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Mangrove forest in the Red river delta of Vietnam



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FOREWORD

Since 2021, the Korea Forest Service (KFS) has been collaborating with the Management Board for Forestry Projects (MBFP) of Vietnam and provincial governments of Nam Dinh and Ninh Binh on a forest cooperation project entitled “Rehabilitation and Sustainable Management of Mangrove Forests in Red River Delta”, to restore the degraded mangrove ecosystems of Red River Delta, Vietnam.



The book, “The Mangroves of the Red River Delta,” is one of the outcomes of the Korea-Vietnam forest cooperation project. It provides general information on the ecosystem and especially the mangroves of the Red River Delta.

Mangroves, which we call “the green lungs,” play an important role not only in sequestering CO₂ but also in protecting the coastal areas, mitigating climate change, and supporting the livelihoods of local residents.

To implement this project more efficiently and effectively, it is very important to identify and understand the characteristics of the mangrove species distributed in the Red River Delta region of Vietnam.

Therefore, we believe that this book will be a useful tool for natural resource supervisors, policymakers, researchers, and local residents in the context of responding to climate change, sea level rise, and mangrove degradation. Moreover, the book will encourage them to further appreciate, protect, and develop the mangrove species.

Finally, I would like to express my sincere gratitude to all those who worked tirelessly to write and compile this book. I hope that this book will be well used in the future for Vietnam’s forest policy and management of mangroves and its resources.

NAM, Song Hee *Nam Song Hee*
Director General
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INTRODUCTION

Crossing the five provinces of Quang Ninh, Hai Phong, Thai Binh, Nam Dinh, and Ninh Binh, the mangrove ecosystem in the Red River Delta covers a total area of 29,176.8 hectares, accounting for 18.8% of Vietnam's total mangrove forest area.

The book “Mangroves in the Red River Delta Vietnam” provides an overview of the mangrove ecosystem in this region. Covering a general features of mangroves, their ecological functions and services, management issues, and development strategies in the context of climate change, the book highlights the diversity of mangrove plant species, provides profile of 21 typical mangrove species found in the Red River Delta such as taxonomy, morphological, biological characteristics, distribution, their valuable uses, and particularly illustrated by their images.

As the chief advisor of the Project “Rehabilitation and Sustainable Management of Mangrove Forests in Red River Delta”, I am delighted to introduce this book to managers, researchers, officials, and students who working in the field of forestry sector, especially in coastal mangrove ecosystems. The book emphasizes the importance of protecting mangrove ecosystems and encourages managers to focus on restoring and developing these precious resources, particularly in the face of sea level rise and climate change.



Dr. Lee Jeonghoo

Chief advisor

*Rehabilitation and Sustainable Management
of Mangrove Forests in Red River Delta*

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The authors

CHAPTER 1

Overview of mangroves

1.1 General introduction on mangroves

1.1.1. *Mangrove ecosystem*

The mangrove ecosystem (ME) plays a crucial role in society through its economic, social, and environmental values. Geographically, MEs are distributed in coastal tidal zones, where mangrove species adapt to constantly changing environmental conditions in terms of physical, chemical, and biological factors. This diverse adaptation has created differences between mangrove vegetation and terrestrial plants as well as agricultural crops.

The term “mangrove” refers to species of plants or a forest area with many plant species living in coastal swamp environments. Mangrove communities comprise various genera and families of plants, many of which are not closely related but share common characteristics adapted to challenging environments such as mudflats, unstable substrates, tidal inundation, and salinity.

Formed and developed in the transitional zone between land and ocean, mangrove forests (MFs) serve multiple purposes in terms of environment, society, and economic value. Particularly noteworthy among these is their role in coastal protection, erosion control, stabilizing coastal and riverine land, wind and storm surge mitigation, tidal regulation, climate moderation, and adaptation to rising sea levels, with an increase of 12 to 45 cm over a 100 - year period during ice ages (Ellison, 1999; Feller, 2017). In addition to their coastal protection functions, MFs provide a wide range of products and services such as timber, fuelwood, non-timber forest products, breeding and nursery grounds for aquatic species, and numerous other values (Feller, 2017).

Mangrove forests (MFs) are considered one of the most seriously threatened ecosystems globally (Martinuzzi, 2009; Taylor, 2003), MFs are facing numerous threats leading to negative trends in both quantity and quality. Rising sea levels due to global warming and climate change have had adverse effects on MFs. However, human-induced impacts are now considered the primary causes of mangrove loss. Direct threats to this ecosystem include increasing population pressure, forest clearance for agriculture, illegal logging, overexploitation of forest resources, and excessive fishing pressure. These ongoing threats underscore the urgent need for timely solutions to protect and sustain a resilient ecosystem, balancing economic development with environmental conservation.

1.1.2. Mangrove forest classification

Based on structural and morphological characteristics, MFs are classified into four types, depending on differences in forest structure, geographical conditions, tidal regimes, and climatic features: (i) Fringe or coastal mangroves; (ii) Riverine mangroves; (iii) Basin mangroves; and (iv) Dwarf or scrub mangroves (Mitsch & Gosselink, 2007). This classification underscores the morphological heterogeneity influenced by tidal dynamics, surface hydrology, and distribution of species and forest structure. For some countries with diverse mangrove species, standardized classification criteria are not widely applied.