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Current Status Research of Heritage Sites and Classification of Adjacent Flora according to UNESCO Standards in Minh Thanh Commune, Son Duong District, Tuyen Quang Province

Do Cong Ba

Tan Trao University, Yen son Distric, Tuyen Quang Province, Vietnam

Corresponding Author: **Do Cong Ba**

Abstract

The research results on the current status of the heritage sites are described as follows: There are 5 nationally recognized heritage sites, including: The Central Police Guest House; the Ministry of Foreign Affairs; the Information House; the Ministry of Justice; and the Vietnam General Confederation of Labour. Additionally, there are 9 provincially recognized heritage sites, comprising: Thanh La Communal House; Headquarters of the Free Village Council; Han Rock Field - Chicken Lake; Mr. Duc Dai's House; Mr. Nguyen Minh Chau's House; Mr. Ma Van Yen's House; Vuc Dao Field; and Le Dung Suspension Bridge. The adjacent flora to the historical heritage sites in the research area is classified and described into 4 vegetation formations, 5 sub-vegetation formations, 5 vegetation groups, and 6 vegetation types of 8 sub-vegetation types,

including: (1) Sub-vegetation type of evergreen broad-leaved forests in lowland and low-mountain terrains under strong impact; (2) Sub-vegetation type of evergreen broad-leaved forests on limestone soils in low mountains under strong impact; (3) Sub-vegetation type of sparse evergreen broad-leaved forests in lowland secondary fallow terrains; (4) Sub-vegetation type of tropical bamboo forests in lowland and low-mountain terrains; (5) Sub-vegetation type of tropical palm forests in lowland terrains; (6) Sub-vegetation type of evergreen tropical shrub vegetation with scattered woody plants; (7) Sub-vegetation type of evergreen tropical shrub vegetation without scattered woody plants; (8) Sub-vegetation type of forest banana groundcover.

Keywords: Flora, UNESCO, Minh Thanh

1. Introduction

Tuyen Quang is a northern midland and mountainous province with a natural area of 586,790 hectares. Tuyen Quang has a high biodiversity and favorable natural conditions for enhancing the biological productivity of both natural and artificial ecosystems. This underscores the necessity of researching and evaluating biodiversity in general, and plant ecosystems in particular, to develop conservation and sustainable development strategies in Tuyen Quang, which is crucial and a top priority. Son Duong district is located in the southern part of Tuyen Quang province, with its district capital being Son Duong town, approximately 30 km northwest of Tuyen Quang city and about 104 km north of Hanoi. The terrain gradually rises from the south to the north, with the highest point being in Tan Trao commune, the revolutionary base, adjacent to the Dinh Hoa ATK base, Thai Nguyen province, characterized by many rugged hills, which were selected by the Central Party and President Ho Chi Minh as the location for living and working, thereby creating the special national historical site of Tan Trao - the Capital of Liberation Zone, the Capital of Resistance. Minh Thanh commune is located in the northern part of Son Duong district, bordered to the north by Yen Son district, to the south by Tu Thinh commune, to the east by Trung Yen and Tan Trao communes, and to the west by Yen Son commune. The commune is entrusted with the strict management and protection of 162.05 hectares of natural forest, 185.3 hectares of forest planted for protection, and special use funded by the state budget.

2. Objectives and Research Methods

2.1 Objectives

The research object is the current situation of historical relic sites and adjacent vegetation carpets at the Tan Trao historical relic site in Minh Thanh commune, Son Duong district, Tuyen Quang province. The research period is from 2023 to 2024.

2.2 Research Methods

2.2.1 Inherited Method

The paper collects and inherits selectively data, documents, and relevant reports related to the research area from scientists and functional agencies.

2.2.2 Plant Research Methods

Transect and Quadrat Survey Method: During the survey process, we use the transect and quadrat survey methods as described by Hoang Chung (2008) [3] and Nguyen Nghia Thin (2007) [9].

Determination of Vegetation Types: Identify vegetation types at the Tan Trao historical relic site according to the classification framework of UNESCO (1973) [11]. The structure of this framework is as follows:

I, II, etc. = Formation class

A, B, etc. = Formation subclass

1, 2, etc. = Formation group

a, b, etc. = Formation

(1), (2), etc. = Subformation

(a), (b), etc. = Further subdivision

2.2.3 Data Analysis and Processing Methods

Processing plant samples: Plant samples collected are processed, prepared, and preserved according to the method of Nguyen Nghia Thin (2007) [9].

Identifying plant species (scientific names, Vietnamese names) using morphological comparison methods, referring to classification keys and species descriptions from various sources such as: "Vietnam Forest Trees" by the Ministry of Agriculture and Rural Development, 2000; "Vietnam Grasses" by Pham Hoang Ho, (1991 - 1993) [5]; "Checklist of Vietnamese Plant Species" (2003, 2005) by Nguyen Tien Ban and colleagues.

Biological statistical methods are employed to process data using Microsoft Excel software.

3. Results of the Study

3.1 Status of Heritage Sites in the Research Area

3.1.1 National-level Heritage Sites

* Central Police Mansion:

- The site is located in Dong Don hamlet, Minh Thanh commune, Son Duong district, and was recognized as a national-level heritage site according to Decision No. 53/1999/QĐ-BVHTT dated August 2, 1999. The Central Police Mansion served as the first and longest-standing military base of the Central Police Mansion during the resistance against the French. Dong Don hamlet witnessed the growth of the police force. It was where the Central Police Mansion issued significant directives and resolutions, and where events of great significance to the entire police force took place.

* Ministry of Foreign Affairs:

- The site is located in Dong Chua hamlet, Minh Thanh commune, Son Duong district, and was recognized as a national-level heritage site according to Decision No. 16/2000/QĐ-BVHTT dated August 21, 2000. This is where the Ministry of Foreign Affairs resided and worked from early 1951 until August 1954.

* Information House:

- The site is located in Moi hamlet, Minh Thanh commune, Son Duong district, and was recognized as a

national-level heritage site according to Decision No. 53/2001/QĐ-BVHTT dated December 18, 2001. This is where the Information House resided and worked in 1951. The total area of the site is 6450m². The area of the inviolable zone is 1800m².

* Ministry of Justice:

- The site is located in Moi hamlet, Minh Thanh commune, Son Duong district, and was recognized as a national-level heritage site according to Decision No. 24/2005/QĐ-BVHTT dated July 17, 2005. This is where the Ministry of Justice resided and worked during the resistance against the French colonial invasion (from late 1949 to September 1950).

* Vietnam General Confederation of Labor:

- The site is located in Cau hamlet, Minh Thanh commune, Son Duong district, and was recognized as a national-level heritage site according to Decision No. 57/2005/QĐ-BVHTT dated October 10, 2005. This is where the Vietnam General Confederation of Labor resided and worked.

3.1.2 Provincial-level Heritage Sites

* Thanh La Communal House Site: This site, located in Moi hamlet, Minh Thanh commune, Son Duong district, was designated as a provincial-level heritage site in 1974. It was the location where the armed uprising for the first government took place nationwide on March 10, 1945.

* Headquarters of the Autonomous Region Committee Site: Situated in Moi hamlet, Minh Thanh commune, Son Duong district, this site was designated as a provincial-level heritage site in 2006. It served as the residence and workplace of the Autonomous Region Committee during its early days of establishment (from March 1945 to early 1946). This was the first autonomous government formed earliest nationwide, marking the fundamental victory of the national liberation movement in the entire district.

* Rocc Han Cave - Ga Pond Site: Located in Le hamlet, Minh Thanh commune, Son Duong district, this site was designated as a provincial-level heritage site in 2006. It was where comrades of the Nguyen Hue Zone Executive Committee resided, worked, and led the revolutionary movement at the end of 1944.

* Mr. Duc Dai's House Site: Situated in Toa hamlet, Minh Thanh commune, Son Duong district, this site was designated as a provincial-level heritage site in 2006. It was where the Nguyen Hue Zone Party Committee led armed forces and local people in an uprising for government on March 10, 1945.

* Mr. Nguyen Minh Chau's House Site: Located in Don hamlet, Minh Thanh commune, Son Duong district, this site was designated as a provincial-level heritage site in 2006. It was where President Ho Chi Minh stayed when receiving the Allied delegation at Lung Co Airport in July 1945. It also served as the office of the Ministry of Foreign Affairs during the resistance against the French colonial invasion in 1947.

* Tham Thi Cave Site: Situated in Nieng hamlet, Minh Thanh commune, Son Duong district, this site was designated as a provincial-level heritage site in 2006. It was where revolutionary weapons were hidden from late 1944 to April 1945.

* Mr. Ma Van Yen's House Site: Located in Co hamlet, Minh Thanh commune, Son Duong district, this site was designated as a provincial-level heritage site in 2006. It was where President Ho Chi Minh stayed at the end of July 1945 to direct and welcome the Allied aircraft.

* Vuc Dao Cave Site: Situated in Le hamlet, Minh Thanh commune, Son Duong district, this site was designated as a provincial-level heritage site in 2006. In early 1945, Vuc Dao Cave was secretly located at the foot of Vuc Dao Mountain near Lê Stream, bordering two hamlets of Le and Don. In this base, revolutionary comrades operated, directed, and prepared for the Thanh La uprising.

* Le Dung Suspension Bridge Site: Located in Le hamlet, Minh Thanh commune, Son Duong district, this site was designated as a provincial-level heritage site in 2006. The Le Dung Suspension Bridge spanned the Pho Day River from the well site in Le hamlet, Minh Thanh commune, to

the foothill of Khi Noc Hill, Yen Thuong hamlet, Trung Yen commune, to facilitate transportation of goods and food for central agencies stationed in Son Duong and Yen Son revolutionary base areas (from 1948 to 1954). This was the only suspension bridge in Viet Bac Military Zone during the resistance against the French colonial invasion.

3.2 Natural Vegetation Carpet

Applying the UNESCO classification framework (1973) ^[11] as adapted by Phan Ke Loc in Vietnam (1985) ^[6] for investigating the current status of vegetation carpets adjacent to heritage sites in Minh Thanh commune, Son Duong district, Tuyen Quang province ^[6], we have identified 4 ecosystem classes, 5 ecosystem subclasses, 5 ecosystem groups, and 6 ecosystems within 8 ecosystem subgroups, as presented in Table 1 below:

Table 1: Vegetation Carpet System Adjacent to Heritage Sites in Minh Thanh Commune, Son Duong District, Tuyen Quang Province

N.o	Vegetation Carpets
I.	Closed Forest Ecosystem Class
I.A	Subclass of Evergreen Closed Forest Ecosystem
I.A.2	Group of Tropical and Subtropical Evergreen Rainforest Ecosystems
I.A.2a	Tropical and subtropical evergreen rainforest ecosystem in lowland and foothill terrain
I.A.2a(2)	Subgroup of Lowland and Foothill Evergreen Broadleaf Forest Ecosystems subject to strong impacts
I.A.2e	Tropical and subtropical evergreen rainforest ecosystem on limestone soil in lowland areas
I.A.2e(1)	Subgroup of Lowland Evergreen Broadleaf Forest Ecosystems on limestone soil subject to strong impacts
II.	Sparse Forest Ecosystem Class
II.A.	Subclass of Mainly Evergreen Sparse Forest Ecosystem
II.A.1	Group of Mainly Evergreen Sparse Broadleaf Forest Ecosystems
II.A.1a	Sparse evergreen broadleaf forest ecosystem in lowland and foothill terrain
II.A.1a(1)	Subgroup of Lowland Sparse Evergreen Broadleaf Forest Ecosystems after shifting cultivation
II.A.1a(2)	Subgroup of Tropical Bamboo Sparse Forest Ecosystems in lowland and foothill terrain
II.A.1a(3)	Subgroup of Tropical Palm Sparse Forest Ecosystems in lowland areas
III.	Shrubland Ecosystem Class
III.A.	Subclass of Mainly Evergreen Shrubland Ecosystem
III.A.1	Group of Evergreen Broadleaf Shrubland Carpet Ecosystems
III.A.1f	Evergreen broadleaf shrubland ecosystem on ferrallitic soil
III.A.1f(1)	Subgroup of Tropical Evergreen Broadleaf Shrubland Carpet Ecosystems with scattered trees
III.A.1f(2)	Subgroup of Tropical Evergreen Broadleaf Shrubland Carpet Ecosystems without scattered trees
IV.	Grassland Ecosystem Class
IV.C	Subclass of Lowland Rice-like Grassland Ecosystem
IV.C.2	Group of Tropical Rice-like Grassland Ecosystems without woody plants
IV.C.2a	Tropical rice-like grassland ecosystem without woody plants
IV.D.	Subclass of Non-Rice-like Grassland Ecosystem
IV.D.1	Group of Tall Non-Rice-like Grassland Ecosystems
IV.D.1a	Tall non-rice-like grassland ecosystem consisting of perennial herbs and Cymbopogon
IV.D.1a(1)	Subgroup of Banana Forest Carpet Ecosystems

3.2.1 Natural Vegetation Carpet

Based on the results in Table 1, the morphological characteristics and structure of the plant ecosystems and sub-ecosystems in the research area are described as follows:

* I.A.2a. Tropical Evergreen Rainforest Ecosystem in Lowland and Foothill Terrain

This ecosystem consists of 1 sub-ecosystem:

▪ I.A.2a(2). Sub-ecosystem of Lowland and Foothill Evergreen Broadleaf Forests Subject to Strong Impact:

This forest type is prevalent in the villages within the research area, with a large area located near residential areas, at elevations below 300m. Due to strong impacts from selective logging for valuable and rare timber species, the forest stands now mostly comprise low-quality timber. The forest structure is often unclear, surpassing canopy layer A1.

Canopy layer (A2): Consists of tree species with average

heights ranging from 10 - 15m, average diameters of 20 - 25cm, and a canopy cover of 70%. Dominant species in this layer include: *Gironniera subaequalis*, *Phoebe tavoyana*, *Saraca dives*, etc.

Understory layer (A3): Tree species in this layer are small-sized with average heights ranging from 5 - 8m, diameters of 10 - 15cm, and a canopy cover of 40%. Key vegetation components include: *Bauhinia championii*, *Liquidambar formosana*, *Litsea cubeba*, etc.

Shrub layer (B): Shrub species in this layer have average heights ranging from 1.5 - 4m, a canopy cover of 20%, including species such as: *Streblus asper*, *Melastoma candidum*, *Glochidion eriocarpum*, etc.

Ground cover layer (C): With a canopy cover of 30 - 40%, dominant plant species are: *Microstegium vagans*, *Centotheca lappacea*, *Phrynium thorelli*, etc.

Epiphytic vegetation: Consists of climbing species such as: *Streptocaulon griffithii*, *Hodgsonia macrocarpa*, *Zehneria indica*, etc.

* I.A.2e. Tropical Evergreen Rainforest Ecosystem on Limestone Soil in Low Mountains

▪ I.A.2e(1). Sub-ecosystem of Evergreen Broadleaf Forests on Limestone Soil in Low Mountains Subject to Strong Impact:

This subtype of forest occurs in some villages of Minh Thanh commune, in areas near residential settlements at altitudes above 700m. Due to excessive exploitation, large valuable timber species are now scarce. The forest structure often lacks clarity beyond canopy layer A1.

Canopy layer (A2): This layer has an average height of 10-15m, average diameter ranging from 20-25cm, and canopy density of 0.5-0.6. Species in this layer include: *Dendrocalamus hamiltonii*, *Diospiros* sp., *Garcinia fagraeoides*, etc.

Shrub layer (B): With an average height of 1.5-5m and canopy density of 0.3-0.4, species in this layer include: *Dracaena cochinchinensis*, *Psychotria rubra*, *Randia spinosa*, etc.

Ground cover layer (C): Vegetation in this layer is sparse and includes species such as *Centotheca lappacea*, *Lycopodium cernuum*, and *Lemmaphyllum microphyllum*.

Epiphytic vegetation: Includes climbing species like *Zehneria indica*, *Caesalpinia bonduc*, etc.

* II.A.1a. Sparse Evergreen Broadleaf Forest Ecosystem on Lowlands and Low Mountains

▪ II.A.1a(1). Sub-ecosystem of Sparse Evergreen Broadleaf Forests on Lowlands after Shifting Cultivation:

This subtype of forest is prevalent in several villages within Minh Thanh commune, primarily concentrated near residential areas, featuring pioneer light-demanding species that grow rapidly. The forest structure consists of three layers:

Canopy layer: The canopy density of trees ranges from 0.4-0.5; with heights typically between 5-10m, including species such as *Trevesia palmata*, *Trema orientalis*, *Sapium discolor*, etc.

Shrub layer: Comprising species like *Alchornea tiliifolia*, *Breynia fruticosa*, *Mallotus apenta*, belonging to the Euphorbiaceae family. Species from the Rubiaceae family like *Psychotria reevesii*, *Ixora coccinea*, *Pavetta indica* are also present.

Ground cover layer: Mainly composed of species from Poaceae, Cyperaceae, and Asteraceae families, such as *Saccharum officinarum*, *Saccharum spontaneum*, *Carex indica*, etc.

Epiphytic vegetation: Includes climbing species from families such as Fabaceae, Vitaceae, and Convolvulaceae.

▪ II.A.1a(2). Sub-ecosystem of Tropical Bamboo Forests on Lowlands and Low Mountains:

Research indicates that this sub-ecosystem originates from the overexploitation or deforestation of lowland evergreen rainforests in low mountainous areas for shifting cultivation. Depending on the degree of involvement of broadleaf tree species, either pure or mixed bamboo forests are formed.

+ **Mixed bamboo forests with broadleaf trees:** In this type of forest, besides the dominant layer of bamboo reaching

heights of 6-8m, there is an additional canopy layer of trees reaching heights of 15-20m, with a canopy density of 0.2-0.3. Some tree species include *Phoebe tavoyana*, *Aglaia dasyclada*, *Castanopsis indica*, etc. The shrub and ground cover layers contain shade-tolerant species more than pure bamboo forests.

+ **Pure bamboo forests:** This subtype covers a considerable area and forms a forest canopy layer dominated by bamboo with heights of 6-8m, average diameters of 3-5cm, and canopy cover of 80-90%. Characterized by the formation of bamboo forests after deforestation or burning for shifting cultivation, these are distributed at altitudes below 400m. Beneath the bamboo canopy, only a few plant species are encountered, such as *Calamus tonkinensis*, *Ancistrocladus scandens*, *Tetracera scandens*, etc.

▪ II.A.1a(3). Sub-ecosystem of Tropical Palm Forests on Lowlands:

This subtype is distributed in several villages of Minh Thanh commune. The dominant species is *Livistona cochinchinensis*, forming the uppermost layer with heights of 12-15m and canopy cover of 60%; the lower layer mainly comprises light-demanding species like *Mallotus apenta*, *Trema orientalis*, etc. The ground cover layer includes species like *Microstegium montanum*, *Dryopteris parasitica*, *Miscanthus floridulus*, etc. Climbing plants consist of *Dioscorea persimilis*, *Lygodium flexuosum*, etc.

* III.A.1f. Evergreen Broadleaf Shrubland Ecosystem on Feralit Soil

▪ III.A.1f(1). Sub-ecosystem of Evergreen Broadleaf Shrubland with Sparse Tree Growth:

The shrubland is currently undergoing a successional process, and if protected, the vegetation cover will develop into secondary forests. Common shrub species include *Melastoma normale*, *Syzygium cuminii*, *Aporosa dioica*, interspersed with light-demanding, fast-growing tree species like *Litsea cubeba*, *Elaeocarpus griffithii*, *Peltophorum pterocarpum*.

The ground cover vegetation consists of species such as *Cynodon dactylon*, *Microstegium vagans*, *Centotheca lappacea*.

Some climbing plants include *Dischidia acuminata*, *Argyreia acuta*.

▪ III.A.1f(2). Sub-ecosystem of Evergreen Broadleaf Shrubland without Sparse Tree Growth:

This subtype comprises several plant communities such as *Ageratum conyzoides*, *Eupatorium odoratum*, *Setaria viridis*, which grow in small patches scattered throughout the area. These shrublands are mainly formed due to secondary succession after abandonment or excessive grazing.

* IV.C.2a. Tropical Herbaceous Low Grassland Ecosystem without Woody Stems

This type of ground cover vegetation is quite common, formed after slash-and-burn agriculture, with small scattered patches, degraded soil, where grazing of livestock often occurs, and woody plants no longer have the ability to regenerate naturally. The predominant plant species are various grasses, herbaceous plants, shrubs, and typical climbing vines such as *Microstegium vagans*, *Cynodon dactylon*, *Cyperus rotundus*,

* IV.D.1a. Tall Grassland Ecosystem without Grain-Like Plants Consisting of Perennial Herbs and Ferns

▪ IV.D.1a(1). Sub-ecosystem of Forest Banana Thicket: Forest bananas (*Musa* sp.) are typically scattered in low mountain foothills and slopes with limited areas, usually in small patches. Beneath the forest banana canopy, there are also some grasses, ferns, and climbing vines belonging to the Asteraceae, Poaceae, and Lygodium families.

3.2.2 Crop Vegetation Cover

Crop vegetation cover refers to artificial cover types created by humans, including agricultural ecosystems and plantation forests. In the research area, agricultural crops mainly consist of rice, maize, and various ornamental flowers covering an area of 643.3 hectares. Plantation forests in the research area primarily comprise monoculture plantation forests funded by government projects, including species such as *Acacia* hybrid, *Acacia mangium*, which constitute a significant proportion (75%) of the plantation forests. Other types of plantation forests such as *Melia azedarach*, *Dracontomelon dupereanum*, and *Bambusa* spp. are also cultivated by local residents sporadically in residential areas, gardens, etc.

Research results indicate a diverse range of vegetation covers (natural and artificial) in the research area, which serve as crucial foundations. They not only contribute to creating harmonious natural landscapes but also serve eco-tourism purposes, environmental protection, biodiversity conservation, heritage preservation, and livelihood support for local residents.

4. Conclusion

The study results on the current status of heritage sites include 5 nationally recognized sites and 9 provincially recognized sites. The vegetation cover adjacent to historical heritage sites in the research area is classified and described into 4 vegetation formations, 5 sub-vegetation formations, 5 vegetation groups, and 6 vegetation types of 8 sub-vegetation formations. The species composition and structure of natural forests adjacent to heritage sites with minimal disturbance exhibit a 5-layered structure, including 3 distinct tree layers: The overstory, canopy layer, understory, shrub layer, and ground cover layer. The investigation also reveals that in provincially recognized heritage sites, due to inadequate attention, forestry resource exploitation activities in the adjacent vegetation covers of heritage sites still occur, leading to a reduction in the diversity of forest plant species groups, thereby diminishing the environmental protection function of forests as well as the landscape formation function for heritage sites.

5. Acknowledgements

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6. References

1. Nguyen Tien Ban, *et al.* Catalogue of Vietnamese Plant Species. Agriculture Publishing House, Hanoi, 2003, 2005.
2. Ministry of Agriculture and Rural Development. Vietnam Forest Tree Names. Agriculture Publishing House, Hanoi, 2000.
3. Hoang Chung. Methods of Plant Community Research, Education Publishing House, Hanoi, 2008.
4. Tuyen Quang Provincial Statistics Office. Tuyen Quang Statistical Yearbook. Tuyen Quang Province, 2023.
5. Pham Hoang Ho. Flora of Vietnam, Volumes I - III, Montreal, Canada, 1991 - 1993.
6. Phan Ke Loc. Application of the UNESCO classification framework to construct the classification framework of Vietnamese forest vegetation. *Journal of Biology*. 1985; (12):27-29.
7. Nguyen Nghia Thin. Tropical Forest Ecology. National University Publishing House, Hanoi, 2004.
8. Tran Dinh Ly, *et al.* Vegetation Ecology, Natural Science and Technology Publishing House, Hanoi, 2018.
9. Nguyen Nghia Thin. Methods in Plant Research, National University Publishing House, Hanoi, 2007.
10. National Center for Natural Science and Technology, Institute of Ecology and Biological Resources. Southeast Asian Plant Resources, Agriculture Publishing House, Hanoi, 1989-2005.
11. UNESCO. International classification and mapping of vegetation, Paris, 1973.
12. Warming E, Vahl M. Oecology of Plants-an introduction to the study of plant-communities. In P. Groom, I.B. Balfour (1925), Reprinted a number of times, most recently by Biotech Books (2nd end), Clarendon Press, 1909. Delhi ISBN 81-7622-010-8.
13. Wilson EO. (ed). Biodiversity. National Academy press, Washington, D.C, 1988.
14. Yucheng L, Shili M. The study on secondary succession of evergreen broad - leaved forest of communities and dominant populations. *Chinese foresry selected abstracts*. CAF - FOR - SPA, 1992, 15.
15. Kammesheid L. Bestandesstruktur und Artendiversität in selektiv genutzten Feuchtwäldern der westlichen Llanos Venezuelas, unter besonderer Berücksichtigung einiger autökologischer Merkmale wichtiger Baumarten. Verlag Erich Goltze GmbH & Co. KG, Göttingen, 230 S, 1994. (ISBN 3-88452-426-7).
16. Nguyen Van Sinh. Sukzessionsuntersuchungen in den Sekundaerwaeldern auf aufgegebenen Reisanbau- und Siedlungsflaechen im Norden Vietnams. Verlag Erich Goltze GmbH & Co. KG, Göttingen, 116 S, 2000. (ISBN 3-88452-401-1).