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# LAKESCAPE UNDER URBAN DEVELOPMENT IN DONG DA DISTRICT, HANOI CITY

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## ABSTRACT

The report deals with results of study on features and state of lakescape under urban development in Dong Da district, Hanoi city. The urbanization of Dong Da district in after - Doi Moi time had strong impact on lakescape:

- Decrease of lake's number and area.
- All lakes in the district are polluted, because they are used for storage of untreated wastewater.
- Now, surrounding bank landscape is not adequate for lakes in the town from Environmentally sound urban development point of view.

The results of study are important data to give recommendations on urban replanning and management at a big scale.

**Key words:** Decrease of lake area, Lakescape, Recommendation, Surrounding bank landscape, Urbanization, Use of lake, Water quality.

## Introduction

In recent decades of the last century together with development of society, Hanoi city has been urbanized more quickly. This urbanization has great impacts on wetland, especially the town - lakescape changes in quantities and qualities.

Lakescape can be understood as a complex of lake water body and its surrounding bank landscape. They are closely related components and an important part of townscape. A study of lakescape change and status under urban development creates basic data for urban planning at a big scale and management.

This report deals with the following contents:

- General characteristics of urbanization in Hanoi city and in Dong Da district.
- Features of lakescape change under urban development (quantitative changes: decrease in lake's number and area; lakescape status: lake water quality, unplanned and planned surrounding bank landscape.
- Remarks and recommendations.

## Study methods and basic data.

Cartographical method and GIS are used for analyzing lakescape changes in area at the different periods of urban development. During the field survey the questionnaire, water quality testing and photo taking are used for studying the status of lake water body, its surrounding landscape and urban management.

The major data used for studying lakescape in the proposed district are:

- Topographic maps at 1:10 000 scale conducted in 1983,1996.
- Collected data from field survey in 1997 and 2001.

## Urbanization of Dong Da district

According to Tran Hung, Nguyen Quoc Thong (1995) the urbanization of Hanoi City has been undergoing several periods:

- Urbanization in feudal period,
- Urbanization in French period (1875 - 1954),
- Urbanization after 1954 (including sub-periods: 1955-1965, 1966-1985, 1986-1993, 1993 up to now).

In Dong Da district the urbanization of the last period had special characteristics, especially the urban development of the 3 last sub-periods had strong impacts on lakescape changes. Here, it is necessary to identify some different key types of townscape:

- Planned multi-storey housing landscape
- Unplanned residential private housing landscape
- Town - lakescape

### *Impact of urban development on features of lakescape change in Dong Da district*

#### *Quantitative change of lakescape*

Quantitative change of lakescape in Dong Da district is represented in decreasing the number and the area of lakes. The investigated data show that in the district, there were 16 lakes in 1983, but now there are only 12. In past 17 years (from 1983 up to now), there were 4 lakes entirely disappeared. They are Cay Dua Lake, Ba Gian Lake, Dai Hoc Thuy Loi Lake and O Cho Dua Lake (Table 1). The rest others were decreased in area. In the period 1983-1996, the total decreased area was about 14631.m<sup>2</sup> (25, 2 % of total lake area in the district). In each year of this period there was more than 1120 .m<sup>2</sup> decreased (Table 1).

The major reason of lake area decrease is identified that:

- No plan of land use in the past, no regulation for wetland use and protection in towns.
- High population growth needs to expand more space for house setting. The expanding of living space was not well controlled by the government.
- Free accumulation of solid wastes.

*Table 1. A change of lake's number and area in Dong Da district in the period from 1983 up to now*

N <sup>o</sup>	Lake	Area (m <sup>2</sup> )			Decreased area			
		1983 (*)	1996 (*)	2001 (**)	1983-1996		1984-2001	
					m <sup>2</sup>	%	m <sup>2</sup>	%
1.	Dai hoc Giao thong	4419	863		3556	80,5		
2.	Hoc vien Quan he Quoc te	7120	2678		4442	62,4		
3.	Chua Lang	761	426		335	44,0		
4.	Van Chuong lon	4616	3893		723	15,7		
5.	Van Chuong nho	2480	1747		733	29,6		
6.	O Cho Dua	2585	1485	0	1100	42,6	1485	100
7.	Dong Da	15874	15471		403	2,5		
8.	Cay dua	3186	3112	0	74	2,3	3112	100
9.	Ba mau	5210	3829	0	1381	26,5	3829	100
10.	Xa Dan	5176	4503		673	13,0		
11.	Benh vien Noi tiet	236	184		52	22,0		
12.	Ba gian	1925	1459		466	24,2		
13.	Chua boc	187	140		47	25,1		
14.	Dai hoc Thuy loi	499	212	0	287	57,2	212	100
15.	Dai hoc Y	1499	1314		185	12,3	1315	
16.	Kim Lien	2203	2029		174	7,9		
	<b>Total</b>	<b>57976</b>	<b>43345</b>		<b>14631</b>	<b>25,2</b>		

(\*): Data obtained from topographic map by using GIS (\*\*): Data of field survey in Jul. 2001

### *Qualitative change*

Qualitative change of lakes deals with a degree of water pollution and status of surrounding bank landscape.

Table 2. Qualitative of lake's water in Dong Da district

Items	Lake					Vietnam's standards TCVN 5944-1995
	Kim Lien	Dai Hoc Y	Van Chuong	Ba Mau	Dong Da	
DO(mg/l)	2.11-2.54	5.08-5.58	0.7-1.4	6.0-8.4	10.40-14.51	>=2
	*		*			
Dissolved salts (mg/l)	1.00	1.20	1.19	1.20	1.15	15
	*	*	*	*	*	
BOD <sub>5</sub> (mg/l)	186-225	162-198	236-253	100-125	68-81	<25
	*	*	*	*	*	
Suspended substances (mg/l)	366	350	392	281	270	80
	*	*	*	*	*	
Water color	Black, cloudy	Black, cloudy	Black, cloudy	Black		

\* -Chemical criteria are more or less than Vietnam's standards TCVN 9544-1995

Data in table 2 show that most of lakes in Dong Da district is strongly polluted: BOD<sub>5</sub> - 68 - .253 mg / l, 3-10 times greater than the standards (TCVN 5944-1995), suspended substances more than 3.5-5 times; dissolved salts less than the standards in 12-15 times.

According to the above mentioned water quality, it is necessary to classify the lakes into groups:

1. Strongly polluted: Van Chuong lake, Kim Lien lake.
2. Average polluted: Dai Hoc Y lake, Ba Mau lake.
3. Less polluted: Dong Da lake

In general, lake water in Dong Da district is polluted mainly by untreated domestic wastewater.

### *Existing use of lakes in Dong Da district*

Now, lakes in the investigated district are used for the following purpose as:

1. Storage of waste water (all lakes)
2. Fishery (Dong Da, Ba Mau Lake)
3. Wet-vegetable (spinach) floating (Kim Lien Lake)
4. Garden - park (Ba Mau Lake).

Generally, all lakes are mainly used for wastewater storage.

### *Surrounding bank landscape*

Lake banks landscape, here, is a man - made landscape representing a kind of land - use. That is the most unplanned private residential housing area (illegally or legally constructed) without a green belt; in some places, with solid waste polluted bank.

These types of landscape are not adequate for lakes in the town.

## Remark and recommendation

1. From this study it becomes apparent that Hanoi city in general, Dong Da district in particular, is an area that has undergone massive urban development, especially in after - *Doi Moi* time. With a large proportion of new urban development in inner Dong Da being focused around the district's numerous water features and the surrounding bank landscape.
2. It became obvious that lakes in Dong Da district is undergoing severe environmental contamination due to surrounding urban activities, both present and past. Land reclamation and inadequate infrastructure have led to the decrease in both size and capacity for use, especially in the last twenty years
3. Recommendation on protection and reclamation of lakescape

By using case study analysis, the 2 key following recommendations can be given from geographical point of view:

1. The recommendation emphasizes the need to do replanning of land use - creating environmentally sound surrounding bank landscapes. This recommendation includes the removal of urban development (house building) away from the banks of lakes. In doing so, green areas can be established, thus acting as a natural filter of pollutants before they reach the watercourses.
2. Other recommendation emphasizes the critical need for the urban population to be more environmentally friendly - untreated waste should not be allowed to flow into waste courses

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