Indigenous Peoples' Good Practices

in Climate Change Adaptation and Disaster Risk Reduction:

Case studies of indigenous Karen community of Hak-kia village in Northern Thailand and Taloctoc tribe in Northern Philippines.

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The documentation of the good practices of indigenous peoples in Thailand and the Philippines is undertaken through the ongoing partnership "Building the Resiliency of Indigenous Communities on Climate Change Adaptation" between Asia Indigenous Peoples Pact (AIPP) and MISEREOR. AIPP project partners include Cordillera Disaster Response and Development Services (CorDisRDS) in the Philippines; Network of Indigenous Peoples in Thailand (NIPT); and NGO-Federation of Indigenous Nationalities (NGO-FONIN) in Nepal.

I would like to take this opportunity to express my sincere thanks to representatives of NIPT and CorDisRDS for conducting case studies in Karen Indigenous community in Northern Thailand and Taloctoc tribe in Northern Philippines respectively. Most importantly AIPP would like to thank all the villagers for trusting our partners and sharing information relating to their good practices.

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Mr. Gam Shimray
Secretary Genaral
Asia Indigenous Peoples Pact

ACRONYMS

AIPP	Asia Indigenous Peoples Pact
CRA	Community Risk Assessment
CorDisRDS	Cordillera Disaster Response and Development Services
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DRR	Disaster Risk Reduction
DRRM	Disaster Risk Reduction and Management
FPIC	Free Prior and Informed Consent
FGD	Focus Group Discussion
HYV	High Yielding Varieties
IP	Indigenous Peoples
KII	Key Informant Interview
LGU	Local Government Unit
MoNRE	Ministry of Natural Resources and Environment
NDRRMF	National Disaster Risk Reduction and Management Framework
NGP	National Greening Project
NGO	Non-Government Office
NGO -FONIN	NGO-Federation of Indigenous Nationalities
NIPT	Network of Indigenous Peoples in Thailand
ONEP	Office of National Resources and Environmental Policy and Planning
R.A.	Republic Act
REDD+	Reducing Emissions from Deforestation and Forest Degradation and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries
TRV	Traditional Rice Varieties
TMK	Timpuyog ti Mannalon iti Kalinga
TMT	Timpuyog ti Mannalon iti Taloctoc
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNFCCC	UN Framework Convention on Climate Change

Building the Resiliency of Indigenous Communities

Executive Summary

In varying degrees, climate change is definitely and irreversibly affecting ways of life and survival of people globally that it is a major focus and concern in international, regional and national conversations and dialogues in terms of policies and strategies. Central to the discourse is the role of indigenous peoples with their sustainable practices and traditional knowledge of natural elements, whose identity is intimately linked to land, who have minimal or least contribution to climate change, yet bear its impact and adverse effects. While world leaders, policy makers, conservationists and environmentalists seek new paradigms and programmes to deal with climate change, indigenous peoples' practices have proven and continue to be viable, time-tested, adaptive and sustainable, enabling their communities to remain resilient. The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) makes milestones possible for indigenous peoples with their role in climate change and biodiversity. The UN Framework Convention on Climate Change (UNFCCC) although government driven process in nature is slowly opening doors for full and effective participation of indigenous peoples through the Local Communities and Indigenous Peoples' Platform established by Paris Decision in 2015. Taking off from the UNDRIP, the Paris Climate Accord preamble gives due and specific recognition to indigenous peoples' rights. Article 7 of the Climate Accord acknowledges the crucial role of traditional knowledge in climate change adaptation action.

Marginalized in mainstream capitalist development processes which have degraded the deterioration of the environment, indigenous peoples with their traditional knowledge on climate and nature's laws, customary laws, and distinct culture and self-governance, illustrate that land ownership and resource management can counter and mitigate the hazards in a changing planet. With the threats and implementation of unwanted development of their resources with state participation and permission, indigenous peoples persist in traditional means that are sustainable and least harmful to their survival and immediate environment.

Two cases present themselves as clear models and studies of how indigenous communities build their resiliency and how these valuably contribute to the understanding of biodiversity processes, disaster mitigation and adaptation in the period of climate change. These studies initiated by Asia Indigenous Peoples Pact (AIPP) with support from MISEREOR under the ongoing project "Building the Resiliency of Indigenous Communities on Climate Change Adaptation" involved the Karen community of Ban Hak-kia in Northern Thailand and the Taloctoc tribe in Tanudan, Kalinga in Northern Philippines, taking into account their socioeconomic and political structures and systems, traditional practices and customary laws in agriculture and forestry, agricultural cycle, resource management and other data gathered as part of the peoples' learning experience.

Communities in Peril

Thailand witnessed more than 50 large extreme weather events in the past 30 years with grave effects such as drought, flooding, extreme temperature change, and severe storms that caused huge damages and losses to lives and livelihood throughout the country. The Karen people who survive on subsistence farming observed the irregular rainfall pattern which altered the agricultural cycle and resulted in drought. Like a domino effect, paddy fields and river gradually dried up, shortening the period for catching marine resources; animal diversity decreased, rice disease was more rampant compounded by various infestations. The community was alarmed with the increasingly low farm and aquatic yields however, they saw the necessity of a cohesive community coming to terms with the environmental changes. In the Philippines, climate change impacted the indigenous peoples like the Taloctoc tribe with typhoons, drought, landslides, pests and diseases, compounded by militarization and development aggression. Particularly, the agricultural calendar shifted making it difficult to predict the weather for production processes. Drought was more often experienced in the last three decades and water scarcity was prime concern in community decision-making. Unable to irrigate their rice lands resulting in low productivity and food insecurity of households, the village was faced with the destruction and loss of farms, decreased cropping seasons and crop yield, and alarming increase of pest infestations. This deviation from traditional practices in subsistence agriculture also affected other economic activities like hunting, gathering, and traditional livelihoods. This prompted the Taloctoc tribe to practice an alternative farming system called takkombang.

Actions on Adaptation and Resiliency

The Karen people resorted to a myriad of practices such as planting of new rice species and choosing more crop varieties to increase soil nutrients with less water consumption, building mini-dams for irrigation, mapping the forest and cultivation areas, enforcing fire prevention measures, and safeguarding certain areas sacred for the conservation of natural resources and aquatic animals. Their accumulated knowledge included observing the direction of wind and flash flood and prohibition of tree cutting to shield the village from windstorms and flooding. Their collective practices on land and natural resources management such as categorization of land according to specific uses, adjustment of agricultural calendar, rotational farming, and avoidance of mono-cropping are proofs of resiliency and adaptation to changes in the period of climate crisis and global warming.

The following adaptation measures are the Karen community's valuable contributions that can be replicated: determining the quality and sufficiency of water; land management including assertion for the recognition of community land ownership, organic improvement of soil, and promotion of environment-friendly cultivation that uses less space; co-management of natural resources in the area with other concerned sectors and stakeholders; development of income generation activities; revitalization of culture through exchange and knowledge transfer to the youth; implementing disaster protection; and advocacy with relevant 6 organizations and civil society networks to support climate change adaptation and disaster risk reduction.

In dealing with the impact of climate change, the Taloctoc tribe employed takkombang, an alternative farming system that digresses from the normal agricultural calendar, where planting rice is done in between the two normal rice croppings. Takkombang is governed by agreements and it promotes collective work to maintain rice plants and irrigation systems. It encourages better water management and increased rice harvests. This practice is evidence of the Taloctoc tribe as knowledge bearers, experts drawing from rich experiences, and innovators who share their success for their own and other communities' benefit.

Prevailing over Climate Crisis

The customary laws and indigenous philosophy on resources and land use have mitigated the onslaught of climatic disturbances in the Karen and Taloctoc communities. Key to these is the conscious revitalization of culture that keeps the community as a unit that takes charge of regulation and enforcement of rules and guidelines to mitigate the onslaught of climate change and to safeguard their biodiversity from further loss and destruction.

Sustained advocacy and engagement with other civil society networks and state agencies for the policy on climate change adaptation and disaster risk reduction is a continuing challenge for indigenous communities in strengthening their resiliency. Indigenous peoples like the Karen and Taloctoc tribe acknowledge the significance of coordinating and collaborating with other actors regarding the application of traditional knowledge, practices, values and innovations.

Paragraph 135 of the Paris decisions has acknowledged the need to to strengthen knowledge, technologies, practices and efforts of local communities and indigenous peoples related to addressing and responding to climate change; and established local communities and indigenous peoples platform in 2015 for the exchange of experiences and sharing of best practices on mitigation and adaptation in a holistic and integrated manner. UNFCCC has prioritized the operationalization of the platform. However, the discussion is mainly limited to the international level. It is imperative to provide and institutionalize such platforms and mechanisms at regional, national and local levels for the continuing exchange of knowledge and experiences taking into account the Free, Prior and Informed Consent (FPIC) of the holders of such knowledge, innovations and practices. It is important that the self-selected representatives of indigenous peoples are availed with sufficient resources for their full and effective participation in platform activities at various levels.

Climate change processes and engagements from the community to the global level are happening and these have to be strengthened and supported. Integrated into new paradigms on adaptation and resiliency are the daily practices of indigenous peoples who are showing the way to being resilient, responsible and holistic stewards of this planet.

Indigenous Peoples' Good Practices in Climate Change Adaptation and Disaster Risk Reduction:

A Case study of Indigenous Karen community of Hak-kia village in Northern Thailand

Introduction

The indigenous peoples in the northern part of Thailand number more than one million people, composed of 14 different groups including Karen, Hmong, Mien, Kachin, Dara-ang, Lahu, Lisu, Lua, Akha, Thaiyai, Khamu, T'hin, Mlabri, and Bhisu. They live mainly in the highland areas and depend on natural resources for their survival and livelihood primarily on a subsistence basis such as collecting timber, fuel wood, bush foods, medicinal plants, etc. In addition, they have been practicing self-reliant agricultural system from one generation to another. This refers to the understanding, skills and philosophies accumulated and developed by indigenous peoples with long histories of interaction with the condition of their natural surroundings. They had already been experiencing the various effects of the changing climate, so their knowledge and practices helped them to survive through the crisis and global warming.

However, most indigenous communities located in remote areas lack access to the correct information and facts related to the impact of climate change and disaster. Moreover, indigenous knowledge on adaptation and mitigation to climate change has not yet been compiled. Thus, Network of Indigenous Peoples in Thailand (NIPT), in collaboration with Asia Indigenous Peoples Pact (AIPP) conducted a case study and data analysis to support the community in scaling up their efforts and initiatives for climate change adaptation and disaster risk reduction. This is also to share their experiences and practices with other communities that are facing similar situation.

The research methodology is to study the knowledge and practice on adaptation and disaster risk reduction to climate change of Ban Hak-kia, a Karen Community. This study employed a participatory action research approach, which emphasizes the learning process of villagers and staff involved. It began with the orientation of the team on the objectives and conduct of the case studies, then gathering of relevant information and data through review of publications, documents, etc. The team composed of villagers and staff brainstormed ideas and designed the tools and methodology. The various tools were designed for the study, such as timeline, seasonal calendar, the information on climate change and disaster that impact on their community, and the assessment of risk, vulnerability and adaptation potential. The information gathered were used for analysis and search for appropriate options on adaptation to climate change and

disasters that may occur in the future. In addition, the collection and review of the secondary data were also used to develop the questionnaire and guide the discussion held in the community. In data gathering, they conducted focus group discussions and interview with different specific groups such as the women, youth, knowledgeable persons, etc. Also, various methods were applied such as interview, photograph of both atmosphere and actual practice, developing basic information, indigenous knowledge, and simple community map. The last method used was analyzing and confirmation of the data based participatory approach, and followed by the writing of case study.

Abstract

The objective of conducting this case study is to (1) document knowledge of Karen people to climate change adaptation and disaster risk reduction, (2) establish the internal learning process in community and shared learning among indigenous communities on climate change adaptation and disaster risk reduction, and (3) lobby and advocacy at different levels in order to protect the community rights. The target community chosen for this case study is Ban Hakkia, Moo 5, T.Ban luang, A.Chomthong, Chiang Mai province. The study methodology and process are (1) formation of documentation team, (2) review of relevant information and data, (3) design appropriate tools and methodology, (4) gathering of information and orientation to the community on the objectives of the case study, (5) drafting the case study, (6) conduct of consultation between documentation team and advisory team to analyze and improve the information, and (7) writing the final case study.

Findings of the case study

The case study on "Indigenous Peoples' Good Practices on Climate Change Adaptation and Disaster Risk Reduction: A case study of Karen Community in Thailand, Ban Hak-kia" was carried out in collaboration between Network of Indigenous Peoples of Thailand (NIPT) and AIPP with the funding support by Misereor/KZE. The study used participatory action study approach. Interview, observation, brainstorming, and data analysis were done jointly by community members, documentation team, and the advisors.

This case study presents the situation on disasters in the community and the impact of climate change, including the review of indigenous knowledge in the forecasting or predictions related to the weather atmosphere (soil, water, wind, and fire), analysis of the social structure and economic occupation in the community, and the role of the chosen community, including the community plan for adaptation to climate change and disaster risk reduction.

The findings of this case study have generated knowledge and increased awareness and understanding of the target community, to the satisfaction of the community members. The recommendations were developed to solve the problems in the community and watershed level, and for policy making at the national level as well. Moreover, the study also recommends that a similar study and research be conducted on the issue of climate change adaptation and disaster risk reduction in other highland communities.

Preface

Many communities are in critical condition due to the impacts of drought and floods, more intense and frequent storms which have damaged several agricultural products, thus threatening people with hunger and malnutrition in the poor countries. We should consider improving the monitoring and measuring of climate change and adaptation, accurate information on climate change related issues and a good early warning system for disaster-prone peoples, and strengthen the resilience and coping strategies. Climate change is a global issue because it impacts on human lifeways and the environment. The human activities in the period of industrial revolution has increased greenhouse gases in the atmosphere and caused for increasing of average temperature of the Earth's by 1 °C, the changes resulting from global warming may increase in occurrence and severity of storms and other severe weather events.

Thailand is one of the vulnerable countries suffering the various effects of the changing climate, drought, flooding, extreme temperature change, and severe storms that impact on the livelihood, economic, and social condition. In the past 30 years, Thailand has seen more than 50 large extreme weather events and caused over several billion Baht in loss and damages. Those loss and damages interrupted the development of the country especially poverty alleviation. It is predicted that the severity of weather events and climate in Southeast Asia will become more serious under the condition of global climate change. Hence, there is a need to have guidelines and procedures for the proper preparation to protect and adapt to climate change as well as to reduce the impact of extreme weather events. Therefore, it is important for Thailand to take action, particularly in research on the risk and vulnerability from the extreme temperature changes and rainfall both at the country and local levels, in order to get accurate and reliable information that can be used for both climate change adaptation and mitigation, and as response to the planning and implementation processes.

At the same time, Thai scientists have indicated that the situation will likely create or exacerbate a number of additional problems during the next 20-30 years, and severe weather events will intensify. Currently, Thailand is experiencing temperature of over 33 degree Celsius for a longer period of 30-50 days compared to the past when it was 20 days a year only. The sea levels are rising especially in the Andaman Sea due to warmer ocean temperatures and the melting of glaciers and small ice caps. Moreover, the recent floods in Bangkok evolved slowly, with the waters descending from the northern hills of the country. The capital was overwhelmed by the huge quantities of water as many of its drainage canals had been blocked as a result of poorly managed development. This may cause an epidemic of disease. To respond to this situation, Thailand developed the National Strategic Plan on Climate Change Management 2008-2012 and approved by the Cabinet on 22 January, 2008. This strategic plan is to be used as a framework to transform into action by other government sectors. In 2015, the Thailand Climate Change Master Plan (2013 – 2050) was developed by the Office of National Resources and Environmental Policy and Planning (ONEP), and the Ministry of Natural Resources and Environment (MoNRE). The Thailand Climate Change Master Plan is a framework of integrated policies and action plans relating to climate change. This master plan was approved by the Cabinet on 14 July 2016 and is to be applied as a long-term framework for the preparation of action plan and operation of the relevant sectors. The main objectives of this master plan are as follows:

(1) To provide a long-term framework to mitigate and tackle problems arising from climate change, including the adaptation activities and promoting the growth pattern of low-carbon approach to sustainable development.
(2) To use as a policy framework for the development of mechanisms and tools in both the overall and in various sectors to tackle climate change effectively.
(3) To encourage the related government agencies and organizations to use as a framework for preparation of action plan, and to increase understanding for those agencies and organizations to integrate and tackle problems arising from climate change.
(4) To encourage responsible agencies for finance management to use as a framework for the allocation of the budget to solve the problem of climate change.
(5) To encourage Thailand to move towards Low Carbon Society in accordance with the concept of "sufficient economy"

In addition, the Department of National Parks, Wildlife and Plant Conservation has also initiated a project to prepare REDD+ for Thailand to alleviate the problem of global warming as well. However, the indigenous peoples movement and civil society in Thailand have proposed their involvement in developing the project, and emphasized that the project must not be bound to market mechanisms and to ensure the respect of community rights and indigenous poeples rights as well.

General information on the case study area

History of the community

Ban Hak-kia is a traditional Karen community which is called "To Lo Pu" in Karen language. This community was established 115 years ago under the leadership of Mr. Naboy who moved from Ban Pakluey Khunya which was 10 kilometers away. The reason for relocation to the new place was to live closer to their cultivation areas. Later, the families of Mr. Nadichi and Mr.Takuelue followed and others later moved into the nearby area. However, before finally relocating in Ban Hak-kia, they had moved the location of the community in several nearby places because of the disease. Then in 1962, they decided to locate permanently at the current place.

The community got its name "To Lo Pu" from the lowland language "Tong Lom" which means quagmire because there is a large area of paddy field in the marshland. Later, the Karen people called it "To Lo Pu" which has no meaning in Karen language.

In 1972, Doi Inthanon National Park declared its coverage of this area. Then in 1977, the national park boundaries were further expanded over into the territory of this community covering their settlement and cultivation areas. In 1989, the Educational Center for Highland Communities established a school in the community and renamed it "Ban Hak-kia" which means "root of pine tree."

There are 50 households with a population of 196 villagers - 95 are male and 101 women. The community stills practice their traditional livelihood. The three main religions and beliefs are traditional beliefs, Buddhism, and Christianity (both Catholic and Protestant). These three different beliefs and religions can live together without discrimination.

People's occupation

Most of the villagers are practicing agriculture for family consumption and selling such as farming in paddy and rice fields, planting corn and vegetables, and integrated agriculture and animal raising. Besides these, there is also gathering of medicinal plants and foods, such as fruit, vegetable, mushrooms, bamboo shoots, wild honey etc. Some of them earn extra income from other employment after the harvest season.

Figure 1 : The past and present situation of the environment and climate, and types of disaster at the study site and the impacts

period	Events and disasters occurred	Impact
1971-1972	Lowlanders caught fish by poisoning in Maeya watershed several times a year.	A huge number of fish died and some aquatic species disappeared from the river.
1981-1997	Severe flooding in Mae-ya river.	- Large areas of rice fields along the river were damaged. - Houses were damaged by the sediment, sand, and weeds from the flooding.
1998	Severe fire in the area	The severe fires that occurred in the area caused the death of a lot of young trees. There was also conflict between highlanders and lowlanders.
2004	Flooding	Roads and bridges were damaged from the flooding.
2005	1st case of Diphtheria in cattle and buffalo	More than 30 animals died so the villagers had to closely monitor and do surveillance on their animals.
2007	Brown plant hopper in the rice plants.	- The rice plants were damaged and decreased rice yield. - Increased use of brown plant hopper chemical control.
2008	Severe storm in the community.	The severe storm damaged houses and huts, and caused trees to fall.
2010	2nd Diphtheria in cattle and buffalo	More than 30 animals died so the villagers had to closely monitor and do surveillance on their animals.
2011	The rainy season was longer than normal and windiness was longer than three consecutive days.	- Farmers could not burn their field for planting rice. - Rice plants were damaged during the harvesting season. - Marine species were reduced as an effect of the disease.
2012	Lightning in the village - Three solar cell panels in the village were damaged.	- Villagers were scared of lighting.
2013	Three consecutive windy days	The house foundation and fruit trees were damaged
2014-2015	Fire caused by drought	- Fruit trees, fence, and huts in their farm were burned. - Small trees in the forest died. - Villagers had to extinguish the fire several times to prevent the fire spreading across the community forest and village.
2016	Sudden/flash flood	- Motorbikes were swept away. - Farmlands of some families were damaged.

The following are the natural phenomenal changes compared to the past:

- The opium cultivation areas in the past had become abundant forests.
- Thunder is less than the past but often followed by lightning.
- The irregular rainfall pattern has altered the agricultural cycle.
- Unlike in the past, for several consecutive days, fog, light rain, and windiness occurred.
- There is a new fish species found in Mae-ya river, which is believed to come from the well of the royal project.
- The river is almost drying up.
- Drought in the paddy field occurred earlier than in the past and the period for catching crab is shorter. In addition, the diversity of animals has decreased, such as crabs, eels, frogs, etc., due mainly to the use of chemicals and tractor.
- Occurrence of disease in rice is often; there are aphids, worms and other pests destroying rice plant, resulting to lower rice yields
- Increased number of insects like ants and mosquitos.
- Increased use of chemicals and pesticides in agriculture.
- The dwelling of rituals.
- Flowers and fruits bloomed at the wrong time due to confusing weather conditions; some fruits yielded better than the past, ex. coconut, tamarind, longan. However, rice yield decreased.
- The bull frog croaks at unusual times.
- The invasion of alien plants such as some grasses, mimosa pudica, etc., while some local grasses are not found in the area.
- Reduction of wild animals, some animals such as vultures, birds, reeds, birds, frogs, thorns, Gibbon, and etc. have disappeared in the area such as To Ter Le, To Chor Pa.
- In some forests where the tree are bigger, some orchid species have been lost and water also has decreased.
- Various diseases occurred such as joint pain, diabetes, gout, stomach, cancer, kidney stones, migraines, obesity, and etc.

The traditional knowledge, practices, values and innovations of indigenous peoples in the study sites for climate change adaptation and disaster risk reduction:

1) Knowledge on soil

In Ban Hak-kia, the Karen elders are knowledge holders who have full knowledge of the universe and nature, including knowledge and beliefs on soil classification. Based on the interview with the elders, it can be concluded that the word "soil" is based mainly on their beliefs, its color, texture, and land use which are: (1) "Kor" (land), the area on which animals and humans live as well as the place on which crops are cultivated and on which forests are located; (2) "Hor kho kler" (world), the entire planet earth, including both land and sea; (3) soil classification according to the crops that can be grown on it such as "hor kho bler" or termite, "hor kho u lor ku" or soil that has been burned for a long time, "hor kho cher

che sui" or soil with tree root, "hor kho lor klor mae" or sandy loam soil, "hor kho ti ni ti" or soil on the edges of water, and etc.; (4) classified according to its color such as black, red, and white soil;' (5) classified according to texture if it is clay, sandy, or loam soil; and (6) classification according to the flavor of soil such as sour, bland, or salty soil.

2) Knowledge on water

Water in Karen language is called "Thi." Water is a vital resource that can be compared to blood in living beings which brings life to all that is alive, including plants, animals, and humans. This dependence of living things on water can be direct and indirect (drinking, cooking, and planting). The Karen believe that water has its owner so they use water sparingly and with respect. They classified water into four categories according to ecological factors that are (1) Thi do klo or river, (2) Thi po klor or stream, (3) No or swamps, and (4) Por lae or sea. Furthermore, the Karen have five categories of water base beliefs that are (1) Thi kwa khi or water source, (2) Thi ko or drinking water, (3) Thi mae ker la or crystal water basins, (4) Thi per thor or spring, and (5) Na u ru or water coming out from the hole.

3) Knowledge on the climate

Figure 2 Knowledge on the climate

Resources	Feature	Forecasting	Adaptation/ response
Soil	- Hor kho o bor or soft soil, the surface layer is hard - Hor kho bler or termite soil, the soil is crumbly and soft and the underground is soft. - Soft soil and water oozing out from the ground. - High quality soil, black soil, loam soil, humidity, and full of vermicomposting.	- Risk of soil erosion. - Suitable to plant eggplant, chili, millet and others. - Risk of soil erosion. - Suitable to plant vegetables and other crops.	- To prevent soil erosion, people plant grass, shrubs, reed, bamboo where their roots will anchor on the soil. According to the traditional ritual, bone and chin of pig will be buried in those areas. - In the paddy field, villagers made a small drain around the paddy field to drain the water.
Water, rain	- River is turbid while there is no rain. - All marine animals such as striped snakehead fish, white frog, crabs, and turtle were caught from the swamp. - La thor de khi or moon rise in the slant position	- It is raining in the upper area and sudden flooding is probable. - The swamp will be dried up. - It will still be raining during that period.	- When it rains for many days, villagers will put stones and rice spatula into a basket, and put on the stump and pray: "Let the rain fall to fill the basket, let the stone float, the stump sprout leaves. If nothing happens, please stop raining." - Pueraria mirifica or Sue Kher Pue, if it is soaked in

Resources	Feature	Forecasting	Adaptation/ response
	- Tho cha makes sound. - Termites make their nest along the rock. - Martin flying around. - Occurrence of Alates. - Moisture occurs in the paddy field. - Dragonflies fly around.	- If it is raining, it will stop soon, but if it is not raining, rain will come soon. - It will be raining soon. - It will be raining in the next three days. - It will be raining soon. - It will be raining in the next 2-3 days. - Rain will stop.	the water then there will be storm. 
Wind/ weather	- When washing face feeling slip. - Difficult to make fire. - Ants carrying their eggs out from the hole to other places. - Nighttime swelter - Insect climb and bite. - Tobacco are sticky. - Seeds of chili are sticky and hard. - Occurence of asthma and itchiness. - Feel stickiness on the body. - Tamarind pods are more bent. - The cicadas make sound at an unusual time. - Fruit tree flowering a lot - Ants make their nest in the high tree or low. - Hear the sound of Cricket - Clouds move from the west to east. - Clouds move from the east to west. - Dogs swim	- It will rain today. - It will be raining soon. - It will be raining soon. - It will be raining the next morning. - It will be raining soon. - Humid and will be raining soon. - It will be raining. - It will be raining. - It will be raining. - It will be cold in the year. - The winter will come earlier in that year. - Wind will be strong - If the ant nest is in a high place, there will be no very strong winds, but if in lower place, the wind will be strong. - It will be raining. - It will be raining in some places. - It will be raining for long time. - It will be raining soon.	- Do not shoot the ker ma sa (a kind of fruit) or throw it up, otherwise there will be severe storm. - All kinds of animals are not allowed to play inappropriately, otherwise there will be severe storm. - Burn an Acacia concinna, seed of cotton, and flick the blanket to help reduce the strong wind. - Put calabash inside the house and keep a branch of Paper mulberry with you to protect you from lightning.
Fire (mer u der)	Where there is a wildfire near the village May Oo Der is the fire that people use for daily life ,the fire cause	Do not swing or flick the firewood because this may cause the fire that will spread.	"Lue me" is the ritual to offer food to the spirits, as they believe that when burning the land, the soil

Resources	Feature	Forecasting	Adaptation/ response
	from human made by using match, lighter or flint.		will be hot and cause many insects and animals to die, so this ceremony is for the dead animals to forgive.
Me u mi	"Me u mi" is caused by the friction of bamboo to make fire for cooking. Women are not allowed to eat, because of the belief that it is hot, so it may be difficult for them to deliver and they may have fever.		To prevent fire from spreading into the village, put salt inside the basket and whisk the salt. They believe that fire will decrease and not spread to the village.

4) Knowledge on forest

The Karen community is located intimately within the forest, thus it is necessary to rely on the forest resources for their subsistence and livelihood such as food, habitation, clothing, and medicine. However, in collecting forest products or making other uses of such resources, the aim is not simply to collect as much as they can. They learn and follow certain ways of collecting forest products by avoiding impact to the forest resources and keeping harmony with nature. The Karen traditional knowledge on sustainable resources management includes the collecting of forest products such as wildlife, vegetables, fruits, mushrooms, and medicinal plants. (See the detail in the annex table 1)

5) Knowledge on survival in the forest

Being knowledgeable about edible plants in the forest will help one to survive in the wild as the saying in the Karen song-poem that "ha hue nor ler ta jo o hue nor se saw a po" or "when you take your sister to the forest, you can find fruit for her when she is hungry." At the same time, the most important thing when you are in the forest is to respect the forest and the Creator, for example, do not speak ill or be rude and curse others, and instead, offer food to the spirits or Creator before eating. The following are skills and knowledge when going to forest;

- When a snail is in the nasal cavity, put lemon juice so it will leave.
- With itchy reaction from nettle leaf, bring soil from the hole of mole to the skin to remedy the itch.
- Bring tobacco, piece of pine tree, and garlic to protect yourself from blood-sucking leech.
- Drinking lemon juice will help dislodge the stuck fishbone from your throat.
- When having eaten poisonous mushrooms, drink water with a soaked head of a turtle.
- When a centipede bites, put toad skin or saliva of rooster on the skin.
- When thirsty, you can drink water from some plants such as rattan, wild banana, Se ngi do, blae bor mue, and etc.

Blae bor mue provides water when you are thirsty.

Moreover, it is forbidden to kill and eat some wildlife such as Tho Kor, Tho Klue, gibbon, Tho hor Che, Tho bibay and boa. Some food cannot be served to guests or friends such as palm civet, snail, mole, jungle fowl, turtle, loris, duck, white chicken, and some animals used for ceremonies. They believe that if people eat these kinds of food together, they will not see each other again.

Hornbill or Tho Kor in Karen.

Scarlet minivet or Tho Bibay in Karen.

Figure 3 : Seasonal calendar of Ban Hak-kia

Activities	Jan	Feb	Mar	Apri	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Note
Prepare land for cultivation													
Repair house													
Wedding													
Raising animal													
Collecting forest product													Collecting based on the season
Weaving, embroidery													
Cultivation													
Conduct ritual in the field													Ritual related to rice, eating new rice.
Annual tradition ceremony													Wrist tying
Blacksmith													
General employing											Rice harvest / milling enough rice		4 families do not have enough rice
Holiday													In every special Buddhist's Day,and every Sunday for Christian.

Community's initiatives on the adaptation to climate change

Rice species have been planted in the past: Bue kor pae, Bue su, Bue ngor be, Bue mue pho, Bue ki, Bue kor lae lu, Bue ba mae, Pi ei su, Bue kor phae pi ei, Bue kor chi, and Bue mue doh. Current rice species; Bue kuey, Bue ner mu, Bue kor chi, and Pi ei su.

Pi ei su
(black sticky rice found in rotational farming)

1) Rotational farming

Currently, half of community members are still practicing rotational farming, however, under state policy pressure to reduce the rotational period from the traditional 6 to 10 years to between 3 and 5 years, the area that is cultivated requires 10 to 15 *thang*[1] of rice seed to an area requiring 3 to 5 *thang* of seed rice. As a result, it is quite clear that the diversity of food plant varieties is declining. Many plant varieties cannot grow on land which has been fallowed for less than three years. Some plants require charcoal and ash from burned swidden for growth, and many plants only grow well when intercropped with rice, and so on. However, planting conditions such as these have been lost in the adjustment of the farming method, causing some of these plants to disappear. At the same time, the condition of the natural environment and the soil has begun to deteriorate because of repeated use of the land and intensive use of chemical fertilizers and pesticides. Regarding the loss of some plant species, many local seeds have disappeared from the community. The seeds that are existing in this community are:condition of the natural environment and the soil has begun to deteriorate because of repeated use of the land and intensive use of chemical fertilizers and pesticides. Regarding the loss of some plant species, many local seeds have disappeared from the community. The seeds that are existing in this community are:

- 6 different species of rice seed that plant in the paddy field,

The Karen ladies are selecting the seed for the next crops cultivation.

[1] 1 thang is 20 litres

- 5 different species of rice seed that plant in the rotational farming,
- 7 different kinds of vegetable,
- 11 kinds of onions,
- 3 kinds of sugarcane,
- 12 kinds of pumpkins,
- 7 kinds of chili,
- 11 kinds of egg plants,
- 6 kinds of taro,
- 3 kinds of ginger,
- 2 kinds of sorghum,
- 3 kinds of sesame,
- 9 kinds of bean,
- 3 kinds of millet,
- 7 kinds of flower,
- 7 kinds of herbal plant. **(see detail in the annex table 2)**

Under the pressure of state policy, villagers realize the importance of food security and diversity, thus those plants and seeds have been planted along the house fence and in home gardens. However, there are quite a number of species that disappeared from the community such as:

- 8 different kinds of rice species that disappeared from the village: Bue kor pae, Bue su, Bue ngor be,Bue mue pho, Bue ki, Bue kor lae lu, Bue ba mae, Bue kow pae pi ei.
- Other 5 local speciess that disappeared: Por ngor, Por bor, Sui, Pae sa boi and Ber.
- 5 new species found in the village: red bean, passion fruit, shallots, corn, and peanut.

2) Paddy field

It was found that the current practice of paddy field farming is quite different from that of the past, when people used buffalo to plowgh the soil. Today people use machine to shorten time. However, the rice yield is lower compared to the past due to insufficient water, warmer climate and it also requires more chemicals and fertilizers. In addition, during and after harvesting, some food can be found in the paddy field such as tadpole, shrimp, crab, fish, insect, eel, sesame, and mint. Now, with limited water, two families decided to plant crops instead of rice.

3) Animal husbandry

Animal husbandry has changed from the past due to the changes in cultivation. For example, pigs cannot be released, cattle require close monitoring to prevent them from entering other fields where they will damage the crops. So people can only release their animals after harvesting. The Karen's belief about husbandry is, to raise animals is dependent on their luck. Some people can raise animals that may grow faster without disease.

4) Gardening

Currently, there is a system of gardening that people in the community follow, to prevent animals from destroying crops in the garden. They, are required to make fences around their garden. Current plant varieties available in the garden are: mango, lychee, longan, jackfruit, coffee, papaya, tamarind, grapefruit, banana, sugarcane, ginger, galangal, lemon grass, turmeric, coconut, lemon, bergamot, and bamboo plants which are mainly for household consumption.

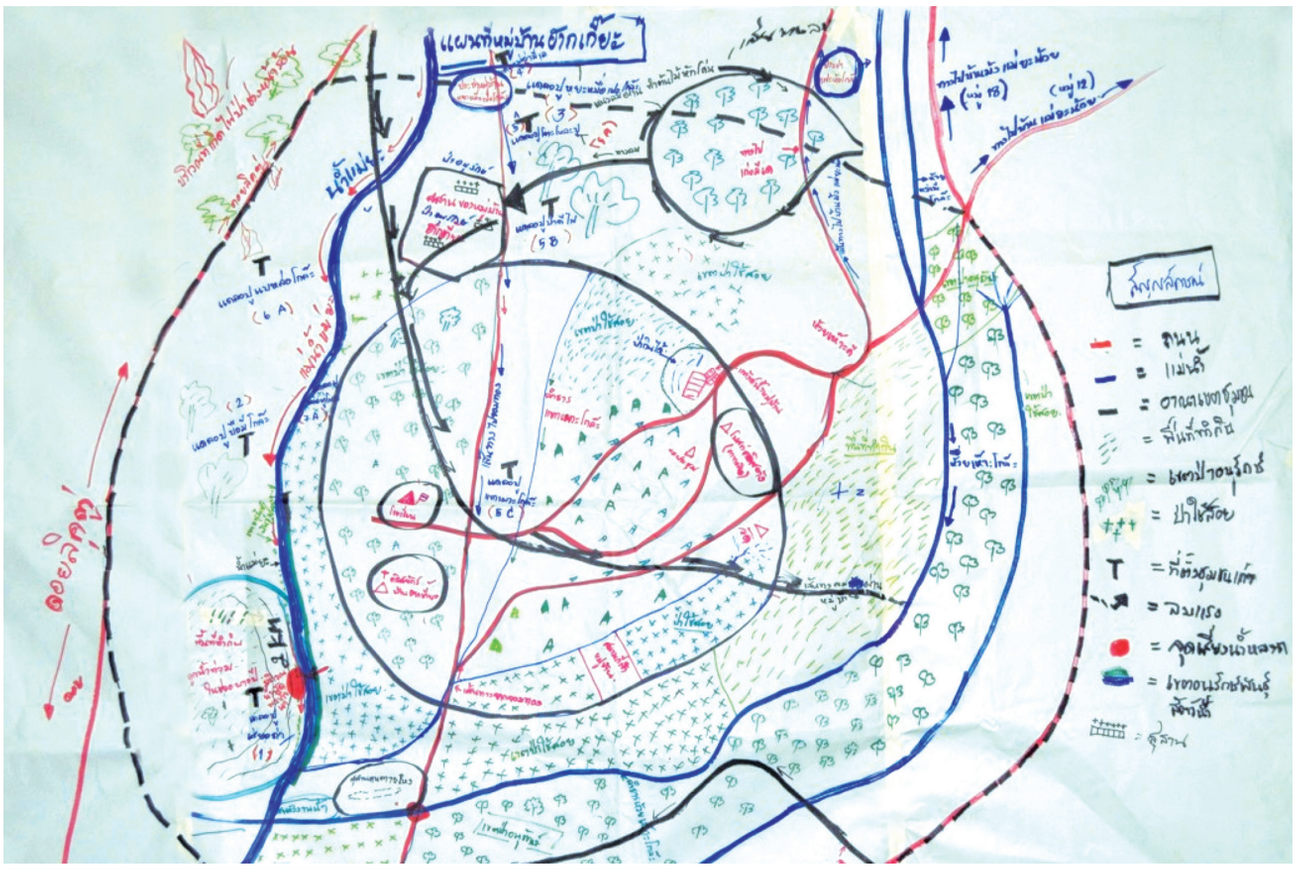
5) Natural resource management

The community has divided the land zone based on the kind of forest use. There are forests where it is allowed to collect forest product and to hunt; hunting and cutting are prohibited in conservation forests; it is prohibited to disturb a taboo forest by clearing it for any use; cultivation area is for villagers to cultivate. Regulation on natural resources management is developed and monitored by the Environmental Committee, and they also survey and map the forest and cultivation areas, systemize fire prevention, and establish sacred areas where they conserve the natural resources and aquatic animals. In addition, it is not allowed to cut the big trees around the village as protection from wind storm and the villagers to have shady and cool cover.

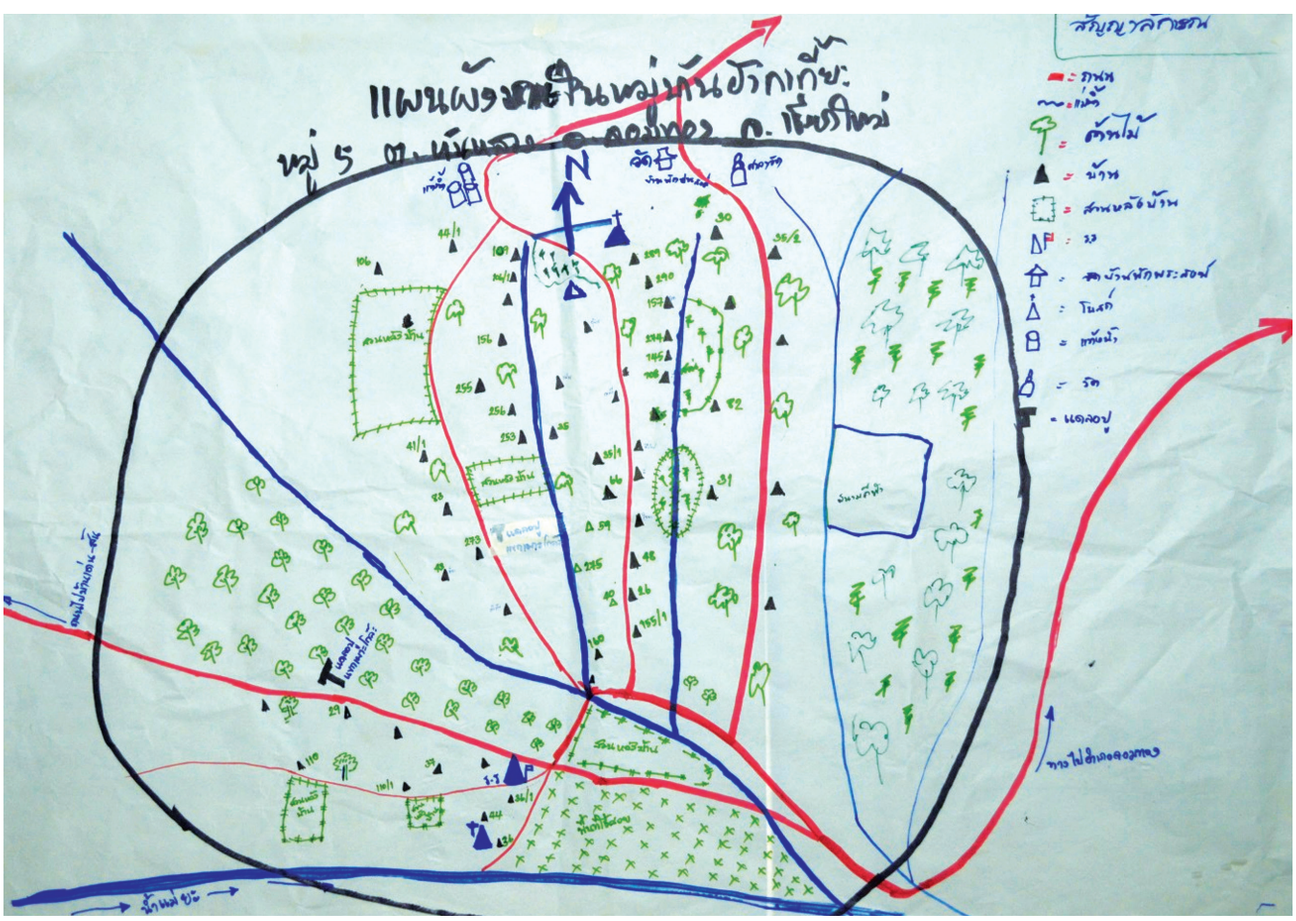
Figure 4 : Adaptation plan of the villagers in Ban Hak-kia

Plan	Activities	Time	Responding person
1. Quality and sufficiency water plan	1.1 Develop a clean and adequate water supply for consumers.	Mid-term plan	Committee of Community , municipal, and other organizations
2. Land Management plan	2.1 Push for the recognition of community land ownership. 2.2 Improve the soil organically. 2.3 Promote environmentfriendly cultivation that uses less space.	Mid to long term plan	Committee of Community
3. Development of co-management of natural resources in the area.	3.1 Increase cooperation among villagers and national park and other local organizations. 3.2 Conduct training on basic human rights and increase presentation and negotiation skills. 3.3 Improve the management of natural resources. 1) Develop signboards on regulation and forest land zone. 2) Increase understanding for nearby communities to understand and recognize and follow through the river basin committee. 3) Advise and monitor the Compliance of regulations	Short and long term plan Short term plan Short term plan	Committee of River basin Committee and other organizations villagers

Plan	Activities	Time	Responding person
4. Development of income generation plan	4.1 Promote cultivation that is friendly to the environment. 4.2 Support product transformation and marketing for local handicraft. 4.3 Promote animal husbandry.	Mid-long term plan Long term plan Long term plan	Committee and other organizations NGOs Villagers
5. Revitalization of culture	5.1 Conduct annual event for the young generation to learn their tradition and culture such as weaving, basket making, music, herbal medicine. 5.2 Promote the transferring of culture and tradition in the family.	Short plan	Committee and elders
6. Disaster protection plan	6.1 Promote tree planting to prevent flash flooding and soil erosion. 6.1 Plan house building to avoid blocking the wind direction. 6.2 Promote tree planting around the village to prevent disaster.	Short plan	Committee
7. Advocacy and push local and state policies on the risk disaster reduction plan	7.1 Coordinate with relevant organizations to support climate change adaptation and disaster risk reduction. 7.2 Advocate for the policy on climate change adaptation and disaster risk reduction with other civil society networks.		Committee



Map of Hakkia Village



Map inside the community of Hakkia Village.

1) Roles and responsibilities of traditional mechanisms in the study area

Some members of this community have changed their beliefs to Christianity, thus they are not involved in the traditional activities. However, the rules and responsibilities of traditional leaders are still practiced and in effect. Even though some of them have changed their religion, they are never disparaged to continue with traditional practices such as the taboo in the forest, compliance with signs or harbinger, respect the rule of Hi Kho (traditional leader) to monitor the regulations of the community and advise on decision making to resolve a problem. The elders and knowledgeable persons in this community still have active roles, however, the education policy has increased the gap between the young people and their community and decreased the role of elders.

Hakkia village' traditional leader, Mr.Insom Eirayakornkul

2) Participation of women and elders and their specific role

In daily life, women are allowed to be involved in the family's decision making on such matters as new house ceremony, new rice ceremony, selling of animals, providing opinion in the family economy and cultivation. At the same time, community governance is seen as the role of men, in fact, if women want to provide opinion and participate, they can only be listeners and they have no chance to speak out in front of the community. Ms. Sriwan Phetpanarak, a member of the community said, "Women often feel humbled and shy to provide opinion or make comment, so men stop them from speaking. This makes them lose their confidence and they don't want to speak even if sometimes their opinions are different from the men." While men argue that there are more spaces provided for women, they do not involve women in the mechanisms and are not given roles in community development and problem resolution.

Regarding the role of elders, they also are important in the community, especially on being consulted by the committee of the village and getting involved in decision making and conflict resolution when the leader could not. Moreover, some traditional activities require the elders to lead such as the auspicious timing of planting, carrying new year ceremony, new housing ceremony, and some rituals including the wedding ceremony, forest and water ordination, offering food to the lords of the forest, paddy field, rice field, etc. In addition, they also have the role to transfer knowledge to the young generation, who today are not keenly interested in their traditional knowledge, but instead on the new technology. There is a saying that goes: "Ker se chu ler a khor me bue ke ler ta bor pu" or "The power of the horse is at its hoof, rice will be good in the new fallow area."

3) Use of traditional knowledge

The indigenous knowledge of Ban Hak-kia is not different from the nearby community, where they are still maintaining and using their indigenous knowledge in daily life such as the belief in weaving,

basket-making, fence building, cultivation, singing during exchange labor, traditional heath care and massage, weather forecasting, predicting, and holding of ceremonies. However, the mainstream culture from outside the village also impacts on the role of indigenous knowledge.

The fig tree, if it bears fruit in the center of the tree, it means there will be rain in the middle of the year. If it bears fruit near the base of the tree, it means there will be rain at the end of rainy season.

Katydid or Tho Char, when it sings, it will be raining.

The engagement, coordination or collaboration with other key actors in relation to the use of traditional knowledge, practices, values and innovations

Ban Hak-kia is located in between the roads to the upper watershed communities and lower communities, thus there is good interaction with neighboring communities such that they can collect forest products for their consumption and they also help to take care of the forest, wildlife and the cultivation areas. There are two main mechanisms established as follows:

1) Ban Hak-kia, as a member of the Highland Network for Conservation in Chomthong district (HNCC) which was formed in 1992 to protect natural resources in the communities, is not allowed to be accessed and occupied by outsiders. They also solve common problems among members especially conflicts related to land and natural resources; and increase cooperation among the 42 clusters, 12 communities, 3 sub-district in Chomthong district. They are continuing consultations and regulations that are strictly followed and activities that involve the network, including setting up clear mechanisms in every watershed sector.
2) Ban Hak-kia is a member of Mae pon – Mae ya River Basin Network which was founded in 2004 and is a partnership for the management of local natural resources among stakeholders in the area such as Doi Inthanon National Park, Ban Luang municipality, village headman, royal project, Raks Tai Foundation, Sustainable Development Foundation, and IMPECT. There were meetings to analyze the situation; to plan for problem resolution related to natural resources; to develop regulations; and to strengthen the mechanism of the network which was accepted by all sectors in the area.

With the involvement in these two networks, Ban Hak-kia and other communities have received positive impact such as the Doi Inthanon National Park's officer changing attitude to the villagers and gaining understanding on the role of local people in the preservation of natural resources. Moreover, the leaders are capable of explaining their livelihood and practices to outsiders; there are more collaborative activities with all sectors such as forest ordination, conservation of aquatic animals, and solving of problem on land use. The villagers' fear of the Doi Inthanon National Park officer has lessened, and they feel closer than before when violations occurred in the area. The officer of Doi Inthanon National Park will help to mediate, monitor and punish according to the regulation. If this process cannot solve the problem, then the committee of those two mechanisms will be invited to make a decision, and use state law.

(1) Local government / government agencies involved including Doi Inthanon National Park, chief District of Ban Luang district municipal, Network of Mae Ya – Mae pon river basin, and community learning centers.
(2) Other institutions such as the HNCC, RaksThai Foundation, IMPECT, Buddhist monasteries, and church (both Protestant and Catholic).

Lessons learned in addressing disasters

1) Villagers have accumulated knowledge on climate change adaptation from experience and their practices such as the observation of the wind direction and direction of flash flood, thus they keep the big trees and plant additional trees to prevent flooding and reduce the risks.
2) The application of new technologies impact on the quality of natural resources.
3) The adaptation was done for survival under the climate condition such as changing of new rice species, new format and method, choice of plants and crops that use less water, building dam for irrigation, planting beans to increase nutrients to the soil, and planting more varieties.
4) There is animal husbandry in the village for their food security and the dung was made into fertilizer.

Lue thi is a Karen traditional ritual to conserve river and aquatic animals.

5) With natural resources management, land was divided into three categories: useable forest, conservation forest, and cultivation land. This prevents the encroachment of monoculture crop and it was found that the natural resources in this community are more abundant. Some of the traditional practices are still being carried out in this community such as "Lue thi" which is a traditional ritual to conserve river and aquatic animals, and fire breaking lines to prevent spread of fire. We observed that there are several forest products that are available and sufficient for the villagers and the nearby communities. The collaboration with HNCC and Network of Mae Ya – Mae pon river basin has been ratified by other government agencies.

Continuing gaps and challenges

Inaccessibility of facts, information and knowledge on climate change to the community, and the indigenous knowledge on adaptation is not shared and recognized as well.

1) The state laws and policies are limited to fulfill Indigenous rights and human rights; villagers are limited to access the rights to manage land and resources in their territory. Since Ban Hak-kia was declared as Doi Inthanon National Park in 1977, there were a number of indigenous people arrested on charges of forest Lue thi is a Karen traditional ritual to conserve river and aquatic animals. encroachment and they had to pay fine to the government, and this situation made the villagers feel insecure in their land.
2) Lacking knowledge on impact of disaster, traditional knowledge and experience on adaptation to climate change and disaster risk reduction should be applied, since there was no disaster found in this village which is serious enough to cause migration. However, they have indicated the changing of climate that occurred in the community.

Challenges

1) The learning and experiences of planting crops and selecting seeds that are suitable to the changing of climate, and supporting the food security for villagers.
2) Alternative occupation that is friendly to the environment and increases income generation such as handicraft, eco-tourism, collecting forest products, etc. which is less vulnerable and risky with the changing of climate.
3) Appropriate policies of relevant organizations that provide support to indigenous practices.

Overall conclusion and recommendations

The implementation of this study has increased the learning process of the project staff and community leaders involved in the study. They have reviewed the situation related to climate change and disaster occurrence in the community and also collected local knowledge on adaptation to climate change and disaster risk reduction such as knowledge on soil, water, wind, fire, agriculture, and management of natural resources. Moreover, it analyzed the social role of the community structure and the recommendation to solve the problem at the community and national level was brainstormed as well. The results of this study are significant to encourage communities to recognize the value of existing knowledge and for them to realize the importance of their participation which is for the good and use of their own community.

Recommendations for community and local authorities

1) Indigenous communities must develop climate change adaptation and disaster risk reduction plans that can be practiced and proposed to the related agencies for support.
2) Indigenous communities and local authorities must develop a management mechanism in the area (at the community, watershed, and ecological sites) based on community rights and rights of indigenous peoples, especially with the network that is involved in the community as well as the communities located in the upper stream and lower area, and plan for sustainable approach and solutions to the problems.
3) Indigenous communities and local authorities must have access to resources and funding to implement activities on adaptation to climate change and disaster risk reduction, and to support the revitalization of the ecosystem, the modification of agricultural adaptation, including income generation that is friendly to the environment.

4) Local authorities must develop data system on statistics, situation, and adaptation and disaster risk reduction to climate change that is appropriate to the community.

Recommendations for policy and government agencies

1) State must take measures to ensure land tenure of indigenous communities that have been declared as protected forest area to achieve stability in agricultural and residential areas.
2) The State has to take measures to promote the use of traditional land and natural resource management, especially in areas at risk to disaster and climate change.
3) The state should resolve the problem on smoke, fire, and fuel management which involves indigenous communities.
4) The state should support the development of a data center on adaptation to climate change and disaster risk reduction at the local level, update the information on communities that may be affected, and encourage the community to access the data and apply these to land management.
5) The state should support capacity development on climate change adaptation and disaster risk reduction, management of natural resources in a sustainable community, set up funding to support the adaptation of indigenous communities.

Community people help each other to draw the community map and identify hazard zone, forest, farming area and their residential area.

Annex

Table 1 : the use of forest of Ban Hak-kia

Category	Species of animal and plant found in the community
Wildlife	Wild boar, deer, grouse, squirrels, chipmunks, flying lemur, slow loris, weasel, mountain rats, quail, bird, rodent, manis, talpidae, shell, Snakehead murrel, Minnow, cobra, turtle, mountain turtle, eel, bamboo Caterpillar, Dynastinae, bee, wasp, cricket, mole cricket, insect, dung beetle, grasshoppers, cicadas, and ko mi sue.
Vegetable	banana-blossom, Banana tree, Marsilea crenata, Paco Fern, Lasia Spinosa, Caladium, Centella asiatica Urban, Azadirachta indica Juss, ber kha pri dor, la li dor, khor khor dor, ki k odor, bamboo shoot, chameleon plant, no dor
Fruit	Broken bones tree, Baccaurea ramiflora, Mangifera pentandra, Jambolan plum, wild longan, olive, per dae sa, se dui sa, se ker moo, ta kue sa, se der po, se ya sa, se tu mae.
Mushroom	Kue ta lu, kue bler, kue tho pri, kue wa kho, kue la thor, kue I, kue chae, kue dae phor, kue khor, kue ner mu, kue ma mae, kue se cher, kue li, kue cho, kue chi bor, kue yae na
Herbal plant	Ter si pa do, se ngi kha, sa ker wa, per tor mae, ker ma, thi due, kho thi kha

Table 2 : Local seeds

Kinds	Number of specie	Local name
Rice seeds in the paddy field	6	Bue po lo, Bue pa tor, Bue chor mi, Bue pho pri, Bue pa do, Bue pue  Bue pa do
Rice seed in the rotational farming	5	Bue kuey, Bue ner mu, Bue kor si, Pi ei su, Bue kor
Vegetable	7	Ser ba Dor, Ser ba pho, Ser ba do/ kae, Ser ba chi, Hor ter der, Sor kha dor
Onions	11	Hor wor, Hor pui, Por kae, Hor wor se, Hue po, Hue po kor la, se kler, e kler, phor si mue, pha chi, hor wor ter po, hor ker a
Sugarcane	3	Ker thi u, ker thi bue, ker thi wa
Pumpkins	12	Di kae, di la kho, di mue, lue sa, lue pru, lue ke bor, te re sa, ter ko sa, da ngue sa, si pho se, ser kor ble
Chili	6	Mue sa yue a, mue sa ber, mue sap ha do, mue sa nae mue, mue sa chor khor me jue, mue sa wa
Eggplants	11	Ser kor hor, Ser kor jor, Ser kor kha bi na, Ser kor kha, Ser kor kha kor la, Ser kor khae, Ser kor kha pler, Ser kor ta do mae kli, Ser kor jor lue, Ser kha vi jue, Ser kha tor pa ne
Taro	6	Kue su, Kue kwa, Kue kor la, Kue ner mu, Kue dor chor, Kue kor
Potato	6	Noi kwa, noi se, noi sa ku, noi ker chor kor lor, noi su, kor ter
Ginger	3	Se ae che, Se yor, Se ae

Sorghum	2	Pe ser blae, pe cher bo
Kinds	**Number of specie**	**Local name**
Sesame	3	Nor su, Ni so su, Ni so kwa
Bean	9	Se be sa, Bor ba per vi, Ber ba sue ner, Ber ba khor jue, Ber ba per, Lae na, Per tor kho, Per tor wa, Per tor bor ue, Per tor kor la
Millet	3	Ber na thi, Ber pa thor, Ber po lo Ber po lo  Ber po lo
Flower	7	Bae se, Bae po, Por thu, Por kor, Por ki mae, Por je, Por chor pa kho si
Herbal plant	7	Plae ko chu, Por ker su, Por u or, Por ka jue, Lor lu mue, Por kri
Total	**107**	

References and glossary

Primary information

List of the villagers who provided information

1) Mr.Tura Chamnansrisawat
2) Mr.Tidu Mekwichianwong
3) Mr.Sridaeng Thanasrichomrak
4) Ms.Sriwan Phetpanarak
5) Ms.Paemu Wisetprakan
6) Mr.Pongpat Wisetprakan
7) Ms.Nochi Thanasrichomrak
8) Mr.Yaemu Thanasrichomrak
9) Ms.Ngern Laprapankul
10) Ms.Moon Buranapraiwan
11) Ms.Keka Damrongsaruekan
12) Mr.Cherla Laprapankul

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Indigenous Peoples' Good Practices in Climate Change Adaptation and Disaster Risk Reduction:

A case study of Taloctoc Tribe in the Northern Philippines

Background on the Research/Case study

The Cordillera Disaster Response and Development Services (CorDisRDS) is a disaster response and preparedness Non-Government Organization, but it does not concern itself only with disaster risk reduction (DRR) and management. CorDisRDS is also involved in sustainable development work amongst indigenous peoples (IP) in the Cordillera; hence, CorDisRDS has to think beyond the present and urgent needs of IP communities during times of disaster. Part of its programs and services is to prepare community profiles and risk assessments to understand the situations of the communities assisted. It is the primary activity before extending further assistance. The result of the study would be the basis of CorDisRDS and assisted communities to plan for joint undertakings. By involving the community people in the research processes, data gathered are accurate and a learning experience for them. While they are involved, they become aware of the root causes of their problems including the effects of climate change to which they can propose doable actions.

In conducting community profiling and community risk assessment (CRA), tools such as seasonal calendar, disaster history, hazard assessment matrix and risk mapping were used. In the CRA tools, data pertaining to climate change impacts, and mitigation or adaptation measures by the community were incorporated. Initial community profiles contain preliminary social investigation as we work together with the community. Deepening social investigation is done with focus on mode of production and natural resources management systems. In the course of the study, traditional knowledge, practices and values are specified, the factors why these are still persistent or disintegrating.

In Taloctoc, Tanudan, Kalinga, the initial social investigation was undertaken in 2012, followed by community risk assessment and documentation of natural resources management practices in the first quarter of 2013. The information gathered pertaining to indigenous socio- political structure, traditional knowledge; practices and values were inventoried and described. Very interesting and unique among the traditional practices of the Taloctoc tribe is the practice of Takkombang.

With AIPP support, we took this opportunity to conduct the case study on Takkombang which we thought is an appropriate topic that shows the ability of IPs to adapt to the effects of disasters and climate change. The case study aims to document how the IPs were able to come up with this farming system, its advantages and disadvantages and the challenges of this practice in consideration of the worsening effects of climate change and high impact disasters.

The research team applied participatory research thru focus group discussions and Key Informant Interviews (KII) among selected community members who are aware and practicing Takkombang and representatives of stakeholders. The consent of the community thru the barangay officials and officers of the community organizations was sought and they helped in identifying the respondents. A community meeting was also conducted wherein the result of study was presented to validate the data. The draft report was deliberated by the research team before it was submitted to AIPP.

Executive Summary

This case study report on Takkombang contains the experiences of the Taloctoc tribe in Kalinga, Cordillera Administrative Region in Northern Philippines, on how they adapted to scarcity of water to irrigate their rice fields. It is a practice which was initiated by a few farmers in the 1980s and eventually became a farming system of the community. The findings of this case study demonstrate how the IPs in Taloctoc are knowledge bearers, teacher-informed experts and how they generously share their innovation to their village mates.

It also presents CorDisRDS' approaches to development work particularly on disaster risk reduction and sustainable development. The research team utilized secondary and primary data to frame the report. Focus group discussions, Key Informant Interviews (KII) and community meetings were the means to involve the respondents in data gathering and validation. The transect walk to the rice fields and sources of irrigation was helpful in describing the farming system.

Taloctoc is a far-flung community in Kalinga which can be reached by a four hour hike from the provincial capital of Tabuk. Farming is their main source of livelihood. Government support to this place is minimal. Like other IP communities, they value their resources and conserve their culture and traditions. The place is threatened by typhoons, drought, landslides, pests and diseases, militarization and development aggression. Water supply for irrigation has become a problem of the villagers since the 1980s which has been affecting food supply especially rice, which prompted their idea to practice alternative farming system called takkombang. Takkombang is governed by agreements of involved farmers and it promotes working together to maintain rice plants and irrigation systems. It encourages better water management and increased rice harvests. However, there are disadvantages such as proliferation of pests, loss of pasture land, potential loss of traditional rice varieties and farmers are always preoccupied with daily farm work.

In this experience of the Taloctoc tribe, it proved that traditional knowledge and practices can provide solutions to the impacts of climate change and help people become better prepared for impending risks; however with the inappropriate government programs and worsening effects of climate change, the hard work, traditional knowledge, innovations and survival of the indigenous peoples will continue to be threatened.

Introduction

The indigenous peoples in the Philippines represent between 10% and 20% of the national population, which is currently estimated to be 102.9 million. The indigenous groups in the northern mountains of Luzon (Cordillera) are collectively known as Igorot while the groups on the southern island of Mindanao are collectively called Lumad. There are smaller groups collectively known as Mangyan in the central islands as well as even smaller, more scattered groups in the central islands and Luzon, including several groups of hunter-gatherers in transition.

Indigenous peoples in the Philippines have retained much of their traditional, precolonial culture, social institutions and livelihood practices. They generally live in geographically isolated areas with a lack of access to basic social services and few opportunities for mainstream economic activities, education or political participation. In contrast, commercially valuable natural resources such as minerals, forests and rivers can be found mainly in their areas, making them continuously vulnerable to development aggression and land grabbing.

In recent years, the Philippines has experienced various disasters. These include flooding, typhoons, earthquakes and drought among others. These incidents have resulted in negative impacts for indigenous peoples such as greater food insecurity, destruction of livelihoods, lands and resources, displacement and health problems

The increase in climate-induced hazards such as landslides and floods has led to deaths, destruction of homes and damage to property. Important infrastructures have been submerged and destroyed, while floods and landslides causing isolation of some communities have disrupted transportation.

Disasters and climate change have adversely affected the traditional livelihoods of indigenous peoples such as subsistence agriculture, fishing, hunting and gathering. Agriculture has been adversely affected due to floods and less rain or extreme temperatures. The agricultural calendar is affected, as it is difficult to predict the weather for cultivation, planting and harvest, leading to deviations from traditional farming practices. These have impacts on crop production, such as poor harvest and destruction offarms, less cropping seasons, decreased crop yield due to unsynchronized planting and harvest, and crop damage due to increasing pest infestations (e.g. rats, giant earth worms).

Increasingly prolonged drought has severely affected the crops and has caused forest fires. In recent years, droughts frequently occurred destroying the harvests and causing forest fires in large scale. Other forest-related problems include erosion of mountains and forests due to landslides during typhoons and heavy rainfall; decrease in the population of forest animals; depletion of forest products such as honey, plants, bamboos and small trees for building and changes in the practice of swidden farming or shifting cultivation in forest areas.

Climate change has caused the degradation of the environment and biodiversity loss, leading to the loss of related indigenous knowledge and practices. Loss in biodiversity includes the loss of indigenous species of seeds and plants, decrease in animals and some local medicinal plants can no longer be found in the forest.

People's health is also affected with the emergence and rise in cases of new and infectious diseases and increasing number of flies and mosquitoes. There is an increase in diseases associated with increasing temperatures and vector-borne and water-borne diseases like cholera and dengue fever. Cold spells also result in health problems such as hypothermia, bronchitis and pneumonia, especially for the old and young.

Social-cultural changes are observed such as migration and forced relocation due to natural disasters. Furthermore, climate change impacts are worsening the socio-economic difficulties already being faced by indigenous communities including discrimination, displacement, political and economic marginalization, lack of social services and unemployment. Other serious social consequences are vanished indigenous religions, cultural practices, knowledge and traditions. In addition, government neglect of basic social services, infrastructure and disaster preparedness and response mechanisms and prevailing poverty and marginalization of indigenous peoples' communities further increase their vulnerability to extreme climate conditions and affect their capacity to adapt to natural calamities.

Indigenous peoples continue to face major problems due to large and medium scale corporate mining, unregulated and non-community controlled small-scale mining, various hydroelectric dams, and other energy generation projects. There was an observed revival of plans for large dam projects

in indigenous communities. The Jalaur River Multipurpose Project in Panay island in the Visayas, which will start implementation in 2016, will affect 17,000 indigenous Tumandok. Numerous other dam and energy projects in indigenous communities around the country are in the pipeline including Pulangi Dam V, Kaliwa- Kanan (Laiban) dam, Sierra Madre dam, Balog-balog dam, Tinoc mini-hydro power plant, Alimit hydropower complex, as well as a host of geothermal and coal fired power plants.

The Philippines enacted the Philippine Disaster Risk Reduction and Management Act (RA 10121) in 2010. RA 10121 provides legal and institutional basis for disaster risk reduction and management (DRRM) in the country and helps ensure the development of policies and plans, implementation of actions and measures pertaining to all aspects of DRRM, including good governance, risk assessment and early warning, knowledge building and awareness raising, reducing underlying risk factors, and preparedness for effective response and early recovery. RA 10121 also calls for the development of a National Disaster Risk Reduction and Management Framework (NDRRMF) which shall provide for a comprehensive, all hazards, multi-sectoral, inter-agency, and community-based approach to DRRM.

The Philippines also passed its Climate Change Act (RA 9729) in 2009 to ensure the mainstreaming of climate change into the national, sectoral and local development plans and programs, in synergy with disaster risk reduction. The Act also mandates the creation of the Climate Change Commission and the National Panel of Technical Experts. The government has established a People's Survival Fund, which is a domestic "rewards fund" aimed at addressing urgent adaptation needs at the local level, and to finance adaptation programs and projects that are directly supportive of the objectives enumerated in the Climate Change Action Plans. There is also the National Climate Change Action Plan (2011) that outlines the specific long-term program and strategies for adaptation and mitigation, and subsequent action plans of local government units and communities.

The government's National Greening Program (NGP) aims to plant 1.5 billion tree seedlings in 1.5 million hectares of public lands and to conduct land surveys nationwide from 2011 to 2016. The NGP is a government priority program aiming to reduce poverty, promote food security, environmental stability and biodiversity conservation, and enhance climate change mitigation and adaptation. Included in the areas targeted for tree planting are indigenous peoples' ancestral domains.

A Case Study on Takkombang, a water management practice of the Taloctoc Tribe

General information on the case study area:

The study area is Taloctoc, Tanudan in the province of Kalinga. Taloctoc consists of two barangays (Upper and Lower Taloctoc) occupied by the Taloctoc Tribe, one among the indigenous peoples (IP) in the Cordillera Region, Northern Philippines. The place is about 5,900 hectares, mostly characterized by rolling to moderately steep slopes. As of 2015, the total population is 2,342 (males 1,208 and 1,134 females). The Taloctoc tribe was one among the tribes to stand against the construction of a mega dam along the Chico River in the 1980s and presently, they are threatened by two big dams along the Tanudan River instigated by the government and capitalist investors.

Upper & Lower Taloctoc, Tanudan, Kaling Photo by: Sarah Fialen, CorDisRDS Staff

The place is about four (4) hours ride from Tabuk City, the capital of Kalinga Province via Calaccad with a distance of 25 kilometers. The road became passable only in 2013. Since it is still new, it can always be damaged during the rainy season and typhoons. The earth road is narrow, poorly maintained, with no drainage, and dangerous due to thick loose soil and a deep ravine on one side. It is a seasonal road, passable only by converted trucks and 4x4 type vehicles during dry months. The alternate route is via the Tabuk-Bontoc Road after a 45 minute ride, then a boat ride to cross the Chico River and four hours hike passing steep pathways.

Ninety percent of the villagers primarily rely on farming for livelihood. Rice is the major crop with two croppings in a year. Rice production is generally intended for household consumption. Other crops are vegetables, root crops, legumes, coffee, fruit trees and sugarcane. Except for coffee that is a cash crop, all the secondary crops are for household consumption. However, in cases of surplus harvests, these can be sold within the community, to nearby barangays and in Tabuk City.

The residential area is clustered and located in flat to sloping portions of the village. The houses are built almost similar to each other (a two-storey structure with 25-35 square meters at most) made of wood, bamboo and galvanized roofing (thin corrugated metal). It was only in 2013 that the national grid powered the community. Almost all households rely on firewood for cooking.

Since the late eighties, the people have gradually migrated to Tabuk City, especially those who finished college education and found employment at the provincial capital and in other places. Because of the boom of paid jobs, almost half of the households left Taloctoc. Some houses were dilapidated while their relatives who were living in the village inhabited others. Occasionally, families who left the place return to visit their relatives and to harvest coffee during harvest time.

There is a health clinic manned by a midwife and Barangay Health Workers (BHW) extending basic health services but it still lacks facilities and medicines. The nearest hospital is located in Bulanao, Tabuk City. Elementary and high schools are available; however books and school facilities are inadequate or obsolete. There are a few college educated youth supported by government scholarships or who supported themselves by working as household helpers while in school. After schooling they move away to work in the cities. Almost all the people in the place are literate except for a few elders.

Cellular site had reached the place that facilitates communication between and amongst the community members especially during emergencies. Brief description of the past and present situation of the environment and climate, and types of disaster of the study site The community members recalled that strong typhoons usually occurred from July to October and the driest months were from April to May. However, in 1995, they started to observe gradual changes in the usual pattern of wet and dry months until in 2000 wherein climate change effects were seriously felt. The heat of the sun was more intense while it became colder during December and January. Wet and dry seasons became abnormal; sometimes late or early for one to two months.

With the warmer weather, the farmers observed that rice plant easily grew but during cold months, plants were stunted. Due to the unforeseen rains that may come earlier or later than its usual period, the farmer's agricultural calendar was distrurbed. Traditional warning systems on weather pattern used by elders were not applicable due to change in the character of nature and climate. The old folks used to predict typhoons and other weather conditions by observing appearance of rare birds, flowering of trees and cloud behaviours.

Generally, the environment of Taloctoc is still preserved because they have a community policy on preserving their natural resources. Clans own the productive and residential lands while hunting grounds are communal. They rely on their natural resources for survival so extracting resources is governed by the concept of *"get what your family needs today and save the rest for the coming days and for the future generations*." There are designated areas for upland farming wherein indigenous soil preservation is applied; moreover, cutting of trees in watershed areas is regulated. Only matured trees can be cut for construction of houses and rice granaries of community members. People from other barangays are not allowed to cut trees within the territory of the Taloctoc Tribe. Burning of mountains and illegal cutting of trees for selling are strictly prohibited, violators are penalized by applying the community policy. The existing barangay officials adopted the community policy by documenting them and eventually this became a barangay ordinance.

The natural soil fertility is maintained by following the traditional way of farming such as use of organic materials to enhance soil fertility. There are also cultural ways of controlling pests such as use of traps, scare crows and insect repellent plants. There are a few who use chemical inputs but this is strongly discouraged by most of the community members especially the elders and women.

Water sources are preserved, however community members claimed that the original amount discharged by the creeks, springs and other water sources became lesser and lesser. They attributed the decreased water to the earthquake in 1990, series of droughts and the warming temperature that increases seepage and water evaporation.

The disasters experienced by the Taloctoc tribe are the following:

Tribal war. Tribal wars with other tribes in the olden times up to the 1980s happened due to retaliation to killing either initiated by Taloctoc tribe or the opposing tribe. The tribal wars brought great loss to their economy, as the usual economic activities were disrupted because men were busy guarding their people, women, elderly and children were quarantined and it caused deaths of tribal warriors. Due to the bad effects of tribal war, the Taloctoc tribe ceased engaging in it, instead, they strengthened their bodong or peace pacts with other tribes to resolve conflicts peacefully.

Emergence of pest and diseases among humans, plants and animals. Particularly in 1986, golden snails started to invade most of the rice fields by eating the newly planted rice which decreased the yield. In the same year, measles was prevalent among children due to lack of vaccines / medicines and the difficulty to bring patients to the hospital, thus a significant number of infants died. In 1987, an animal disease called blackleg caused deaths of cows and carabaos. In the early 1990s, High Yielding Varieties (HYV) of rice were introduced by the Department of Agriculture, which caused the emergence of new pests such as dangaw, igges kalaw, and tutok (these are new insects and viruses). The presence of these plant pests caused a few farmers to use chemical-based pesticides to combat extensive infestation of rice plants.

Earthquake. A strong earthquake occurred in 1990. Though no one was injured, it caused damages to the irrigation system; water sources dried up; water exits on the ground shifted; and a series of landslides occurred on trails and rice fields. After the earthquake, there were residential areas that sunk and soil cracks were observed in the mountains. In recent years, the mountains have started to erode with continuous rain. The sinking portions in the village have worsened, posing danger to the community members.

Militarization. In the late 1980s, the government army encamped in the village, and people were restrained and restricted to go to the fields. The situation caused food shortage and trauma among the community members because their economic activities were disrupted when soldiers harassed them and looted their properties. A number of families migrated to Tabuk City due to fear of the atrocities of the government's army. In 1987, a military detachment was permanently established and the army's presence always posed danger to the villagers and their youths were recruited as para-military forces especially in 2012.

Rains and Typhoons. Ever since they can remember, the community members claimed that rains and typhoons hit the community yearly. The typhoons caused isolation and inaccessibility due to damaged pathways and impassable roads. These also resulted in damaged crops, swollen water sources, washed out irrigation systems and rice fields. Whenever the Tanudan River swells, carabaos grazing along the riverbanks are swept away and crossing the river becomes extremely dangerous.

Drought. The normal months of the dry season extended which caused dwindling of water supply for both domestic and irrigation uses. This started in 1972 when the villagers experienced famine because of dried up irrigation and water sources. Simultaneous with the drought was the proliferation of rats that ate their crops. Another instance was in 1997 with similar effects of drought aside from the incidence of skin diseases among the villagers. There were also instances of shortened dry season and too much rain, which affected their usual economic activities.

The traditional knowledge, practices, values and innovations of indigenous communities in the study sites for climate change adaptation and disaster risk reduction

Being a community of indigenous peoples, the Taloctoc tribe has been maintaining their traditional knowledge, practices and values especially on environmental care, sustainable agriculture and preservation of their ancestral land. Particular to acclimatizing to climate change effects that impact greatly on water supply, a water management concept called takkombang was initiated by five middle-aged men due to the burden of maintaining their old earthen irrigation system in the late 1980s. They were compelled to think of a remedy to cope with water scarcity because of the decreasing volume of water from springs and creeks that were tapped for irrigation. Moreover, water seepage was extreme especially during the dry season resulting to low productivity and abandonment of rice fields. They had been asking support from the government to improve the irrigation canals but the projects that were supposedly implemented became milking cows of politicians and contractors.

During that time, all households experienced rice shortage for three to six months. They had to buy rice in Tabuk City and carry the sacks on their back for four hours passing steep pathways since there was no road going to their community. During rainy months, accessibility problems heightened because pathways were sometimes impassable due to big landslides and swollen river. In some cases, isolation lasted for a month with many landslides along the pathways needing to be cleared.

Takkombang means not following the normal agricultural calendar for planting rice. It entails rice planting in between the two normal rice croppings. It is not a synchronized way of planting rice. The normal cropping season is twice a year, of which the main crop or dinagon is from February to June and the second crop locally called sawali is from July to December. The concept of Takkombang is to ration water supply alternately and only specific portions of rice fields are planted according to the amount of available water for irrigation.

To practice takkombang, all the landowners of the specific rice fields have to unite on the following:

- Clustering of rice fields based on proximity
- Formation of a farmers group based on the clustering
- Calendar to guide the use of the irrigation and the group that will do the first, second and third cropping.

All landowners or tillers per site of rice fields (locally called dumapat) who practice Takkombang are obliged to follow the agreement. In case group members failed or missed on their scheduled turn to plant, they have to wait for their next turn. In case of water shortage or drought, farmers with wide rice fields within the site employing Takkombang waive portions of their fields. As much as possible, all rice fields involved in takkombang are entitled to two croppings yearly.

In one of the sites visited during this study, the rice fields were divided into three clusters comprising of around 10 to 15 landowners. The first cluster assigned to plant commenced by preparing a small portion of the rice field through ammoyo or collective labor among the members of the group to sow the rice. Sowing in one field facilitates the concentration of water for the germination of the seeds and synchronized planting of all group members. Upon sowing, land preparation follows through the aid of a carabao to plough the rice fields. In a span of 30 to 45 days, all the rice fields belonging to the first cluster have been planted and they have the priority right to use the irrigation until the ripening stage of the palay (rice) wherein water supply is not necessary. While the rice plants are on their milking

stage (development of grains), the next group prepares their rice fields and sow seedlings. After two and half months of use by the first group, the irrigation will be handed over to the second group. The third group follows the process undergone by the first and second groups. When the rice planted by the third group is at the ripening stage, the first group starts to prepare their rice fields and sow seedlings. In this system, all the rice fields are planted twice a year despite scarcity of water for irrigation. The figure below demonstrates the clustering and the stage of the rice plants:

Figure 1 : A site of rice fields applying Takkombang (September 18, 2016)

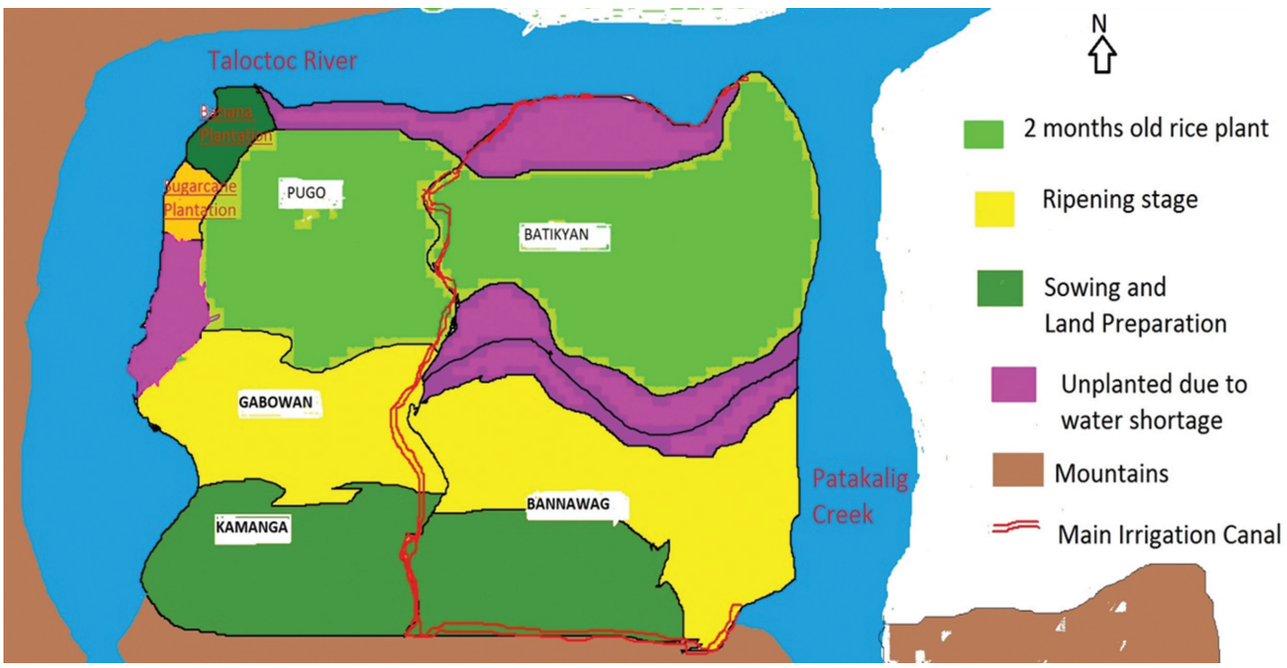

Figure 2 : The actual view of the ricefields (based on Figure 1)

View of Pugo and Batikyan: Rice plant on growing stage

View of Gaboan: Rice plant on ripening

View of Kamanga and Bannawag: Preparation for Sowing of seeds and soon for plowing to prepare the fields for planting

It is the responsibility of the assigned group to maintain the irrigation system. Moreover, the groups are transformed into work formations to help each other during the whole stage of farming through the ammoyo, a collective and exchange labour practice especially during sowing, transplanting and harvesting periods.

Takkombang was introduced in the late 1980s and implemented in certain sites but in recent years, wider and more rice fields are practicing Takkombang. The Taloctoc people decided to change their farming practice because they noticed that there was lack of food in some households due to low yields because of water problems and water scarcity. The peak of food shortage is from March to July and this period needs more management in watering the fields. Half of the families in Taloctoc are now practicing Takkombang.

When doing Takkombang, the farmers plant biit rice varieties or HYVs that have adjusted to the weather and organic farming system and which can be harvested in a shorter span than the traditional rice varieties (TRVs). TRVs which take five to six months to harvest are not suitable for the takkombang due to their longer life span which entails longer period of needing water for irrigation. The use of HYV is crucial when practicing the takkombang because of the shorter growing period and shorter period of needing water to sustain the plant. Though the HYVs planted in Taloctoc have already adapted to the weather and grown organically, it is still prone to pests and diseases.

The rice variety has also implications on the way the rice is harvested, where the HYV is harvested with a sickle instead of a lakem, a traditional harvesting tool. This is an easier way to harvest the rice, in comparison to the way the traditional rice varieties are harvested. Drying the rice, on the other hand, needs to be done with more care, otherwise molds grow on the rice. Sometimes some people use chemically-based fertilizers to grow the HYVs.

The impacts of Takkombang : the advantages and disadvantages as observed by the people in Taloctoc:

ADVANTAGES OF TAKKOMBANG

1. **Continuous food supply:** The quantity of rice harvest is more spread over the year because most of the rice fields are cultivated. The community members said that no single household is buying rice outside, though there are a few families who reported that though their harvest is not enough for their year-round supply, they can buy or borrow rice from their neighbors. Now, the Taloctoc tribe can manage their rice stock and this is even a source of cash since 35% of the total households have surplus. In times of disasters and widespread food crisis in the town centers, the Taloctoc tribe has food security. They have the capacity to provide their own food and have rice stock for at least three months.

- **Mr. Tanding is one among the five farmers who conceptualized takkombang. He harvests 60 cavans of unmilled rice every cropping, and in a year, he has 120 cavans from where takkombbang is applied. His family can only consume 48 to 60 cavans a year, thus the surplus is more or less 60 cavans. Since 2015 during dry season, he vends few of his surplus harvest to Tabuk City.**
- **Mr. Sulca, also one of the initiators of takkombang made an extension of his rice granaries because his rice harvest is regular; he said that some of his present stocks were harvested five years ago.**

Mr. Sulca (middle) showing one room of his rice granary full of harvest

2. **Better water-management:** Since planting is not synchronized anymore, water can be managed better. Before the practice of takkombang, they had to stay awake all night to manage the water, so that no one will divert bigger amounts of water to his/her rice field.

Sometimes, it even caused misunderstanding among the community members if somebody tried to divert more water to his rice fields. Despite equal sharing of water, their harvest was less and more rice fields were not planted since the irrigation system relies much on an unsteady water source and the irrigation is too small to reach the outermost areas. The main advantage of the *takkombang* is that people have stopped quarreling about the water supply.

Zenaida, a woman-farmer said, *"When takkombang was employed to ration water for irrigation, I need not alternate with my husband to watch the water during night time. Now, we can sleep together at night and have time to help our children in their studies and since we have enough supply of rice, I can stay home during lean work in the farm to take care of my children and grandchildren."*

Zenaida with her granddaughter Maud

3. **Improved awareness to preserve sources of water:** Since they have realized the importance of water for food production and domestic uses, the watersheds are safeguarded from tree cutting. Though almost all watersheds are tax declared or under a "lakon" (ancestral land of families /clans), cutting of trees to sell as lumber is strictly prohibited.

   When the Department of Environment and Natural Resources (DENR) introduced the National Re-greening Program (NGP), the community did not allow new tree species to be planted in their domains. They prefer to plant fruit trees and propagate endemic trees that are water bearing.

4. **Promotion of indigenous support systems like *angkas and ammoyo*:** It is the obligation of the land owners and tillers to maintain the irrigation system. Prior to planting time, all

group members assigned to use the irrigation for the specific cropping period will fix the ir rigation system through "angkas," or "*bayanihan*" to make sure that maximum amount of water flows in the irrigation canals. In cases of damages or obstacles, all the group members are automatically mobilized to do repair. Moreover, in cases when a group member is not available during the *angkas,* he/she contributes food. When rice fields erode or are damaged during typhoons, the groups practice the *angkas* to help the landowners repair the damaged rice fields.

Throughout the cropping period, ammoyo or collective and exchange work is observed by the groups. It starts during sowing period wherein all group members are mobilized to prepare the field to sow the seedlings. After sowing, each member has a turn to take care of the seedlings until ready for transplanting. During rice transplanting and harvesting, *ammoyo* is employed to ease burden of every member.

Using scare blusters is a traditional way of driving rats away to protect the seedlings.

DISADVANTAGES OF TAKKOMBANG

1. **Increase of pests:** An increase in the types and number of pests was observed since the start of the *Takkombang.* People suspect that it was an effect of the year-round planting on rice fields that provided the food supply of pests. Previously, with synchronized planting, there was at least a one-month break before the next cropping so pests had no food and eventually died or left to look for food. *Dangaw* and rats are the prevalent pests that attack not only their rice plants but also other crops. This problem compelled farmers to use commercial chemicals to control pests when proliferation cannot be controlled by cultural and biological means.

2. **Continuous work:** Work has increased because farmers who employ *takkombang* and normal agricultural calendar in different sites of their rice fields have unending tasks. This caused other work to be put aside or became seasonal such as cutting of firewood, cleaning of coffee plantations, pottery, and weaving baskets. Some children are neglected because the parents are always working long days in the farm. Older children are trained to assume household responsibilities while younger children are sometimes not properly dressed, not fed or not assisted in their school assignments because parents are too tired at the end of the day.

   Often times, assisting agencies like the Cordillera Disaster Response and Development Services (CorDisRDS) and the local government units (LGUs) have to conduct organizational meetings, training and other activities at night or have these scheduled when there is less work in the fields.

3. **Gradual change of rice varieties, from traditional rice varieties to high yielding varieties:** Another point to consider in practicing takkombang is the possibility of losing the traditional rice varieties especially if all the rice fields will be converted to *takkombang* as rice planting system.

4. **Loss of carabao pasture land:** Before, people would leave carabaos in the fields after harvesting. Now, rice fields that are into *takkombang* cannot be for pasture because they are still planted. Pasturing on rice fields after harvesting contributes to sustainable agriculture because the carabaos eat the rice stalks and grasses, then they dispose their wastes in the fields and these are mixed with the soil during ploughing.

Roles and functions of traditional institutions and other organisations

Bodong or peace pact with other tribes is the existing traditional institution in Taloctoc but it does not have direct correlation with the study. Existing community organizations like the Timpuyog ti Mannalon iti Taloctoc (TMT) or Alliance of Farmers in Taloctoc, the KALIPI or women's organization and the Taloctoc Community Cooperative are actively campaigning to sustain organic farming practices, food processing and preservation. Their programs are geared towards promoting food security and sufficiency. Despite attaining enough rice supply, these organizations want to have nutritious and locally produced food so that in times of disasters, they can be self-reliant.

The local government (barangay), assisted by Cordillera Disaster Response and Development Services (CorDisRDS) with active participation of the community organizations, organized a tribe-wide disaster risk reduction management committee to ensure that the community people are prepared and capable to respond to the needs of those affected by disasters.

Among the activities implemented by these community organizations are the repair of basic community infrastructures such as water system, and cleaning and improvement of pathways through ammoyo or community work. TMT's products out of sugarcane are sugar, wine and vinegar. The women's organization maintains a community garden and seed banks, and some of their products are processed into chips, flour and noodles. The Cooperative acquired processing tools for coffee and managed the tree planting activities under the program of the DENR.

As mentioned, there are government agencies collaborating or extending services to the community in relation to issues on climate change and disaster risk reduction. These are the agencies and their programs that either support or cause the Taloctoc tribe's traditional knowledge, practices and values to disintegrate:

Department of Environment and Natural Resources (DENR) – In past years, DENR was negotiating with the barangay government to implement a reforestation program where they were introducing new tree species but the community did not entertain this since their forests have good vegetation. However, in 2014 DENR entered into a partnership with the Taloctoc Cooperative and implemented the National Re-greening Program (NGP), and a few members of the cooperative who availed of the program have chosen to plant fruit trees and endemic trees.

Department of Agriculture (DA) – Through its special program, particularly the Central Cordillera Agricultural Project (CECAP), irrigation systems were improved and new HYVs of rice were introduced in the 1990s. However, most of the irrigation canals were damaged by typhoons and landslides. The farmers observed that when more types of HYVs were accommodated, new pests emerged triggering them to use chemical pesticides, which were again introduced by DA technicians.

Cordillera Disaster Response and Development Services (CorDisRDS) – Our assistance to the community started in 2012 upon the request of Timpuyog ti Mannalon iti Kalinga (TMK). The program began with community profiling and risk assessment. Among the priority activities undertaken was the formation of a farmer's organization called Timpuyog ti Mannalon iti Taloctoc (TMT). After the launching of the farmers' group, a series of community trainings on Leadership, Sustainable Agriculture, Climate Change and Disaster Risk Reduction was jointly implemented with TMK and the local government. The projects implemented were sugar cane presser and repair of two community waterworks to bring enough potable water to the cluster of houses all over the two barangays. The output of the DRR training was the formation of a tribe-wide Disaster Risk Reduction Management Committee.

Timpuyog ti Mannalon iti Kalinga (TMK) – This is the province–wide farmers formation in Kalinga, and its programs include formation and strengthening of community-based farmers' organization to bring issues of farmers to concerned agencies. Among the activities implemented jointly by TMK and TMT were the active participation in the FPIC process on two planned big dams along the Tanudan River which the community members disapproved, and a training on Muscovado Sugar Production and organizational management.

Specific roles and contributions of indigenous women and elders

Indigenous women and elders are keepers of traditional knowledge especially on agriculture and resource management. The five men who introduced takkombang in the 1980s are the current elders. With more than three decades of practicing takkombang, they head the community members who planned to transform their rice fields into takkombang. Selected elders comprise the barangay *Lupon* (a council of elders who litigate cases of misunderstanding and violators of community ordinances) that ensures fair settlement of cases involving community members by following community norms and policies.

The women of Taloctoc are farmers and they participate in most of the agricultural activities except for work that requires physical strength like land preparation and hauling. Women lead in sowing and

transplanting of rice plants (also known as *palay*). They are also in charge of producing vegetables, legumes and root crops.

Traditional knowledge, practices and values are passed on to the younger generation. Notwithstanding the knowledge and skills learned by the younger generation from schools and influence of modern technology, indigenous peoples value the importance of nature, their homeland and resources, and the observance of traditions and practices which were inculcated in their minds by their parents and elders. The younger generations respect their elders.

Lessons Learned

After three decades of practicing takkombang, the lessons gained by the community members are the following:

a. Takkombang as a farming practice which was initiated by few farmers, prospered due to the support of fellow farmers who felt the same problem;
b. Food security is important to achieve with the worsening effects of disasters and climate change;
c. Traditional practices on collective work and mutual understanding are important factors in practicing takkombang;
d. Water is important in rice production, thus the watersheds must be preserved;
e. Before other rice fields are converted into takkombang, look for other alternatives to minimize the disadvantages especially the threatened loss of traditional rice varieties and proliferation of pests;
f. The usual farming system (dinagon and sawili) is still the best planting calendar but with the change in climate wherein rain, typhoons and drought are unpredictable, the IP farmers may not be able to practice traditional knowledge and practices; and
g. IPs should continue to safeguard their natural resources, as these are our only refuge from the effects of disasters and climate change

Continuing gaps and challenges faced by indigenous communities in the study sites in relation to climate change adaptation and risk reduction

The introduction of takkombang as a farming practice to manage water shortage was adopted by almost 50% of the community members since it was observed to be effective. However, there are still challenges, which are the stated disadvantages. The reality about climate change and disaster projections, government neglect, IP issues, poverty are among the sources of the challenges.

Landslides, washouts and leakages damage basic infrastructures like waterworks and irrigation systems during rainy months; while during dry months; people are affected by the risks arising from drought. The community must also study the types of projects that assisting agencies are introducing especially programs related to utilization of natural resources.

As to the functionality of the tribe-wide disaster risk reduction management committee established in 2015, there is a need to capacitate the committee especially on seeking funding from government agencies to provide support for their disaster risk reduction plan.

Overall conclusion and recommendations

The inaccessibility of the community honed the intellectual capacity of the indigenous peoples to innovate a farming practice and to become resourceful to be able to produce enough rice for their community. Takkombang as a planting technique in Taloctoc village has revealed positive and negative aspects. Rice field areas without adequate water supply and good irrigation system just do not have any choice. Water scarcity needs a lot of attention, and takkombang is one of the major solutions to cope with this problem. In addition, because the prospect is that summer will get drier and stronger typhoons are coming, the threat to food security may become worst for the people in Taloctoc. However, almost all the respondents are positive about the adoption of this farming practice in the face of the worsening effects of climate change and inappropriate programs of the government to address the problems.

If government agencies will keep ignoring the issues of IPs such as the provision of basic services and not recognizing their rights over their ancestral lands, their plight would remain. In the case of Taloctoc, why should the government insist on the reforestation program when in fact the vegetation of the place is still adequate? The implementation of the NGP in the area is funded by capitalist countries in exchange for continuing business that produces greenhouse gases which would result to irreparable damages that traditional knowledge cannot cope with anymore.

The people in Taloctoc, though optimistic that they can find ways to solve their problems, said that they continue to rely on outside support because their capacities are limited. One of the goals of the community is to strengthen their unity to protect their ancestral land and maintain their forests and watersheds to have enough supply of water. Stakeholders should support this goal.

In the present situation, far- flung IP communities and poor farmers who rely on nature to survive pay the consequences of climate change because of the exploitation of their natural resources by big companies and promotional technologies that have negative effects on the environment such as inorganic inputs for agriculture. Government programs should prioritize the needs of farmers and other vulnerable sectors over profit.

GLOSSARY

Ammoyo – A form of exchange labor applicable in agricultural works practiced by Taloctoc Tribe
Angkas – a form of collective work in IP communities
Biit – a general name of rice varieties with shorter life span (3 to 4 months after planting)
Bodong – refers to the peace pact or peace council used in the Cordillera Region, Philippines
Dangaw – an insect with foul odor that infests rice plant during milking stage
Dinagon – a term used by Taloctoc tribe and other tribes in the Cordillera referring to a rice-cropping period from February to June
Dumapat – land owners in a specified rice fields
Lakem – a cutting tool to harvest traditional rice varieties
Lakon – a term used by the Taloctoc tribe indicating ownership of a piece of land by a family or clan
Palay – common term in the Philippines referring to rice plant
Sawali – a term used by Taloctoc tribe and other tribes in the Cordillera referring to a ricecropping period from July to December
Takkombang – a farming practice in Taloctoc that does not follow the normal agricultural pattern for planting rice

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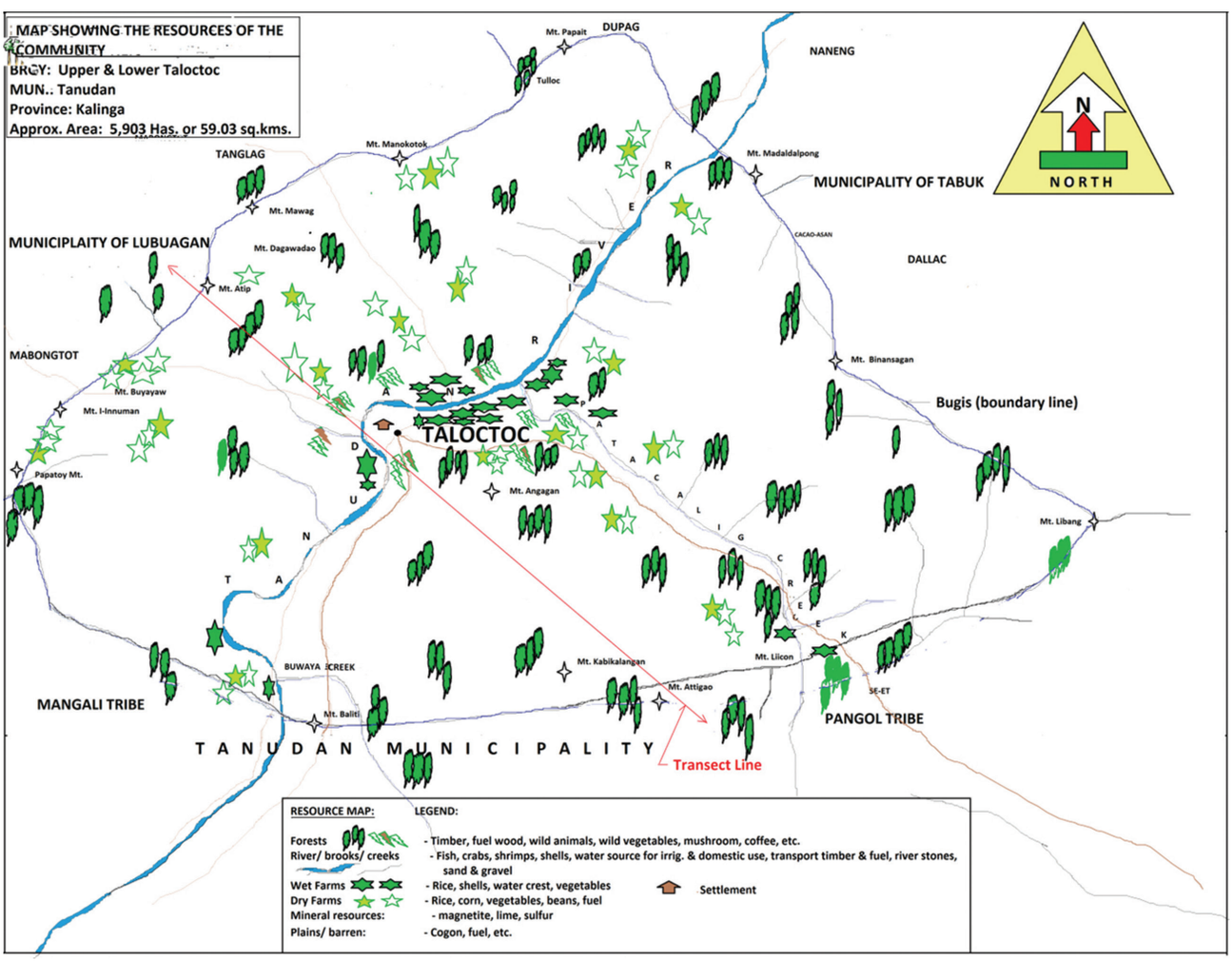

AIPP at a glance

The Asia Indigenous Peoples Pact (AIPP) is a regional organization founded in 1988 by indigenous peoples' movements. AIPP is committed to the cause of promoting and defending indigenous peoples' rights and human rights and articulating issues of relevance to indigenous peoples. At present, AIPP has 48 members from 14 countries in Asia with 18 indigenous peoples' national alliances/networks (national formations), 30 local and sub-national organizations. Of this number, 16 are ethnic based organizations, six (6) indigenous women and four (4) are indigenous youth organizations and one (1) organization of indigenous persons with disabilities.

Our Vision

Indigenous peoples in Asia are fully exercising their rights, distinct cultures and identities, are living with dignity, and enhancing their sustainable management systems on lands, territories and resources for their own future and development in an environment of peace, justice and equality.

Our Mission

AIPP strengthens the solidarity, cooperation and capacities of indigenous peoples in Asia to promote and protect their rights, cultures and identities, and their sustainable resource management systems for their development and self-determination.

Our programmes

Our main areas of work among the different programmes are information dissemination, awareness raising, capacity building, advocacy and networking from local to global. Our programmes are ;

- Human Rights Campaign and Policy Advocacy
- Regional Capacity Building
- Environment
- Indigenous Women
- Communications Development
- Organizational Strengthening

AIPP is accredited as an NGO in special consultative status with the UN Economic and Social Council (ECOSOC) and as observer organization with the United Nations Framework Convention on Climate Change (UNFCCC), Convention on Biological Diversity (CBD), Global Environment Facility (GEF), Green Climate Fund (GCF), United Nations Environment Programme (UNEP), World Intellectual Property Organization (WIPO). AIPP is a member of the International Land Coalition (ILC) and Global Environment Facility NGO Network.

Indigenous Peoples' Good Practices

in Climate Change Adaptation and Disaster Risk Reduction:

A case study of indigenous Karen community of Hak-kia village in Northern Thailand and *Takkombang* - a water management practice of the Taloctoc tribe in Northern Philippines.