

A STUDY ON MANGROVE PLANTS IN DUONG KINH, HAI PHONG

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Abstract: The study was conducted to determine the floristic composition and ethnobotanical values of mangrove plants in the coastal area of Duong Kinh, Hai Phong city, thereby providing scientific data for biodiversity conservation and sustainable socio-ecological development. A total of 37 species of mangrove-associated plants were recorded, belonging to 26 families and 2 divisions of vascular plants. Among these, numerous taxa possess significant ecological roles (wave attenuation, shoreline stabilization, soil amelioration), economic values (timber, tannin, paper pulp, apiculture) and medicinal properties. Several representative species include *Sonneratia caseolaris* (L.) Engl. , *Bruguiera gymnorrhiza* (L.) Lam., *Kandelia obovata* Sheue, H.Y.Liu & J.W.H.Yong, *Rhizophora stylosa* Griff. and *Aegiceras corniculatum* (L.) Blanco. These findings reaffirm the crucial role of mangrove vegetation in coastal protection, biodiversity maintenance and sustainable utilization of this natural resource.

Keywords: Mangrove plants, Duong Kinh, Hai Phong.

NGHIÊN CỨU THỰC VẬT RỪNG NGẬP MẶN Ở DƯƠNG KINH, HẢI PHÒNG

Tóm tắt: Nghiên cứu được thực hiện nhằm xác định thành phần loài và giá trị sử dụng của thực vật rừng ngập mặn ven biển Dương Kinh, thành phố Hải Phòng, góp phần cung cấp dữ liệu khoa học cho công tác bảo tồn đa dạng sinh học và phát triển kinh tế - sinh thái bền vững. Kết quả khảo sát thành phần loài rừng ngập mặn tại Dương Kinh đã ghi nhận 37 loài thực vật, thuộc 26 họ và 2 ngành thực vật bậc cao có mạch. Trong số này, nhiều loài có giá trị sinh thái (chắn sóng, chống xói mòn, cải tạo đất), giá trị kinh tế (lấy gỗ, tanin, nguyên liệu giấy, nuôi ong) và giá trị dược liệu. Một số loài tiêu biểu gồm: Bần chua (*Sonneratia caseolaris* (L.) Engl.), Vẹt dù (*Bruguiera gymnorrhiza* (L.) Lam.), Trang (*Kandelia obovata* Sheue, H.Y.Liu & J.W.H.Yong), Đước vôi (*Rhizophora stylosa* Griff.), Sú (*Aegiceras corniculatum* (L.) Blanco). Các kết quả

nghiên cứu khẳng định vai trò quan trọng của hệ thực vật rừng ngập mặn trong việc bảo vệ bờ biển, duy trì đa dạng sinh học và mở ra triển vọng khai thác hợp lý nguồn tài nguyên này.

Từ khóa: Thực vật rừng ngập mặn, Duong Kinh, Hải Phòng.

1. Introduction

Duong Kinh, located in the coastal zone of Hai Phong city, harbors mangrove ecosystems primarily distributed in Hai Thanh and Tan Thanh. This is the estuarine area of the Lach Tray and Van Uc rivers, strongly influenced by tidal regimes and saline intrusion. In the context of climate change and sea-level rise, mangroves play an increasingly important role in disaster mitigation, genetic resource conservation and sustainable livelihood support for local communities [2].

Although previous investigations have addressed the vascular flora of Duong Kinh, comprehensive surveys focusing specifically on mangrove vegetation remain limited. Therefore, this study was conducted to provide supplementary data on floristic composition and utilization values of mangrove-associated plants in the area, serving the purposes of planning, management and sustainable development.

2. Materials and methods

Study objects: True mangrove species and mangrove-associated taxa occurring in Duong Kinh, Hai Phong.

Survey period: Specimen collection was conducted in coastal planted and natural mangrove forests from October 2024 to July 2025.

Field work: The specimens were collected following the botanical research methods of Nguyen Nghia Thin [6]. Efforts were made to collect both flowering and fruiting specimens. All the specimens are kept at the biology laboratory, faculty of Mathematics and Natural Sciences, Hai Phong University.

Taxonomic identification: Taxonomic identification was carried out using comparative morphological methods, combined with consultation of national and international floristic references [1,4]. The nomenclature of species was standardized according to the international plant database Plant of the World Online (POWO, <https://powo.science.kew.org>) and reference [1]. Information on ethnobotanical uses was supplemented from the literature [3,4,5] and through Participatory Rural Appraisal (PRA) interviews with local communities.

3. Results and discussion

3.1. Floristic composition

The floristic survey recorded a total

of 37 mangrove and mangrove-associated plant species, belonging to 26 families and 2 divisions of vascular plants. Among them, Magnoliophyta predominated with 35 species, while Polypodiophyta were represented by 2 species. Representative taxa frequently encountered in the area

include *Sonneratia caseolaris* (L.) Engl.- a characteristic species distributed along tidal mudflats; *Bruguiera gymnorrhiza* (L.) Lam.; *Kandelia obovata* Sheue, H.Y.Liu & J.W.H.Yong; *Rhizophora stylosa* Griff. and *Aegiceras corniculatum* (L.) Blanco.

Table 1. Mangrove plant species recorded in Duong Kinh, Hai Phong

No.	Scientific name	Vietnamese name	Utilization
	POLYPODIOPHYTA	NGÀNH DƯƠNG XỈ	
	1. Pteridaceae	Họ Ráng sọ gà	
1	<i>Acrostichum aureum</i> L.	Ráng biển thường	Edible, medicinal
	2. Salviniaceae	Họ Bèo ong	
2	<i>Salvinia natans</i> (L.) All.	Bèo ong	Fodder
	MAGNOLIOPHYTA	NGÀNH MỘC LAN	
	MAGNOLIOPSIDA	LỚP HAI LÁ MÀM	
	3. Acanthaceae	Họ Ô rô	
3	<i>Ruellia tuberosa</i> L.	Quả nỏ	Medicinal
4	<i>Acanthus ebracteatus</i> Vahl	Ô rô biển	Medicinal
	4. Amaranthaceae	Họ Rau dền	
5	<i>Achyranthes aspera</i> L.	Cỏ xước	Edible, medicinal
	5. Annonaceae	Họ Na	
6	<i>Annona glabra</i> L.	Bình bát	Edible, medicinal
	6. Asteraceae	Họ Cúc	
7	<i>Grangea maderaspatana</i> (L.) Desf.	Rau cóc	Edible, medicinal
8	<i>Pluchea pteropoda</i> Hemsl.	Cúc tần biển	Medicinal

No.	Scientific name	Vietnamese name	Utilization
9	<i>Wollastonia biflora</i> (L.) DC.	Hải cúc	Edible, medicinal
	7. Boraginaceae	Họ Vòi voi	
10	<i>Heliotropium indicum</i> L.	Vòi voi	Medicinal
	8. Casuarinaceae	Họ Phi lao	
11	<i>Casuarina equisetifolia</i> L.	Phi lao	Timber, medicinal, other uses
	9. Convolvulaceae	Họ Khoai lang	
12	<i>Cuscuta chinensis</i> Lam.	Tơ hồng trung quốc	Medicinal
13	<i>Ipomoea pes-caprae</i> (L.) R. Br.	Muống biển	Medicinal, fodder
	10. Euphorbiaceae	Họ Thầu dầu	
14	<i>Phyllanthus amarus</i> Schumach.& Thonn.	Chó đẻ răng cưa	Medicinal
15	<i>Ricinus communis</i> L.	Thầu dầu	Medicinal
	11. Fabaceae	Họ Đậu	
16	<i>Canavalia cathartica</i> Thouars	Đậu dao	Edible, green manure
17	<i>Crotalaria pallida</i> Aiton	Lục lạc ba lá tròn	Medicinal, green manure, other uses
18	<i>Sesbania bispinosa</i> (Jacq.) W. Wight	Điên điên gai	Medicinal, other uses
	13. Goodeniaceae	Họ Hếp	
19	<i>Scaevola taccada</i> (Gaertn.) Roxb	Hếp	Medicinal, ornamental, other uses
	14. Mimosaceae	Họ Trinh nữ	
20	<i>Mimosa diplotricha</i> C. Wright	Trinh nữ gai	Green manure, other

No.	Scientific name	Vietnamese name	Utilization
			uses
21	<i>Mimosa pudica</i> L.	Trinh nữ	
	15. Molluginaceae	Họ Rau đắng đất	
22	<i>Glinus oppositifolius</i> (L.) Aug. DC.	Rau đắng biển	Medicinal
	16. Passifloraceae	Họ Lạc tiên	
23	<i>Passiflora foetida</i> L.	Lạc tiên	Edible, medicinal
	17. Portulacaceae	Họ Rau sam	
24	<i>Portulaca pilosa</i> L.	Sam lông	Medicinal
	18. Primulaceae	Họ Anh Thảo	
25	<i>Aegiceras corniculatum</i> (L.) Blanco	Sú	Other uses
	19. Rhizophoraceae	Họ Đước	
26	<i>Bruguiera gymnorrhiza</i> (L.) Lam.	Vẹt dù	Timber, other uses
27	<i>Kandelia obovata</i> Sheue, H.Y.Liu & J.W.H.Yong	Trang	Timber, medicinal
28	<i>Rhizophora stylosa</i> Griff.	Đước vôi	Edible, timber, other uses
	20. Sonneratiaceae	Họ Bần	
29	<i>Sonneratia caseolaris</i> (L.) Engl.	Bần chua	Edible, medicinal, other uses
	21. Verbenaceae	Họ Cỏ roi ngựa	
30	<i>Lantana camara</i> L.	Ngũ sắc	Ornamental, medicinal

No.	Scientific name	Vietnamese name	Utilization
	LILIOPSIDA	LỚP MỘT LÁ MÀM	
	22. Araceae	Họ Ráy	
31	<i>Pistia stratiotes</i> L.	Bèo cái	Medicinal, fodder
	23. Cyperaceae	Họ Cói	
32	<i>Cyperus michelianus</i> subsp. <i>pygmaeus</i> (Rottb.) Asch. & Graebn.	Cói lùn	
33	<i>Cyperus mindorensis</i> (Steud.) Huygh	Cỏ bạc đầu	Fodder, medicinal
34	<i>Cyperus rotundus</i> L.	Củ gấu	Essential oil, medicinal, fodder
	24. Pandanaceae	Họ dứa	
35	<i>Pandanus odoratissimus</i> L. f	Dứa dại	Edible, medicinal, other uses
	25. Poaceae	Họ Cỏ	
36	<i>Phragmites australis</i> subsp. <i>australis</i>	Sậy	Fodder, medicinal, other uses
	26. Pontederiaceae	Họ Lục bình	
37	<i>Pontederia crassipes</i> Mart.	Lục bình	Medicinal

Note: Edible: edible flowers, fruits, seeds, tubers, stems and leaves; used as condiments or for herbal beverages. Other uses: Plants with other uses such as windbreaks, sand stabilization, wave attenuation, erosion control, hedging, tying materials, fuelwood, dyeing, fiber, papermaking and nectar sources for apiculture.

3.2. Utilization values

The inventory of 37 mangrove plant species in Duong Kinh revealed the following patterns:

A total of 12 species (32.4%) were identified as having particularly important ecological functions within the mangrove ecosystem, contributing to environmental protection through wave attenuation,

erosion control, wind and sand shielding and water filtration. This group of species plays a vital role in maintaining the stability of coastal mangrove ecosystems. Representative taxa include *Kandelia obovata* Sheue, H.Y.Liu & J.W.H.Yong, *Rhizophora stylosa* Griff., and *Bruguiera gymnorhiza* (L.) Lam.. These species possess stilt and pneumatophore root systems that anchor firmly into coastal mudflats, dissipate wave energy, and reduce current velocity. Consequently, they mitigate shoreline erosion, promote sediment accretion, and create habitats for aquatic organisms, thereby serving as breeding and nursery grounds for fisheries resources.

In addition, *Casuarina equisetifolia* L. is effective in windbreaks and sand stabilization, while *Phragmites australis* subsp. *australis*, with its rapid growth rate

and extensive root system in aquatic environments, is capable of wastewater filtration and improving water quality in wetlands.

Medicinal plants: 26 species (accounting for 70.3%). Several taxa are widely used in traditional medicine, for example: *Aegiceras corniculatum* (L.) Blanco: employed in folk remedies for rheumatism and joint pain. *Cyperus rotundus* L.: traditionally used in gynecological disorders and as an expectorant. *Bruguiera gymnorhiza* (L.) Lam.: applied in the treatment of diarrhea and malaria. *Ipomoea pes-caprae* (L.) R. Br.: used for boils, colds and rheumatic pain in limbs. *Acanthus ebracteatus* Vahl: prescribed for gastrointestinal ailments and painful urination. *Ruellia tuberosa* L.: valued for its diuretic, detoxifying and antipyretic properties...



Fig. 1. *Sonneratia caseolaris* (L.) Engl.



Fig. 2. *Kandelia obovata* Sheue, H.Y.Liu & J.W.H.Yong

Fruiting branch, Duong Kinh site, photo by Pham Thi Oanh

Timber and fuelwood species: 7 species (accounting for 18.9%). Members of the Rhizophoraceae (*Rhizophora stylosa* Griff., *Bruguiera gymnorrhiza* (L.) Lam., *Kandelia obovata* Sheue, H.Y.Liu & J.W.H.Yong) and Casuarinaceae (*Casuarina equisetifolia* L.) provide hard and durable timber used for construction materials, boat building and as fuelwood.

Tannin- and industrial-resource species: 3 species (8.1%). These include primarily *Rhizophora stylosa* Griff., *Aegiceras corniculatum* (L.) Blanco and

Bruguiera gymnorrhiza (L.) Lam., which serve as traditional sources of tannins for dyeing and other industrial purposes.

Edible plants (vegetables and fruits): 9 species (24.3%). Notable examples are *Sonneratia caseolaris* (L.) Engl., whose fruits are edible and used as condiments; *Pandanus odoratissimus* L. f and *Annona glabra* L., both bearing edible fruits; and *Acrostichum aureum* L., with young fronds consumed as vegetables.



Fig. 3. *Canavalia cathartica* Thouars



Fig. 4. *Ipomoea pes-caprae* (L.) R. Br.

Flowering branch, Duong Kinh site, photo by Pham Thi Oanh

Other useful species: 11 species (29.7%) such as *Phragmites australis* subsp. *australis* and *Pandanus*

odoratissimus L. f, which provide raw materials for papermaking and handicrafts; and *Salvinia natans* (L.) All.,

Pistia stratiotes L., and *Canavalia cathartica* Thouars, which are utilized as green manure and livestock fodder.

Thus, among the 37 recorded species, as many as 35 species (94.6%) exhibit uses values across multiple domains (medicine, food, materials, landscape and ecosystem services). Many taxa are recognized as multipurpose resources, for instance: *Sonneratia caseolaris* (L.) Engl. - edible fruit, medicinal bark, wave attenuation and nectar source for honey production; *Rhizophora stylosa* Griff. - timber, tannin, fuelwood and shoreline protection. Nevertheless, most of these values are currently exploited only at a spontaneous and small-scale level, without being developed into commercial commodities.

3.3. Proposals

However, besides the beneficial species, several invasive alien species recorded in the area, such as *Lantana camara* L., *Pistia stratiotes* L., *Pontederia crassipes* Mart., *Mimosa diplotricha* C. Wright and *Annona glabra* L., pose significant ecological risks. Aquatic macrophytes like *Pistia stratiotes* L. and *Pontederia crassipes* Mart. obstruct hydrological flow, promote organic sediment accumulation, and reduce dissolved oxygen, thereby adversely affecting aquatic biota. *Mimosa diplotricha* C. Wright and *Lantana camara* L., when forming dense monospecific stands, can

alter mangrove habitats and inhibit the natural regeneration of native arboreal species. To mitigate these impacts, it is essential to strengthen periodic ecological monitoring, implement manual/mechanical eradication programs, and enhance community awareness in order to prevent the intentional planting or release of invasive species into natural ecosystems.

Under current conditions, where urbanization and aquaculture are causing a decline in mangrove forest area, the establishment of a strategy for developing mangrove-based raw material zones linked to sustainable utilization is urgently required. This strategy should be grounded on two main pillars: medicinal resources and mangrove ecotourism.

First, development of mangrove-derived medicinal resources. Many species such as *Aegiceras corniculatum* (L.) Blanco and *Sonneratia caseolaris* (L.) Engl. have long been used in traditional medicine to treat skin diseases, rheumatism, and diarrhea. These are valuable resources that warrant further investigation into their phytochemical constituents, bioactive properties, harvesting techniques and processing methods. On this basis, small-scale mangrove medicinal plantations could be established, thereby both conserving genetic resources and generating high-value commercial products.

Second, development of mangrove ecotourism. The coastal zone of Duong Kinh has great potential for ecotourism

activities such as mangrove forest tours, kayaking, beekeeping with *Sonneratia* nectar and tasting local dishes made from mangrove fruits (*Sonneratia caseolaris* (L.) Engl., *Bruguiera gymnorrhiza* (L.) Lam.). Ecotourism not only generates economic benefits but also raises community awareness of biodiversity conservation and the role of mangroves in climate change adaptation.

To implement this strategy, close collaboration is required among local authorities, research institutions, enterprises and coastal communities. Local authorities should designate and secure stable mangrove forest zones; research institutions provide scientific data, plant germplasm and technical protocols; enterprises engage in product processing and market linkages; and local communities act as direct stakeholders in planting, protecting and sustainably exploiting the mangroves.

If implemented synchronously, the strategy for developing mangrove raw material zones will not only contribute to biodiversity conservation and protection of the coastal ecological environment but also serve as a key driver for improving household income and livelihoods, thereby advancing sustainable development of Duong Kinh mangroves in the context of climate change and economic integration.

4. Conclusions

The survey and investigation of mangrove vegetation in the coastal zone of Duong Kinh, Hai Phong city recorded 37 species belonging to 26 families and 2

divisions of vascular plants. The species composition is fairly characteristic of the mangrove ecosystems of Northern Vietnam, with prominent taxa including *Sonneratia caseolaris* (L.) Engl., *Rhizophora stylosa* Griff., *Bruguiera gymnorrhiza* (L.) Lam., *Kandelia obovata* Sheue, H.Y.Liu & J.W.H.Yong and *Aegiceras corniculatum* (L.) Blanco. Among these, 35 species (94.6%) exhibit documented utilization values, comprising: 26 medicinal species (70.3%), 7 timber and fuelwood species (18.9%), 3 species used for tannin and industrial materials (8.1%), 9 edible plants (vegetables, fruits or tubers) (24.3%) and 11 species (29.7%) with other uses such as fiber, papermaking, green manure and livestock fodder. Furthermore, 12 species (32.4%) provide essential ecological services including wave attenuation, erosion control, soil amelioration and water filtration.

The results of this study confirm that the mangrove flora of Duong Kinh plays not only a crucial ecological role in coastal protection and climate change adaptation but also harbors significant socio-economic and ecological potential that warrants rational and sustainable utilization.

REFERENCES

1. Nguyen Tien Ban (chief editor) (2001-2005), *Checklist of Plant Species of Vietnam, Vols. 2-3*, Agriculture Publishing House.
2. Phan Nguyen Hong & Le Xuan Tuan (2008), *Mangrove forests and their adaptive capacity to sea-level rise*, Report

presented at the Conference on Global Climate Change and Vietnam's Response Strategies, Hanoi and Nam Dinh, 26-29 February 2008.

3. Vo Van Chi & Tran Hop (1999-2001), *Useful Plants of Vietnam, Vols. 1-3*, Education Publishing House.

4. Pham Hoang Ho (1999-2000),

Flora of Vietnam, Vols. 1-3, Youth Publishing House.

5. Do Tat Loi (2005), *Vietnamese Medicinal Plants and Remedies*, Medical Publishing House.

6. Nguyen Nghia Thin (2007), *Methods in Botanical Research*, Vietnam National University Publishing House.