

Freshwater Fish Survey by Land Use Type in Cantho City, Vietnam

D. H. Truong¹, L. V. Ly¹, T. M. Duong² and H. T. Phung¹

¹*College of Environment & Natural Resources, Cantho University, 94115 Ninh Kieu, Can Tho, Vietnam*

²*Mekong Conservancy and Research Assistance Foundation, 216 College of Environment & Natural Resources, Cantho University, 94115 Ninh Kieu, Can Tho, Vietnam*

(Received 3 October, 2021; Accepted 21 November, 2021)

ABSTRACT

This research chose 28 sites to research randomly and properly combined with investigation process as well as means of technologies such as ArcGIS Desktop, ArcGIS Online, ArcGIS Mobile, ArcGIS Collector and Open Data Kit. The result showed that the distribution of fresh water fish diversity in Can Tho city concentrated mainly on canal, farm land, perennial and yearly plant land rural land. The number of species appearing in Can Tho city was divided into 4 levels of biodiversity such as high (accounting for 8,1%), medium (accounting for 82,5%), low (accounting for 2,4%) and very low (accounting for 7%) base on the frequency of fish species in types of land use in Can Tho city.

Key words : Freshwater fish, Land use type, Vietnam

Introduction

Can Tho is a grade 1 city in the Mekong Delta, Vietnam with the following development objectives: 1) Continuing economic restructuring towards industrialization and modernization; 2) gradually increase the proportion of industry and services, and integrate into the region's economy; 3) turn potential into comparative advantage to attract investment, develop modern technology, produce highly competitive goods; 4) maintain and enhance the role and position of the City as the center to create driving force for the development of the whole Mekong Delta region.

These shifting pressures have affected biodiversity in this place, reducing the reserves of natural species, especially the fish stocks in Can Tho, which has decreased significantly. Through the data

of the Statistical Yearbook, (2010) shows that the reserves have decreased from 7,255 tons in 2001 to 5,935 tons in 2010. This proves that to get the achievements like today, Can Tho has to trade-off biological resources, specifically aquatic resources.

Currently, there are not many documents on the field of fish diversity research in Cantho. The topic "SURVEY OF FISH DIVERSEMENTS IN FRESH WATER BY LAND USE TYPE IN CAN Tho" is very necessary to solve the current difficulties.

Research

Inheritance method

Using the method of inheriting the documents on the status of fish resources in Can Tho City from the departments of Can Tho City, the Faculty, the Can Tho University

- 1) Inheriting current land use map data, land use planning map up to 2020 and general construction planning map until 2025
- 2) Inheriting policies on socio-economic development of Can Tho City in the past, present and in the future

Field survey method

Choose a location

- a. From the map of potential biodiversity of Can Tho City in 2012, draw lines along the Hau River, with a distance of 1km between the two routes, similarly, draw lines perpendicular to the Hau River, with the distance between the two lines also being 1 kilometer. The result after drawing the lines is a network of squares (called survey points) covering the whole area of Can Tho City and each survey site has an area of 1km² (Figure 1).
- b. To select the survey location corresponding to 4 potential biodiversity levels on the map, remove all classes, leaving the potential diversity layer to be sampled.
- c. On the vertical and horizontal lines, choose those routes with more than 70% of the sites with high biodiversity potential in the total number of survey points on that route.
- d. Number the selected routes.
- e. Randomly select 3 longitudinal and 3 transverse

routes from the selected routes (step d).

- f. On each selected route (step e), remove survey sites that do not have high biodiversity potential, and number the remaining survey sites.
- g. Randomly select 1 survey point on each route, so 6 survey points are selected.

Repeat steps b to g for medium, low and very low potential biodiversity classes. After performing the above steps, a total of 24 survey sites with each potential biodiversity level will have 6 sites selected.

Land use survey

Survey of farming techniques of all land use types included in the sampling site including water collection methods, embankment infrastructure, process of change of use patterns. The survey site is spread over all potential land uses

Methods of data analysis and processing

The data were entered using Microsoft Excel. The fishes are on the columns; the interviewer's names are on the rows. Transfer the data encoded by Microsoft Excel into SPSS software for statistical analysis and compare the differences in fish species occurring between habitats and flat land use patterns. Using the analytical tools available in SPSS such as Oneway Anova analysis of variance with Duncan test.

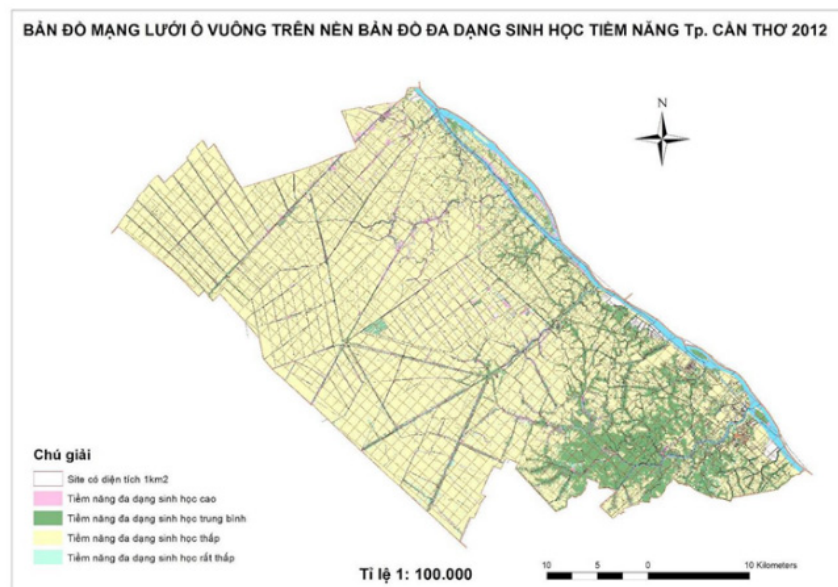


Fig. 1. Map of the grid of squares on the background of the potential biodiversity map of Can Tho 2012.

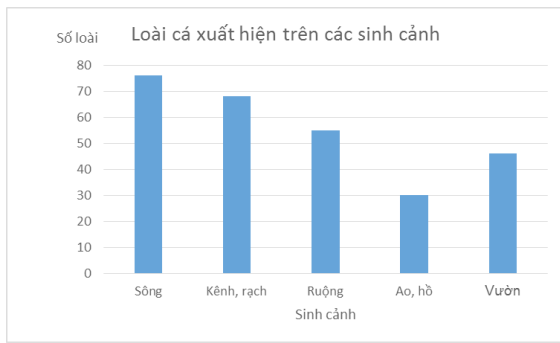


Fig. 2. Fish species found in each habitat.

Results and Discussion

Fish species appearing in habitats

The results of interviews on 28 sites in Can Tho city showed that the river habitats had the highest species diversity with 76 species recorded. Following by canal habitats with 68 species found; 55 species reported in fields, 46 species in garden drain and the lowest in ponds and lakes with 30 species recorded.

Fish species appearing in land-use types

In general, fish species are concentrated mainly on 5 main land-use types in Can Tho, including rural land, perennial crops, annual crops, farmland and irrigation land (rivers, canals, etc.).

However, among the three land uses for perennial crops, annual crops and field land, the number

of fish species appeared similar. Thus, the diversity of fish species on each land use type in Can Tho City can be divided into 4 levels as follows:

+ High diversity: Table 1 shows that the number of fish occurrences on the irrigation land use type including rivers and canals has the highest value at 0.97. Therefore, the group of irrigated land is classified as a group with a high diversity of fish species;

Table 1. Comparison of differences in occurrence of fish species in each habitat

Land-use type	% fish diversity
Rural land	0.38
Annual Crops area	0.59
Perennial crops area	0.67
Rice field	0.71
Irrigation land (Rivers, canals)	0.97

+ Average diversity: including three groups of land for perennial crops, annual crops and field land with the average value of occurrences of 0.59, 0.67 and 0.71 respectively;

+ Low diversity: In rural areas, the % of fish presence was 0.38 compared to other groups.

+ Very low diversity: The remaining land groups such as urban land, industrial park land, defense land ...

Fish resources in Can Tho city are heavily influenced by the upstream areas of the Mekong River. In recent years, due to overfishing and changing

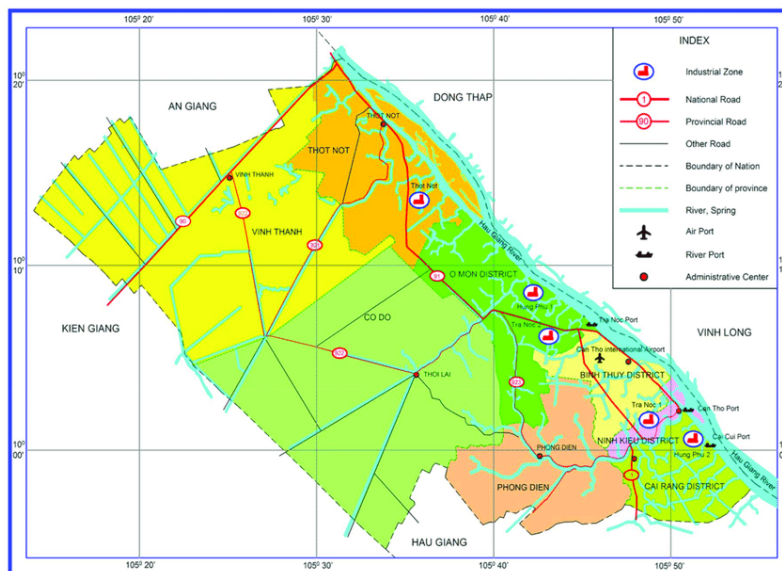


Fig. 3. Cantho city map with all districts (researchgate.net).

environmental conditions, fish stocks have decreased significantly. However, according to interviews in Can Tho, there are still areas with high fish diversity, mainly in small river habitats (grade 1 or 2 rivers).

However, the level of fish diversity will change according to the season, some fish species only appear in the flood season. Larger floodplains will be home to more fish species.

In Cantho, Ninh Kieu district has a very low diversity of fish species, this is an urban area with high density, many industrial zones and residential areas, so the land use type is not favorable for fish species to live. Besides, pollution sources from urban waste, wastewater from industrial zones will affect fish species a lot. These unfavorable conditions have caused very low fish diversity in Ninh Kieu district (Fig. 3).

Nowadays, due to the significant increase in rural population, people build houses almost adjacent to each other. During the research, there were very few ponds and fields around the house, instead there were fruit gardens or open fields. All of this results in fewer fish species in the countryside.

The average biodiversity of Can Tho city, mainly concentrated in rice-growing areas (such as Thoi Lai, Co Do, Vinh Thanh districts). or areas where perennial and annual crops are grown (such as Phong Dien district). These areas only have low dykes, floods can still enter the field, creating a large flooded space, enabling fish to move in the field to find food and spawning grounds (Fig. 3).

Conclusion and Recommendation

diversity of freshwater fish species in Can Tho city with four levels: high biodiversity (accounting for 8.1%), medium (accounting for 82.5%), low (accounting for 2.4%) and very low (7%), based on the occurrence of fish species on land use types in Can Tho.

The level of biodiversity in rivers and canals is the highest (76 species), the lowest in ponds and lakes with 30 species recorded.

During the flood season, the land use pattern is very important for fish growth, this is a large flooded area essential for fish foraging and spawning grounds.

It is necessary to carry out more in-depth studies at 28 survey sites to supplement and update fish

data regularly and to correct the distribution of fish species on each appropriate land use type.

Design and build a reasonable dike, creating conditions for fish to enter the field in the flood season, and at the same time cleaning the field after each crop.

Acknowledgement

This study is funded in part by the Can Tho University Improvement Project VN14-P6, supported by a Japanese ODA.

References

- Ann Bishop, 2002. Fish migrations of the Lower Mekong River Basin: implications for development, planning and environmental management. MCR Technical Paper.
- Cong, N. V., Trang, N. T. Q., Nguyen, P. Q. and Thanh, N. V. 2011. Effects of cypermethrin on survival rate, air intake frequency and growth of Dong perch (*Anabas testudineus*) at seed stage. *Journal of Science*. 19b 197-208, Can Tho University.
- Dien, L. N., Dinh, T. D., Nhon, N. T., Son, M. B. T., Phuong, T. T., Hoc, T. H., Thie, U. V. V., Giau, N. N., Du, L. T., Van, M. V., Thanh, V. C., Hung, H.P., Minh, V. Q. and Quang, C. T. 2011. Assessing and proposing measures to protect and sustainably develop aquatic resources of Can Tho City.
- Dung, P. H. 2012. Developing a potential ecological map of biodiversity in Can Tho city.
- Eric Baran, 2006. Fish biodiversity along the Mekong River from the Himalaya to the coast.
- Eric Baran, 2010. Mekong Fisheries and Mainstream Dams.
- IUCN, 2008. Guidelines for the conservation of agricultural biodiversity in Vietnam.
- Ministry of Fisheries. Fisheries resources of Vietnam (1996).
- Ministry Of Fisheries. List of some aquatic species with high economic value in Vietnam (2005).
- Tam, L. T. M. 2003. *Using GIS techniques to investigate the correlation between land use change and changes in air and water quality during the urbanization of Long Xuyen City in the 1997 period. – 2000* Master Thesis in Environmental Science, Faculty of Environment & Natural Resources, Can Tho University.
- Thuong, N. V. 2000. Summary of data on distribution and migration of fish of the family Pangasiidae.
- Toan, N. V. 2009. *Effects of pesticides containing active ingredient Diazinon on physiology, biochemistry and growth of perch (Anabas testudineus) like* Master Thesis in Environmental Science, Faculty of Environment & Natural Resources Nature, Can Tho University.