



Diversity of Ecosystem and Local Wisdoms Related to Local Lifestyle at Khameun Watershed in Phu Hin Rongkla National Park, Phitsanulok Province

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Abstract- The objectives of this research were 1) to study the diversity of ecosystem in the area of Khameun watershed of Phu Hin Rongkla National Park in Phitsanulok Province, 2) to study the diversity of local wisdom diversity related to local lifestyle in the area of Khameun watershed. It is a mixed method: quantitative and qualitative research. The data collection of the former employed questionnaires with 383 participants from the samples by using Krejci & Morgan table with the error of .05 and analyzed by using mean, standard deviation. Then the data collection of the latter employed focus group discussion from 3 groups of 45 informants by purposive sampling and analyzed by using content analysis.

The findings were as follows: (1) The ecosystem in the area of Khameun watershed at Phu Hin Rongkla National Park, Phitsanulok was found that the ecosystem in the dense forest, the plants found most are Zingiberaceae, Melastomataceae, Aceraceae, Fagaceae, as well bryophyte and ferns. Most of the soil called roam also found here so the water can be drained well; the soil temperature is moderate; the pH level is rather low; it has the electrical conductivity. Salt value and organic matters in the soil are high with high Nitrogen and Potassium and low Phosphorus and, overall, the richness of the soil is moderate. And (2) the study of the diversity of local wisdoms related with local lifestyle in the area of Khameun watershed in Phitsanulok Province was found that the outstanding local wisdoms are the weaving of fishing net, the Hmong Designed embroidery, Hmong flute/bamboo mouth piece organ, Hmong backpack weaving, Hmong Pizza and the broom making from flower stalk.

Keywords: Ecosystem, Lifestyle, Local Wisdom, Khameun Watershed

I. INTRODUCTION

The watershed forests are very valuable natural forests with circulated energy as natural ecosystem very fruitful for human beings not only being the 4 necessities for human existence (food, shelter, medicine and clothes). In addition, they become the agricultural factor resources for Thais: the resource for watershed which is the main factor for both consumption and utilization for Thailand (Junkaew, 1996). The communities living in the areas of watersheds can access the mountainous areas in terms of settlement and doing slashed and burned agriculture which destroys the watersheds and causes the people who live on the plain with shortage of water during dry season. The slashed and burned farming of various hilltribes, they cut trees and burned forests expanding the areas from foot hills up to the steeping mountains which are watersheds and from the survey of forest areas and communities in those areas still lack the explicit statistical data to which unit they belong and how many still exist; however, the areas where wildlife, forests, and various plants have been destroyed without any preventive strategy from natural disasters (Department of Water Resource, 2007).

As years gone by, Thailand has faced the problems on the loss of watershed due to the continuous deforestation resulted to the United Nations Development Program (UNDP) entry to Phitsanulok hopefully to solve the problems of wetland, watershed forests, and agriculture that reduces the environment impact the least to the project under the continuous change in the areas of Phitsanulok both economic and social sectors. The forests become the barren ones which have never occurred before in the past and the areas have been expanded for the agriculture including the Khameun watershed which is very important to the local ways of life. The inhabitants can access the areas in terms of food, shelter, medicine and clothing which are necessities for them for such a long time. Furthermore, they can depend on the water from watershed forests for agricultural purposes obtaining the product from the forests in terms of supplementary incomes besides doing agriculture. In addition, the forests have become the belief sources, tradition which is community-based relations. The role of the forests for the survival of the communities has been essential and dispensable for such a long time. The locality of ethnic group or local folks diverse regarding to having culture and practicality to manage and conserve the forests such as the

belief in ghosts who protect the forests, to conserve the watershed, valuable natural utilization plan and to have clever scheming to conserve the richness of the forests via varieties of rites e.g., the ordination of trees. Although the local communities and local people group of Phitsanulok Province look after the forest resources including the government sector having the policy, laws and measures limiting the deforestation and conserving the rich forest areas in ecosystem and the watershed beside the deforestation, factors for operation, policy, measures that do not help and there is conflict in the policy and practice. Moreover, the forest conservation policy does not help and become outdated and the problem solving at the end of the cause. This leads to the conflict between the authority and people in the communities, which may impact the community ways of life and as well as the forest resource.

Therefore, the current condition must be the mobility of development plan policy on the areas of watershed systemically and sustainably as the Ministry of Natural Resource and Environment has set the goal. The government alone cannot impel and enable to keep the forest resource thoroughly, so they must cooperate with the people and various organizations and construct the mutual ways in solving the problems and developing the forests by focusing more community centered, that is, the people are involved in every procedure starting from thinking, collecting data, planning, monitoring and evaluating, conserving and being responsible for the would be outcomes as well as giving the importance to every sector in the society (Phienstaporn, 2010). From the field study with the leader of the Noen Phoem Sub-district, Nakhon Thai District since the year of 2015, the researchers have learned that Khameun River is very important for the community ways of life. The watershed areas are located in Phu Hin Rongkla National Park, the people in the plain do not know what Khameun watershed looks like but they would like to know the quality of the water at the watershed areas. Due to the fact that the people in the plain always depend on the mountainous water supply, in addition, there are interesting diversified local wisdoms such as broom making from the flowers of the weeds, basket making, bags made from rattans, Hmong bamboo sticky rice, rice planning on the hills etc., as well as the rite tradition, beliefs inherited for such a long time. Such wisdoms have been inherited and mainly is utilizing of the resources from Khameun watershed forests; such valuable wisdoms having been existed become declining from the migration to other areas and the loss of elderly scholars in the communities. Currently, there is no collection of local wisdoms for the learning resource for the next generation to study, search. Besides the data are scattered and more importantly there is a lack of community's masterplan on ecosystem conservation, local wisdoms, and utilization of the natural resource in the area of Khameun watershed. This research focuses on the benefit for the communities in the forest areas in Phu Hin Rongkla National Park and sets up the learning center for the diversity of ecosystem and local wisdoms correlated with the local ways of life in the area of Khameun watershed being the role model for others in the future.

Objectives of the study

1. To explore the diversity of Ecosystem at Khameun Watershed in Phu Hin Rongkla National Park, Phitsanulok Province.
2. To analyze the diversity of Local Wisdoms Related with Local Lifestyle at Khameun Watershed in Phu Hin Rongkla National Park, Phitsanulok Province.

II. METHODOLOGY OF THE STUDY

The study of Diversity of Ecosystem and Local Wisdoms Related with Local Lifestyle at Khameun Watershed in Phu Hin Rongkla National Park, Phitsanulok Province, to obtain the data that accord with the objectives, the research team has designated the methodology as follows:

The Study of Diversity of Ecosystem: this study has been designated the scope of the areas at Khameun watershed in Phu Hin Rongkla National Park, Noen Phoem Sub-district, Nakhon Thai District, Phitsanulok Province of 1 square kilometers by asking the permission from the National Park, Department of National Park of Wild Animals and Plants. The research team has gone for the field study gathering the data and study the eco system by plotting designation of the areas in 20 plots; each plot of land measured 100 x 100 square meters from October 2018 to Many 2019 gathering plant characteristics, humidity, and soil in those 20 plots to analyze the chemical properties, namely humidity, draining, temperature, pH, electrical conductivity, salt, organic in the soil, Nitrogen, Potassium, and Phosphorus according to the Scientific Laboratory standard, Faculty of Science and Technology of Pibulsongkram Rajabhat University. Then, take all the data to analyze for mean and standard deviation by using statistical program SPSS Version 23 (Bodeerat et al., 2019).

Population and samples: Quantitative study: The population of this study is 8,991 people from Noen Phoem Sub-district, Local Administration, Nakhon Thai District, Phitsanulok Province and the samples

were 383 people by using Krejci & Morgan's table (Akakul, 2000) with the error of .05, besides the samples also were used the stratified sampling and simple random sampling. The qualitative study: It is conducted by using participatory focus group through purposive sampling (Vanichbuncha, 1999). The informants were divided into three groups as follows: qualitative research is conducted with participatory focus group by purposive sampling (Vanichbuncha, 1999). The informants were divided into 3 groups as follows: (1) The main informants or the scholars who live in the community of Ban Nam Khameun are 15 People: authoritative officers at Phu Hin Rongkla National Park, headmen, assistant headmen, local scholars, village committee and chairs of various organizations. (2) Villagers in the community who are involved in the watershed management gave information and observed the way of life on staying together and utilizing from the watershed forests totally 15 people. and (3) Outsiders who are involved in the community managing the watershed forests are 10 people from community developers of local administration, forest authoritative officers who give information to the outsiders on the process of watershed management.

Research tools: For quantitative research, the data were collected by using questionnaire constructed by studying from theories, principles, books, documentation from related literature on diversity of local wisdoms, conservation, and the management of Khameun watershed in the areas of Phu Hin Rongkla National Park, Nakhon Thai District, Phitsanulok Province. The questionnaire was divided into 3 parts as follows:

Part 1. An analysis of general information of the informants.

Part 2. An analysis of diversified ecosystem in the area of mountainous water supply in Khameun watershed, Phu Hin Rongkla National Park, Phitsanulok Province.

Part 3. An analysis of diversified local wisdoms related to the way of life of local people in Khameun watershed, Phu Hin Rongkla National Park, Phitsanulok Province.

For qualitative research, the research was conducted by using focus group discussion from the 3 group informants on basic information of local wisdoms of the community and opinion information on permanent exhibition of local wisdoms, conservation, and the management of Khameun watershed in the areas of Phu Hin Rongkla National Park, Nakhon Thai District, Phitsanulok Province in 3 facets via observation notes: checklists (to choose or not to choose) and then the research team went on content analysis.

Testing quality of instruments, the research team has tested the quality of the questionnaire in two facets as:

1. The validity of the questionnaire is tested to see if it is accurate (questionnaire and focus group questionnaire) according to the objectives of the research either it covers the content by discussing with the experts for any suggestions on each questionnaire for the readjustment.

2. The reliability of the questionnaire is tested by using Alpha Coefficient of Cronbach (Cronbach 1990: 204) and tried out with 30 people who are non-samples. And then the team takes the questionnaire to test reliability with the computer.

Procedures of data collection: The plan of data collection is operated as follows: 1. Conduct the meeting with the research team, 2. Review the knowledge on the research, 3. Construct the research tools and test them, 4. Co-ordinate with the related units, 5. Collect the quantitative data (questionnaire) and qualitative data (focus group discussion), 6. Analyze the data, revise the data, evaluate and conclude the research project, and 7. Make a complete research report.

Analysis of Data : An analysis of data and data processing of questionnaire is analyzed by using descriptive statistics: frequency, percentage, mean, standard deviation to describe the population characteristics and diversity of local wisdoms, conservation and management of Khameun watershed in the areas of Phu Hin Rongkla National Park, Nakhon Thai District, Phitsanulok Province by employing computer program together with additional analysis from the focus group questionnaire by content analysis in order to meet with the objectives of the research.

III. RESEARCH RESULTS

1. General information of the informants: General information of inhabitants in the areas through which Khameun river flows Nern Pherm Sub-district include 383 people as follows: 173 males (45.2%), 210 males (54.8%); mainly their ages are 41-60 years old of 173 people (45.2%), followed by more than 60 years old of 139 people (36.3%) and 20-40 years old of 67 people (17.5%), and the rest are less than

20 years. They are mainly married of 325 people (84.9%), widowed/divorced of 30 people (7.8%), and the rest are still single. They are mostly graduated from primary education of 257 people (67.1%), followed by upper secondary education/vocational level of 43 people (11.2%), and lower secondary education of 42 people (11%) respectively. They are mostly agriculturalists of 264 people (68.9%), followed by general employed of 49 people (12.8%) and other vocations of 39 people (10.2%) respectively. Their monthly incomes mainly are under 5000 baht of 266 people (69.5%), followed by 5001-10,000 baht of 92 people (24%), 10,001-20,000 baht of 19 people (5%) respectively. They mainly have their homeland in Phitsanulok Province of 339 people (88.5%), followed by the homeland in Phetchabun Province of 7 People (1.8%) and the rest they have homeland in Uttaradit Province. All of them have been living in this area more than 10 years.

2. The diversity of ecosystem in the area of Khameun Watershed in Phu Hin Rongkla National Park, Phitsanulok Province found that

2.1. Khameun River is located in Nakhon Thai District, Phitsanulok Province with the total length of 37.32 kms., originated from the watershed dense forests of Phu Hin Rongkla National Park, flowing through Noen Phoem District. Upon the village of Ban Rongkla Moo 10 lives the Hmong tribe people. They have settled in this area over 100 years since 1902. Their ancestors migrated from Laos to Thailand via the mountain range in Pua District and Thungchang District, Nan Province and moved to live in this area till present (picture 1A). Since then, the Hmong people have extended the families, and the Communism had been collapsed so they joined the Thai Development Group in 1980. Then in 1982, they moved to the plain where Khameun River is flowing; there the village of Ban Huay Sai Nua Moo 15 originated along with the village of Ban Huay Sai Tai Moo 16 in 1983. There is the mountainous water supply through the water treatment provided by the government called village fund in 2017 till a present day.



Figure 1 Khameun River area: A) Map of Khameun River that flows through Noen Phoem Sub-district, B) Khameun River at the watershed forests, C) The watershed areas are dense forests, D) *Globba sp* are mostly found in ginger specie, and E) *Silawaree* found at Khameun River

The characteristics of the field study has the geographical coordinate from 71°67'84"N to 18°76'98.4"E and found that there is lot of rain at the areas of Khameun watershed, humidity, dense forests; the plants found in the ecosystem of dense forests are Zingiberaceae, Melastomataceae, Arecaceae and Fagaceae as well as Bryophyte and ferns in the high humid near the water resource (figure 1B-C)

Plants mostly found in the areas of Khameun Watershed forests are *Globba sp.* classified in Zingiberaceae specie which is biennial plant with single leaf alternating, spear-like leaf, parallel line like feather. The base of the leaf spreads as base having stipule. The outstanding characteristic of specie is the biennial

plant with rhizome and other parts having scent smell. The leaves are double parallel, the flowers linking as tubes or links from the base. The flower has one stamen and other 2 infertile stamens like the pedals linking each other like lips shown in figure 1D.

2.2. Study the climatic temperature which is during 19 to 27.67 degree Celsius with humidity from 57.67% to 79.67% and the intensity of the light from 10.67 to 815 lux (Table 1).

Table 1 Geographical coordinates of randomly sampled plot and physical factors from October 2018 to January 2019

Plot	Geographical coordinates		Physical factors		
	Latitude	Longitude	Climatic temperature (C°)	Climatic humidity (%)	Light intensity (Lux)
1	71°75'30"N	18°76'98.4"E	22.70	68.00	182.00
2	71°75'49"N	18°76'24.3"E	22.36	70.67	206.67
3	71°75'68"N	18°75'96.1"E	22.67	72.67	10.67
4	71°74'05"N	18°76'96.0"E	22.17	71.67	470.67
5	71°73'56"N	18°76'77.3"E	22.27	66.67	250.00
6	71°74'65"N	18°75'84.9"E	24.00	70.67	28.67
7	71°73'56"N	18°76'69.9"E	21.30	74.00	213.00
8	71°71'91"N	18°76'77.3"E	19.33	74.67	73.67
9	71°72'78"N	18°76'39.7"E	24.33	75.00	412.67
10	71°73'20"N	18°76'25.9"E	25.33	65.33	815.00
11	71°73'53"N	18°76'00.5"E	24.33	66.00	49.00
12	71°72'59"N	18°76'56.0"E	26.00	63.00	166.00
13	71°73'14"N	18°76'30.5"E	25.67	64.67	541.00
14	71°73'31"N	18°76'12.7"E	27.67	57.67	97.00
15	71°70'79"N	18°76'82.0"E	23.00	79.67	178.00
16	71°71'41"N	18°76'58.8"E	23.33	73.33	32.67
17	71°70'04"N	18°76'23.7"E	19.67	66.33	245.33
18	71°69'57"N	18°76'60.8"E	25.67	64.67	541.00
19	71°69'00"N	18°76'06.3"E	19.00	69.00	82.33
20	71°67'84"N	18°76'83.0"E	25.03	60.33	391.00

2.3. Most of the soil is roam with good drainage. The structure of the soil is mainly finely incoherent and some areas it is fine with sand sized 0.1-0.4 millimeter. The temperature of the soil is moderate (29-31 °C), the low pH (3.4-4.7); the electric conductivity (441.7-859.3 μS/cm); salt value (209.7-415.3 ml/L), and high organic matters (3.6-10.3%) having high Nitrogen (3.42%), low Phosphorus (0.35%) and high Potassium (95.8 mg/Kg). Overall, the richness of the soil is moderate. (Table 2)

Table 2 Chemical property of the soil in the areas of Khameun watershed forest at Phu Hin Rongkla National Park, Phitsanulok Province comprising the temperature in the soil (T), percentage of soil humidity (M); the chemical property of the soil comprising the acid and base (pH), electric conductivity (EC), salt value (S), organic matter (OM), Nitrogen (N), useful Phosphorus (P), and exchangeable Potassium (K).

Plot	Chemical property of the soil								
	T (°C)	M (%)	pH	EC (μS/cm)	S (ml/L)	OM (%)	N (%)	P (%)	K (mg/kg)
1	29.1±0.1g h	37.2±3.1i	3.9±0.1	441.7±42.4e	209.7±21.6f	7.90	0.36	0.03	68.67
2	29.3±0.2fg	45.6±4.9e fg	3.7±0.1	732.3±117.9a bc	359.7±32.5abc d	10.02	0.40	0.03	119.89
3	29.6±0.1d ef	48.1±0.6e f	4.0±0.1	655.0±97.5ab cd	306.3±45.2abc def	8.48	0.38	0.03	46.57
4	29.4±0.1fg h	42.9±2.0g	3.8±0.1	710.0±140.5a bc	338.7±68.2abc de	6.39	0.30	0.03	91.52
5	29.0±0.1h	45.9±0.4e fg	3.8±0.0	562.7±52.4cd e	270.3±28.4cdef	8.27	0.34	0.04	61.75

Plot	Chemical property of the soil								
	T (°C)	M (%)	pH	EC (µS/cm)	S (ml/L)	OM (%)	N (%)	P (%)	K (mg/kg)
6	30.2±0.2b	46.3±1.9e fg	4.1±0.0	741.7±175.7a bc	306.±45.2abcde f	8.05	0.3 6	0.03	83.61
7	29.4±0.1fg	49.2±0.6e f	3.6±0.1	636.0±37.8bc de	305.3±22.9abc def	10.1 8	0.4 4	0.05	105.96
8	29.0±0.2h	31.7±1.1j	4.0±0.1	785.0±110.2a b	370.7±51.7abc d	5.28	0.2 0	0.05	60.57
9	29.8±0.2c de	54.5±0.9d	3.5±0.1	664.3±81.7ab cd	299.3±68.0abc def	7.05	0.2 9	0.04	78.29
10	31.0±0.1a	83.6±1.4a	3.5±0.1	673.3±68.9ab cd	263.3±87.2def	10.2 5	0.4 4	0.04	110.44
11	30.0±0.1c	50.1±2.0e	3.6±0.1	615.0±68.9bc de	282.3±32.1bcd ef	8.50	0.3 0	0.03	50.53
12	30.8±0.2a	53.6±1.2d	4.1±0.1	859.3±120.0a	415.3±60.2a	7.77	0.3 4	0.03	94.07
13	30.5±0.4b	66.2±1.8b	3.6±0.1	732.7±143.7a bc	336.0±102.0ab cde	10.3 8	0.4 4	0.04	110.35
14	31.0±0.1a	59.9±1.0c	3.5±0.1	649.7±159.1b cd	267.0±50.4def	9.76	0.3 7	0.05	73.06
15	30.3±0.1b	55.1±1.5d	3.6±0.2	739.0±34.4ab c	341.7±73.0abc de	10.0 2	0.4 3	0.03	72.97
16	29.9±0.2c d	48.1±0.5e f	3.9±0.1	633.7±60.1bc de	289.3±39.1bcd ef	6.51	0.2 7	0.04	54.24
17	29.5±0.1ef	46.8±3.4e fg	3.4±0.1	680.0±4.3abc d	387.3±102.8ab c	8.56	0.3 7	0.02	91.20
18	29.0±0.1h	31.2±2.2j	4.2±0.0	484.0±114.7d e	228.7±53.3ef	3.57	0.1 8	0.04	134.57
19	29.0±0.2h	40.6±1.3h	3.8±0.0	798.3±103.6a b	389.7±56.5ab	7.96	0.3 2	0.03	269.40
20	29.1±0.2g h	44.0±0.9f gh	4.7±0.0	768.0±162.0a bc	354.3±59.7abc d	6.78	0.3 1	0.02	138.79

NB: The English alphabets different in each column show the mean indicating the statistic difference with reliability of 95% by Turkey test

3. Local wisdom diversity related to the way of life of the local people at the forest areas of Khameun watershed in Phu Hin Rongkla National Park, Phitsanulok Province was found that

The samples of qualitative and qualitative data comprised of personnel related to the villages utilizing from Khameun river are as follows: 1) Moo 1 Ban Huay Tin Tung, Moo 10 Ban Rongkla, Moo 15 Ban Huay Nam Sai, Moo 16 Ban Huay Sai Tai, M00 17 Nam Khameun and Moo 19 Kaeng Therd Prakiat. The findings were found that the outstanding local wisdoms are as follows: Fishnet weaving, Hmong design embroidery, Hmong flute/bamboo mouthpiece, Hmong backpack weaving, Hmong Pizza making, broom making from weed flowers.

The analytical results from local wisdom diversity related to the way of life of the local people at the forest areas of Khameun watershed in Phu Hin Rongkla National Park, Phitsanulok Province via community participation from 2 facets and the findings were found that

1) In terms of guideline on local wisdom diversity management via the community participation from the samples of questionnaire respondents from Table 3. The findings were found that, overall, it was at a high level ($\bar{x} = 3.83$, S.D. = 0.917). When considered by each item, it was found that the highest mean was the people participated in the meeting proposing the problem and needs of the community in conserving the natural resources in the forest areas of Khameun watershed ($\bar{x} = 3.86$, S.D. = 1.063), the people participated in proposing how to solve the problem on how to rehab for the conservation of the natural resources in the forest areas of Khameun watershed ($\bar{x} = 3.83$, S.D. = 1.104), and the least mean was the people participated in monitoring of the officers in the forest areas of Khameun watershed in conserving the natural resources ($\bar{x} = 3.80$, S.D. = 0.982).

Table 3 Guideline for the management of local wisdom diversity via the community participation

Items	\bar{x}	S.D.	Interpretation
1. The people participate in the meeting proposing the problems and needs of the people on the conservation of natural resources in the areas of Khameun watershed.	3.86	1.063	high
2. The people participate in proposing the guideline in solving the problems on adjusting the conservation of natural resources in the areas of Khameun watershed.	3.83	1.114	high
3. The people participate in monitoring the officers' operation in the areas for the conservation of natural resources.	3.80	0.982	high
Average	3.83	1.053	high

2) In terms of conservation and management of local wisdom diversity via community participation from the questionnaire respondents from Table 4, the findings were found that, overall, it was at a high level (\bar{x} = 3.90, S.D. = 0.924). When considered by each item, it was found that the item with the highest mean was the Sub-district municipality/National park did the campaign and managed the natural resources in the forest areas of Khameun watershed (\bar{x} = 3.95, S.D. = 0.901), the Sub-district municipality/National park rehabbed and developed the natural resources in the forest areas of Khameun watershed sustainably (\bar{x} = 3.93, S.D. = 0.914), and the item with the least mean was the Sub-district municipality/National park organized the activities encouraging everyone to know how conserve the natural resources in the forest areas of Khameun watershed (\bar{x} = 3.84, S.D. = 0.959)

Table 4 Guideline for conservation and management of local wisdom diversity via community participation

items	\bar{x}	S.D.	interpretation
1. Sub-district municipality/National park do the campaign and manage the natural resources in the areas of Khameun watershed.	3.95	0.901	high
2. Sub-district municipality/National park rehab and develop the sustainability of the natural resources in the areas of Khameun watershed.	3.93	0.914	high
3. Sub-district municipality/National park organize activities to encourage everyone to know how to conserve the natural resources in the areas of Khameun watershed.	3.84	0.959	high
Average	3.90	0.924	high

4. The Frequency Utilizations in Khameun Watershed Area

Frequency of Khameun Watershed Utilizations was found that they make us of the watershed areas all year round with the frequency percentage of entering the areas more from January to June. They enter the areas less in July due to the rainy season with lots of rain causing uneasy and unsafe journey. During November and December, they enter the areas less due to the drought and less humidity which causes less plants production (Figure 2). This may differ from community scholars who mentioned that they had utilized the areas more during the dry season from October to May every year.

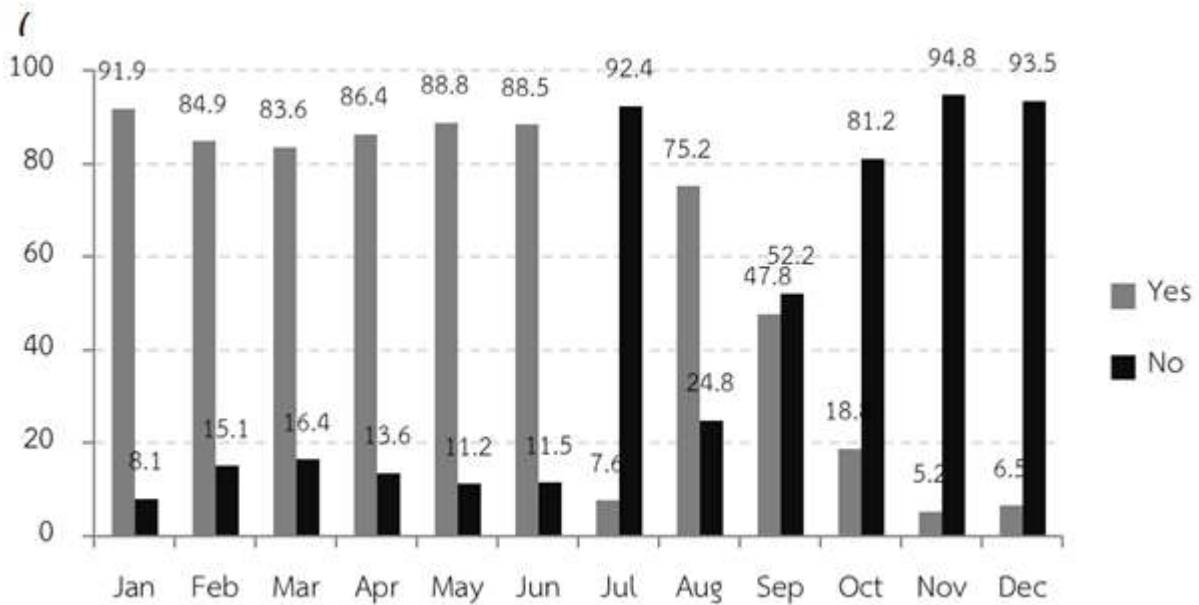


Figure 2 Frequency percentage of Khameun Watershed Area all year round, yes = number of people goes to watershed and no = number of people does not go to watershed.

The Hmong tribe has utilized from Khameun River and areas at Khameun Watershed for agriculture, consumption and utilization. At the watershed, the river is clear and yellowish due to the pile of leaves; the people collect the forest products such as herbal energy plants (Chua eae), two-color leaf plant (Chua lia), gaining weight plant (Ya-uan or Sua Jor), fragrance plant (Ya-hom) and blood nourishment (leave of Chasong and Yechuadua), ripen fruit of the Khao (likes ginger) is red and sweet which can cure for diarrhea. In terms of food, they can gather bamboo shoots, tops of Fishtail tree (Taorang tree) in small and big varieties, tops of sugar palm tree (Chid), tops of Nipa palm tree, big frogs (roasted, grilled, parched curry), edible insects such as Khem (water bug like to make chili paste), Mang Mun (Carebara same as Subterranean ant), bamboo caterpillar, banana root borer. Edible fruit wild such as Ma Rong Kla (very sour), Jee Nheng (sweet and sour), fruit of Zingiberaceae plant (sweet and bitter with strong smell as Galanga). Besides, orchid in several *Dendrobium* species and wild life such as squirrel, tree shrew, bird, boar be a rare item.

The Khameun River flows through the village of the people who live on the plain in which most of the residents are from Northeastern Thailand. The river becomes turbid and brownish in the areas of Ban Khameun Moo 17, Ban Huay Teen Tung Moo 1, Ban Kaeng Therdphrakiat Moo 19 flowing to Huay Hia Sub-district concurring with Khwae Noi River. Mostly the people on the plain use the Khameun River for agriculture purposes on mostly growing rice, cassava and corn, raising animals and also for a recreational area. Here rare plants such as stone flower (Silawaree) in Podostemaceae (Family of water plant) on the rock reefs can be found from November to January every year (Figure 1E).

IV. DISCUSSION

From the research conclusion, it can be discussed according to the objectives as follows:

1. General information of informants was found that All the informants have been living in this area more than 10 years. Everyone knows and gets used to utilizing Khameun River. Most of them live in their homeland in Phitsanulok (88.5%) and they are Hmong aged less than 40 years. Whereas the people living on the plain are under 80 years old. Since the Hmong people moved here in 1980 from Pua District and Thungchang District, Nan Province (Boderat et al., 2020), it was found that both males and females have provided information in depth similarly from the way of similar living; that is, the ones who are 41 years old up gave more information covering more than other groups. Even those who are younger, they can provide more information depending on vocations and experience in their daily ways of life: mainly agriculturalists (68.9%) who are related to Khameun River more than other vocations. Their main incomes are below 5000 baht. Gender is a mainstreaming for sustainable development. Women are a labor and caretaker of the family. They can be a key factor how much natural resources consumption and be invisible agricultural production (Carol et al., 2016; Asher and Shattuck, 2017).

2. The diversity of ecosystem of Khameun Watershed forests at Phu Hin Rongkla National Park in Phitsanulok Province: This is a mixed deciduous forest. During the hot-dry season had the highest temperatures (often over 40°C) between February-May. During rainy season was covered with dense fog, cold and high humidity between June-September. During winter temperature had 5-15°C with high humidity between October-January, lowest temperatures less than 5°C. Above and below ground diversity depend on physical and chemical characteristics of soil. Nitrogen, Phosphorus and Potassium level in soil was shown that this watershed is complete in term of nutrient circulation for living things (Bodeerat et al., 2019). pH was 6.6-7.9 and organic matter was 0.34-0.38% are optimal for life cycle of several living things (Ma et al., 2017). The ecosystem of Khameun Watershed is deciduous forest where similar to other areas in North-east forest of Thailand such as Chang Kian Valley, Chiang Mai province (Rundel and Boonpragob, 2005; Maxwell and Vaidhayakarn & Maxwell, 2010). Baimai was reported in 2010 that Thailand's tropical forests funding some 12,000 species of vascular plants, roughly 15,000 known species of animals and about 10,000 known species of microorganisms. More than 100,000 species of living organisms in Thai forests await discovery.

3. The diversity of local wisdom related to the ways of life of the local people at the Khameun Watershed forests in Phu Hin Rongkla National Park in Phitsanulok Province: The outstanding local wisdoms are as follows: small fishing net weaving, Hmong embroidery, flute/bamboo mouthpiece, Hmong backpack weaving, Hmong pizza and broom making from weed flowers, all which are so diversified. From the research findings, ones can see the dimension reflected from the relationships of the people in the community not only the reflection of the ways of life of the community people but also reflection of ideas, belief, the relationship among the families, people in the community, various tradition which will be the foundations for the existence of the people in the community. Most importantly the sharing among one another is the starting point on development which leads to the management on people in the community. This will lead to the love of conservation, inheritance, transferring to the next generation with such pride, which is consistent to the research of Promsing and Sangkharat (2014) who did the research entitled "Watershed Forest Management Potential on Banthat Mountain Range in Trang Province" and found that the villagers' ways of life in Nachumhet are connected to the nature; that is, they have depended on the nature since the past till today. They conserve the forests through knowledge, belief, wisdom, and various cultures of the communities. In addition, they manage the resources via the participation of the communities. Furthermore, the people themselves are aware of the conservation of the watershed forest resource by realizing of its importance in that if they lack the forests, water, it can cause the problems to whomever live at the end of the tunnel. From this study, the researchers can see the potential of the community on the watershed forest resource management which should be involved from every sector's cooperation: government, private sectors and villagers in the community working hands in hands cooperatively for the sustainable natural resource management and the more effective watershed forest management.

4. Utility classification of Khameun Watershed Area: the opinion of Hmong tribe and people around Khamuen watershed about forest products is not depending on fire. Fire forest is disadvantage and their heat has negative effects on soil especially living things and soil quality in the upper soil layer. Some of them are a volunteer to stop forest fire because burned or unburned areas were not affected to them for forest product hunting. Kennedy et al. (2012) reported mushroom blooming (*Astraeus odoratus*) were found in both burned and unburned areas in deciduous dipterocarp-oak forest in the north and north-east of Thailand. *Astraeus* can produce sporocarps without fire and other factors such as soil moisture and length of the hot-dry season are important factor to mushroom blooming.

This study can classify the utilization of Khameun Watershed into 10 models similar to Ban Luk 32 Community, Xay District, Oudomxay Province, Lao People's Democratic Republic (Sithirath et al., 2011), Sirikit dam at Uttaradit province (Satean et al., 2012) and Krokpradoo Community Forest, Tambol Khokklang, Amphoe Lamplaimat, Buriram Province (Moonwandee, 2016) including fuel wood, plant shoot, Broom grass, forest vegetable, mushroom, wild fruit, wild life, herbs, edible insect and orchid. Forest ecosystems are important providers and supportor of multiple ecosystem services essential for human well-being (Ma et al., 2017).

The people living in the areas have been utilizing Khameun watershed all year round. Mostly the people make use of it during dry season starting from October to May because they can reach their more conveniently, safely and most importantly due to the less slugs. The duration of gathering information by questionnaire and interview was inexact with the revision with the Hmong scholars. This may be due to their understanding of utilizing from the Khameun River not Khameun watershed, therefore, the research team should spend time in explaining the respondents item by item as well as answering the questionnaire. This might be much better than explaining all before answering the questionnaire.

Moreover, forest governance needs to concern about food security and natural resource management in term of maintenances and restoration of soil fertility, erosion control and biodiversity (Aju, 2014; Carol et al., 2016).

V. RECOMMENDATIONS

The recommendations of the study entitled “Diversity of Ecosystem and Local Wisdoms Related with Local Lifestyle at Khameun watershed in Phu Hin Rongkla National Park, Phitsanulok Province” were as follows:

1. Suggestion and applicability: The related units should publicize in a variety of channels: broadcasting tower, bill board on campaigning models, conservation and natural resource management in Khameun watershed continuously to allow the public to participate for the ultimate benefits of the public in the area.
2. Presentation on policy: the local administrations and related units should organize the public meeting to allow them to share their learning and build understanding thoroughly, have public hearing for would-be-beneficial suggestions.
3. Suggestion for research: for the field study, there should be planning in advance and the contact with the officers or the experts in the community who know the route well and coordinate with the related persons to make the fruitful research.

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