

Species Composition And Diversity Of Plant Along The Rach Tra River In Ho Chi Minh City

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Abstract – This research provides data on species composition and plant diversity along the Rach Tra river that has not been published in any prior literature. The survey method was applied according to the linear system and typical standard plots in field trips combined with a morphological method in the laboratory. The results of studying vegetation along the Rach Tra river recorded 132 species, 113 genera, 59 families belonging to two phyla of vascular plants: Polypodiophyta and Magnoliophyta.

The value of plant resources in the investigation area was identified with six major use groups as follows: medicine (89 species), food (21 species), household goods (8 species), ornamental (12 species), firewood (2 species) and organic fertilizer (5 species). Besides, two invasive plant species were found including *Mimosa pigra* and *Eichhornia crassipes*. The life forms of plants along the Rach Tra river were classified into shrub (18 species), herb (62 species), lianas (28 species) and timber (24 species).

Keywords – Biological diversity, ecosystem, Rach Tra, vegetation along rivers.

I. INTRODUCTION

The Rach Tra river is a large tributary of the Saigon river, about 44 km in length, the Rach Tra basin is part of the area of Cu Chi and Hoc Mon districts in Ho Chi Minh City, Vietnam [1]. In recent times, the interaction between human activities and the interior areas of the Rach Tra basin has been progressing quite complicatedly, landslides on both sides of the river were mainly due to over-exploitation of riverside land (housing, farming, raising fish, etc.) and waterway traffic. These changes were resulting in a great impact on the biodiversity of the vegetation along the Saigon River. However, Rach Tra has not been paid attention to a more sustainable approach to development [2], [3].

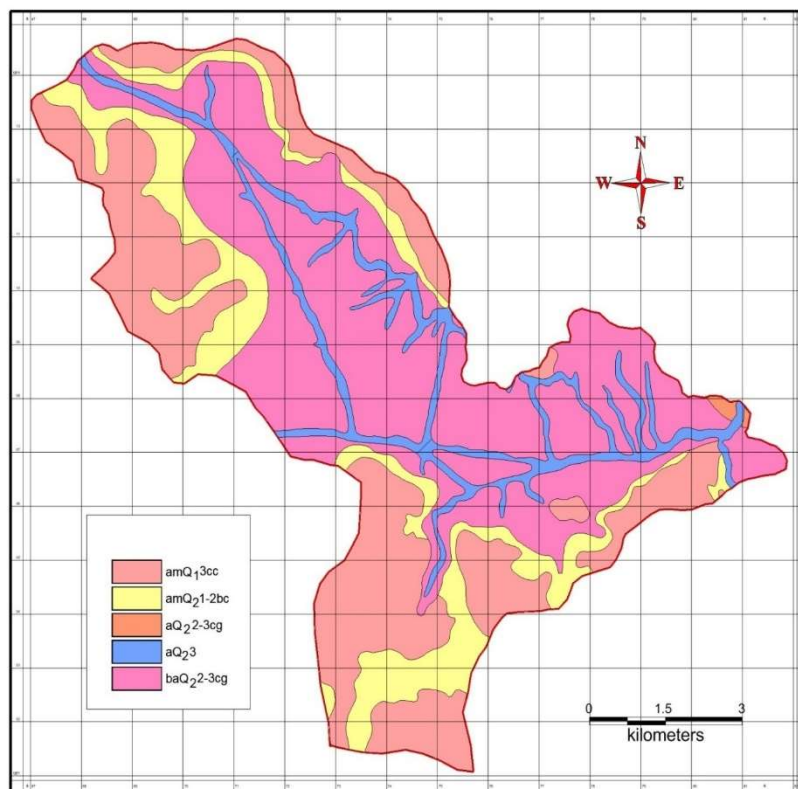


Figure 1. Geological map of Rach Tra

In this study, we will survey and evaluate the current state of the vegetation along Rach Tra. It aims at providing data on the species composition and diversity of the flora along Rach Tra, as well as the value of plant resources for humans. Another aim is to contribute a scientific basis to management agencies in planning, conserving, utilizing, and developing this natural resource sustainably.

II. MATERIALS AND METHODS

2.1. Science field trips

The method we employed to collect the data is conducting the survey according to the linear system and typical standard plots [3]. In addition, it was combined with the research methods of Nguyen Nghia Thin [4], based on the map of current status and characteristics accompanying with topographic location so as to establish sampling lines. In this way, the route must pass through the habitats of the study area (the lines cross the representative areas of the study area) [5].

From the above sampling lines, we selected the key points, which could show the most typical characteristics, to place the standard plots. After locating the plots, colored nylon ropes were used to fix the plots. In each standard plot 50m x 50m (0.25 ha) in size, all vascular plant species within the plot area were investigated [6]. The collected plant samples were photographed, preliminarily treated with 70 - 80% alcohol solution, and attached with labels [7].

2.2. Laboratory

Determination of scientific names of plant species was based on a morphological method, a comparison of plant-specific morphology with plant images captured from the field trips. Additionally, the actual recorded characteristics of each individual plant would be compared with Pham Hoang Ho's Cayco Vietnam [8], and the standard samples stored at the Botanical Museum of the Institute of Tropical Biology, 85 Tran Quoc Toan, District 3, HCM City.

Division of plant life forms and value of plant resources based on field results combined with the documents: Dictionary of medicinal plants in Vietnam by Vo Van Chi [9], Vietnam useful plants of Vo Van Chi and Tran Hop [10], Vietnam medicinal plants and herbs by Do Tat Loi [11], 1,900 useful plant species of Vietnam by Tran Dinh Ly [12].

The list of plant species composition was created following categories from lower to higher plants. The families of the phyla, along with the genera and species of the families were arranged alphabetically (by scientific name) [13], [14].

III. RESULTS AND DISCUSSION

3.1. Diversity of plant species composition

According to the results of field investigation and laboratory analysis, it can be described that the composition of plant species along Rach Tra had 132 species, belonging to 113 genera, 59 families of 2 phyla of vascular plants including Polypodiophyta and Magnoliophyta (Table 1). From the total species, genera, families recorded, respectively, Polypodiophyta had 8 species (6.1%), 5 genera (4.4%), and 5 families (8.5%) consisting of Blechnaceae, Marsileaceae, Parkeriaceae, Pteridaceae and Schizeaceae. In comparison with Polypodiophyta, Magnoliophyta possessed 124 species, 108 genera, 54 families. Thus, it can be confirmed that Magnoliophyta dominated with the total number of species, genera, and families in the study area.

Table 1. The plant families with a large number of species

Families	Number of species	Rate (%)
Fabaceae	12	9,1
Asteraceae	11	8,3
Poaceae	11	8,3
Convolvulaceae	8	6,1
Euphorbiaceae	7	5,3
Schizeaceae	4	3,1



Figure 2. The vegetation along the Rach Tra river

Further analysis of Magnoliophyta shows that the Dicotyledon class (Magnoliopsida) dominated with 92 species (74.2%), 80 genera (74.1%), 41 families (75.9%); The monocotyledon class (Monocotyledoneae) owned a lower proportion with 32 species (25.8%), 28 genera (25.9%), 13 families (24.1%). Dicotyledon was dominant in Magnoliophyta and even in the entire flora of the study area.

Some families had many species in the flora of the study area. Specifically, in Magnoliophyta, the Fabaceae family possessed the highest number of species with 12 species accounting for 9.1 % of the total species. Asteraceae and Poaceae families had the same number of species with 11 species (8.3%); Convolvulaceae family had 8 species (6.1%); and Euphorbiaceae family had 7 species (5.3%). For Polypodiophyta, Schizeaceae family obtained the highest number of species with 4 species (3.1%).

3.2. Diversity in value of plant resources

It has been verified that in the study area there were 132 plant species, in which 103 species are valuable for use on a regular basis, such as medicinal plants with 89 species (67.4%) [15], [16], [17], plants for food with 21 species (15.9%), ornamental plants with 12 species (9.1%), plants for household products with 8 species (6.1%), plants for firewood with 2 species (1.5%), plants for organic fertilizer with 5 species (3.8%) [18]. Variation in plant resource value is shown in the **Figure 3**.

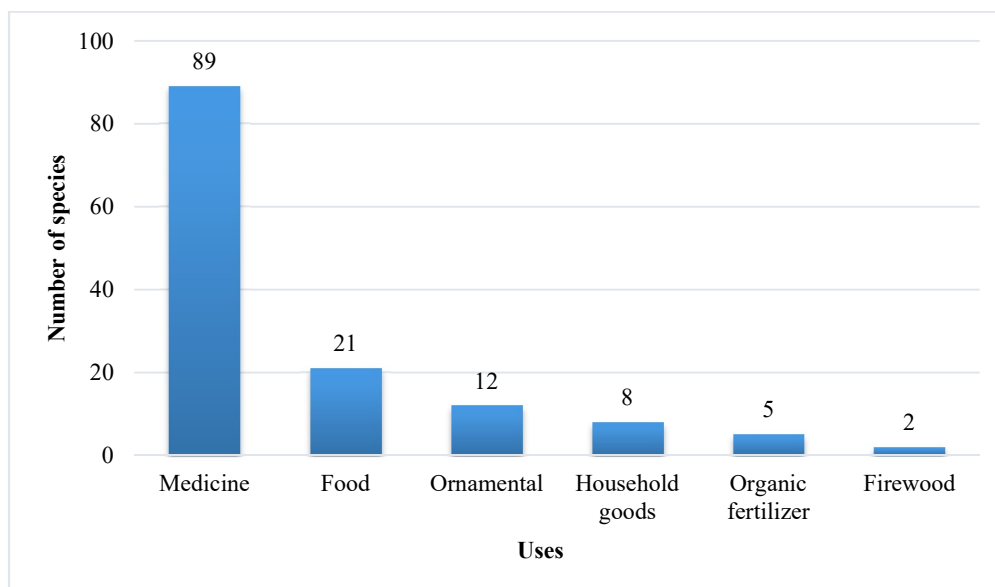


Figure 3. Diversity in value of plant resources

The species were popularly exploited by people residing along Rach Tra for ornamental purposes such as *Barringtonia macrostachya*, *Gardenia jasminoides*, *Ixora finlaysoniana*, *Typha angustifolia* [19], [20].

Plants were used as food and medicine [21], [22], [23] such as *Stenochlaena palustris*, *Enhydra fluctuans*, *Sphenoclea zeylanica*, *Crateva religiosa*, *Momordica charantia* [24], [25].

Plants were for manufacturing construction materials, household appliances, boats, fibers, handicrafts, or firewood such as *Calophyllum inophyllum*, *Melaleuca cajuputi*, *Hibiscus tiliaceus*, *Eichhornia crassipes* [26], [27].

In addition to the above use values, many plant species also have value for environmental cleaning, contributing significantly to the regulation and balance of the water environment [28], [29] such as *Lemna minor*, *Phragmites karka*, *Ludwigia adscendens*, *Polygonum tomentosum*, *Eichhornia crassipes*, etc [30], [31].

According to The World Conservation Union (IUCN), the 132 plants species recorded in the study area along Rach Tra existed *Dolichandrone spathacea* (L.f.) Seem. on the list of plant species needing conservation, as a least-concern species (LR - Lower Risk) [32].

3.3. Diversity in the plant life forms

The flora in the study area was divided into four main groups of life forms: shrub, herbaceous plant, lianas and timber plant [33], [34], [35, 36]. Details are described in the **Figure 4**.

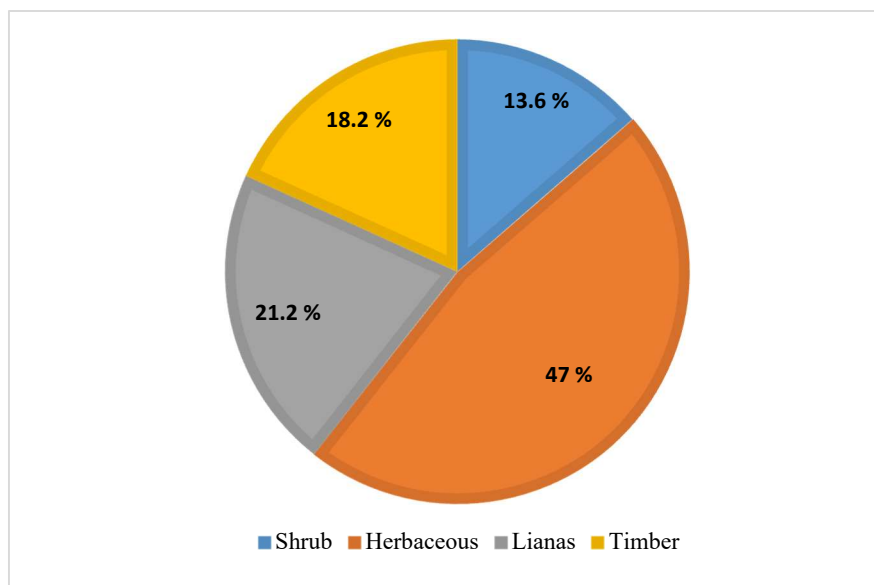


Figure 4. Diversity in the plant life forms

- The shrubs group had 18 species (13.6%), this group was usually found in many areas along the coasts of the dry or wet soils, focusing mainly on families such as Arecaceae, Fabaceae, Melastomataceae, etc.
- The herbaceous plants' group had 62 species (47.0%), this group included plants living along the alluvial, lowland riverside or wetlands, mainly concentrated into families such as Poaceae, Cyperaceae, Asteraceae, etc.
- The lianas group had 28 species (21.2%), the most common families were Schizeaceae, Convolvulaceae, Fabaceae, Menispermaceae, etc.
- The timber plants' group had 24 species (18.2%), this group consisted of plants living along the river such as Annonaceae, Apocynaceae, Myrtaceae, Lecythidaceae, etc.

Thus, the herbaceous plants' group had the highest number of species (47.0%) among the existing life forms in the study area. They not only contribute to increasing diversity of riparian plant ecosystems but also bring the use-value to the locals, as well as participating in environmental protection and preventing erosion.

IV. CONCLUSIONS

Through investigation and survey, there were 132 species, 113 genera, 59 families of 2 phyla of vascular plants including Polypodiophyta and Magnoliophyta. Fabaceae, Asteraceae and Poaceae were the three most abundant families, this is may be due to environmental factors directly affecting to the richness of plant species [37].

There were 132 species of plants in the study area with 103 species for the use value, including medicinal plants with 89 species, plants for food with 21 species, 12 species of ornamental plants, plants for household appliances with 8 species, plants for firewood with 2 species, plants for organic fertilizer with 5 species.

According to The World Conservation Union, one plant specie were on the list of plant species in the need of conservation. That was *Dolichandrone spathacea* (Lf) Seem.

The flora in the study are was classified into four main groups of life forms comprising of the shrubs group with 18 species, the herbaceous plants' group with 62 species, the lianas group with 28 species and the timber plants' group with 24 species.

In the study area along Rach Tra, there were two invasive plant species consisting of *Mimosa pigra* [38], [39] and *Eichhornia crassipes* [40], [41]. The development of *Mimosa pigra* and *Eichhornia crassipes* tends to increase [42], [43], [44], hindering the movement of people and affecting the habitat of the flora and fauna.

The wetlands along Rach Tra had a habitat of a natural flora corridor with a small area [45], [46] distributed along the riverbank with a width of 5 - 50m.

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