CONSERVATION OF THREATENED PLANT SPECIES IN DONG VAN KARST PLATEAU GEOPARK, HA GIANG PROVINCE

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Abstract

This paper provides information regarding threatened plant species in Dong Van Karst Plateau Geopark, Ha Giang province. This study aims to determine the composition, conservation status and propose solutions to protect threatened plant species in the geopark. Based on observations and measurements of general characters, results indicate that there are 13 threatened plant species distributed in Dong Van, belonging to 10 families. There are 11 species listed in Viet Nam Red List (2007), five species listed in IUCN (2015), and five species listed in Decree 32/2006/NDCP. Most of the species are distribute from 1500m to 1800m above sea level. Only three species are distributed between 1000m - 1300m. This research also provides information of morphologial and ecological characteristics of the three endangered species *Taxus chinensis* (Pilg.) Rehder, *Pinus kwangtungensis* Chun ex Tsiang and *Tsuga chinensis* (Franch) Pritzel ex Diels.

Keywords : Conservation, Dong Van Karst Plateau Geopark, Ha Giang, Threatened Plant Species,

I. Introduction

Dong Van Karst Plateau Geopark is located in the North of Ha Giang province and consists of four districts Meo Vac, Dong Van, Yen Minh, Quan Ba. It covers a total area of more than 2,350 square kilometers. The plateau was recognized by UNESCO as one of only 77 geological parks in the world. It became the first geopark in Viet Nam and the second in Southeast Asia, due to typical topographical features, geology, climate and natural vegetation. Many plant species are used as medicine, timber and food. However, plant resources has been reduced due to human activities and many species are under serious threat such as *Taxus chinensis, Podocarpus pilgeri, Cephalotaxus manii.* Therefore, to study the conservation status of threatened plant species in Dong Van Karst Plateau Geopark is an urgent need.

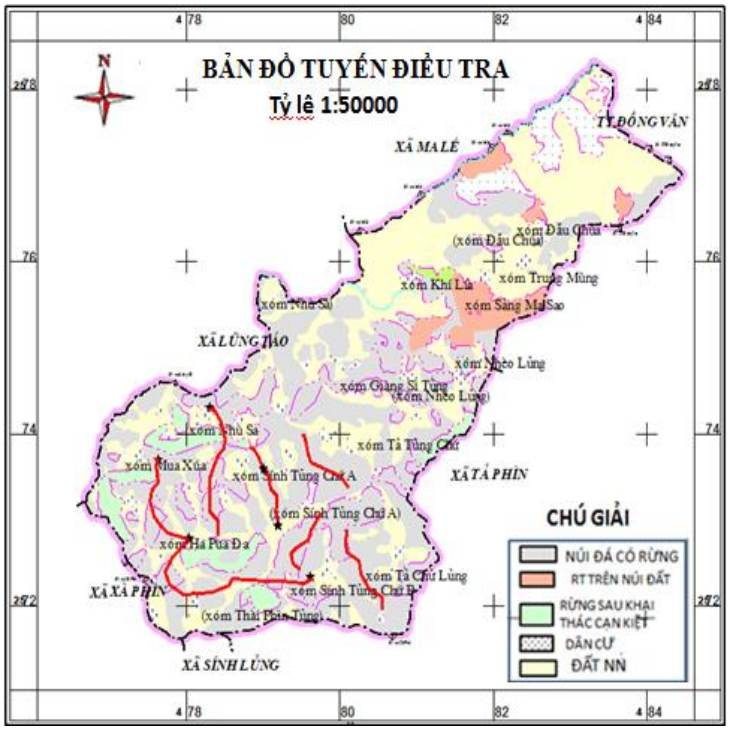
II. Content and methodology

Content:

- To study the composition and conservation status of threatened plant species in Dong Van Karst Plateau Geopark, Ha Giang province.
- To study biological and ecological characteristics of threatened plant species in Dong Van Karst Plateau Geopark, Ha Giang province.

Methodology:

- Establishingsix transects in the research area (map 1) with a total length of transect of about 25 km. We also establish 45 plots with a size of 40 x 50 m. Within transects and plots all threatened plant species were collected and documented with several pictures. Sample specimens were deposited in the herbarium of the Vietnam National University of Forestry (VNUF).
- Conservation levels of threatened plant species were identified based on the Red data book of Vietnam (2007), Red list of IUCN (2015), and Degree 322 of the Vietnamese government dated from the 30th March 2006.
- Interviewing 60 local people, forest rangers, and local authorities in the research area about the situation of threatened plant species in Dong Van Karst Plateau Geopark.



Map 01: Map of transects

III. Result and Discussion

3.1. Diversity of threatened plant species in Dong Van Karst Plateau Geopark

A total of 13 threatened plant species were found in Dong Van Karst Plateau Geopark, Ha Giang province. They belong to 10 families and 13 genera (table3.1).Nine of them belong to the plant division of Pinophyta and four to Magnoliophyta.

Of them 9 species of Pinnophyta and 4 species belong to Magnoliophyta.

3.2 Distribution of threatened plant species by elevation in Dong Van

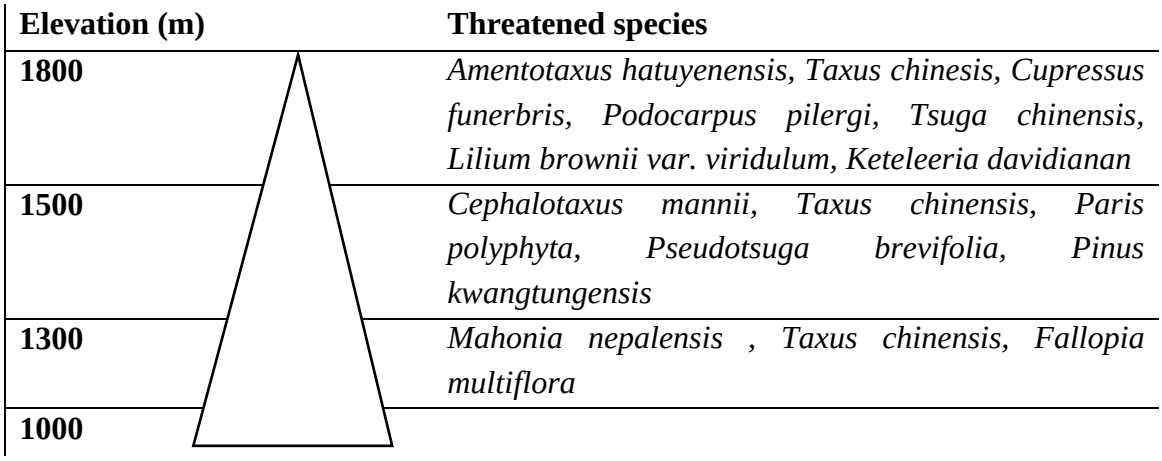


Figure 02. Distribution of threatened plant species by elevation.

The figure 02 shows the distribution of threatened plant species in different levels of elevation. With seven species most of them were found between 1500m – 1800m (*Taxaxus chinensis, Podocarpus pilgeri, Tsuga chinensis, Lilium brownie* var.*viridulum, Cupressus funerbris, Amentotaxus hauyenensis and Keteleeria davidianan),* representing about 54 % of total threatened plant species in this area. There are five species at the elevation level from 1300-1500m, (*Cephalotaxus mannii, Taxus chinensis, Paris polyphyta, Pseudotsuga brevifolia, Pinus kwangtungensis*), illustrating roughly 38 % of all threatened plants species. Between 1000 – 1300 three threatened species were found (*Mahonia nepolensis, Taxus chinensis, Fallopia multiflora*), representing approx. 23% of threatened species in Dong Van Karst Plateau Geopark. The result of the research also show that *Taxus chinensis* species are distributed at all three elevation levels, but *Mahonia nepolensis* only appears in elevation between 1000 - 1300m.

3.3 Conservation status of threatened plant species in Dong Van Karst Plateau Geopark

A total of 13 threatened plant species were found in Dong Van Karst Plateau Geopark. There are 11 species listed in the Red Book of Vietnam (2007),one species Critically endangered (CR), four species Endangered (EN) and six species Vulnerable (VU). There are five species listed in the IUCN Red list 2015. One of them is Endangered (EN), two species Vulnerable (VU), and two species are at Least concern (LC) level. In Decree 32 of Vietnamese government, there are also five species listed, two species at the prohibiting exploitation and use for commercial purpose (IA) level and three species at the restricting exploitation and use for commercial purpose (IIA) level. The result are shown in Table 01.

Table 01: Conservation status of threatened plant species in Dong Van Karst Plateau Geopark

No	Family/Species	Status of conservation			Elevation (m)
		IUCN,	Vietnam	Decree	

		2015	Red Book, 2007	No 32/2006 NĐ-CP	
Họ Thông – Piniaceae					
1	*Pseudotsuga brevifolia* W. C. Cheng & L. K. Fu – Thiết sam giả lá ngắn		VU		1300m-1500m
2	*Tsuga chinensis* (Franch.) Pritzel ex Diels - Thiết sam đông bắc	LC	VU		1500m-1700m
3	*Pinus kwangtungensis* Chun et Tsiang – Thông pà cò		VU	IA	1200m-1400m
4	*Keteleeria davidianan* (Bertrand) Beissner – Du sam đá vôi		EN	LC	1600m-1800m
Họ Thông đỏ - Taxaceae					
5	*Taxus chinensis* (Pilg.) Rehder - Thông đỏ bắc	EN	VU	IIA	1000m-1700m
Họ Dẻ tùng – Amentotaxus					
6	*Amentotaxus hatuyenensis* T.H.Nguyên - Dẻ tùng sọc nâu	EN			1600m-1800m
Podocarpaceae- Họ kim giao					
7	*Podocarpus pilgeri* Foxw - Thông tre lá	LC			1500m-1800m

	ngắn				
Cupressceae- Họ hoàng đàn					
8	*Cupressus funebris* Endl.- Hoàng đàn rủ		CR	IA	1600m-1800m
Cephalotaxaceae- Họ Đỉnh tùng					
9	*Cephalotaxus mannii* J. D. Hooker.– Đỉnh tùng	VU	VU	IIA	1200m-1500m
Berberidaceae- Họ Mã hồ					
10	*Mahonia nepalensis* DC. – Hoàng liên ô rô		EN		1300m-1500m
Trilliaceae- Họ Trọng lâu					
11	Bảy lá một hoa- *Paris polyphylla* Smith		EN		1200m-1400m
Liliaceae- Họ Hành					
12	*Lilium brownie* var. *viridulum* Baker – Bạch huệ núi		EN	IIA	1700m-1800m
Polygonaceae-Họ rau răm					
13	*Fallopia multilflora* (Thumb) Haraldson - Hà thủ ô đỏ		VU		1000m-1300m

Note: CR: Critically endangered; EN: Endangered; VU: Vulnerable; LC: Least concern; NT: Near threatened; IA: Prohibiting exploitation and use for commercial purpose; IIA: Restricting exploitation and use for commercial purpose

3.4 Ecological characteristics and distribution of some threatened plant species inDong Van Karst Plateau Geopark

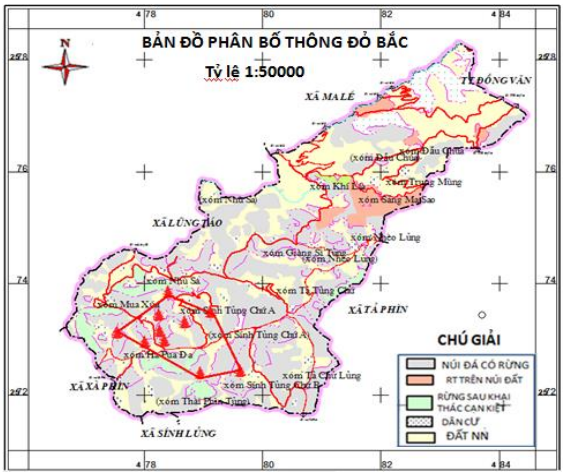
***Taxus chinensis* (Pilg.) Rehder**
Vietnamese name: Thông đỏ bắc
Family name: Taxaceae
a/ Morphology

Taxus chinensis is an evergreen tree up to 14 m tall, wide and bushy when cultivated. Leaves linear-lanceolate, falcate, spirally arranged, spreading in two ranks, about 1.2-2.7 cm long, 2-2.5 mm broad, abruptly pointed at the apex, the base decurrent, yellowish green above, pale green beneath. Seeds drupe-like, the fleshy arillate coat reddish at maturity, ripening in the first season (November). Trunk bark grayish red, with flimsy longitudinal commissure-like chinks; outer bark about 0.4-1.6 mm., membranous or fibrous, with a reddish brown to orange yellow cross-section; freshly cut sapwood pale apricot yellow, wood rays inconspicuous.

b/ Ecology

Taxus chinensis is a slowly growing tree, has cones around April and May, cones ripe on August and November. In Dong Van, this species distribution in limestone forest at elevations between 1300m-1700m and grows along with *Tsuga chinensis, Amentotaxus hatuyenensis, Podocarpus pilgeri. Taxus chinensis* is natural regenerated in Dong Van and seven seedling were recorded during the field assessment.

Picture 01 *Taxus chinensis* (Pilg.) Rehder



Map 2: Distribution map of *Taxus chinensis* (Pilg.) Rehder

***Pinus kwangtungensis* Chun ex Tsiang**
Vietnamese name: Thông Pà Cò
Family: Pinaceae
a/ Morphology

Trees of Pinus kwangtungensis are up to 30m tall with a trunk up to 1.5m DBH. The bark is brown, scaly; 1st-year branchlets pale brown; old branchlets grayish brown or yellow-brown, glabrous, rarely puberulent; winter buds black-brown, slightly resinous. Needles 2-5 per bundle, triangular in cross section, 3.5-7cm × 1-1.5mm, vascular bundle 1, resin canals 2, marginal, sometimes also 1 median, base with sheath shed. Seed cones usually solitary, pedunculate, reddish

brown at maturity, cylindric-oblong or cylindric-ovoid, slightly resinous. Seed scales cuneate-obovate, apophyses rhombic, apex thin, straight or slightly incurved. Seeds ellipsoid or obovoid, 0.8-1.2cm, together with wing subequal to seed scales. Pollination is around April and May, seed maturity in October of 2nd year.

b/ Ecology

Pinus kwangtungensis is distributed on limestone ridge from over 1400- 1700m above sea level. Only one individual tree of this species was found in Dong Van. Natural regeneration is poorly in this area. Accordingly, no seedlings were recorded and Pinus kwangtungensis Endangered and even locally extinct.

Picture 02 *Pinus kwangtungensis* Chun ex Tsiang

Map 03: Distribution map of *Pinus kwangtungensis* Chun ex Tsiang

***Tsuga chinensis* (Franch) Pritzel ex Diels**
Vietnamese name: Thiết sam núi đá
Family: Pinaceae

a/ Morphology

Tsunga chinensis trees are up to 20m tall and reach a DBH of 70-80cm, usually with a single trunk, often forked in the crown. Bark rough, scaly, comprised of blackish brown plates, with irregular longitudinal fissures; lenticels inconspicuous; outer bark about 6 mm thick, with alternate tiered layers of pale yellowish brown corky layers and brown lignified fibrous layers; newly formed periderm purplish red; inner bark about 4-5 mm thick, pale reddish brown, fibrous. Freshly cut sapwood pale yellowish white, wood rays inconspicuous. The crown is broad, becoming irregular or flat-topped with age. Twigs pale yellow-brown, buds ovoid-globose, 1-4mm diameter, not resinous, dark or red-brown. Leaves are mostly pectinate, linear, flattened, apex emarginate. Pollen cones are crowded near ends of branches, 3-5mm long, yellow with purple tinge. Seed cones numerous, short-pedunculate, ovoid-oblong when closed, light green ripening light brown. Seed scales nearly circular, 10 mm diameter, lower surface striated. Seeds are ovoid-oblong, light brown.

b/ Ecology

Cones of *Tsuga chinensis* appear on March-April, and ripen on September-October. *Tsuga chinensis* distribute on limestone in Dong Van at an elevation from 1400- 1700m above sea level. This species usually grows with *Pseudotsuga brevifolia, Podocarpus chinensis, Taxus chinensis. Tsuga chinensis* is a natural regeneration stage in Dong Van Karst Plateau Geopark and eight seedling could be recorded.

Picture 03. *Tsuga chinensis* (Franch) Pritzel ex Diels

Map 04. Distribution map of of *Tsuga chinensis* (Franch) Pritzel ex Diels

Conclusion

A total of 13 threatened plant species were recorded in Dong Van Karst Plateau Geopark, Ha Giang province, belonging to 10 families. There are 11 species listed in the Viet Nam Red List (2007), five species listed in IUCN (2015), and five species are listed in Decree 32/2006 of Vietnamese government.

The majority of species are distributed between 1500m to 1800m above sea level. Only three species occur at a level of 1000m- 1300m, representing roughly 23% of threatened plant species in the study area. This research also provides morphological and ecological characteristic as well as distribution maps ofthree endangered species: *Taxus chinensis* (Pilg.) Rehder, *Pinus kwangtungensis* Chun ex Tsiang and *Tsuga chinensis* (Franch) Pritzel ex Diels. All three are currently threatened and facing the rsik of extinction in the study area. In particular Pinus kwangtungensis Chun ex Tsiang was found only one time as mature tree and even no seedlings. *Taxus chinensis* (Pilg.) Rehder and *Tsuga chinensis* (Franch) Pritzel ex Diels has both natural regeneration in Dong Van Karst Plateau Geopark, but the number of seedlings of each species is smaller than ten individual, respectively.

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