The International JOURNAL of ENVIRONMENTAL, CULTURAL, ECONOMIC & SOCIAL SUSTAINABILITY

Community-based Wetland Management in Northern Thailand

Yongyut Trisurat

VOLUME 2, NUMBER 1

COMMON GROUND

www.Sustainability-Journal.com

INTERNATIONAL JOURNAL OF ENVIRONMENTAL, CULTURAL, ECONOMIC AND SOCIAL SUSTAINABILITY
http://www.Sustainability-Journal.com

First published in 2006 in Melbourne, Australia by Common Ground Publishing Pty Ltd
www.CommonGroundPublishing.com.

ISSN: 1832-2077
Publisher Site: http://www.Sustainability-Journal.com

The INTERNATIONAL JOURNAL OF ENVIRONMENTAL, CULTURAL, ECONOMIC AND SOCIAL SUSTAINABILITY is a peer refereed journal. Full papers submitted for publication are refereed by Associate Editors through anonymous referee processes.

Typeset in Common Ground Markup Language using CGCreator multichannel typesetting system
http://www.CommonGroundSoftware.com.

Community-based Wetland Management in Northern Thailand

Yongyut Trisurat, Kasetsart University, Thailand

Abstract: Large areas of freshwater wetlands and mangrove forest in Thailand were converted to agriculture and shrimp farms during the 19th and 20th centuries, such that few now remain in a natural state. Some of these areas are threatened despite the fact that they are vital to the daily life of local people, who have relied on them for generations. Planning for wetland management is hampered by limited budget and lack of commitment by government agencies, low levels of acceptance by local communities and the absence of any monitoring. Within this context, this paper focuses on the community-based wetland management project in northern Thailand jointly implemented by the Office of Natural Resources and Environmental Policy and Planning (ONEP) and the Management and Protection of Wetland Areas (MPW) Project funded by DANIDA. The objectives of this paper are to identify ecological characteristics of wetlands (biological, physical and physio-chemical features), resource uses and management issues, using rural appraisal techniques and the Asian Wetland Inventory (AWI), to promote sustainable wetland management through the participation of local stakeholders in a strategic planning process at both local and provincial levels. The results show that various user groups, local government and provincial government are committing resources and effort to manage the wetland in a sustainable manner. The process reflects the fact that local communities must be involved from the start in the planning, implementing and monitoring stages of resource management. Without early involvement, such programs aimed at conservation and wise use of wetland resources cannot be successful.

Keywords: Wetland Inventory Approach (AWI), Participatory Planning, Community-Based Conservation, Strategic Management, Thailand, Wetland

Introduction

RURAL THAI PEOPLE have relied on wetland goods and services for their daily livelihood for generations. However, large areas of wetlands in Thailand, especially freshwater wetlands and mangrove forests, were converted to agriculture and shrimp farms during the 19th and 20th centuries and few natural areas remain. The results of a national wetland inventory in 1999 indicated that wetlands cover approximately 36,600 km^2 or 7.5 % of the country area (OEPP, 1999). The inventory also identified 61 wetlands of international importance, 108 sites of national importance and more than 40,000 sites of local importance. Some of those wetlands are threatened by encroachment and others by development activities.

To demonstrate the country's recognition of the importance of wetlands, Thailand ratified the Ramsar Convention on 13th September 1998. Currently, ten wetland sites have been listed as Ramsar Sites. The Office of Natural Resources and Environmental Policy and Planning (ONEP), as the national focal point of the Ramsar Convention, formulated the National Policies, Measures and Action Plans on Wetland Management for 1997-2002, and developed management plans for specific Ramsar Sites. But planning for wetland management is hampered by limited budgets, lack of commitment from implementing agencies, low acceptance by local communities, and the absence of monitoring systems (UNEP/GEF, 2005). Thus, it is essential to strengthen community organizations and local administrations in conservation and wise use of wetlands through community participation and multi-stakeholder networking.

Goldstein (1994) comprehensively reviewed concepts, guidelines and case studies of community-based conservation produced by non-government organizations (NGOs), government agencies, and financial sponsors in Africa, Asia, Australia and Pacific Islands. Fikret (1989) identified and discussed the role of community-level institutions in the management of common property resources and also included case studies of single and multiple resource management in various parts of the world. Basically, community-based conservation intentionally includes a range of activities and practices that directly or indirectly affect biodiversity conservation, and there is no one definition. However, it has two broadly recognized objectives: 1) to enhance wildlife/biodiversity conservation; and 2) to provide incentives, normally economic, to local people (Campbell and Vainio-Matila, 2003). Community-based conservation has three essential characteristics: 1) indigenous peoples and local communities are concerned about the relevant ecosystems that are related to them culturally and / or for livelihood; 2) they are the major players in decision making and the implementation of decisions; and 3) management decisions and efforts towards conservation of biodiversity are voluntary (EPA, 1997; Borrini-Feyerabend et al., 2004).

EPA (1997) defines community-based environmental protection as action that local individuals and groups take to address their own environmental concerns. In addition, Borrini-Feyerabend et al (2004) define community conserved *areas* as natural and modified ecosystems, including areas of significant biodiversity, ecological services and cultural values, voluntarily conserved by indigenous peoples and local mobile communities through customary laws or other effective means. If this approach is implemented in government-designated protected areas, where decision-making power, responsibility and accountability are shared between government agencies and other stakeholders, in particular local communities, it is named co-management of protected areas. It is believed that people, who work, live and have business in the community have common interests in protecting their shared environment and quality of life. In addition, they create a sense of local ownership of issues and solutions, and encourage long-term community support and accountability.

A number of papers on various aspects and guidelines of community-based conservation have been published in recent years. Zorini et al (2004) used a participatory approach to identify alternative resource uses for long-term sustainable use of mangroves in three communities relying on mangrove swamps in East Africa. In Australia, the first Indigenous Protected Area (IPA) was formally proclaimed in 1998 for Aboriginal-owned property. In addition, Aboriginal landholders can now establish formal conservation agreements under state or territory legislation or under indigenous law (Smyth, 2001). In Thailand, the community-based approach was initiated for integrated watershed management (Contreras, 2004), however the debate on *pros and cons* of this approach is ongoing between conservationists and socialists. A few case studies of community-based mangrove forests and coastal zone management in Thailand have been implemented, with the pioneer application of grassroots methods to enhance local community involvement in the management of coastal resources being implemented by the Yad Fon (Rain Drop) Association in Southwestern Thailand (Quarto, 2005).

The objectives of this paper are to identify important ecological characteristics (biological, physical and physio-chemical features), resource uses and management issues for the Nong Bong Kai wetland in Northern Thailand, using rural appraisal techniques, economic valuation and the Asian Wetland Inventory (AWI), to promote sustainable wetland management through the participation of local stakeholders in a strategic planning process at both local and provincial levels.

Methods

Nong Bong Kai Non-hunting Area was selected as one of two pilot projects implemented by the Office of Natural Resources and Environmental Policy and Planning (ONEP) through "Implementation of the Ramsar Convention in Thailand: Management and Protection of Wetland Areas Project (MPW)". This project has been funded by Danish International Development Assistance (DANIDA) from 2001-2006. Nong Bong Kai wetland is located in Pa Sak and Yo Nok Sub-districts, Chiang Saen District, Chiang Rai Province in northern Thailand, approximately five km. from the Mekong River (Figure. 1). Initially, this area was an intermittent floodplain surrounded by low mountains and hills. Later, a concrete weir was constructed to store the water for agricultural uses, creating a small artificial lake covering approximately 432 ha, and has been named "Chiang Saen or Nong Bong Kai Lake".

The lake is an important tourist attraction for Chiang Rai Province and also provides habitat for feeding and resting migratory water birds in winter (November-February). Nong Bong Kai was formally declared a non-hunting area in 1985 by the Ministry of Agriculture and Cooperatives. Furthermore, it was registered as the 5th Ramsar Site of Thailand in 2001. Most of the Ramsar Site is covered by water but there is also a narrow strip of deteriorated forest. All of the surrounding land belongs to private individuals. The lake's boundary is not clearly demarcated on the ground, thus Government officials and local people understand that the periphery of the non-hunting area is the water's edge, although it fluctuates between wet and dry seasons.

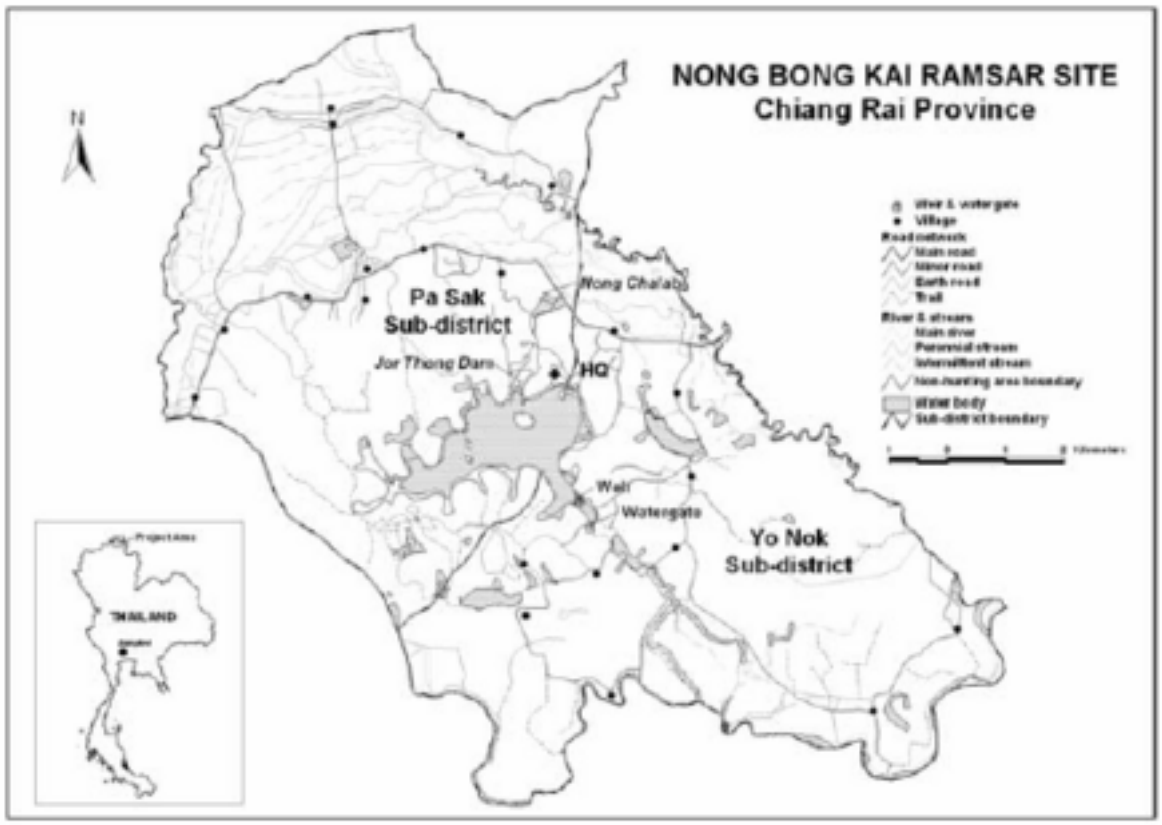

Figure 1: Location of Nong Bong Kai Ramsar Site

The MPW Project applied strategic planning guidelines (Ministry of Forests, 1998) and the Ramsar Guidelines for Management Planning (Ramsar Convention Bureau, 2002) through a consensus-based, multi-stakeholder participatory planning process to develop the Strategic Wetland Management Plan (SWMP) of Nong Bong Kai. This strategic plan has a 20 year horizon, 2004-2023 and its associated action plan covers 5 years, 2004-2008. Even though the Ramsar Site is small (432 ha), the planning area covers the whole of two sub-districts (100.7 km^2) for practical implementation in the administration system.

Before actual planning started, awareness building activities were employed to increase stakeholder understanding of the functions and values of the wetland and to create interest its management. Participatory rural appraisal (PRA) was used to identify resource uses and livelihoods of local communities, and key management issues. In addition, the MPW project also applied the Asian Wetland Inventory (AWI) (Finlayson et al., 2002) and Geographic Information System (GIS) for developing and presenting ecological characteristics (biological, physio-chemical and physical features) (Trisurat et al., 2004; Suthammawong, 2005). The planning process comprised seven steps, including 1) data consolidation and analysis; 2) issue identification; 3) development of vision, goals and objectives; 4) conflict resolution, management zone and strategic actions; 5) action plan development and projects; 6) implementation; and 7) monitoring and evaluation.

Representatives of resource utilization groups (e.g., water use, fish resources, bird conservation, and buffalo grazing, women's group), were nominated by their groups to voice their concerns and work with local leaders (village headman), and representatives of government and local administrative organizations as a Planning Working Group (PWG) throughout the planning processes. In total, there were 40 persons in the multi-stakeholder planning team, and the proportion of government representatives and non-government representatives was approximately 50:50. The PWG was supported by wetland ecology experts and technicians, and natural resource management planners served as facilitators and provided technical assistance. The PWG members were trained in planning, wetland management, map reading and mapping using the Global Positioning System (GPS) to increase their capacities prior to implementing the planning process. They also used GPS to demarcate the boundary of the non-hunting area and locate specific ecological features of Nong Bong Kai.

The planning process (steps 1-5) was implemented during 2004, through four workshops of 2-3 days each, supplemented by additional suggestions received from organizations and other local stakeholders, who were kept informed of workshop deliberations through simultaneous informal community networking and feedback mechanisms. The process took less than one year to complete.

Results

Ecological Characteristics

Nong Bong Kai is a natural depression surrounded by a small catchment of 16.6 km^2. The lake bed is 4.5 meters at its deepest,, with an average depth of 2 m, and the level subsides by about 1-1.5 m in the dry season. All of the water that flows into the lake is surface run-off of 27 mcm/year from rainwater.. Maximum water storage capacity is approximately 4.9 mcm. The excess flows into downstream tributaries but there is significant loss through underground recharge or seepage. The current water volume used for agriculture is 3.2 mcm but the water demand for domestic consumption, agriculture and fishponds is approximately 5 mcm.

The results of satellite imagery interpretation (2003) indicated that paddy fields cover approximately 47 km^2 or 46% of the two sub-districts, which is dominant downstream. “Old clearing” is found in hilly areas and covers nearly 15%, mixed deciduous forest covers 9% on the surrounding hills, cash crops cover 6%, and water bodies account for 6 %. Other land use categories occupy less than 5% each.

Dominant species of floating plants include *Eichhornia crassipes, Salvinia* sp., and *Imperata cylindrical*, that clumps together. Over the last 20-30 years, *Mimosa pigra*, an exotic species, was brought into the area. It is now predominant in the drawdown zone and disperses rapidly. Nine exotic fish species have been introduced, the most serious of which is the giant snake head fish (*Channa micropeltes*). There are at least 46 fish species from 17 families, with 17 species having economic value. Five threatened species are important for conservation. There were 15 species that seasonally migrated between Nong Bong Kai and nearby rivers but, now, migration has been reduced due to the lack of interconnectivity in the hydrological system. Surveys found that fish lay eggs and raise their young at the east end of the lake because that area has been effectively protected by the Superintendent and fish habitat is still in good condition.

Wildlife habitat in Nong Bong Kai and vicinity has been badly degraded. Only small animals (rodents) remain that can adapt to the degraded habitat. However, water sources in the lake and adjacent wetlands are moderately attractive for winter migratory birds. Water birds usually rest in the wetlands and often feed on paddy grain in downstream areas. Thus, conflicts between farmers, officials and bird lovers are usually observed during the winter period. It was found that there are at least 225 bird species in the planning area. Of these, 219 are listed as protected species in Thailand and 19 species are internationally threatened. In addition,,there are 79 migratory species, 23 resident breeders, 23 migratory and resident breeders, and 11 species of ducks. The most favourable duck habitats in the area are located in Jo Thong Dam paddy (mud flats) followed by Nong Chalab pond, situated just north of the Ramsar Site. Nong Bong Kai Lake is ranked third among duck habitats in this wetland. However, the birds in the first two habitats are often disturbed by buffalo grazing during the day. Water birds in nearby wetlands are not abundant due to extensive human activity and deteriorated habitats.

The results of water quality analysis in terms of temperature, turbidity, pH, dissolved oxygen, dissolved nitrate (NO_3) and phosphorus (PO_4)), indicate that, at present, water quality is still in the standard range of water sources and does not affect aquatic plants and animals. Alkali water is found to the west of Nong Bong Kai and to the east of the non-hunting area office. This occurs because the villagers keep animals such as buffalo, pigs and poultry in those areas and they release polluted water into the lake without proper treatment. The quantities of NO_3 and PO_4 are higher than the standard for drinking water. These readings occur in the area near the resorts and orange orchards in the northwest portion of Nong Bong Kai Lake. The water at the middle of the lake is clearer than in the drawdown zone because it is not disturbed by domestic animals.

Resource Uses

There are 21 villages in the two sub-districts. Per capita income in Yo Nok sub-district is slightly above the poverty line of US$ 625, while in Pa Sak Sub-district it is below. Seven of 10 villages, or approximately 20 % of the total families in Pa Sak sub-district, and 5 of 11 villages, or approximately 53 % of the families in Yo Nok sub-district, use resources in the wetland and adjacent areas. This includes gathering bamboo shoots; fishing; corn farming; cattle raising, using water for agriculture, raising chickens and fish, gardening and gathering edible weed. There are 2.5 times as many families using the area from Yo Nok than Pa Sak because they are located down stream and are closer to the lake (Figure. 2).

The direct economic value of Nong Bong Kai Lake is estimated at about US$385,000 per year. Water from the lake generates incremental gross in-

come from agricultural production of approximately US$ 115,000 per year, while resource harvesting and fish catching are worth a net value of US$ 90,000 for each sector. Moreover, there are about 1,300 tourists visiting Nong Bong Kai per year and they create more than US$ 85,250 value added annually. However, it is found that the value from lodging, food and souvenir services have not yet been distributed into communities. The indirect values of Nong Bong Kai wetland such as its bird habitat (partially reflected in the tourism values), food sources of aquatic animals, underground water sources, flood and drought prevention etc., may also be significant but they have not been valued.

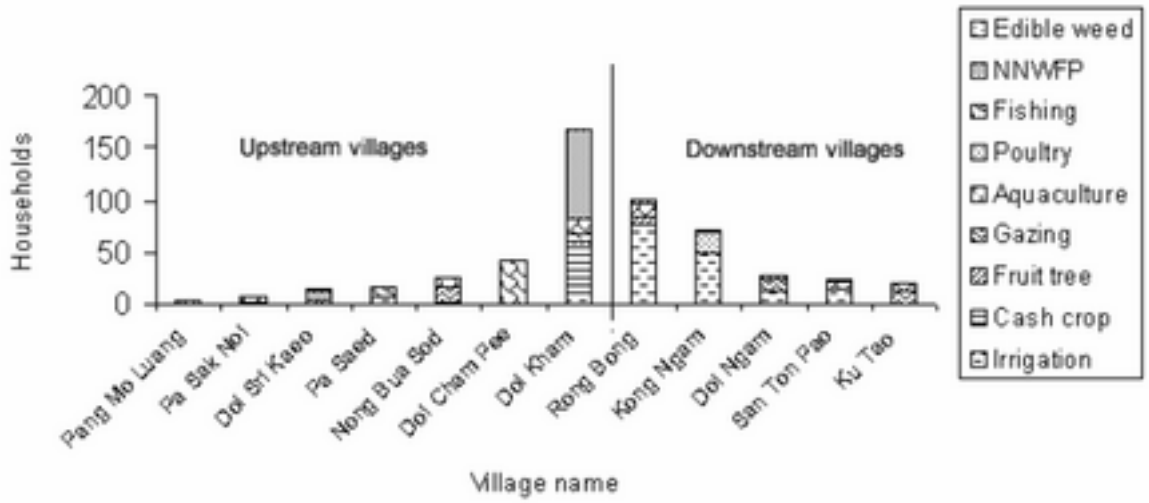

Figure 2: Resource Uses by Local Communities

Issues

Four major issues affecting the sustainable use and integrity of Nong Bong Kai were identified (Figure 3). The first major issue for management is the low quantity of water available in the lake to meet the future needs of both agriculture and household consumption. This insufficiency is due to a deteriorated irrigation system and poor management of the available water. Increasing human population near the wetlands, and the proposed industrial park in Chiang Saen district, may escalate the severity of this issue.

Another major issue is the degradation of the wetland ecosystem and surrounding areas. This issue can be divided into three specific problems. First is the water bird habitats, both inside and outside Nong Bong Kai, that are disturbed by buffalo grazing, especially at Jor Thong Dam and Nong Chalab. This issue is causing conflicts between grazing and the maintenance of birds for tourism and local appreciation. Second is the fish habitat in the lake that is damaged and threatened by excessive fishing and other human activities. Finally, is the integrity of the wetland and surrounding areas in the catchment that are badly deteriorated. Exotic species such as the Apple Snail, giant snake head fish and Mimosa shrub spread rapidly and invade native species. Mimosa competes with other hydrophytes and could become a severe problem for wetland management in the future.

The third issue is the declining water quality in the Ramsar site due to the release of wastewater from cultivated areas, human settlement, and chicken or pig farms situated in the catchment. For example, orange growers, use chemical fertilizers and pesticides on their farms and these substances contaminate the water quality and accumulate in the wetland. Even though the existing water quality situation is not serious, the trend is of concern for the future.

The last major management issue is related to the awareness of local people. Local residents lack awareness and understanding of wetland values and cannot foresee the impacts that result from over-exploitation of the wetland resources. As discussed earlier, the non-hunting area has not been demarcated on the ground and, with seasonal fluctuations in water level, land speculators invade the wetland and fill the draw down area. In addition, the community-based mapping exercise found that several patches of water body are now situated outside the legal boundary. They should be included in a revised non-hunting area declaration. It is evident from the above that the Ramsar site is being managed on a day-to-day basis, without a long-term strategy or integrated concept of wise use, as required by the Ramsar Convention.

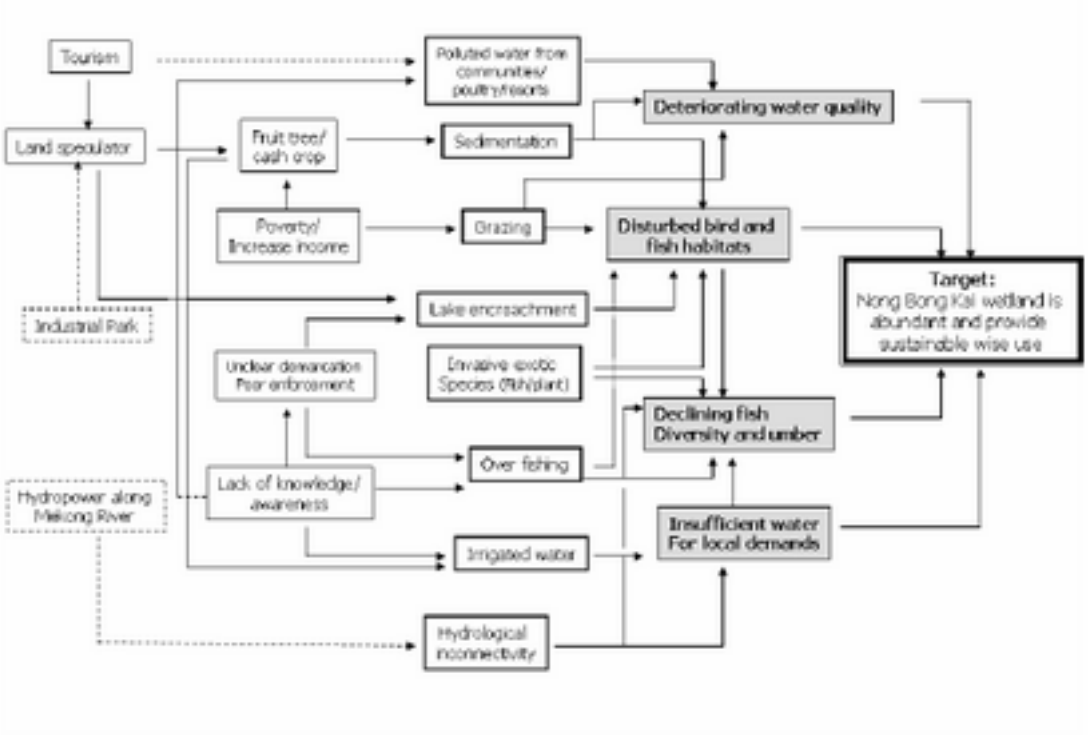

Figure 3: Causal Analysis of Issues in Nong Bong Kai Ramsar Site

Vision, Goals and Objectives

The strategic vision of the Nong Bong Kai Ramsar site, developed by using the AIC approach (Appreciation, Influence and Consensus) (Smith, 1983), is "*to have abundant water bird and fish species and to increase the natural heritage and beauty of Nong Bong Lake for ecotourism"*. Meanwhile, the non-hunting area will seek cooperation from all local stakeholders to protect, conserve and rehabilitate deteriorated areas for conservation and sustainable wise use of the wetland resources. This vision statement will strengthen the existing management and administration of the non-hunting area, which is weak and does not collaborate with other co-management partners. The vision statement is also relevant to the Ramsar guidelines. Further, the Nong Bong Kai stakeholders defined goals, objectives and guidelines for actions (Table 1).

Table 1: Summary of Nong Bong Kai Strategic Wetland Management Plan (SWMP)

Issues	Goals	Objectives	Guidelines for actions
1. The quantity of water in Nong Bong Kai Lake is insufficient to meet the future needs of agriculture and household consumption	1.1 The quantity of water is sufficient to meet the future needs of current users living in two sub-districts around the lake	1.1.1 To increase the efficiency of the water management system or the water quantity to meet the needs of farmers and household users	1) To manage the water quantity and allocate sufficient water for the needs of farmers and household users.
2. The ecosystem health of the Nong Bong Kai wetland	2.1 Ecosystem of Nong Bong Kai wetland and	2.1.1 To conserve the wetland ecosystem and restore	1) To set up appropriate guidelines on the introduc-

and basin area has deteriorated	basin area can maintain its value and role as habitat for migratory water birds	degraded areas surrounding the lake caused by human activities	tion and distribution of exotic species in wetland
			2).1.1 To build awareness and knowledge of the use and importance of wetlands, according to the Ramsar convention, as well as the effects of wetland ecosystem destruction
			3) To restore the deteriorated ecosystem of the wetland and surrounding areas
			4) To decrease top soil erosion and protect areas at risk
3. Fish habitats in the lake are damaged and threatened by over-fishing and other human activities	3.1 Ecosystem of Nong Bong Kai wetland and basin area can maintain its value and role as habitat for migratory water birds	3.1.1 To conserve the wetland ecosystem and restore degraded areas arounding the lake caused by human activities	1) To improve and develop hydrological connectivity in the Nong Bong Kai wetland, Kok river and Lua river, and water sources both inside and outside the basin area.
			2) To control or decrease the exotic fish species that live and breed in the wetland
			3) To increase the population of native fish species in the wetland
			4) To preserve and conserve the fish breeding areas sensitive to disturbance or destruction
4. Habitat for waterfowl both inside and outside the Nong Bong Kai are disturbed and destroyed by water buffalo, there are conflicts between the fisheries and farmers	4.1 Ecosystem of Nong Bong Kai wetland and basin area can maintain their values and roles as habitat for migratory water birds	4.1.1 To conserve the wetland ecosystem and restore degraded areas surrounding the lake caused by human activities	1) To build local awareness and increase knowledge on water birds and wetland values to farmers and youth
5. Water quality in Nong Bong Kai wetland tends to	5.1 The water quality in Nong Bong Kai lake is	5.1.1 To decrease the use of chemical substances in agri-	1) To educate the farmers on the effects of pesticide

be lower than the Thailand standard for drinking and domestic consumption, especially in the areas near human communities	higher than the Thailand standards for household consumption and aquatic organism.	cultural areas, and reduce waste matter and wastewater released from communities, poultry and tourist enterprises.	use and the usefulness of biological controls.
			2) To manage and control point sources of pollution, waste matter and garbage in the system
			3) To monitor water quality in the lake and nearby water sources.
6. The areas around Nong Bong Kai Lake are invaded by land speculators	6.1 To have an effective management team mechanism that consists of stakeholders who manage the wetland according to the Ramsar Convention	6.1.1 To strengthen the efficiency of protection and management and develop the capacity of officials and communities to participate in Nong Bong Kai wetland management	1) To survey and set up a clear boundary of the Nong Bong Kai Non-hunting Area and areas which have potential to be additional conserved zones
			2) To strengthen wetland management efficiency and potential of non-hunting area officers, local administration organizations and communities according to the Ramsar Convention
7. Local residents lack of knowledge and understanding of the integrated functions and values of Nong Bong Kai wetland	7.1 Sustainable use of Nong Bong Kai wetland is occurring and the benefits are distributed fairly to communities in the wetland areas.	7.1.1 To gain knowledge and build awareness by people, farmers and youth about the importance of the ecosystem and use of the wetland, and how plant and animal species should be conserved.	1) To promote ecotourism with community participation to strengthen the wetland's value

Conflict Resolution and Management Zones

Using GIS to display the ecological character, resource use, and possible conflicts on the landscape of the wetland, the PWG was able to explore spatial relationships among conflicting users and to decide how to optimize the uses of wetland resources. Basically, one management issue and two resource use conflicts arose during this stage. First, local communities in Pa Sak sub-district (upstream) wanted to maintain water levels in the lake to sustain their fishery but residents in Yo Nok sub-district (downstream) wanted to drain water for second and third crops. The MPW Project provided the forum for them to discuss and resolve this conflict in which stakeholders appointed a water user group, comprising representatives from both sub-districts, to monitor the water level and allocate water as agreed. Secondly,, the buffalo grazing group agreed to raise their livestock in other places during the winter to avoid disturbing waterbird habitat, and this agreement was documented and signed by both parties. Further, after local fishermen were able to see the areas of critical fish habitat and, foreseeing the impact of over-fishing, they agreed on locations for fishing and types of fishing gear. Later, the Superintendent and fishermen used bamboo sticks to demarcate a fish protection zone.

The zonation of Nong Bong Kai and the surrounding two sub-districts basically followed the Biosphere Reserve Zonation concept (Phillips, 1998), which proposes three management zones - core zone, buffer, and transition zone. Nong Bong Kai zonation also recognizes multiple use in surrounding areas and the on-going land use planning implemented by the Chiang Rai Provincial Declaration on Town and Country Planning.. The PMG modified the above concept and defined three main management zones: wetland protection zone, wise use zone, and intensive or multiple use zone. These three zones were then sub-divided into eight sub-zones according to specific uses and land ownership. Brief descriptions and management intent, as well as management zone maps, are presented in Table 2 and Figure 4, respectively.

Table 2: Summary of Management Zones of the Nong Bong Kai Ramsar Site and Vicinity

Zone	Description	Management intense	Size	
			km^2	%
1. Wetland Protection Zone	Land and water both inside and outside the Ramsar site that contain abundant habitats for fish breeding and nesting, and water bird resting.	Protect and maintain fish and water bird habitats to facilitate breeding and nesting, and nesting activities, respectively.	**4.3**	**4.3**
1.1 Protection Zone	Critical and fragile habitats for fish and waterfowl located inside the Ramsar site	Protect, maintain and rehabilitate deteriorated fish and water bird habitats to facilitate breeding & nesting, and nesting activities, respectively.	0.7	0.7
1.2 Special Waterbird Conservation Zone	Critical and fragile waterfowl habitats on privately owned land outside the Ramsar site, e.g. Jor Thong Dam, Nong Chalab and Nong Ngiew.	Conserve and maintain waterfowl habitats to facilitate resting and feeding through collaborative management among officials, buffalo grazers and land owners.	0.4	0.4
1.3 Water Conservation Zone	Remaining water bodies in Nong Bong Kai Lake outside zone 1.1	Manage water storage for domestic consumption and irrigation purposes, and allow sustainable fishing through agreements among user groups	3.2	3.1
2. Wise Use Zone	Agricultural and scattered communities in the Nong Bong Kai catchment where agricultural practices and other land utilizations are harmonized with the wetland environment and do not cause severe impacts to the lake's ecological integrity.	Promote ecotourism and other sustainable wise uses of the wetlands and other natural resources in the catchment area, and reduce chemical substances e.g. pesticides and herbicides	**12.2**	**12.1**
2.1 Agricultural eco-development zone	The terrestrial area in the catchment, excluding zones 1 and 2.2, is basically owned by private enterprise and individuals, and is being used for farming and scattered residential purposes.	Private land owners are educated and encouraged to reduce chemical substances on their farmlands that would affect the lake ecosystem. In addition, soil and water conservation measures are promoted.	12.0	11.9
2.2 Service and Recreation Zone	Areas suitable for outdoor recreation and services. These areas occupy the HQ of the Non-Hunting Areas and a narrow strip along the road from the HQ to Lake View Resort.	Promote eco-tourism and develop facilities for outdoor recreation and a nature education center to educate and raise awareness about the importance of the wetland ecosystem and its wise.	0.2	0.2
3. Intensive and Multiple Uses Zone	The remaining areas of two sub-districts outside the Nong Bong Kai catchment where intensive and multiple land uses are practiced e.g. water bodies, rural and agricultural areas, and low density residential	Management intensity in this zone follows the Provincial Declaration on Chiang Rai Country and Town Planning, dated January 12, 2003, that aims to develop this area for agriculture, community forest, aquaculture and human settlement	**84.3**	**83.7**
3.1 Water Environmental Quality Protection and Fishing Zone	Natural and man-made water bodies, excluding Nong Bong Kai lake. Infrastructure and human activities that will affect water quality are prohibited, except for the purpose of water treatment.	Promote aquaculture, fish ponds, research related to fisheries and water resources development	2.4	2.3
3.2 Rural and Agri-	The remaining areas outside the Nong	Promote as reduced-chemical agricul-	76.7	76.2

cultural Zone	Bong Kai catchment where intensive agricultural land uses and scattered communities are located.	ture and commercial area related to agriculture, such as post-harvest, which does not cause impacts to humans or cultivated land		
3.3 Low Density Residential Zone	Areas that contain villages, large communities and shop houses	Aimed to develop it as human settlement, shop house, and specific industries that do not cause impacts to humans or the environment.	5.2	5.2
Total			**100.7**	**100.0**

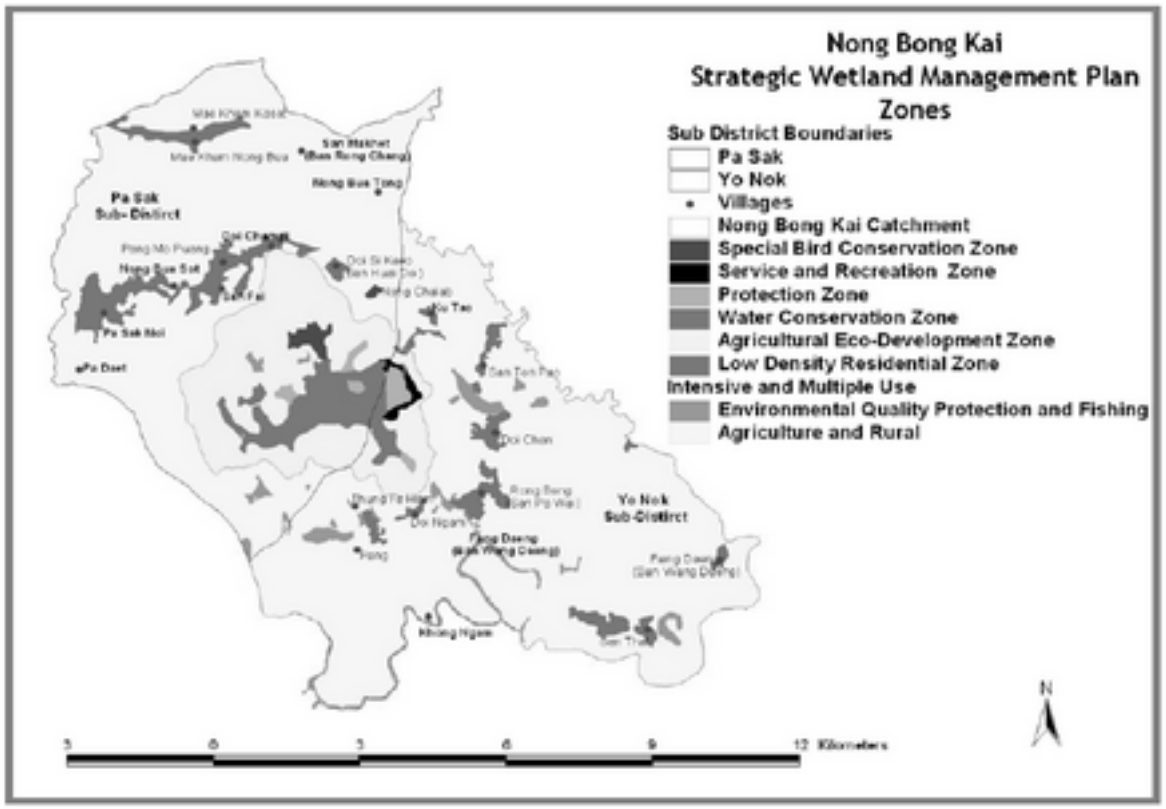

Figure 4: Management Zones of the Nong Bong Kai Ramsar Site

Action Plan and Projects

The action plan covers a duration of 5 years, 2004-2008. It consists of project definitions and a listing of projects by budget source and year of expected implementation (Table 3). The PWG proposed criteria to select projects for funding from the MPW/DANIDA budget, the local budget, and provincial or central government budgets. The criteria for utilizing the MPW/DANIDA budget included: urgent projects to be implemented in 2004, as there is no time to get government budgets; projects to educate local people on wetland values and promote wise use of wetlands; and projects to strengthen the capacity of local people through participatory processes. The potential projects to be funded by local government are those that strengthen communities, have limited budget requirements, and conform to the legitimate roles of local government. Meanwhile, the larger projects that require larger budgets, create significant impact beyond the two sub-districts, and may cause controversial issues that exceed the ability of local administrative organizations are prescribed for provincial or central government budgets.

Table 3: Summary of Projects and Budgets by Budget Source during 2004-2008 (US$ 1000)

Budget sources		Year					Total	% contribution
		2004	2005	2005	2007	2008	Number of projects [1] /US$ 1000	
MPW/DANIDA	Number of project	9	16	16	14	11	19	
	Cost (US$)	22.75	49.25	39.50	33.75	27.50	172.75	14.75
Local Government	Number of project	2	11	7	11	7	11	
	Cost (US$)	1.25	15.25	4.50	11.75	4.50	37.25	3.18
Provincial & central Government	Number of project	2	12	12	9	7	16	
	Cost (US$)	1.00	281.00	614.75	36.00	28.50	961.25	82.07
Total	Number of project	13	39	35	34	25	46	
	Cost (US$)	25.00	345.50	658.75	81.50	60.50	1,171.25	100.00
Annual cost (%)		2.13	29.50	56.24	6.96	5.17	100.00	

[1] Some projects are implemented longer than 1 year

Based on the agreed criteria, the PWG proposed 45 projects with a total budget of approximately US$ 1.2 million. The expected budgets to be funded by the MPW, local government and provincial & central government are US$ 172,750, US$ 37,250, and US$ 961,250 respectively. Even though the proportion of local government expenditure is only about 3% of the total budget, they contribute almost 24% of the total project list. This indicates the important commitment of local government to be involved in project implementation after completion of the plan. A few strategically important projects include: the preparation of detailed guidelines for water allocation; the feasibility study and environmental impact assessment of raising the weir to increase water quantity; improvement of the water gate and irrigation network; and construction of the wetland education centre.

In addition, there are many community-based conservation projects and implementation progress to date has been substantial. For instance, local community groups e.g., Water Bird Lovers, Friends of Chiang Saen Lake, Local Fishermen, Water Use, and Liquid Bio-fertilizer groups, etc. were officially established on a voluntary basis. In addition, their capacities have been strengthened through various training activities. Local committees from 15 villages are participating in a liquid bio-fertilizer project made from the Apple Snail. In 2004, they produced 172 tanks of fertilizer, which can effectively substitute for chemical fertilizer, and also has important non-market values (e.g., health and environmental benefits). In addition, the revolving fund for the Liquid Bio-Fertilizer Group increased approximately 56% from the original funding of the MPW Project. The additional funds came from the contributions of local governments (two sub-districts) and shares bought by the members. Awareness of wetland conservation and wise use activities are regularly and jointly conducted by stakeholders in the non-hunting area, e.g., Bird Spirit Day, Chiang Saen Lake Rehabilitation Day, etc. In addition, Wetland International (Thailand Program) and local school teachers developed wetland curriculums for various subjects that are now being used by primary and secondary schools located around the lake.

Monitoring and Evaluation

The monitoring framework is divided into three levels: 1) to assess progress in the application of the strategy towards achievement of the planned vision, goals, and objectives of Nong Bong Kai SWMP; 2) to evaluate the progress of the project's implementation; and 3) to assess the awareness of stakeholders and the change in the status of wetland ecological parameters. The Chiang Rai Provincial Office is responsible for training the officers and stakeholders for monitoring. Examples of monitoring indicators are shown in Table 4.

Table 4: Examples of Monitoring Indicators for Nong Bong Kai Strategic Management

Objectives	Guidelines for actions	Strategic actions	Indicators
1.1.1 To increase the efficiency of the water management system or the water quantity to meet the needs of farmers and household users	1) To manage the water quantity and allocate sufficient water for the needs of farmers and household users.	1) Establish a water management team and water use regulations for organizations, user groups and others affected by water shortages.	Agreement of water users
		2) Construct an irrigation system that links wetlands with the basin areas to increase water quantity.	Irrigation system in place
2.1.1 To conserve the wetland ecosystem and restore degraded areas arounding the lake caused by human activities	1) To set up appropriate guidelines on the introduction and distribution of exotic species in wetland	1) Set up guidelines on control and monitoring of the Giant Mimosa and Apple Snail distribution.	Manual on how to control exotic species in freshwater wetlands (Giant Mimosa and Apple Snail)
		2) Provide facilities and produce informative materials about the importance of wetland ecosystems	Nature study center and nature interpretation program

Discussion

Nong Bong Kai is the first wetland in Thailand to adopt Ramsar planning guidelines for community-based management planning. Various factors were influential in determining the success of this project. The results show that the various user groups, local government and provincial government are continuously involved in formulating and making decisions on conservation and wise use of the Nong Bong Kai Ramsar site and surrounding area. In addition, they are committing resources and effort to manage the wetland sustainably because they were involved from the start in the planning, implementing and monitoring stages of resource management. Another key factor is the extensive stakeholder preparation, and the development of spatial ecological and socio-economic information prior to actual planning. The Local Initiative Fund also stimulated and provided incentive for stakeholder participation. This evidence supports the wetland management observations of Finlayson (2003) that: effective involvement of local communities in environmental management, incentives for local involvement; trust between parties; flexible approaches; capacity building; continuity of resources and effort; and monitoring, would assure more sustainable outcomes.

Community-based conservation or co-management of protected areas is a new paradigm for biodiversity conservation that has been recognized by the Ramsar Convention and is included in the recommendations of the Vth World Parks Congress in Durban, 2003 (IUCN/CEESP, 2003; McNeely, 2003; Lock and Dearden, 2005). The Congress called for a '*new paradigm'* for protected areas, the characteristics of which would see new and more people focused on protected area legislation, as well as the re-engineering of protected area people, etc. On the other hand, community-based conservation has been criticized from various perspectives. For instance, Berkes (2003) indicated that community development objectives are not necessarily consistent with conservation objectives in a given case. Others say that conservation and development objectives, both important in their own right, should not be linked because the mixed objective does not serve either objective well (Redford and Sanderson, 2000). In addition, integration of the human dimension into protected areas will undermine the creation of real protected areas for maintaining ecological integrity, especially the wide-ranging larger forms that require wilderness (Lock and Dearden, 2005), and stands in contrast with the Convention on Biological Diversity (CBD) that requires signatory nations to establish protected area systems as a response to the erosion of wild biodiversity.

These criticisms and concerns are not applicable to human-dominant wetlands where local communities have relied on wetland resources for the goods and services of their daily livelihood for generations. Past experience has proven that government alone cannot manage wetland resources and enforce regulations effectively, such as the freshwater marsh in Sam Roi Yot National Park (Wetlands International, 2005). The Thai Constitution of 1997, and the Enhancement and Conservation of National Environmental Quality Act of 1992, now empower provincial

and local authorities (sub-district) and local communities to share responsibility and accountability, and to formulate their own environmental management plans. In addition, the Decentralization Act, 1999 and the National Reform Act, 1999 have devolved significant authority for budget planning and development because 35% of the national income through taxation will be allocated to the local government. Moreover, the entry of civil society into forest governance in Thailand, in recent years, is seen by many as the emergence of participatory and people-oriented forest science and management (Contreras, 2004). In addition, the new National Wetland Management Plan for 2003-2007 focuses on public participation in the conservation and management of wetlands (UNEP/GEF, 2005). With all of these important legal and institutional developments, this is the right time to modify our traditionally centralized natural resource management and replace it with integrated, local multi-stakeholder participatory co-management processes. The challenge is how fast this can occur and what decision-making mechanism will effectively engage the responsible agencies at all levels to scale-up from this successful pilot project and make the required effort to adopt this new paradigm of natural resources management in Thailand.

Conclusions

The findings of this project indicate that participatory rural appraisal is very useful for identifying resource uses and management issues at the Nong Bong Kai Ramsar site in Thailand. After their integration with ecological characteristics, developed in a GIS database, local stakeholders could visualize spatial relationships between resource capacities and management issues on the landscape. In addition, the results show that various user groups, local government and provincial government stakeholders working together have the capability to formulate a community-based strategic wetland management plan with technical support from facilitators. Potential conflicts in resource uses and management could be settled through a consensus-based decision-making approach, and management zones could be delineated by the multi-stakeholder planning group to define how to use wetland resources and the surrounding area in a sustainable manner. With the stakeholder buy-in that was facilitated by this participatory process, all parties are committing resources and effort to sustainably manage the wetland.

The success of the process reflects the fact that local communities must be involved from the start of the planning, implementing and monitoring stages of resource management. Without early involvement, such programs aimed at conservation and wise use of wetland resources cannot be successful. The results of this pilot project also reveal that there are at least two approaches to community-based wetland management. One is the bottom up approach which is driven by a desire to resolve problems that are apparent within the community, such as the local conflict over water use. The other is top-down, in which an outside, national agency (ONEP) attempts to enlist community cooperation to attain the Ramsar objectives that the agency has perceived to be important, such as preserving national and global wetland values. In the first case, the superintendent or manager might act as a facilitator or source of expertise, and in the second case the manager takes on the role of an educator about the broader roles of social responsibility. Community-based conservation or co-management represents an increasingly strong alternative to central agency control of natural resources management. It is also considered an effective tool to resolve local conflicts and to engage community cooperation at the national level. It is hoped that this new planning paradigm will be up-scaled to other Ramsar sites and wetlands in Thailand in the near future.

Acknowledgements

The authors would like to thank DANIDA for financial support; ONEP and the Chiang Rai Province for effective cooperation. The authors are also very grateful to the Planning Working Group (PWG) for their dedication and hard work during and after the management planning process. A number of scientists, socio-economists and colleagues, namely Dokrak Marod, Chongrak Watcharinrat, Prateep Duengkae, Sommai Jenkitkan, Sarawood Sangkaeo, Sumaree Wannarat, and Penporn Jankarnkit kindly provided information. In addition, the authors also acknowledge Lyndon Wester, Kem Lowry, Jefferson Fox, and two anonymous referees for their valuable comments on this manuscript. The preparation of this manuscript was supported in part by the Fulbright Scholarship Program. The authors are grateful to the University of Hawaii at Manoa and the East-West Center in Hawaii for hosting the primary author during manuscript preparation.

References

Berker, F. 2003. Rethinking community-based conservation. Conservation Biology 18: 621-630.

Borrini-Feyerabend, G. Kothari A. and Oviedo, G. 2004. Indigenous and Local Communities and Protected Areas. IUCN-The World Conservation Union, Gland Switzerland.

Campbell, L.M. and Vainio-Matila, A. 2003. Participatory development and community-based conservation: opportunities missed for lessons learned?. Human Ecology 31: 417-437.

Contreras, A. 2004. Civil society, environmental security and knowledge: forest governance in Thailand and the Philippines in the context of ASEAN. International Environmental Agreements: Politics, Law and Economics 4, 179-193.

EPA. 1997. Community-Based Environmental Protection: A Resource Book for Protecting Ecosystems and Communities. U.S. EPA, Washington, D.C., USA.

Fikret, B. 1989. Common Property Resources: Ecology and Community-Based Sustainable Development. Belhaven Press, New York, London,

Finlayson, M. 2003. Ecosystem assessment: links between science and community – the common ground?. Ecological Management & Restoration 4: 3-4.

Finlayson, C. M. Begg, G.W. Howes, J. Davies, J. Tagi, K. and Lowry, J. 2002. A Manual for an Inventory of Asian Wetlands: version 1.0. Wetland International Global Series 10, Kuala Lumpur, Malaysia.

Goldstein, B. 1994. Community-Based Conservation. CPL Bibliography 313, Chicago, USA.

IUCN/CEESP. 2003. Policy Matter 12, Special Issue on Community Empowerment for Conservation. Www.iucn.org/themes/ceesp/Publications/newsletter/PM12.pdf

Kratina, B, and Wells, M. 1992. Planning for People and Parks: Designing Dilemmas. World Development 20, no 20: 557-570.

Locke, H. and Dearden, P. 2005. Rethinking protected area categories and the new paradigm. Environmental Conservation 32: 1-10.

McNeely, J. 2003. Workshop Stream: Building Broader Support for Protected Areas. Available at: http://w ww.iucn.org/themes/wcpa/wpc2003/pdfs/Proceedings/recommendations.pdf

Ministry of Forests. 1998. Guide to Writing Effective Resource Management Plans: With an Emphasis on Higher Level Plans. Ministry of Forests in Cooperation with Ministry of Environment, Lands and Parks, Victoria, British Columbia, Canada.

OEPP. 1999. National Wetland Inventory of Thailand. Office of Environmental Policy and Planning, Ministry of Science, Technology and Environment, Bangkok, Thailand. 142 pp.

Phillips, A. 1998. Biosphere Reserves and Protected Areas: What is the Difference? In IUCN (1998) Biosphere Reserve-Myth or Reality? Proceeding of a Workshop at the 1996 IUCN World Conservation Congress, Montreal, Canada. IUCN, Gland, Switzerland and Cambridge, UK.

Quarto, A. 2005. Case Studies of Successful Community Involvement in Sustainable Management of Coastal Resources. Available at: http w ww.iucn.org/themes/ceesp/Publications/SL/MAP%20Comm%20Involvement.pdf

Ramsar Convention Bureau. 2002. Guidelines for Management Planning for Ramsar Sites and Other Wetlands. IUCN-The World Conservation Union, Gland Switzerland.

Redford, K.H. and Sanderson, S.E. 2000 Extracting humans from nature. Conservation Biology 14:1362-1364.

Smith, W.F. 1983. Wholensee: the development of a new philosophy, model and process of organization. www.odii.com/Papers/Wholeness-print.pdf

Smyth, D. 2001. Joint Management of National Parks in Australia. *In*: Borrini-Feyerabend, G. Kothari, A. and Oviedo G. (eds.), Indigenous and Local Communities and Protected Areas. IUCN-The World Conservation Union, Gland, Switzerland.

Suthammawong, N. 2004. Habitat Modeling for Bare's Pochart and Serruginous Pochart at Nong Bong Kai Ramsar Site, Chiang Rai Province. MS. Thesis. Faculty of Forestry, Kasetsart University, Bangkok, Thailand.

Trisurat, Y. Hall, B., and Howes, J. 2004. Implementation of the Asian Wetland Inventory (AWI) Approach: Chiang Saen Lake Ramsar Site in Northern Thailand. Abstract Proceedings of the 7th International Wetlands Conference on 25-30 July 2004. p. 321. Utrecht, the Netherlands.

UNEP/GEF. 2005. Thailand Wetlands National Action Plan. Faculty of Fisheries, Kasetsart University, Bangkok, Thailand.

Wetlands International. 2005. A Directory of Wetlands of International Importance. www.wetlands.org/RDB/Ramsar_Dir/Thailand/TH004D02.htm

Zorini, L. Contini, C. Jiddawi, N. Ochiewo, J. Shunula, J. and Cannicci, S 2004. Participatory appraisal for potential community-based mangrove management in East Africa. Wetlands Ecology and Management 12: 87-102.

About the Author

Dr. Yongyut Trisurat

Dr. Yongyut Trisurat is Assistant Professor Forestry at Kasetsart University in Thailand. He obtained his Ph.D. in Natural Resources Conservation at Asian Institute of Technology in Bangkok in 1997 and was a Research Fellow at the Institute of Geography, Freie University Berlin in 1995, as well as a Fulbright Visiting Scholar affiliated with the Department of Natural Resources and Environmental Management, University of Hawaii at Manoa and the East-West Center in 2005. He worked for ten years as a park official for the Royal Forest Department. Dr. Trisurat has been involved in several international projects funded by ADB, CIDA, DANIDA and ITTO related to protected areas, biodiversity conservation, GIS, and wetlands.

THE INTERNATIONAL JOURNAL OF ENVIRONMENTAL, CULTURAL, ECONOMIC AND SOCIAL SUSTAINABILITY

Please visit the Journal website at http://www.Sustainability-Journal.com for further information:

- ABOUT the Journal including Scope and Concerns, Editors, Advisory Board, Associate Editors and Journal Profile
- FOR AUTHORS including Publishing Policy, Submission Guidelines, Peer Review Process and Publishing Agreement

SUBSCRIPTIONS
The Journal offers individual and institutional subscriptions. For further information please visit http://ijs.cgpublisher.com/subscriptions.html. Inquiries can be directed to subscriptions@commongroundpublishing.com

INQUIRIES
Email: cg-support@commongroundpublishing.com