DIVERSITY AND CONSERVATION OF DIPTEROCARPACEAE IN THE PHOUXIENGTHONG NATIONAL PROTECTED AREA, LAO PDR

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SUMMARY

The Champasack's Pouxiengthong National Protected area (CPNPA) is known as the repository of biodiversity. There are about 1,200 species of angiosperms in the area. The Dipterocarpaceae is among the dominant and important timber family in the study site. The species of this family are facing tremendous pressure due to habitat degradation, overexploitation and changing environmental conditions. Therefore, while exploring the floristic diversity of CPNPA, attempts were made to explore the Dipterocarpaceae diversity, distribution patterns, nativity, endemism, threat categories, and local uses. In the present study, distance sampling using line-transect was used to assess the species diversity, distribution and number of Dipterocarpaceae species in the CPNPA. Total 19 species of the Dipterocarpaceac representing 6 genera were recorded between 30- 300 m asl from CPNPA. Of these, 19 species were native, 2 species crictically endangered (10.53%), 4 species endangered (21.05%), and 10 species vulnerable (52.63%), 2 near threatened (10.53%). 1 least concern (5.26%). These species are represented in four forest types and are used for curing various diseases/ailments by the inhabitants of the buffer zone of CPNPA. Due to habitat degradation, the populations of these species are decreasing fast. The overexploitation, habitat degradation and changing environmental conditions of these species has led to rapid population depletion. Therefore, appropriate strategy has been suggested for the conservation and management of this family.

Keywords: Champasack's Pouxiengthong National Protected area, conservation, Dipterocarpaceae, diversity.

1. INTRODUCTION

The Champasack's Pouxiengthong National Protected Area (CPNPA) is located in Southern Lao PDR, covering an area of 34,821 ha and comprises of three districts in Champasack province. CPNPA, as one of the mega hot spots of biological diversity, is a source of a great diversity of food, fuel, fodder, timber, dye and medicinal plants (Ministry of Agriculture and Forestry of Laos, 2018 (MAF, 2018)). In the Lao's People Democratic Republic (Laos), there are 27 species from 6 genera of Dipterocarpaceae. Most of these species are in lowland forests below 1500 m, and were found in the Dry Dipterocarps Forest (DDF), Mixed Deciduous Forest (MDF) and Dry Evergreen Forest (DEF). (Hanhsamone Phongoudom and Khamfeua Sirivongs, 2006). The family Dipterocarpaceae is the most important timber family in the CPNPA. They form the dominant trees in the forests and may comprise over 20% of the basal area of the trees in the 4 forest types or close to or over 40% of the emergents (MAF, 2018), (Phiapalath et al., 2018). Ecologically, they form the main structure and support for the other life forms that develop in the 4 forest ecosystems of CPNPA. Due to their dominance and their good wood working properties, they are featured strongly in the timber trade. For example in 1997, the dipterocarps contributed 38.2% (2.8 million cubic metres) of the total log production for Lao PDR (Anonymous et al, 1997). In the past and before established CPNPA, conservation of the dipterocarpaceae was not an important issue as the family is seen as common and it has been assumed that none of the species are in anyway threatened. However, changing land-use patterns, increasing demands on forestry resources and Laosian commitment to sustainable utilisation of the forest resources now require that the whole issue of the conservation of all species be looked into. This is particularly so for the members from the family Dipterocarpaceae in the CPNPA. In ascertaining the conservation of the family Dipterocarpaceae, some basic information will be necessary for the task. Amongst them are understanding of diversity, distribution (where they are found). With such information known in their natural range, the conservation status can then be assessed accurately. However, studies at CPNPA for the diversity, distribution

of Dipterocarpaceae have not been carried out, which is most important for the conservation and management of family. Therefore, this paper attempts to: (i). To assess and identify the Dipterocarpaceae species in the study site; (ii). To assess the status and distribution patterns of native and endemic species belong to Dipterocarpaceae; (iii). Assess Dipterocarpaceae's diversity for threat categories, and (iv). To suggest strategy plan for the conservation of Dipterocarpaceae in the study site.

2. MATERIALS AND METHODS

2.1. Study area

The study area is located in the Southern part of Laos, covered a total area of 34,821 ha. It is located at the South East of the province of Champasack (14°55" - 15°11" N and 105°55' - 106°17' S) (see Figure 1), and is characterized by lowlands, mountain plain. The area is 50 to 300 m above the sea level and has a typical tropical monsoon climate, with distinct rainy (May to October) and dry (November to April) seasons. Based on data collected by the Department of Meteorology in Province from 2011 to 2019, the mean (± SE) annual rainfall was 1467.96 ± 137.63 mm. Mean daily temperature during this period was 20.40^0C ± 0.16. The relative humidity varied between seasons and was about 71 ± 0.63%. The mean annual wind speed at the site was 3.12 ± 0.16 m/s and was the highest encountered at the countrylevel. The geological formations consist mainly of a yellow - red lateritic loamy soil derived from quartz with pH varying between 3 and 5. The hills around the plain consist mainly of sandstone, granite, and schist, with medium - rich loams.

The Laos introduced a classification of the forest stypes with respect to the tree species. The DMSB: (D: Dipterocarps Forest; M: Mixed Deciduous Broadleaf Forests; S: Semi - Mixed Deciduous Broadleaf Forests; B: Mixes Bamboo Broadleaf Forests (MAF, 2018). The original vegetation cover of the area consisted primarily of Dipterocarps Forest; Mixed Deciduous Broadleaf Forests; Semi - Mixed Deciduous Broadleaf Forests; Mixes Bamboo Broadleaf Forests located centrally within the CPNPA. The forest types correspond approximately to the Dipterocarps Forest (mainly Dipterocarpaceae Fabaceae), Mixed Deciduous Broadleaf Forests (mainly Fabaceae) and Mixes Bamboo Broadleaf Forests (mainly Bambusoideae), (Chanthasome Vongthavone, 2020)

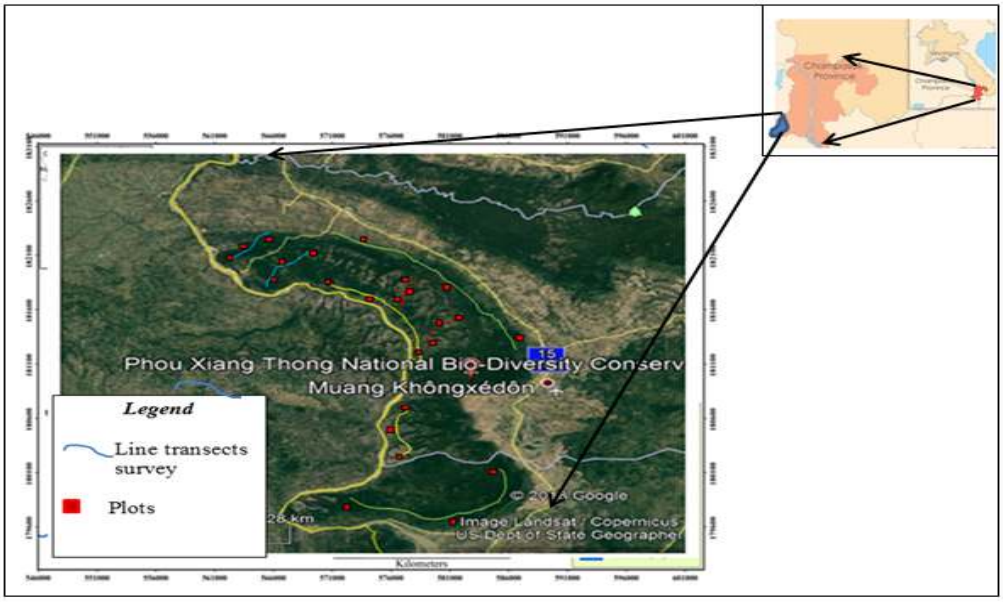

Figure 1. The map of Phouxiengthong Protected Area in Champasack Province and line transects, plots used in the study

2.2. Methods

Surveys, sampling, identification

Preliminary distribution data of CPNPA dipterocarpaceae were based on Department of Forestry, Ministry of Agriculture and Forestry of Lao, 2018.

Secondary data collection. The extensive field surveys were conducted to explore the diterocarpaceae diversity, distribution of the CPNPA between 50 – 300, and 4 forest types during 2020- 2021. It was conducted by 8 line transects and 16 plots sized 25 m x 40 m, depending on the slope and area forest types.

To survey and identify the Dipterocarpaceae species. Along each transect and in plot, Dipterocarpaceae species were searched for by two assigned observer moving along the transect line and in the plots. The perpendicular distance from the transect to each tree (Dipterocarpaceae species) sighted was recorded using Laser Distance (Leica Disto D2 NEW), rapid sampling of dipterocarp tree species was done and the samples of each species were collected for proper identification. For each species, information on habitat, altitudinal range, density per hecter, local uses, etc. was collected. The species were identified with the help of a checklist flora of Lao PDR. Species were analyzed for nativity, endemism and rarity. Nativity of the species was identified. Endemism of the species was identified based on The Lao Red Book 2007. National Forestry Law of Lao (December 2019 N°6/NA); CITES (Convention on International trade of endangered species). Convention signed by Lao PDR the 01/March/2004 and According to the International Union for Conservation of Nature (IUCN, 2020). Information on the local uses of the species is based on the available literature and interviews of the inhabitants.

To investigate tree species. The sampling plot was designed by taking 40 x 25 m each north then east, south and west in clockwise direction from the base tree, which was considered as the reference point. It was purposed to collect the information about the trees, woody and herbaceous climbers found within this sampling plot. The collected indices were species name (Lao name, science name); Diameter at breast height ($D_{1.3}$ cm); Maximum height (H_{vn} m) for the tree $D_{1.3} \geq 6$ cm.

Data analysis

Data analysis was carried out following equations below:

Density per hecter (N/ha): $$N = \frac{\text{Total no.of individual of a dipterocarp species found}}{\text{Total area plot examined}} 10.000 \quad (1)$$

Important Value of every species (IV %):

$$IV_i\% = \frac{N_i\% + G_i\%}{2} \quad (2)$$

$$G_i = \frac{\pi}{4} D^2_{i(1.3)} \ (m^2)$$

$$G = \sum_{i=1}^{n} \frac{\pi}{4} D^2_{1.3} \ (m^2)$$

$$Gi\% = \frac{G_i}{G} 100 \ (m^2) \quad (3)$$

$$Ni\% = \frac{N_i}{N} 100 \quad (4)$$

Volume:

$$M = G.H.0,45 \ (m^3/ha) \quad (5)$$

All where, N = ΣNo. of trees

N_i = the number of individual in the species i

H = Average height of forest type

$D_{1.3}$ = Diameter at breast height

3. RESULTS AND DISCUSSIONS

3.1. Diversity

A total of 19 species of the dipterocarpaceae representing 6 genera were recorded in CPNPA, These species were found across four notable forest types: (i). Dipterocarps Forest; (ii). Mixed Deciduous Broadleaf Forests; (iii). Semi - Mixed Deciduous Broadleaf Forests and (iv). Mixes Bamboo Broadleaf Forests. Table 1 shows the list of these 19 dipterocarpaceae species in the CPNPA.

Table 1. List of botanical dipterocarps identified during study

No	Lao names (Genera/species)	Dipterocarps botanical name (Genera/species)	Lao red Book	IUCN 2020
I	**Khen**	**Shorea**		
1	Mai Chik	*Shorea obtusa* Wall. ex Blume		NT
2	Mai Hang	*Shorea siamensis* Miq.		LC
3	Mai khean fai	*Shorea hypochra* Hance		CR
4	Mai Khen kha	*Shorea roxburghii* G.Don		VU
II	**Hao**	**Parashorea**		
5	Mai hao	*Parashorea stellata* Kurz		VU
III	**Nhang**	**Dipterocarpus**		
6	Mai nhang deng	*Dipterocarpus costatus* Roxb		VU
7	Mai nhang sad	*Dipterocarpus obtusifolius* Teijsm		NT
8	Mai Nharng thong	*Dipterocarpus turbinatus* CFGaertn		VU
9	Mai Sabeng	*Dipterocarpus intricatus* Dyer	EN	EN
10	Mai Khen yong	*Dipterocarpus tuberculatus* Roxb.		VU
11	Mai Yang na	*Dipterocarpus alatus* Roxb. ex G.Don		VU
12	Mai Yangdol	*Dipterocarpus turbinatus* C.F.Gaertn.		VU
13	Mai Yang deng	*Dipterocarpus costatus* C.F.Gaertn.		VU
14	Mai yang dong	*Dipterocarpus retusus* Blume		VU
IV	**Khen**	**Hopea**		
15	Mai khen yorng	*Hopea pierrei* Hance	EN	EN
16	Mai Khen yong	*Hopea odorata* Roxb.		VU
17	Mai khen hin	*Hopea ferrea* Pierre	EN	EN
V	**Sia**	***Vatica***		
18	Mai Si	*Vatica odorata* (Griff.) Symington	CR	CR
VI	**Bark**	**Anisoptera**		
19	Mai bark	*Anisoptera costata* Korth	EN	EN

Abbreviation in table are (CR = Critically Endangered; NE = Endangered; VU = Vulnerable; LC= Least Concern;

3.2. Threat and threat categorization

- Two main threats for Dipterocarpaceae species in CPNPA were identified during the field survey: (i). Heavy illegal logging and forest conversion. For the first threat, there are two to four sources of chainsaw sound that were heard by the team every day during the field data collection. Laos local people did the logging activities, and they targeted mainly big trees from Dipterocarpaceae pecies, including the 4 endemic tree; (ii). The second threat to the Dipterocarpaceae was habitat conversion. Local people cut the forest along the buffer zone areas and plant the cassava, sweet potato, and others. These plantations were distributed mainly along the northern buffer zone of the CPNPA and could stretch up to more than 100 m into the forest areas.

- Of the total species (19, table 1): according to Laos Red Book Category (2007), threat categorization as a national level, 1 specie (5.26%) were classified as Critically Endangered (CR), 4 species (21.05%) have been identified as Endangered (EN). Furthermore, according to the International Union for Conservation of Nature (IUCN) Red List (2020) Category, 2 specie (10.53%) were classified as Critically Endangered (CR), 4 species (21.05%) have been identified as Endangered (EN, 10 species (52.63%) as Vulnerable (VU); 2 species (10.53%) as Near Threatened (NT) and 1 specie (5.26%) as Least Concern (LC). According to Lao National Forestry Law (2019), 3 species have been categorized as Critically Endangerd (2) and Endangered (1).

3.3. Distribution

The identified dipterocarpaceae species represent the flora of the majority of patches forming the forest along an forest types and

altitudinal gradient from 50 to 300 m asl. On the basis of relative density, relative basal area and relative frequency, the four forest types differed in the most important dipterocarpaceae species. All field inventory sheet, recorded tree species, their importance value in each forest types is synthesized in table 2.

Table 2. Recorded dipterocarpaceae species and their composition in four forest types and altitudinal zones of the study area, ranked by importance value (IV)

No./FT	Lao name	Botanical name	Ni (%)	Gi (%)	IV (%)	Al. zone (m)
A. Dipterocarps Forest Types (I +II): 54 species			**100**	**100**	**100**	
I	***Dipterocarpaceae species (11)***		***44.49***	***54.25***	***49.3***	
1	Mai Chik	*Shorea obtusa* Wall. ex Blume	16.29	17.51	16.9	
2	Mai Khen yong	*Dipterocarpus tuberculatus* Roxb.	6.76	12.34	9.55	
3	Mai Sad	*Dipterocarpus obtusifolius* Teijsm.	6.24	9.97	8.1	
4	Mai Hang	*Shorea siamensis* Miq.	4.51	4.04	4.27	**150 - 300**
5	Mai Khen Kha yom	*Shorea roxburghii* G.Don	2.2	2.1	2.1	
6	Mai Sabeng	*Dipterocarpus intricatus* Dyer	1.91	2.14	2.03	
7	Mai Yang na	*Dipterocarpus alatus* Roxb. ex G.Don	1.73	1.62	1.66	
8	Mai khean fai	*Shorea hypochra* Hance	1.56	1.71	1.64	
9	Mai nhang deng	*Dipterocarpus costatus* Roxb	1.56	1.65	1.6	
10	Mai nhang sad	*Dipterocarpus obtusifolius* Teijsm	1.04	0.83	0.93	
11	Mai Nharng thong	*Dipterocarpus turbinatus* CFGaertn	0.69	0.34	0.52	
II	***The other associated tree species (43)***		***55.51***	***45.75***	***50.7***	
B. Mixed Deciduous Broadleaf Forests Types (I +II): 71 species			**100**	**100**	**100**	
I	***Dipterocarpaceae species (5)***		***12.03***	***17.08***	***14.555***	
1	Mai Khen yong	*Hopea odorata* Roxb.	7.57	13.37	***10.47***	
2	Mai Yangdol	*Dipterocarpus turbinatus* C.F.Gaertn.	1.34	1.57	***1.455***	
3	Mai hao	*Parashorea stellata* Kurz	1.34	0.88	***1.11***	**150- 270**
4	Mai Khen Kha yom	*Shorea roxburghii* G.Don	1.11	0.89	***1***	
5	Mai Yang na	*Dipterocarpus alatus* Roxb. ex G.Don	0.67	0.37	***0.52***	
II	***The other associated tree species (64)***		***87.97***	***82.92***	***85.445***	
C. Semi - Mixed Deciduous Broadleaf Forests Types (I +II): 56 species			**100**	**100**	***100***	
I	***Dipterocarpaceae species (6)***		***27.67***	***26.8***	***27.235***	
1	Mai bark	*Anisoptera costata* Korth	10.93	10.74	***10.835***	
2	Mai Si	*Vatica odorata* (Griff.) Symington	6.43	6.41	***6.42***	
3	Mai Yang deng	*Dipterocarpus costatus* C.F.Gaertn.	4.06	4.46	***4.26***	**30 - 150**
4	Mai yang dong	*Dipterocarpus retusus* Blume	2.94	2.32	***2.63***	
5	Mai Yang na	*Dipterocarpus alatus* Roxb. ex G.Don	2.31	1.74	***2.025***	
6	Mai Khen Kha yom	*Shorea roxburghii* G.Don	1	1.13	***1.065***	
II	***The other associated tree species (50)***		***72.33***	***73.2***	***72.765***	
D. Mixes Bamboo Broadleaf Forests (I +II): 34 species			**100**	**100**	***100***	
I	***Dipterocarpaceae species (4)***		**27.25**	**22**	**24.625**	
1	Mai Khen yong	*Dipterocarpus tuberculatus* Roxb.	12.5	10.39	***11.445***	
2	Mai Chik	*Shorea obtusa* Wall. ex Blume	12.5	10	***11.25***	**40 - 60**
3	Mai khen yorng	*Hopea pierrei Hance*	1.21	0.73	0.97	
4	Mai khen hin	*Hopea ferrea* Pierre	1.04	0.88	0.96	
II	***The other associated tree species (30)***		**72.75**	**78**	**75.375**	

3.3.1. Ditribution by forest types

In the Dipterocarps Forest Types**,** 54 species were recorded belonging to 32 families such as: Dipterocarpaceae, Fabaceae, Euphorbiaceae, Anacardiaceae, Podocarpaceae, and so on. Out of 54 tree species, 11 dipterocarps species were recorded (see table 2). Among them, *Shorea obtusa* Wall. ex Blume, *Dipterocarpus tuberculatus* Roxb and *Dipterocarpus obtusifolius* Teijsm were the ecologically most important, dominance species (dominance species with an IV ≥ 5%) for this forest type with an IV value 16.9, 9.55 and 8.10% respectively. The second important species were *Shorea siamensis* Miq, *Shorea roxburghii* G.Don, *Dipterocarpus intricatus* Dyer, *Dipterocarpus alatus* Roxb. ex G.Don, *Shorea hypochra* Hance*, Dipterocarpus costatus, Dipterocarpus obtusifolius* Teijsm, *Dipterocarpus turbinatus CFGaertn* with an IV value 4.27, 2.1, 2.03, 1.66, 1.64, 1.6, 0.93 and 0.52% respectively.

In the Semi - Mixed Deciduous Broadleaf Forests Types, 71 species were recorded. Out of 71 tree species, 5 dipterocarps species were recorded. Among them, *Hopea odorata* Roxb vas the ecologically most important, dominance species for this forest type with an IV value 10.47%. The second important species was *Dipterocarpus turbinatus* C.F.Gaertn with an IV value 1.45%.

In the Semi - Mixed Deciduous Broadleaf Forests Types, 6 dipterocarps species were recorded. Among them, *Anisoptera costata* Korth and *Vatica odorata* (Griff.) Symington were the ecologically most important, dominance species for this forest type with an IV value 10.84% and 6.45%. The second important species was *Dipterocarpus costatus* C.F.Gaertn with an IV value 4.26%.

In the Mixes Bamboo Broadleaf Forests, 2 dipterocarps species were recorded. Among them, *Dipterocarpus tuberculatus* Roxb and *Shorea obtusa* Wall. ex Blume were the ecologically most important, dominance species for this forest type with an IV value 11.45% and 11.25%.

3.3.2. Distribution by altitudinal zone

A total of 19 species of the Dipterocarpaceae were recorded at an elevation of 30 m to the highest peak at 300 m above sea level. However, most of the individuals and species (14 species) were found at an elevation of 150 to at 300 m, including 4 the endemic *D. intricatus* Dyer, *Hopea pierrei* Hance, *Hopea ferrea* Pierre and *Anisoptera costata* Korth that was dominantly located at the top high of hills. There were only a few species found at an elevation of 30 to at 150 m, such as *Shorea roxburghii* G.Don, *Dipterocarpus retusus* Blume and *S. obtusa* Wall. ex Blume. Furthermore, the forest types (including Dipterocarps Forest and Mixed Deciduous Broadleaf Forests Types) was observed to be the most favorable habitat for the *Dipterocarpaceae* species (Table 1 and Table 2). The diversity of dipterocarpaceae increases with the increase in altitude 30 - 300.

3.4. Discussion

The number of genera in the study area was 6. Genera that was represented by the highest number of species was Dipterocarpus (9 species), followed by Shorea (4 species), Hopea (3 species), Parashorea (1 specie), Vatica (1 specie) and Anisoptera (1 specie). Compared to other study area in Lao and Vietnam. In Vietnam, 44 species belonging to 6 genera have been recorded and 11 species were listed in the Red Data Book of Vietnam in 2007 which is a list of rare and endangered species of fauna and flora native to Vietnam (Hoang et al., 2013). In Lao, 56 species belonging 15 gennera have been recorded and now 9 species were listes in IUCN, 2020 and 7 species were listes in Lao red book, 2017 (Phiapalath et al., 2018). The number dipterocarps species in the study area higher than Phu Quoc National park and Ben En, and Cuc Phoung National park. In Lao, The CPNPA of Champasack province supports relatively higher number of dipterocarpaceae compared to other province such as The Champasack

Rucervus Eldi Protected Area there are 14 species of the Dipterocarpaceac (Nongkhan Borlivanh, 2020). The Phoukhaokhaoy National Park, 6 species of the Dipterocarpaceac (Keovilay Chanthavong et al., 2020). In the buffer zone Nampui National park, 4 species of the Dipterocarpaceac were recorded (Bouaphanh Chanthavong et al., 2019) .

Mostly woody dipterocarps (17 species) are found in the CPNPA except *Dipterocarpus obtusifolius* Teijsm. (Lao name. Mai nhang sad) and *Dipterocarpus intricatus* Dyer (Mai Sabeng), which are moderate woody and small woody in nature of CPNPA.

3.4.1. Conservation

The occurrence of representative, natural, unique and socio-economically important dipterocarpaceae in the area indicates high conservation and socio-economic values and merits priority attention for conservation of these species. In CPNPA and Champasack provice, the inhabitants are largely dependent on forests for grazing, fuel, fodder, timber, medicinal plants, wild edible plants, and for making agricultural tools, etc. Due to continuous use of economically important species, their populations are depleting rapidly and the habitat degradation has increased many folds. Due to a high commercial values of *Vatica odorata* (Griff.) Symington (Mai Si); *Dipterocarpus intricatus* Dyer (Mai Sabeng) and *Dipterocarpus intricatus* Dyer (Mai Bark) as woody, these species is facing tremendous pressure and has been identified as critically endangered and endangered. If overexploitation and forest degradation continues, this species may become extinct in the area.

3.4.2. Suggestion

Study on habitat ecology, mass multiplication using convention and propagation methods, establishment and maintenance *in-situ* conditions, promotion of dipterocarpaceae, educational and awareness programmes on status, conservation and management of dipterocarpacea, promotion of dipterocarpaceae species with high woody value in floriculture, and involvement of inhabitants in the conservation management have been suggested.

In order to conserve the species and to find ways to explore its economic value, the following suggestions are given in the study area:

- Illegal harvesting and trade violations need to be rigorously punished. This requires improved monitoring system and the relevant forestry and agriculture departments should conduct an inventorization at the district, province level

- Small-scale dipterocarpus plantation should be initiated. This should include detailed observations of the species natural habitat and growth factors. Such plantation could also be supported by training on different cultivation techniques and the knowledge of relevant cultivation aspects such as habitat, diseases and other features of Dipterocarpaceae.

4. CONCLUSION

There are 19 species of Dipterocarpaceae that are recorded for the time in CPNPA. They distributed in four forest types, two altitudinal zones, of which 2 species are endangered, one specie is critically endangered to the Laos, based on the country's list of threatened species and on the international level. None of these species have yet been assessed with regard to their conservation status. Despite extensive wood extraction that has been undergoing for a long time, Champasack's Pouxiengthong National Protected Area still possesses a high species diversity of Dipterocarpaceae. This high species diversity has made the island one of the hotspots for Dipterocarpaceae biodiversity. Immediate comprehensive conservation actions need to be implemented to conserve the species and their habitat.

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ĐA DẠNG VÀ BẢO TỒN CÁC LOÀI THUỘC HỌ DẦU (DIPTEROCARPACEAE) TẠI KHU BẢO TỒN THIÊN NHIÊN PHOU XIÊNG THÔNG, NƯỚC CỘNG HÒA DÂN CHỦ NHÂN DÂN LÀO

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[2]Trường Đại học Lâm nghiệp

TÓM TẮT

Khu bảo tồn Phou Xiêng Thông, tỉnh Chăm Pha Sắc (CPNPA) được ghi nhận là một trong những khu bảo tồn có tính đa dạng sinh học cao. Trong khu có khoảng 1.200 loài thực vật hạt kín phân bố tự nhiên. Loài cây họ Dầu (Dipterocarpaceae) là một trong số những loài chiếm ưu thế và có giá trị cao trong số các họ thực vật của khu bảo tồn. Tuy vậy, một số loài cây trong họ đang bị suy kiệt, thậm chí có nguy cơ tuyệt chủng do bị khai thác quá mức, do biến động sinh cảnh và biến đổi khí hậu gây ra. Do vậy, điều tra, đánh giá và phân cấp mức độ đe dọa loài cây họ Dầu tại khu bảo tồn là rất cần thiết. Kết quả nghiên cứu, bằng phương pháp sử dụng các tuyến điều tra phân bố theo khoảng cách cùng với ô tiêu chuẩn được bố trí đều theo tuyến trên các kiểu rừng với chiều dài tuyến không xác định để điều tra, ghi nhận và phân cấp thành phần loài cây họ Dầu. Tổng số 19 loài thực vật thuộc 6 chi trong họ Dầu được ghi nhận, trong đó: 2 loài rất nguy cấp, chiếm 10,53%; 4 loài nguy cấp, chiếm 21,05%; 10 loài sắp nguy cấp, chiếm 52,63%; 2 loài sắp bị đe dọa, chiếm 10,53% và 1 loài ít quan tâm, chiếm 5,26%. Thực vật họ Dầu được phân bố tự nhiên trên 4 kiểu rừng và được người dân địa phương sinh sống trong vùng đệm sử dụng vào nhiều mục đích như gỗ làm nhà, làm thuốc nam chữa bệnh. Do bị khai thác quá mức, làm suy thái sinh cảnh sống và thay đổi điều kiệm môi trường cho các loài thực vật họ Dầu đã làm cho số lượng loài suy giảm đáng kể. Để quản lý và phát triển tốt những loài cây họ Dầu này, cần có có những biện pháp quản lý và bảo tồn phù hợp.

Từ khóa: bảo tồn, đa dạng, họ Dầu, Khu bảo tồn Phou Xiêng Thông.

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