

Ecological Services Analysis: Some Evidences and Policy Implications for Socio- Economic Development of Ecosystems of Việt Trì City, Phú Thọ Province

Phan Thị Kiều Trang*, Đoàn Hương Mai

Faculty of Biology, VNU University of Science, 334 Nguyễn Trãi, Hanoi, Vietnam

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Abstract: Việt Trì is the capital city of Phú Thọ province, a tourism city known as the city of Vietnam is national origin. Besides, Việt Trì is also one of 12 “type I” cities in Vietnam with a high socio-economic development rate. Accordingly, the analysis of ecological services of the ecosystems of Việt Trì city is necessary for sustainable socio-economic development. In this research, different ecosystems of Việt Trì city were studied based on already established understanding of Việt Trì ecology. After that, the important level of ecological services was analyzed and evaluated so as to propose orientations and methods for sustainable development.

Keywords: Ecosystem, ecological services, sustainable development.

1. Introduction

Viet Tri city is the politic-economic center of Phu Tho province and also is one the first industrial cities of northern Vietnam with great potential and high rate for industrial development, agriculture, trade and services. In 2012, Viet Tri was designated as a class I of provincial in Vietnam city classification criteria. Besides, Viet Tri is famous for name of “Vietnam festival origin ethnic - Hung Kings Festival”, in 2012 also, especially, UNESCO recognized the veneration of Hung Kings that is intangible cultural heritage which represents for human. The veneration of Hung Kings is the

only venerable heritage of Vietnam which has been recognized by UNESCO. More specifically, in geography, Viet Tri is called City of Confluence where three big rivers meet together, that creative a characteristic ecosystem and develop aquatic economic.

However, the socio - economic development is so rapidly which is threatening seriously on natural ecosystems in Viet Tri city. Studies are very necessary so as to assess accurately the current state of ecological landscape of each ecosystem in the city, in order to propose plans for the best conservation and maximizing the ecological services to serve the city’s development. This study is overall picture of ecosystems of Viet Tri city.

* Corresponding author. Tel.: 84-949873988.
Email: phantrang.1909@gmail.com

2. Study methods

The main focus of this study is Viet Tri city in PhuTho province in the Northeast region of Vietnam (80km far from Hanoi). Viet Tri is a tourist city of original ethnic Vietnam as well as

the Van Lang capital – the first capital of Vietnam and is the gateway to the Northwest of the country. The city is located at 21⁰24' north latitude, 106⁰12' east longitude and have natural area is 111, 7511 km². [2]



Figure 1. Location of Viet Tri city, PhuTho province.

Methods: the following methods are used.

- Ecological fieldwork: observe and take photos of ecosystems.
- Sociological survey
- Collecting documents, synthesis and statistical data processing
- Analysis of ecological services method

3. Results and discussion

3.1. Ecosystems of Viet Tri city [4, 5, 7]

In order to serve the orientation of sustainable development planning in the city, the research has conducted a survey of current state of ecosystem in the city to fully assess all

issues relating ecology and resources of the city. The result shows that Viet Tri city has eight main ecosystems, they distributed in different places and each of them has distinct characteristics.

- Residential ecosystem is accounted up half of the total natural land area of Viet Tri city. This ecosystem is being until now developed and expanded continuously.

- Agricultural field ecosystem has small area around 12% of the total natural land area of the city. However, the area of agricultural field ecosystem now is reducing rapidly because of enhancing urbanization.

- Lakes, ponds ecosystem play an important role in regulating water in the city. In particular,

lakes in the city are being focused on expanding for rising the city's landscape and cultural life.

- River ecosystem is diversity ecosystem with distinct characteristics of confluence of three rivers. There are many species which only present in confluence such as Anh Vu fish...

- Grass land ecosystem is a land covered by plants which are mainly herbaceous and annual plants. They are currently being re-planning to achieve high productivity so as to serve food for livestock and fisheries.

- Planted forest and perennial fruit trees ecosystem is scattered in the city. This ecosystem is being concerned and increased area dramatically in recent time.

- Forest on land ecosystem of the city is very special including mountains belong The Hung Temple Nation Forest which is historic - cultural - environmental forest in the system special - using in Vietnam. Therefore, this

ecosystem is particularly concerned to protect and conserve.

- Industrial area and river port ecosystem has several advantageous conditions so as to remain and develop.

3.2. Analyze and assess the importance of ecological services of ecosystems [1, 3, 6]

Each ecosystem of Viet Tri city has different important level of its ecological services. Based on already understanding about ecological services of ecosystems, important level of the services of each ecosystem is presented below assessment table (Table 1). Table 1 lists the various important levels of ecological services of the main ecosystems of Viet Tri city: (0 - not important, 1 - low important level, 2 - medium important level, 3 - high important level).

Table 1. Ecological services of main ecosystems and their important level

Ecological services	Forest on land	Planted forest, perennial fruit trees	Grass land	River Lakes, ponds	Agricultural fields	Residential area	Industrial area and river port ecosystem
Provisioning group							
1 Forest resources	3	2	1	0	0	0	0
2 Wildlife resources	3	1	1	1	1	0	0
3 Aquatic resources	0	1	1	3	3	1	0
4 Agricultural resources	2	3	3	1	2	1	0
5 Forage (grassland...)	2	2	3	0	0	1	0
6 Industrial materials	2	3	2	0	1	1	1
7 Fuel	2	2	2	1	1	1	0
8 Provide gene resources	3	1	1	2	2	1	0
9 Water supply	2	2	2	3	3	0	0
10 Waterways transport	0	0	0	3	3	0	3
...							
Regulating group							
1 Climate control	3	3	3	2	3	1	0

2	Flood/draining flow	3	2	2	3	3	2	1	1
3	Epidemic control	3	2	2	3	2	2	1	0
4	Riverbank stability	2	2	2	2	2	1	2	1
5	Storm prevention	3	3	2	2	2	2	3	1
6	Maintaining quality/ purifying water	3	2	2	3	3	2	2	0
7	CO ₂ absorbing	3	2	2	2	3	2	2	0
	...								
	Supporting group								
1	Regeneration of nutrients	3	2	2	2	2	2	2	0
2	Land construction	3	2	2	3	2	2	2	0
3	Biological productivity (primary,...)	3	2	2	2	3	2	1	0
	...								
	Cultural group								
1	Biodiversity	3	2	2	3	3	2	2	1
2	Aesthetic/moral/spiritual	3	3	2	3	3	3	2	1
3	Entertainment/ tourism	3	3	2	3	3	2	3	1
4	Education	3	2	2	3	3	3	2	1
	...								

3.3. Orientation for development of the ecosystems of Viet Tri city for maximal development of ecological services [1, 3, 4-6]

According to the planning of Viet Tri city socio-economic development by 2020, it is necessary to plan and manage the ecosystem in order to maximize all their ecological services. The assessment of ecological services importance level of main ecosystems of Viet Tri city is based on:

- The importance of each ecological services towards each type of ecosystem
- The need and orientation of sustainable socio-economic development of Viet Tri city
- The area, location and diversity of each ecosystem of Viet Tri city at present

The following are orientations for the development of main ecosystems of Viet Tri city:

- Residential ecosystem should be created for full use of all the regulating services groups and the cultural services groups.

- Agricultural field ecosystem should be developed services belong to the provisioning services groups and the supporting services groups.

- Lakes, ponds ecosystem should be ensure maximum all services of the regulating services groups, the supporting services groups and cultural services groups.

- River ecosystem should be created for full use of the provision services groups, the regulating services groups and the cultural services groups.

- Grass land ecosystem should be created full use for the provisioning services groups and regulating services groups.

- Planted forest and perennial fruit trees ecosystem should be created full use of the provisioning services groups and the regulating services groups.

- Forest on land ecosystem should be created for full use of the regulating services groups, the supporting services groups and the cultural services groups.

- Industrial area and riverport ecosystem should be created for full use of provisioning services.

4. Conclusions

- This research identified that there are 8 main ecosystems in Viet Tri city.

- Each type of ecosystem in Viet Tri city, the importance level of each service (24 main services) is different.

- In order to develop socio-economic of Viet Tri city sustainably, it's necessary to orient for development and management of Viet Tri

city's ecosystems towards maximizing their ecological services.

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Định hướng phát triển kinh tế - xã hội các hệ sinh thái chính của thành phố Việt Trì, tỉnh Phú Thọ dựa trên cơ sở phân tích các dịch vụ sinh thái của chúng

Phan Thị Kiều Trang, Đoàn Hương Mai

Khoa Sinh học, Trường Đại học Khoa học Tự nhiên, ĐHQGHN, 334 Nguyễn Trãi, Hà Nội, Việt Nam

Thành phố Việt Trì thuộc tỉnh Phú Thọ là một trong những thành phố công nghiệp đầu tiên của miền Bắc. Năm 2012, Việt Trì được công nhận là một trong 12 đô thị loại I trên cả nước có tiềm năng và tốc độ đô thị hóa và phát triển kinh tế - xã hội cao. Do đó, muốn đạt được mục tiêu phát triển bền vững kinh tế - xã hội, cần thiết phải tiến hành việc phân tích các dịch vụ sinh thái của các hệ sinh thái của thành phố Việt Trì. Báo cáo này dựa trên cơ sở những hiểu biết đã có về thành phố Việt Trì cũng như những hiểu biết về sinh thái học. Từ đó xác định được các hệ sinh thái chính của thành phố và

phân tích, đánh giá thực trạng và tầm quan trọng của các dịch vụ sinh thái của chúng. Cuối cùng, dựa trên những phân tích, đánh giá đó để đưa ra định hướng phát triển và quản lý các hệ sinh thái chính của thành phố Việt Trì để phát huy tối đa các dịch vụ sinh thái phục vụ cho sự phát triển bền vững kinh tế - xã hội.

Từ khóa: hệ sinh thái, các dịch vụ sinh thái, phát triển bền vững.