Conservation status of conifers in Nam Dong Conservation Area (Thanh Hoa Province, northern Vietnam)

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Abstract. During the field works 2017–2019, we collected herbarium specimens of conifers in limestone area of Nam Dong Conservation Area, Thanh Hoa Province, northern Vietnam. They belong to six genera and five families (Cephalotaxaceae, Gnetaceae, Pinaceae, Podocarpaceae, and Taxaceae). Studied species are identified by IUCN Red List as EN (one species), VU (two species), LC (three species), and NT (two species). Three species found in the area are listed in Vietnam Red Data Book (Part II. Plants) and Vietnam Red List as VU. In addition, three species are listed by the Decree 32/ND-CP as IIA (two species) and IA (one species). The paper provides data on distribution of all coniferous species in studied area. The result of the study provides new original information for biodiversity management especially for threatened conifers in Nam Dong Conservation Area.

1. Introduction

Nam Dong Conservation Area lies between 20°18'07"–20°19'38"N and 104°52'08"–104°53'26"E, and includes territory over 646 ha. It is located in the southwestern part of Quan Hoa District of Thanh Hoa Province in northern Vietnam. The territory of Nam Dong District is a hilly area with dominating elevations 600–900 m a.s.l. with a tropical climate, annual precipitation 1600–1700 mm, high humidity (86%), cool winter (15–20°C) and warm summer (27–34°C). Diverse natural conditions lead to the formation of various forest types with very rich species composition. The forest covers about 86% of the area and harbours 673 documented flowering plant species, which belong to 136 plant families [1]. Many species, especially conifers such as *Cephalotaxus mannii* Hook.f., *Pinus kwangtungensis* Chun & Tsiang, *Taxus chinensis* (Pilg.) Rehder have economic value. However, all coniferous species have been damaged seriously in recent years due to negative human activity. This study provides information about the status and the distribution of coniferous species in Nam Dong Conservation Area necessary to improve the management and conservation efforts in this area.

2. Methods and Materials

Initial desk study of available relevant literature [1] were completed prior to research fieldwork in Nam Dong Conservation Area. Seven transects coming from foothills to highest hill tops (figure 1) representing all vegetation types were identified for the study. On each transect, all coniferous species were recorded. Analytical photographs of the plants were made additionally to collecting of voucher herbarium specimens. All locations were recorded by Garmin navigation system (gpsmap 62s). Plant species identification were based on the major literatures applied to the studied region [2-15]. Collected and studied voucher herbarium specimens were deposited in the herbarium of Vietnam National University of Forestry (VNF) and the Herbarium of Komarov Botanical Institute of the Russian Academy of Sciences (LE). Conservation assessment of the threatened species were followed to the terms and categories accepted in IUCN Red List [16], the Vietnam Red Data Book [17], and the Degree No 32 issued by Vietnamese Government for the threatened species needed to be conserved [18].

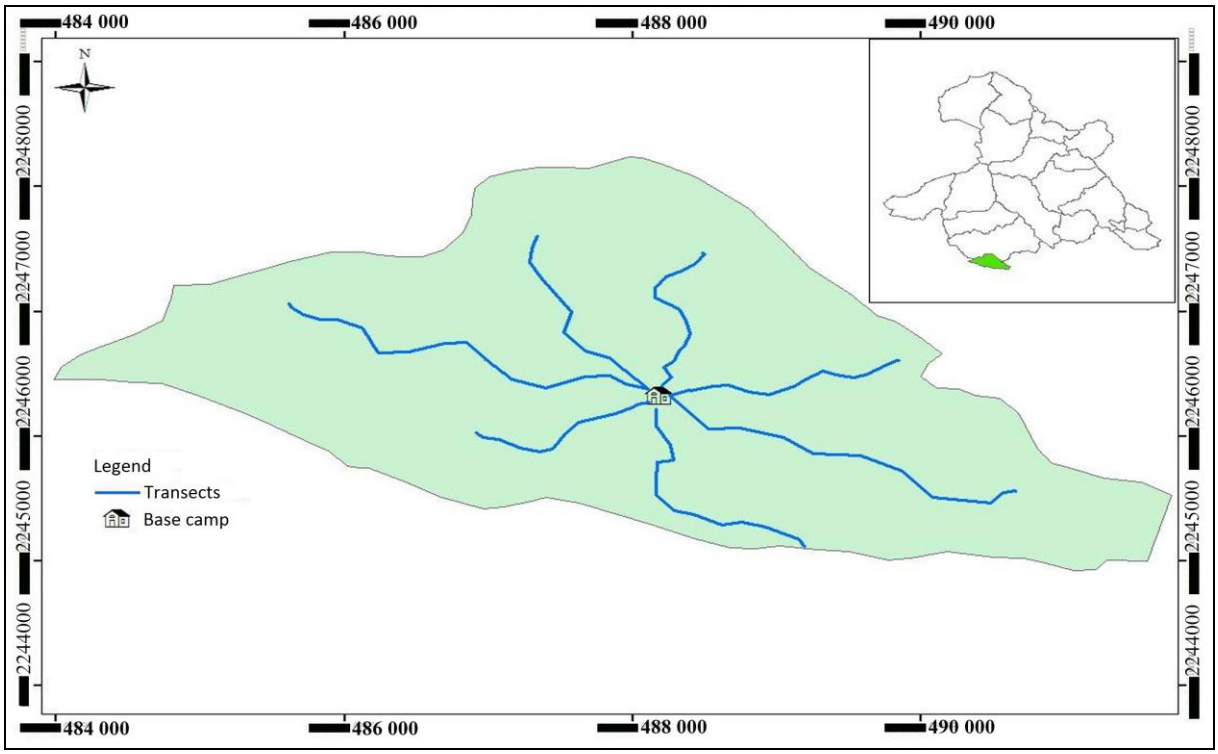

Figure 1. Location and studied transects of Nam Dong Conservation Area.

3. Results and Discussion

3.1. Diversity and distribution of coniferous species in Nam Dong Conservation Area

3.1.1. Diversity of coniferous species. Eight coniferous species recorded in Nam Dong Conservation Area (figure 2, 3) belong to five families including Cephalotaxaceae, Gnetaceae, Pinaceae, Podocarpaceae, and Taxaceae. The family Taxaceae includes three species, *Amentotaxus argotaenia* (Hance) Pilg., *Amentotaxus yunnanensis* H. L. Li and *Taxus chinensis* (Pilg.) Rehder; Podocarpaceae – two species, *Podocarpus neriifolius* D. Don and *Podocarpus pilgeri* Foxw. Other three families, Cephalotaxaceae, Gnetaceae and Pinaceae include only one species each. These species are – *Cephalotaxus mannii* Hook. f. (Cephalotaxaceae), *Pinus kwangtungensis* Chun & Tsiang (Pinaceae), and *Podocarpus neriifolius* D. Don (Podocarpaceae) (table 1).

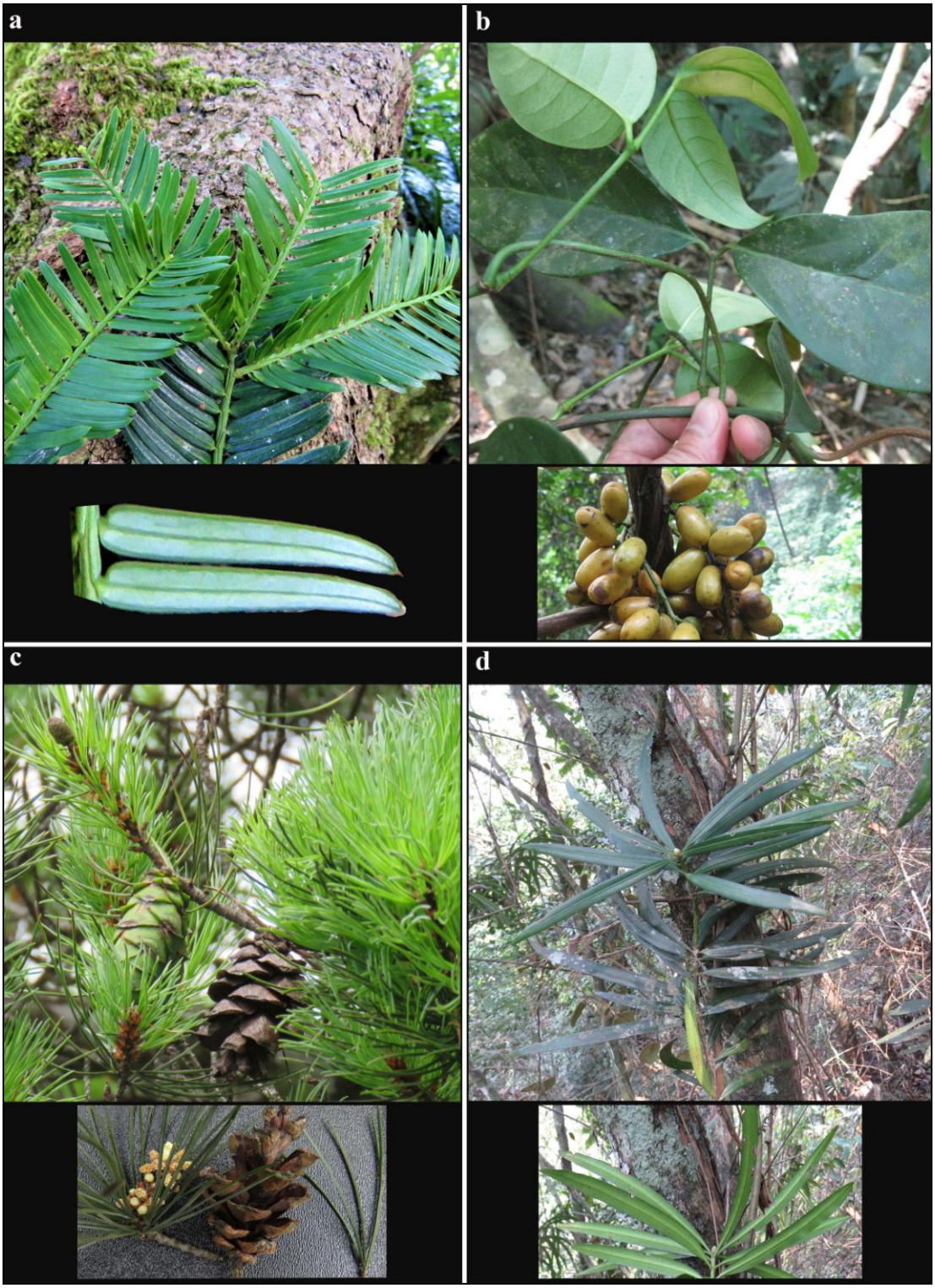

Figure 2. *Cephalotaxus mannii* (a); *Gnetum montanum* (b); *Pinus kwangtungensis* (c); *Podocarpus neriifolius* (d).

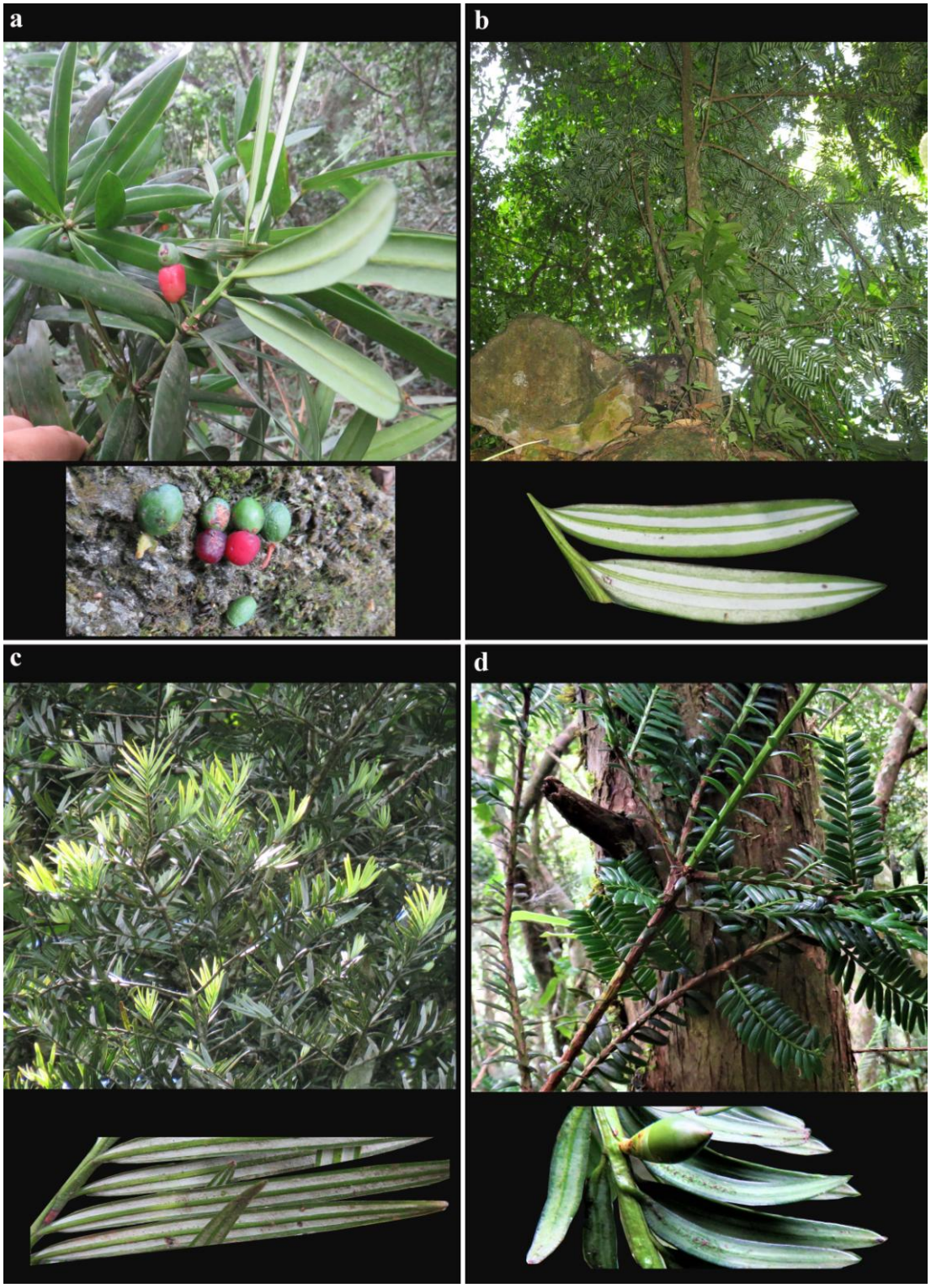

Figure 3. *Podocarpus pilgeri* (a); *Amentotaxus argotaenia* (b); *Amentotaxus yunnanensis* (c); *Taxus chinensis* (d).

Table 1. The list of voucher herbarium specimens collected in Nam Dong Conservation Area.

No	Scientific name (family)	Local name	Collection number
1	*Cephalotaxus mannii* Hook. f. (Cephalotaxaceae)	Đỉnh tùng	CLL 0295
2	*Gnetum montanum* Markgr. (Gnetaceae)	Gắm núi	ND-TV 0127
3	*Pinus kwangtungensis* Chun & Tsiang (Pinaceae)	Thông Pà Cò	CLL 0283
4	*Podocarpus neriifolius* D. Don (Podocarpaceae)	Thông tre lá dài	CLL 0279
5	*Podocarpus pilgeri* Foxw. (Podocarpaceae)	Thông tre lá ngắn	Picture
6	*Amentotaxus argotaenia* (Hance) Pilg. (Taxaceae)	Dẻ tùng	CLL 0242
7	*Amentotaxus yunnanensis* H.L.Li (Taxaceae)	Dẻ tùng sọc rộng	Picture
8	*Taxus chinensis* (Pilg.) Rehder (Taxaceae)	Thông đỏ bắc	CLL 0014

3.1.2. Distribution of coniferous species. Most coniferous species in Nam Dong Conservation Area grow between 800 m to 1200 m a.s.l. *Podocarpus neriifolius* and *Gnetum montanum* are found at elevations lower 900 m while the remaining species are located from 900 m to 1100 m. *Pinus kwangtungensis* was recorded in Nam Dong Conservation Area for the first time. It was found at elevations from 1000 m to 1200 m (table 2).

Table 2. Distribution of conifers in Nam Dong Conservation Area.

No	Scientific name	Altitude, m	Positions (gpsmap 62s)
1	*Cephalotaxus mannii* Hook. f.	915	20°18'29"N 104°52'35"E
2	*Gnetum montanum* Markgr.	850	20°18'51"N 104°52'25"E
3	*Pinus kwangtungensis* Chun & Tsiang	1127	20°18'81"N 104°53'65"E
4	*Podocarpus neriifolius* D. Don	875	20°18'49"N 104°53'29"E
5	*Podocarpus pilgeri* Foxw.	1084	20°18'83"N 104°53'57"E
6	*Amentotaxus argotaenia* (Hance) Pilg.	999	20°18'29"N 104°53'35"E
7	*Amentotaxus yunnanensis* H.L.Li	990	20°18'55"N 104°52'64"E
8	*Taxus chinensis* (Pilg.) Rehder	1066	20°18'41"N 104°53'42"E

3.2. Natural conservation status of conifers in Nam Dong Conservation Area

Results from survey investigation indicated that eight species of conifers were found in Nam Dong Conservation Area. Of which eight species are listed in the IUCN Red list (2020), three species are listed in the Vietnam Red Data Book (2007), and three species are listed in Decree 32 of the Vietnamese government (2006) (table 3).

Table 3. The status of coniferous species in Nam Dong Conservation Area.

No	Scientific name	IUCN[a] [16]	Vietnam Red Data Book [17]	Decree [18]
1	*Cephalotaxus mannii* Hook. f.	VU	VU	IIA
2	*Gnetum montanum* Markgr.	LC		
3	*Pinus kwangtungensis* Chun & Tsiang	NT	VU	IA
4	*Podocarpus neriifolius* D. Don	LC	-	-
5	*Podocarpus pilgeri* Foxw.	LC		
6	*Amentotaxus argotaenia* (Hance) Pilg.	NT	-	-
7	*Amentotaxus yunnanensis* H.L.Li	VU		
8	*Taxus chinensis* (Pilg.) Rehder	EN	VU	IIA

[a] Status: EN: Endangered; VU: Vulnerable; NT: Near threatened; LC: Least concern; IA: Prohibiting exploitation and use for commercial purposes; IIA: Restricting exploitation and use for commercial purpose.

4. Conclusion

Eight coniferous species belonging to five families, Cephalotaxaceae, Gnetaceae, Pinaceae, Podocarpaceae and Taxaceae were found in Nam Dong Conservation Area. Most of them have high conservation values. All species are listed in IUCN Red List (2020), three species are listed in Vietnam Red Data Book (2007), and three species are listed in Decree 32/CP/2006 of the Vietnamese government. Almost all coniferous species in Nam Dong Conservation Area were found at elevations from 800 to 1200 m a.s.l.

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