

Impacts of ecotourism on consumption, poverty and environment in three communities of the Mae Wang watershed, Chiang Mai province

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ABSTRACT

The research investigates the impacts of eco-tourism in the Mae Wang Watershed, Chiang Mai Province, Northern Thailand. It answers a set of policy-related questions concerning the effects of eco-tourism on consumption, poverty and the natural environment in three village communities, whose residents are of three different ethnic groups: Karen, Hmong and the northern Thai. Detailed analyses presented in this research drew from both secondary data on basic needs and primary data from household surveys and interviews. The results show that the average household head was male, 51 year olds, and presided over a family of four people whose total income was 8,365 Thai baht per month. Household data demonstrated that although the Karen village has attracted foreign tourists through a tour company, the share of tourism income actually accruing to the community has been relatively limited. Consumption in the watershed results in high levels of spending over relative income. This finding highlights the importance of two main groups of consumption. The primary expense is food, which averages 39,007 Thai baht per household per month, far surpassing average household income; while non-food is 6,061.89 per month. The Karen village has the lowest Gini at 0.147, the Thai village ranked second at 0.244, and the Hmong village had relatively severe inequality at 0.350. Elephant riding and bamboo rafting benefit household income per capita across all community members. Income redistribution was hampered because income was more heavily concentrated in the hands of non-minority Thai people. This in turn is due to the political relationship between local government, business owners and the State. Nevertheless, satellite photographs attest to the positive ecological impact that forest area after eco-tourism activity began. Eco-tourism can therefore support natural resource conservation.

Keywords: Eco-tourism, poverty, environment, Mae Wang watershed, Chiang Mai Thailand

1. Introduction

The tourism industry in Thailand has been a major source of income and stimulated the country's economic development. The success of the tourism industry is evidenced by the fact that it has generated significant revenue and income circulating throughout the country. The World Tourism Organization (WTO) has predicted that the Asia-Pacific region will welcome 416 million visitors in 2020. The average income from tourism was 11,292 million USD. (Bank of Thailand, 2008). Unfortunately, however, tourism revenue will benefit rich people more than the poor. (Kaosa-ard, 2005)

Ecotourism has grown tremendously in the past two decades in Thailand as a field of inquiry within the broader study of tourism. Ecotourism is defined as responsible tourism in natural areas able to facilitate conservation objectives (cf. Blangy and Wood, 1993; Yu et al., 1997; Maharana et al., 2000) many ecotourism definitions highlight outcomes relevant to local communities, such as participation (Acott et al., 1998; Ross and Wall, 1999), empowerment (Scheyvens, 2002) and long-term benefits (Honey, 2008).

Chiang Mai is a popular natural and cultural tourist destination located in the North of Thailand (Tourism Authority of Thailand). In recent years, Chiang Mai has also become an increasingly modern city and has succeeded in attracting over 5 million visitors each year, of which between 1.4 million and 2 million per year are non-Thai tourists.

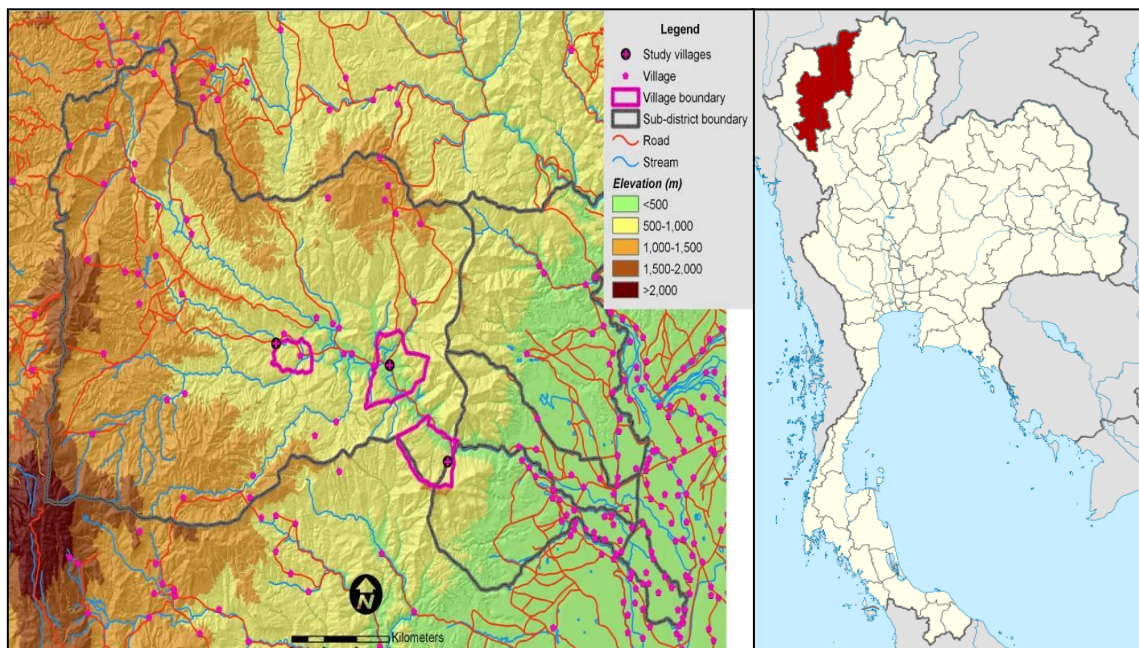


Figure 1. Geographical location of Mae Wang watershed

2. Literature review

Worldwide, ecotourism has been growing at rates of 10%–12% per year 3 times faster than the tourism industry as a whole (IES, 2008). More importantly, ecotourism has been embraced by several developing countries that are home to many of the world's rare and threatened species and hope to improve their economies in environmentally sustainable ways (Brooks et al., 2006).

Northern Thailand's mountainous areas provide many opportunities for tourists to enjoy trekking, rafting, jungle safari, elephant riding, tree-top rope-line descents, and encounters with hill tribe communities. "Hill Tribe" is a name given to an assortment of approximately 20 culturally distinct ethnic groups that inhabit the highlands of Southeast Asia. Six ethnic groups, which include the Karen, Hmong (Meo), Mien (Yao), Lahu, Lisu and Akha, have been the center of attraction for what one might refer to as "hill tribe tourism" (Cohen, 1996).

Mae Win is the sub-district of Mae Wang district covering a full one-third of the area of Mae Wang area. Combined with San Pa Tong and Doi Lour districts. Mae Wang covers approximately 400 square kilometers or 312,000 rai. Throughout this geographical area, the majority of the people are Hmong and Karen at higher elevations, and northern Thai in the lower areas.

Mae Win sub-district is also close to Doi Inthanon, a famous climbing peak; as such, it is mostly mountainous but it also has a large areas of forest. 80 years ago a logging concession had been given to foreign companies. At the present time, it has come back again. Abundant low-lying water sources allow it to take advantage of the river, as well to target both Thai and foreign eco-tourists. While the community could thus participate in eco-tourism, community decisions and management of the natural environment will inevitably affect cultural traditions and community activities. If undertaken correctly, community-based tourism could give a major hand in developing local communities.

3. Methodology

Because of its net benefits and advantages, including a low impact on the natural environment, ecotourism could logically contribute to employment creation, a more equal income distribution, and sustainable development. At the same time, it could create winners and losers in terms of ethnic group identity and impacts on local culture. To measure, weight and test the significance of these countervailing effects, this thesis will investigate the effects of eco-tourism parameters on consumption, poverty and the environment in the Mae Wang watershed. It is expected that the results of this study may be used to guide sustainable development policy for the country's tourism industry.

2.1. Study site

Mae Win Sub-District (or *tambon* in Thai) is located 52 kilometers south of Chiang Mai City in a mountainous area covering approximately 442 sq km in the Mae Wang Sub-Basin of the Ping River Basin. This area is well known for eco-tourism in its own right and is also in close proximity to the hill tribe villages in Doi Inthanon. While

only a very small portion is not legally classified as reserved forest land, about 70% of total land area is locally considered public forest land, while 24% is seen to be agricultural land holdings. Most households, housing some 60 percent of the population, are engaged in agriculture. Production of subsistence crops has gradually expanded or shifted into commercial production of onions, maize, soybeans, *longa*, and various vegetable crops for sale in local and regional markets. Other increasingly important occupations include off-farm employment, cottage industry, home-based handicrafts, tourist operations, and trade (Mae Win Sub-District Administrative Organization, 2007).

When measuring the impact of eco-tourism, the first problem is that eco-tourism is not commonly classified as an income-generating activity for households. In solving this problem, household expenditures per mouth must be corrected for consumption, and must be allocated to non-overlapping indicators of economic activities. Only after making these adaptations can one estimate the direct impact of ecotourism on village revenues and consumption; for instance, the purchase and use of durable goods or non-durable goods.

The second technical problem is choosing which indirect effects of poverty to consider and an appropriate poverty line as a basis for estimating the incidence, depth, and intensity across different villages. For this study, we selected 3,000 baht per person per month. To ensure that the results from this study may be compared with similar work elsewhere – i.e., to maximize “external validity” -- the household survey format and content were based on the approach taken by World Bank.

Even so, there are inevitably problems and difficulties in conducting research related to both primary and secondary data. First, many indirect effects are caused by linkages between household income and household consumption. Studies into these linkages predominantly show that household income and household consumption have unbalanced linkages, whereas benefit linkages with purchasing are rising more than earning. This outcome is not surprising, as most household’s expenditures relate to food consumption. Hence, a household survey is well suited to the compilation of such eco-tourism impacts. In general, is also attractive for residential purposes, and thus will be attractive as a location for eco-tourism services. This type of business clearly creates positive eco-tourism linkages; however, the benefits primarily accrue to low-altitude populations where entrepreneurs choose to locate.

2.2. Data analysis

This brief review shows that most eco-tourism impact studies relate to relatively specialized groups of households, and to business entrepreneurs with the financial potential to invest in eco-tourism. Of the three villages, Sob Win is a diversified community, where the majority of people live relatively close to the Mae Win sub-district office. These facts may mean that tourism benefits are unevenly distributed among the population.

Meanwhile, parts of the Mae Sapok Tai are still functioning according to tour guide rules of eco-tourism planning that are different from the market rules assumed in general equilibrium models. Hence, measuring income from eco-tourism for Mae Sapok

Tai appears to be a reasonably efficient and adequate way to study the impact of eco-tourism on this watershed area. The choice of income furthermore depends on the prices set by tour companies in Chiang Mai city.

In contrast, when one studies the impacts of eco-tourism activity or changes in the number of tourists (a demand shock) in Houy Nam Rin village (from where elephant camps have moved up to Sob Win village), village income analysis seems generally adequate. These types of income are mainly collected from the agriculture sector. In earlier phases of eco-tourism development, however, the main research question is usually different, namely how poor is a certain household with respect to certain types of eco-tourism expenditures. In such cases, the Foster-Greer Thorbecke (FGT) and Gini coefficient approaches are more appropriate. In this paper, we are interested in many questions, which is the reason why consumption, poverty and environment approach have all been chosen as overlapping areas of inquiry.

The poverty approach used in this research is two-staged. First, the “Basic Need Data” method is employed to establish a poverty threshold; then, the Foster-Greer-Thorbecke indices of absolute poverty (incidence, depth and severity) are calculated and compared among the three communities. The reference period is 2009-2010, the most recent year for which both farm income and off-farm income are available from the Mae Win sub-district office).

4. Data

Data collection

The data collected for this study derived from surveys of 156 households in three villages (a) Huay Nam Rin. (B) Sob Win (c) Mae Sa Pok Tai of Mae Wang district, Chiang Mai, Thailand. In order to determine the consumption and general information of households, the latest secondary data were compiled from a booklet from the Sub-district Office of the Mae Win. These data were supplemented by interviews of the village heads using Thai speaking interviewers. Finally, focus groups were conducted with a small group of randomly selected eco-tourism business owners in Sob Win village.

Policy-oriented research questions

The above data allow us to answer five (5) practical questions for improving income and evaluating the true potential of eco-tourism development in the Mae Wang watershed. These are:

1. What are the current patterns of socio-demography, income and employment, eco-tourism development, and durable and non-durable consumption in the Mae Wang watershed as a whole?
2. Do these socio-demographic, economic, eco-tourism, and/or consumption patterns differ significantly among the three study communities?
3. What are the levels of relative and absolute poverty in the three villages that could be targeted by income-enhancement or eco-tourism policies?

4. What -demographic, economic, eco-tourism factors most significantly related to increase or undermine income per capita?
5. What policies could be put into place to operate on those factors to increase income in conjunction with eco-tourism development?

5. Results

The household survey data displayed great disparity around the means (Table 1). Therefore the variables presented in tables 1, 3, 5, and 7 will be listed by descending order of the coefficient of variation (standard deviation divided by the mean), a standard measure of variability.

Table 1 Descriptive statistics: socio-demography of the Mae Wang watershed

| Variable | Minimum | Maximum | Mean | Std. Deviation | Coeff. variation |
|---------------------|-----------|---------|---------|----------------|------------------|
| Senior high | .00 | 1.00 | .0064 | .08006 | 1249% |
| Widowed | .00 | 1.00 | .0128 | .11286 | 880% |
| Divorced | .00 | 1.00 | .0513 | .22128 | 432% |
| Junior high | .00 | 1.00 | .1026 | .30437 | 297% |
| Single | .00 | 1.00 | .1731 | .37953 | 219% |
| | Male head | Female | .2692 | .44499 | |
| Female head | | haead | | | 165% |
| Primary | .00 | 1.00 | .3462 | .47728 | 138% |
| Unschoolcd | .00 | 1.00 | .5449 | .49959 | 92% |
| Married | .00 | 3.00 | .8013 | .51331 | 64% |
| Hh_members | 1.00 | 10.00 | 4.0000 | 1.64611 | 41% |
| Happy_family (1, 0) | .00 | 1.00 | .9167 | .27728 | 30% |
| Age_hhh | 28.00 | 93.00 | 51.5321 | 14.10441 | 27% |

Source: Survey analysis by Authors

The data suggest that the head of the household was a married, middle aged male who had a 54% chance of being unschooled, and presided over a happy family of four members on average. Average income was 8,365 Baht per month per household or 2,490 Baht per capita.

The question naturally arises: are there any significant differences within this broad characterization across the three villages? Table 2 reports only the differences significant at the .099 level or better (last column). We find that Huay Nam Rin has younger household heads, a smaller percentage of female heads, and a larger number of household members. Meanwhile, Sob Win has more single and fewer married heads; and that Mae Saport has the greatest number of uneducated heads. These socio-demographic differences may or may not explain the success of eco-tourism or explain the level of income per capita. That analysis will be reserved for the regression equations to follow.

Table 2 Significant differences in socio-demographic status by village

| Dependent Variable | Highest village | Lesser village | Mean difference | Std err | Sig. |
|--------------------|-----------------|----------------|-----------------|---------|-------|
| Age_hhh | Mae Sapork | Huay Nam Rin | 6.37738* | 3.03 | 0.037 |
| | Sob Win | Huay Nam Rin | 9.94873* | 2.81 | 0.001 |
| Single | Sob Win | Huay Nam Rin | .28650* | 0.07 | 0.000 |
| | Sob Win | Mae Sapork | .25257* | 0.07 | 0.000 |
| Married | Huay Nam Rin | Sob Win | .30020* | 0.10 | 0.004 |
| | Mae Sapork | Sob Win | .20377* | 0.09 | 0.030 |
| Divorced | Mae Sapork | Huay Nam Rin | .08333* | 0.05 | 0.091 |
| Female head | Mae Sapork | Huay Nam Rin | .16429* | 0.10 | 0.090 |
| | Sob Win | Huay Nam Rin | .28415* | 0.09 | 0.002 |
| Hh_members | Huay Nam Rin | Mae Sapork | 1.09881* | 0.34 | 0.002 |
| | Huay Nam Rin | Sob Win | 1.53659* | 0.32 | 0.000 |
| Primary | Mae Sapork | Sob Win | .33333* | 0.15 | 0.038 |
| | Huay Nam Rin | Mae Sapork | .21786* | 0.10 | 0.032 |
| Unschoolled | Mae Sapork | Sob Win | -.36815* | 0.08 | 0.000 |
| | Mae Sapork | Mae Sapork | .36815* | 0.08 | 0.000 |
| Unschoolled | Mae Sapork | Huay Nam Rin | .29821* | 0.10 | 0.005 |
| | Mae Sapork | Sob Win | .42894* | 0.09 | 0.000 |

Source: Survey analysis by Authors

Table 3. Descriptive statistics: income and economic activity in the Mae Wang watershed

| Variable | Minimum | Maximum | Mean | Std. Deviation | Coeff variation |
|-----------------------------------|---------|---------|-------|----------------|-----------------|
| Herder | .00 | 1.00 | .0064 | .08006 | 1249% |
| Other is main business place | .00 | 1.00 | .0128 | .11286 | 880% |
| Wealthy standard of living | .00 | 1.00 | .0192 | .13778 | 716% |
| Income > 40,000 | .00 | 1.00 | .0192 | .13778 | 716% |
| Unemployed | .00 | 1.00 | .0256 | .15857 | 618% |
| Income 30,000-40,000 | .00 | 1.00 | .0256 | .15857 | 618% |
| Partner | .00 | 1.00 | .0256 | .15857 | 618% |
| Income = 20,000-30,000 | .00 | 1.00 | .0321 | .17670 | 551% |
| Worker | .00 | 1.00 | .0385 | .19293 | 502% |
| Ten to 20 years experience | .00 | 1.00 | .0513 | .22128 | 432% |
| Five to 10 years experience | .00 | 1.00 | .0513 | .22128 | 432% |
| More than 20 years experience | .00 | 1.00 | .0513 | .22128 | 432% |
| Shop is main business place | .00 | 1.00 | .0513 | .22128 | 432% |
| Very bad standard of living | .00 | 1.00 | .0705 | .25683 | 364% |
| Riverside is main business place | .00 | 1.00 | .0769 | .26733 | 348% |
| One to 5 years experience | .00 | 1.00 | .0833 | .27728 | 333% |
| Number of employees or co-workers | .00 | 12.00 | .6987 | 2.16548 | 310% |
| Income 10,000-20,000 | .00 | 1.00 | .1090 | .31261 | 287% |
| Home is main business | .00 | 1.00 | .1218 | .32810 | 269% |

| Variable | Minimum | Maximum | Mean | Std. Deviation | Coeff variation |
|---|----------------|----------------|-------------|-----------------------|------------------------|
| place | | | | | |
| Merchant | .00 | 1.00 | .1218 | .32810 | 269% |
| Company owner | .00 | 1.00 | .1859 | .39028 | 210% |
| Bad standard of living | .00 | 1.00 | .1987 | .40032 | 201% |
| Good standard of living | .00 | 1.00 | .2821 | .45145 | 160% |
| Income per capita | 500.00 | 25000.00 | 2490.6899 | 3071.17278 | 123% |
| Average standard of living | .00 | 1.00 | .4231 | .49564 | 117% |
| Household income | 5000.00 | 50000.00 | 8365.3846 | 8653.98401 | 103% |
| Hired labourer | .00 | 1.00 | .5128 | .50145 | 98% |
| Farmer | .00 | 1.00 | .5256 | .50095 | 95% |
| Years since company founded | 1.00 | 25.00 | 9.4834 | 7.61501 | 80% |
| Percentage monthly savings occupation | 1.00 | 100.00 | 26.4500 | 20.24175 | 77% |
| farmer | | unemployed | 2.7949 | 1.80936 | 65% |
| Income < 10,000 | .00 | 1.00 | .8141 | .39028 | 48% |
| Total salary per worker per day | .00 | 300.00 | 145.2381 | 56.79956 | 39% |
| Work hours per day | 2 | 13 | 8.59 | 3.198 | 37% |
| Standard of living | .00 | 4.00 | 2.3167 | .85354 | 37% |
| Months worked per year | 1 | 12 | 9.80 | 3.513 | 36% |
| Operating days per week | 1.50 | 7.00 | 5.9583 | 2.00846 | 34% |
| Operating days per week | 1.50 | 7.00 | 6.0500 | 1.71644 | 28% |
| Added workers during past year | 1 | 1 | 1.00 | .000 | 0% |
| Can't operate year-round because I leave for other job | 1 | 1 | 1.00 | .000 | 0% |
| Can't operate year-round because lack input supplies | 1 | 1 | 1.00 | .000 | 0% |
| Can't operate year-round because of rain and climate | 1 | 1 | 1.00 | .000 | 0% |
| Can't operate year-round because of seasonality of tourism | 1 | 1 | 1.00 | .000 | 0% |
| Can't operate year-round because river level too low | 1 | 1 | 1.00 | .000 | 0% |
| Can't operate year-round for other reasons | 1 | 1 | 1.00 | .000 | 0% |
| Did not add workers during past year | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Do not have social insurance for workers | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Do not operate in response to orders placed | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Have social insurance for workers | 1 | 1 | 1.00 | .000 | 0% |
| Mae Wang Watershed will not suffer water shortage in future | 1 | 1 | 1.00 | .000 | 0% |
| Mae Wang Watershed will suffer water shortage | 1.00 | 1.00 | 1.0000 | .00000 | 0% |

| Variable | Minimum | Maximum | Mean | Std. Deviation | Coeff variation |
|--------------------------------------|---------|---------|--------|----------------|-----------------|
| in future | | | | | |
| Operate in response to orders placed | 1 | 1 | 1.00 | .000 | 0% |
| Will need animal feed | 1 | 1 | 1.00 | .000 | 0% |
| Will need groceries | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Will need hardwood | 1 | 1 | 1.00 | .000 | 0% |
| Will need lumber | 1 | 1 | 1.00 | .000 | 0% |
| Will need other equipment | 1 | 1 | 1.00 | .000 | 0% |
| Work > 12 hours per day | 1 | 1 | 1.00 | .000 | 0% |
| Work 1-2 hours per day | 1 | 1 | 1.00 | .000 | 0% |
| Work 5-8 hours per day | 1 | 1 | 1.00 | .000 | 0% |
| Work 8-12 hours per day | 1 | 1 | 1.00 | .000 | 0% |
| Would not save any surplus income | 1 | 1 | 1.00 | .000 | 0% |
| Would save any surplus income | 1.00 | 1.00 | 1.0000 | .00000 | 0% |

Source: Survey analysis by Authors

Table 4. Significant differences in income and economic activity by village

| Dependent Variable | Highest village | Lesser village | Mean difference | Std err | Sig. |
|--|-----------------|----------------|-----------------|---------|-------|
| Average standard of living | Huay Nam Rin | Sob Win | .32720* | 0.10 | 0.001 |
| | Mae Sapork | Sob Win | .15696* | 0.09 | 0.081 |
| Very bad standard of living | Mae Sapork | Huay Nam Rin | .11726* | 0.06 | 0.039 |
| | Mae Sapork | Sob Win | .10474* | 0.05 | 0.028 |
| Bad standard of living | Mae Sapork | Huay Nam Rin | .22679* | 0.09 | 0.011 |
| | Mae Sapork | Sob Win | .13442* | 0.07 | 0.068 |
| Good standard of living | Sob Win | Huay Nam Rin | .25205* | 0.09 | 0.004 |
| | Sob Win | Mae Sapork | .36872* | 0.08 | 0.000 |
| Company owner | Mae Sapork | Huay Nam Rin | .16667* | 0.08 | 0.048 |
| | Sob Win | Huay Nam Rin | .28767* | 0.08 | 0.000 |
| Farmer | Sob Win | Mae Sapork | .12100* | 0.07 | 0.085 |
| | Huay Nam Rin | Mae Sapork | .39583* | 0.09 | 0.000 |
| Five to 10 years experience | Huay Nam Rin | Sob Win | .75342* | 0.08 | 0.000 |
| | Mae Sapork | Sob Win | .35759* | 0.08 | 0.000 |
| Have worked at this activity during last two weeks | Mae Sapork | Huay Nam Rin | .10417* | 0.05 | 0.034 |
| | Mae Sapork | Huay Nam Rin | .27083* | 0.09 | 0.003 |
| Hired labourer | Sob Win | Huay Nam Rin | .28767* | 0.08 | 0.001 |
| | Huay Nam Rin | Mae Sapork | .48750* | 0.11 | 0.000 |
| Home is main business place | Huay Nam Rin | Sob Win | .29315* | 0.10 | 0.003 |
| | Sob Win | Mae Sapork | .19435* | 0.09 | 0.028 |
| Household income | Mae Sapork | Huay Nam Rin | .18750* | 0.07 | 0.010 |
| | Sob Win | Huay Nam Rin | .13699* | 0.07 | 0.041 |
| Income < 10,000 | Sob Win | Huay Nam Rin | 4553.81605* | 1743.57 | 0.010 |
| | Sob Win | Mae Sapork | 3327.62557* | 1575.91 | 0.036 |
| Income 10,000-20,000 | Huay Nam Rin | Sob Win | .20196* | 0.08 | 0.011 |
| | Mae Sapork | Sob Win | .18350* | 0.07 | 0.010 |
| | Sob Win | Mae Sapork | -.18350* | 0.07 | 0.010 |
| | Sob Win | Mae Sapork | .12272* | 0.06 | 0.035 |

| Dependent Variable | Highest village | Lesser village | Mean difference | Std err | Sig. |
|--|-----------------|----------------|-----------------|---------|-------|
| Income per capita | Sob Win | Huay Nam Rin | 1900.69192* | 614.27 | 0.002 |
| | Sob Win | Mae Sapork | 1184.12800* | 555.21 | 0.035 |
| Merchant More than 20 years experience | Sob Win | Huay Nam Rin | .13581* | 0.07 | 0.044 |
| | Sob Win | Huay Nam Rin | .10959* | 0.04 | 0.015 |
| Number of employees or co-workers | Sob Win | Mae Sapork | .10959* | 0.04 | 0.007 |
| | Sob Win | Huay Nam Rin | 1.15068* | 0.44 | 0.009 |
| One to 5 years experience | Mae Sapork | Huay Nam Rin | .14583* | 0.06 | 0.018 |
| Ten to 20 years experience | Sob Win | Huay Nam Rin | .08219* | 0.05 | 0.071 |
| Partner | Mae Sapork | Huay Nam Rin | .06250* | 0.04 | 0.076 |
| | Mae Sapork | Sob Win | .04880* | 0.03 | 0.098 |
| Percentage monthly savings | Huay Nam Rin | Sob Win | 13.67241* | 4.65 | 0.004 |
| | Mae Sapork | Sob Win | 20.98194* | 3.63 | 0.000 |
| Riverside is main business place | Sob Win | Huay Nam Rin | .10959* | 0.05 | 0.046 |
| Shop is main business place | Sob Win | Huay Nam Rin | .10959* | 0.04 | 0.015 |
| | Sob Win | Mae Sapork | .10959* | 0.04 | 0.007 |
| Total wage bill per month | Sob Win | Huay Nam Rin | 5095.89041* | 1948.79 | 0.010 |
| | Mae Sapork | Huay Nam Rin | .07560* | 0.04 | 0.074 |
| Worker | Mae Sapork | Sob Win | .10417* | 0.04 | 0.003 |

Source: calculations from primary survey data.

Table 5. Descriptive statistics: tourism and eco-tourism in the Mae Wang watershed

| Variable | Minimum | Maximum | Mean | Std. Deviation | Coeff variation |
|---|---------|---------|-------|----------------|-----------------|
| Elephant camp is most important within ecotourism | .00 | 1.00 | .0064 | .08006 | 1249% |
| Homestay is most important within ecotourism | .00 | 1.00 | .0128 | .11286 | 880% |
| 1-2 days per week | .00 | 1.00 | .0192 | .13778 | 716% |
| Have not worked at this activity during last two weeks | .00 | 1.00 | .0192 | .13778 | 716% |
| Bamboo rafting is most important within ecotourism | .00 | 1.00 | .0192 | .13778 | 716% |
| Elephant camp | .00 | 1.00 | .0192 | .13778 | 716% |
| Wooden toys/handcrafts is most important within ecotourism | .00 | 1.00 | .0192 | .13778 | 716% |
| 3-4 days per week | .00 | 1.00 | .0256 | .15857 | 618% |
| Souvenir/food shop is most important within ecotourism | .00 | 1.00 | .0256 | .15857 | 618% |
| Mostly government/community leaders for training | .00 | 1.00 | .0321 | .17670 | 551% |
| 5-6 days per week | .00 | 1.00 | .0321 | .17670 | 551% |
| Bamboo rafting | .00 | 1.00 | .0321 | .17670 | 551% |
| Ecotourism has bad impact on community | .00 | 1.00 | .0321 | .17670 | 551% |
| Wooden toy/handicraft | .00 | 1.00 | .0385 | .19293 | 502% |
| Wooden toy/handicraft is most important eco-tourism activity in community | .00 | 1.00 | .0449 | .20769 | 463% |
| Homestay | .00 | 1.00 | .0513 | .22128 | 432% |
| Tour guide is most important eco-tourism activity in community | .00 | 1.00 | .1026 | .30437 | 297% |
| Mostly foreign tourists | .00 | 1.00 | .1154 | .32051 | 278% |

| Variable | Minimum | Maximum | Mean | Std. Deviation | Coeff variation |
|--|-------------|-------------------|----------|----------------|-----------------|
| Mostly Thai tourists | .00 | 1.00 | .1282 | .33539 | 262% |
| Elephant camp is most important ecotourism activity in community | .00 | 1.00 | .1282 | .33539 | 262% |
| Homestay is most important ecotourism activity in community | .00 | 1.00 | .1282 | .33539 | 262% |
| Worst case scenario income from my ecotourism enterprise | .00 | 30000.00 | 2813.333 | 6542.0909 | 233% |
| 7 days per week | .00 | 1.00 | .1795 | .38500 | 214% |
| Nature guide is most important ecotourism activity in community | .00 | 1.00 | .1859 | .39028 | 210% |
| Souvenir or food shop | .00 | 1.00 | .1859 | .39028 | 210% |
| Average scenario income from my ecotourism enterprise | 5.00 | 50000.00 | 5528.500 | 10603.680 | 192% |
| Past week average daily number of tourists | 1 | 2000 | 229.10 | 436.273 | 190% |
| Have worked at this activity during last two weeks | .00 | 1.00 | .2179 | .41418 | 190% |
| Ecotourism agent | .00 | 1.00 | .2308 | .42268 | 183% |
| Ecotourism activity | none | Toys/handicrafts | .8654 | 1.53281 | 177% |
| Good scenario income from my ecotourism enterprise | 10.00 | 70000.00 | 8727.000 | 15232.184 | 175% |
| Best case scenario income from my ecotourism enterprise | 20.00 | 100000.00 | 14596.77 | 25356.583 | 174% |
| Shops are most important ecotourism activity in community | .00 | 1.00 | .2949 | .45745 | 155% |
| Holiday average number of tourists | 3 | 600 | 89.15 | 127.443 | 143% |
| Bamboo rafting is most important ecotourism activity in community | .00 | 1.00 | .3782 | .48650 | 129% |
| Local tax paid on ecotourism activities per year | .00 | 3000.00 | 653.7419 | 727.07574 | 111% |
| Major clientele | Mostly Thai | Mostly foreigners | 1.9744 | 1.92610 | 98% |
| January activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1.00 | 13.00 | 2.3548 | 2.12208 | 90% |
| Most important ecotourism activity in community | 0 | 6 | 1.88 | 1.583 | 84% |
| Weekend average number of tourists | 2 | 100 | 34.52 | 23.875 | 69% |
| Weekday average number of tourists | 2 | 70 | 25.15 | 16.749 | 67% |
| April activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1.00 | 4.00 | 1.9677 | 1.19677 | 61% |
| Quality of tourist business in April (1=excellent, 2 = good, 3= fair, 4=bad) | 1 | 4 | 1.97 | 1.190 | 60% |
| March activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1.00 | 4.00 | 2.2581 | 1.09446 | 48% |
| May activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1.00 | 4.00 | 2.0968 | .97826 | 47% |
| Quality of tourist business in May (1=excellent, 2 = good, 3= fair, 4=bad) | 1 | 4 | 2.14 | .976 | 46% |
| Quality of tourist business in March (1=excellent, 2 = good, 3= fair, 4=bad) | 1 | 4 | 2.22 | 1.004 | 45% |
| Employee status within the ecotourism company | worker | owner | 2.4359 | 1.09532 | 45% |
| December activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1.00 | 4.00 | 2.2258 | .95602 | 43% |
| Ecotourism has good impact on | .00 | 1.00 | .8526 | .35568 | 42% |

| Variable | Minimum | Maximum | Mean | Std. Deviation | Coeff variation |
|---|---------|---------|--------|----------------|-----------------|
| community Quality of tourist business in December (1=excellent, 2 = good, 3= fair, 4=bad) | 1 | 4 | 2.22 | .917 | 41% |
| November activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1.00 | 4.00 | 2.5161 | 1.02862 | 41% |
| Quality of tourist business in November(1=excellent, 2 = good, 3= fair, 4=bad) | 1 | 4 | 2.51 | .961 | 38% |
| February activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1.00 | 4.00 | 2.0645 | .77182 | 37% |
| Quality of tourist business in October (1=excellent, 2 = good, 3= fair, 4=bad) | 1 | 4 | 2.92 | 1.090 | 37% |
| Average operating days per month October activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1 | 30 | 23.81 | 8.765 | 37% |
| Quality of tourist business in January (1=excellent, 2 = good, 3= fair, 4=bad) | 1.00 | 4.00 | 2.8387 | 1.03591 | 36% |
| Quality of tourist business inFebruary (1=excellent, 2 = good, 3= fair, 4=bad) | 1 | 3 | 2.11 | .737 | 35% |
| July activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1 | 4 | 2.22 | .750 | 34% |
| August activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1.00 | 4.00 | 2.6129 | .88232 | 34% |
| June activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1.00 | 4.00 | 2.9032 | .94357 | 33% |
| Quality of tourist business in August (1=excellent, 2 = good, 3= fair, 4=bad) | 1.00 | 4.00 | 2.1935 | .70329 | 32% |
| Quality of tourist business in July (1=excellent, 2 = good, 3= fair, 4=bad) | 1 | 4 | 2.86 | .918 | 32% |
| September activity level (1 = excellent, 2 = good, 3 = average, 4 = bad) | 1 | 4 | 2.78 | .886 | 32% |
| Quality of tourist business in June (1=excellent, 2 = good, 3= fair, 4=bad) | 1.00 | 4.00 | 3.0323 | .94812 | 31% |
| Quality of tourist business in September (1=excellent, 2 = good, 3= fair, 4=bad) | 1 | 4 | 2.65 | .789 | 30% |
| Activity requires physical inputs Agree that OBT can raise taxes on eco- enterprises | 1 | 4 | 3.16 | .866 | 27% |
| Bamboo rafting is the best ecotourist activity for my village | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Disagree that OBT can raise taxes on eco-enterprises | 1 | 1 | 1.00 | .000 | 0% |
| Elephant camp is the best ecotourist activity for my village | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Emphasize both tourist quantity and quality (1,0) | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Emphasize tourist (1,0) | 1 | 1 | 1.00 | .000 | 0% |
| Emphasize tourist quantity (1,0) | 1 | 1 | 1.00 | .000 | 0% |
| Operate 1-2 days per week | 1 | 1 | 1.00 | .000 | 0% |
| Operate 3-4 days per week | 1 | 1 | 1.00 | .000 | 0% |
| Operate 5-6 days per week | 1 | 1 | 1.00 | .000 | 0% |
| Operate 7 days per week | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Riverbasin resources in 20 years will likely be as sustainble as now | 1 | 1 | 1.00 | .000 | 0% |
| Riverbasin resources in 20 years will | 1.00 | 1.00 | 1.0000 | .00000 | 0% |

| Variable | Minimum | Maximum | Mean | Std. Deviation | Coeff variation |
|--|---------|---------|--------|----------------|-----------------|
| not likely be as sustainable as now | | | | | |
| Single most sustainable ecotourist activity is bamboo rafting | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Single most sustainable ecotourist activity is elephant camp | 1 | 1 | 1.00 | .000 | 0% |
| Single most sustainable ecotourist activity is homestay | 1 | 1 | 1.00 | .000 | 0% |
| Single most sustainable ecotourist activity is nature guide | 1 | 1 | 1.00 | .000 | 0% |
| Single most sustainable ecotourist activity is shop | 1 | 1 | 1.00 | .000 | 0% |
| Single most sustainable ecotourist activity is tourist agency | 1 | 1 | 1.00 | .000 | 0% |
| Single most sustainable ecotourist activity is wooden toy/handicraft | 1 | 1 | 1.00 | .000 | 0% |
| There is no room for more ecotourism enterprises in future | 1 | 1 | 1.00 | .000 | 0% |
| There is room for more ecotourism enterprises in future | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Will protect resources for future ecotourism possibilities | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Will invest to expand ecotourism activities if capital available | 1.00 | 1.00 | 1.0000 | .00000 | 0% |
| Will not invest to expand ecotourism activities if capital available | 1 | 1 | 1.00 | .000 | 0% |

Source: Survey analysis by Authors

The results (Table 6) show that the villagers who have business activities related to eco-tourism live mostly in Sob Win village, where a full 30 households representing 90 percent of families engage in eco-tourism. Mae Sa Pok village comes on the second. In stark contrast, Huai Nam Rin village has seen its eco-tourism activities cut off because the elephant camp burned eight year ago and was subsequently move uphill to the Sob Win area. Households in Huai Nam Rin therefore have the lowest number of households engaged in ecotourism.

This said, only 27-38 households have benefited from eco-tourism in the three villages. The average period during which their business in eco-tourism has been open exceeds 10 years. About 25 visitors come per day during the week and 34 on Saturdays and Sundays. The highest number of visitors is in the holiday season: an average of 89 per day and up to 1,000 durin the Songkran festival in April. The number of visitors tends to increase every year because tour companies focus on sitess that are not far from the city and that are appropriate for all members of the family. They must ideally provide facilities for swimming and parties, and safe play areas for children.

Table 6. Significant differences in tourism and eco-tourism by village

| Dependent Variable | Highest village | Lesser village | Mean difference | Std err | Sig. |
|---|-----------------|----------------|-----------------|---------|-------|
| Ecotourism activity | Mae Sapork | Huay Nam Rin | .93512* | 0.33 | 0.005 |
| | Sob Win | Huay Nam Rin | 1.05127* | 0.30 | 0.001 |
| Most important ecotourism activity in community | Huay Nam Rin | Sob Win | .963* | 0.38 | 0.013 |
| | Mae Sapork | Sob Win | 1.263* | 0.28 | 0.000 |
| Bamboo rafting is most important eco-tourism activity in community | Sob Win | Huay Nam Rin | .62661* | 0.08 | 0.000 |
| | Sob Win | Mae Sapork | .62900* | 0.07 | 0.000 |
| Homestay is most important eco-tourism activity in community | Mae Sapork | Huay Nam Rin | .13036* | 0.07 | 0.081 |
| | Huay Nam Rin | Mae Sapork | .15298* | 0.07 | 0.039 |
| Elephant camp is most important eco-tourism activity in community | Huay Nam Rin | Sob Win | .17495* | 0.07 | 0.011 |
| | Mae Sapork | Huay Nam Rin | .64583* | 0.09 | 0.000 |
| Shops are most important eco-tourism activity in community | Mae Sapork | Sob Win | .44035* | 0.07 | 0.000 |
| | Sob Win | Huay Nam Rin | .20548* | 0.08 | 0.011 |
| Souvenir/food shop is most important within ecotourism | Sob Win | Huay Nam Rin | .05479* | 0.03 | 0.092 |
| | Sob Win | Mae Sapork | .05479* | 0.03 | 0.063 |
| Nature guide is most important eco-tourism activity in community | Huay Nam Rin | Sob Win | .31429* | 0.07 | 0.000 |
| | Mae Sapork | Sob Win | .37500* | 0.07 | 0.000 |
| Tour guide is most important eco-tourism activity in community | Huay Nam Rin | Sob Win | .11429* | 0.06 | 0.054 |
| | Mae Sapork | Huay Nam Rin | .13571* | 0.06 | 0.035 |
| Wooden toy/handicraft is most important eco-tourism activity in community | Mae Sapork | Sob Win | .25000* | 0.05 | 0.000 |
| | Sob Win | Huay Nam Rin | .08219* | 0.04 | 0.054 |
| Ecotourism agent | Mae Sapork | Huay Nam Rin | .30476* | 0.09 | 0.001 |
| | Sob Win | Huay Nam Rin | .23170* | 0.08 | 0.007 |
| Ecotourism has good impact on community | Mae Sapork | Huay Nam Rin | .42321* | 0.07 | 0.000 |
| | Sob Win | Huay Nam Rin | .44462* | 0.06 | 0.000 |
| Mostly foreign tourists | Mae Sapork | Huay Nam Rin | .29167* | 0.07 | 0.000 |
| | Mae Sapork | Sob Win | .23687* | 0.06 | 0.000 |
| Mostly government/community leaders for training | Sob Win | Huay Nam Rin | .06849* | 0.04 | 0.058 |
| | Sob Win | Mae Sapork | .06849* | 0.03 | 0.036 |
| Mostly Thai tourists | Sob Win | Huay Nam Rin | .23288* | 0.07 | 0.001 |
| | Sob Win | Mae Sapork | .17038* | 0.06 | 0.005 |
| Homestay | Sob Win | Huay Nam Rin | .08219* | 0.05 | 0.071 |
| | Mae Sapork | Huay Nam Rin | .24226* | 0.08 | 0.005 |
| Souvenir or food shop | Sob Win | Huay Nam Rin | .17691* | 0.08 | 0.026 |
| | Sob Win | Huay Nam Rin | .08219* | 0.04 | 0.037 |
| Wooden toy/handicraft | Sob Win | Mae Sapork | .08219* | 0.04 | 0.021 |
| | Mae Sapork | Huay Nam Rin | .06250* | 0.04 | 0.076 |
| 3-4 days per week | Mae Sapork | Sob Win | .04880* | 0.03 | 0.098 |
| | Mae Sapork | Huay Nam Rin | .16667* | 0.08 | 0.046 |
| 7 days per week | Sob Win | Huay Nam Rin | .27397* | 0.08 | 0.000 |

Source: Survey analysis by Authors

Table 7. Descriptive statistics: consumption patterns in the Mae Wang Watershed

| Variable | Minimum | Maximum | Mean | Std. Deviation | Coeff variation |
|--|-----------|-----------|------------|----------------|-----------------|
| Services consumption value | 200 | 867500 | 26685.98 | 102498.522 | 384% |
| Total wage bill per month | .00 | 54000.00 | 3076.9231 | 9641.33471 | 313% |
| Value of nondurable consumption per month | 840.00 | 900241.00 | 35087.0897 | 108333.27303 | 309% |
| Total value of daily household consumption per month | 840.00 | 935817.00 | 39007.0385 | 112306.65998 | 288% |
| Durable asset purchase last year | 0 | 67500 | 5138.76 | 10926.341 | 213% |
| Lottery consumption value | 20 | 12000 | 1147.05 | 2227.392 | 194% |
| Non-food products consumption value | 270.00 | 102336.00 | 6061.8896 | 10687.98204 | 176% |
| Milk and dairy products consumption value | 12 | 3000 | 428.48 | 670.037 | 156% |
| Vegetables and fruit consumption value | 20 | 3250 | 258.31 | 403.684 | 156% |
| Drinks consumption value | 12 | 4000 | 567.58 | 878.343 | 155% |
| Fat consumption value | 2.00 | 1200.00 | 70.6783 | 108.75963 | 154% |
| Minimal cost per month for basic household necessities | .00 | 60000.00 | 6304.2581 | 8306.15606 | 132% |
| Value of equipment last month | 120.00 | 70000.00 | 15071.7143 | 18109.31325 | 120% |
| Spice and sauces consumption value | 15.00 | 2200.00 | 452.7727 | 449.41511 | 99% |
| Smoking consumption value | 12.00 | 700.00 | 175.6098 | 169.04523 | 96% |
| Food consumption value | 53.00 | 9210.00 | 2089.0064 | 1454.54994 | 70% |
| Percentage ecotourism income spent on household expenses | 10.00 | 100.00 | 64.6875 | 24.88482 | 38% |
| Gap between household income and best scenario income | -4.30E+04 | 50000.00 | -1209.6774 | 21835.87865 | -1805% |

Source: calculations from primary survey data.

Table 8. Significant differences in consumption patterns by village

| Dependent Variable | Highest village | Lesser village | Mean difference | Std err | Sig. |
|---------------------------|-----------------|----------------|-----------------|---------|-------|
| Food consumption value | Huay Nam Rin | Mae Sapork | 600.19643* | 291.81 | 0.041 |
| | Sob Win | Huay Nam Rin | 863.57926* | 269.92 | 0.002 |
| Fat consumption value | Sob Win | Mae Sapork | 1463.77568* | 243.97 | 0.000 |
| | Sob Win | Mae Sapork | 38.70716* | 20.61 | 0.062 |
| Smoking consumption value | Huay Nam Rin | Mae Sapork | 149.08966* | 41.02 | 0.000 |
| | Huay Nam Rin | Sob Win | 115.99400* | 43.98 | 0.010 |
| Spice and sauces | Mae Sapork | Huay Nam | 170.21071* | 93.22 | 0.070 |

| | | | | | |
|--|---------|------------|-------------|---------|-------|
| consumption value | | Rin | | | |
| | Sob Win | Huay Nam | 411.69135* | 86.62 | 0.000 |
| | | Rin | | | |
| | Sob Win | Mae Sapork | 241.48063* | 78.37 | 0.002 |
| Vegetables and fruit consumption value | | Huay Nam | | | |
| | Sob Win | Rin | 190.224* | 99.67 | 0.059 |
| Minimal cost per month for basic household necessities | | Huay Nam | | | |
| | Sob Win | Rin | 4046.42857* | 1653.25 | 0.016 |
| | Sob Win | Mae Sapork | 5027.91667* | 1495.03 | 0.001 |
| Durable asset purchase last year | | Huay Nam | | | |
| | Sob Win | Rin | 6789.180* | 2596.30 | 0.010 |

Source: calculations from primary survey data.

Table 9. Relative and absolute poverty measures by village (2010)

| Poverty measure | Relative | | Absolute (FGT) | | Village type |
|-----------------|-------------|------------------|----------------|------------------|--------------------------|
| | <i>Gini</i> | <i>Incidence</i> | <i>Depth</i> | <i>Intensity</i> | |
| Huay Nam | | | | | Unequal and poor |
| Rin | 0.350 | 86% | 0.276 | 0.53 | |
| Sobwin | 0.244 | 37% | 0.307 | 15.24 | Equal and non-poor |
| Mae Sabok | | | | | Very equal but very poor |
| Tai | 0.147 | 81% | 0.512 | 9.7 | |

Source: calculations from primary survey data.

Labourers who work in the eco-tourism business earn average wages of 145 baht per day, compared to hired workers in the city at 150-180 per day. They earn less in part because most people in the community work by themselves or pay wages to relatives or neighbors who know each other. The flexibility of employed labor makes for easy management. For example, on during the Songkran festival the children not attending school help in the shops or in controlling the bamboo rafting.

The main occupation of households still lies in the agricultural sector, where farmers grow such crops as rice, bananas, and *longan*; and raise livestock. However, over the past ten years tourist-oriented activities have become the next most important occupation for communities. Our statistics show that business owners open their shops for tourists an average of 9 hours per day approximately six days per week, or 23 days per month during the period October to June. They break between July and September because the water levels in rivers pose dangers to do activities such as rafting, shopping, because it is the rainy season, affecting the amount of water in the river and security. Trekking in Mae Wang eco-tourism is different because this activity can be offered to visitors all year round. The majority of those visitors are non-Thai.

Table 10 Regression of socio-demographic variables on income per capita

| Dependent variable = income per capita | Unstandardized Coefficients | | Standardized Coefficients Beta | t | Sig. |
|---|--------------------------------|------------|--------------------------------------|-------|------|
| | B | Std. Error | | | |
| (Constant) | 2964 | 1077 | | 2.75 | .007 |
| Primary | 1775 | 495 | .276 | 3.59 | .000 |
| Junior high | 1847 | 764 | .183 | 2.42 | .017 |
| Senior high | 6524 | 2902 | .170 | 2.25 | .026 |
| Age_hhh | 31 | 17 | .141 | 1.82 | .071 |
| Single | -1364 | 643 | -.169 | -2.12 | .035 |
| Hh_members | -665 | 139 | -.356 | -4.78 | .000 |
| Adj. R-squared | 0.178 | | | | |
| F | 6.61 | | | | .000 |
| d.f. | 149 | | | | |

Source: calculations from primary survey data.

Table 11 Regression of economic variables on income per capita

| Dependent variable = income per capita | Unstandardized Coefficients | | Standardized Coefficients Beta | t | Sig. |
|---|-----------------------------|---------------|--------------------------------------|-------|------|
| | B | Std. Error | | | |
| (Constant) | 2992 | 489 | | 6.11 | .000 |
| Number of employees or co-workers | 544 | 109 | .384 | 4.98 | .000 |
| More than 20 years experience | 3162 | 1030 | .228 | 3.07 | .003 |
| Home is main business place | 1221 | 644 | .130 | 1.89 | .060 |
| Merchant | -1889 | 648 | -.202 | -2.91 | .004 |
| Hired labourer | -998 | 434 | -.163 | -2.30 | .023 |
| Farmer | -856 | 434 | -.140 | -1.97 | .050 |
| Adj. R-squared | 0.433 | | | | |
| F | 20.698 | | | | .000 |
| d.f. | 149 | | | | |

Source: calculations from primary survey data.

Table 12 Regression of tourism and eco-tourism variables on income per capita

| Dependent variable = income per capita | Unstandardized Coefficients | | Standardized Coefficients Beta | t | Sig. |
|---|--------------------------------|------------|--------------------------------------|-------|------|
| | B | Std. Error | | | |
| (Constant) | 1470 | 248 | | 5.93 | .000 |
| Company owner | 3453 | 821 | .439 | 4.21 | .000 |
| Elephant camp is most important eco-tourism activity in community | 1910 | 607 | .209 | 3.15 | .002 |
| Unemployed | 3917 | 1297 | .202 | 3.02 | .003 |
| Ecotourism agent | 1947 | 1040 | .268 | 1.87 | .063 |
| Souvenir or food shop | -1886 | 868 | -.240 | -2.17 | .031 |
| Bamboo rafting | -2023 | 1198 | -.116 | -1.69 | .093 |
| Adj. R-squared | 0.328 | | | | |
| F | 13.06 | | | | .000 |
| d.f. | 149 | | | | |

Source: calculations from primary survey data.

Table 13 Regression of combined variables on income per capita

| Dependent variable = income per capita | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|--|-----------------------------|------------|---------------------------|-------|------|
| | B | Std. Error | Beta | | |
| (Constant) | 3050 | 796 | | 3.83 | .000 |
| Primary | 743 | 365 | .116 | 2.03 | .044 |
| Senior high | 5698 | 2296 | .149 | 2.48 | .014 |
| Age_hhh | 23 | 13 | .105 | 1.82 | .071 |
| Female head | 474 | 409 | .069 | 1.16 | .248 |
| Home is main business place | 1631 | 578 | .174 | 2.82 | .005 |
| More than 20 years experience | 3621 | 938 | .261 | 3.86 | .000 |
| Number of employees or co-workers | 571 | 98 | .403 | 5.81 | .000 |
| Hh_members | -646 | 105 | -.346 | -6.13 | .000 |
| Single | -828 | 498 | -.102 | -1.66 | .099 |
| Merchant | -1741 | 554 | -.186 | -3.15 | .002 |
| Adj. R-squared | 0.548 | | | | |
| F | 19.82 | | | | .000 |
| d.f. | 145 | | | | |

Source: calculations from primary survey data.

6. Discussion

At the outset, we posed five policy-oriented research question for income-enhancement and/or ecotourism development in the Mae Wang watershed.

Question one was “What are the current patterns of socio-demography, income and employment, eco-tourism development, and durable and non-durable consumption in the Mae Wang watershed as a whole?” Our analysis showed thatAfter Thailand have been a decrease in forest cover in the past 50 year. There has also been increasing in agriculture and population density. The driving force of globalization and economics conditions effect the Thai people to move up to this watershed and effected ethic group that living here for a long time. The movement of Thai people changes in agriculture systems and transfer to the eco-tourism over the past 10 year that associated with a variety of activities, for example, bamboo rafting, elephant riding, homestay, OTOP product that bring government or sub-district organization use the development programs for expand eco-tourism.

The second question was “Do these socio-demographic, economic, eco-tourism, and/or consumption patterns differ significantly among the three study communities?” We found that As a result, globalization is playing an increasingly important role in Mae Wang lives. But in the meantime whether it is a livelihoods style or a traditional culture has sparked a heated debate. Ethic people argue that globalization has not a fundamentally beneficial influence on their lives, while Houy Nam Rin and Mae Sapok Tai consumption’s are lesser than Sob Win. So that it has a difference in some category for example smoking value and fat consumption in Huey Nam Rin consume more than Mae Sa Pok Tai as well.

A socio-demographic patterns differ significantly convincing argument can be made about the head of household than slightly difference in the ethnic group and religion by the way 2/3 female in three village. The economics patterns of three villages are differ in term of standard of living and valuable of their live for the example in Thai village (Sob Win) they are a lot of homestay hosts and eco-tourism activities that link in the employment with Karen village (Mae Sa Pok Tai). So the eco-tourism patterns are developed and invests more in the center Sob Win. The consumption pattern is depend on the value on food consumption and economy, but also promoting the cultural between different ethnic people. To start with, it is the globalization that impelled many believe and corporate to become the materialism, thereby Thai people want to be the city lifestyle and go to the supermarket every weekend. Specifically, when a Karen or Hmong establish a labour in eco-tourism worker, the new equipment, the new motorcycle were consumed and the money management are all in the worst of the local society. Moreover, people in Huey Nam Rin and Mae Sa Pok Tai can get some problem on financial and become debt. It is easy to see that more and more Karen and Hmong workers show cultures different from Sob Win.

The third question was “What are the levels of relative and absolute poverty in the three villages that could be targeted by income-enhancement or eco-tourism policies?” We have determined thatThe poverty line of 3 communities is under the average poverty line in Thailand but in term of local consumption it is the normal livelihoods that the people in this are spending. As the result of relative income (Gini coefficient) and absolute income (FGT) we can said that by Gini Mae Sa Pok Tai is Very equal but very poor so the reason is they are the best income distribution in 3 villages and the second is Sob Win and the last is Huey Nam Rin that they are unequal and poor and the income does not distribute to many people in the village because of the small of household and eco-tourism is not successful in this village on the other hand in Mae Sa Pok Tai they are equal income because of the village cannot get benefit that they could get from the eco-tourism similar as Sob Win Village. We can see eco-tourism is not a tools in evaluation of share equality divided ecotourism business into Northern Thai hand representing most of shops run with Sob Win people and other from city. The classification result is the basis of ecotourism regionalization.

Question fourth was “What -demographic, economic, eco-tourism factors most significantly related to increase or undermine income per capita” Our results show that In summary, the factor to drive the local economy is that the location of ecotourism are that we found that Sob Win is the best advantages for eco-tourism. Because of the location on the center between Mae Sapok Tai and Houy Nam Rin that cannot do business activities. The financial support in other village Mae Sa Pok Tai and Houy Nam Rin does not healthy from the result showed that people who are the eco-tourism business owner in Sob Win invest in their business compared with the orther villages and the developed the area for serve the tourist and make the support from the government. But Huay Nam Rin is lower consuming village than Sob Win. This village concentrate in agriculture sector such as rice, flowers, been which bring the result form the survey are consumed on non-durable goods. For example agriculture equipment,

power generators, water pumps for invest in crop production. The merchant behavior of Hmong people have contributed to the creation of their own money back as well as the Chinese culture. The people of Mae Sa Pok is Karen, who have their own culture for 400 years ago. While households consumption are not very high compared with the other villages that they have low income and a financial management problem so as a result of living in such a way as to not rely too much on the money.

The final question was “What policies could be put into place to operate on those factors to increase income in conjunction with eco-tourism development?” We deduce from the preceding results that Finally, the study of this issue is the way in developing eco-tourism. The policies for eco-tourism needs to improve and support by the Thai government such as the eco-tourism week in the winter or promote the route for foreigner. By the way, the sustainable eco-tourism need to engage and knowledge the people in 3 communities, there are two issues for the distribution of income from eco-tourism could fair enough for all stakeholders. On the other hand, we would be created a new tourist attraction on the other natural resources such as Mae Tang Watershed for impressing and creating the return of travelers. The government could build the relationships and agreements with the company or private sector to achieve common understanding of tourists and tour operators to focus on the conservation of nature in the country and the region, too. In the same time, company’s agent could be truly cares about the environment and responsibility to their own business that may be issued a certificate from the community. It could be found the quality of visitor. This is an advantage in tourism development, sustainability and stability further.

It is difficult to quantify the relationship between ecotourism and local communities. Integrative environment using a series of indices such as land use, watershed management and satellite photography was analyzed in relation to the case of the Mae Wang Watershed area. The changing trend of land use was identical to the interrelationship among these indices and related factors. The results of that analysis fit the facts, pointing to both ecotourism impacts and the ecological quality of the Mae Wang river. Therefore, FGT analysis of absolute poverty is useful and practical in the assessment of ecotourism’s impacts on consumption and income. Elephant camps and bamboo rafting generate various values for ecotourism, and offer tourists differing tastes for enjoying ecotourism activities.

Among positive attributes of ecotourism, wooden games and ship models augment the ecotourism value of the Sob Win area, while the Karen in Mae Sapok Tai promote the ecological characteristics of the forest and the natural environment.

Biodiversity, including species richness, evenness, and diversity, is an important characteristic of forest that make national parks attractive to tourists. Moreover, biodiversity levels are sensitive to disturbance and thus serve as a good indicator of ecotourism impacts. Elephant riding under the forest canopy is more sensitive to treading.

Negative aspects of eco-tourism include the amount of rubbish, the degree of damaged branches, treading intensity, the creation of stumps and the speed of tree

regeneration. Taken together, these direct consequences of ecotourism activity effectively capture the impacts of tourists on the forest. Perhaps some additional activities such as bamboo rafting, hiking, bicycling, and so on need to be quantified in any full accounting of damage in environment.

The results of FGT and Gini analyses have further proved that ecotourism is not a successful strategy for the more equal distribution of income in Northern Thailand. Ecotourism shops are mostly run by Sob Win people in collaboration with entrepreneurs from the city.

7. Concluding remarks

In summary, of the three villages selected for study, Sob Win enjoys the best advantages for eco-tourism. This is largely because of its central location between Mae Sapok Tai and Houy Nam Rin, which cannot directly conduct business activities. The results show that people in Sob Win consume in all categories detailed in the basic needs secondary data collected by official sources. In comparison, Huay Nam Rin has lower consumption patterns than Sob Win. This is because it concentrates on spending income from such agricultural sector commodities as rice and flowers on agricultural equipment, power generators, and water pumps for use in crop production. The merchant behavior of the Hmong people, as well as the Chinese culture, has contributed to the creation of net positive returns on these investments.

The lowest consumption levels are observed among the Karen people of Mae Sa Pok, who have maintained their own culture for the past 400 years. Household consumption spending is lowest because the villagers have both low income and significant financial management problems. As a result, living patterns have evolved that do not rely too much on money.

The ultimate question posed by this study has been how best develop eco-tourism in these diverse contexts. For the sustainable development of community-based eco-tourism, two specific recommendations require that the distribution of income from eco-tourism be fair for all stakeholders. On the other hand, we recommend the creation of a new tourist attraction on the other natural resources such as Mae Tang Watershed for impressing and creating economic return from travelers. The government could also build the relationships and agreements with the company or private sector to achieve common understanding of tourists and tour operators to focus on the conservation of nature in the country and the region. On the other hand, the company's agent should be someone who truly cares both about the environment and responsibility to their own business so that they may be issued a certificate from the community. Screening for high-quality visitors could also be an advantage in tourism development, sustainability and further stability.

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