Human Dimensions in Thailand Western Forest Complex: Challenges and Opportunities[1]
มิติด้านมนุษย์ในผืนป่าตะวันตก ประเทศไทย: โอกาสและความท้าทาย

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ข้อมูลเกี่ยวกับมิติด้านมนุษย์ในการจัดการเชิงระบบนิเวศมีส่วนสำคัญอย่างยิ่งในผืนป่าตะวันตก (WEFCOM) ทั้งนี้เนื่องจากมีหมู่บ้านตั้งอยู่ในผืนป่าตะวันตกมากกว่า 200 หมู่บ้าน โดยที่หมู่บ้านต่างๆ เหล่านี้ต้องพึ่งพิงทรัพยากรธรรมชาติจากป่าไม้ การวิจัยเชิงสำรวจนี้มุ่งที่จะรายงานปัจจัยที่เกี่ยวกับชุมชนและระดับของการใช้ประโยชน์ทรัพยากรป่าไม้ของหมู่บ้านที่มีต่อผืนป่าตะวันตก การสำรวจข้อมูลทางสังคม-เศรษฐกิจกระทำโดยวิธีการสำรวจชุมชนแบบเร่งด่วน (RRA) และการสำรวจชุมชนอย่างมีส่วนร่วม (PRA) เพื่อเก็บรวบรวมข้อมูลการใช้ประโยชน์ทรัพยากรป่าไม้ ได้แก่ การใช้ประโยชน์ไม้ ของป่า สัตว์ป่า โดยมีการแบ่งระดับการใช้ประโยชน์ทรัพยากรต่างๆ จากป่าไม้ เป็น 4 ระดับ นอกจากนี้ ปัจจัยทางเศรษฐกิจและสังคม เช่น อัตราการเพิ่มของประชากร ขนาดการถือครองที่ดิน รายได้จากการเกษตร และมาตรการในการอนุรักษ์ของชุมชน ก็ถูกนำมาใช้ประกอบการวิเคราะห์เพื่อทราบถึงผลกระทบของจากการดำเนินชีวิตของมนุษย์ที่มีต่อระบบนิเวศของผืนป่าตะวันตก นอกจากยังได้เสนอแนะแนวทางในการนำข้อมูลทางเศรษฐกิจและสังคมที่ได้จากการศึกษาไปใช้ในการจัดการเชิงระบบนิเวศในผืนป่าตะวันตก

ABSTRACT

Information regarding human dimensions in ecosystem-based management plays significant roles in Western Forest Complex (WEFCOM) simply because there are more than 200 villages inside the WEFCOM which their lives are dependent on forest resources. This survey research intends to report some demographic factors and levels of forest resource uses the villagers imposed on the ecosystem of WEFCOM. Rapid Rural Appraisal and some participatory methods are employed in data collection. Forest resource uses with respect to wood consumption, non-timbered forest product, and wildlife consumption are classified into four degree of use levels. In addition, socio-economic factors such as population growth rate, land use size, agricultural income, and conservation measures are used to assess the likely impacts of human activities on to the WEFCOM ecosystem. The application of the socio-economic information to ecosystem-based management of WEFCOM is also discussed.

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INTRODUCTION

There are profound effects of human activities on ecosystem of protected areas in Thailand. Several human activities such as agricultural farming, settlement, mining, forest product collection, wildlife hunting, and domestic animal rising can be typically found in protected areas. The management of protected areas has to understand the complexity of human in order to maintain ecological integrity of the protected areas. Unfortunately, the luxury of that understanding and knowledge of socio-economics factors related to the ecosystem integrity is hardly attained.

One important task of ecosystem-based management is to develop management schemes and make decisions based on data or information. Unfortunately, the socio-economic data of the Western Forest Complex of Thailand (WEFCOM) has never been collected systematically and designed to accommodate the future continuous monitoring. The survey research addresses two issues relevant to ecosystem-based management in WEFCOM area: (1) collecting useful information as a basis for classifying management zones of the WEFCOM, and (2) application of socio-economic data in ecosystem-based management particularly in outreach strategy development to a full range of stakeholders.

THE STUDY SITE

1. The Western Forest Complex (WEFCOM)

The Western Forest Complex (WEFCOM) is the largest surviving forest tract in Thailand, covering 18,730 square km. It is composed of 9 National Parks, 6 Wildlife Sanctuaries and 2 Proposed National Parks. Two of the largest Wildlife Sanctuaries, Huai Kha Khaeng and Thung Yai Naresuan, have been designated as World Heritage Sites by UNESCO. WEFCOM is rich in biodiversity. Tiger (Panthera tigris), elephant (Elephas maximus), guar (Bos guarus) and tapir (Tapirus indicus) are among 153 mammal species found in the area. As many as 490 bird species have been seen here. It encompasses many waterways which supply three of Thailand's six major rivers (1).

A number of communities are living inside the protected area and a great number of villages are surrounded the WEFCOM. The protected area is under pressure from agricultural encroachment, wild fires, infrastructure development, mining, illegal logging and poaching of wildlife.

2. The WEFCOM Ecosystem-based Management Project

The project was initiated in 2000 by the Royal Forest Department with support from the Denmark Government (DANCED). The objective of the Project is to promote integrated ecosystem management in order to keep the Western Forest Complex intact and healthy. The Project aims to achieve this through a multi-sectoral approach that emphasizes local participation in conservation of the protected area. The Project is implemented by the Natural Resources Conservation Office of the Royal Forest Department (RFD) in co-operation with other RFD units. Other key participants include local authorities, local communities, NGOs and other organizations. The main project outputs are the integrated management structure, establishment of 6 Provincial Conservation Fora (PCF) for local participation in conservation of WEFCOM, ecological and socio-economic surveys, monitoring and information systems for management zoning, Pilot Activity Fund (PAF) to support local conservation activities, and training (2).

SURVEY METHOD

The objectives of the socio-economic survey are to obtain data for WEFCOM zoning and as a basis for recommending outreach strategies. Since WEFCOM covers

quite a large area and there are limited staff and financial resources in survey activities, the WEFCOM Project decided to use the Rapid Assessment method and Participatory Approach to collect socioeconomic data (2). From September 2001 until October 2002, two surveys were carried out: the rapid survey of demographic data and the in-depth survey of selected villages.

Data Collection

Census survey was first carried out to collect demographic data for classifying WEFCOM management zones with other ecological data. The total villages were 216. Surveyed data items included village name, location (administrative address and x, y coordinates), population and household numbers, and ethnic groups.

Then, the purposive sampling technique was employed to acquire village samples inside the WEFCOM area for the in-depth survey. The selection criteria for village samples were based on the information given by the field unit superintendents and the PCF committee on issues of villages' natural resources dependency. The total village samples for in-depth socio-economic survey were 175 villages or about 80 % of the total village numbers in the WEFCOM. Data items primarily collected on village-based were: the history and age of village settlement, amount of forest resource uses, rate of population growth, and conservation measures, and on household based: the average income, and average size of agricultural land. The survey teams were comprised of 6 WEFCOM project personnel who have knowledge and background in participatory rural appraisal.

Data Analysis

Locations of villages were put onto thematic map and other demographic information in table forms that can be linked to the map for management zone classification purpose. Forest resource uses of each village were classified into 5 aspects: (1) use of wood product such as house construction, furniture, and fuel wood (2) use of non-wood products such as mushroom, bamboo shoot, honey, and wild medicine herbs (3) wildlife consumption (4) socio-economic factors affecting resource uses and ecosystem integrity such as village population growth, average income and land use size per household (5) forest conservation measures. There are four levels of forest resource uses and other socio-economic factors ranging from high, relative high, relatively low, to low forest resource uses or dependencies with the score ranges from 4 to 1, respectively.

The criteria on amount of forest resource uses for wood product, non-wood product and wildlife consumption were based on the average amount of each forest resource use found in WEFCOM area plus or minus standard deviation. The explanation of the criteria is the followings:

- The high level of use (score = 4) means any amount of forest resource uses that is higher than the sum of average amount found in the WEFCOM protected area and its standard deviation, $> (X \pm SD)$;
- The relatively high level of use (score =3) means any amount of forest resource uses that is in the range of average amount of use found in the WEFCOM protected area plus its standard deviation, $X - (X \pm SD)$;
- The relatively low level of use (score = 2) means any amount of forest resource uses that is in the range of average amount of use found in the WEFCOM protected area minus its standard deviation, $X - (X \pm SD)$;
- The low level of use (score = 1) means any amount of use that is lower than the average amount of forest resource use in WEFCOM protected area minuses standard deviation, $< (X \pm SD)$.

The socio economic factors such as population growth rate of the village, size of land use per household, and average income

per household are grouped into 4 levels, the highest to the lowest from 4 to 1. The ranges for population growth rate are given based on the average figure found in the Thailand (2 per cent per year). The land use size or average income per household was based on the average acreage of land use or agricultural income found in WEFCOM area plus or minus standard deviation.

The explanation of the ranges is the followings:

- The high level of impact from land use size or household income (score = 4) is any land use size or income per household that is lesser than the average amount per household found in the WEFCOM protected area minuses its standard deviation, < (X ± SD) meaning that the villagers might not have enough land or income to accommodate their needs, thus, land encroachment is highly possible;
- The relatively high level of impact from land use size or household income (score = 3) means any land use size or income per household that is in the range of average amount per household found in the WEFCOM protected area minuses its standard deviation, X - (X ± SD);
- The relatively low level of impact from land use size or household income (score = 2) means any land use size or income per household that is in the range of average amount found in the WEFCOM protected area plus its standard deviation, X - (X ± SD);
- The low level of impact from land use size or household income (score = 1) means any amount of land use or income that is higher than the sum of the average amount plus its standard deviation found in WEFCOM protected area, > (X ± SD).

The indicators and criteria for land and resource use impacts in the WEFCOM area are shown in Table 1.

RESULTS AND DISCUSSION

General Demographic Information

Only 2 out of 17 protected areas in WEFCOM: Huay Kha Kaeng Wildlife Sanctuary and Klong Lan National Park have no local community inside. Within 15 protected areas there are 216 villages located in the WEFCOM areas comprising of 14,512 households and 68,997 people, respectively (Figure 1). Their average total income from both agricultural and non-agricultural is 33, 496 Baht per household per year or about 800 US $. Ethnic group distribution showed that nearly half is Thais from Central, Northeast, and North regions, respectively (45.5%). The rest are Karen (29%), Hmong (10.1%), non-residence such as Mianmar, Raman, Karen (12.6%), and others (2.3%). Table 2 shows numbers of population classified by ethnic groups in protected areas of WEFCOM. Typically most Thai and Hmong grow single cash crops such as corn and sugar for their income while rice cultivation is for own consumption. Karen people typically practice land rotation or shifting cultivation with rotation period ranging from 3 to 10 years.

Table 1. Indicators and criteria of impact levels from human activities on forest resources in WEFCOM area

Indicators	Average	Criteria on levels of impacts			
		High (4)	Relatively high (3)	Relatively low (2)	Low (1)
Wood products					
1. Fuelwood (cu.m/yr/village)	400	> 700	401–700	100–400	< 100
2. Charcoal (Sack/yr/village)	550	> 800	551–800	300–550	< 300
3. Construction(cu.m/yr/village)	8	>15	9–15	2–8	<2
4. Furniture (cu.m/ yr/village)	5.5	>10	5.6–10	1–5.5	<1
Non-wood products					
5. Bamboo shoot (kg/yr/village)	9,000	> 17,000	9,001–17,000	1,000–9,000	<1,000
6. Bamboo stick (stick/yr/village)	10,000	> 20,000	10,001–20,000	1,000–10,000	<1,000
7. Musroom (kg/yr/village)	2,000	>4,000	2,001–4,000	500–2,000	<500
8. Pak Wan vegetation (kg/yr/village)	1,200	>2,000	1,200–2,000	400–1,200	<400
9. Honey (bottle/yr/village)	100	>180	101–180	20–100	<20
10. others (kg/yr/village)	4,000	>6,500	4,001–6,500	3,500–4,000	<2,500
Wildlife consumption					
11. Fowl/bird hunting (body/yr/village)	100	>200	100–200	10–100	<10
12. Large mammal (body/yr/village)	10	>15	11–15	5–10	<5
13. Small mammal (body/yr/village)	250	>500	251–500	50–250	<50
14. Reptiles (body/yr/village)	45	>80	46–80	10–45	<10
15. Amphibian (kg/yr/village)	170	>300	171–300	50–170	<50
Socio-economic					
16. Population growth rate (%)	2	>3	2.1–3	1–2	<1
17. Land use size (Ha/household)	3.84	<2.4	2.4–3.84	3.84–4.8	>4.8
18. Agricultural income (Bath*/yr/household)		<5,000	5,000–17,500	17,501–30,000	>30,000
Conserrvation measures					
19. Resource conservation measures		Don't have it	Have it but rarely implement it	Have and implement it occasionally	Have and implement it regularly
20. Forest fire measure		Don't have it	Have it but rarely implement it	Have and implement it occasionally	Have and implement it regularly

* 1US dollar = 42 Baht

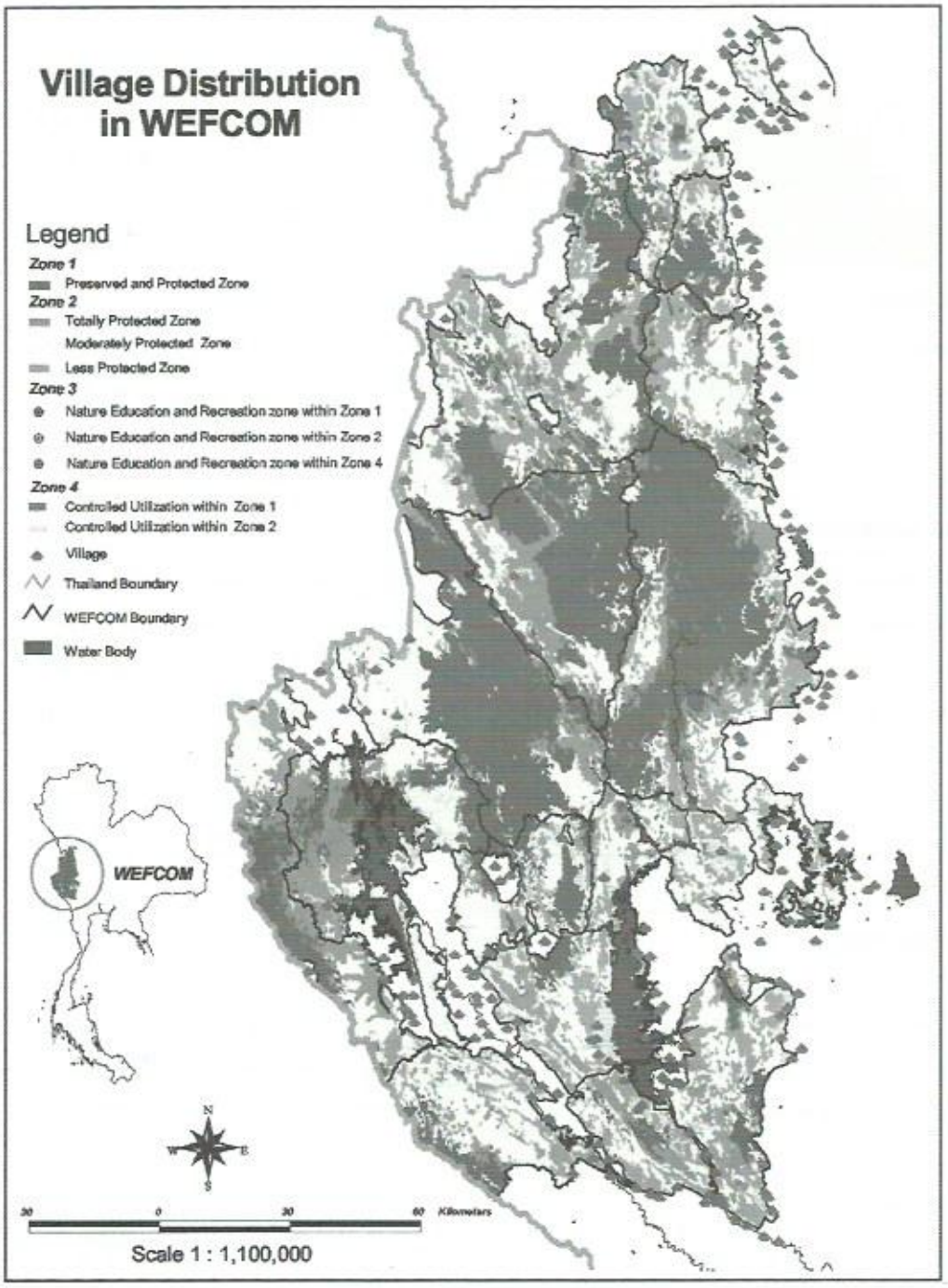

Figure 1. Villages distribution in WEFCOM area

According to the management zone classification, there are 4 villages situated in zone 1 which is the preserved and protected zone, the most critical ecosystem (Table 3). Ten villages are found in Zone 2.1, the totally protected zone which will need rehabilitation to achieve zone 1 criteria. These villages will be given special attention due to their sensitivity of their village locations.

Outreach strategies for villages located in zone 1 and 2.1 are proposed to minimize the effects of human activities and enhance local cooperation in resource conservation. Among more than 200 villages inside the WEFCOM these 14 villages are given first priorities in outreach plan and implementation.

Table 2. Numbers of population classified by ethic groups in WEFCOM

Protected areas	Numbers of population							Unit: number (%)
	Thai	Karen	Hmong	Yao	Kamu	Non-residenc[4]	Others[5]	Total
1. Khao Sanam Preang WS	6411 (96.4)	–	–	–	–	–	238 (3.6)	6649 (100)
2. Klong Wang Jao NP	99 (2.2)	588 (11.9)	4222 (85.5)	–	–	30 (0.6)	–	4939 (100)
3. Mae Wong NP	1441 (100)	–	–	–	–	–	–	1441 (100)
4. Phu Teuy NP	254 (18.3)	1139 (81.7)	–	–	–	–	–	1393 (100)
5. Chalerm Rattana kosin NP	107 (8.1)	1221 (81.7)	–	–	–	–	–	1328 (100)
6. Salak Pra WS	6294 (8.9)	–	–	–	–	38 (0.6)	738 (10.4)	7070 (100)
7. Erawan NP	1126 (66.1)	–	–	–	563 (33)	14 (0.8)	–	1703 (100)
8. Kern Srinakkarin NP	2310 (54)	1949 (45.5)	–	–	–	19 (0.5)	–	4278 (100)
9. Lam Klong Ngu NP	2724 (72)	782 (20.7)	–	142 (3.8)	–	135 (3.5)	–	3783 (100)
10. Sai Yok NP	331 (82.3)	–	–	–	–	71 (17.7)	–	402 (100)
11. Khao Leam NP	3464 (52.9)	1574 (24.1)	–	–	–	1506 (23.0)	–	6544 (100)
12. Thongphaphum NP	3041 (34.4)	1232 (14.0)	–	–	–	4556 (51.6)	–	8829 (100)
13. W. Thung Yai WS	–	2085 (71.8)	–	–	–	819 (28.2)	–	2904 (100)
14. E. Thung Yai WS	–	1181 (97.0)	–	–	–	36 (3.0)	–	1217 (100)
15. Umphang WS	15 (0.18)	5895 (71.6)	1916 (23.3)	2 (0.02)	–	404 (3.9)	–	8232 (100)
Total	27617 (45.5)	17646 (29.0)	6138 (10.1)	144 (0.2)	563 (0.9)	7628 (12.6)	976 (1.1)	60712 (100)

[4]Mianmar, Raman, Karen

[5]Lao Song, Lao Koa

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Outreach strategies for villages located in zone 1 and 2.1 are proposed to minimize the effects of human activities and enhance local cooperation in resource conservation. Among more than 200 villages inside the WEFCOM these 14 villages are given first priorities in outreach plan and implementation.

Table 3. Villages located on critical ecosystem management zones in the WEFCOM area

Protected areas	No. of Household (No. of Population)	Village names	1Management 2.1zones[62.1]
1. Khao Sanam Preang WS	132 (569)	Ban Nam Tok in Mo Seau Do Cluster	2.1
2. Mae Wong NP	15 (50)	Ban Bu Meao	2.1
3. Kern Sri Nakkarin NP	19 (113)	Ban Ta Ta in Nong Bang Cluster	2.1
4. Khao Leam NP	15 (74)	Ban Po Ta Na in Ti Pu Yae Cluster	1
	50 (135)	Ban Li Jia	1
5. W. Thung Yai Nareasuan WS	28 (150)	Ban Lai Voa	2.1
	8 (45)	Ban Hua Na in Ban Ja Kae Cluster	1
6. Umphang WS	46 (233)	Ban Ti Po Gi	1
	44 (268)	Ban Umphang Ki	2.1
	75 (337)	Ban Kosota in Nu sae plo cluster	2.1
	8 (51)	Ban Pa plu	2.1
7. Lam Klong Ngu	6 (18)	Ban Ti nuay in Thung Seu Tone cluster	2.1

[6]Zone 1 = Preserved and Protected Zone
Zone 2.1 = Totally Protected Zone
Zone 2.2 = Moderately Protected Zone
Zone 2.3 = less protected Zone
Zone 3.1 = Nature Education and Recreation Zone within Zone 1
Zone 3.2 = Nature Education and Recreation Zone with Zone 2
Zone 3.3 = Nature Education and Recreation Zone with zone 4
Zone 4.1 = Controlled Utilization within Zone 1
Zone 4.2 = Controlled Utilization within Zone 2

Located in Zone 1, Ban Po Ta Na and Ban Lijia in Khao Leam National Park, Ban Hua Na in East Thung Yai Wildlife Sanctuaries and Ban Tipogi in Umphang Wildlife Sanctuary have 15, 50, 8, and 46 households respectively. These local people are Karen mostly. Their peaceful and subsistence way of life should be encouraged under condition that the ecosystem is not jeopardized. Although their forest resource uses are not as high as other villages, but they are located in Zone 1 which is considered fragile ecosystem. Thus, activities for controlling land uses and enhancement conservation awareness must be put into action.

When analyzing it with the amount of resource uses and their other socio-economic factors, it reveals that villages found in critical zones of Mae Wong and Kern Sri Nakkarin National Parks need special attention on controlling wildlife hunting, Khao Sanam Preang and Kern Sri Nakkarin National Park need careful resource management on forest product uses, while villages in Umphang wildlife sanctuary, West Thung Yai wildlife sanctuary, and Kern Sri Nakkarin National Park are concerned with socio-economic factors such as income and population growth. From the impact viewpoint, Ban Nong Bang cluster in Kern Sri Nakkarin National Park are in great concerns as related to forest resource uses and their socio-economics situation (Table 4).

Levels of Forest Resource Uses

The amount of forest resource uses and socio-economic impacts of villages inside the WEFCOM showed in Table 5. It is obvious that Chalerm Rattana Kosin and Klong Wang Jao National Parks with the highest score found in the WEFCOM (2.18 from the scale of 4) imply notable issues on overall forest resource use circumstances. Special remarks go to wildlife hunting in Klong Wang Jao National Park, wood consumption and conservation measures in Chalerm Rattana Kosin National Park, forest product collection in Salak Phra Wildlife Sanctuary, and socio-economic factors in Thong Phaphum National Park.

Table 6 also shows list of villages that their amount of forest resource uses may need distinctive attention. The ten highest ranks in amount of usage are put on view.

OUTREACH STRATEGY

Community outreach means to reach out to local communities so that partnership and support in resource conservation can be established. Community outreach provides opportunities to build good relationship and partnership between protected area officials and local people, mobilize people to act on resource conservation, communicate and experience exchanges with local people to achieve ecosystem-based management goals of maintaining ecosystem integrity and quality of life of the local people (3).

Community outreach program or strategy should be systematically planned, implemented, and evaluated based on information. It is essential to avoid an ad hoc approach in which activities are not clearly defined in terms of goals and expected outcomes. It is crucial to gather socio-economic information so that target villages, issues, and strategies can be identified.

For WEFCOM project, three issues in forest resource uses are identified: wood consumption, non-wood product consumption, and wildlife use. It is obvious that all villages in WEFCOM area are dependent on forest resources of WEFCOM. Thus, the participatory demarcation of agricultural use and settlement zones are necessary so that more encroachment can put on hold.

Villages that pertain high uses in forest resources will need outreach strategies especially practical knowledge on maintaining sustainability of each forest resource use so that further resource degradation will be reduced. Villages with low conservation measures will definitely need environmental

and conservation awareness program to help them establish local conservation measures. Villages that have issues on socio-economic factors such as low income and undersized land must have some agricultural extension and suggestion on appropriate type of agriculture and its marketing so that land can be wisely used, gain higher production resulting in higher profit per land unit area. However, the agricultural technology must be environmental friendly and do not cause any more environmental problems.

Table 4. Forest resource uses of villages located in critical zones of WEFCOM

Protected Areas	Village names	Zone	Levels of forest resource uses from human activities and other factors affecting WEFCOM ecosystem[7]				
			Wood consumption	Forest products	Wildlife hunting	Socio-economic factors	Conservation measures
Khao Leam NP	Ban Potana	1	1.25	1.33	2.20	1.0	2.00
	Ban Lijia*	1	–	–	–	–	–
Umphang WS	Ban Tipogi	1	1.75	1.50	2.40	2.67	1.50
	Ban Unphang Ki	2.1	2.00	1.67	2.40	2.00	2.50
	Ban Kosota*	2.1	–	–	–	–	–
	Ban Pa plu*	2.1	–	–	–	–	–
Khao Sanam Preang WS	Ban Mo Seua Du	2.1	1.50	2.67	1.40	2.00	2.00
Mae Wong NP	Ban Bu Meo	2.1	1.75	1.50	3.40	1.67	2.00
Kern Sri Nakkarin NP	Ban Nong Bang	2.1	2.00	2.50	3.20	3.33	1.50
	Ban Klang*	2.1	–	–	–	–	–
	BanSawang pa*	2.1	*–	–	–	–	–
W. Thung Yai Nareasuan WS	Ban Lai Vo	2.1	1.5	1.33	1.40	2.67	2.50
	Ban Ja Kae	1	2.0	1.50	1.40	1.67	2.50

* No in-dept information

[7]Level of forest resourece used or impact : High = 3.26-4.00
Relatively high = 2.51-3.25
Relatively low = 1.76-2.50
Low = 1.00-1.75

Ecotourism can be used as a tool for gaining supplementary income to villagers especially those situated near tourism resources. Villages that may encourage community-based ecotourism are: Ban Lo Ko (Hmong and Karen) in Klong Wang Jao National Park, Ban Taphen Ki in Phu Teuy National Park, Ban Khao Lek in Chalerm Rattana Kosin National Park, Ban Nong Bang in Kern Sri Nakkarin National Park, Ban Huay Seua and Ban Thung Nang Kruan in Lam Klong Ngu National Park, Ban Ti Pu Yea in Khao Leam National Park, Umphang Ki, Ban Ko Ta in Umphang Wildlife Sanctuary.

Table 5. Average level of uses from human activities and other factors affecting WEFCOM ecosystem

Protected Areas	Level of uses from human activities and other factors affecting WEFCOM ecosystem[8]					Overall average impact
	Wood consumption	Forest products	Wildlife hunting	Socio-economic factors	Conservation measures	
Khao Sanam Preang WS	1.65	1.87	2.04	1.93	2.35	1.93
Klong Wang jao NP	1.53	2.07	2.94	1.81	2.50	2.18
Mae Wong NP	1.88	1.92	2.40	1.67	1.75	1.98
Phu Teuy NP	2.25	1.83	2.27	1.67	1.83	2.00
Chalerm Rattanakosin NP	2.38	2.25	1.60	2.33	2.75	2.18
Salak Phra WS	1.31	2.76	1.77	1.87	2.42	2.05
Erawan NP	1.50	2.12	1.85	1.83	2.13	1.89
Kern Sri Nakkarin NP	2.09	2.12	2.05	2.13	2.13	2.10
Lam Klong Ngu NP	1.37	2.31	1.90	1.79	2.38	2.07
Sai Yok NP	1.38	1.67	1.40	2.50	2.50	1.75
Thong Pha Phum NP	1.91	1.91	1.76	3.03	2.27	2.08
Khao Leam NP	1.94	2.22	1.98	2.30	2.33	2.13
W. Thung Yai Nareasuan WS	1.79	1.62	1.54	2.67	2.27	1.86
E. Thung Yai Naresuan WS	1.68	1.88	2.00	2.81	2.43	2.06
Umphang WS	1.91	2.01	2.19	2.58	2.02	2.12

Table 6. List of villages ranking tenth highest usages in forest resource uses

[8] High = 3.26–4.00
Relatively high = 2.51–3.25
Relatively low = 1.76–2.50
Low = 1.00–1.75

Table 6. List of villages ranking tenth highest usages in forest resource uses

Rank	Wood product uses	score	Non-wood forest production uses	score	Wildlife uses	score
1.	Ban Pak Meung *Kern Sri Nakkarin NP*	3.25	Ban Pi Lock Ki *Khao Leam NP*	3.5	Ban Pa Ka Klong Wang Jao	3.6
2.	Ban Via ka dee *Thong Pha Phum NP*	3.25	Ban Wang Yang *Salak Phra WS*	3.5	Ban Bu Meo Mae Wong NP	3.4
3.	Ban Kreang Ka Via *Khao Leam NP*	3.25	Ban Mong Ka Tae *Salak Phra WS*	3.5	Ban Hoa Fai Nue *Khao Sanam Preang WS*	3.2
4.	Ban Kloay *Phu Teuy NP*	3.0	Ban Ta Ma Now *Salak Phra WS*	3.5	Ban Lo Ko (Hmong) *Klong Wang Jao NP*	3.2
5.	Ban Prajam mai *Thong Pha Phum NP*	3.0	Ban Hin Dad *Salak Phra WS*	3.5	Ban Pa Mak *Klong Wang Jao NP*	3.2
6.	Ban Cha-ee *Lam Klong Ngu NP*	2.75	Ban Kreang Ka Via *Khao Leam NP*	3.17	Ban Nong Bang *Kern Sri Nakkarin NP*	3.2
7.	Ban Rai Pa *Thong Pha Phum NP*	2.75	Ban Tha Tum *Salak Phra WS*	3.0	Ban Via Ka Dee *Thong Pha Phum NP*	3.2
8.	Ban Huay Hin Dam *Phu Teuy NP*	2.75	Ban Khao Noi *Salak Phra WS*	3.0	Ban Le Tong Ku *Umphang WS*	3.2
9.	Ban Huay Seua-Huay Muong *Lam Klong Ngu NP*	2.75		3.0	Ban Ko Tha *Umphang WS*	3.0
10.		-		-	Ban Wang Yang *Salak Phra WS*	3.0

High = 3.26-4.00
Relatively high = 2.51-3.25
Relatively low = 1.76-2.50
Low = 1.00-1.75

CHALLENGES AND OPPORTUNITIES

An accurate understanding of relationships between people and protected areas is essential in ecosystem-based management. This socio-economic survey of WEFCOM illustrates how one can use the information and other social research in the process of making decision on outreach strategies so that the healthy intact ecosystem can be achieved. The socio-economic information and level of resource uses also give the public the opportunity to understand the human use situation in WEFCOM.

However, the issue of communication internally and externally of the survey results to ensure mutual understanding of the WEFCOM human use situation is a big challenge. Moreover, the integration of information from natural and social sciences

into the decision making process is not well materialized, not only at the WEFCOM but most of protected areas in Thailand. Finally, the continuous monitoring program must be done so that changes in human dimension are observed. As a result, adaptive management can be applied properly in WEFCOM decision making process.

CONCLUSION

The report shows how the protected area managers can use socio-economic data in formulation of management zones, and develop outreach strategies. The socio-economic data in terms of levels of forest uses and its likely impact on ecosystem analyzed at individual village level can give managers some directions on which village will need higher attention than the others and on what resource use issues. It is found that there are fourteen villages in the WEFCOM located in Zone 1 and 2.1 where ecosystem is fragile. These villages really need special attention in terms of outreach strategies particularly on controlling human impacts. In addition 25 villages will need outreach strategies in order to manage resource uses for sustainability and the well beings of local people. Continuous monitoring of human use in WEFCOM is considered essential in the next phase of WEFCOM project as well as the communication of the survey results.

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