Forest Vegetation Cover in Tram Chim National Park in Southern Vietnam

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Abstract. Tram Chim National Park is located in the Mekong Delta of southern Vietnam. The obtained results from the study undertaken on the composition of plant species and forest vegetation in TCNP indicated a record of 133 vascular plants species, that belongs to 54 families. Useful plants of 133 species listed consists of 38 species of medicinal plants, 31 species of edible plants, 15 species of timber plants, 10 species of ornamental plants, 9 species of industrial plants, 6 species of fiber plants and 9 species of unknown use plants, respectively. During the duration of investigation, Elaeocarpus hygrophilus Kurz, Eleocharis ochrostachys Steud. and Oryza rufipogon Griff. were endangered, threatened species in the forest vegetation of Tram Chim wetlands. A variety of vegetations in the area under study is described. In this study, two major vegetation types of wetland ecosystems were identified in National Park.

1. Introduction
Tram Chim National Park (TCNP) is located in the cane fields of Dong Thap Muoi, Dong Thap province of Vietnam. In 1991, TCNP was transferred to a protected area to protect several species of rare birds, especially the threatened Eastern Sarus Crane (Grus antigone sharpii), and other species listed in the red list of the International Union for conservation of nature (IUCN). TCNP was originally named “Tram Chim Nature Reserve”. Located in 5 communes (Phu Duc, Phu Hiep, Phu Thanh B, Phu Tho and Tan Cong Sinh) and Tram Chim Town, TCNP supports one of the last remnants of the Plain of Reeds wetland ecosystem [1, 2]. In 2012, TCNP was recognized as the World’s 2000th Ramsar site. The research object, with an area of 7313 ha, is located between 10°40’ – 10°47’ north latitude and 105°27’ – 105°37’ east longitude (figure 1).

(figure 1)
Figure 1. Location of Tram Chim National Park in Vietnam.

TCNP is divided into five separate management zones, A1, A2, A3, A4, A5, and C Zone as Administrative Zone, each surrounded by canals with a total of 60km in length. Other canals of varying depth and width run through the management zones, for example A1 has been divided into three units by additional major canals [2].

TCNP is the evergreen forest on wetland, located of South Western Vietnam. Rare, valuable and endemic species of flora and fauna, listed in the Red Book of Vietnam (2007) and the International Union for Conservation of Nature (IUCN), live in TCNP. However, in recent years, the structure of forest vegetation cover in TCNP has changed. This led to a change in the habitat of plants and animals, the number of individuals decreased, and many rare and endangered species were threatened. Therefore, the issue of forest conservation in TCNP plays an important role. The wetlands of TCNP are also an important source of food, spawning grounds, nursery and migration paths on which fish stocks, within and outside the wetlands [1, 2].

2. Methods and Materials

2.1. Materials
The objects for research were wetland ecosystems cover TCNP. Ecological and geographical analysis of the species composition of forests in TCNP indicates certain links between regions and environmental conditions reveals their environmental specificity.

2.2. Methods
Geobotanical and floristic study was carried out on the 25 plots (20×20 m). We established 06 transects, which covered the whole surface area of TCNP. The total length of these transects combined is about 30 km. In each transect we marked all species and collected specimens of plants which could not be identified in the field. We also collected many plants outside the plots and traverses, to make sure that our inventory was as representative of the entire area with species of the local flora [3].

Voucher species were sent to the Herbarium of the Vietnam National University of Forestry – Dong Nai campus and other specialists for identification. Plant species were identified with reference to An Illustrated of Flora of Vietnam [4].
The vegetation types of TCNP were classified according to Thai Van Trung [5]. Additionally, the human disturbance levels of the vegetation were determined by noting the number of tree stumps and number of foot paths in the plots [6].

From 2/2020-4/2020, the research team conducted many surveys in 4 communes (Phu Duc, Phu Hiep, Phu Thanh B and Phu Tho) and Tram Chim Town. Field research was conducted to gain intensive understanding of people through discussions and interactions. Primary data was gathered initially through household interviews based on questionnaires, Rapid Rural Appraisal (RRA), and the “walk in the woods” method [7-9].

3. Results and Discussion

3.1. Vegetation types

The vegetation of TCNP is dominantly vegetation type on wetlands. Among the natural vegetation cover TCNP there is a major dichotomy between *Melaleuca* forests, seasonally inundated marsh and permanently inundated swamp. The composition of the vegetation cover TCNP is identified by two major types: *Melaleuca* forest and mixture of seasonally inundated grassland.

*Melaleuca* forest (figure 2). National Park has been dominated by *Melaleuca cajuputii* Roxb. species with a grass community and vines. *Melaleuca* forest covers about 3000 ha (41.0% of the total area) of National Park and rest was comprised of bare soil, canals and grassland. The ground survey revealed that there are 74 plant species of natural plants belonging to 42 different families. Among them, grass and liana are the most dominant types. Although known as *Melaleuca* forest, there are 7 other tree species such as: *Annona glabra* L., *Elaeocarpus hygrophilus* Kurz, *Syzygium cumini* (L.) Skeels, *Cassia alata* L., *Ceiba pentandra* (L.) Gaertn., *Lagerstroemia speciosa* (L.) Pers. and *Combretum acuminatum* Roxb.

![Figure 2. Vegetation types of Tram Chim National Park.](image)

Mixture of seasonally inundated grassland. The seasonally inundated marshes of TCNP are the last extensive remnant of once immense freshwater marshes of the Plain of Reeds. The marsh plant communities form a continuum, closely following the gradient of soil surface elevation and water permanence.

Grass community and vines with dominant families are Poaceae, Cusutaceae, Convolvulaceae, Nymphaeaceae, Nelumbonaceae, etc. Grass species were usually present in wet areas along the canals and bogs where previously *Melaleuca* forests were burn down by humans. Besides the two dominant species of *Oryza rufipogon* Griff. and *Panicum repens* L., this habitat also had 5 other grass species.
Oryza rufipogon was found to be common along the routes distributed throughout TCNP along with reed grassland. The total area of O. rufipogon grassland was estimated to be 50 ha. It was usually the dominant species, with density of about 95%, and height about 30-60 cm.

Panicum repens was found to be common distributed throughout TCNP. It also was usually the dominant species, with density of about 90%, and height about 40-70 cm.

Other species such as Eleocharis dulcis var. tuberosa (Schult.) T. Koyama, Polygonum tomentosum Willd., Ischaemum rugosum Gaertn., Xyris indica L. were also present.

Lotus Nelumbo nucifera Gaertn. is abundant in permanently inundated swamps which are located on old riverbeds and shallow streams. Besides Nelumbo nucifera, many other aquatic plants are also found in lotus swamps such as: Nymphaea lotus L., Nymphaea nouchali Burm. f., Nymphaea tetragona George. (Nymphaeaceae), Eichhornia crassipes (Mart.) Solms (Pontederiaceae), Ludwigia adscendens (L.) Hara. (Onagraceae) and Salvinia cucullata Roxb. (Salviniaceae).

3.2. Floristic diversity
During our investigations, 133 vascular plant species belonging to 54 different plant families were identified in TCNP can be seen in table 1.

3.2.1. Magnoliophyta
In National Park, useful plants of 133 species listed consists of 38 species (28.6%) of medicinal plants (Me), 31 species (23.3%) of edible plants (Ed), 15 species (11.3%) of timber plants (Ti), 10 species (7.5%) of ornamental plants (Or), 9 species (6.8%) of industrial plants (In), 6 species (4.5%) of fiber (Fi) and 9 species (6.8%) of unknown use plants (Un), respectively in table 2.

Table 1. Summary on the floristics of TCNP.

| No. | Taxa          | Family | Genus | Species |
|-----|---------------|--------|-------|---------|
| 1.  | Magnoliophyta | 54     | 112   | 133     |
| Total | 54           | 112   | 133   |

The plant resources of TCNP are valuable not only because of the great diversity, but also have great environmental importance. As part of the flora of TCNP, 02 species of 133 plant species were listed in the Red book of Viet Nam (2007) [10]. In the red book of IUCN (2020) [11], 02 species were classified as endangered species (EN) and as least concern (table 3).

Table 3. List of endangered and threatened plants in TCNP.

| No  | Scientific name          | VRDB (2007) | IUCN (2020) |
|-----|--------------------------|-------------|-------------|
| 1.  | Eleocharis ochrostachys  | LC          |             |
| 2.  | Elaeocarpus hygrophilus  | VU          |             |
| 3.  | Oryza rufipogon          | VU          |             |

4. Conclusions
Tram Chim National Park is characterized by two major vegetation types cover: Melaleuca forest and mixture of seasonally inundated grassland.
The diversity of plant species in TCNP was studied to provide baseline information for conservation and sustainable management processes that will prolong the the life of National Park. A total of 133 species of vascular plants are recorded in TCNP belonging to 54 plant families.

The useful plant resources were divided into seven groups as follows: medicinal plants with 38 species, edible plants with 31 species, timber plants with 15 species, ornamental plants with 10 species, industrial plants with 9 species, fiber plants with 6 species and unknown use plants with 9 species.

Besides this survey, the forest areas were explored, concentrating on the useful plants and it was recorded that TCNP has 3 species subject to global-level and national-level conservation.

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