

Rivers in Jeopardy and the Role of Civil Society in River Restoration: Thai Experiences*

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ABSTRACT

Despite the traditional belief and respect in the goddess of Mother River (Pra Mae Kong Ka), all rivers in Thailand have been poorly managed and treated. River systems have been dramatically altered by land use developments, construction, channelization, pollution, encroachment, dams and reservoirs, etc. There has been a reduction in landscape quality, loss of wilderness areas and aesthetic beauty of natural rivers has vanished. Some species of flora and fauna have disappeared, exotic species have invaded, and the functional characteristics of the river system have been disrupted. Moreover, the headwater areas in upper watersheds which are the sources of our rivers and streams have been seriously degraded and misused.

In response to the need to save our rivers and their environments, the members of local communities partake their responsibilities in protecting and restoring their rivers. This paper describes the case study on the efforts directed to the application of engineering principles to the development of environmentally-sensitive approaches and the role of civil society using indigenous knowledge for managing and restoring the Ping River and its headwaters in Chiang Mai Province, Thailand. The new policies of the Government in the conservation and development of river and canal environment are also discussed.

Key words: River system, Civil society, Watersheds, Exotic species

INTRODUCTION

The Ping River, one of the 4 major tributaries of the Chao Phraya River, is a main river which provides water for livelihood to northern and central regions of Thailand. With the length of about 740 km., it joins the Chao Phraya River at Nakhonsawan Province and subsequently drains into the gulf of Thailand in southern area of Bangkok.

Chiang Mai Province is the home of forests and mountains where headwaters and streams originate and form the Upper Ping River Basin covering an area of about 22,000 km². The longitudinal course of the river through Chiang Mai Province is about 250 km. It passes through the provincial town and villages which are residential areas of nearly one million population.

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The crucial problems of the Ping River, as well as of other major rivers in Thailand, are diversified and complex. These include the lack of proper planning, administration and management within the fluvial hydrosystems; inadequate environmentally sensitive river engineering projects; deforestation on the mountains which causes severe watershed degradation, heavy soil erosion and deposition in the river channel as well as climatic changes; improper land use; drainage of waste into the river which causes water pollution; and river encroachment. The river encroachment is the unscrupulous personal desire for land by encroachment into the river corridors and water body. This is evinced by filling with soil and other materials and by other practices such as planting of some aquatic species that cause siltation. At many spots, the width of the river consequently becomes smaller and smaller. In some areas the remaining width of the river is as small as 1/5 of the original width.

The encroachment, deposition and pollution problems have negatively affected the aquatic ecosystem and the biological resources of the river both quantitatively and qualitatively. The amount and quality of water have decreased drastically in the dry season, as have the numbers and types of plants and animals, some becoming extinct. The natural beauty and landscapes of the river are damaged and degraded. Natural, or to be more correct, man-induced disasters such as flash floods and mudslides, once rare in the area, have now become annual occurrences.

RIVER ENGINEERING PRACTICES

Conventional river engineering works have become more intrusive in terms of the scale of modifications as mechanization has increased our ability to modify rivers and their local environment. Any engineering work that modifies the river system has the potential to cause instability and adversely affect the riverine environment. Attempts to impose an unnatural condition on a river can lead to major instability problems unless the river is heavily engineered. In turn, this can cause severe environmental degradation. The types of problems that can result may be illustrated by considering a range of engineering works on the Ping River and its headwaters as follow:-

- 1) Flood control and land drainage works have involved different combinations of dredging and straightening. Not only does this destroy river and bankside flora and habitats, but also adversely affects the local sediment transport regime of the river and promotes channel instability.
- 2) Straight channel alignment and geometrical homogeneity of cross-section have replaced the winding river with its charming and ecologically- important contrast. Aesthetically-pleasing features of the river have been lost.
- 3) Dredging of the river lowers the bed level and hence the accompanying lower water levels in the dry season and causes the groundwater table to be lower also. The capacity of the aquifers to serve agriculture is diminished. The coolness and the greenery of the lands alongside the river have been reduced.
- 4) Construction of bankside roads along the main river and its tributaries have caused severe erosion and sedimentation problems. Similar impacts are caused by road construction in the mountains and by many highland and upstream construction projects.

- 5) Bank revetments are mostly done with cement lining or concrete structures to prevent bank erosion. Inevitably, this totally destroys the instream habitats of the natural flora and fauna. The river becomes canalized with little or no environmental value.
- 6) Reservoirs and dams have destabilized the river system by reducing flood flows and caused bed degradation for a considerable distance downstream. This also promotes a coarsening or armouring of the riverbed as finer material is eroded but not replenished from upstream. Eventually a state is reached when relatively little bed material transport occurs. The bed then becomes hardened as fines fill in the voids in the gravel framework and the bed is rendered relatively impermeable and unsuited for invertebrates and for fish spawning. In addition, the width of the river is drastically reduced by vegetation encroachment, mostly from exotic species e.g. *Mimosa pigra* or giant sensitive plant, as annual flood flows no longer occur. The problem of water pollution is also intensified particularly in the dry season since the river flow is reduced and sometimes a state is reached when there is no flow at all. Low flow also stimulates sedimentation of mud. Thus it is found that the riverbed in the Upper Ping region is often covered with mud instead of sand and gravel as there used to be. This renders the river unsuitable for recreational activities.

Table 1. Examples of Engineering and Environment performance of flood alleviation schemes (adapted from Petts and Calow, 1996).

	Engineering and environment performance		
Option	Advantages	Disadvantages	Design limitations
Distant flood banks	Natural stability and flood capacity maintained. Instream and bankside habitats and flora unaffected		Preferred solution. Large space requirement which may be unavailable in urban areas. Possible need to change agricultural practice in flood storage zone in rural areas
Adjacent flood banks	On lowland rivers with negligible bed material load, no significant change on instream habitats and flora. Bank diversity may be enhanced	Scouring on upland rivers which transport bed material load unless bed is armoured. May be prevented by weirs. Restricts view of river across floodplain	Not suited to upland-type rivers without additional engineering works
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Two-stage channel	On lowland-type rivers, instream low-flow habitats and flora unaffected. In short-term floral diversity increased on berm but unlikely to be maintained should reed bed become established without heavy maintenance	On upland-type rivers deposition of bed material load at entrance to two-stage section will promote instability. On lowland-type rivers need to ensure that flood berm is sufficiently high above the water table to allow grazing/mowing and prevent reed growth. If berm surface becomes overgrown, design flood capacity is lost	Not suited to upland-type rivers. Larger space requirement. In urban areas could be developed as a linear park
Relief channels	Instream and bankside flora and habitats unaffected	On upland-type rivers significant deposition likely to occur at entrance to relief channel and erosion at exit	Not suited to upland-type rivers
Resectioning		On upland-type rivers severe erosion at head of dredged section, unless prevented by weir or bed sill, and deposition at downstream end. In lowland-type rivers siltation in dredged reach requiring regular maintenance dredging. Instream and bankside flora are totally destroyed	Not recommended unless necessitated by lack of space. Check sediment transport capacity for stability and ensure weirs and bank revetments have conservation/architectural merit

THE ROLE OF CIVIL SOCIETY IN PING RIVER RESTORATION

In response to the need to save the Ping River and its environment, the members of local communities partake their responsibilities in protecting their river. The “Love Mae Ping River Group” was formed in 1992 and volunteered to clean up the river and to guard against waste disposal and any damage done to the river. The group has grown and expanded into various civic groups. In 1993, the Coordinating Committee for the Protection of the Ping River Basin and Environment (CCPE) has been organized. Its members consist of volunteers who are academics, teachers, students, monks and interested people. Many programmes are set up for both short term and long term goals.

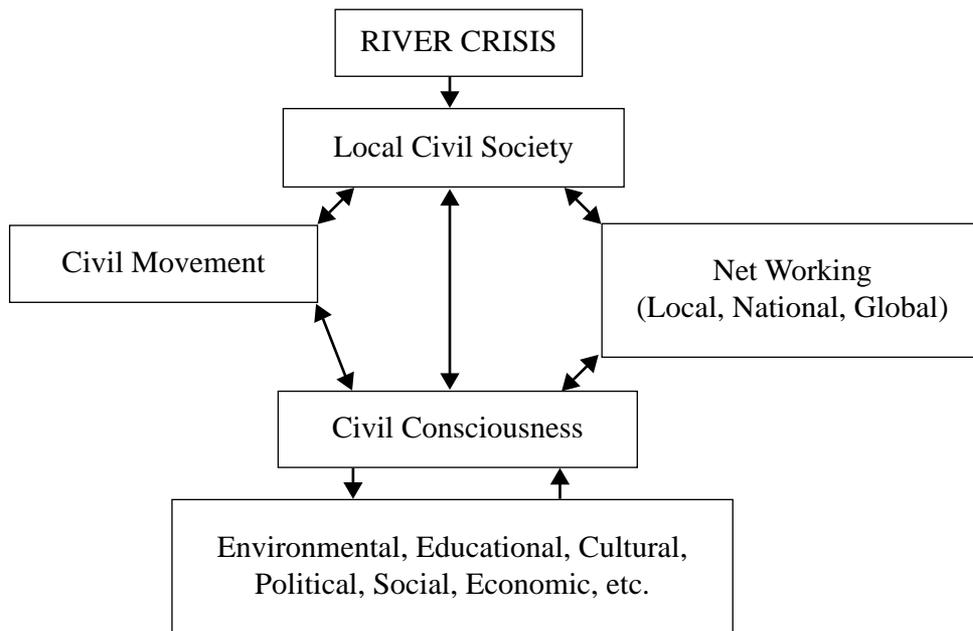
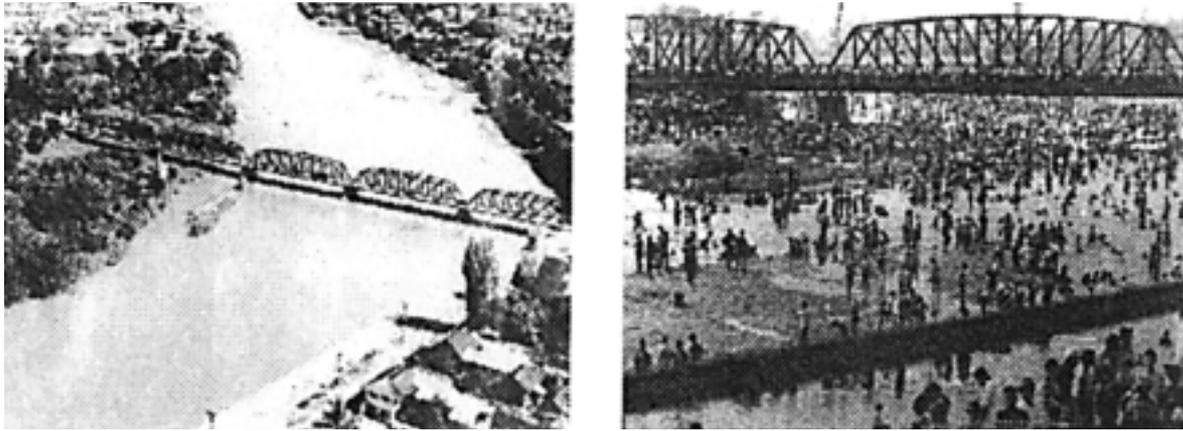


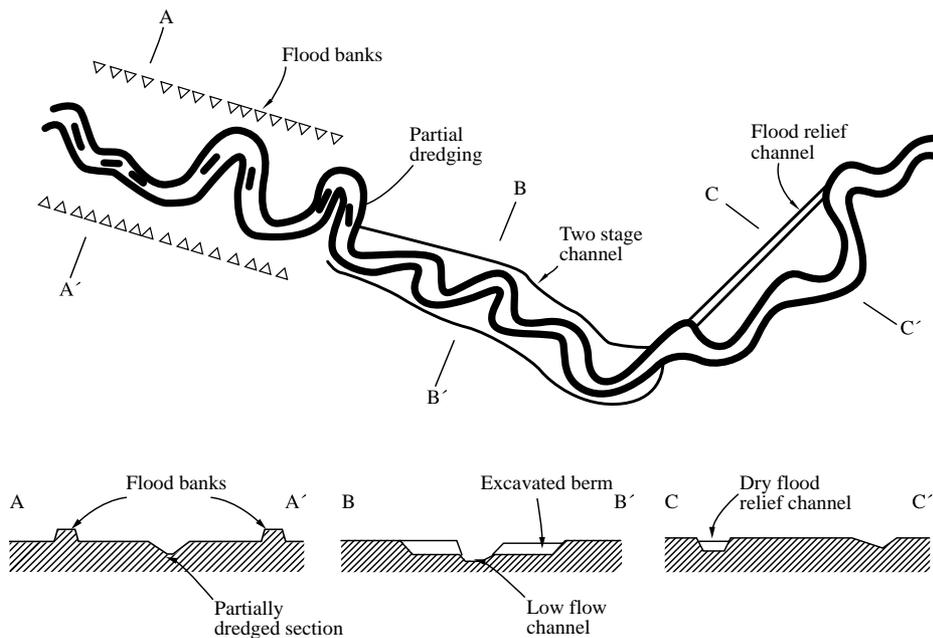
Figure 1. Relationship and movement of the Chiang Mai civil society in restoring the river and its environment.

The Goals of Programmes:

- 1) To guard against the encroachment and the disposal of community waste into the Ping River.
- 2) To revive the aquatic ecosystem of the river.
- 3) To preserve the natural beauty of the Ping River.
- 4) To formulate preventive measures which effectively apply the community participation in the protection of the Ping River.
- 5) To set up good examples for other communities regarding the protection and maintenance of river and streams with emphasis on people participation.
- 6) To promote environmentally-sensitive river engineering practices/projects.
- 7) To initiate the amendment of related Municipal Acts/laws/policies for the protection and conservation of the riverbanks, water quality and its flora and fauna.



Picture 1. Songkran Festival(Thai traditional New Year) celebrated in the Ping River Chiang Mai some 40 years ago. The river was clean, clear and aesthetically beautiful.



A – A' = Distant flood banks

B – B' = Two – stage channel (with excavated berm)

C – C' = Flood relief channel

Partial dredging = A limited central section of the river is dredged to increase channel cross-sectional area, particularly at shallow riffle sections. The undisturbed bed acts as a biological store of recolonizing species.

Figure 2. Environmental sensitive options for flood alleviation schemes of the river. (adapted from Petts and Calow, 1996).

Implementation of the Programmes

In order to solve the river problems, first of all, public consciousness has to be provoked. The CCPE tries to convert crisis into opportunity for river restoration. Since people-centred development is the development by the people and for the people, therefore damages to the river, which are caused by the people, must be solved by the people themselves.

Step 1: Awareness raising about the situation and problems

To educate and inform the public about the negative results of river encroachment and the pollution of their river which is caused by wastewater and disposal discharged from households, restaurants and hotels, the CCPE organizes the programmes to mobilize the local people such as town and district administrative officers, youth, teachers, government departments and civil groups including the mass media to be aware of the problems and to take further action.

Activities:

- River survey camps: to learn about the water resources, headwaters in the forest areas, landuse along the river, water pollution and role of youth in river monitoring and surveillance.
- Dialogue seminars: to provide the information on the importance of the river / water for our lives, the problems and effects, then encourage the local people to form groups to tackle the problems together.
- Boat trips: to survey the quality of the water and analyze the situation, in this activity CCPE involves all sectors in the communities to join, especially the mass media, in order to distribute the information to the public on river environment as well as solicit comments from communities.
- Education and awareness campaigns.

Step 2: Development of knowledge and skill / River monitoring programme

After the public understands the situation and realizes the problems, they are encouraged to form groups to tackle the problems and take some action. Different volunteer groups for river protection are formed such as Ping River Preservation Volunteers Group, Love Mae Ping River Group and River Monitoring Group. The CCPE tries to empower the local people and provide them with more knowledge and skill as well as encourage them to involve more people in the programme and organize various kinds of activities to promote people participation in the process.

Activities:

- Training/Workshops to check the quality of the water by using chemical test and biological method
- Launch guarding activities along the target locations by volunteers at a weekly/ monthly basis to protect the river environment
- Field trips/ study tours in order to get the first hand experiences e.g. the process, strategy, implementation, impact, success and failure of other groups. Such programmes can expand the network and linkage at the same time

- Organize fish sanctuaries and aquatic organism conservation zones which are looked after by the local people

Step 3: Cooperation and Networking

To save the river effectively, cooperation among all concerned organizations and individuals is of utmost importance. The CCPE has its role as a coordinating agent between the civic groups and various government departments, e.g. the River Authority of the Harbour Department, the Land Department, the Irrigation Department and the Public Health Department as well as local administrative organizations at the village, tambol or sub-district, district and provincial levels. River Revival Committees are set up with full participation from various partners. Strong links and networks are created among towns, villages, volunteers, monasteries, schools, universities and mass media.

Activities:

- River watch networking
- River Revival Campaign
- Local Radio / Newspaper Campaign
- Amendment of Municipal acts / Laws / Policies
- Establishment of riverside parks
- River corridor registration

Results and impacts

- Towns and villages, in response to the river crisis have joined together with CCPE to study the problems and exchange information in order to convert crisis into opportunity for river revival.
- Town and village leaders have combined traditional methods of thinking and beliefs with modern values regarding conservation and passed these on the others. The traditional belief and respect in the goddess of Mother River (Pra Mae Kong Ka), the indigenous wisdom such as the river life-prolonging ceremonies based upon local religious beliefs are used to raise awareness, create and strengthen the connection between people and their river.
- The non-fishing zones as well as aquatic organism conservation zones have been established by many villages. A committee in each village is set up to oversee the zones and make rules and establish clear and strict fines. The pressure of local social standards is also applied to ensure compliance.
- Funds have been set up to support the carrying out of group activities on a continuous and sustainable basis.
- Changes in curriculum of local schools and universities.
- All sectors in the society are involved: homes / monasteries / schools / business / industry / mass media/ etc.
- Public river fronts and parks along the riversides as well as nature study centres are being established in many towns and villages

ROLES OF THE GOVERNMENT SECTORS

In response to the voice of the people and civil society organizations, in September 2001, the Thai Cabinet and the National Environment Board have agreed on the policy and work plan for conservation and development of rivers and canals throughout the whole country as follow:

- 1) Designate September 20th as “the national river and canal environment conservation day”
- 2) Designate the years 2001 – 2003 as “the years of rivers and canals conservation”
- 3) Agreement on the policy and work plan for conservation and development of river and canal environment and pilot projects
- 4) Agreement on setting up a national committee as an implementing agency for the conservation and development of river and canal environment
- 5) The Budget Bureau to provide budget for implementation according to the policy, work plan, and the pilot projects

Policies

To promote and support the conservation and development of the river and canal environment, the following policies are made :

- Policy 1. The regulation of guidelines and the control of land use along the rivers and canals to maintain balance with the surrounding without creating impact on the rivers and canals as well as monumental and cultural environment sites
- Policy 2. The conservation of natural and cultural environment, including cultural heritage and traditional lifestyle of riverside community, in order to retain unique characteristics of local heritage
- Policy 3. The control and management of riverside community
- Policy 4. The rehabilitation of water quality in rivers and canals
- Policy 5. Promoting appropriate rivers and canals utilization without creating impact on the environment or local way of life
- Policy 6. Enhancing the knowledge and awareness of the significance of rivers and canals and enabling participation in conservation and development
- Policy 7. Designating responsible agencies and improving legal framework concerning conservation and development of rivers and canals

Strategies

With the recognition that the conservation and development of river and canal environment is a challenge that needs corporation from all parties, the Office of Environmental Policy and Planing has set up both development objectives (long term) and immediate objectives (short term) by preparing work plans , activities , and projects for agencies relevant to the conservation and development of rivers and canals in both Urgent Plan and 5-year Action Plan. All the activities and projects correspond to 3 strategies:

- Strategy 1 Setting up the guideline for river and canal environmental management for harmonious utilization

Strategy 2 Allowing NGOs and local community to be the leaders in the process of river and canal environment conservation and development

Strategy 3 Conservation and rehabilitation of river and canal environment as a base for the social and economic development of the community

The objectives of the Urgent Plan (2001-2003) are:

- 1) To rehabilitate rivers and canals which are significant in terms of history, ecology, with diversified activities and public attention in Bangkok and vicinity and another province as pilot projects(at least one in each place)
- 2) To conduct survey and register rivers and canals within the year 2003
- 3) To create public awareness to conserve and develop river and canal environment

The objectives of the Action Plan (2001-2006) are:

- 1) To produce master plan and work plan for the conservation and development of river and canal environment, the regulation of land use, and the registration of rivers and canals to be conserved
- 2) To set up local network to conserve and develop river and canal environment, and promote historical canals as cultural tourism destinations to support local economy

The Work Plans and Projects in conservation and development of rivers and canals consist of:

Work Plan 1	Administration
Work Plan 2	Land use regulation
Work Plan 3	Environmental rehabilitation
Work Plan 4	Nature, art, culture and indigenous knowledge revitalization
Work Plan 5	Promotion of cultural tourism
Work Plan 6	Promotion of public participation
Work Plan 7	Research and study
Work Plan 8	Monitoring and evaluation

Progress

Cooperation with relevant agencies

After the cabinet has approved the policies and action plans for the conservation and development of river and canal environment, the work has been progressed by different agencies as follow:

Office of Environmental Policy and Planning (OEPP) has cooperated with relevant government agencies, namely Ministry of Interior to work with provincial offices in awareness-raising campaign to conserve and rehabilitate river and canal environment by proposing one river or canal in each province for consideration. OEPP also works with Regional Environmental Office to select one regional project for each 12 regions. In 2002 all provincial offices have arranged activities in conservation and development of rivers and canals. Some of the provincial offices also propose work plans in the conservation of rivers and canals to receive budget under the provincial environmental management plan.

Department of Pollution Control

Water pollution in Tachine River, one of the main rivers in the central river basin, in the year 2000 resulted in the decrease of fish population in the river as well as affected water usage and river ecology. Department of Pollution Control has created a plan to protect, improve, and rehabilitate water quality in Tachine River. The plan is under the monitoring of the subcommittee on Tachine River water quality management with the objective to improve and rehabilitate water in Tachine River to meet with water source standard with efficient public participation and responsibility for the whole river basin within the year 2010. There are 28 relevant agencies responsible for this project. The main objectives are:

- 1) To reduce at least 70% of the amount of waste from Point Source into the river
- 2) To control and maintain effective water flow from all water gates
- 3) To continually reduce pollution from Non-point Source
- 4) To encourage public participation in pollution protection and problem-solving in Thachine River
- 5) To systematically monitor and evaluate water quality
- 6) To increase the level and rate of water flow in Tachine River and branch canals
- 7) To conserve water source and make appropriate land use plan
- 8) To systematically coordinate in water quality management in Tachine River
- 9) To efficiently apply relevant legal framework in the project
- 10) To systematically conduct study, research, and develop Tachine River basin

Department of Environmental Quality Promotion has worked on public relation campaign to build awareness on the significance of rivers and canals and arrange corresponding activity by September 20, 2001 with activities such as academic, social, and tourism, which have attracted government sector as well as public and local communities.

Pilot projects for the conservation and development of river and canal environment

Set as model for implementation in other areas, the pilot projects start in 3 selected areas:-

- 1) Klong Om Noi, Klong Bangkoknoi, Klong Bangkruai in Nonthaburi Province. This is a pilot project in conservation and development of the environment because these canals have high water quality and good eco system. These canals also have historical and cultural importance with unique traditional way of life.
- 2) Klong Dan, Klong Bangkhunthain, Klong Samachai in Bangkok. This is a pilot project in rehabilitation of the environment because the water quality is not high, moreover, canal and cultural environment is in degradation
- 3) Klong Amphawa in Samut Songkhram Province. This is a pilot project to conserve the environment with good condition. Local community is strong with a good degree of awareness.

There are 6 activities in each pilot projects:-

- 1) Arranging workshop with local communities, relevant agencies, experts addressing the condition and problems of the area in order to work together on the issue
- 2) Capacity building for local network to promote and encourage public participation
- 3) Producing land use regulation in the canal areas

- 4) Supporting activities to monitor canal environment and its surrounding as well as improving areas along the canals
- 5) Promoting and supporting eco-tourism
- 6) Monitoring and evaluation

Master plan and Action plan for the conservation and development of river and canal environment

Office of Environmental Policy and Planning (OEPP) has produced “Master Plan and Action Plan for the conservation and development of river and canal environment” to set the framework and guideline to conserve and develop river and canal environment. In 2001, as a part of this effort, the Western Canals Area Study proposed criteria for the evaluation of canal for conservation as well as other important data. In 2003, the master plan and action plan for the conservation and development of the Ping River and its tributaries covering five provinces including Chiang Mai, Lam Poon, Tak, Kamphaeng Phet and Nakhon Sawan have been conducted.

PROSPECTS AND CONCLUDING REMARKS

All levels of river conservation require planning and management; controls – and the administration of these controls – on the wide range of human activities that influence river ecosystems.

- It should always be remembered that “a kilogram of prevention is worth a ton of cure” i.e. protection against degradation will always prove to be more cost effective and ecologically effective than expensive restoration projects.
- Our rivers, streams and canals must be maintained with gentle hands and hearts, and objectives must not only for good water flow but more directed towards caring for the watercourses and their immediate surroundings.
- Responsible authorities for the entire river systems must be established and strong commitments are absolutely necessary.
- Ecological criteria are considered on equal footing with technical criteria. The engineering approach makes up only part of the information on which such processes should be based. The necessary more-diversified approach requires additional information about geology, morphology, biology, sociology and landscape. The engineer, who would traditionally be in charge of river projects, should find himself to be only one member of a team that includes botanists, geologists, sociologists, geographers, and landscape architects.
- Research needs to be carried out to develop and define environmentally sensitive options for river management. Further research is also required to develop river restoration procedure and evaluate the impact and range of application of rehabilitation measures. The studied area cannot be limited to the space between the riverbanks; it must include the entire floodplain or river basin.
- Public participation is of utmost importance. The role of civil society has to be recognized and strengthened.
- Any public decision making must be based on genuine facts and thorough understanding of the river environmental system. Therefore continuous public education and campaigns are absolutely essential.

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