**0.0**	5		0.5	0.4	0.6	0.6	-	1.1	0.2	1.2
614 Mae Had	**0.8**	7		0.8	0.6	2.8	0.9	-	1.6	0.1	0.0
Lower Sub-Basins				***1.6***	***1.2***	***1.2***	***1.7***	-	***1.6***	***0.4***	***1.9***
			weight:	*1.0*	*1.0*	*1.0*	*1.0*	*0.0*	*1.0*	*1.0*	*1.0*
616 Ping part 4	**1.0**	8		1.1	2.0	1.0	1.0	-	1.2	0.0	1.7
617 Huay Mae Thor	**0.0**	6		0.2	0.9	1.7	1.0	-	0.3	0.1	2.1
618 Klong Wang Chao	**0.6**	7		0.7	0.8	1.7	**3.0**	-	0.2	0.0	0.9
619 Klong Mae Raka	**0.8**	8		1.3	1.7	0.7	1.1	-	0.7	0.0	2.2
620 Klong Suan Mark	**0.4**	7		1.1	0.3	1.7	1.4	-	0.7	0.1	1.8
621 Lower Ping	**3.0**	12		**3.0**	0.3	1.1	2.2	-	2.0	0.6	2.3
Ping Basin				**0.9**	**0.7**	**1.4**	**1.5**	-	**1.7**	**0.6**	**1.6**

* combined with lower Mae Chaem data

At the same time, there is growing global recognition that the natural resource base is limited. Thus, sustainable provision of environmental services upon which societies depend requires careful management and maintenance of ecosystem functions that are threatened as humans seek to increase the immediate benefits they can derive from natural resources. Different elements of society are developing different visions for the future, and competition is growing among the claims being made on natural resources. This competition is reflected in political, legal and institutional arrangements to facilitate, regulate or restrict how resources may be used.

If sub-basin management organizations are to become a means for improving both the equity and sustainability of natural resource use and conservation, they must include all elements of society among whom costs and benefits of improved management will be distributed. This means that ethnic minorities, who have often been marginalized, ignored, or blamed in the past, must be brought into these processes, especially in upper sub-basins and areas where their activities are believed to have impacts on natural resource management. It also means that densely settled cities and urbanizing areas need to play an important role, especially in middle and lower sub-basins where they are most prominent.

Another important objective of improved river basin management is to improve the health and well-being of local people and communities. Links between public health and environmental issues is an area of growing interest, but much more systematic data from monitoring key aspects of public health and environmental quality are needed.

While socio-economic issues such as these are a major concern under this project, there are still many constraints on the content and form of available data. It is also an area where many issues are very complex. Although organizations like the National Economic and Social Development Board (NESDB) are developing quality of life indicators, such data does not yet appear to be available in a format that would allow aggregation at a sub-basin level.

Figure 3-6. Socio-economic Indicator Scoring for Ping Sub-Basins

		3. Overall Social & Economic Issues			3.1. Poverty		3.2. Competition		3.3. Minorities & Urban		3.4. Health		
					3.1.1.	3.1.2.	3.2.1	3.2.2	3.3.1	3.3.2	3.4.1	3.4.2	3.4.3
					Low Income Score	Village Low Development Score	Land Use Restriction Score	Agricultural Conflict Score	Upland Ethnicity Score	Population Density Score	Water Supply Score	Waste Management Score	Pesticide Poisoning Score
	Sub-Basin	Score	weighted total	*source:*	MCC / Panya	MCC - CDD	KUFF/onep	Panya/onep	ONEP, Panya	Panya	กชช.2ค / onep	กชช.2ค / onep	กชช.2ค / onep
	Upper Sub-Basins				***1.6***	***1.433***	***2.8***	***2.3***	***0.8***	***0.3***	***1.4***	***1.6***	***0.6***
				weight:	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
602	Ping part 1	3.0	15		0.8	2.4	2.6	2.2	0.8	0.3	2.8	2.2	0.9
603	Mae Ngad	**0.8**	9		1.2	0.6	2.8	1.4	0.3	0.4	2.1	0.3	0.5
604	Mae Taeng	**1.8**	12		1.4	2.2	3.0	2.8	0.7	0.3	1.3	2.2	0.1
608	Mae Khan	**0.0**	6		1.0	0.4	2.3	1.5	0.5	0.4	0.3	1.6	0.4
610	Mae Klang	**2.3**	13		2.2	3.0	2.8	2.6	0.8	0.5	1.2	3.0	0.4
612	Mae Chaem upper	*	*		*	*	*	*	*	*	*	*	*
613	Mae Chaem lower	**2.7**	14		3.0	1.8	2.9	3.0	1.5	0.2	1.9	2.5	0.6
615	Mae Teun	**1.6**	11		2.8	0.0	2.9	3.0	1.3	0.1	0.8	1.6	0.9
	Middle Sub-Basins				***0.6***	***0.4***	***1.8***	***0.7***	***0.2***	***0.8***	***0.8***	***1.7***	***0.4***
				weight:	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*3.0*	*1.0*
605	Ping part 2	**0.8**	6		0.4	0.0	1.0	0.4	0.0	3.0	0.7	1.6	0.6
606	Mae Rim	**2.0**	8		0.6	1.2	2.3	1.4	0.0	1.2	1.4	1.9	0.3
607	Mae Kuang	**0.0**	4		0.5	0.1	1.6	0.4	0.0	0.8	0.6	1.6	0.1
609	Mae Lee	**1.5**	7		1.3	1.2	1.6	0.8	0.5	0.5	1.3	2.2	0.1
611	Ping part 3	3.0	10		1.1	1.8	2.3	1.1	3.0	0.0	0.8	1.6	0.7
614	Mae Had	**1.4**	7		0.0	2.2	2.0	1.6	0.1	0.6	0.4	1.8	2.0
	Lower Sub-Basins				***1.5***		***1.6***	***1.0***	***0.1***	***0.5***	***1.7***	***0.9***	***2.0***
				weight:	*1.0*	*0.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
616	Ping part 4	**0.6**	6		2.1		1.7	0.9	0.1	0.4	0.8	0.8	1.1
617	Huay Mae Thor	**0.0**	5		0.8		2.2	1.5	0.2	0.2	0.0	0.7	0.0
618	Klong Wang Chao	3.0	10		2.4		2.6	2.2	0.9	0.2	1.5	0.0	0.2
619	Klong Mae Raka	**1.6**	8		2.7		1.2	1.0	0.0	0.2	2.4	0.8	0.0
620	Klong Suan Mark	**2.5**	9		1.5		2.5	1.6	0.1	0.4	3.0	0.7	0.8
621	Lower Ping	**0.6**	6		1.1		1.0	0.8	0.1	0.9	2.0	1.1	3.0
	Ping Basin												

* combined with lower Mae Chaem data

Thus, a quite simple and focused criterion was proposed for the sub-basin selection process. Since socio-economic factors would be further studied in pilot sub-basins, basins, those findings would then be incorporated into learning processes under the project. The four sub-criteria and nine indicators proposed and evaluated for sub-basin selection were summarized on a scale of 0 to 3, as shown in Figure 3-6.

3. ***Local capacity & administrative complexity***. While it was very important to have representation of conditions under which a reasonable range of natural resource and socio-economic issues are likely to be key elements of pilot sub-basin management activities, it was also important to consider elements affecting the likelihood of significant progress being made under the project. We also needed to consider how other sub-basins will view the relevance of project activities in terms of the capacity of their local governments and communities to provide essential support for sub-basin activities. Thus, three sub-criteria and seven indicators were proposed and evaluated to assess key elements of these issues on which data was available, and summarized on a scale of 0 to 3 as shown in Figure 3-7.

In addition to the summary scores for each indicator, the above summary tables for each major criterion include lines where relative "weights" can be assigned to each indicator for each of the three groups of sub-basins. This allows different levels of importance or priority to be applied to different sub-criteria and indicators, in order to reflect the role that they are seen to have in the decision-making process. Thus, weights can be used as a transparent method for reflecting expert opinion, they can be derived through stakeholder consensus, or they can be used to assess how sensitive results are to changes in any particular indicators or sub-criteria.

In order to derive an overall ranking of sub-basins for the selection process, all three major criteria are combined in an overall summary table, as shown in Figure 3-8. The calculations shown in this table include weights that are assigned to various indicators according to reasoning and assumptions that are detailed in the watershed consultant's final report.

The methods used for calculating scores for each indicator in this system are completely transparent, with details on calculations and data sources presented in the watershed consultant's

final report, which is available in both English and Thai languages. The calculation tables are all integrated into a spreadsheet system version, so that if any changes to importance weights are made, all associated values are automatically recalculated.

Figure 3-7. Organization & Administration Indicator Scoring for Ping Sub-Basins

		4. Overall Local Org Capacity & Simplicity			4.1. Capacity				4.2. Specialist Knowledge		4.3. Simplicity
					4.1.1.	4.1.2.	4.1.3	4.1.4	4.2.1.	4.2.2.	4.3.1.
					Loc Govt Capacity Score	Community Participation Score	Group Organization Score	Community Learning Score	Local Specialists Score	Project-related Training Score	Admin Simplicity Score
	Sub-Basin	Score	weighted total	source:	MOI / onep	MCC - CDD	MCC - CDD	MCC - CDD	กชช.2ค / onep	กชช.2ค / onep	Panya, ONEP
	Upper Sub-Basins				***0.5***	***1.9***	***1.9***	***1.7***	***2.3***	***2.1***	***2.6***
				weight:	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
602	Ping part 1	**1.5**	13		1.1	0.0	1.3	2.7	2.9	2.4	2.5
603	Mae Ngad	**2.0**	14		0.0	1.6	2.4	1.9	2.2	**3.0**	2.8
604	Mae Taeng	**0.7**	11		0.2	2.7	0.3	1.9	2.9	0.8	2.4
608	Mae Khan	**3.0**	16		1.2	**3.0**	**3.0**	1.6	2.6	2.5	2.2
610	Mae Klang	**0.0**	10		1.7	1.7	0.0	0.0	2.9	0.3	3.0
612	Mae Chaem upper	*	*		*	*	*	*	*	*	*
613	Mae Chaem lower	**1.2**	12		0.4	1.9	2.1	1.4	2.1	2.1	2.3
615	Mae Teun	**0.5**	11		0.0	1.9	1.9	1.4	0.3	2.5	2.7
	Middle Sub-Basins				***1.1***	***2.3***	***2.0***	***1.3***	***2.1***	***1.6***	***1.8***
				weight:	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
605	Ping part 2	**1.3**	12		**3.0**	2.5	2.0	1.2	2.0	1.2	0.0
606	Mae Rim	**2.9**	14		0.2	1.9	1.6	**3.0**	**3.0**	1.8	2.7
607	Mae Kuang	**2.1**	13		1.8	2.1	2.1	1.5	2.4	2.3	0.6
609	Mae Lee	**0.0**	10		0.5	2.2	1.9	0.4	1.9	0.5	2.5
611	Ping part 3	**0.6**	11		0.2	**3.0**	1.4	1.3	1.3	1.4	2.2
614	Mae Had	**3.0**	14		0.2	**3.0**	2.0	1.1	2.3	2.8	3.0
	Lower Sub-Basins				***0.8***				***0.7***	***1.5***	***2.4***
				weight:	*1.0*	*0.0*	*0.0*	*0.0*	*1.0*	*1.0*	*1.0*
616	Ping part 4	**1.5**	5		0.8				1.1	1.4	1.8
617	Huay Mae Thor	**3.0**	7		0.1				2.8	0.6	**3.0**
618	Klong Wang Chao	**2.5**	6		0.2				0.7	2.2	2.9
619	Klong Mae Raka	**0.5**	4		0.0				1.0	0.4	2.7
620	Klong Suan Mark	**0.0**	4		0.8				0.0	0.0	2.8
621	Lower Ping	**1.6**	5		1.5				0.5	2.0	1.2
	Ping Basin				**0.8**				**1.8**	**1.7**	**2.3**

* combined with lower Mae Chaem data

Figure 3-8. Overall summary of weighted sub-basin scores by watershed consultant

		Summary Overall Weighted Scores		1. Grouping Lowland Zone Bias		2. Overall Natural Resource Issues		3. Overall Social & Economic Issues		4. Overall Local Org Capacity & Simplicity	
	Sub-Basin	Score	weighted total	Score		Score	weighted total	Score	weighted total	Score	weighted total
	Upper Sub-Basins			***1.88***							
					weight:		**2.50**		**3.00**		**1.50**
602	Ping part 1	**3.0**	119	2.24		**3.0**	13	**2.3**	24	**0.6**	10
603	Mae Ngad	**1.9**	96	2.27		**1.9**	11	**0.7**	17	**1.7**	12
604	Mae Taeng	**1.9**	109	1.59		**1.9**	11	**1.9**	23	**0.5**	10
608	Mae Khan	**2.1**	89	1.95		**2.1**	11	**0.0**	14	**3.0**	13
610	Mae Klang	**1.9**	114	1.87		**1.9**	11	**2.3**	24	**0.0**	9
612	Mae Chaem upper	*	*	1.43		*	*	*	*	*	*
613	Mae Chaem lower	**2.8**	117	1.88		**0.0**	8	**3.0**	27	**0.7**	10
615	Mae Teun	**2.4**	114	1.93		**1.9**	11	**2.2**	24	**0.9**	10
	Middle Sub-Basins			***2.54***							
					weight:		**2.50**		**3.00**		**1.50**
605	Ping part 2	**3.0**	95	2.80		**2.4**	18	**3.0**	12	**0.0**	9
606	Mae Rim	**1.4**	78	2.32		**0.8**	11	**2.5**	11	**2.9**	12
607	Mae Kuang	**2.0**	84	2.63		**3.0**	21	**0.0**	6	**0.2**	9
609	Mae Lee	**1.8**	82	2.59		**1.8**	15	**1.7**	10	**1.2**	10
611	Ping part 3	**0.3**	67	2.33		**0.0**	7	**2.7**	11	**1.4**	10
614	Mae Had	**0.0**	64	2.73		**0.3**	8	**1.1**	8	**3.0**	12
	Lower Sub-Basins			***2.80***							
					weight:		**2.50**		**3.00**		**1.50**
616	Ping part 4	**1.5**	58	2.81		**0.9**	11	**1.1**	8	**1.0**	3
617	Huay Mae Thor	**0.0**	44	2.54		**0.1**	9	**0.0**	6	**0.7**	3
618	Klong Wang Chao	**2.1**	64	2.53		**0.0**	8	**3.0**	13	**1.0**	3
619	Klong Mae Raka	**2.0**	62	2.99		**0.8**	11	**2.1**	11	**0.0**	3
620	Klong Suan Mark	**2.1**	63	2.55		**0.4**	9	**2.3**	11	**3.0**	4
621	Lower Ping	**3.0**	72	2.94		**3.0**	17	**1.0**	8	**2.4**	4
	Ping Basin			**2.33**							

* combined with lower Mae Chaem data

Criteria from project implementation consultant team

The project implementation consultant team has a substantial database on characteristics of the Ping River Basin that reflects their history of work with various agencies and organizations. While the data is particularly rich in relation to water resources, a range of other types of data is also included. Indeed several of the indicators proposed by the watershed management consultant were evaluated using data from the implementation consultant's database.

In consultation with ONEP staff, project implementation consultants reviewed the criteria and indicator systems proposed by the watershed management consultant together with their own approach for developing criteria and indications for pilot sub-basin selection. While they felt the overall system proposed by the watershed management consultant was too complicated and difficult to present to Ping River Basin stakeholders, they did adopt the sub-basin grouping approach and several individual indicators. These were then integrated with some of their own data and indicators into a simplified system as shown in Figure 3-9.

Figure 3-9. Simplified criteria & indicators for pilot sub-basin selection

		Level Classification			(weight)	Weighted Level Scores		
		High	Medium	Low	Max Score	High	Medium	Low
Natural Resources								
Forest Cover	percent of total area	< 60 %	60-70 %	70-80 %	15	15	10	5
Agriculture Area	percent of total area	> 30 %	10-30 %	< 10 %	10	10	6.6	3.3
Water Resources								
Runoff	(litres/second/km2)	< 8.5	8.5 - 10.0	> 10.0	5	5	3.4	1.7
Drought	dry season / annual flow	< 0.20	0.20 - 0.25	> 0.25	5	5	3.4	1.7
Flooding	(QMAX-QMIN)/QMEAN	> 2.75	1.50 - 2.75	< 1.50	5	5	3.4	1.7
Quality	quality level	>Level 4	Level 3	<Level 2	5	5	3.4	1.7
Social status								
population density	persons / km2	> 100	50 - 100	< 50	20	20	13.4	6.7
ethnic groups	% highland minorities	>30%	10-30%	<10%	5	5	3.4	1.7
Economic status								
conflicting land use	agriculture in forest lands	>100 points	50-100 points	<30 points	5	5	3.4	1.7
income	Baht / person / year	< 10,000	10,000 - 12,000	> 12,000	20	20	13.4	6.7
Potential of local government units								
	Potential level	>80 points	40-80 points	<40 points	5	5	3.4	1.7
					100			

Under this approach, data values for each indicator were first classified into high, medium or low categories. They were then converted to a score value using a maximum score for each indicator that reflected their perceptions of the relative importance it should be assigned in the decision making process. Weights were the same for sub-basins without regard for their being in lower, middle and upper sub-basin groupings.

Score values for each indicator were then calculated using this approach, based on data for each sub-basin. Results of score calculations are shown in Figure 3-10. Total score values were then used to rank sub-basins within each of the lower, middle and upper groupings of sub-basins within the Ping River Basin.

Figure 3-10. Sub-basin technical indicator scores for rankings by project implementation consultants

Sub-basin	Variable											Total Score
	Natural Resources						Social		Economic		Potential of local govt units	
	Forest cover	Agriculture area	Water resources				Population density	Ethnic minorities	Conflict in land use	Income		
			Runoff	Drought	Flooding	Quality						
	forest area / sub-basin area	agric area / sub-basin area	amt/time/area litre/sec/km^2	dry seas/annual % annual flow	$(Q_{MAX}-Q_{MIN})/Q_{MEAN}$	Level	persons / km^2	% highland minorities	agriculture in forest lands	Baht / person / yr	Potential level	
Maximum score:	*15*	*10*	*5*	*5*	*5*	*5*	*20*	*5*	*5*	*20*	*5*	***100***
Upper Ping												
Ping part 1	5.0	6.6	3.4	1.7	3.4	1.7	6.7	3.4	3.4	20.0	3.4	**58.7**
Mae Ngad	5.0	6.6	5.0	3.4	3.4	1.7	6.7	1.7	3.4	6.7	1.7	**45.3**
Mae Taeng	5.0	6.6	3.4	1.7	5.0	1.7	6.7	3.4	5.0	13.4	1.7	**53.6**
Mae Khan	5.0	6.6	5.0	1.7	3.4	1.7	13.4	3.4	3.4	6.7	3.4	**53.7**
Mae Klang	5.0	6.6	1.7	1.7	3.4	1.7	13.4	3.4	3.4	6.7	3.4	**50.4**
Mae Chaem (combined)	5.0	3.3	3.4	1.7	3.4	1.7	6.7	5.0	5.0	6.7	1.7	**43.6**
Mae Teun	5.0	3.3	1.7	3.4	3.4	1.7	6.7	5.0	5.0	6.7	1.7	**43.6**
Middle Ping												
Ping part 2	15.0	10.0	3.4	1.7	3.4	3.4	20.0	1.7	1.7	6.7	5.0	**72.0**
Mae Rim	5.0	6.6	1.7	1.7	1.7	1.7	20.0	1.7	3.4	6.7	1.7	**51.9**
Mae Kuang	15.0	6.6	1.7	3.4	1.7	5.0	20.0	1.7	1.7	6.7	3.4	**66.9**
Mae Li	10.0	10.0	5.0	3.4	3.4	1.7	13.4	3.4	1.7	6.7	1.7	**60.4**
Ping part 3	5.0	3.3	5.0	1.7	1.7	3.4	6.7	5.0	1.7	6.7	1.7	**41.9**
Mae Had	10.0	6.6	5.0	1.7	1.7	1.7	6.7	1.7	3.4	6.7	1.7	**46.9**
Lower Ping												
Ping part 4	15.0	6.6	5.0	3.4	1.7	3.4	13.4	1.7	1.7	13.4	3.4	**68.7**
Huay Mae Thor	5.0	3.3	5.0	3.4	1.7	1.7	6.7	1.7	3.4	6.7	1.7	**40.3**
Klong Wang Chao	5.0	6.6	5.0	1.7	5.0	1.7	6.7	3.4	5.0	13.4	1.7	**55.2**
Klong Mae Raka	10.0	10.0	5.0	3.4	3.4	1.7	6.7	1.7	3.4	20.0	1.7	**67.0**
Klong Suan Mark	10.0	6.6	1.7	3.4	3.4	1.7	13.4	1.7	3.4	6.7	3.4	**55.4**
Ping part 5	15.0	10.0	3.4	3.4	5.0	3.4	20.0	1.7	1.7	6.7	3.4	**73.7**

Results from the initial technical assessment conducted by the participatory watershed management consultant and the simplified composite approach developed by the project implementation consultant team are compared in Figure 3-11.

Priorities assigned to sub-basins in the middle Ping are very similar under both assessment approaches. While first priority sub-basins are also the same for upper and lower groups of sub-basins, there are some quite significant differences in rankings of other sub-basins in these groups. Many of these differences in rankings between the two technical assessment approaches appear to relate to the high importance weight given in the simplified approach to population density, combined with lower importance given to ethnic minority and land use conflict indicators.

Figure 3-11. Sub-basin priorities from technical assessments

	Sub-basin name	Watershed consultant ranking	Implementation consultants ranking
Upper Ping	Ping Part 1 (upper Ping)	1	1
	Mae Ngad	6	5
	Mae Taeng	5	3
	Mae Khan	7	2
	Mae Klang	4	4
	Mae Chaem	2	6
	Mae Teun	3	7
Middle Ping	Ping Part 2	1	1
	Mae Rim	4	4
	Mae Kuang	2	2
	Mae Li	3	3
	Ping Part 3	5	6
	Mae Had	6	5
Lower Ping	Ping Part 4	5	2
	Huay Mae Thor	6	6
	Klong Wang Chao	2	5
	Klong Mae Raka	4	3
	Klong Suan Mark	3	4
	Ping Part 5 (lower Ping)	1	1

3.1.2. Participatory selection process

The participatory process for selecting pilot sub-basins centered on the Water Forum workshops held during March 2005 at Kamphaengphet for lower Ping sub-basins, and at Chiang Mai for middle and upper Ping sub-basins. Total numbers of different types of participants in these events are shown in Figure 3-12.

Figure 3-12. Participants in Water Forum events for pilot sub-basin selection

Meeting participants	**Lower Ping** (persons)	**Upper Ping** (persons)
1) Representatives of central government agencies	13	15
2) Representatives of provincial government agencies	40	44
3) Representatives of district government agencies	12	14
4) Representatives of local governments (administrators / members)	83	174
5) Representatives of farmers / sub-basin representatives	28	36
6) NGOs / independent technical specialists	2	6
7) Academics / technical specialists	3	4
8) Mass media	1	18
total	**182**	**311**

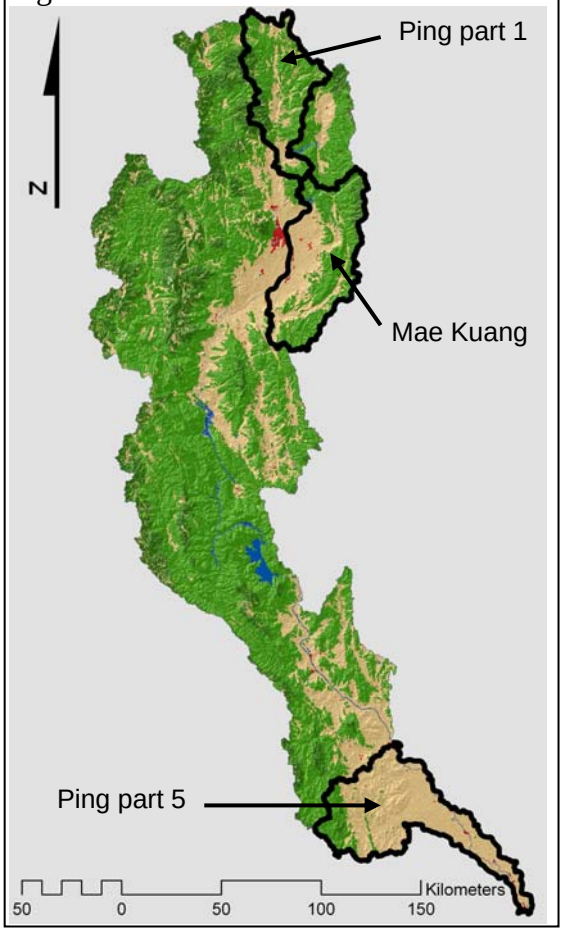
At the Water Forum events, senior members of the project implementation consultant team presented the background and objectives of the project, and the set of simplified criteria and indicators described above. Presentations included recommendations for candidate sub-basins based on priority rankings from the technical assessment, but they tried to make it clear that the forum was free to consider any sites. The floor was then opened for questions, discussion and general debate on sub-basin selection. At the Chiang Mai forum participants split into separate groups for middle and upper groupings of sub-basins.

The process that followed in all three sub-basin groupings was probably inevitable given the size and formality of the meeting, as well as the types of activities previously under other efforts to

develop river basin management organization in Thailand. The main outcome was that the discussion soon began to reflect a sense of competition for sub-basin selection. This was probably at least partly due to impressions that large amounts of financial resources might be granted to selected sub-basins. This type of thinking was stimulated by misunderstandings about the role of the World Bank in the project, and by recent announcements by Thai government leaders that major funding would be allocated to river basin restoration and development.

As a result, the technical assessment approach faded into the background, although speakers arguing for one sub-basin or another would often include references to particular indicator data that supported their argument. More faction-based (*pak puak*) blocks began to form, and it soon became clear that a reasoned compromise outcome would be unlikely. Thus, calls for a direct vote soon emerged. And, since there was no previously agreed upon basis for how representation should be reflected in voting, most all participants were allowed to cast a vote. While the voting process was transparent, it was biased by the disproportionate presence of people from different sub-basins. This effect was amplified by the departure of representatives from some more remote sub-basins when the direction the process was taking became clear. Thus, there is a high correlation between the three selected sub-basins and their accessibility to the meeting site.

Figure 3-13. Selected Pilot Sub-basins



The outcome of this decision making process was selection of the three pilot sub-basins (Figure 3-13):

Upper Sub-Basin:Ping Part 1
Middle Sub-Basin:Mae Kuang (including Mae Tha)
Lower Sub-Basin:Ping Part 5 (Lower Ping)

While these decisions were made through basically political processes that emerged during the Water Forum events, implementation consultant staff were able to compare numbers of voting participants with the outcome of the voting process. It was clear that the total number of votes cast for the "winning" sub-basins was far higher than the number of voting participants from those sub-basins. This is evidence that a significant number of participants did vote for a sub-basin other than their own, although we can only speculate about their reasons for doing so.

It is also useful to compare results of pilot sub-basin selection under the Water Forum process to results of the preliminary assessments based on technical criteria and indicators, as shown in Figure 3-11. The pilot sub-basins selected to represent upper and lower sub-basin groupings are exactly the same as the sub-basins assigned first priority by technical assessments. And for middle sub-basins, the selected pilot sub-basin was the second highest priority in both technical assessments.

While it is difficult to know what conclusions to draw from this outcome, at least it is clear that there is no significant difference between selection of sub-basins at the Water Forum events and selection that would have followed from use of the more technocratic quantitative approaches.

It may be important to note, however, that it may not be realistic to expect that processes requiring clear reasoning and evidence-based negotiations can be conducted through large workshops organized at the river basin level. At least at this point, such processes appear to require more of the types of common identity, mutual familiarity, understanding and trust that are so far only found at much more local levels of social organization.

3.2. Identifying long-term organizational models and development processes

The participatory watershed management consultant was assigned the task of proposing organizational models for sub-basin management organizations that could be tested within pilot sub-basins. There were two main components of this work. The first component focused on development of model structures for sub-basin management organizations, while the second component centered on the long-term processes required for establishing and developing the management organizations within sub-basins of the Ping River Basin.

3.2.1. Review of relevant international experience and national context

Efforts to develop and propose model structures for sub-basin management organizations began with review of experience with river basin management organizations at the international level and within Thailand. Further details are in the watershed management consultant's final report.

At the international level, global trends toward river basin management are reflected in:

- intergovernmental agreements and institutional polices, beginning with the Dublin Principles that were accepted at the 1992 global Conference on Environment and Development, and subsequent developments under the European Union Water Framework Directive and policy reforms at the World Bank and the Asian Development Bank.
- global and regional civil society organizations that have emerged to support integrated water resource management in river basin contexts around the world, such as the World Water Council, the Global Water Partnership, the Network of Asian River Basin Organizations, and the growing range of programs and websites to provide support for river basin organizations.
- the rapid growth and evolution of international literature on river basin organizations that reflects activity by a global web of international research centers and their colleagues in countries around the world, including recent publications on comparative studies of experience with integrated river basin management sponsored largely by the World Bank.

Major lessons that can be drawn from global experience with river basin organizations include:

- There are no "blueprint" models for river basin organizations (RBOs). It is clear that RBOs need to be 'localized' in their specific environmental, historical, cultural, social, political and economic context. While there are many lessons to be learned from the diverse experience with RBOs around the world, they need to focus on basic operational principles that are associated with different types and degrees of RBO performance, as well as considerations regarding organizational structure of RBOs that can facilitate or constrain their performance.
- The scope of integrated river basin management has grown because the increasingly complex and contentious context of water resource and river basin management requires its integration with a growing range of natural resource, environmental, economic, political, social, and cultural considerations. Experience shows that RBOs with relatively wide mandates are better able to attract and hold interest of major stakeholders, who feel they are involved with work that is relevant to their needs, especially in basins where there are multiple major problems.

Clarity and mutual understanding of the scope of an RBO mandate is essential, however, as well as the capacity, organizational arrangements and resources needed to implement it.

- The concepts of subsidiarity and decentralization are of central importance to efforts to manage complex systems with the highest possible overall levels of efficiency and equity. Subsidiarity results in decisions being made at the most local level where they are possible and viable. Appropriate decentralization can improve many aspects of efficiency and equity in most decision making processes, but it requires basic rules, procedures, and capacities in local institutions, and often clearly defined rights and priorities regarding access to and use of water and related natural resources.
- Improved accountability is a key principle that depends (1) on adequate local institutions to prevent benefit and organization capture by groups of local elites, (2) on accessibility to venues for negotiation of disputes, and (3) on sufficient stakeholder participation, leadership, expertise, information and financial resources. Both upward and downward accountability are required in RBO organizational hierarchies.

Assessments of international experience with RBOs have also identified structural characteristics of the organizations that can help to facilitate or constrain RBO performance, or which may be particularly important for success in specific social and cultural contexts. Key examples include:

- Type of organization. RBOs come in a great variety of forms, that include agencies, committees, commissions, companies, NGOs, etc., and numerous variations within each type. The main issue is the RBO must be able to function effectively to achieve its objectives under its mandate. No matter what type of organizational format it has, this will depend on what it seeks to do, how it seeks to do it, and how specific forms of organization are operationally, technically and legally defined and operated in the context of that society.
- Levels of organization. There is wide variation among RBOs regarding the number of hierarchical levels of organization. Some have a single organizational level, while others have several nested organizational levels. Where relevant existing groups already exist, RBO performance is better when they become building block units at their appropriate level. As sub-units become smaller or larger, their relative advantages for various functions change. The appropriate combination and balance of organizational levels will depend largely on the local context of the RBO.
- Stakeholder representation and roles. RBOs using integrated water resource management principles clearly function best when the full range of stakeholders is represented and actively participating. While RBOs vary widely in how they seek to achieve stakeholder participation, RBOs that are able to maintain active participation over time are able to convince stakeholders (1) that they are engaged in important issues, (2) that their views and interests are welcome and considered, (3) that they actually participate in important decisions, (4) that stakeholders with different views are treated fairly, and (5) that real progress is being made toward achieving RBO objectives in an open, fair and equitable manner. It is also very important that stakeholder groups have representatives who really represent their views.
- Leadership. Experience shows that leadership is a very important factor in RBO performance. But top-down institutional leadership appears to have a negative effect on performance. And where leadership is focused on particularly charismatic local leaders, it may be difficult for other leaders to emerge, and to maintain long-term organizational sustainability.
- Responsibilities. While there is a wide range in the roles played by RBOs, most all of them have a major role in planning, policy and/or coordination functions. These are seen as the key roles of most RBOs. Depending on local context, the RBO may also have a major role in monitoring conditions and identifying and analyzing problems, and there may be activities, projects or operations that it conducts directly. Some RBOs also have a major role in

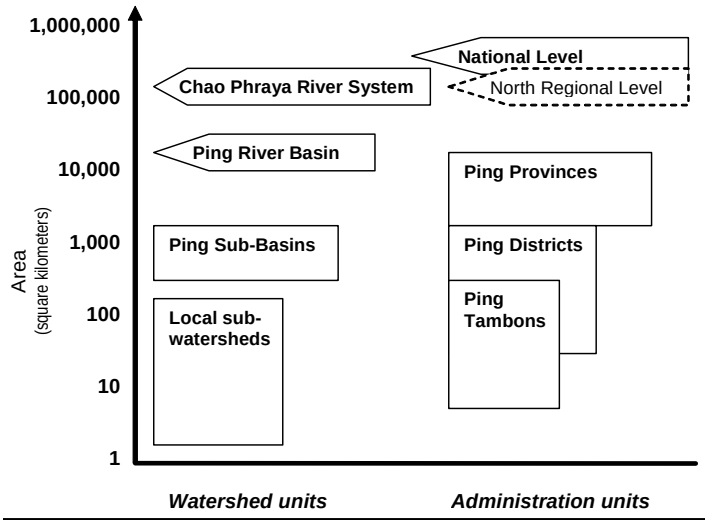
operating regulatory or economic incentive tools, including registration, zoning, allocation, licensing, fees, etc. Where RBOs operate and maintain water resource infrastructure, such as irrigation, water supply, drainage, or electrical generation, they often establish self-financing units that can take on the form of a government enterprise or private company.

- Information. Most all assessments of experience agree on the need for high quality information with open access to it. In some societies, this can be provided from other sources with which the RBO can collaborate. In many others, however, information and data are scarce and of questionable quality, gaps are wide, expertise is low or concentrated in a few agencies or stakeholder groups, and public access to information is not a common practice.
- Coalitions and alliances. Increasingly, RBOs face a situation where they are expected to respond to broader mandates, but in a more decentralized manner. Experience confirms that, under the right conditions, this can increase stakeholder participation, accountability, efficiency and equity. But 'right conditions' include needs for capacity, tools, information, and other resources at local levels where such things are often scarce. Moreover, RBOs cannot do everything themselves, and most of them depend on agencies, local governments, civil society organizations, and private sector interests to implement their plans and provide various types of material, social and intellectual support for their operations. Accordingly, it is now widely recognized that RBOs need to join with a range of other groups and organizations to build networks, coalitions, and alliances at various levels, beginning within their basins, but extending outward in all relevant directions.

Experience with RBOs in Thailand was reviewed in terms of its interactions with developments at the international level, in terms of government policy responses to perceived problems in managing watersheds, natural resources and the environment, and in terms of specific river basin management initiatives that have emerged since the government first began efforts to formulate a comprehensive water management strategy for river basins [*see chapter 1*]. Particular attention was given to establishment of Upper Ping and Lower Ping 'sub-basin' committees, and to river basin planning processes conducted under the leadership of the Department of Water Resources and the Department of National Parks, Wildlife and Plant Conservation.

Consideration was also given to the potential role of sub-basins in the hierarchies of administration units and watershed units found in the Ping River Basin (Figure 3-14). These types of considerations are important for helping to clarify the potential role for RSBOs and the types of relationships they will need to develop with other types of organizations.

Figure 3-14. Relative area scales of hierarchy units

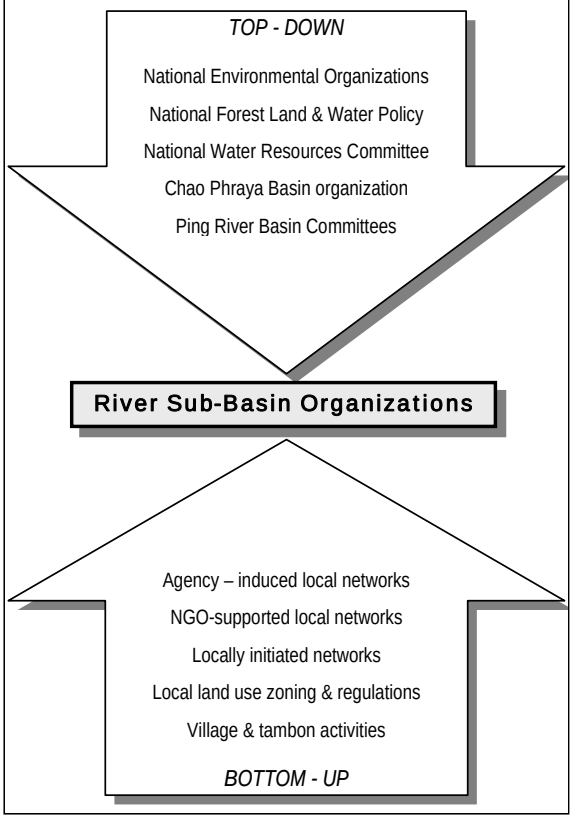


Thus, the review also extended to other types of planning processes already being conducted in sub-basins, including regular planning processes of provincial and local governments, as well as various non-governmental planning initiatives.

This resulted in identification of several key gaps and operational issues related to current river basin and sub-basin initiatives, including:

- Effective and consistent efforts need to be made to reduce confusion and uncertainty about river basin and sub-basin programs, which is largely due to repeated rounds of planning under changing mandates and shifting responsibilities of agencies and organizations, without a clear commitment to actual implementation.
- Venues and processes should foster stakeholder discussion and debate aimed at building mutual understanding of commonalities and differences in interests and visions of the future, development of a common identity among stakeholders at the sub-basin level, and an atmosphere where reasoned compromise solutions can be formulated.
- Government agencies need to examine their own strengths and weaknesses, and join with other stakeholders in identifying means for overcoming problems associated with poor coordination and cooperation among agencies, and lack of downward accountability.
- Problem identification and analysis needs to become more empirical and data based, and recognize the need for negotiating trade-offs among the benefits and costs accruing to different stakeholder groups. There needs to be less focus on winning/losing, and more focus on equitably achieved 'best possible' outcomes.
- Principles of subsidiarity and specialization need to be used in identifying and building appropriate coalitions that can help achieve broader and more difficult goals.
- In order to provide a solid basis for transparency, accountability and learning, sub-basin management organizations should place substantial emphasis on building their capacity to conduct three types of monitoring: (1) project inputs and outputs: (2) progress toward achieving program and plan objectives; (3) status of the range of conditions corresponding to their overall mandate. Partnerships and coalitions will be needed to effectively achieve all these types of monitoring.
- A systematic and effective information management system needs to be developed at the Ping River Basin level. It needs to build on previous and on-going work, and provide linkages with emerging sub-basin organizations in order to support their functions and further development.

Figure 3-15. Sub-basin as interface venue



In considering the potential role for RSBOs in helping to address these gaps and operational issues in current efforts to build effective river basin management organizations, one of the first fundamental questions is whether a sub-basin organization will be viewed as:

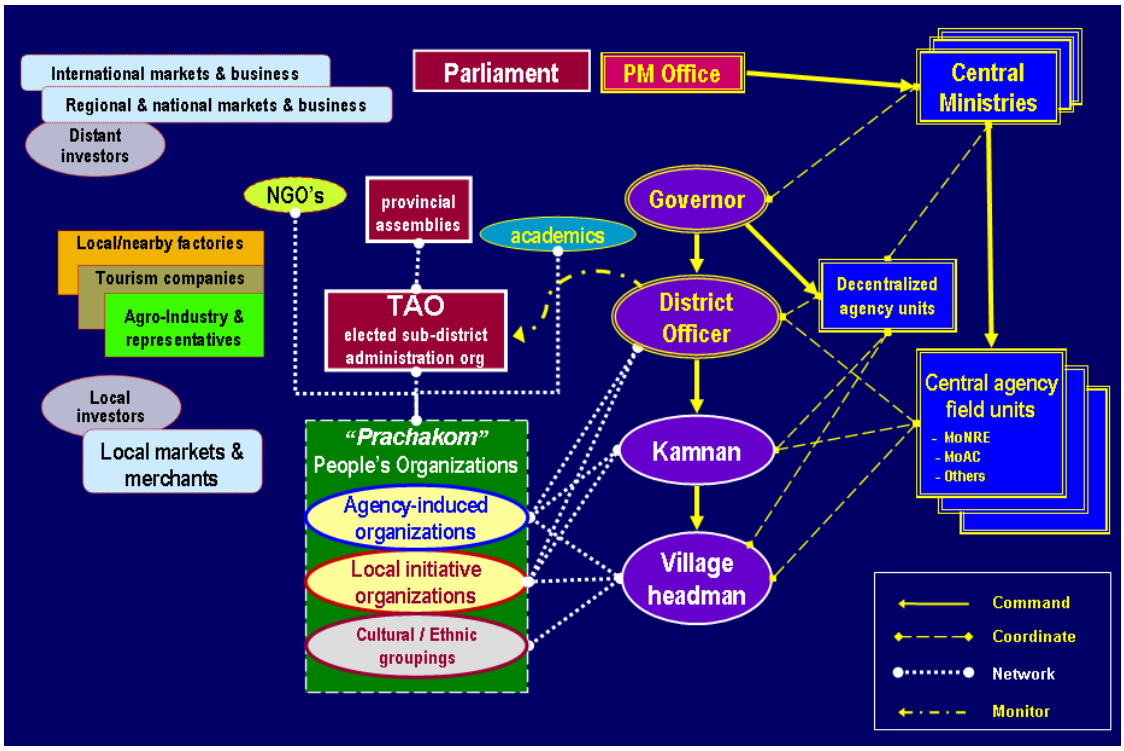
- a downward extensions of top-down processes
- an upward extensions of bottom-up processes
- a forum where bottom-up processes can interface with top-down processes

All three perspectives are possible, and different stakeholders will no doubt advocate each of these points of view.

When comparing the relative strengths and weaknesses, however, it appears that the sub-basin

level may be most suited to provide the interfacing functions suggested in the third option and shown in Figure 3-15. This follows both from characteristics that provide potential strengths at the sub-basin level, and from weaknesses of other levels to provide these functions. However, the relative degree to which an organization may link more closely with top-down or bottom-up processes may not be the same for all sub-basins.

Figure 3-16. Components of the institutional context in Ping sub-basins



In order to further explore the context of sub-basin management organizations, a review was also made of the range of relevant stakeholder and institutional interests as viewed from more local levels within Ping River sub-basins. Key sets of stakeholders included: (a) central government agencies; (b) provincial and district administrations; (c) forestry agencies and policies; (d) agriculture of various types; (e) private business; (f) urban centers; (g) local government; and (h) civil society and academia. Village-reported data from the national rural development database was used to help provide a quantitative dimension for this assessment.[2] A diagrammatic framework for relationships among these stakeholders is shown in Figure 3-15. Although highly simplified, this diagram gives us somewhat of an overview of the institutional stakeholder complexities that sub-basin organizations must face – in addition to institutional factors introduced by the river basin organization system itself.

[2] Detailed findings and data are in the watershed consultant's final report [Thomas 2005]

3.2.2. Alternative models for river sub-basin management organizations

Based on review of experience at both international and Ping River Basin levels, six areas of consideration were proposed for priority consideration in developing models of organization for river sub-basin management organizations (RSBOs):

- Mandate, responsibilities and authority. Conditions in the Ping Basin favor a broad and integrated mandate for RSBOs, but their roles and responsibilities need to constructively complement regular development planning processes and the administration hierarchy. Both 'expert' and local knowledge need to be combined in problem identification and analysis, but either agencies or local organizations probably need to take a leadership role. Program and project planning is an area for RSBO leadership, but an overall sub-basin management plan is needed to provide goals, objectives, priorities, and resource allocation. RSBOs need to clarify their roles in terms of project implementation and any regulation functions. Conditions in the Ping Basin argue for a strong RSBO role in monitoring and learning. Access to sources of authority will depend on a common sense of ownership.

- Representation: core membership, constituencies and selection processes. Particular attention needs to be given to achieving appropriate stakeholder balance among sectors, between central and local government, among elements of local governance systems, and between gender groups. The main RSBO 'assembly' or decision-making body needs to be of a manageable size, probably in the range of 20-50 representatives, with appropriate working sub-groups. Selection of stakeholder representatives needs to be transparent and participatory, while allowing flexibility for election or consensus processes. Those outside the entourage of an organized interest group also need representation, and mechanisms such as fixed terms are needed to assure all representatives are accountable to their constituents.

- Leadership. While flexibility needs to be maintained, attention needs to be given to the individual leadership qualities and characteristics of potential leaders. Where numerous factions exist, cohesion may be encouraged by election standards higher than a plurality of voters. If new selection procedures are established, current leaders should be encouraged to become candidates.

- Institutional positioning and linkages. RSBOs will need to develop linkages with other organizations at levels above and below the sub-basin in organizational hierarchies, as well as peer-to-peer linkages among organizations at similar levels. The principle of subsidiarity implies more local levels should take the lead in most issues, and raise issues they have difficulty addressing to the RSBO. The RSBO should pass issues they cannot resolve to river basin or other higher levels. All levels need sufficient authority and resources to take initiative at their level, and all must be accountable for their actions. Alliances will be needed among local organizations within sub-basins, among sub-basins in the context of river basin level issues and processes, and among local groups with similar concerns in networks that cross sub-basin boundaries. RSBOs should seek partnerships to strengthen their overall operations.

- Legal status. RSBOs should consider the advantages and disadvantages of different options for their official legal status, and there should be flexibility for it to change over time as capacity develops and conditions change.

- Operational components and specialists. While RSBOs should have flexibility to design their own structure, they need to consider at least 3 basic types of components: (a) an RSBO assembly where the full range of stakeholder representatives conducts overall deliberations and decision-making processes; (b) permanent and temporary working groups to lead efforts in program and project planning, data and communications, public participation and

awareness, problem identification and analysis, and monitoring and learning; (c) a secretariat to conduct administrative and operational tasks, support working groups, and manage facilities. Location of the secretariat needs careful consideration.

There are clearly various alternative structural options under each of these considerations. At an overall organizational level, however, various options tend to 'cluster' around alternatives that are at least internally consistent and able to support viable RSBO structures and functions.

In order to help clarify how various internally consistent and compatible combinations can provide a set of realistic alternative structures for RSBOs, five alternative organizational models were described to represent variations falling under three generic types. The unifying theme for distinguishing these generic types centers on identity, participation and subsidiarity issues discussed in the previous section.

Under a participatory watershed management project, it must be stakeholders within a sub-basin who decide for themselves what type of 'model' of organization is best for them. Thus, to help facilitate decisions by sub-basin committees and stakeholders regarding the type of RSBO they want to establish, a comparison chart of the major structural and organizational characteristics of each type of model was developed, as shown in Figure 3-17.

In addition to providing an overview of model types, the chart can also be used in considering how changes in various components are associated with changes in overall orientation of alternative types of RSBOs. Indeed, it was anticipated that choices made in pilot sub-basins, and the similarity or differences among them, should be very informative for efforts to develop support services, and to anticipate options and needs for Ping sub-basins at the overall level.

It is also important to note that attributes described for each model could be altered or adjusted in various ways. Thus, the specific combinations shown are meant to indicate a certain type of RSBO organizational model, but each can be further adjusted to improve its performance under specific conditions

Government-oriented models

These two models continue past trends in Thailand toward establishment of RBOs and RSBOs through central government initiative aimed primarily at improving government programs.

Type 1. Focused government model

The central focus of this model is on efficiency and effectiveness in utilizing the institutional arrangements of a single ministry to implement activities within the mandate of that ministry – the Ministry of Natural Resources and Environment (MoNRE). Thus, participation under the RSBO is primarily to assist and improve the design and implementation of MoNRE programs.

While in many ways this appears to be a government agency business-as-usual model, there are still several ways in which it would be an improvement over current conditions. It would, for example, require some real coordination among departments of MoNRE, in order to develop a uniform set of ministry guidelines regarding sub-basin boundaries, leadership, responsibilities, a single set of sub-basin organizational arrangements, *etc*. Moreover, many of the issues related to confusion could be clarified in the context of a relatively narrow focus, and action plans could be adapted quite readily from earlier plans already produced under activities led by DWR and DNP. In comparison to other approaches, this model would be relatively quick and easy to define and organize, and it could be established through a ministry-level directive issued by MoNRE.

The key potential weaknesses of this model relate to its tendency to be dominated by the views and policies of a single ministry. The identity of the RSBO will likely tend to become regarded as a public relations unit for MoNRE and its agencies and associates. Emphasis will tend to be strong on water, soil and forest conservation, water use and pollution, garbage reduction and disposal, and any other major programs of the ministry. Remedial measures will tend to be strong in these areas, but unable to address major underlying causes that require broader consideration or action by other ministries or sectors.

RSBOs preferring this type of model might seek to mitigate potential weaknesses by modifying arrangements to include, for example, at least some elected leaders and broader local network and civil society representation, by employing public hearings and other types of tools to enhance public participation and transparency, and/or by seeking stronger interaction with planning processes of local governments in the sub-basin regarding broader underlying issues and associated development needs.

Type 2. Broader government model

The main focus of this model is still on efficiency and effectiveness in utilizing government institutional arrangements and mechanisms, but the scope is broadened to include activities within the mandate of multiple ministries. Given the difficulties in coordination among ministries at high levels, the provincial local administration hierarchies are brought in as a partner to assist with coordination and integration of plans at more local levels.

Relative to the focused government model, this may be a more ambitious model to implement, but it also provides some important additional features. In addition to requiring substantially improved coordination among MoNRE policies and agencies, the model also seeks coordination among multiple ministries. As this is not likely through normal channels, the model relies on an umbrella high-level directive or cross-ministry agreement, combined with a partnership with provincial governors and local administration to help coordinate activities at sub-basin and more local levels. With broader government participation, it may be able to consider and address some more complex underlying causes and effects of sub-basin problems, and encourage more broad-based local participation.

The key potential weaknesses of this model relate to tendencies toward domination associated with its strong links with central and provincial government. It may be difficult to attract and maintain participation by strong local leaders who want to avoid domination by officials, and local factions friendly with government officials may seek to capture control. Moreover, there may be a tendency for the RSBO to be regarded primarily as a source of government funds, resulting in local tendencies to say what they think central agencies want to hear in order to obtain funds that can help boost the prestige and welfare of various local factions.

RSBOs preferring this type of model might seek to mitigate potential weaknesses, for example, by modifying arrangements to include at least some elected leaders, by more transparency and local initiative in selecting local representatives, and by employing public hearings and other types of tools to enhance public participation and transparency. It may also want to emphasize strong interaction with planning processes of provinces and local governments in the sub-basin regarding broader underlying issues and associated development needs, both within and beyond mandates of participating ministries.

Multi-level partnership models

These two indicative models employ multi-level partnerships to establish the sub-basin level as the primary venue for an interface between top-down and bottom-up processes.

Type 3. Central – local partnership model

This model places its main focus on creating a real partnership among groups and organizations from central to local levels, but with a degree of asymmetry that assigns somewhat greater weight to central and provincial government agencies. Primary coordination and integration functions are shifted to provincial and local levels, and implementation plans are integrated into the regular development planning process. This reduces or eliminates needs for formal cross-ministry agreements at high levels, while expanding the range of issues available for RSBO consideration.

This model represents efforts by MoNRE and its agencies to reach downward in administrative and natural resource hierarchies to form a real partnership with local administration, local governments, civil society and other local stakeholder groups. While the ministry and province local administration still provide a degree of leadership, this model encourages and requires much more active local participation and decision-making.

Key potential weaknesses relate to its greater complexity and needs for coordination, as well as a need for strong local leadership that can balance tendencies toward domination by government, local elites, business interests or other locally influential factions.

RSBOs preferring this type of model might seek to mitigate potential weaknesses by seeking multi-level dialogue with partner institutions, and by seeking ways to encourage and strengthen capacity of local leaders, as well as mechanisms to assure transparency, accountability and access to information.

Type 4. Local – Central partnership model

The main focus is also on creating a real partnership among groups and organizations from central to local levels, but with a degree of asymmetry that assigns somewhat greater weight to local government and civil society groups and institutions.

This model represents efforts by local governments and organizations in the sub-basin to organize themselves and reach upward in administrative and natural resource hierarchies to form a real partnership with provincial administrations, government agencies under MoNRE and other participating ministries, and other relevant stakeholder groups. Its structure helps reduce threats of government domination, but requires strong local leadership, participation, and initiative.

Key potential weaknesses relate to its complexity, to threats of domination by local factions, or to stagnation if different local interests cannot negotiate effectively among themselves.

RSBOs preferring this type of model might seek to mitigate potential weaknesses by seeking ways to strengthen the roles and capacity of local networks, civil society institutions, local government, and constituency groups, by encouraging local leadership and initiative, by strengthening negotiation and conflict management capacity, and by providing regular forums for communication among all sectors, as well as through mechanisms to assure transparency, accountability, and strong public information, education and participation programs.

Non-government alternative models

This model views the RSBO as a further extension of bottom-up non-governmental processes.

Type 5. Local non-government model

The main focus is on effectiveness in mobilizing non-governmental groups and civil society institutions to formulate, advocate and monitor activities within the mandate of the RSBO.

This model represents efforts by local non-governmental groups and organizations in the sub-basin to lead efforts to organize themselves into an independent RSBO outside the government sphere. They would conduct independent analyses, program planning and monitoring activities that seek to provide advice and some assistance to local governments, provincial administrations, and central agencies, as well as strong efforts to raise public awareness and mobilize public support and pressure for integrating improvements into all relevant decisions made in the public policy arena. Its strengths relate to its independence, flexibility, and strong grounding in local communities and conditions, and its access to information, advice and assistance from a wide range of non-governmental and academic sources. Similar models have sometimes been applied internationally, such as in the Fraser River Basin in Canada where strong issues between the government and Native American communities made it the option most acceptable to all stakeholders.

Key potential weaknesses relate to the absence of formal links with government organizations, which may result in weakened ability to influence develop planning processes, less access to government information, less ability to interact constructively with higher policy levels representing wider stakeholder interests beyond the sub-basin, and less access to basic support to sustain its operations over the long term.

RSBOs preferring this type of model could seek to mitigate potential weaknesses by upgrading roles for at least local governments, by building mechanisms to assure regular constructive interaction with relevant government institutions and agencies at multiple levels, by registering with ministry funding programs for NGOs and peoples organizations, as well as by seeking clear *prachakhom* recognition by all TAOs and *tessaban* in the sub-basin. The RSBO secretariat may also want to include a unit responsible for exploring a wide range of possible funding sources.

Figure 3-17. Comparison chart of five alternative models for sub-basin organization.

	Focused Government	Broader Government	Central-Local Partners	Local-Central Partners	Local Non-Government
Scope of Mandate					
water use	X	X	X	X	X
forest land use	X	X	X	X	X
agriculture land use		X	X	X	X
pollution	X	X	X	X	X
solid waste / trash	X	X	X	X	X
health		X	X	X	X
education			X	X	X
infrastructure			X	X	X
livelihoods			X	X	X
Duties					
identify & analyze problems	advice/assistance	advice/assistance	lead	lead	lead
planning	advice/assistance	advice/assistance	lead	lead	lead / advise
implementation		advise	advise	advise / assist	advise
implementation monitoring		advise	advise	assist	advise
environmental monitoring	advice/assistance	advice/assistance	lead	lead	advise / assist
impact monitoring		advise	lead	lead	lead / assist
Main authority sources	ministry	ministries - prov	min - prov - TAOs	TAOs - prov - min - public	TAOs advisor / public awareness
Representation					
ministries	MoNRE agencies	MoNRE, agric, health	MoNRE, other relevant	MoNRE, other relevant	invited advisors
province / district	Prov - Dist Officers	Prov - Dist Off-Kamnan	Prov - Dist Off-Kamnan	Prov - Dist Off-Kamnan	invited advisors
local government	TAOs, Kamnan	TAOs	TAOs	TAOs	invited advisors
business / industry	selected	selected	invited / voted	voted / group-selected	voted / group-selected
livelihood groups	selected	selected	invited / voted	voted / group-selected	voted / group-selected
civil society	<informal>	selected	invited / voted	voted / group-selected	voted / group-selected
local communities	selected PYB	selected	invited / voted	voted / group-selected	voted / group-selected
Leadership					
chairman / deputies	Officials	Officials	voted	voted	voted local non-gov
Secretariat	Officials	Officials	officials / voted	voted	voted
Technical info/advice	Officials	Officials / consult	offic / acad / priv / non-gov	offic / acad / priv / non-gov	gov / acad / priv / non-gov
Primary Linkages					
Upward	Ministry	PingRB / Ministries	PingRB / Prov / Min	PingRB / Prov / Min	PingRB
Downward	Min units / District	Districts / TAOs	District / TAOs	TAOs / Networks / groups	Networks / groups
Main funding sources	MoNRE	Ministries	Min / Prov / TAOs	TAOs / Prov / Min / non-gov	TAOs / grants / non-gov

3.2.3. Proposed process for developing sub-basin management organizations

A five phase process was proposed for developing river sub-basin management organizations (RSBOs) in the context of the Ping River Basin.[3] This sequence of phases has now already begun, and would extend far beyond the timeframe of this project. International experience confirms that development of effective long-term river basin organizations is a long-term process. Thus, expectations about the contributions that a project such as this one can make to RSBO development in Ping sub-basins need to be realistic, and they need to be formulated and assessed within this longer-term framework.

These five phases of RSBO development are based on assessments from international literature. But they are also constructed in a manner that reflects the particular circumstances faced by this project in the context of current conditions in the Ping Basin, as discussed in previous sections of this report. The five phases are listed in Figure 3-18.

Figure 3-18. Phases of Ping RSBO Development

1. Getting started
   - Preliminary sub-basin committees
   - Initial action planning process
2. Establishing long-term organization and processes
   - Review initial planning experience
   - Select, localize and establish long-term RSBO organizational model
3. Launching implementation in a River Basin Management framework
   - Outline initial long-term River Basin management plan
   - Begin implementation and monitoring
   - Begin systematic capacity building
   - Build parallel Ping Basin – level support capacities
4. Strengthening long-term management planning and learning processes
   - Management plan elaboration, refinement and consensus building
   - Annual progress reviews, learning and adjustments
5. Maintaining long-term organizational relevance, vitality &performance

This project has focused on efforts to implement the first two phases in the pilot sub-basins, and to make as much progress as possible toward building the basic foundation for activities to be completed during the third phase. Progress toward achieving these objectives in each of the pilot sub-basins is summarized in the next section of this chapter.

1. Getting started. This phase builds on existing organizations and plans in establishing an initial sub-basin working group and formulating initial action plans. Emphasis is on articulating a vision, goals, objectives, criteria, and priorities to select action plan component projects, review and screen existing sub-basin plans, link with TAO and provincial plans, and select priority activities and local studies for implementation.
2. Establishing long-term organization and process. This phase centers on participatory review of experience with planning processes at sub-basin and other relevant levels, and selection and localization of an initial organizational model for a long-term RSBO. The five alternative types of organizational models described in the previous section can be a useful input into this process. While the initial design of the organization should reflect what is appropriate and viable under current conditions in the sub-basin, views should also be solicited about directions in which the RSBO should evolve. This should help identify directions for developing capacity and other aspects of the organization.
3. Launching implementation in a River Basin Management framework. This phase moves into 'multi-tasking' mode, wherein priority activities under the initial action plan begin implementation, and monitoring and results-based measurement systems begin to be

[3] More detailed discussion of each phase can be found in the watershed consultant's final report [Thomas 2005]

established and activated. It builds on experience during the first phase and begins operating under the long-term RSBO structure established during the second phase. Its central focus is on outlining a broader RSBO Management Plan (see Figure 3-19), which includes strategies for monitoring, information, partnerships, capacity building and funding. Initial high priority components of the capacity building strategy begin to be implemented. Particular emphasis is on starting learning processes associated with the monitoring and information strategy, and on identifying approaches for assuring that views of all major stakeholder groups in the sub-basin are considered. This may require systems to provide support for negotiations, and to assure transparency, accountability and equity. These are processes that should be supported through parallel efforts at the Ping River Basin level to build support capacities in terms of a knowledge center, mobile technical support teams, and data and analytical systems.

Figure 3-19. Management Plan Components

RSBO Management Plan

1. Statement of priority problems to be addressed in the management plan
2. RSBO vision statement, goals and objectives
3. Action plans for achieving goals and objectives
4. Monitoring and information strategy
5. Partnership and capacity building strategy
6. Funding strategy

4. Strengthening long-term management planning and learning processes. This phase moves to a multi-year approach, with emphasis on broadening and deepening understanding and consensus within and among stakeholder groups in the sub-basin. RSBO structures, plans and processes are further refined, based on careful consideration of various views, and emphasis on learning from experience with actual implementation activities. These are processes that cannot be unduly rushed by unreasonable time constraints. To help stimulate these considerations, several sets of initial questions are proposed under more detailed discussions in the watershed management consultant's final report. An annual review process would become part of a long-term continuous learning cycle of problem identification, analysis, planning, monitoring, and outcome and impact assessment. This process should be participatory, inclusive, transparent, accessible, and both downwardly and upwardly accountable. Continuing efforts to improve these processes will need support, and the specific needs in a sub-basin are likely to change over time. Thus, they could benefit greatly from a Ping River Basin level knowledge center that would include information access, mobile technical support teams, and data and analytical systems.

5. Maintaining long-term organizational relevance, vitality and performance. The final open-ended phase takes well-functioning RSBOs into long-term operation and maintenance mode. In addition to annual learning and adjustment cycles, a second perhaps 5 to 6 year cycle is added to focus on longer-term changing conditions, and on assessments of RSBO performance and stakeholder satisfaction. This includes reassessment of needs for programs and operations, as well as ways to improve structures and functions to respond to those needs.

3.3. Developing sub-basin organization and planning processes

Project activities in pilot sub-basins have sought to complete the first two phases of the five phase process described in the previous section, and to make as much progress as possible toward building the basic foundation for activities to be completed during the third phase. This section summarizes the progress made in each pilot sub-basin.

Implementation of specific activities in the three pilot sub-basins under component 1 of the project was conducted under two distinct stages of activity. In addition to what has already been mentioned in Part I of this report, there a few additional characteristics of these stages that will help clarify the discussions of activities in each pilot sub-basin in following parts of this section:

(1) Initial Sub-basin Working Groups facilitated by implementation consultants

In order to understand the context of efforts by the project to facilitate the development of sub-basin action plans and sub-basin level organizations for management of natural resources and the environment in the 3 pilot sub-basins, it is important to begin with the structure, composition and duties of the initial sub-basin working groups under the project.

Since these working groups were established by directives issued by the Office of Natural Resources and Environmental Policy and Planning, their leaders needed to be officials under the jurisdiction of that agency. Other members of the working groups were seen as trying to provide a reasonable balance of various important stakeholder groups in the sub-basins.

Duties of initial sub-basin working groups focused on: (1) conducting planning processes to produce an initial action plan for management of natural resources and environment in each pilot sub-basin, including aspects related to livelihoods and public health; and (2) considering the structure and functions for a long-term sub-basin management organization that could be established to lead implementation and further development of management processes in each sub-basin. Project implementation consultants served as facilitators for these efforts.

Since the project implementation consultant team facilitated working groups in all three pilot sub-basins and were responsible for preparing overall project reports during this stage, they encouraged working groups to conduct their planning processes in a fairly similar manner, and to produce outputs that were in a similar format. They also sought agreement among all three pilot sub-basins on a similar basic type of long-term organization structure (Figure 3-20). They believed that these types of similarity across the three pilot sub-basins could improve their chances of being accepted by central government systems, and improve their ability to be replicated in other sub-basins around the Ping River Basin.

(2) Review and modifications facilitated by sub-basin networks

After initial action plans and proposed arrangements for long-term sub-basin management organization were developed and drafted, they were then submitted for further review and modification by major stakeholder groups in the sub-basin. This work was facilitated by a small team of local staff in collaboration with existing relevant networks in each sub-basin.

Main concerns of these review teams centered on how well the draft plans and organizational arrangements matched with current situations and local views among major stakeholder groups within each of the individual sub-basins. The scope of their review included processes and assumptions used during development of draft plans and organizational arrangements, as well as the content of the products resulting from the first stage. They believe that close matching of

plans and organizations with specific local conditions and views in each of the three pilot sub-basins will greatly improve their ability to bring real improvement for local livelihoods and for the sustainable management of natural resource and the environment.

Figure 3-20. Proposed common characteristics for all RSBOs

Implementation consultants concluded that long-term sub-basin management organizations in all sub-basins should have these structural elements:

1. Membership

- Chairmen & vice-chairmen are high-level government officials from NRE agencies in the area, in order to have efficient directives and coordination.
- Secretaries & assistant secretaries are from government units in the area responsibile for care of NRE, in order to have people who can coordinate among members, communicate & conduct documentation.
- Members are people representing all parties related to benefits received from resource use, including local governments, local specialists, & existing network organizations.

2. Advisors. Organizations need an advisory group affiliated with the Ministry of Interior & local governments, to provide advice, recommendations & support for activities of the organizations at sub-basin & network levels.

3. Roles & duties:

- Formulate action plans for NRE management in the sub-basin
- Monitor and evaluate implementation of activities and projects
- Consider, review & modify action plans that are not efficient & relevant to real local conditions
- Conduct dissemination & public relations
- Coordinate & implementation jointly with Coordination offices for NRE restoration
- Consider establishment & certification of network organizations
- Negotiate and mediate disputes related to resource management & use

4. Organization support requirements:

- Organizational strengthening. Increasing knowledge, understanding, skills, & experience of organizations at various levels through training, study tours, meetings/seminars, & research studies to develop organization management, monitoring & evaluation of implementation results.
  Estimated budget requirement: 880,000 baht /year / sub-basin
- Organization administration. Reliable basic support for organization management, including budgets for durables, expendables, communications, & travel, & for local meetings, monitoring, evaluation, and dispute mediation.
  Estimated budget requirement: 1,240,000 baht /year / sub-basin

Thus, the plans and organizational arrangements presented in the following sections have resulted from the combination of tensions and compatibilities between these two types of approaches. In the process, parties with quite widely different views have had the opportunity to make significant inputs. As the following sections indicate, some types of results have varied greatly among the three pilot sub-basins, while others show substantial consistency across the three sites. While the time has been very limited, many important principles and issues have managed to enter into the process and have impacts on the results.

3.3.1. Ping part 1 (Upper Ping) sub-basin

Sub-basin Context

As the northernmost sub-basin of the Ping River Basin, the Ping part 1 sub-basin is located entirely in Chiang Mai province and contains the headwaters of the main channel of the Ping River. Thus, it is often referred to as the "upper Ping" sub-basin. Under this project, the Ping part 1 represents the group of "upper" sub-basins described in section 3.1.1. Basic data describing the physical, demographic, administrative, and land and resource use features of the sub-basin as

Figure 3-21. Sub-basin data table: Ping part 1

Sub-basin total area	kilometer^2	**1,974**

Altitude zones		
< 600 masl	% land area	40
600 - 1,000 masl	% land area	43
> 1,000 masl	% land area	16

Watershed classification			
1A	protected forest	% land area	42
1B	protected forest	% land area	4
2	restricted uses	% land area	18
3	limited uses	% land area	15
4	conservation measures	% land area	13
5	unrestricted	% land area	8

Climate		
- average temperature	degree C	**25.6**
hottest month	degree C	36
coolest month	degree C	14
- total average rainfall	mm	**1,272**
rainy season	mm	1,121
dry season	mm	150
- total average runoff	million m^3	**536**
rainy season	million m^3	398
dry season	million m^3	138

Water storage	million m^3	**9**
- large scale	number	-
capacity	million m^3	-
service area	% land area	-
- medium scale	number	-
capacity	million m^3	-
service area	% land area	-
- small scale	number	11
capacity	million m^3	**9**
service area	% land area	0.7

Water requirements	million m^3	**128**
- irrigation	million m^3	**85**
large-scale	million m^3	-
	% land area	-
medium / small / pumping	million m^3	56
	% land area	4
people's local irrigation	million m^3	30
	% land area	1
- consumption & domestic	million m^3	**5**
municipalities	million m^3	2
rural	million m^3	3
- industry & tourism	million m^3	**0.003**
- ecological balance	million m^3	**37**

Population			
- total population		persons	**79,711**
municipalities		percent	46
rural		percent	54
- overall population density		pers/sq km	**40**

Administrative units		
municipalities	number	4
tambons	number	14
districts	number	5
provinces	number	1

State forestlands			
- national park		number	3
	declared area	% land area	**56**
- wildlife sanctuary		number	1
	declared area	% land area	**9**
- reserved forest		number	7
	declared area	% land area	**26**
Total state forestlands		% land area	**90**
Land outside state forestlands		% land area	10

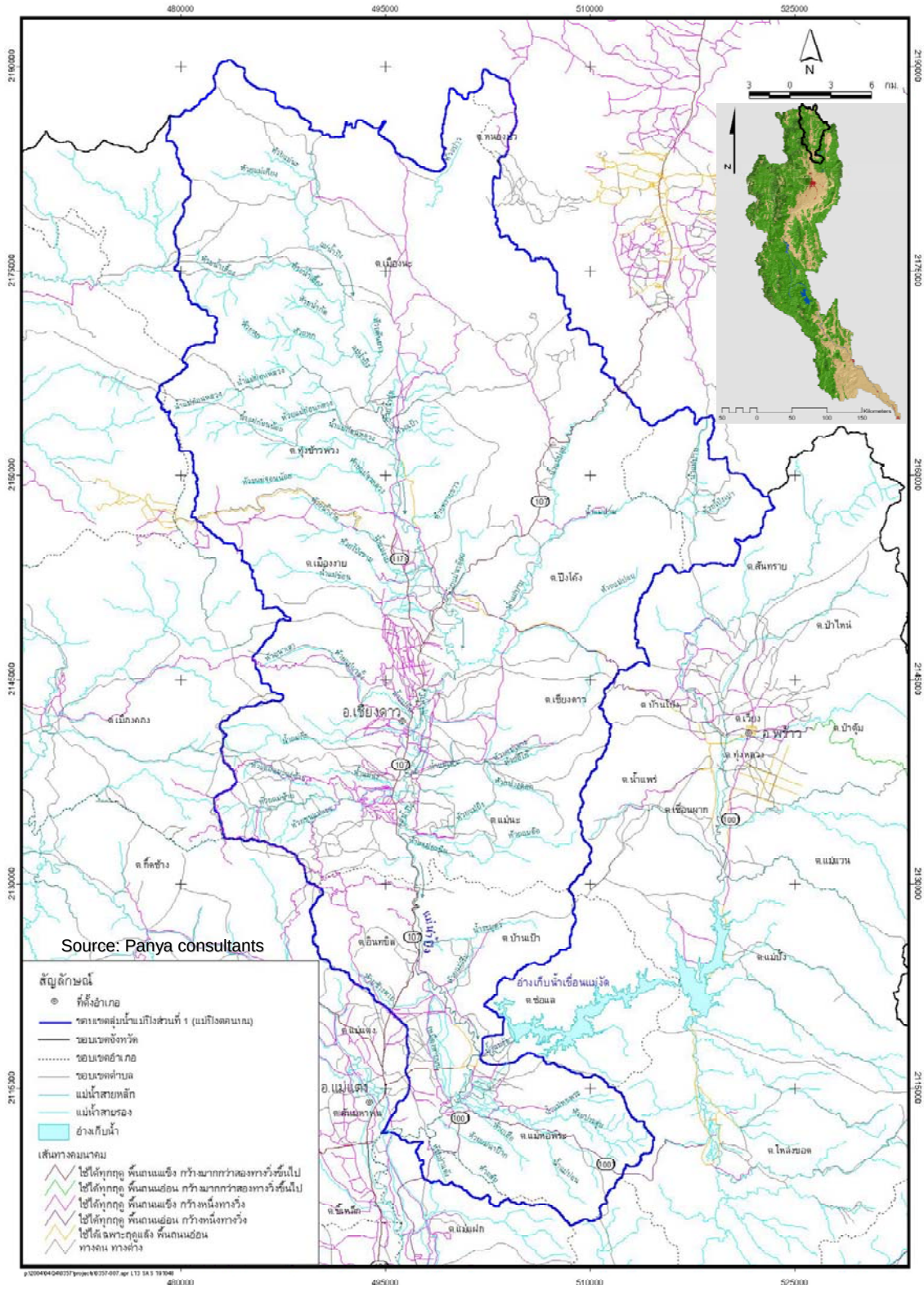
Land use			
- forest cover		% land area	**72**
- not under forest cover		% land area	28
- suitabile for agriculture		% land area	20
	suitable for rice	% land area	14
	suitable for field/tree crops	% land area	6
- agriculture		% land area	**26**
- settlements		% land area	**1**
- water & other		% land area	**1**

Municipality pollution			
municipalities		number	4
population		persons	36,656
- total wastewater		million m^3/yr	**1.7**
- biochemical oxygen demand - BOD		tons / year	**166**
- garbage		tons / year	**13,954**

Agriculture pollution			
- pesticide use	rice	tons / year	0.03
	field crops	tons / year	0.3
	fruit trees / horticulture	tons / year	3.7
- nitrogen use	rice	tons / year	127
	field crops	tons / year	336
	fruit trees / horticulture	tons / year	501
- phosphorus use	rice	tons / year	30
	field crops	tons / year	59
	fruit trees / horticulture	tons / year	75
- estimated BOD	rice	tons / year	118
	field crops	tons / year	94
	fruit trees / horticulture	tons / year	90

shown in Figure 3-21, and the spatial configuration of the sub-basin is presented in Figure 3-22. As with most upper sub-basins, the Ping part 1 retains extensive areas of forest and 90 percent of its area is claimed as state forestlands. Areas suited for lowland paddies are very limited, and its northern Thai and ethnic minority communities manage agroecosystems that include upland and managed forest areas, many of which are now claimed as protected state forestlands. Economic development has brought expansion of upland crops such as maize, and orchard crops such as longan and oranges, as well as expansion of commercial livestock production, tourism and some cottage industry.

Figure 3-22. Sub-basin map: Ping part 1 (upper Ping)



While the role of forest agencies is very prominent in this sub-basin, there have also been strong efforts by local communities to build their own organizations and networks to improve management of natural resources. Support for their efforts has come from both state agencies and non-government organizations. The growing strength and capacity of local organizations has been reflected in the manner in which they have participated in project activities.

Project implementation leadership in the Ping part 1 Sub-basin

The structure and composition of the initial project working group that provided leadership for project implementation in the Ping part 1 sub-basin is shown in Figure 3-23. Although not all members were able to attend all meetings, a quorum was always present. The project implementation consultant team facilitated work by the Ping part 1 working group. This included providing information both from their rapid initial surveys in the sub-basin and from secondary sources, as well as organizing and analyzing data for the working group. They also helped prepare meeting agendas and documents, and provided various specialists to assist with particular topics as appropriate. Members of ONEP staff and their watershed consultant also attended major meetings of the Working Group.

Figure 3-23. Working Group: Ping part 1

Chairman	
Head, Province NRE office (CM)	1
Secretary	
Province ONEP officer	1
Members	
Province governments	1
Province NRE office - nat. res. working group	1
Government agency - Royal Forest Dept.	1
Project implementation consultant	1
Local officials	2
Upper Ping Committee	1
Local organization supported by DNP	1
Local specialists	3
Peoples representatives	5
Peoples organizations	2
NGO	1
Business representative	2
TOTAL	23

The subsequent process to review and modify sub-basin plans and proposed organizational arrangements was led by well-known people in the sub-basin who are active in networks and organizations related to management of natural resources and the environment. Facilitators for this process were independent development workers who are native to or long-term residents of the Ping part 1 sub-basin. Deliberations of major meetings and forums conducted under this process are documented.

Remaining parts of this section discuss the results of these processes in terms of the progress made toward completing the requirements of phases 1 and 2 of the five phase process for developing sub-basin management organizations summarized in section 3.2., and developing the basic components of a draft long-term sub-basin management plan for phase 3.

Identification of sub-basin problems

The first basic component of a long-term sub-basin management plan is clear statement of the problems to be addressed by a sub-basin organization and its planning process. Problem assessments facilitated by project implementation consultants using “PRA”-type techniques resulted in identification of the range of problems listed in Figure 3-24. These problems were reviewed and adjusted by the Working Group, and used as an input into development of a draft sub-basin action plan that sought to address many of these problems.

This preliminary listing of problems places strong emphasis on current problems associated with the state of natural resources and the environment, but also identifies some important economic and social issues in the sub-basin. Although some linkages between these two major types of

issues and problems appear to be likely, no specific efforts to identify cause-effect relationships are apparent.

Figure 3-24. Preliminary problem identification: Ping part 1

Important issues — *Problem*
1. Natural resources
(a) forests
1. Forest encroachment, especially in watershed forest, due to needs of land for residence & cultivation
2. Illicit timber harvest and forest destruction
3. Forest fires due both to natural causes and to people in the area
4. Polices and laws related to forest resources are not in line with current conditions
5. Conflict in use of forest lands
(b) land
1. Erosion of topsoil in sloping lands
2. Landslide hazards due to improper agriculture & no soil conservation practices or cover crops
3. Degraded soil and lack of soil fertility
4. Soil acidity; soil structure destroyed by continuous cropping without proper soil maintenance
5. No tenure rights in farm land because most land in protected forest & watershed areas
(c) water
1. Lack of water during the dry season and absence of local water resources
2. Natural disaster problems during rainy season
3. Problems due to conflict over water use between upstream and downstream communities
2. Environment
1. Water quality not suitable for consumption & domestic use
2. Use of chemicals and pesticides in agriculture
3. Air pollution by particulate matter, smoke & foul odors from distilleries, pig farms, burning weeds in agricultural fields, and burning trash
4. Untreated wastewater of communities, residences, farms & industrial factories released into streams
5. Increasing amounts of garbage & waste, but no systematic collection or control processes
3. Health
1. Air pollution problems due to dust, soot, smoke & odors affect nearby community health through allergies & contagious diseases, such as intestinal, respiratory, & skin diseases
4. Economy
1. High agriculture investment cost, but low product prices determined by merchants/middlemen
2. Problems of poverty, unemployment, lack of secure occupations, landlessness & debt
3. Lack of occupational capital and income, cannot make living during agriculture off-season due to lack to other occupational skills
5. Social issues
1. Local population growth due to births & in-migration cause local conflicts over land for residences & fields, and cause forest encroachment, water use, garbage & social problems such as drugs & killings
2. Change & modern technologies entering daily life cause old community lifestyles based on sufficient economy to change, including unnecessary debt & problems in passing on local knowledge
3. Migration & relocation cause lack of health care knowledge & awareness; inappropriate community sanitation
4. Educational problems due to lack of opportunities for children & youth to study
5. Problem of construction of good basic public utilities in the area

While results of the "PRA"-type summary of natural resource and environmental problems in the sub-basin identified a number of important issues, the subsequent review by sub-basin networks felt the information and analysis was insufficient to identify the important issues that underlie and drive most of these problems.

Thus, they developed and proposed the additional framework for assessing watershed problems shown in Figure 3-25. This framework reflects elements of the analytical processes that local network organizations have been developing and using within the Ping part 1 sub-basin. While it accepts the existence of the types of problems listed in Figure 3-24, its orientation is toward identification and understanding of the types of processes of change that have resulted in these problems. Their hope is that this can help them to identify and develop approaches for

addressing these basic issues in order to increase the sustainability of both natural resource management and livelihood development.

Figure 3-25. Identification of underlying problems: Ping part 1

1. Problems based in legal structures a. Declaration of conservation forests displaced community areas, agricultural fields and community forests for subsistence and rituals long used by local communities b. Declaration of agricultural land reform areas caused the framework for land holdings to be outside forest lands, & not under the land law, making people unable to have correct land tenure arrangements
2. Problems based in policies a. Promotion of planting monocrops brought rapid expansion of monocrops such as large-scale orange orchards, use of chemicals, soil degradation, topsoil erosion, and conflict over use of resources such as water & forest b. Opening of free trade areas, especially for major local garlic & longan crops, caused villager output prices to fall, feeding conflict in resource access and use, soil degradation, & arguments due to competition for resources c. Conversion of assets to capital led to encroachment & expansion of areas held by capital groups, such as in *miang* forest tea garden areas
4. Problems following from impacts of legal & policy problems on communities a. Conflict between communities and the state, between communities and capital investors, & among communities b. Degradation of land, water and forest resources c. Debt problems, and various other problems, including many listed in Figure XX.

Sub-basin vision, goals and objectives

Initial efforts by the Working Group centered on articulating a sub-basin vision statement, goals and objectives, in a structure that was somewhat similar to those being developed in other sub-basins. In an effort to facilitate thinking, the project implementation consultants presented similar elements from various previous planning processes conducted under programs of other agencies working in the sub-basin. Local leaders in the Working Group resisted completion of this process in a single working session without the opportunity to confer with other local colleagues. Thus, they deferred their response until the next Working Group meeting. Although this was still not enough time for very much interaction at the local level, they at least felt more comfortable with agreeing upon a general structure by the second meeting, which was then used in the initial draft sub-basin plan.

The subsequent sub-basin review process felt this was a quite important deficiency in the initial planning process. In their view, a vision statement should be what people and communities in the sub-basin hope will happen, with characteristics of an ideal image or “dream image”. Thus, it should be developed collaboratively. But sub-basin goals and objectives in the initial draft plan seem to emphasize only directions for conservation, care and restoration in order to restore natural resource fertility. They saw a need to expand the issues being emphasized in the goals and objectives to be in line with resource access and use of resources using local knowledge. This is to improve sustainability and acceptance of community knowledge in resource management. At the same time, there should be emphasis on building awareness in communities, and building capacity of community organizations in managing resources following the diverse ways of life and culture in the sub-basin.

As a result of this review and refinement process, major revisions were made to this level of the initial draft action plan for the Ping part 1 sub-basin. The overall logic of the plan was simplified to include only a vision statement and a single goal, as seen in Figure 3-26. In this approach, the vision statement is a combination of three elements, and each element is then more clearly defined. These three definition statements can be seen as equivalent to objective statements that are specifically and clearly linked with the overall vision. These ideas are then integrated into a single overall goal statement for the sub-basin plan.

Figure 3-26. Ping part 1: Sub-basin vision & goal

Vision Beautiful forests, clear water, development with united hearts & promoting local wisdom

Beautiful forests, clear water means resources are rich, have biodiversity, are sources of food and medicines to care for disease, and communities have access to their benefits

Development with united hearts means collaborative linkage mechanisms among all local parties, no matter if at the level of groups, peoples organizations, local agencies, local governments, temples, schools, etc.

Promoting local wisdom means rehabilitation and gathering of local knowledge, presenting information, and building acceptance

Goal

Communities have knowledge & awareness about local resource problem situations, and apply it in building participatory strategies with all local parties for sustainable management of natural resources in the watershed

This is an interesting and innovative approach that seeks to combine the necessary types of information into a format that is quite simple, straightforward, and easy to understand.

Action Plan for the Ping part 1 Sub-basin

Efforts by the Working Group combined their initial sub-basin vision statement, goals and objectives, with a set of strategies that could be roughly matched with those being developed in other sub-basins. A long list of hundreds of locally proposed projects collected by the implementation consultants was then sorted according to sub-basin strategies. The sub-basin Working Group then selected and grouped small projects into larger projects that logically fit under each sub-basin strategy. Although it was logistically difficult to consider so many projects in such a short period of time, efforts were made to select priority types of activities from the lists of projects and project groups.

The initial draft action plan for the sub-basin was then submitted for review by local networks in the sub-basin. Local leaders reviewed draft action plan documents and reports and prepared summary materials for joint consideration by a local working group and specialists. The local review group included representatives of villagers, various local networks, and others related to management of natural resources and the environment. After several rounds of review and modification, the revised plan structure was presented and reviewed at a sub-basin forum with more than 150 participants from the sub-basin.

During the review process, much initial emphasis was placed on clarifying the basic directions and characteristics of the sub-basin action plan. Local reviewers felt that a watershed resource management plan that really brings increased efficiency to implementation probably results not only from high-level knowledge in its activities, from its good looks, or from its beautiful language. It is also due to its efforts to give importance to processes in preparing components related to implementation and participation by groups and organizations, including various networks, as well as the knowledge base, the base of experience in direct and indirect ways of managing resources, and many other factors in building participation in action planning.

Considerable importance was given to local exchange of ideas related to the question of "what should a good plan be like?" This resulted in articulation of seven principles for a good plan, as listed in Figure 3-27. These views also reflect emphasis by local sub-basin networks on long-term processes for developing sub-basin plans, including emphasis on processes that need to occur before planning in order to prepare people, build data, conduct exchange and build understanding. Such initial processes are then followed by identification of the content,

components and procedures of the planning process, and then finally by determining the strategies, measures and indicators contained in the plan.

While the networks sought to employ this approach as much as possible during the short time available for refinement of this initial sub-basin action plan, they also integrated these processes into the revised plan in order to support the longer-term processes required for building capacity, real participation, and development of a "good" long-term sub-basin plan.

Results of their efforts are reflected in the revised structure of the Ping part 1 sub-basin action plan as in Figure 3-28.

Figure 3-27. What does a good plan look like?

1. A plan must have life, which means it must have flexibility to adapt according to conditions and it can really be implemented
2. A plan must have a real database, whether it is data on knowledge or data on various conditions
3. A plan must emphasize processes with real participation of the people
4. A plan must be easy to understand, not confusing, and written in language that can be easily understood
5. A plan must not be driven by funds & budgets, it should be led by heart & thought
6. A plan must have continuity and seek sustainability
7. A plan must be in line with current contexts, conditions & problem situations

Figure 3-28. Ping part 1 Sub-basin Action Plan: Strategies & component measures

Strategy 1. Building capacity of community organizations (human resource development)

- 1.1 Support and promote provision of knowledge to community organizations at all levels
- 1.2 Further build on the base of resource management activities conducted by local peoples organizations
- 1.3 Promote establishment of networks among peoples organizations to manage natural resources in the sub-basin and sub-watersheds
- 1.4 Support and promote continuing inheritance of local knowledge
- 1.5 Support and promote providing knowledge in occupations appropriate for community potential and location
- 1.6 Support and promote sanitation and hygiene for improving quality of life and health

Strategy 2. Studying and gathering of community datasets and knowledge

- 2.1 Make information system for peoples resource-based management organizations in sub-basin & sub-watersheds
- 2.2 Study & collect knowledge datasets & local knowledge about local natural resource & environmental management
- 2.3 Establish implementation-based research in collaboration with local communities in the watershed
- 2.4 Establish processes for data analysis and evaluation of problem conditions in the watershed

Strategy 3. Building mechanisms for collaboration with local parties

- 3.1 Build collaboration among communities and local government organizations in managing resources in watersheds
- 3.2 Raise the level of communities in natural resources and environment planning that can join with local governments
- 3.3 Promote establishment of networks among peoples organizations to manage natural resources in the Ping part 1 sub-basin and local sub-watersheds

Strategy 4. Promote and support natural resource management activities (natural resource conservation)

- 4.1 Restore natural resources and environment
- 4.2 Control and protect community natural resources
- 4.3 Community collaboration in determining directions of resource management
- 4.4 Use ways of life and culture as tools in management and activities

Strategy 5. Managing resources and watershed management organization structure

- 5.1 Raise the level of community organizations in holistic watershed management
- 5.2 Develop organizational mechanisms for managing watersheds and community organizations
- 5.3 Formulate plans for managing sustainable use of resources

Strategy 6. Policy monitoring and advocacy

- 6.1 Monitor, examine and present opinions about state resource management policies
- 6.2 Supplement processes of various networks in following laws demanded by communities, such as the community forestry law

At this point, further detail of the plan consists of (1) lists of example types of activities to be conducted under each strategy, and (2) identification of first-year priority activities under each strategy for each sub-district in the sub-basin. Indicators have also been developed at the level of measures, but they are really closer to statements of expected outcomes, as discussed in more detail in section 6.1.1, below.

Other strategy components for a long-term sub-basin management plan

As leaders in the Ping part 1 sub-basin move toward further improvement and development of a full-scale long-term river sub-basin plan, they should consider any needs for further work on other strategies associated with a full-scale long-term sub-basin management plan, as follows:

- Monitoring and information strategy. Descriptive names of measures and activities listed under each strategy of the action plan indicate there are many activities aimed at building and using local knowledge and data bases, including expanding local monitoring of natural resources, the environment, and other dimensions of sub-basin livelihoods and quality of life. Moreover, these are aimed at sub-basin, local organization and community levels, where they would both generate and use various types of important information.

  Once the sub-basin management organization is established and its roles and duties become clear, it may be useful to extract and assemble these components, and begin systematic identification of the full range of monitoring and information needs of the sub-basin. This could help in developing an overall monitoring and information strategy to meet the range of needs in the most systematic and efficient manner possible.

- Partnership and capacity building strategy. There also appears to be very strong emphasis on capacity building of organizations at sub-basin and more local levels, as well as on building of partnership linkages among organizations in the sub-basin. Partnerships with local governments are also the focus of specific measures, while collaboration with outside networks receives attention under strategy 6. Partnerships with other types of organizations based outside the sub-basin are mentioned, but are not yet very clear.

  After the sub-basin management organization is established and its roles and duties become clear, it may also be useful to extract and assemble these components, and begin systematic identification of the full range of capacity building and partnership needs of the sub-basin. This could help in developing an overall strategy to meet the range of needs in the most systematic and efficient manner possible.

- Funding strategy. The current uncertainties surrounding funding support for activities of the sub-basin management organization, and for activities contained in the sub-basin action plan, are still too great for sub-basin leaders to be able to identify a potential structure for an overall sub-basin funding strategy. Discussions have already begun, however, regarding alternative funding sources that may have potential for providing support for different types of projects and activities under the action plan. It is already clear that local governments (TAO, *tessaban*, PAO), province administrations, and various relevant central government agencies are seen as important partners and sources of support for particular types of activities. Discussions in the Ping part 1 sub-basin also include efforts to develop proposals to seek support from a wider range of government, non-government, and possibly even international outside sources

  One important current question is whether or not the relevant central government agencies will be willing and able to provide basic core support for operation and development of the sub-basin organization itself. Once the source of this type of support can be identified, it will become more feasible to explore additional potential sources of support, and to make more progress toward developing an overall sub-basin funding strategy.

River Sub-basin Management Organization (RSBO) for the Ping part 1 sub-basin

Initial efforts by the sub-basin Working Group toward identification of an appropriate structure for a long-term sub-basin management organization began with a review of existing local organizations in the Ping part 1 sub-basin. Facilitated by implementation consultants, this initial review focused on the types of organizations shown in Figure 3-29. In the case of the Ping part 1 sub-basin, half of the types of organizations identified were established by local people and communities themselves. The other three types were established through efforts by government agencies, with each agency supporting its own local organization.

Figures 3-29. Initial review of existing local organizations: Ping part 1

Existing organization	*Established by*	*Remarks*
Restoration of natural resources & environment		
1 Joint sub-committee for restoration of natural resources & environment, Ping part 1 sub-basin, with sub-district working groups	Dept. Nat. Parks	*established 2005*
Forest conservation		
2 Community forest network	local people	*strong*
Water conservation, watershed forest		
3 Ping River stream network	local people	*strong*
Water management		
4 Irrigation water administration group	Irrigation Dept	*strong*
5 Muang fai weir irrigation groups	local people	*strong*
6 Water management working group, Ping part 1 sub-basin (Upper Ping management sub-committee)	Dept. Water Resources	*no supporting budget until DWP got funds for 2006-07*

Figure 3-30. Initial organization SWOT analysis: Ping part 1

Strengths

1 have customs, traditions & ways of life that depend on forests; local knowledge in forest resource conservation & use
2 have strong local natural resource conservation groups, such as soil doctors, muang fai, forest conservation groups & groups opposing pollution
3 have watershed management committees in every sub-district with established regulations and penalties regarding water use; & have sub-district-level natural resource restoration working groups
4 receive technical support, techniques, methods & funds from various development organizations

Weaknesses

1 absence of coordination linkages among state agency units and local groups
2 some villages and groups still lack forest management
3 coordination among local organizations has not yet received participation
4 management organizations are complicated
5 state does not understand work by the people's sector
6 various information communications & public relations are conducted too slowly
7 lack of funding support for conducting activities

Opportunities for group development

1 state policies, work plans, & projects that provide full support for natural resource conservation
2 state provides support for people's participation in managing natural resources & environment

Limitations

1 related agency units do not provide real and continuous support so that results can meet goals
2 outside investors encroach on forests and use land inappropriately
3 duplication in implementation work of agency units
4 frequent change of administrators & political policies of supporting organizations result in no implementation continuity

Working groups then conducted a SWOT analysis of these existing organizations, with assistance from implementation consultants, and the results are summarized in Figure 3-30.

After reviewing SWOT analyses from all pilot sub-basins, and developing an overall framework for a uniform type of RSBO structure,[4] project implementation consultants proposed an initial structure for a long-term RSBO for the Ping part 1 sub-basin. Its characteristics are summarized in Figure 3-31. Leadership positions are all assigned to government officials according to positions that they occupy, and members are to be selected according to allocations under 4 types of forest and water management issues.

Results of this process generated a great deal of discussion and analysis during the subsequent review and modification process facilitated by local sub-basin networks.

One key issue raised by local network reviewers was the very limited range of types of existing local organizations considered during this process. Types of relevant organizations used in local analysis should include:

Figure 3-31. Initial RSBO structure proposed by implementation consultants: Ping part 1

Chairman	
Head, Coordination office for Upper Ping NRE restoration	1
Vice Chairman	
Representative, Office of NRE, Chiang Mai Province	1
Secretary	
Head, sub-basin coordination working group, Coordination office for Upper Ping NRE restoration	1
Assistant Secretary	
Head, environment working group, Office of NRE, Chiang Mai Province	1
Members	
Upper watersheds (forest conservation)	
Farmers	1
Ethnic minority groups	2
Local government (TAO)	2
Non-government organizations (NGO)	1
Monks	1
Community specialist – forest	1
Community specialist – soil	1
Agriculture water pollution	
Farmers (paddy rice) – medium to large size fields	1
Farmers (longan) – medium to large size orchard	1
Farmers (orange) – medium to large size orchard	1
Farmers (maize) – medium to large size fields	1
Tourism entrepreneur	1
Public health specialist	1
Water shortage / water management	
Heads of tradition water management groups (muang fai)	3
Tourism entrepreneur	1
Village philosopher	1
Kamnan	1
Village headmen	1
Local government (TAO)	1
Non-governmental organizations (NGO)	1
Sub-basin facilitator – water	1
Sub-basin facilitator – organizations	1
Floods	
Rep. Center to prevent & abate public hazards, Chiang Mai	1
Local government (TAO)	1
Total membership:	32

- Old existing community organizations related to ways of life, culture and religion
- Groups and organizations established by the government
- Groups emerging in response to problem situations related to forest, land, water, etc.
- Groups of local government organizations / administration groups
- Groups of entrepreneurs related to businesses that use or sell resources
- Technical specialist groups / private development organizations (NGO).
- Groups of central or provincial government organizations or their local working units

Using this type framework, assessments by local networks came to the conclusion that a long-term RSBO for the Ping part 1 sub-basin should place strong emphasis on development of local

[4] See section 3.3 introduction

capacities to be the primary source of leadership and initiative for sustainable management of natural resources and environment in the sub-basin, as required to achieve their vision (Figure 3-26) and to effectively implement their action plan (Figure 3-28).

Thus, the roles and duties of a long-term RSBO for the Ping part 1 sub-basin were revised to include the eight major areas of activity listed in Figure 3-32.

Figure 3-32. Ping part 1 RSBO: Roles & duties

1.	Administer, manage and plan activities and budgets of local organizations in the watershed
2.	Promote working processes of local organization networks in conducting local-level natural resource management activities
3.	Disseminate and publicize information, activities, and knowledge related to resource management to people in the area, the public and related organizations, in order for them to receive and understand results or various implementation methods under natural resource and environmental management action plans
4.	Link & coordinate partnership mechanisms at local area level and at network level
5.	Conduct duties to negotiate and mediate conflicts arising in local areas related to management and uses of natural resources and environment in the watershed
6.	Conduct policy-oriented monitoring of proposals by local community organization networks on management of natural resources and the environment or of large-scale development projects in the area
7.	Consider, review and modify action plans for watershed management to increase efficiency and relevance to the state of local areas
8.	Consider certification of the status of local network organizations

Accordingly, another important revision has been in the membership composition and structure of the long-term RSBO. As indicated in Figure 3-33, members are to provide appropriate representation of the range of existing local organizations that are the building blocks for the RSBO. All leaders are to be elected locally, domination by government agencies or other powerful outside interests is not seen as desirable.

Figure 3-33. Ping part 1 RSBO: Membership

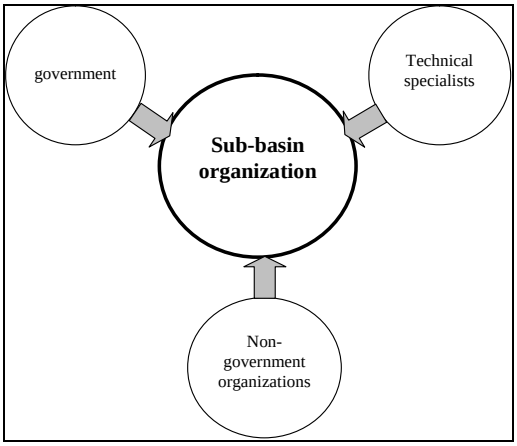
Chairpersons & secretaries	
Elected locally	
Sub-committees	
Linkages with local sub-watershed committees	
Membership composition:	
Old existing community organizations	6
Community forestry networks	3
Ping River stream conservation network	2
Farmers networks	2
Ethnic minority groups	3
Housewives groups, Women's development groups	3
Local government (TAO, *tessaban*, PAO)	4
Kamnan / village headmen	3
Government officials, agency local units	3
Local specialists	2
Non-governmental organizations (NGO)	2
Private investor / entrepreneur groups	2
Total membership:	35

Establishment of this approach requires an initial selection committee, and acceptance by major stakeholders of a process for building the capacity and strength of the RSBO:

- *A Selection Committee* is to be composed of honorable individuals who have relationships with local management of natural resource and the environment. They will conduct processes to select individuals to participate in the organizational structure, also known as the Watershed Committee. In order to conduct this process, the selection committee must be appointed and roles must be specified.
- *Building organizational strength.* One important aspect of directions for building the strength of the sub-basin organization is to give importance and acceptance to the form of local network organizations conducting management duties. This is especially important for government units and local governments, who will have important roles in providing continuing support for action plans and activities of organizations. The state must show sincerity by using a supporting approach in order for real participatory management to emerge both in the roles and duties of the organization, and in sub-basin

action plans. The main theory is 4 pillars (Figure 3-34): The basic idea is to allow the watershed organization to be the main structural pillar, and have non-government development organizations, government organizations, and technical specialists provide support under the roles, duties and conditions established by the local sub-basin organization.

Figure 3-34. Ping part 1 RSBO 4 Pillars



3.3.2. Mae Kuang sub-basin

Sub-basin Context

The Mae Kuang sub-basin is a quite large sub-basin that covers most of the eastern side of the Chiang Mai – Lamphun valley, including areas in both of those provinces. Under this project, Mae Kuang represents the group of "middle" sub-basins described in section 3.1.1. Basic data on the physical, demographic, administrative, and land and water resource use features of the sub-basin are shown in Figure 3-35, and the spatial configuration of the sub-basin is presented in

Figure 3-35. Sub-basin data table: Mae Kuang

Sub-basin total area	*kilometer²*	**2,734**

Altitude zones		
< 600 masl	*% land area*	69
600 - 1,000 masl	*% land area*	25
> 1,000 masl	*% land area*	6

Watershed classification			
1A	*protected forest*	*% land area*	26
1B	*protected forest*	*% land area*	1
2	*restricted uses*	*% land area*	17
3	*limited uses*	*% land area*	9
4	*conservation measures*	*% land area*	12
5	*unrestricted*	*% land area*	35

Climate		
- average temperature	*degree C*	**25.9**
hottest month	*degree C*	*37*
coolest month	*degree C*	*14*
- total average rainfall	*mm*	**1,126**
rainy season	*mm*	*1,002*
dry season	*mm*	*123*
- total average runoff	*million m³*	**912**
rainy season	*million m³*	*759*
dry season	*million m³*	*153*

Water storage	*million m³*	**348**
- large scale	*number*	*1*
capacity	*million m³*	***263***
service area	*% land area*	10.2
- medium scale	*number*	*4*
capacity	*million m³*	***26***
service area	*% land area*	1.9
- small scale	*number*	*51*
capacity	*million m³*	***59***
service area	*% land area*	2.4

Water requirements	*million m³*	**577**
- irrigation	*million m³*	***546***
large-scale	*million m³*	*316*
	% land area	10
medium / small / pumping	*million m³*	*161*
	% land area	10
people's local irrigation	*million m³*	*69*
	% land area	4
- consumption & domestic	*million m³*	***21***
municipalities	*million m³*	*11*
rural	*million m³*	*10*
- industry & tourism	*million m³*	***10***
- ecological balance	*million m³*	**-**

Population			
- total population		*persons*	**290,988**
	municipalities	*percent*	*50*
	rural	*percent*	*50*
- overall population density		*pers/sq km*	***106***

Administrative units		
municipalities	*number*	14
tambons	*number*	69
districts	*number*	10
provinces	*number*	2

State forestlands			
- national park		*number*	*2*
	declared area	*% land area*	***2***
- wildlife sanctuary		*number*	*1*
	declared area	*% land area*	***11***
- reserved forest		*number*	*15*
	declared area	*% land area*	***50***
Total state forestlands		*% land area*	**63**
Land outside state forestlands		*% land area*	37

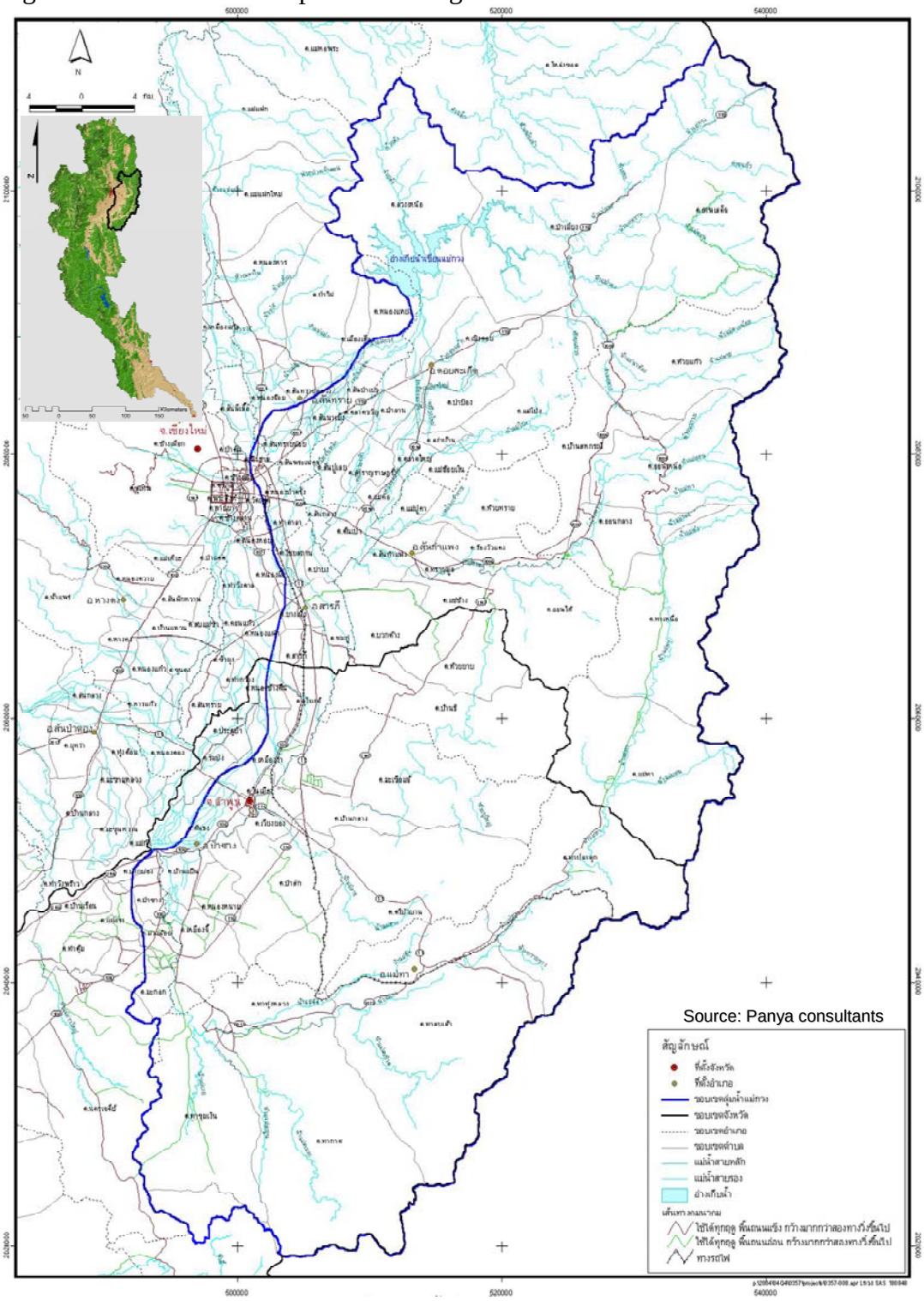
Land use			
- forest cover		*% land area*	**56**
- not under forest cover		*% land area*	44
- suitabile for agriculture		*% land area*	30
	suitable for rice	*% land area*	*22*
	suitable for field/tree crops	*% land area*	*8*
- agriculture		*% land area*	**33**
- settlements		*% land area*	**7**
- water & other		*% land area*	**3**

Municipality pollution			
	municipalities	*number*	*14*
	population	*persons*	*145,473*
- total wastewater		*million m³ /yr*	**6.9**
- biochemical oxygen demand - BOD		*tons / year*	**687**
- garbage		*tons / year*	**35,781**

Agriculture pollution			
- pesticide use	*rice*	*tons / year*	0.2
	field crops	*tons / year*	0.1
	fruit trees / horticulture	*tons / year*	8.1
- nitrogen use	*rice*	*tons / year*	931
	field crops	*tons / year*	75
	fruit trees / horticulture	*tons / year*	1,091
- phosphorus use	*rice*	*tons / year*	216
	field crops	*tons / year*	13
	fruit trees / horticulture	*tons / year*	163
- estimated BOD	*rice*	*tons / year*	866
	field crops	*tons / year*	21
	fruit trees / horticulture	*tons / year*	195

Figure 3-36. As is characteristic of middle sub-basins, Mae Kuang is a diverse, complex sub-basin that includes substantial headwater forest areas and some ethnic minority communities, as well as very substantial areas of irrigated agriculture, river plains and urban areas. Economic development has brought commercial intensification of agriculture and livestock production, and a growing number of part-time farmers who join with urban populations in expanding industrial, commercial and service activities, as well as emerging resort and recreational facilities. Impacts of these activities have brought strong and growing concerns about resource competition and pollution issues.

Figure 3-36. Sub-basin map: Mae Kuang



Although forest agencies have a substantial presence, irrigation agencies are very strong here, and several agencies and organizations have strong linkages with local groups in different parts of the sub-basin. While various local groups have grown quite strong in different parts of the sub-basin, their interaction and collaboration appears to have been limited. The resulting tensions between tendencies toward competing factions, and their common desire to build local capacity and leadership to address natural resources and environment issues has been reflected in the manner in which they have participated in project activities.

Project implementation leadership in the Mae Kuang Sub-basin

The structure and composition of the initial project working group that provided leadership for project implementation in the Mae Kuang sub-basin is shown in Figure 3-37. The project implementation consultant team facilitated work by the Mae Kuang working group. This included providing information both from their rapid initial surveys in the sub-basin and from secondary sources, as well as organizing and analyzing data for the working group. They also helped prepare meeting agendas and documents, and provided various specialists to assist with particular topics as appropriate. Members of ONEP staff also attended major Working Group meetings.

Figure 3-37. Working Group: Mae Kuang

Chairman	
Heads, Province NRE offices (CM, LP)	2
Secretary	
Province ONEP officer	1
Members	
Province governments	2
Province NRE office - nat. res. working group	1
Province NRE office - water working group	1
Government agency - Royal Forest Dept.	1
Project Consultant	1
Local officials	3
Upper Ping Committee	1
Local organization supported by DNP	1
Local specialists	2
Peoples representatives	4
Peoples organizations	1
NGO	1
Business representative	2
TOTAL	24

The subsequent process to review and modify sub-basin plans and proposed organizational arrangements was led by well-known people in the sub-basin who are active in networks and organizations related to management of natural resources and the environment. Deliberations of major meetings and forums conducted under this process are documented.

Remaining parts of this section discuss the results of these processes in terms of the progress made toward completing the requirements of phases 1 and 2 of the five phase process for developing sub-basin management organizations summarized in section 3.2., and developing the basic components of a draft long-term sub-basin management plan for phase three.

Identification of sub-basin problems

The first basic component of a long-term sub-basin management plan is clear statement of the problems to be addressed by a sub-basin organization and its planning process.

Problem assessments facilitated by project implementation consultants using secondary information and “PRA”-type techniques resulted in identification of a range of important problems. The review and revision process facilitated by local networks in the Mae Kuang sub-basin maintained the basic structure of this problem identification approach, but made a number of modifications in how problems are described. The listing of issue topics and problems shown in Figure 3-38 reflects the overall results of both of these processes.

In the documents that describe these problems, many specific situations and locations are identified to reinforce and further describe the nature of most of these problems. This is also

evidence of the very substantial amount of local thought and discussion that has been invested in identifying and understanding local problems during recent years. These processes clearly have been going on for some time, so that this project has sought to benefit from, and help facilitate expansion and integration of various lines of analytical activity in the sub-basin.

Figure 3-38. Issues and problem situations: Mae Kuang

Issue Topics	*Problems*
1. Natural resources	
(a) forests	
	1. Illicit timber harvest and forest destruction in upper watershed forests for non-timber forest products, timber, fuelwood and charcoal due to increasing outside demand and prices; and forest fires set to help obtain various production inputs, hunt wildlife, and make land use claims.
	2. Forest encroachment in watershed forest areas, due to clearing of old land claims by residents for business, for new residents and farms, and for religious facilities including some backed by funds from overseas
	3. Increased use of forest resources by private entrepreneurs for orchards, quarries, etc. under concessions, but with no restoration after concessions expire.
	4. Government organizations request and obtain forest land for colleges, schools, agricultural extension
	5. Polices & laws related to forest resources not in line with current conditions, such as declaring national parks over community agriculture areas; promoting investment and trade competition that encourages forest resource use
(c) water	
	1. Increased use of water for agriculture, industry, services, and community settlements
	2. Inefficient management of water resources with conflict among communities, and among state agencies and organizations,, business sector, and local people over water resource structures, diversions, pumping, etc.
	3. Headwater sources have less water storage capacity
	4. Shortage of supplemental water supplies for use during dry season
	5. Shallower waterways, accumulation of sediment, riverbank scouring during high flow periods
	6. Flooding in some areas
	7. Encroachment in riverside areas
	8. Loss of riparian ecology and aquatic biodiversity due to landscape modifications, dredging and projects by central and local governments, private sector and local people
(b) land	
	1. Deteriorated soil from use of chemicals and incorporation of chemicals into the soil
	2. Erosion of topsoil from agriculture and flooding; soil acidity from pumping groundwater
	3. Topsoil degradation and erosion
	4. Lack of tenure rights in farm land, and leaving areas as wastelands
2. Environment	
	1. Wastewater from communities, pig farms, dairy farms, industrial factories, laundries, paper & textile production
	2. Increasing amounts of garbage without proper sanitary disposal
	3. Air pollution by dust, soot and smoke from industrial factories, rice mills, forest fires and burning garbage
	4. Pollution from agricultural chemical residues in produce, which causes problems for consumers
3. Population, Economy & Society	
	1. Changing social values and increasing consumption and resource use
	2. Increasing agricultural expenses, such as fertilizers and pesticides
	3. Decreasing income from agriculture due to reduced production and quality; decreasing amounts & types of food from natural sources
	4. Less consciousness of community members about resource conservation and development
	5. Less role for communities and their participation in managing natural resources and the environment
	6. Roles of existing community organizations in managing natural resources and the environment are being replaced by central government agencies and local governments
	7. Various projects, such as projects related to narcotics and an establishment for care of ethnic minority children
3. Health	
	1. Status of illness due to intestinal and respiratory diseases
	2. Status of illness due to agricultural chemical use
	3. Provision of public health services