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The Last and Largest of *Cephalanthus Tetrandra* Freshwater Swamp Forest in Northeast Thailand: Natural Resource Appreciation and Management of Local Community

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Abstract Initial study revealed that the freshwater swamp forest of *Cephalanthus tetrandra* trees in Don Daeng village, Nakhon Phanom province, is the only one of its kind in Northeast Thailand. This, then, led to questions as to how the community managed the forest's natural resources. This study found that the villagers' appreciation of the forest for their life, socio-cultural and farming support have contributed significantly to the preservation of the forest. Two approaches were employed in the management of the forest. The direct approaches include management of the freshwater swamp forest in order to preserve *C. tetrandra*, preservation of the lake as a main source of water supply, water management for off-season rice farming and protection of aquatic plant and animal as well as wildlife species, while the indirect approach concerns the worship of the villagers' ancestors' ghosts. The active participation of the local community in simultaneous management and preservation of the lake's natural resources should serve as a great example to other communities where *C. tetrandra* swamps used to be in existence.

Keywords: freshwater flooded forest, Chai Wan Lake, natural resource management

Introduction

Freshwater swamp forest is a wetland ecosystem flooded permanently or seasonally by a nearby river. In Thailand, dominant plant species of freshwater swamp (lake) forests include bamboo, Cephalanthus tetrandra (*Cephalanthus tetrandra* (Roxb.) Ridsd. and Bakh. f.) or a mixture of both. Cephalanthus tetrandra or local name called Chai Wan are found along the lower Songkhram River and along the Moon River (Biological Diversity Division, Thailand, 2011).

According to literature review, there are no other *C. tetrandra* dominated freshwater swamp forests outside of the Northeast Thailand. This plant species used to be so common to an area of Udon Thani province that the newly created district was named after it. Over the years, however, the

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freshwater swamp forests of the Chai Wan district have lost its dominant species of *C. tetrandra*.

In contrast, initial study found that a community of Don Daeng village, Tha Bo Songkhram sub-district, Sri Songkhram district in Nakhon Phanom province, has preserved their *C. tetrandra* freshwater swamp forest, remaining the only one of its kind in Thailand, which is the last and largest of *C. tetrandra* freshwater swamp forest in the area. This wetland forest has enjoyed mutual benefits with the community, providing the villagers with sources of economic support while being maintained and protected by them.

The successful management of *C. tetrandra* forest by the Don Daeng villagers was of great interest to us. In the study, we found out methods employed by the villagers in maintaining the forest's richness. This study believe that our findings could be applied to other wetlands on which the communities living in their vicinity depend, particularly those that were once dominated by *C. tetrandra.*

Methodology

The study site, the last and largest of *C. tetrandra* forest in the Northeast Thailand is located in Don Daeng village, Tha Bo Songkhram sub-district, Sri Songkhram district, Nakhon Phanom province at around the latitude and longitude of 17°38′N and 104°10′E (Figure 1). The data collection were gathered from the study site in February to April 2014. This study used secondary data support and conducted sub-topics as a tool for primary data collection (Borisutdhi, 2008; 2015). With a total of 41 people, participants for our study, chosen by purposive sampling and triangulation technique, include 9 key informants, 12 individuals participating in household interviews and 24 individuals taking part in group interviews and discussion. Our results were reported back or reporting result return to the community for verified and saturated the result. Data analysis were subjected to the 6C analysis technique, in order of sequence, analysis while data collection, categorization, comparison, combination, construction and creation (Borisutdhi, 2015).

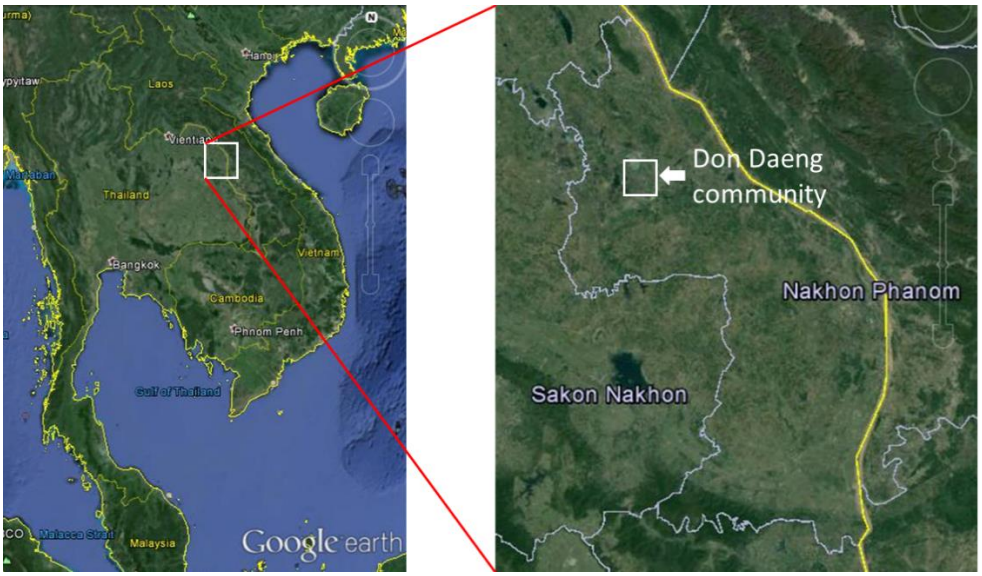

Figure1. The location of the study site (Sources of map: Google earth)

Result and discussion

General context of the community

The village is 11 kilometres from the nearby town of Sri Songkhram and approximately 85 kilometres from Nakhon Phanom city. It has been in existence for around 200 years. In 2014, the population of the village is 278 households, with 433 males and 416 females. The majority of the villagers are of Lao ethnicity while the Nyaw make up the rest. Mostly, they live on agricultural based, especially rice farming.

Geographical context of the community

Four types of geography are categorised within the community.

Community forest

Community forest located to the northeast of the village and to the east of Chai Wan Lake, the community forest has an area of 600 Rai (1 Rai is an equivalent of 1,600 m^2 or 6.25 Rai is equal 1 hectare.). It is believed to be protected by the villagers' ancestors' ghosts (the ghost of ghost ancestor or villager called Pee Pu Ta). The forest is 500-520 ft. above sea level. The forest is a source of food and provides wood fuel for the local. They have set up rules for the common use of the forest (Figure 2).

Village settlement area

Situated just below the community forest, the village is 480-490 ft. above sea level. It has an area of around 200 Rai. Route 2177 connects the community to Sri Songkhram district of Nakhon Phanom province and to

Akat Amnuai district of Sakhon Nakhon province. The settlement of the villagers is similar to those others of the Northeast Thailand, with houses scattered along the main road (Figure 2).

Farmland

The farmland comprises an area of around 3,500 Rai. It is 480-490 ft. above mean sea level. There are 4 types of land use within the farmland. (a) Situated on a slightly raised ground, about 100 Rai of farmland can only be used for in-season rice farming during the rainy months between May and November. During the dry season, the area is used for cattle raising, with cattle being an extra source of income for the villagers. (b) Most of the available farmland can be used for double-cropping of rice. However, the area for double-cropping varies year by year depending on the amount of water. The first crop takes place during the rainy season (from May to November), while the second crop (from November to March) is irrigated by nearby bodies of water; the village's lakes, Songkhram River and its tributaries. (c) The farmland of about 2000 Rai, directly adjacent to the lakes and rivers, is available for rice plantation only during the dry season, because it is inundated by water throughout the rainy season. All of the rice grown in farmland (a)-(c) is either for household consumption or for sale. (d) About 500 Rai of farmland is used for growing other crops, vegetables and local fruits. Most of the products are for household consumption. The plantation receives water from lakes and rivers as well as from underground sources. In addition, the community also has a little bit farmland for Para rubber plantation which an important crop as well as other areas of Nakhon Phanom province because the most of the farmland were wetland (Figure 2).

Swamp

The community's wetland is between 470 ft. and 490 ft. above sea level. Four lakes compose the wetland ecosystem of the village. (a) Sung Yai Lake: located to the west of the village and with an area of over 2,000 Rai, the lake is the largest wetland in Sri Songkhram district. For the villagers of Don Daeng and those of the nearby villages, Sung Yai Lake is a source for fish, buffalo leeches (*Poecilobdella manillensis*) (exported to Taiwan ROC) and aquatic plants for consumption. Moreover, it serves as the main water supply for irrigating paddy fields as well as provides space for cattle herding. (b) Chai Wan Lake: located to the north of the village, the around 1,200-Rai lake has *C. tetrandra* as its dominant plant species. The lake serves the villagers similar purposes as Sung Yai Lake; furthermore, it is their water supply for household consumption and *Actinoscirpus grossus* stems are collected for mat making. (c) Liang Chang Lake: located to the south of the village and covering an area of about 120 Rai, the lake has fewer aquatic plants than Sung Yai Lake and Chai Wan Lake. Its dominant plants are *A. grossus* and water lily. (d) Yao Lake (also known as Huai Bo Lake): this open lake is a tributary of Songkhram River. It is located to the east of the village and covers an area of around 120 Rai. There are relatively

few aquatic plant species in the lake. The latter two lakes have similar functions to those of Chai Wan Lake, except that they are not a source for household water consumption. Yao Lake lacks *A. grossus* and; as a result, the lake does not provide the villagers with the material for mat making (Figure 2).

Figure2. Geographical contexts of the community. (Sources of map: Google earth)

Context of Chai Wan Lake

The lake comprises two parts the upper Chai Wan Dong sub-leak and the lower Chai Wan Yai sub-leak. With around 664 Rai in area, the former part is slightly larger than the around 600 Rai of Chai Wan Yai. They are connected by a narrow strip of water. During the rainy season the lake measures 4-5 metres deep while in the dry season it is 1.5-2 metres deep. There is a small stream connecting Chai Wan Yai to Yao Lake, a tributary of Songkhram River. In the rainy season, the three lakes function as reservoirs for the overflowing water, with Yao Lake as the first natural defence against flooding, followed by Chan Yawan Yai and Chai Wan Dong. Chai Wan Lake is unique in that it has *C. tetrandra* as a dominant plant species. The trees are particularly dense in the middle of both Chai Wan Dong and Chai Wan Yai. Other plants co-existing with *C. tetrandra* include *Nepenthes mirabilis*, *Stenoch-leana palutris*, *Cleistocalyx operculatus* (Roxb.) *and Kailarsenia Lineata* (Graib) *Tirveng.* Many animal species, for example birds, insects and fish are found in the lake, while aquatic plants are Water lily (*Nymphaea lotus Linnaeus.*), *C. ciliata*,

Marsilia crenata, *R. wallichii*, *Hydrilla verticillata*, several algae species and *A. grossus* (Figure 3).

Figure3. The context of Chai Wan Lake: The last and largest of *C. tetrandra* freshwater swamp forest in Northeast Thailand. (Sources of map: Google earth)

Uses of Chai Wan Lake by the community

The lake is mainly used by the villagers of Don Daeng, with others from neighbouring communities occasionally also using it. There are five purposes, in order of importance, which the lake serves the community.

Water supply for the village: about 100 Rai of the lake is preserved as the source of water supply. Here fishing and wildlife hunting are prohibited.

Food source: various kinds of fish, frogs, tree frogs and snails are found in the lake. Plants found include *Stenoch-leana palutris* and *Garcinia*

schomburgkiana. *Nepenthes mirabilis* can be used to wrap rice-based local desserts. Most of these activities are for household consumption. Recently, bird-hunting is forbidden.

Water source for off-season rice plantation: over seventy-percent of the total households are engaged in double cropping of rice. The water from Chai Wan Lake is directed along a small stream and then dive rated to the rice fields. All the costs arising from the pumping of water are paidby the owner of the rice field, while the village committee oversees the management of irrigation.

Grounds for buffalo raising: the most of the livestock are buffaloes. They graze the area in the dry season.

Other purposes: for example, buffalo leeches (*Poecilobdella manillensis*), exported to Taiwan ROC. to be used as an ingredient for Chinese herbal medicine, fetch a price of around 600 Thai Baht per kilogramme.

Community's appreciation for Chai Wan Lake

The villagers were asked to assess the value of the lake. In summary, the lake was appreciated in three different ways.

Appreciation for life support: lake is a source for food as well as water supply for consumption.

Appreciation for socio-cultural support: lake provides grounds for interaction between the villagers. They have learned a fair distribution of resources from the wetland. During Songkran, the water-splashing festivity takes place around Chai Wan Lake. In the community forest immediately to the west of the lake, the villagers perform rites to worship the ghosts of their ancestors whom they believe have protective power over the forest, the lakes and the togetherness of the two-ethnic groups (Laos and Nyaws ethnic groups).

Appreciation for farming support: lake is a water source for off-season rice plantation. Moreover, the villagers use the area around the lake to raise their buffaloes. The two agricultural activities provide them with the capital village and allow them to live sustainably within their village.

The value the villagers place over their community Chai Wan Lake summarises their dependence and; hence, respect for the resources that the lake has, for decades, provided to them.

Community approaches to managing Chai Wan lake

Being the only remaining *C. tetrandra* wetland in the Northeast Thailand, it is clear that the lake has been well managed by the community. From our study, we classified the approaches to managing the lake in two ways.

Direct Management

Rules governing the use of the lake have been established by the village committee. The direct management can be categorised into four main points.

Management of the lake in order to preserve C. tetrandra C. *tetrandra* is essential for the survival of many aquatic plant and animal as well as wildlife species of the lake. Felling or burning down live *C. tetrandra* trees is strictly forbidden. The villagers are only allowed to collect their dead or fallen twigs. The village committee oversees the strict enforcement of the rules; those who break them will be punished. The villagers also control the water level of the lake so that it should not exceed five metres, as too high a water level might cause damage to *C. tetrandra.* The authority once proposed that a dyke be built around the lake. The villagers, however, rejected the proposal since the construction of the dyke could inundate several *C. tetrandra*, affecting the many species that depend on them.

Preservation of the lake as a main source of water supply within an area of about 100 Rai of the lake, no other activities except the usage of the lake's water for household consumption are permitted. Being fenced with barbed wire, the whole area is off limits to fishing and hunting of wildlife animals.

Water management for off-season rice farming: within the village committee, there is a designated group of members, comprising selected members of the community, who are off-season rice farmers. The village committee designs policy concerning water use and decides year on year how much water should be pumped out of the lake to irrigate the rice fields. The designated group is, then, responsible for the pump management and its members also report to the village committee on the amount of water pumped out in total.

Protection of aquatic plant and animal as well as wildlife species: besides *C. tetrandra*, felling down or burning of *Kailarsenia Lineata (Graib) Tirveng.* is also prohibited. Fishing by electric shock or during their breeding season is not permitted. Fish lings must not be caught. Furthermore, bird hunting is permitted. These measures are designed to protect the diversity of the species found in Chai Wan Lake.

Indirect management through the ghosts of the ancestors: the villagers believe that the spirits of their dead ancestors still reside within their community. The ghosts should have protective power over the well-being of individuals of the village. The village committee plays a minor role in this indirect approach, as the villagers themselves believe that any moral misdeeds, would anger their ancestors' ghosts leading to the diminishing of their protective power. The violation of the rules governing the use of the lake, which have been set up by the village committee, would not only be punished by the local committee but is also considered morally corrupt

upsetting the ancestors' ghosts. Both ethnic groups, participate in a special worshipping ceremony taking place three days after the full moon day of the third month of the lunar calendar (usually in February).

The approaches to managing Chai Wan Lake involve selected members of the community in the village committee. This alone, without the cooperation of the rest of the villagers, would not yield as much success as we have witnessed in the wetland preservation. The fair distribution of resources is governed both by the village committee, who set up clear rules over the use of the lake, where rule breakers are punished, and by the moral obligation the villagers have towards their ancestors' ghosts. Sinthipong (2015) and Soontornwong (2003), concluded that available resources for fishing in the sea are not overexploited because the fishermen believe that the sea belongs to god and it should not be abused. The value the community places over their resources is reflected in customs, traditions and rules. The abuse of natural resources is not only against the wishes of their respected supreme being, and that it would be punished, but also violate the rules of the society. Moreover, religious beliefs and certain rituals play an important role in resource management. Fowler (2003) studied resource management of the Karendi for Mata Loko case (river's source), which involved the punishment by deity. Religious and superstitious beliefs of local people influence the way the ecology of the community is managed. Management through these beliefs of scarce natural resources, for example, water or cultural resources that are of historical importance, can serve as a model for preservation efforts of other communities.

Conclusion and Recommendation

The appreciation of the community for their Chai Wan Lake for their life, socio-cultural and farming support is a major contribution to the preservation of this wetland ecosystem. These three types of support provides both economic and social capital to the villagers.

The approaches to managing the lake are largely through the village committee who oversees the management of the lake both directly and indirectly. The direct measures include management of the lake in order to preserve *C. tetrandra*, preservation of the lake as a main source of water supply, water management for off-season rice farming and protection of aquatic plant and animal as well as wildlife species, while the indirect measure refers to the fear of each individual that their well-being would not be guaranteed by their ancestors' ghosts if they were to take an unfair advantage of the lake.

The successful preservation of the lake by the local community should be actively supported by the authority so that this rich wetland ecosystem will continue to be of great economical, societal, and environmental values. Moreover, other communities, where *C. tetrandra* swamp forests used to

exist, can learn from the villagers of Don Daeng and adapt their approaches for the recovery of their forests.

Acknowledgements

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