

HANOI LAKES REPORT 2015



Editor - in - Chief

Nguyen Ngoc Ly

Collaborators

Dao Thi Thanh Thuy, Duong Manh Nghia,
Dang Thuy Trang, Dang Xuan Huy,
Dinh Tien Dung, Doan Vu Thao Ly,
Nguy Thi Nguyen Hong

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Introduction

The lakes, ponds, and marshes in and around the City of Hanoi (Hanoi lakes) are all an integral part of the wetland and riverine ecosystem of Hanoi's landscape. In the development process to becoming a modern capital, the Hanoi lake and wetland ecosystems have played an essential role in the environment by promoting socio-ecological functions, regulating storm water discharge to reduce catastrophic flooding and inundation, and supporting Hanoi adaptation to climate change. Many of the ponds and lakes of Hanoi are associated with pagodas deeply rooted in Hanoi's history. These pagodas are considered spiritual places, places that are now highlights for tourism, sightseeing, recreation, entertainment, and festivals in Hanoi.

In October 2010, the Center for Environment and Community Research, in cooperation with the Vietnam Environmental Protection Fund - Ministry of Natural Resources and Environment, developed a report entitled: *"Support Community Participation in Environmental Lake Protection: Baseline Report in Six Core Districts in Ha Noi: Ba Dinh, Hoan Kiem, Hai Ba Trung, Cau Giay and Tay Ho."* The report was published as a gift to celebrate the 1,000th anniversary of Thang Long – Hanoi. The report has contributed background information and data related to Hanoi lakes and, as a result, was recognized in the top ten awards of "Bui Xuan Phai – For the Love of Ha Noi" according to the Viet Nam News Agency (TTXVN).

For the last five years, the report has served as a reference tool for Hanoi policy makers, scientists, and communities for analyses, research, and communication development of new measures and actions. Although the research in the report provided meaningful results, baseline data for the Hanoi lakes is still limited, so there is much more that still needs to be accomplished in future years.

The Vietnam Environmental Protection Fund and the Center for Environment and Community Research have developed the *"Hanoi Lakes Report 2015."* The 2015 updated report focuses on the current status of the Hanoi lakes five years after the first report was published. The report includes results and recommendations for more in-depth research on some specific lakes, an assessment and analysis of policies related to Hanoi lakes's management and protection, identification of challenges and barriers that currently prevent the restoration and long-term management of lakes and wetlands, sharing of experiences of community participation in lake protection and long-term recommendations for future Hanoi lake protection.

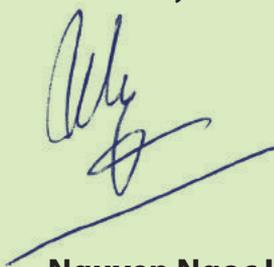
We hope the results of the 2015 report will inspire and support protection of Hanoi lakes with broader participation of policy makers, scientists, managers, businesses and communities and that Hanoi people will work hand in hand to protect and preserve the lakes for a greener, cleaner, more beautiful capital and sustainable development.

Vietnam Environmental Protection Fund



Nguyen Nam Phuong
Director

Center for Environment and
Community Research



Nguyen Ngoc Ly
Director



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First of all we would like to thank Vietnam Environment Protection Fund for supporting our initiative for the development of baseline information of Hanoi's lakes system and the promotion of community participation in environmental protection in general and the protection of Hanoi's lakes in particular. The Fund's partnership and sponsorship for both the 2010 and 2015 Report on Hanoi's Lakes were a huge encouragement for the team. In the past five years, communities' awareness about protecting Hanoi's lakes has been transformed into specific campaigns and actions carried out by local Women's Unions, pioneer youth groups and communities around lakes in Hanoi. We would like to especially thank Mr. Nguyen Nam Phuong, Director of Vietnam Environment Protection Fund for his dedication in developing the baseline information for Hanoi's lakes system. Without his enthusiastic support this initiative would likely be postponed many years before being undertaken.

We would like to thank Mr. Steve Nichols and Mrs. Sally Benson, the Chino Cienega Fund for the encouragement and co-funding for the 2015 Report on Hanoi's Lakes. Their love for Hanoi has greatly inspired and motivated the team.

We would like to take this opportunity to thank Policy Advocacy Program of Oxfam/DFID for supporting institutional research and community's activities in protection of Ha Noi Lakes.

The 2015 Report on Hanoi's Lakes would not be completed without participation and inputs from many experts in different fields, community groups and particularly volunteer student groups in Hanoi.

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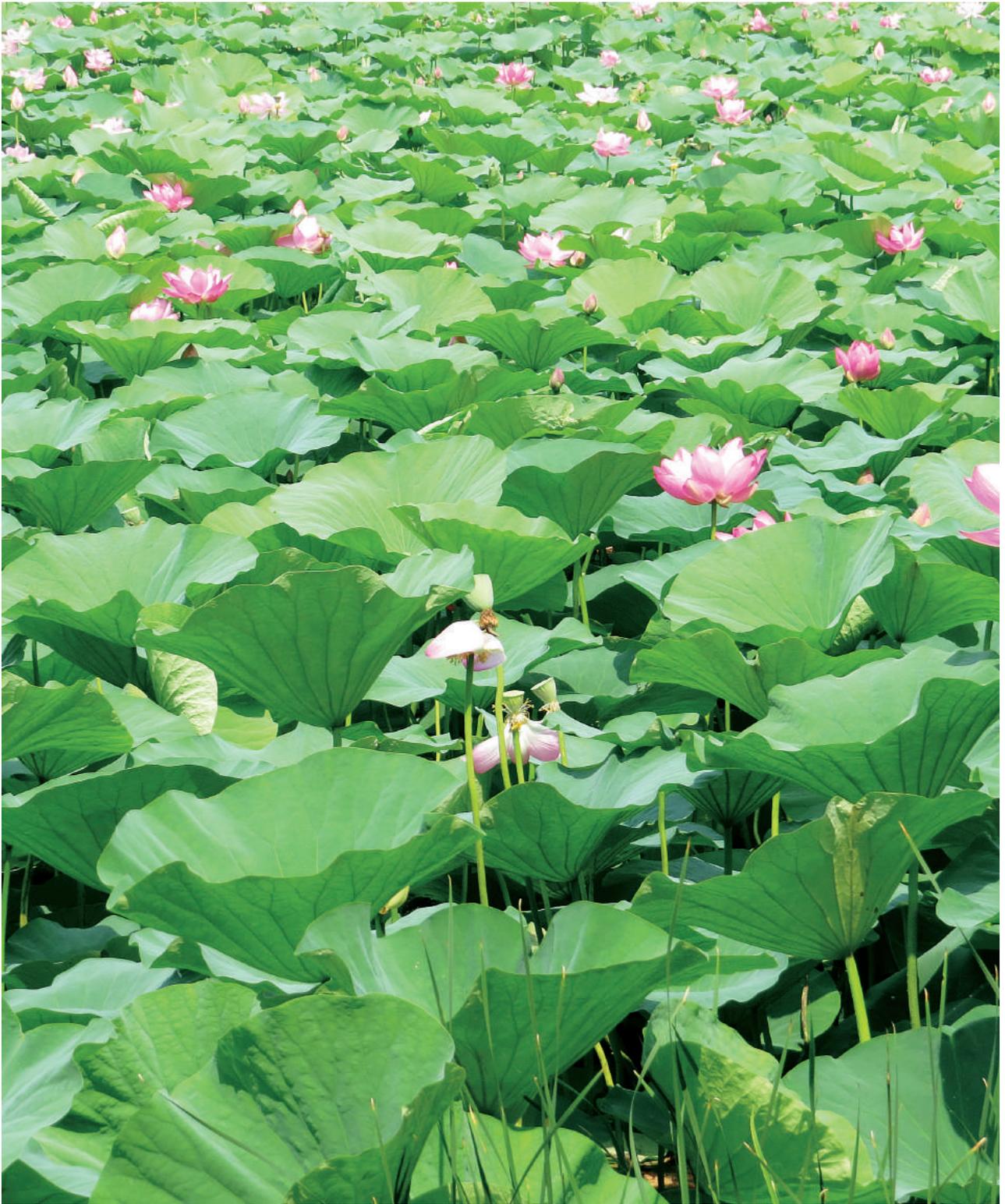
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Finally, we would like to thank Mr. Truong Manh Tien, Chairman of Hanoi's Lakes Club, who has contributed valuable initiatives in the process of developing the report and members of Hanoi's Lakes Club who have maintained, connected and expanded activities regarding protection of Hanoi's lakes throughout the past five years.

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PART 1. APPROACH AND METHODOLOGY

Although the baseline information report on Hanoi Lakes (2010) only focused on six core districts of Hanoi, the report has provided an overall picture of the Hanoi Lakes environment, management and community in general. The report provided static, preliminary information in order for others to be able to consider and evaluate the extensive changes that have, and are continuing to occur, in recent years. The report also strove to contribute additional baseline data while also calling attention to the need for updating the data on Hanoi Lakes in the very near future. Within a complex ecosystem like the Hanoi lakes system, five years may not be long enough to be able to measure changes in absolute, scientific terms, but in the context of the rapid urbanization that continues to occur in the City of Hanoi and the need to raise an immediate awareness in the general population about the Hanoi lakes, five years is an adequate period to update and assess any and all available baseline information. Doing so will provide the people of Hanoi with an idea of whether the Hanoi Lakes system is getting better or more degraded after five years of implementing management solutions to reduce lake pollution and to determine the priority activities to do in the future.

The Hanoi Lakes Report 2015 builds upon the Hanoi Lakes Report 2010 but also has some major differences including:

1. Preparing and determining future methods and approaches;
2. Updating the status of the lakes using basic data such as number of lakes, area, state embankment, corridor shore environment, and water quality of all the lakes in the 2010 report, verifying the data in the 2010 report, and a general comparison between the lakes in 2010 and 2015;
3. Based on baseline information, 30 representative lakes were selected based on criteria such as: areas, level of the improvement and degradation of environmental and water quality, the level of encroachment risk. These lakes were surveyed and in-depth analyzed of change according to the above criteria. During the survey, the main sources of wastewater discharge into each lake were also determined. The status of each lake in 2015 was then compared with status of the lake in 2010;
4. Mapping data for the 30 lakes was built using GIS and ArcView software to make it easier in monitoring and reporting changes on-line in the future;
5. An analysis of the policies of Hanoi related to lake protection, with the aim of identifying progress, as well as shortcomings, in lake management in the last five years. analyze the advantages, disadvantages and issues in implementation of the policies of the city in order to identify gaps in legal regulations system governing lakes;
6. Brief summaries of some projects related to improvement of the water quality of some inner-city lakes;
7. Brief summaries of communities' activities and initiatives to protect lakes in the last 5 years;
8. Provide recommendations for the future.



PART 2. STATUS OF HANOI LAKES 2015

This part includes the following sections:

1. *Executive summary of the environmental status of Hanoi Lakes in 2010 including information about the severity of pollution and the amount infrastructure surrounding the lake.*

2. *The status of Hanoi Lakes in 2015 with basic information and the latest updates about the all of the ponds and lakes in 2015, the changes of the ponds and lakes since 2010, including the information about survey methodology, research, analysis of the current state of the lakes in 2015 and comparison to 2010, so that the reader can easily see the changes in the ponds and lakes of Hanoi after 5 years.*

1. Summary of the Status of Hanoi Lakes 2010

The baseline report of Hanoi Lakes in 2010 provided information on the status of 120 water entities, which included lakes, ponds and marshes in the six core districts of Hanoi: Ba Dinh, Hoan Kiem, Tay Ho, Hai Ba Trung, Cau Giay and Tay Ho. In the book, they were presented in this order.

Of the 120 water bodies that were surveyed in 2010, besides the lakes that were managed by the city and local governments, 80 lakes were selected to be measured for area, lakeshore environmental assessments and analysis water quality. Information on each lake includes location, maps of geographical areas around the lake, panorama images, partial image, and the newspaper points that describe the current state of the lakeshore and water environment.

The results of baseline information in 2010 showed that, in the 80 lakes, 76% of the lakes had an area greater than 1,000 m². In terms of water quality, 71% of the lakes were polluted ($BOD_5 > 15$ mg/l reached the diagnostic criteria of QCVN 08: 2008 / BTNMT), 14% of the lakes contained heavy organic pollutants ($50\text{mg/l} < BOD_5 < 100$ mg/l) and 32% of the lakes were slightly polluted. In 2010, the survey also showed that majority of sources that lead to water quality pollution were human activities such as water waste that directly discharged into ponds and lakes.... Especially in those lakes and ponds located in densely populated areas.

In terms of infrastructure, most of the lakes had embankments to prevent encroachment of lakeshore and landscape area. Only 26% of lakes had no embankments. Almost all of these lakes are located outside the city center, with some ponds located in Hai Ba Trung, Cau Giay and Tay Ho. The embankment helps to maintain the surface water quality and improvement environmental conditions around the lakeshore. To be more specific, in total lakes had embankment, 54% of them had clean lakeshore, and 19% was very clean. While, of those lakes without embankment, 80% lakeshore corridors was seriously polluted.

The lakes without embankments were at risk of encroachment by housing, parking, becoming junkyard, place for waste containers, etc. For the lakes with embankments, the big issue is the building up of shops and food services among embankments along the lakes and ponds.

Status Report of Hanoi Lakes in 2015 will compare advances or the remaining issues compared to 2010.

2. Status of Hanoi Lakes 2015

Result 1: The status of Hanoi Lakes in 2015 and 2010

A research team has reviewed status of all lakes in the list of lakes for 2010. The results of the lakes status in 2015 are:

Quantity of lakes

- Total of Hanoi ponds and lakes was 120, including two ponds named Hoa Muc Pond and Ngoc Quan Pond, which are double ponds, so the actual quantity of lakes in 2010 was 122;
- From 2010 to 2015, 17 lakes were completely leveled, and 7 lakes were added;
- The total number of ponds and lakes in Hanoi in 2015 is 112;

Actually, comparison with 2010, quantity of lakes reduced 10 in 2015

Surface area of lakes

- Total surface area of Hanoi lakes and ponds in 2010 was 7,031,845 m²;
- Total surface area lake was reduced was 122,540 m²;
- Total surface area of lakes expanded was 49,198 m²;
- Total surface area of Hanoi lakes and ponds in 2015 is 6,959,305 m².

Hence, comparison with 2010, the total surface area of Hanoi lakes decreased to 72,540 m².

Figure 1 and 2 display the changes of quantities and surface area of Hanoi ponds and lakes from 2010 – 2015, below:

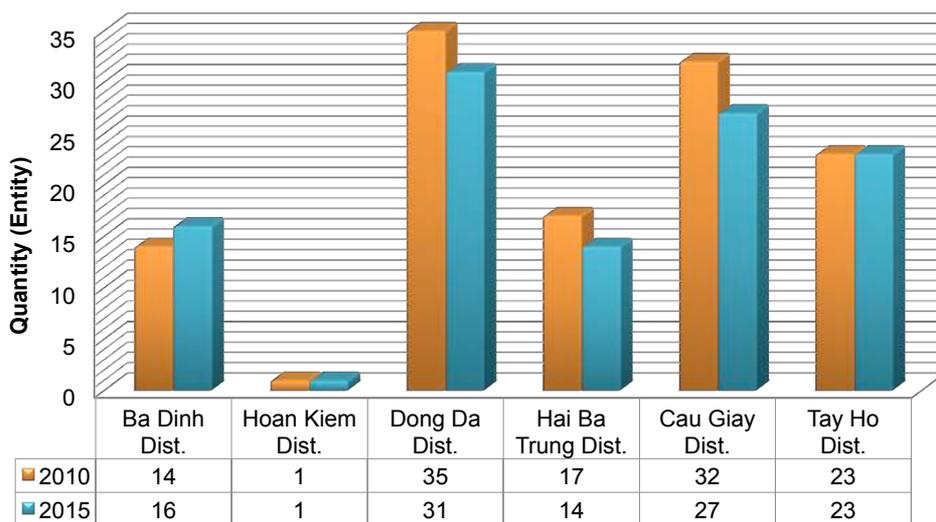


Figure 1: The changes of Ha Noi lakes quantity 2010 - 2015

(In six core districts, Ba Đình district adds two lakes; Hoàn Kiếm district maintains good status of lakes, Dong Da district lost four lakes, Hai Ba Trung district lost three lakes; Cau Giay district lost eight lakes; adds three new lakes; and Tay Ho district lost two and adds two new lakes).

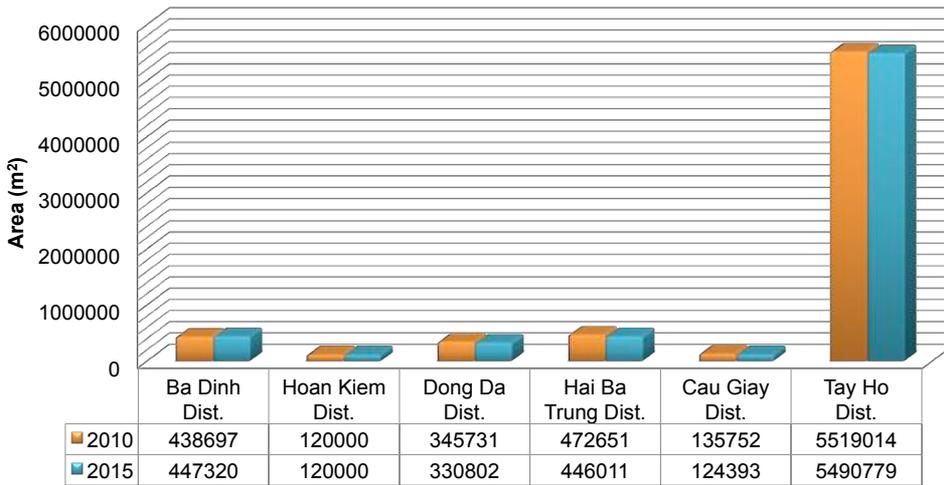


Figure 2: The changes of Ha Noi lakes surface area 2010 - 2015

Structure of lakes embankment

- In 2010, there were 80 lakes with full embankments, 66.5% of the total lakes and ponds of Hanoi; 10 lakes with partial embankments, 8% of the total lakes and ponds; and 32 lakes did not have embankments, 26% of the total lakes and ponds.
- In 2015, there are 80 lakes with full embankments, 77% of the total quantity Hanoi lakes and ponds; 13 lakes with partial embankments, 11.5% of the total lakes and ponds; and 13 lakes do not have embankments, 11.5% of the total lakes and ponds.

Hence, compared to 2010, the number of lake and pond of Hanoi with full embankments increased to 10.5%, partial embankments of lakes increased to 3.5% and lakes without embankment decreased 15.5%.

Environment of lake's corridor

The embankment of a lake aims to keep a stable area and sanitation of the lakeshore region around the lake. In the past 5 years, the Hanoi government has made many efforts for supporting the building of embankments around lakes.

- In 2010, 73% of the lakes with full embankments had an environmental status of clean and clean, 23% of lakes were dirty, and 4% of lakes were seriously dirty. For lakes and ponds that had partial embankments and no embankments, there were only 18% of the lakes that were considered clean, 20% were considered dirty, and 62% were seriously dirty.
- In 2015, overall, the number of lakes with full embankments in Hanoi significantly increased and the sanitation quality is good, 82% of the lakes with full embankments have an environmental status of clean and clean. However, there are still 14% of the lakes that are dirty, and 4% that are seriously dirty. For lakes with partial embankments and lakes with no embankments, there are only 20% of the lakes that have a clean environmental lakeshore corridor, and 52% of the lakes are seriously poor, and 28% are poor.

The lakes with no embankment and the lakes with a partial embankment always face the risk of encroachment by building construction, parking, or becoming a landfill. Currently the lake with full embankments are facing the challenge of being encroached and changed to small food stalls. Typically, in Lang Thuong lake - located on Chua Lang Street, people arbitrarily encroach upon the pavements to do business. This is a complex issue, and has been reported on many times in the media, communication, newspaper, and magazines. Unfortunately, the problem continues and is still not terminated.

Thus, comparison with 2010, the environmental lakeshore corridor of fully embankment lakes are considered quite clean and increased 9 percent, the poor condition lakes decreased to 9 percent, and some lakes have unchanged status at 4%. The amount of lakes have partial embankment of lake and no embankment were considered clean and quite clean increased to 2 percent, the dirty lakes increased to 32%, and the seriously dirty lakes dropped 34 percent.

Figure 3, 4 and 5 show the changes on the structure embankment and environmental status of Hanoi ponds and lakes from 2010 – 2015 below:

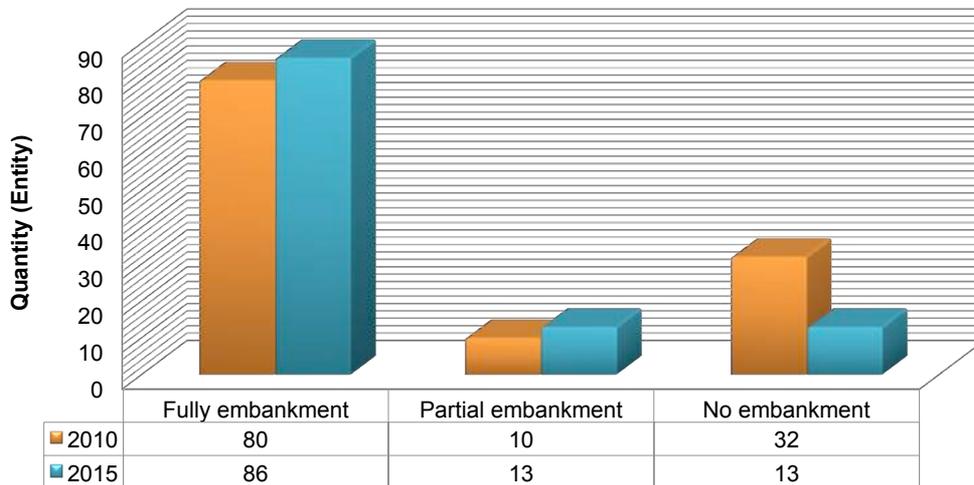


Figure 3: The changes on the structure embankment of lakes

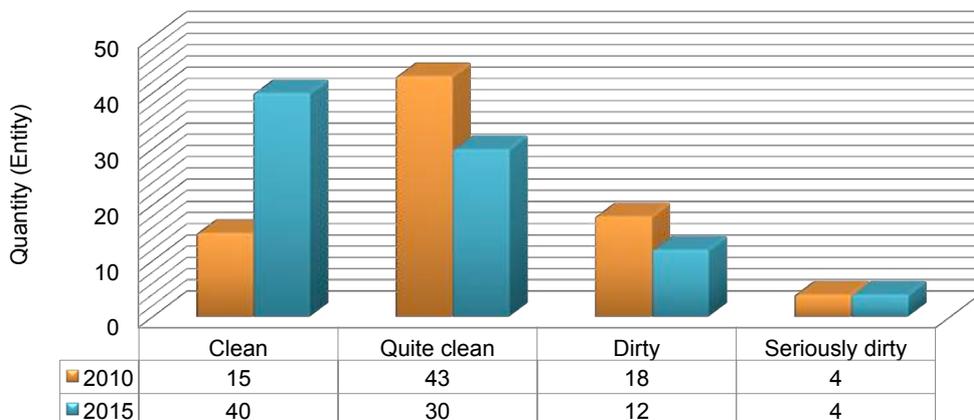


Figure 4: The changes of environmental quality's corridor of fully embankment lake 2010-2015

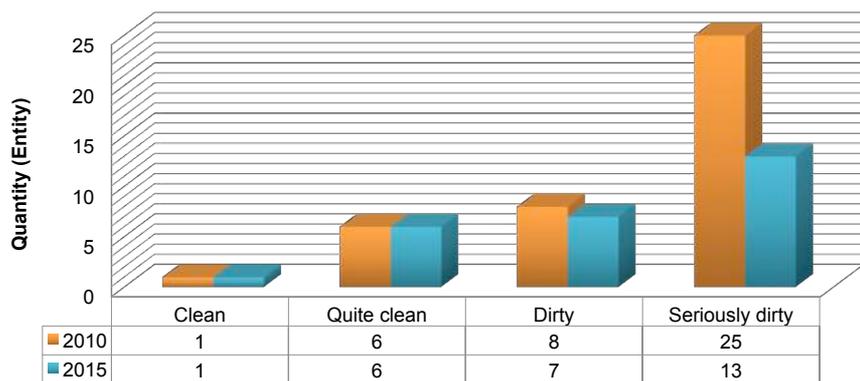


Figure 5: The changes on environmental quality's corridor of partial embankment and no embankment lakes 2010-2015

Water quality of lakes

In 2015, based on the status survey of the ponds and lakes in the city, and the baseline information of ponds and lakes in 2010, the research team has selected 30 lakes and ponds to analyze their water quality. These 30 lakes and ponds had changes in area, environmental sanitation's corridor, environmental water and interventions activities by the community have occurred in the past 5 years. The analysis of the 30 lakes aims to assess the water quality of these lakes and ponds in 2015, and document the changes in water quality that has occurred in these lakes after 5 years.

The analysis of water quality in these 30 lakes included criteria related to the development of biomes in selected ecosystems. The criteria included temperature, dissolved oxygen (DO), biochemical oxygen demand (BOD₅) and chlorophyll-a. These analyses were then compared with the water quality assessment based off the Regulation of Technical National on surface water quality, QCVN 08: 2008. BTNMT column B1 - Serves well for irrigation and water resources purposes. Since then there are statistics on environmental quality of the 30 lakes as follows:

In the 30 lakes analyzed, 5 lakes were assessed as unpolluted, 11 lakes have slightly polluted water, 8 lakes have polluted water, and 6 lakes have heavily polluted water. The survey shows that the main reason leading to water quality pollution is due to human activities such as water waste, directly discharged into ponds and lakes. This is especially true for lakes located in densely populated areas.

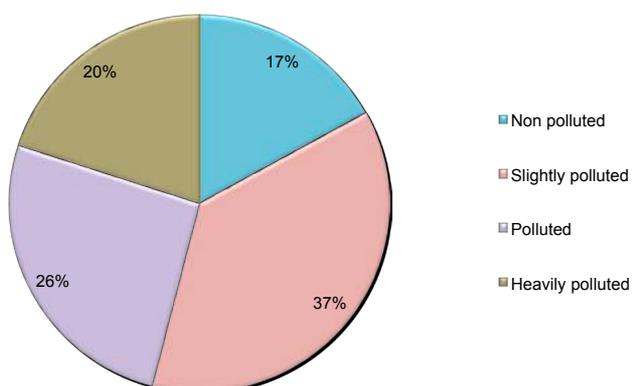


Figure 6: Pollution level of 30 lakes water

After 5 years, the water quality of 30 lakes improved in comparison with 2010, the amounts of lakes have polluted water and heavily polluted water is decreasing.

Conclusion: Basically, the statuses of Hanoi Lakes in 2015 have had major changes compared to the 2010 data as follows:

- Except Ba Dinh district, which has a number of lake increases, and Hoan Kiem, which has no change in the number of lakes, the remaining districts saw a decrease in quantity of lakes ranging from 1 to 5 lakes. The quantity of lakes and area of lakes has a decreasing trend;
- The quantity of lakes with a full embankment and partial embankments have an increasing trend, and lakes with no embankments have significantly reduced;
- The environmental corridors of lakes with full embankments, partial embankments, and no embankments have improved; the clean lakes have increased and dirty lakes have decreased;
- The water quality of ponds and lakes has improved, and the number of polluted lakes and heavily polluted lake is decreasing;

Result 2: The changes in the status Hanoi Lakes based on districts

Ba Dinh District

Ba Dinh district which contains many famous lakes in Hanoi, many of these lakes are linked to historical and cultural sites of the country such as Truc Bach lake, Fishponds Mausoleum, the One Pillar Pagoda Pond, Thu Le Lake and Huu Tiep lake.

From 2010 to 2015, the status of ponds and lakes in Ba Dinh remained good. In 2015, the number of lakes rose from 14 to 16 lakes. The two additional lakes are Bay Gian lake and Voi Phuc Temple Well, they are two lakes not included in the 2010 book. The water surface area of lakes has increased by 8,623 m².

Details of the existing ponds and lakes in the district are shown in the table below:

No.	Name	Area (m ²)		Structure of embankment	
		2010	2015	2010	2015
1	Hồ Trúc Bạch	158453	158453	Full embankment	Full embankment
2	Ao cá Lăng Bác	2745	2745	Full embankment	Full embankment
3	Hồ Bách Thảo 1	6679	6679	Full embankment	Full embankment
4	Hồ Bách Thảo 2	5906	5906	Full embankment	Full embankment
5	Hồ Bách Thảo	113	113	Full embankment	Full embankment
6	Hồ Giảng Võ	68300	68300	Full embankment	Full embankment
7	Hồ Đầm	9536	9536	Full embankment	Full embankment
8	Hồ Đình Ngọc Hà	2816	2816	Full embankment	Full embankment
9	Hồ Hữu Tiệp	1393	1393	Full embankment	Full embankment
10	Hồ Ngọc Khánh	35881	35881	Full embankment	Building lake, full embankment
11	Hồ Thành Công	50046	50046	Full embankment	Full embankment
12	Hồ Thủ Lệ	68521	68521	Full embankment	Full embankment
13	Ao chùa Một Cột	202	202	Full embankment	Full embankment
14	Hồ Dài	1106	1106	Full embankment	Full embankment
15	Hồ Bảy Gian *	N/A	8526	N/A	Full embankment
16	Giếng Đền Voi Phục *	N/A	97	N/A	Full embankment

Note: *Additional Lake

Thus, in 2015, the status of ponds and lakes in Ba Dinh are as follows:

- Total number of lakes is 16, which is 2 lakes more when compared with the 2010 data (14 lakes);
- Total surface area of lakes and ponds is 447,320 m², which is increase by 8,623 m² in compared to the 2010 data (438,697 m²);
- Total lakes with full embankments are 15 lakes, lakes with partial embankments are 1 lake, no lakes have no embankment;

Due to many lakes in the district being famous, the government is concerned about protecting the lakes with embankments. Currently 15/16 lakes have full embankments, only Bay Gian lake is a partial embankment because of obstacles with the clearance process.

Hoan Kiem District

Hoan Kiem district is located in the center of Hanoi, it also contains the fewest lakes in the city, and the district has just one really famous lake: Hoan Kiem Lake (also called Sword Lake). The State Government conferred Hoan Kiem Lake as a special National Monument, so the local government manages it tightly, and the community living around the lake is very aware about lake preservation and protection, there are no issues of encroachment and no actions that increase lake pollution.

Details of the current status of lakes in Hoan Kiem District is shown in the table below:

No.	Name	Area (m ²)		Embankment	
		2010	2015	2010	2015
1	Hồ Hoàn Kiếm	120000	120000	Full embankment	Full embankment

Thus, in 2015, the status and area of Hoan Kiem lakes has not changed, the total amount of lakes is one lake and the water surface area is 120,000 m².

Dong Da District

Dong Da district is one of the districts that contains many of the ponds and lakes in the city (over 30 lakes). Dong Da contains many large lakes such as Dong Da lake, Ba Mau lake, Nam Dong lake and Linh Quang lake. In addition, the district has many lakes associated with historical and cultural importance such as well of Memorial of Literature, well in Boc Pagada, well in Lang Pagoda, well Kim Lien Temple.

From 2010 to 2015, the district has lost four lakes, which were a pond near Lang Pagoda pond, a pond after Lang Pagoda, vegetable grow pond, and Ba Gang lake. These were used to plant vegetables, they had no embankments, the lakeshore environment was heavily polluted, and they were located in densely populated areas.

In terms of embankment structures, the district has 28 lakes with full embankments, 1 lake with a partial embankment and 2 lakes no embankments: which are pond of Mieu Temple and Linh Quang Lake.

In terms of surface area of lake water, after 5 years, the district has lost 14,929 m² of

water surface area. The main reason is that 4 lakes have been filled, Linh Quang lake and Phu pond have been encroached, Hao Nam pond has been filled about 50%.

Dong Da district has total of 31 ponds and lakes. Details of the status of these lakes is shown in the table below:

No.	Name	Area (m ²)		Embankment Structure	
		2010	2015	2010	2015
1	Hồ Kim Liên	20422	20422	Full embankment	Full embankment
2	Hồ Nam Đồng	42876	42876	Full embankment	Full embankment
3	Hồ Ba Mẫu	43448	43448	Full embankment	Full embankment
4	Hồ Bán Nguyệt	1380	1380	Full embankment	Full embankment
5	Hồ Đống Đa	135100	135100	Building lake, full embankment	Full embankment
6	Hồ Văn Chương	13418	13418	Full embankment	Full embankment
7	Ao Vườn	343	343	Full embankment	Full embankment
8	Hồ Đình Ứng Thiên	320	320	Full embankment	Full embankment
9	Ao Đình Khương Thượng	3939	3939	Full embankment	Full embankment
10	Hồ Sốt	1715	1715	Full embankment	Full embankment
11	Ao Phủ	4066	4006	Full embankment	Full embankment
12	Ao Chùa Bộc	840	840	Full embankment	Full embankment
13	Ao cạnh Chùa Láng **	4066	N/A	No embankment	N/A
14	Giếng Chùa Bộc	110	110	Full embankment	Full embankment
15	Ao Đình Hoàng Cầu	300	300	Full embankment	Full embankment
16	Ao Đình Hào Nam	490	490	Full embankment	Full embankment
17	Ao Chùa Láng	147	147	Full embankment	Full embankment
18	Giếng Chùa Láng	119	119	Full embankment	Full embankment
19	Hồ Láng Thượng	14797	14797	Full embankment	Full embankment
20	Giếng Văn Miếu 1	150	150	Full embankment	Full embankment
21	Giếng Văn Miếu 2	150	150	Full embankment	Full embankment
22	Giếng Văn Miếu 3	150	150	Full embankment	Full embankment
23	Giếng Văn Miếu 4	150	150	Full embankment	Full embankment
24	Hồ Vuông	1220	1220	Full embankment	Full embankment
25	Giếng Thiên Quang	587	587	Full embankment	Full embankment
26	Hồ Văn	6827	6827	Full embankment	Full embankment
27	Giếng Đình Kim Liên	114	114	Full embankment	Full embankment
28	Ao Chùa Miếu	164	117	No embankment	No embankment
29	Ao trồng rau **	1927	N/A	No embankment	N/A
30	Hồ Hồ Mễ	10061	10061	Building lake, full embankment	Full embankment
31	Hồ Ba Giang **	3598	N/A	No embankment	N/A
32	Ao Hào Nam	7904	3402	No embankment	Full embankment
33	Hồ Linh Quang	22700	22108	No embankment	No embankment
34	Giếng Làng Kim Liên	1996	1996	Full embankment	Full embankment
35	Ao sau chùa Láng **	137	N/A	No embankment	N/A

Note: ** Vanished Lake

Thus, in 2015, the status changes of lakes in Dong Da district are as follows:

- Total number of lakes are 31 lakes, 4 fewer lakes than 2010;
- Total water surface area are 330,802 m², 14,929 m² less than 2010 (345,731 m²);
- Total number of lakes with full embankments are 28 lakes, the number of lakes with partial embankments is 1 and the number of lakes without embankments are 2;

It is true that after filling these ponds and lakes, the environment and the landscape in some areas have been improved better than before. For example, the pond located near Lang Pagoda was previously used only to plant vegetables, now they have converted it into a mini football yard, for the local community; before Ba Giang Lake was heavily polluted and encroached for building tents, it is now planned to be used as a flower garden and a park for community activities

Hai Ba Trung District

Hai Ba Trung district is one of the districts that contain many of the ponds and lakes in the city, especially in the Vinh Tuy ward. In the district, there are many large lakes such as Bay Mau Lake, Thanh Nhan Lake and Thien Quang Lake.

From 2010 to 2015, the district has lost 3 lakes: Ponds of Fish Camp, Pond of Police Hai Ba Trung 1 and Pond of Vinh Tuy Lane 153/34. These ponds were used for planting vegetables and fishing, but they had no embankments. The lakeshore environment and water quality was heavily polluted.

In terms of embankment structures, the district has 10 lakes with full embankments, 1 lake with a partial embankment, and 3 lakes with no embankments: the lake near Uncle Ho fish pond, the pond of Police Hai Ba Trung 2, and the Pond of Vinh Tuy 2 Lane 153/34.

In terms of surface area of lake water, after 5 years, the district has lost 26,640 m² of water surface area. The main reason is due to the backfilling of 3 lakes and the encroachment of Uncle Ho fish pond, pond of near Uncle Ho fish pond or the ponds belonged to the planning project as pond of Police Hai Ba Trung 2 and Pond of Vinh Tuy 2 Lane 153/34.

Hai Ba Trung district has a total of 14 ponds and lakes. Details of the status of these lakes is shown in the table below:

No.	Name	Area (m ²)		Embankment Structure	
		2010	2015	2010	2015
1	Hồ Bảy Mẫu	210270	210270	Full embankment	Full embankment
2	Hồ Hai Bà Trưng	11451	11451	Full embankment	Full embankment
3	Hồ Công viên Tuổi trẻ	17302	17302	Full embankment	Full embankment
4	Hồ Tiên	4850	4850	Full embankment	Full embankment
5	Hồ Thanh Nhàn	76000	76000	Full embankment	Full embankment
6	Hồ Thiển Quang	58686	58686	Full embankment	Full embankment
7	Hồ Quang Trung	10736	10736	Full embankment	Full embankment
8	Ao Chùa Linh Sơn	185	185	Full embankment	Full embankment
9	Hồ Quỳnh	7201	7201	Full embankment	Full embankment
10	Hồ Cẩn	16325	16325	Full embankment	Full embankment
11	Hồ CA Q.HBT 1 **	851	N/A	No embankment	N/A
12	Hồ CA Q.HBT 2	2655	664	No embankment	No embankment
13	Hồ cạnh hồ cá Bác Hồ	6304	6272	No embankment	No embankment
14	Hồ cá Bác Hồ	27709	18944	Partical embankment	Partical embankment

15	Ao Trại Cá **	1022	N/A	No embankment	N/A
16	Ao Ngõ 153/34 Vĩnh Tuy 1 **	1997	N/A	No embankment	N/A
17	Ao Ngõ 153/34 Vĩnh Tuy 2	19257	7275	No embankment	No embankment

Note: ** Vanished lake

Thus, in 2015, the status changes of lakes in Hai Ba Trung district are as follows:

- Total number of lakes is 14 lakes, 3 fewer lakes than 2010 (17 lakes);
- Total water surface area is 446,011 m², 26,640m² less than 2010 (472,651 m²);
- Total number of lakes with full embankments is 10 lakes, the number of lakes with partial embankments is 1 and the number of lakes without embankments is 3.

2 lakes from the Hai Ba Trung district are on the Hanoi Department of Natural Resources and Environment's list of water treatment with biological products. The process of cleaning lakes has had positive results, the water looks cleaner, the smell is better and the quality of the water improves.

After six months of treatment, Hai Ba Trung Lake and Quynh Lake (Dong Nhan ward, Hai Ba Trung) have significantly improved water quality compared to the data prior to treatment.

The landscape of the lakes has also been improved. Sanitation in and around the lake is treated pretty well, with the support from the communities around the lake

Cau Giay District

Cau Giay district is a district that contains many lakes of the city; however, the majority of the ponds and lakes in this district are small (with 13 ponds covering an area of 1,000 m²).

From 2010 to 2015, the district has lost 8 lakes: Yen Hoa Pond, Ai Bai An Pond, pond in school of management, Xom Da pond, Dong Xa Pond area, Feed Turtle pond, Pond near ostrich farm and pond of Dong Xa fishing. The ponds and lakes were mainly used for farming fish, lotus planting and water supply for livestock. The ponds did not have embankments; the lakeshore environment was heavily polluted and the ponds were located in densely populated areas.

In terms of embankment structures, the district has 23 lakes with a full embankment, 1 lake with a partial embankment and 3 lakes with no embankment: Dong Xa lotus pond, Dong xa fish pond, pond opposite Ao Mai Dich Cemetery.

In terms of surface area of lake water, after 5 years, the district has lost 11,359m² of water surface area. The main reason is due to the backfilling of 8 lakes and encroachment of these lakes: Van Cong Pond and Dong Xa lotus pond.

Cau Giay district has a total of 27 ponds and lakes. Details of the status of these lakes is shown in the table below:

No.	Name	Area (m ²)		Embankment Structure	
		2010	2015	2010	2015
1	Hồ Nghĩa Tân	43706	43706	Full embankment	Full embankment
2	Hồ Quận ủy Cầu Giấy	2814	2814	Full embankment	Full embankment

3	Hồ Chùa Tháp	1721	1721	Full embankment	Full embankment
4	Hồ Trung Kính	4078	4078	Full embankment	Full embankment
5	Ao Cửa Miếu	436	436	Full embankment	Full embankment
6	Ao trong Ngọc Quán Tự 1	3921	3921	Full embankment	Full embankment
7	Ao trong Ngọc Quán Tự 2			Full embankment	Full embankment
8	Hồ Công viên Cầu Giấy *	N/A	13053	N/A	Full embankment
9	Ao Yên Hòa	1034	1034	Full embankment	Full embankment
10	Ao Tăng	230	230	Full embankment	Full embankment
11	Ao Giếng Đền	350	350	Full embankment	Full embankment
12	Ao Ái Bái Ân **	9614	N/A	No embankment	N/A
13	Ao Hòa Mục 1	704	704	Full embankment	Full embankment
14	Ao Hòa Mục 2	605	605	Full embankment	Full embankment
15	Hồ ĐH sư phạm	389	389	Full embankment	Full embankment
16	Hồ Nghĩa trang Mai Dịch 1	10553	10553	Full embankment	Full embankment
17	Hồ Nghĩa trang Mai Dịch 2			Full embankment	Full embankment
18	Hồ ĐH Sân khấu - Điện ảnh	1703	1703	Full embankment	Full embankment
19	Ao trong trường cán bộ quản lý **	393	N/A	Full embankment	N/A
20	Ao Văn Công	1777	848	Full embankment	Full embankment
21	Ao Thủy Đình	194	194	Full embankment	Full embankment
22	Ao Đình Đa Phú	213	213	Full embankment	Full embankment
23	Ao xóm Đa **	3522	N/A	Not embankment	N/A
24	Ao Làng Trung Kính	383	383	Full embankment	Full embankment
25	Ao khu Đồng Xa **	228	N/A	Not embankment	N/A
26	Ao đối diện nghĩa trang Mai Dịch	24276	22935	Not embankment	Not embankment
27	Ao sen Đồng Xa	11984	7752	Not embankment	Not embankment
28	Ao nuôi ba ba **	3088	N/A	Not embankment	N/A
29	Ao cạnh trại nuôi đà điểu **	3049	N/A	Not embankment	N/A
30	Ao cá Đồng Xa	2390	2189	Not embankment	Not embankment
31	Ao thả cá khu Đồng Xa **	979	N/A	Not embankment	N/A
32	Hồ nhỏ Phường Yên Hòa	228	N/A	Full embankment	N/A
33	Hồ Dạ Dày *	N/A	128	N/A	Full embankment
34	Hồ Trung Kính Thượng *	N/A	4299	N/A	Full embankment
35	Ao Cầu	1190	1190	Full embankment	Full embankment

Notes: * Additional lake

** Vanished lake

Thus, in 2015, the status changes of lakes in Hai Ba Trung district are as follows:

- Total number of lakes is 27 lakes, 5 fewer lakes than in 2010 (32/129 lakes);
- Total water surface area is 124,393 m², 11,359 m² less than in 2010 (135,752 m²);
- Total number of lakes with full embankments is 23 lakes, the number of lakes with partial embankments is 1 and the number of lakes without embankments is 3.

Previously Cau Giay was really rural, had an agricultural based economy, was very poor, and had poor infrastructure. Now Cau Giay is one of the core urban districts with modern infrastructure and civilization. Their new economy model is service - industry - agriculture. Due to the impact of economic development, environmental protection is now a significant issue, especially for lake environmental protection.

In 5 years, a series of projects were started causing many lakes to be filled. The "Construction work of Nguyen Van Huyen extend Street" caused the leveling of Xom Da pond and the "Urban Exchange City area" caused the leveling of Dong Xa pond.

Tay Ho District

Tay Ho district is a district that contains few big lakes, especially West Lake, Dam Tri Pond and Quang Ba Lake. Almost all of the lakes were a part of West Lake in the past.

On the Hanoi Lakes 2010 list, Tay Ho district had 23 ponds and lakes in the district. From 2010 to 2015, the district lost 2 ponds: Vuon Dao and Dong. These ponds and lakes had no embankments and polluted water surface environment. Additionally they were located by the construction site of the Nhat Tan Bridge. In 2015, there were 2 new lakes are added to the list of lakes: Ham Long Pond and Long Nghi Tam Pond. Thus, after 5 years, the quantity of lakes in the district still remains at 23 lakes.

In terms of embankment structures, the district has 8 lakes with full embankments, 9 lakes with partial embankments and 6 lakes with no embankments: Tay Ho is the district that has the fewest lakes that have full embankment and the most lakes with no embankments. Some lakes belonged to the Tu Lien Lake "Lake Reconstruction" project from 4 years ago (2011) but currently the lakes still have no embankments.

In terms of surface area of lake water, after 5 years, the district has lost 28,235 m² of water surface area. The main reason is due to 15/23 lakes having just partial embankments or no embankments.

Details of the status of lakes in the Tay Ho district are shown in the table below:

No.	Name	Area (m ²)		Embankment Structure	
		2010	2015	2010	2015
1	Hồ Tây	5160000	5160000	Full embankment	Full embankment
2	Đầm Bày	57135	57135	Full embankment	Full embankment
3	Đầm Sen Quảng Bá 1	34452	33070	Partial embankment	Partial embankment
4	Đầm Sen Quảng Bá 2	39305	39305	Partial embankment	Partial embankment
5	Ao chùa Phổ Linh	23565	23565	Partial embankment	Partial embankment
6	Ao Đình Phú Gia	399	399	Partial embankment	Partial embankment
7	Hồ Đền Sóc	1789	1789	Partial embankment	Partial embankment

8	Hồ KS Fraser Suites 1	3107	1986	Partial embankment	Partial embankment
9	Hồ KS Fraser Suites 2	2335	2857	Partial embankment	Partial embankment
10	Hồ Trùng	14425	10757	No embankment	No embankment
11	Hồ Tứ Liên	26446	25796	No embankment	No embankment
12	Hồ Quảng Bá	62194	30469	Partial embankment	Partial embankment
13	Ao Vườn Đào (3 ao) **	1094	N/A	No embankment	N/A
14	Ao Dốc Bao Bì	2080	807	No embankment	Full embankment
15	Ao Đình Tây Hồ	5130	4807	No embankment	No embankment
16	Ao Đồng **	2175	N/A	No embankment	N/A
17	Ao Chùa Bà Già	3543	4580	Full embankment	Full embankment
18	Ao Dài	4580	4299	Full embankment	Full embankment
19	Ao Ải	163	148	No embankment	No embankment
20	Ao Chéo	4277	4270	Partial embankment	Partial embankment
21	Ao Vườn Hồng	734	383	No embankment	No embankment
22	Ao Láng	8596	8062	No embankment	No embankment
23	Đầm Trị	61490	61490	Partial embankment	Partial embankment
24	Ao Hàm Long *	N/A	7427	N/A	Partial embankment
25	Ao Dài Nghi Tàm *	N/A	15668	N/A	Partial embankment

Notes: * Additional lake: Hồ thêm vào
 **Vanished lake

Thus, in 2015, the status changes of lakes in Tay Ho district are as follows:

- Total number of lakes is 23 lakes, no changes compared with the 2010 data (23 lakes);
- Total water surface area is 5,490,779 m², 28,235 m² less than in 2010 (5,519,014 m²);
- Total number of lakes with full embankments is 8 lakes, the number of lakes with partial embankments is 9 and the number of lakes without embankments is 6.

Tay Ho is the district with the largest water surface area in the city, covering 79% of total water area in the city. However, almost all of the ponds and lakes only have partial embankments or no embankments, which is 66% of the total lakes. In 5 years, there were not many renovation projects for adding embankments to lakes and ponds in this district. Opening restaurants and other businesses, especially in Thuy Su ponds, Dam Bay, and Tu Lien Lake areas, is encouraging the encroaching of the lakeshores in this district.





**PART 3.
CURRENT STATUS OF SOME LAKES**

GIANG VO LAKE



CHÚ GIẢI			ĐV QUẢN LÝ		 TỶ LỆ: 1:4500 TỌA ĐỘ: 105,83;21,03 ĐỊA CHỈ: Trần Huy Liệu Giảng Võ, Ba Đình
Thang bộ xuống mặt nước	Nhà	Nước ô nhiễm rất nặng	Đơn vị quản lý địa giới hành chính: UBND Quận Ba Đình		
Bãi tập kết rác	Bè thủy sinh	Nước ô nhiễm nặng	Đơn vị quản lý an ninh trật tự ven hồ: UBND Phường Giảng Võ		
Cây xanh	Kè toàn bộ	Cổng xả thải	Đơn vị quản lý vệ sinh ven hồ: Công ty Hà Thủy		
Bụi cỏ	Điều hòa	Đường	Đơn vị quản lý chất lượng nước: Xí nghiệp thoát nước số 4		
Quán cóc ven hồ	Cảnh quan				



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

The lake has regulatory function, receiving rainwater and wastewater from residential area, businesses and service households by the lake. Lakeshore is a venue for cultural and sport activities every year.

In 2015, some parts of embankment have been degraded but not yet repaired.

SHORE AND CORRIDOR

The lake had full embankment. Lake corridor was wide, paved except for a part of lakeshore owned by the hotels on Ngoc Khanh St. adjacent to the lake, had many shaded trees and was often cleaned. Around the lake was a residential area, school, service establishments such as restaurants, hotels, which had many sewage pipes discharging into the lake.

The status of embankment and corridor is similar to the 2010 status. However some parts of embankment are degraded and there is a big garbage-gathering yard and 2 lakeside refreshment stalls.

Lake water is fishier and fouler than before.

WATER AREA

Lake water was green in color, turbid and odorless. The lake had many fish and small aquatic animals.

Lake water is green in color, turbid, fishy and foul. Lake fauna are mainly released fish and snails; others are clams and eels growing naturally. The lake has no aquatic vegetation.

Results of the water analysis in 2010 and 2015 both showed lake water is neutral, contaminated by organic substances and has the algae growth. However, the level of organic pollution and concentration of algae in 2015 has decreased compared to 2010.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)	Sampling date	Sample ID		QCVN 08(B1)
	BD06-1	BD06-2			BD06-1	BD06-2	
16/7/2010				07/7/2015			
pH	8.35	8.34	5.5-9	pH	7.7	7,4	5.5-9
DO (mg/l)	1.68	1.88	≥4	DO (mg/l)	2.44	1.86	≥4
BOD ₅ (mg/l)	85	90	15	BOD ₅ (mg/l)	24	26	15
Chlorophyll-a (mg/l)	0.873	0.839	-	Chlorophyll-a (mg/l)	0.185	0.095	-

WASTE SOURCES

The lake receives wastewater from big lakeside hotels such as the Hanoi Hotel and the Lakeside Hotel. On rainy days, water flowing from the lakeside garbage-gathering yard into the lake pollutes it.

COMMUNITY ACTIVITY

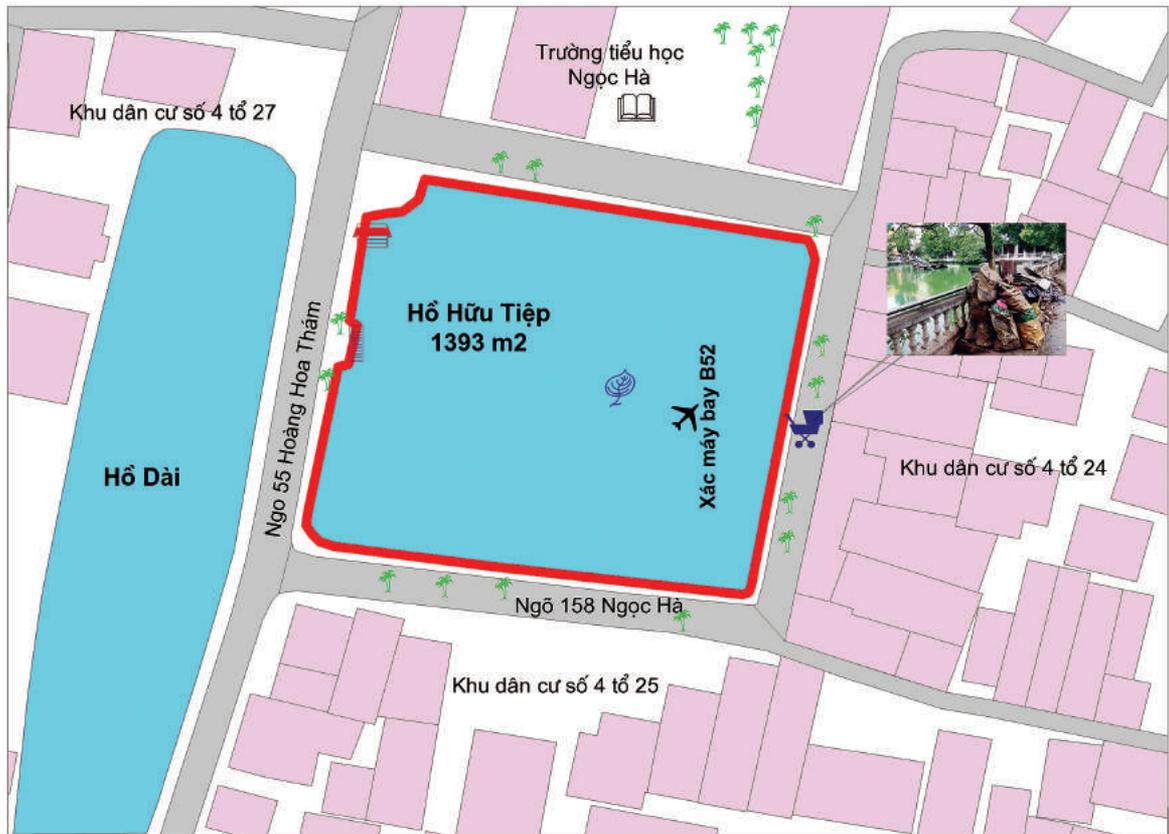
Regular cleaning activities of volunteer groups have helped the lake to be cleaner while simultaneously raising awareness to the surrounding community.

RECOMMENDATIONS

Giang Vo lake has a nice landscape, so more attention should be paid towards it for lake preservation and improvement. Wastewater from the lakeside hotels and garbage-gathering yard has increased nutrient concentration causing algae growth in the lake. Therefore, wastewater from the hotels must be treated before being discharged into the lake or it must be collected in the city's drainage system, and the garbage-gathering yard needs to be moved to another location.



HUU TIEP LAKE



CHÚ GIẢI

	Cảnh quan		Kè toàn bộ
	Quán cóc ven hồ		Bãi tập kết rác
	Thang bộ xuống mặt nước		Đường
	Nước ô nhiễm nặng		Nhà

ĐƠN VỊ QUẢN LÝ

Đơn vị quản lý địa giới hành chính:
UBND Quận Ba Đình

Đơn vị quản lý an ninh trật tự ven hồ:
Công An phường Ngọc Hà

Đơn vị quản lý vệ sinh ven hồ:
Bảo tàng Chiến thắng B52

TỶ LỆ:
1:3.500
TỌA ĐỘ:
105,83;21,04
ĐỊA CHỈ:



Làng Ngọc Hà , Phường Ngọc Hà
Quận Ba Đình



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

Huu Tiep lake is a national-level historic site managed by the Museum of Capital Military Zone. Among the lake is the B-52 aircraft wreck that was shot down in 1972 during the war against America.

Results of the water analysis in 2010 and 2015 both showed that the lake water is contaminated by organic substances and has the growth of algae. However, the level of organic pollution and concentration of algae in 2015 has sharply fallen compared to 2010.

SHORE AND CORRIDOR

The lake had full embankment, was surrounded by an iron fence and had no corridor. Around the lake were roads with shaded trees and ornamental plants, a temporary market and stalls. The shore had a lot of household waste.

The lake has full vertical embankment and is fenced in with a concrete wall about 0.5m high separating it from the road. Despite there being a signboard prohibiting building materials gathering near the stairs leading down to the lake, the area is still gathering construction waste.

WATER AREA

Lake water was mossy green-coloured and smelly. There were air bubbles on the lake's surface.

Lake water is green-colored, turbid, and quite foul. B-52 aircraft wreck in the lake is rusted and severely degraded. Lake fauna consists of fish, shrimp, and pupa. Flora is mostly green algae.

RESULT OF WATER ANALYSIS

Sampling date 16/7/2010	Sample ID		QCVN 08(B1)
	BD09-1	BD09-2	
pH	8.35	8.34	5.5-9
DO (mg/l)	1.68	1.88	≥4
BOD ₅ (mg/l)	85	90	15
Chlorophyll-a (mg/l)	0.873	0.839	-

Sampling date 07/7/2015	Sample ID	QCVN 08(B1)
	BD09	
pH	6.7	5.5-9
DO (mg/l)	1.27	≥4
BOD ₅ (mg/l)	41	15
Chlorophyll-a (mg/l)	0.095	-

WASTE SOURCES

The lake receives wastewater from some homes and trash from the temporary market, but the main source of waste is from the yard of construction materials on the shore, washed into the lake by rain.

CHALLENGES

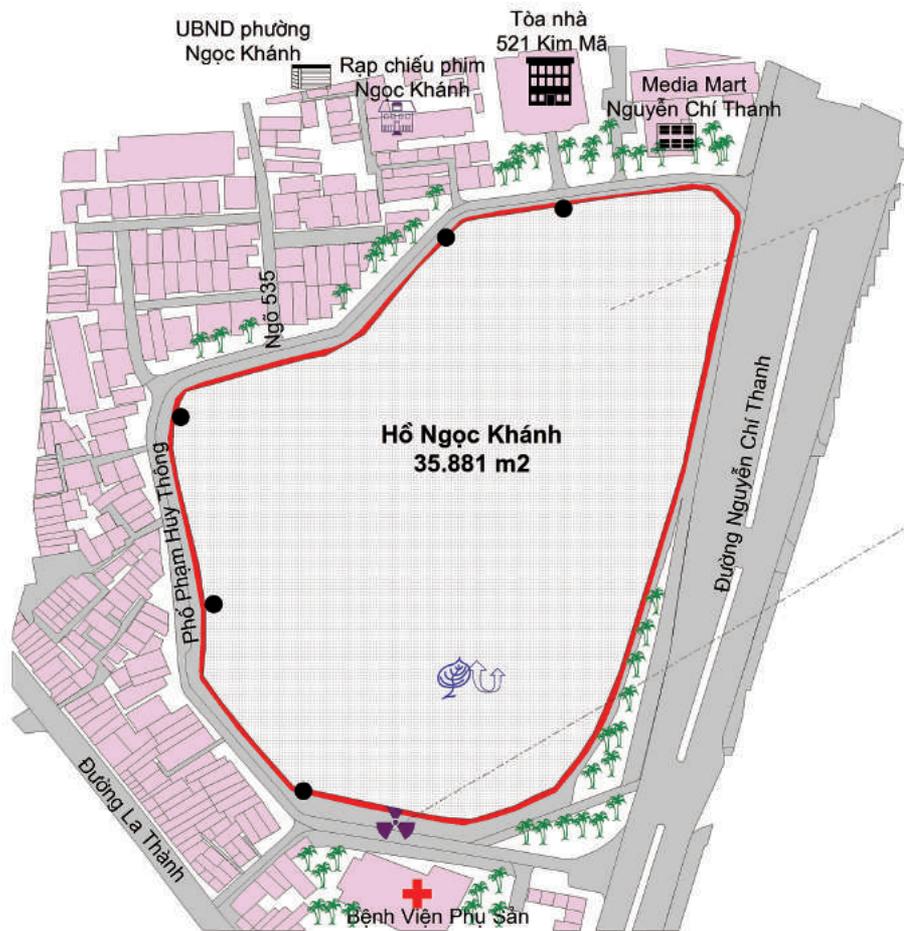
Improve water quality and preserve the B-52 aircraft wreck from not becoming degraded.

RECOMMENDATIONS

Huu Tiep lake is a nice monument, thus there should be a focus on protecting it. There should be measures to penalize the gathering of building material around the lake and to remove the other solid waste and wastewater sources that flow into it.



NGOC KHANH LAKE



N

TỶ LỆ 1 : 2700
TỌA ĐỘ 105,81 ; 21,03
VỊ TRÍ Nguyễn Chí Thanh,
 Ngọc Khánh,
 Ba Đình

CHÚ	Đang cải tạo	Kè toàn bộ	Cảnh quan
	Cây xanh	Nhà	Điều hòa
GIẢI	Thiết bị xử lý nước	Cống xả thải	Đường

ĐƠN VỊ QUẢN LÝ

Đơn vị quản lý địa giới hành chính:
 UBND Quận Ba Đình

Đơn vị quản lý an ninh trật tự:
 UBND Phường Ngọc Khánh

Đơn vị quản lý vệ sinh ven hồ:
 Xí nghiệp MTĐT số 1



2010	2015
------	------

GENERAL INTRODUCTION

The lake is surrounded by Pham Huy Thong St. and Nguyen Chi Thanh St. Its function involves landscaping and receiving rainwater from the area. Currently the lake is in the process of renovating and dredging sludge.

SHORE AND CORRIDOR

The lake had full embankment, no fence, and had a surrounding paved sidewalk. Around the lake there were shaded trees and flowers. It was a community space for the people in the area.

The lake is fenced in with 2m-high steel sheet. The part of sidewalk outside the fence by Nguyen Chi Thanh St. has small wood trees and very few remaining shaded trees. The lakeshore is relatively narrow but quite clean.

WATER AREA

Water was green-colored and odorless. The lake had many fish. Lake surface had rafts of waterfern and umbrella plant, which were a test in a lake water treatment project with aquatic plants.

Because the lake is in the process of dredging, it has only a small amount of wastewater flowing into it. So the sampling has not been implemented.

WASTE SOURCES

The lake receives wastewater from the surrounding households because their floor is lower than the wastewater collection pipes of the area. The investor for the renovation project is the Hanoi Department of Construction has not yet come up with solutions for this issue.

RECOMMENDATIONS

Redesign the pipe system collecting household wastewater from the residential area around the lake, in order for the lake to not receive wastewater.

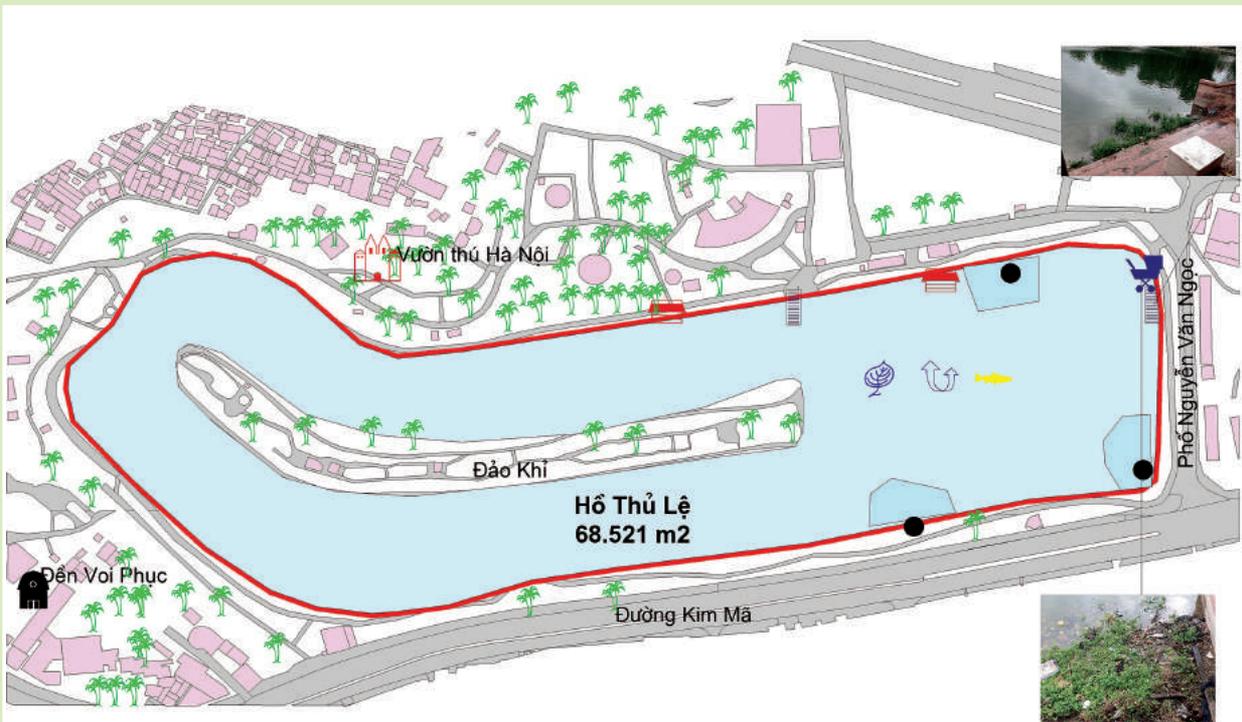
DIFFERENCES

Currently the lake is in the process of renovating and is separated from the outside area.

FOCUS
 In the past 5 years, Ngoc Khanh lake protection activities have lively taken place with the initiative of the Women’s Union of Ngoc Khanh ward, the Center for Environment and Community Research, and the participation of volunteer groups. These activities, such as cleaning the lake periodically, cycling around the lake, also raise public awareness about lake protection. Ngoc Khanh lake was the first venue in Vietnam for an Earth Day event that occurred in 2012.



THU LE LAKE



CHÚ GIẢI

- | | | | |
|--|-------------------------|--|--------------------------|
| | Hàng quán ven hồ | | Kè toàn bộ |
| | Thang bộ xuống mặt nước | | Cống xả thải |
| | Cây xanh | | Nước không ô nhiễm |
| | Bãi tập kết rác | | Nước có dấu hiệu ô nhiễm |
| | Nhà | | Cảnh quan |
| | Đường | | Điều hòa |
| | | | Nuôi cá |

ĐV QUẢN LÝ

ĐV quản lý địa giới hành chính:
UBND Thành phố Hà Nội

ĐV quản lý an ninh trật tự ven hồ:
Công ty TNHH MTV Vườn thú Hà Nội

ĐV quản lý vệ sinh môi trường hồ:
Xí nghiệp môi trường đô thị số 1

ĐV quản lý mực nước:
Xí nghiệp thoát nước số 1

TỶ LỆ

1 : 4200

TỌA ĐỘ

105,81 ; 21,03

ĐỊA CHỈ

Kim Mã, Ngọc Khánh,
Ba Đình



2010 **2015**

DIFFERENCES

GENERAL INTRODUCTION

It is one of the most beautiful lakes of the capital, located in Thu Le park premises. Currently the Hanoi People's Committee manages the lake.

In 2015, the situation of dead fish in the lake isn't occurring but a lot of garbage appears in the water near the shore.

SHORE AND CORRIDOR

The lake had a full stone embankment. There were many ornamental plants and shaded trees around it.

The embankment is being renovated. The corridor is clean, airy and has many shaded trees. The pavement outside the park premises is occupied by refreshment stalls.

The result of the water analysis in 2015 showed slight algae growth in the lake.

WATER AREA

The lake's surface did not have much of garbage due to daily cleaning. Water was green-colored and foul. Many fish were dead in the lake.

There is a lot of garbage in the water near the shore, particularly at the stairs leading down to the lake. The lake has many aquatic animals such as goldfish, tilapias, tiny shrimps, and some lakeshore plants such as ferns, algae and mosses.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	BD12-1	BD12-2	
07/7/2015			
pH	8.7	8.8	5.5-9
DO (mg/l)	3.81	3.22	≥4
BOD ₅ (mg/l)	12	10	15
Chlorophyll-a (mg/l)	0.045	0.043	-

WASTE SOURCES

The lake receives wastewater from the restaurants in front of the park gate through 2 pipelines. Some lakeside cane juice stalls discharge bagasse, plastic bags and glass-washing water into the lake, especially near the stairs leading to the water.

CHALLENGES

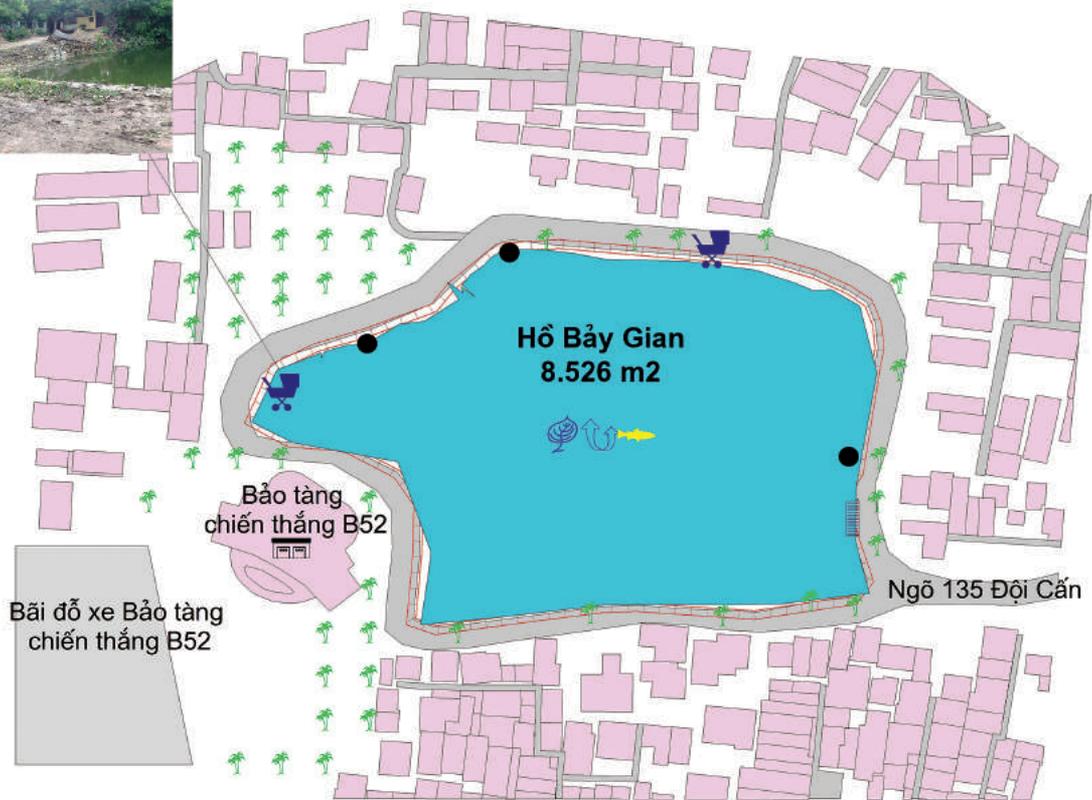
The balance between its function for landscaping and its function for tourism.

RECOMMENDATIONS

Aggresively control the discharge of the lakeside restaurants and refreshment stalls and better the cleaning work onshore. There should be policies to protect and make the lake a highlight of the city's landscape.



BAY GIAN LAKE



CHÚ GIẢI		Cây xanh	 TỶ LỆ 1:1400 TỌA ĐỘ 105,85;21,04 ĐỊA CHỈ Đội Cấn - Ba Đình
Thang bộ xuống mặt nước	Cảnh quan	Điều hòa	
Bãi tập kết rác	Nuôi cá	Nước ô nhiễm rất nặng	
Kè một phần	Đường		
Cống xả			
Nhà			
		ĐV QUẢN LÝ	
		Đơn vị quản lý địa giới hành chính: UBND Quận Ba Đình	
		Đơn vị quản lý an ninh trật tự: UBND Phường đội Cấn	
		Đơn vị quản lý vệ sinh ven hồ: Công Ty Công Viên Cây Xanh	



GENERAL INTRODUCTION

This is one of the newly added lakes to the survey in 2015. It is located in lane 135 Doi Can St., Ngoc Ha ward, Ba Dinh district. The lake is used for landscaping and regulating water in the area.

SHORE AND CORRIDOR

The lake had almost a full embankment. The surrounding road is paved except the part adjacent to the shore without embankment. The sidewalk is 2-3m wide and has many shaded trees. Currently the sidewalk is occupied as a parking lot. Some people have built shacks, planted vegetables and bananas on the shore without embankment. This is also a gathering place for a large volume of household waste, household items and building materials.

WATER AREA

The water is mossy green-colored and smelly. The lake has many fish, shrimps, pupas and duckweed. Water near the shore without embankment contains a lot of garbage that has fallen down from the shore.

RESULT OF WATER ANALYSIS

Sampling date 07/7/2015	Sample ID	QCVN 08(B1) BD12-1
	BD12-1	
pH	8.0	5.5-9
DO (mg/l)	2.69	≥4
BOD ₅ (mg/l)	34	15
Chlorophyll-a (mg/l)	0.225	-

WASTE SOURCES

The lake receives domestic solid waste and building materials from lakeside households, and wastewater from the car wash service.

The lake has three large drains connected to the city's sewer system to regulate water.

RISKS

The gathering/dumping of building materials and domestic solid waste at the lake area increases the risk of narrowing the lake's area and reducing the lake's depth.

RECOMMENDATIONS

Continue building the embankment surrounding the lake, and completely solve the situation with the shacks, vegetable garden and bananas on the shore without embankment. Prohibit the discharge of household waste and construction materials into the lake.

The result of the water analysis has shown that the lake is contaminated by organic substances, and algae strongly grow in the lake.



KIM LIEN LAKE



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

Kim Lien lake consists of two interconnecting lakes, which are large Kim Lien and small Kim Lien. The lake is used for landscaping, and regulating water.

SHORE AND CORRIDOR

The lake had a full embankment on which many vegetables and weeds were growing. Outside the 60 cm-high iron fence surrounding the lake was a 1.5-2m wide sidewalk with shade trees that was being built. Garbage and construction materials were on the uncompleted part of the sidewalk.

The shore infrastructure, except the sidewalk has been completed, is similar to that of 2010. The corridor of the lake is encroached nearly entirely by refreshment stalls, and the residents' vegetable-planting boxes and housewares.

WATER AREA

The lake water was green-colored, and heavily fishy smelling. The lake had various fish, shrimps, duckweed, water hyacinth and other species. Rafts of aquatic plants were placed in the lake to treat water.

The lake water is green-colored, turbid, and heavily smelling. The environment of the water has not improved despite applying some measures to treat water such as sprinklers and microorganisms.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	DD01-1	DD01-2	
16/7/2010			
pH	7.87	8.07	5,5-9
DO (mg/l)	1.82	1.55	≥4
BOD ₅ (mg/l)	7	24	15
Chlorophyll-a (mg/l)	0.052	0.203	-

Sampling date	Sample ID		QCVN 08(B1)
	DD01-1	DD01-2	
07/7/2015			
pH	8.2	7.0	5.5-9
DO (mg/l)	3.67	3.64	≥4
BOD ₅ (mg/l)	45	50	15
Chlorophyll-a (mg/l)	0.363	0.472	-

WASTE SOURCES

In 2010, the lake received domestic wastewater and solid waste from the surrounding households. In 2015, water flowing into the lake comes from lakeside stalls, car wash station and 2 sewers. Due to the lake receiving a large volume of wastewater, the lake water quality has been seriously polluted.

RECOMMENDATIONS

A proper system for collection and treatment of wastewater should occur before it is discharged into the lake. Measures to improve the scene of the water area are really necessary.

In 2015, the large Kim Lien lake's shore has no construction materials due to the renovation being completed. However, dumping garbage at the area of lake still occurs. The scene of water area is degraded; weeds and water hyacinth cover nearly completely the surface of the big lake. Result of the water analysis in 2015 shows the lake water quality decreases compared to 2010. The lake is heavily eutrophicated and polluted by organic substances.

PRESS REVIEW

The project Building and renovating the technical infrastructure surrounding Kim Lien lake with a total budget of VND 38.3 billion, was approved on 23.04.2004 by Hanoi People's Committee, and invested by the Management Board of Urban Transport Project (Department of Transport). To date, phase 1 of the project for renovation of large Kim Lien lake has been basically completed and put into use. However, due to problems relevant to the construction design, after the improvement by over 10 years, phase 2 of the project for renovation of small Kim Lien lake ... still at a standstill. *Small Kim Lien lake is becoming ...a stagnant pond, New Newspaper, 12/5/2014*



NAM DONG LAKE



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

As one of the city's cleanest lakes, Nam Dong lake has regulatory function for the area. In addition, it is used to raise fish for business.

SHORE AND CORRIDOR

The lake had a full embankment, and a 50cm-high surrounding wall. The lakeshore was a 0.5-3m wide sidewalk with many shade trees and flowers, which was being renovated; some parts of the shore were overgrown with weeds. The lakeshore was a place for community's activities; there were stalls on one side of the shore.

The lake has a full embankment. The corridor of the lake is pretty clean; it is a place for community's activities, especially at the 10m-wide part of sidewalk adjacent to Dang Van Ngu St. However, many parts of the shore are encroached by refreshment stalls and food stalls, particularly on the sides of Ho Duc Di St. and Xa Dan II lane.

WATER AREA

The lake water was green-colored, slightly fishy and foul. There were many dead fish and lots of garbage near the shore. The lake had farmed fish, daphnia magna, daphnia pulex, and various plants. It had rafts of umbrella papyrus to treat water and notice signs that require keeping the lake clean.

The lake water is clear, and slightly foul. Garbage sparsely appears near the shore and is frequently picked up. Rafts of aquatic plants are maintained regularly, creating an aesthetic for the lake while improving water quality.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	DD02-1	DD02-2	
16/7/2010			
pH	8.32	7.87	5.5-9
DO (mg/l)	6.12	5.25	≥4
BOD ₅ (mg/l)	40	39	15
Chlorophyll-a (mg/l)	0.078	0.034	-

Sampling date	Sample ID		QCVN 08(B1)
	DD02-1	DD02-2	
30/6/2015			
pH	8.6	8.9	5.5-9
DO (mg/l)	6.73	4.92	≥4
BOD ₅ (mg/l)	13	10	15
Chlorophyll-a (mg/l)	0.030	0.033	-

WASTE SOURCES

The lake has four major sewers connected to the city's drainage system, of which the sewer on the side of Tran Huu Tuoc St. often discharges wastewater into the lake. The lake is also influenced by fish feed, garbage and wastewater from the lakeside stalls.

RECOMMENDATIONS

Encroaching on the lake and discharging waste into the lake by businesses should be strictly forbidden.

The scene of the water area has improved significantly compared with 2010. Results of the water analysis in 2010 and 2015 both show that there is algae in the lake. The concentration of organic substances in 2015 is significantly lower compared to the 2010 result.

FOCUS

In recent years, environmental protection activities at Nam Dong lake have been implemented by residential community of Nam Dong ward, Youth's Union, and volunteers from the Youth School for Pioneers in Environmental Protection and Climate Change. These activities combined with the water quality maintenance of Hanoi Drainage Company have made Nam Dong lake the cleanest lake in the Dong Da district.



BA MAU LAKE



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

Ba Mau lake belongs to the system of natural lakes that connects to Bay Mau lake. The lake is used for landscaping and regulating water in the region. In 2010, Ba Mau lake was one of the city's most polluted lakes.

In 2015, some parts of the embankment and stairs are degraded and unsanitary.

SHORE AND CORRIDOR

The lake had a full embankment. The shore corridor was about 5m wide, consisted of lawn, vegetation and sidewalk. A part of the sidewalk was occupied by car parking, and the yard gathering construction and domestic solid wastes.

The status of embankment and shore corridor is similar to that of 2010. However, some parts of the embankment and stairs leading to the water are degraded and unsanitary due to garbage and defecation. The shore corridor is encroached by refreshment stalls, parking lots and garbage-gathering yards.

According to the interview with residents and result of the water analysis, the lake water in 2015 is still polluted by organic substances and has algae growth. However, the level of organic pollution and the amount of algae has decreased significantly compared to those of 2010.

WATER AREA

There was little of garbage on the lake surface. Organisms in the lake included water spinach, water hyacinth, fern, and black catfish. Two rafts of aquatic plants were placed in the lake for water treatment.

The lake water is green-colored, and foul. On hot days, a large amount of algae die and float on the lake surface, causing very stinky smell. Organisms in the lake included fern, water hyacinth, and black catfish. Besides, the lake has two rafts of aquatic plants.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	DD03-1	DD03-2	
12/7/2010			
pH	8.33	8.62	5.5-9
DO (mg/l)	3.12	2.37	≥4
BOD ₅ (mg/l)	60	65	15
Chlorophyll-a (mg/l)	0.333	0.558	-

Sampling date	Sample ID		QCVN 08(B1)
	DD03-1	DD03-2	
30/6/2015			
pH	8.9	9.0	5.5-9
DO (mg/l)	4.63	4.81	≥4
BOD ₅ (mg/l)	27	25	15
Chlorophyll-a (mg/l)	0.098	0.061	-

WASTE SOURCES

The lake receives wastewater through 10 major sewers, of which a large volume of wastewater flows from the sewer near lane 150 Kim Hoa St. into the lake. Additionally, the lake also receives garbage from stalls and restaurants which is dumped into it. On the side of Trung Phung ward, some restaurants often raise ducks on the lake surface, ruining aesthetic and contaminating water.

RECOMMENDATIONS

Take measures to return space to the lake corridor,
 Repair the embankment, stairs leading to the water,
 Strictly prohibit the discharge into the lake.



DONG DA LAKE



CHÚ THÍCH

- | | |
|--------------------------|-----------------|
| Kè toàn bộ | Quán cóc ven hồ |
| Nước có dấu hiệu ô nhiễm | Cảnh quan |
| Nước ô nhiễm nặng | Điều hòa |
| Bãi tập kết rác | Nuôi cá |
| Thang bộ xuống mặt nước | Cống xả |
| Nhà | Đường |

ĐV QUẢN LÝ

Đv quản lý địa giới hành chính:
UBND Quận Đống Đa

Đv quản lý an ninh trật tự:
UBND phường Ô Chợ Dừa,
Trung Liệt

Đv quản lý vệ sinh môi trường:
Công ty Hà Thủy

Đv quản lý mực nước:
Xí nghiệp thoát nước số 4



TỶ LỆ
1:6.000
TỌA ĐỘ
105,83 ; 21,02
ĐỊA ĐIỂM
Mai Anh Tuấn-
Hoàng Cầu-
Ô Chợ Dừa



2010 **2015**

DIFFERENCES

GENERAL INTRODUCTION

The lake is located on Hoang Cau St., Trung Liet ward, which is the largest lake in Dong Da district. It has function of water regulation, and it is also used for fish farming. The lake renovation has completed in 2011.

Although being renovated in 2011, the phenomenon of fish kill in the lake still occurs every year. Result of the water analysis in 2015 shows that the lake has algae growth and is slightly polluted by organic substances.

SHORE AND CORRIDOR

The lake was being under construction, dredged and renovated.

The lake has a full embankment. The shore corridor is the 2m-wide sidewalk with many shade trees, which is occupied by parking lots, refreshment stalls, households for their activities, and yards gathering garbage, which is mainly from lakeside business households.

PRESS REVIEW

The residents of O Cho Dua ward, Dong Da district, Hanoi are being upset about the situation of valuable land inconsiderately encroached by private sector. Specifically, in 2013, the project of renovating and upgrading the entertainment area of Dong Da peninsula has been carried out. However, after completion, the entertainment area is shrunk instead of being broadened or renewed, for the appearance of a seafood restaurant named La Vong. Strictly penalizing for violations in the project of entertainment area at Dong Da peninsula, People's Public Security newspaper, 06/6/2015

WATER AREA

The lake water is green-colored, clear, fishy and foul. There is dead fish and lots of garbage near the shore. Animals in the lake are mainly farmed fish.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	DD05-1	DD05-2	
07/7/2015			
pH	7.0	7.1	5.5-9
DO (mg/l)	3.83	1.29	≥4
BOD ₅ (mg/l)	20	20	15
Chlorophyll-a (mg/l)	0.132	0.098	-

WASTE SOURCES

Waste sources for the lake include water from the city's drainage system which is connected to the lake through 3 sewers, domestic wastewater directly discharged into the lake from households, food for fish, and water runoff from the garbage-gathering yard on the shore when it rains.

CƠ HỘI

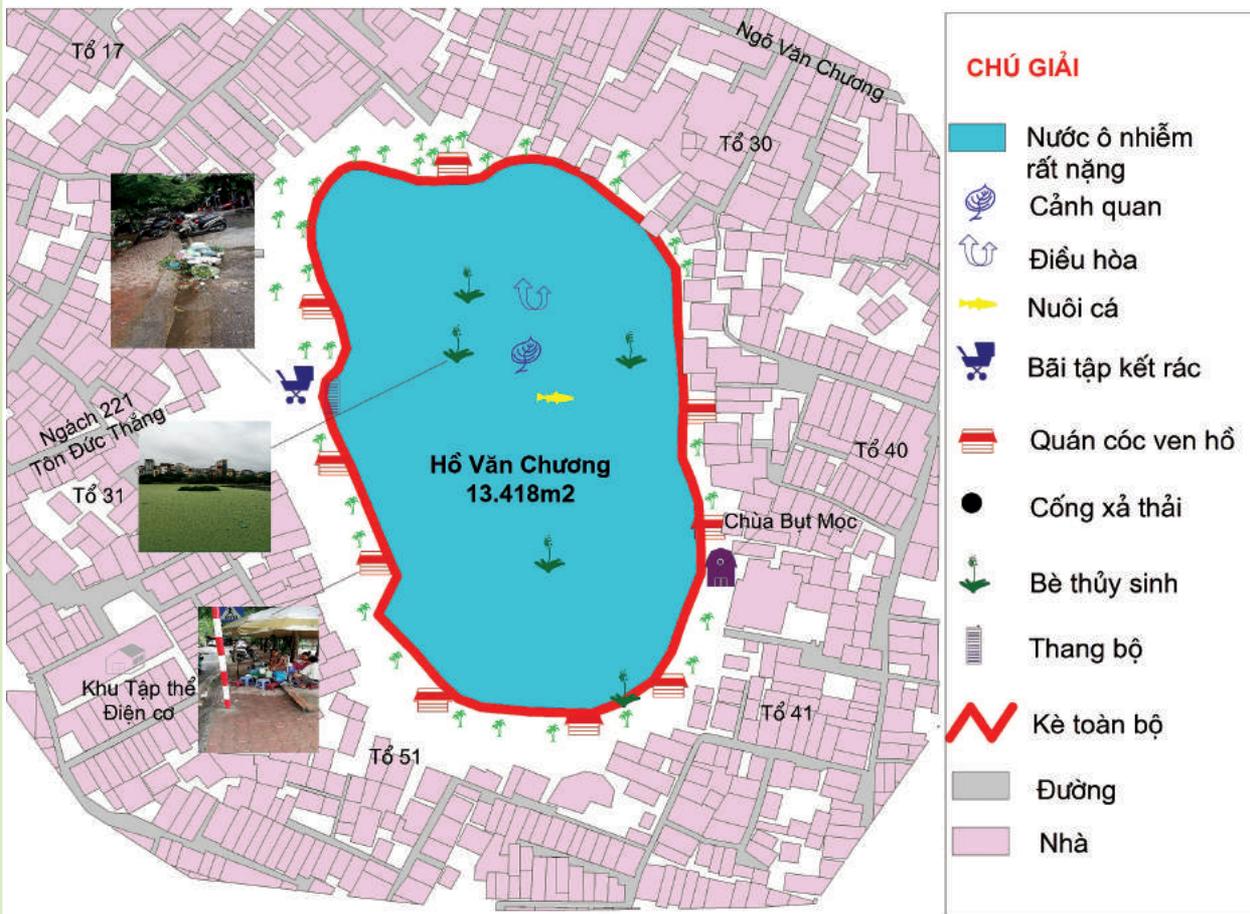
The lake is catching the attention to lake protection of local authorities and people.

RECOMMENDATIONS

Fish farming in the lake should be ceased in order to limit fish kill and improve the lake environment. Propagandizing and encouraging the community in lake protection and regular clean-up should be strengthened.



VAN CHUONG LAKE



ĐV QUẢN LÝ

Đơn vị quản lý địa giới hành chính:
UBND quận Đống Đa

Đơn vị quản lý an ninh trật tự ven hồ:
UBND Phường Văn Chương,
Hàng Bột, Thổ Quan

Đơn vị quản lý vệ sinh môi trường:
Xí nghiệp MTĐT số 4

TỶ LỆ

1:2000

TỌA ĐỘ

105,83 ; 21,02

ĐỊA CHỈ

Ngõ 221 Tôn Đức Thắng
Văn Chương, Đống Đa



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

Van Chuong lake is located in the adjacent region and under the management of three wards: Van Chuong, Tho Quan and Hang Bot. In 2010, the lake was one of the most polluted lakes of the city.

Results of the water analysis in 2015 shows that the level of organic pollution in the lake has decreased significantly compared to 2010. However, algae in the lake still grow strongly.

SHORE AND CORRIDOR

The lake had full embankment on which weeds grew partly. The shore was 1.5m wide, surrounded by 60cm-high iron fence. Outside the fence was the pavement with ornamental and shaded trees, occupied nearly entirely by stalls.

The status of shore and corridor is nearly unchanged compared to 2010.

WATER AREA

Although the lake had just been renovated, there was a lot of garbage in and around the lake. Water was black-green, fishy and foul.

Water is green, turbid, smells foul near the sewer; very stinking with white-colored scum in summer. Fauna in the lake are mainly farmed fishes. Flora are mainly duckweed and mosses covering the entire lake's surface

FOCUS
people's annoyance At Van Chuong lake, green mosses cover the entire water surface. Ms. Nguyen Thi Lan, a resident living near Van Chuong lake said that because the sewer lies higher than the lake surface, every time the lake's water level is low, wastewater from outside flows into the lake causing the pollution. "This problem has been reported to the ward's authority and then the district's ... but the pollution still remains."

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	DD06-1	DD06-2	
22/7/2010			
pH	8.05	7.55	5.5-9
DO (mg/l)	1.45	2.78	≥4
BOD ₅ (mg/l)	242	132	15
Chlorophyll-a (mg/l)	0.211	0.153	-

Sampling date	Sample ID		QCVN 08(B1)
	DD06-1	DD06-2	
07/7/2015			
pH	8.6	7.6	5.5-9
DO (mg/l)	2.96	0.96	≥4
BOD ₅ (mg/l)	24	25	15
Chlorophyll-a (mg/l)	0.250	0.092	-

WASTE SOURCES

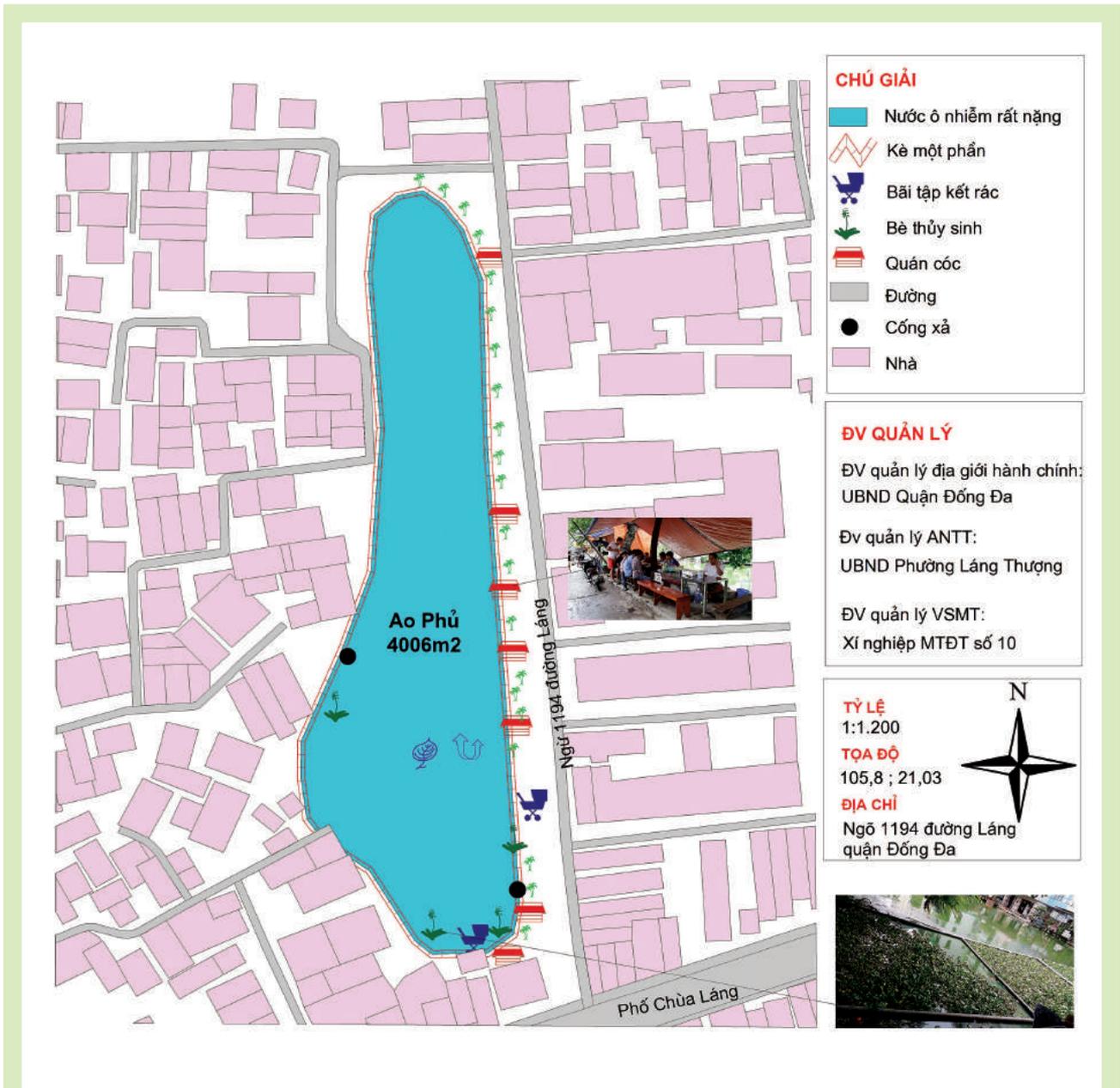
The lake receives wastewater from lakeside residential areas and service establishments, and fish feed.

RECOMMENDATIONS

Fish farming and fish, snail release into the lake should be strictly prohibited. Strengthening informing and encouraging community to regularly participate in lake protection and clean-up.



PHU POND



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

Phu pond is one of the most polluted ponds in Hanoi, located in the alley 1194, Lang Street, Lang Thuong ward, Dong Da district.

It is in a densely populated area, adjacent to the market and houses. In 2010, the pond was used to plant water spinach but is now used to farm catfishes.

SHORE AND CORRIDOR

The pond had nearly full embankment. Shore corridor was 0 - 3.4m wide with many weeds and trees such as bamboo, flamboyant, tropical almond. The shore was also a place for gathering building materials and garbage. A part of the pond was adjacent to road and houses.

The status of the shore and corridor is unchanged compared to 2010.

WATER AREA

Pond water was dark green-colored, fishy and foul, and had air bubbles. Pond surface was covered entirely by water spinach, weed, duckweed, mosses. The pond had many water beetles and fishes.

The scene of water area has not been improved compared to 5 years ago. Water near the shore has scum, much of organic waste and dirty foam.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID	QCVN
24/7/2010	DD11	08(B1)
pH	8.66	5.5-9
DO (mg/l)	3.98	≥4
BOD ₅ (mg/l)	32	15
Chlorophyll-a (mg/l)	0.192	-

Sampling date	Sample ID	QCVN
07/7/2015	DD11	08(B1)
pH	6.7	5.5-9
DO (mg/l)	1.85	≥4
BOD ₅ (mg/l)	31	15
Chlorophyll-a (mg/l)	0.159	-

WASTE SOURCES

The pond receives wastewater, garbage directly from pond side houses, stalls, temporary market, car wash service establishment, including waste from poultry farming. Additionally, a large amount of food for fish in the pond also impacts notably on water quality.

RECOMMENDATIONS

The function of the pond should be changed from fish farming to landscaping. It is necessary to prevent discharge into the pond and develop plans for pond management and protection.

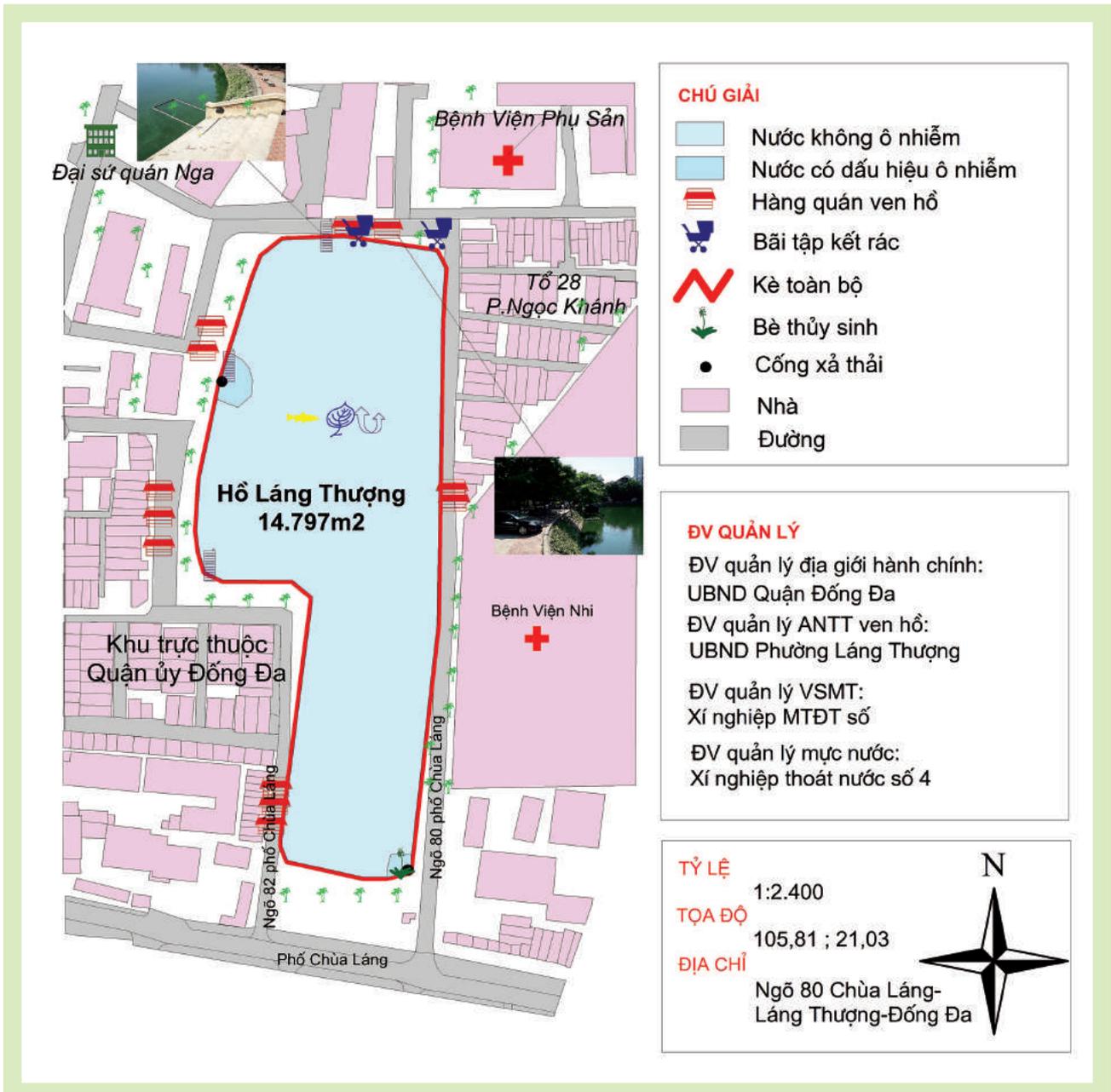
Results of the water analysis in 2010 and 2015 show that water quality remains virtually unchanged. The pond is still polluted by organic substances and has strong growth of algae.

FOCUS

The impact of aquaculture on the environment of ponds, lakes

Currently, Phu pond is farming a large number of black catfishes. Like other aquaculture ponds and lakes, feeding the fish too much makes leftovers to settle to the pond bottom, causing eutrophication and imbalance in the pond ecosystem. Bio-products (probiotics) can be used to clean water and the bottom of aquaculture lakes. These bio-products could decompose mud, leftovers, and toxic gases, prevent the growth of blue-green algae and increase dissolved oxygen contributing to the improvement of the lake environment.

LANG THUONG LAKE



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

The lake is opposite to the Diplomatic Academy of Vietnam on Chua Lang Street, Lang Thuong ward, Dong Da district. It is used for water regulation, landscaping, and fish farming.

SHORE AND CORRIDOR

The lake had full embankment, on the soil of the embankment there were many weeds and vegetables grown by people. The shore was 1-5m wide sidewalk with shaded trees, occupied by stalls. There was much garbage on the shore.

The status of the shore is similar to it in 2010. The corridor is cleaner due to regular clean-up but still occupied by people for commercial purposes.

WATER AREA

Lake water had the green color of moss, foul smell and much of scum. Besides farmed fishes, aquatic fauna in the lake also included shrimps, daphnia magna, daphnia pulex. Floating plants were mosses.

Lake water is clear, not foul and has little of garbage.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	DD19-1	DD19-2	
24/6/2010			
pH	8.79	8.75	5.5-9
DO (mg/l)	7.70	8.90	≥4
BOD ₅ (mg/l)	31	15	15
Chlorophyll-a (mg/l)	0.137	0.146	-

Sampling date	Sample ID		QCVN 08(B1)
	DD19-1	DD19-2	
07/7/2015			
pH	8.8	9.1	5.5-9
DO (mg/l)	7.58	5.7	≥4
BOD ₅ (mg/l)	24	29	15
Chlorophyll-a (mg/l)	0.029	0.034	-

WASTE SOURCES

In 2010, the lake primarily received domestic wastewater through 2 sewers. In 2015, its main waste source is food for fishes.

CHALLENGES

Maintaining and improving water quality and the surrounding environment.

RECOMMENDATIONS

The lake's scene should be renovated and fish farming in the lake for business should be prohibited.

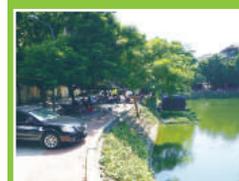
In 2015, although still being occupied by stalls, the lake corridor is kept clean.

The scene of water area has been improved. Water is cleaner and clear. The analytical results in 2015 show that the lake is still contaminated by organic substances but the amount of algae has decreased greatly compared to 2010.

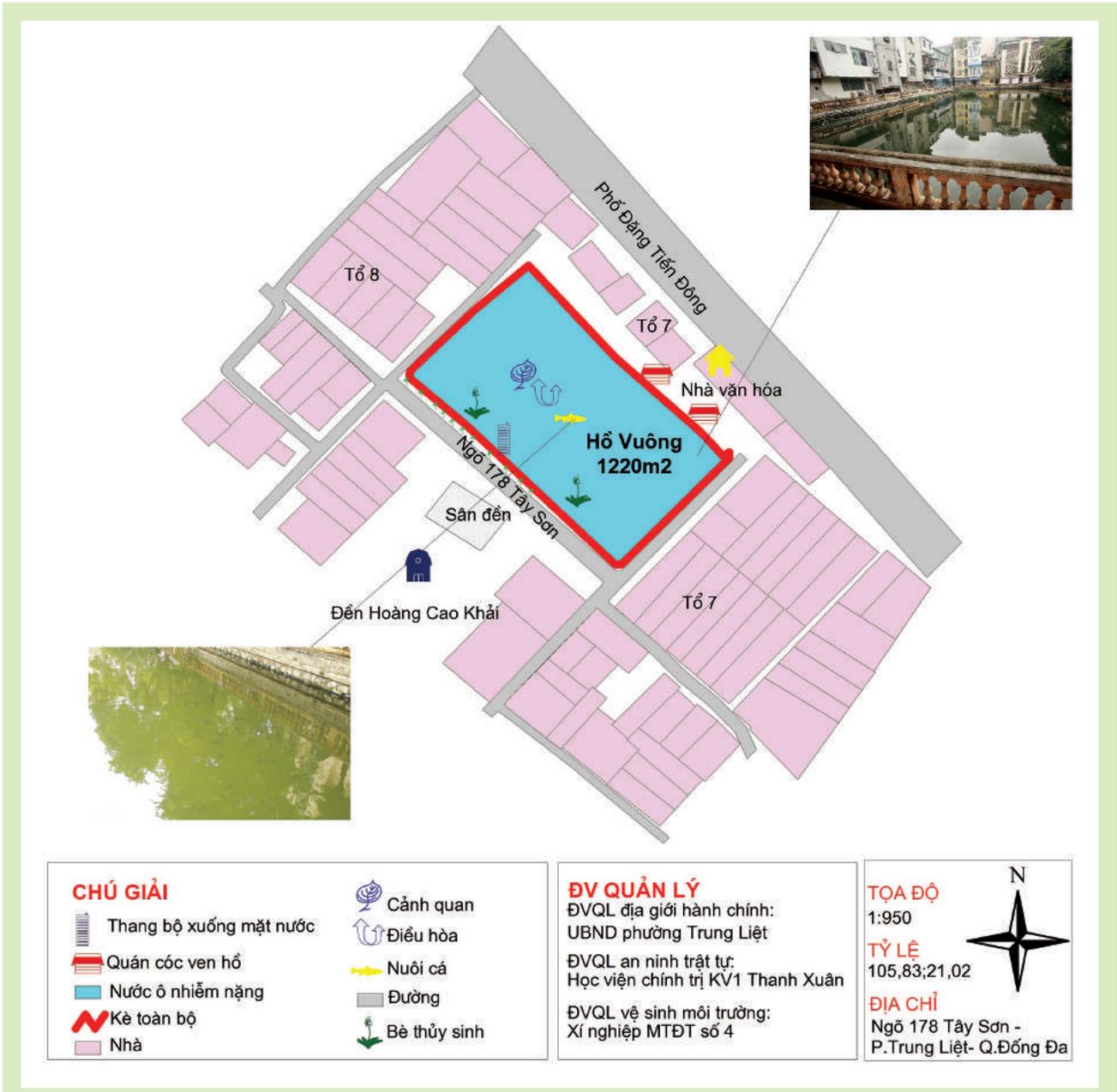
PRESS REVIEW

Lang Thuong lake is located in a densely populated area together with schools and offices of some state agencies. Recently, the lakeside road is continuously in traffic congestion, the sidewalk along the lake is occupied by beer stalls, cafés and parking.

Lang Thuong lake is "besieged" by beer and iced tea stalls, Labour newspaper, 25/06/2014



VUONG LAKE



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

The lake is located in the Hoang Cao Khai monument. Currently, it is used for landscaping, fish farming and organizing annual fishing activity for children on June 1st.

In 2015, a part of the shore has been occupied by a market and stalls. Lake water is cleaner, the behavior of dumping waste into the lake happens less than 5 years ago because of better community awareness. Results of the water analysis in 2015 show that although the lake is still contaminated by organic substances and has algae growth but the lake's water quality has been improved obviously compared to 2010.

SHORE AND CORRIDOR

The lake had full embankment and 80cm-high surrounding brick wall adjacent to road with shaded trees.

The current status of the shore is similar to the status in 2010. It has a very few of garbage. However a part of the shore has become the place for temporary market and stalls.

WATER AREA

Lake water was dark green-colored, stinking, had scum. There was fairly much garbage in the lake despite being picked up regularly. Aquatic fauna included fishes, daphnia magna, daphnia pulex, water beetles. Flora were algae, mosses.

Lake water is green-colored, odorless. There is a small amount of domestic solid waste and leaves on the water surface near the shore. Climbing perch is farmed in the lake for the annual event of June 1st.

RESULT OF WATER ANALYSIS

Sampling date 16/7/2010	Sample ID DD32	QCVN 08(B1)
pH	8.20	5.5-9
DO (mg/l)	Saturate	≥4
BOD ₅ (mg/l)	90	15
Chlorophyll-a (mg/l)	0.243	-

Sampling date 07/7/2015	Sample ID DD32	QCVN 08(B1)
pH	6.7	5.5-9
DO (mg/l)	1.04	≥4
BOD ₅ (mg/l)	31	15
Chlorophyll-a (mg/l)	0.159	-

WASTE SOURCES

The lake receives domestic wastewater from leaking pipes of some households and garbage from the lakeside temporary market.

OPPORTUNITIES

The lake is likely to be protected well because it lies within Hoang Cao Khai monument and serves children annually on June 1st.

RECOMMENDATIONS

Children's activity of fishing at Vuong lake on June 1st annually is a cultural characteristic peculiar to the lake. The local government and community need to pay more attention to this characteristic to have appropriate measures of lake protection; The local government should encourage unions to carry out lake clean-up regularly.

FOCUS
Protection of Vuong lake gradually becomes concern of the surrounding community, hence the lake environment quality gets better and better. Organizing the activity of fishing at the lake for children on June 1st every year is also a measure to educate and raise their awareness of lake preservation and protection.



HAO NAM POND



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

The pond is in front of Hao Nam communal house, used for landscaping and water regulation. It has been filled partly by Cat Linh - Ha Dong elevated railway project.

SHORE AND CORRIDOR

The pond did not have embankment. A large part of the shore was used for stalls, car parking and washing stations, construction and domestic wastes gathering site.

The pond has full embankment. The shore corridor is occupied entirely by refreshment stalls, construction wastes and materials, parking, and flowers and ornamental plants of households.

WATER AREA

Pond water was black-colored, dirty, stinking. Plants in the pond were mainly water spinach, the others were duckweed, pistia, nipas, algae and mosses.

Pond water is dark green-colored, turbid, fishy. There are scum and organic garbage in the area of sewer near the pumping station. Animals in the pond include fishes, snails released by people. Plants are only duckweed.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	DD32-1	DD32-2	
16/7/2010			
pH	8.65	8.47	5.5-9
DO (mg/l)	0.58	1.42	≥4
BOD ₅ (mg/l)	120	107	15
Chlorophyll-a (mg/l)	0.141	0.143	-

Sampling date	Sample ID		QCVN 08(B1)
	DD32-1	DD32-2	
07/7/2015			
pH	7.4	5.5-9	5.5-9
DO (mg/l)	7.89	≥4	≥4
BOD ₅ (mg/l)	20	15	15
Chlorophyll-a (mg/l)	0.021	-	-

WASTE SOURCES

The pond receives wastewater from car washing stations, stalls and runoff from construction waste gathering site when it rains.

CHALLENGES

Because the pond is small, lacking of water circulation, and located in a densely populated area, improving water quality and returning corridor to the pond is a major challenge.

RECOMMENDATIONS

It is necessary to make plans for relocating stalls, parking/car washing stations to return corridor to the pond. Gathering construction waste at the pond area must be strictly prohibited.

In 2015, water spinach is no longer grown in the pond. Pond area is reduced by half compared to 2010. After the presence of the embankment, the entire corridor has been occupied for different purposes. Results of the water analysis in 2015 shows that the level of algae growth and organic pollution has decreased obviously compared to 2010.

FOCUS

The Women's Union of O Cho Dua ward actively cleans up Hao Nam pond.

Before 2014, Hao Nam pond's corridor was not only occupied to make refreshment stalls but also seriously polluted by waste from these stalls and the customers' indiscriminate defecation. The Women's Union of O Cho Dua ward has implemented the movement Lake Protection for a Green - Clean - Beautiful Environment by informing, reminding vendors and people living near the lake to clean up the corridor weekly throughout 2014. To date, although there is still the situation of occupying the sidewalk, the pollution caused by waste and indiscriminate defecation have been limited.

LINH QUANG LAKE



2010 **2015**

DIFFERENCES

GENERAL INTRODUCTION

Linh Quang lake is one of the city's most polluted lakes at the moment, located in Van Chuong II alley, Van Chuong ward, Dong Da district. It is under a lake renovation project, however the project has been in standstill since 2010. The lake encroachment of households is a hot problem in recent years.

In 2015, the scene of the shore and water area has degraded seriously. Results of the water quality analysis show that the lake is polluted by organic substances and has a strong growth of algae.

SHORE AND CORRIDOR

The lake was being renovated, so it was cluttered with waste.

The renovation project is in standstill, the lakeshore has not yet had embankment and corridor. The part of the shore towards Van Chuong market has become car parking and solid wastes gathering site. The remaining parts are adjacent to houses, lodging houses, and are encroached by dumping soil, construction waste and garbage.

PRESS REVIEW

Lake water has turned dark – colored, fetid smelled, the lake surface is covered completely by waste and weeds. The reason for this condition is that thousands of surrounding households daily discharge wastewater into the lake. Besides, many people used vans, carts, and took advantage of night to dump construction waste into the lake. The encroachment of Linh Quang lake is upsetting the public. Previously the lake had an area of about 2 hectares, now it is only a small pond. As soon as the lake is encroached, stalls, temporary markets, car parking “grow” ...

Linh Quang lake is polluted seriously, Capital Labor, 16/01/2015

WATER AREA

Shallow

Lake water is black – colored, stinking. There is much garbage including mainly domestic solid waste, animal carcasses, and dead fishes on the lake. Animals in the lake include frogs, catfishes, gong vo. Plants are water spinach, water taro, water hyacinth covering entirely the lake surface. The water area is being gradually encroached for livestock and poultry farming by lakeside households.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	DD33-1	DD33-2	
07/7/2015			
pH	7.6	8.0	5.5-9
DO (mg/l)	7.44	6.82	≥4
BOD ₅ (mg/l)	27	44	15
Chlorophyll-a (mg/l)	0.167	0.236	-

WASTE SOURCES

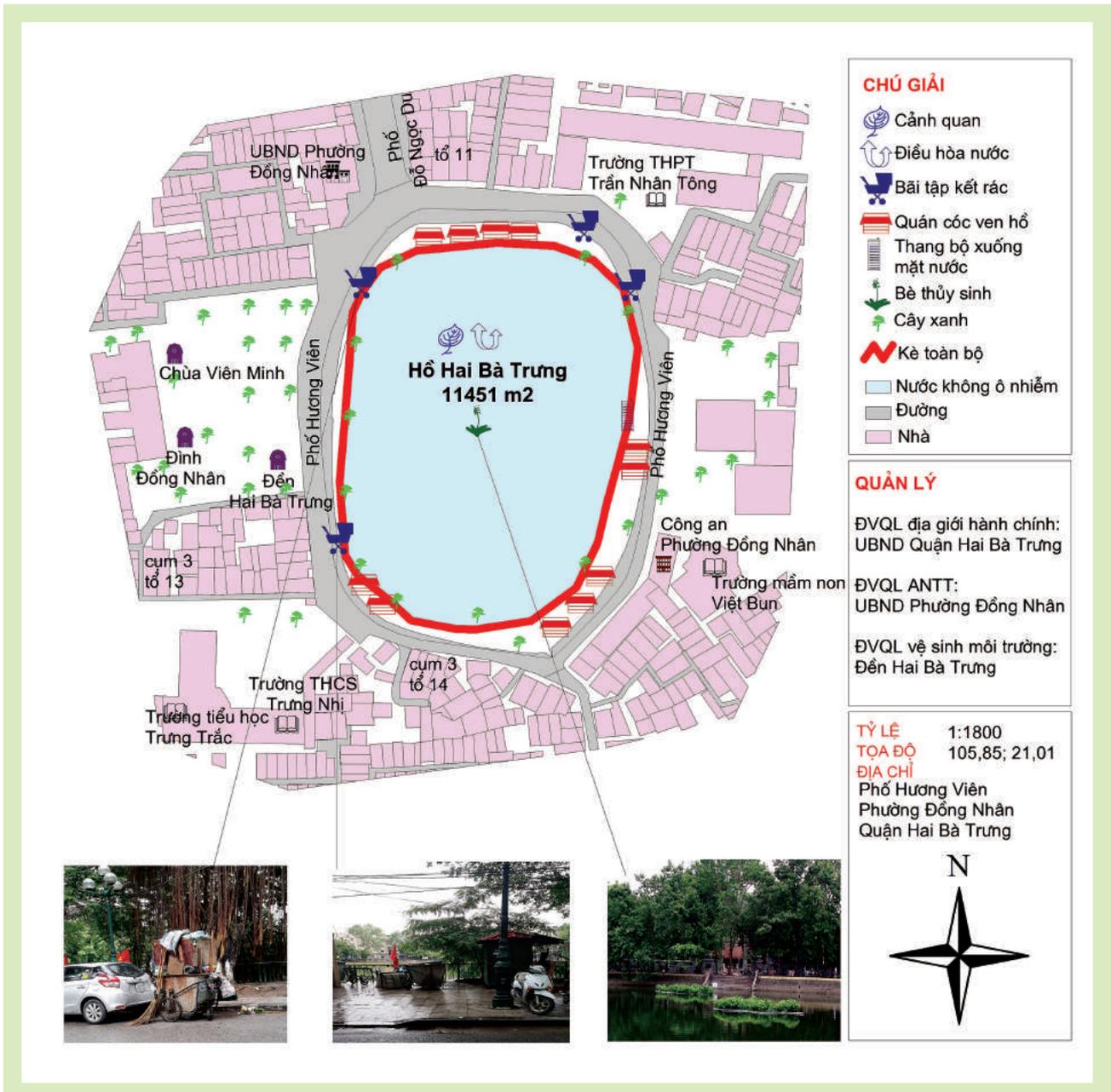
The lake receives domestic wastewater from lakeside residential areas, waste from service establishments and stalls in Van Chuong market discharged into the lake. The delay in lake renovation exacerbates the problems of pollution and encroachment.

RECOMMENDATIONS

The renovation and restoration of the lake and landscape should be implemented drastically. The more stoppages, the more cost for lake renovation increases, and the less living quality of the people in the area.



HAI BA TRUNG LAKE



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

The lake is located on Huong Vien street, Dong Nhan ward, Hai Ba Trung district, next to Hai Ba Trung temple.

The water area is also cleaner.

SHORE AND CORRIDOR

The lake had full embankment and iron fence. The surrounding paved sidewalk was 1-2m wide, had many trees such as flamboyant, African mahogany, Chinese banyan. Much litter on the shore.

The condition of the embankment and shore corridor is similar to those in 2010. Soil of the embankment is used by people to plant vegetable. The sidewalk is free of garbage.

Results of the water analysis in 2015 show that the amount of algae in the lake has decreased significantly compared to 2010.

WATER AREA

Lake water did not circulate, smelled slightly fishy. There were plenty of mosses, algae, fishes and other species such as daphnia magna, daphnia pulex in the lake. Lake water was being tested for treatment by aquatic plants with rafts of umbrella papyrus placed in the middle of the lake.

Lake water is green – colored, clear, odorless. Lake surface has fallen leaves, insect corpses. The lake has algae, a lot of fishes, daphnia magna, daphnia pulex and 6 small rafts of aquatic plants.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	HBT02-1	HBT02-2	
16/7/2010			
pH	8.67	8.84	5.5-9
DO (mg/l)	2.54	1.72	≥4
BOD ₅ (mg/l)	11	12	15
Chlorophyll-a (mg/l)	0.110	0.139	-

Sampling date	Sample ID		QCVN 08(B1)
	HBT02-1	HBT02-2	
30/6/2015			
pH	7.5	7.5	5.5-9
DO (mg/l)	6.44	5.41	≥4
BOD ₅ (mg/l)	9	10	15
Chlorophyll-a (mg/l)	0.033	0.034	-

WASTE SOURCES

In 2010, the lake received wastewater from surrounding areas. In 2015, it has no direct waste source.

RECOMMENDATIONS

Because the lake attaches to Hai Ba Trung temple, lake preservation and regular maintenance need to be implemented so that the lake becomes a scenic highlight of the area.



THIEN QUANG LAKE



CHÚ GIẢI

- Điều hòa
- Cảnh quan
- Quán cóc ven hồ
- Cống xả
- Kè toàn bộ
- Nước ô nhiễm nặng
- Đường
- Nhà

QUẢN LÝ

ĐVQL địa giới hành chính:
UBND Quận Hai Bà Trưng

ĐVQL ANTT:
UBND Phường Nguyễn Du

ĐVQL VS ven hồ:
Xí nghiệp môi trường đô thị số 3

ĐVQL mực nước:
Xí nghiệp thoát nước số 3

TỶ LỆ 1:3500

TOA ĐỘ 105,85; 21,02

ĐỊA CHỈ
 Nằm giữa bốn phố:
 Trần Nhân Tông, Quang Trung,
 Nguyễn Du, Trần Bình Trọng,
 Phường Nguyễn Du,
 Quận Hai Bà Trưng,
 Hà Nội



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

Thien Quang lake belongs to a system of natural lakes connecting underground with Bay Mau lake, is used for water regulation, landscaping, and fish farming.

The lake is surrounded by four streets full of trees and shades including Nguyen Du, Tran Binh Trong, Tran Nhan Tong and Quang Trung.

SHORE AND CORRIDOR

The lake had full embankment, and a surrounding sidewalk with shaded trees such as flamboyant, giant crape-myrtle. As the lake shore was managed well and often cleared, it was relatively clean.

The status of shore and shore corridor is similar to 2010. The sidewalk is clean and clear, is the place for community's activities. There are some refreshment stalls on the sidewalk.

WATER AREA

Lake water was odorless, had fishes and so much of moss so that its color turned to green. There was little of garbage on the lake surface.

Lake water is green-colored, fishy, has algae. There is a small amount of garbage including plastic bags and fallen leaves on the surface, especially on the water near the sewer. The lake has phenomenon of fish mass mortality in summer but its cause has not been determined.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	HBT06-1	HBT06-2	
16/7/2010			
pH	8.55	8.20	5.5-9
DO (mg/l)	3.76	4.13	≥4
BOD ₅ (mg/l)	80	110	15
Chlorophyll-a (mg/l)	0.146	0.265	-

Sampling date	Sample ID		QCVN 08(B1)
	HBT06-1	HBT06-2	
7/7/2015			
pH	7.6	7.3	5.5-9
DO (mg/l)	3.83	3.31	≥4
BOD ₅ (mg/l)	23	18	15
Chlorophyll-a (mg/l)	0.212	0.109	-

WASTE SOURCES

The lake receives water from the drainage system and waste from the refreshment stalls on the shore.

RECOMMENDATIONS

Because wastes from refreshment stalls on the shore reduce landscape of the area and lake water quality, these stalls should be prohibited.

Fish farming in the lake should be ceased to limit the phenomenon of fish mass mortality and reduce its impact on the lake environment.

In recent years, the lake is a venue for major events such as the New Year's Eve event.

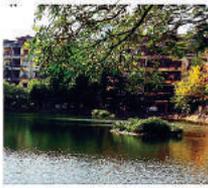
Results of the water analysis in 2015 show that although algae are still thriving in the lake, organic pollution has decreased significantly compared to 2010.

PRESS REVIEW

Since the morning of September 15, fishes in Thien Quang lake suddenly died in mass, covering fully the lake corner at the bridge to the island near the intersection between Tran Binh Trong St. and Tran Nhan Tong St. Mr. Vu Van Khai, a 48 year-old employee of No. 3 Urban Environment Company said "there is a huge quantity of dead fishes, and sunny weather makes them too smelly". At a corner of the lake, fish kills were picked up nearly completely by him but the water was still filled with white scum. "In the morning, our group collected nearly 3 tones of dead fishes. In addition, people also picked up another 3 tones. I have never seen such fish kills," Khai said.

Tones of dead fishes covering whitely a corner of Thien Quang lake, VnEpress, 15/9/2014

QUYNH LAKE



CHÚ GIẢI

- Điều hòa
- Cảnh quan
- Quán cóc ven hồ
- Bè thủy sinh
- Cây xanh
- Cổng xả
- Kè toàn bộ
- Nước có dấu hiệu ô nhiễm
- Đường
- Nhà

QUẢN LÝ

ĐVQL địa giới hành chính:
UBND Phường Thanh Nhân

ĐVQL ANTT:
UBND Phường Thanh Nhân

ĐVQL VS ven hồ:
Xí nghiệp thoát nước số 3

TỶ LỆ 1:1800
TỌA ĐỘ 105,85; 21,01
ĐỊA CHỈ
 Ngõ 88, phố Võ Thị Sáu,
 phường Thanh Nhân,
 quận Hai Bà Trưng
 Hà Nội



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

Lake is located in 88 Lane, Vo Thi Sau Street, Thanh Nhan Ward, Hai Ba Trung District. The lake is also located in a residential area, there are many building complexes with high population density around the lake

Lake corridor has more barriers to separate with the main road.
 No.3 drainage company plants more aquatic trees on the lake so water quality is remarkable improved.
 Results of the water analysis show that chlorophyll-a concentration is less than this in 5 years ago, and algae grow slowly.
 Results of BOD5 are less than this in 2010 showing that lake is just slightly organic polluted.
 Generally, water quality in 2015 has improved compared to 2010, but still polluted.

SHORE AND CORRIDOR

The lake had low embankment, no barrier with wide lakeshore and many trees. Garbage on lakeshore was collected daily so the lake looked clean, fresh. However, sometimes it could be seen bad people's behaviors such as throwing garbage, construction waste into the lake.

The lake has full embankment and 0.5 meter wide lakeshore, has barrier to protect and separate the lake from the main road. Lake has no sidewalk making lake space clean and refresh. There are many trees around the lake.

WATER AREA

Lake had more than 20 drainage systems, sewage systems. Water is dark- blue, odorless. Water surface had many fallen leaves, concentrated in lake shore. There were various fishes and animals in the water. Currently, the lake was being tested by treatment methods with aquatic plants.

Water is opaque green, has bad smell, many algae, dead fishes and plastic bags are observed. The lake has four rafts of aquatic plants. Fishes are plenty, attracts many people to come fishing.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	HBT09-1	HBT09-2	
16/7/2010			
pH	8.69	8.63	5.5-9
DO (mg/l)	3.25	2.17	≥4
BOD ₅ (mg/l)	95	145	15
Chlorophyll-a (mg/l)	0.375	0.581	-

Sampling date	Sample ID		QCVN 08(B1)
	HBT09-1	HBT09-2	
7/7/2015			
pH	7.5	7.3	5.5-9
DO (mg/l)	4.59	6.05	≥4
BOD ₅ (mg/l)	13	14	15
Chlorophyll-a (mg/l)	0.092	0.140	-

WASTE SOURCES

Lake received waste from food for fishes.

RECOMMENDATIONS

Fishing should be prohibited, lake surface, lakeshore should be cleaned regularly.



CAN LAKE



CHÚ GIẢI

- Cảnh quan
- Điều hòa
- Kè toàn bộ
- Nước có dấu hiệu ô nhiễm
- Nhà
- Đường
- Cây xanh

QUẢN LÝ

- ĐVQL địa giới hành chính: UBND Phường Vinh Tuy
- ĐVQL ANTT: Công an phường Vinh Tuy
- ĐVQL VS ven hồ: Người dân xung quanh

TỶ LỆ 1:2300
TỌA ĐỘ 105.88; 21.00
ĐỊA CHỈ
 Ngách 34/153/14
 Phố Vinh Tuy
 Phường Vinh Tuy
 Quận Hai Bà Trưng
 Hà Nội



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

The lake is located in Vinh Tuy Ward, Hai Ba Trung District. It belongs to natural pond system in Hanoi. The lake has been renovated to regulate water and farm fishes.

Lake has been renovated and has full embankment. Results of the water analysis show that water quality has improved after 5 years. Chlorophyll-a level at measuring time was high but still lower than that in 2010.

SHORE AND CORRIDOR

The lake had partial embankment, no barrier, and was adjacent to roads. Lake was used for fishing tender. Lakeshore has many trees such as fish-egg trees, logans.

Lake has full embankment, surrounding the lake are 3 meter wide sidewalks, paved entirely. Garbage around lake was few because population density is low, mainly plastic bags, bottles. Currently the lake is used for fish farming. Lake view is quite clean, fresh.

The results show that despite high eutrophication, growth of algae is lower. Results of BOD5 show that the lake is still heavily organic contaminated. Generally, lake's view and water quality have improved better than 2010

WATER AREA

The lake had received wastewater from residential areas. Water was green, foul. There were various fishes and aquatic species such as bare pine tree ceiling plants, vegetable, weed, mosses inside the lake.

Water is green, slightly opaque. There was little garbage on lake surface, some areas has dirty foam. There are many fishes, aquatic plants such as weed, mosses inside the lake.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	HBT10-1	HBT10-2	
16/7/2010			
pH	8.17	8.23	5.5-9
DO (mg/l)	5.63	3.02	≥4
BOD ₅ (mg/l)	35	65	15
Chlorophyll-a (mg/l)	0.276	0.316	-

Sampling date	Sample ID		QCVN 08(B1)
	HBT10-1	HBT10-2	
7/7/2015			
pH	8.3	8.0	5.5-9
DO (mg/l)	6.65	4.76	≥4
BOD ₅ (mg/l)	35	25	15
Chlorophyll-a (mg/l)	0.197	0.108	-

WASTE SOURCES

Lake received garbage dropped down into water and food for fishes. Due to full embankment, there is no wastewater discharge into the lake.

CHALLENGES

Maintenance and improvement of water quality of the lake

RECOMMENDATIONS

Fishing farming should be well controlled; the role of ecological landscape should be promoted.



HO CA BAC HO LAKE



2010	2015
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DIFFERENCES

GENERAL INTRODUCTION

The lake is located in Vinh Tuy ward, Hai Ba Trung district, and is currently a popular fishing area in Hai Ba Trung district.

SHORE AND CORRIDOR

The lake was renovated in 12 months (began on March 2010)

Three-fourth of the lakeshore has embankment, the rest is located near residential areas. Garbage concentrated pretty much at east and north of the lakeshore.

The lake has large embankment, the uncompleted embankment located near residential areas. The lake is heavily polluted by garbage from households. Results of the water analysis in 2015 show that algae strongly grow. The results of BOD5 show that the lake is slightly organic polluted.

WATER AREA

Water is quite dirty, black, has stinky smell. It can be seen much garbage from households, plastic bags, bottles on the lake surface. Garbage mainly concentrates in lakeshore and the residential area

PRESS REVIEW

Community living in no.103 cluster of Vinh Tuy Ward feels pressing because of the environment of "Uncle Ho's fish lake". The lake was heavily polluted since the renovation was stopped due to the difficulty in clearance. This lake was just only dredged and embanked in the west and south, where there was no residential area. Households adjacent to the lake not only encroached the lakeshore but also discharged wastewater into the lake, thus making the lake more polluted. These households did not allow the local government's staffs to measure their lands for clearance compensation. *"Lake renovation by socialization fund": The mountain labored and brought forth a mouse, Hanoi New, 11 May 2014*

RESULT OF WATER ANALYSIS

Sampling date	Sample ID	QCVN
7/7/2015	HBT14	08(B1)
pH	7.3	5.5-9
DO (mg/l)	1.68	≥4
BOD ₅ (mg/l)	18	15
Chlorophyll-a (mg/l)	0.109	-

WASTE SOURCES

Lake received wastewater from high density residential areas and construction works from Time City building complex project.

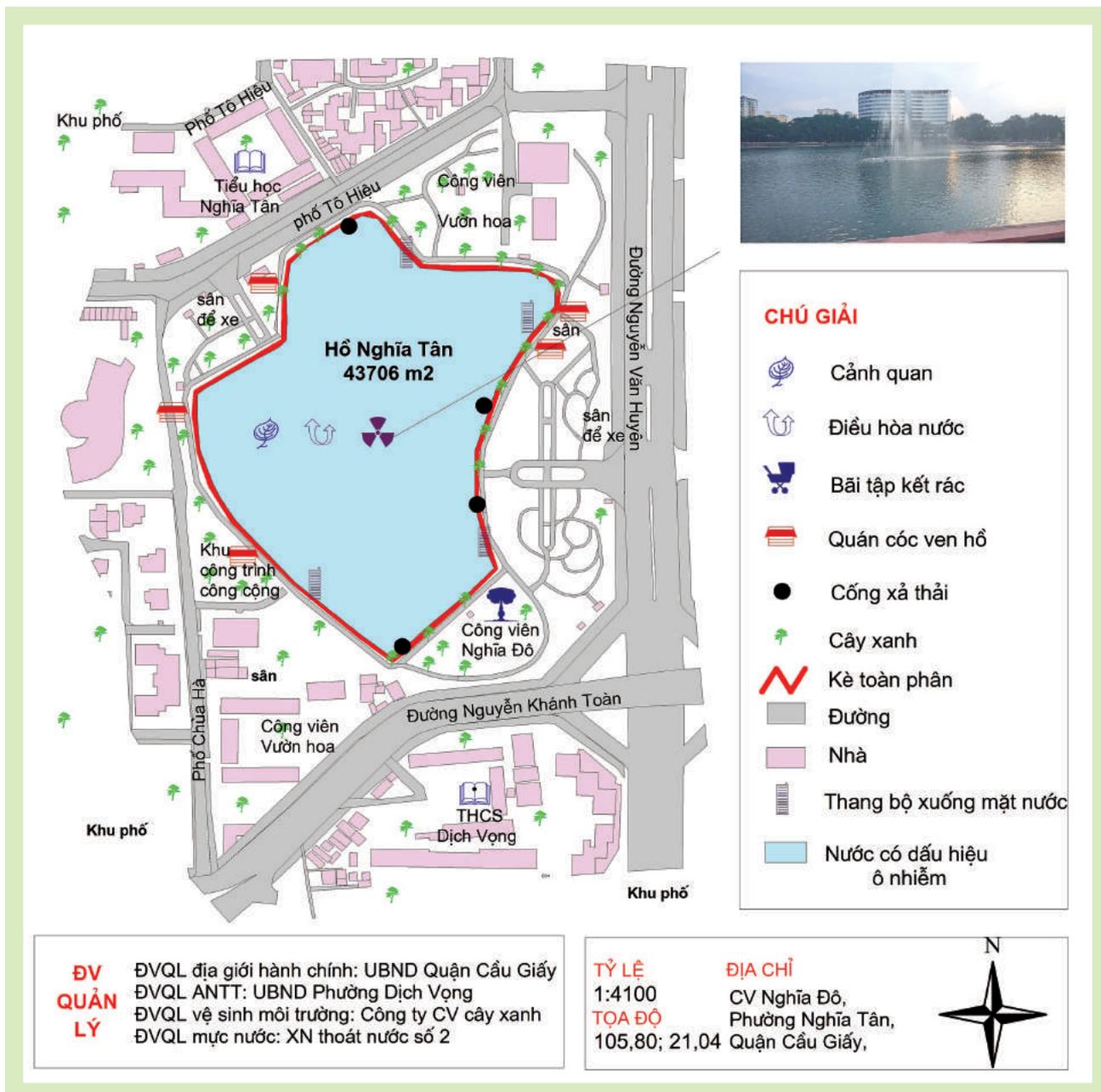
RISKS

Lake corridor is occupied near the residential area.

RECOMMENDATIONS

Prevent encroachment on the lake.
Control pollution discharge points from households

NGHIA TAN LAKE



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

Tu Lien lake has another name of Belly Fish Lake, which is located near No.43 of Xuan Dieu Street, Tu Lien Ward, Tay Ho District. The lake is used mainly for planting vegetable. Although it is one of the lakes considered in the lake renovation project in 2010, but so far the project has not been implemented.

SHORE AND CORRIDOR

The lake did not have embankments, was located near households, had no barrier and sidewalk around. On the lakeshore, there were many fruit trees like banana, labels, shrubs, bamboos. There were houses on the lake which discharged wastes into the lake. Much garbage and construction waste near Xuan Dieu street.

Since the project of lake renovation has not been implemented, the status of lakeshore is still being degraded with serious pollution. The side at Xuan Dieu street is filled with garbage from households and small business establishments. On the lakeshore, there were ten small stalls, snack restaurants, tents. The lakeshore opposite to Xuan Dieu street is adjacent to residential areas with no stall.

The renovation project has been suspended since 2010 making local communities feel pressing. Results of the water analysis in 2015 show that the lake was contaminated with organic matters and algae. Lake landscape is degraded, many stalls are likely to expand.

WATER AREA

The lake is a closed lake. Inflow is from rainwater and wastewater from residential areas. The lake's surface was entirely covered with water spinach. Water was green, had bad smell, plenty of fishes.

Water is opaque gray, stinky. The lake's surface is still entirely covered with water spinach. Only black catfishes can live in the lake. However, local communities said that vegetables and fishes here are unable to eat because the lake is too dirty.

FOCUS
The community loves Nghia Tan lake and has set up a facebook page to update on the status of the lake.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	CG11-1	CG11-2	
21/7/2015			
pH	7.2	7.8	5.5-9
DO (mg/l)	6.2	4.21	≥4
BOD ₅ (mg/l)	18	20	15
Chlorophyll-a (mg/l)	0.092	0.119	-

WASTE SOURCES

The lake received wastewater through sewers of surrounding houses, and wastes dumped directly around and into the lake.

RISKS

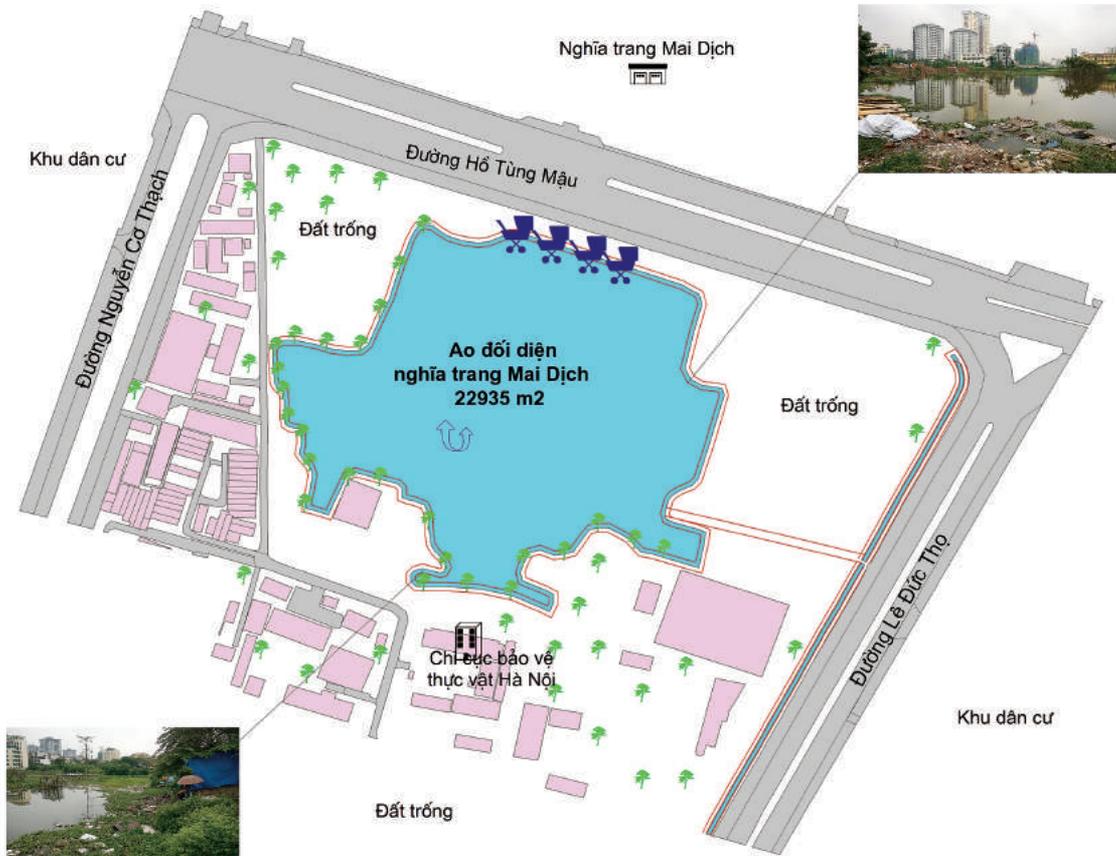
Lake being narrowed, water quality being heavily polluted

RECOMMENDATIONS

Lake should be embanked, mud dredged immediately.



MAI DỊCH LAKE



CHÚ GIẢI

-  Chưa kè
-  Nước ô nhiễm nặng
-  Đường
-  Nhà
-  Điều hòa
-  Bãi tập kết rác
-  Cây xanh

QUẢN LÝ

ĐVQL địa giới hành chính:
UBND Quận Cầu Giấy

ĐVQL ANTT:
UBND Phường Mai Dịch

TỶ LỆ 1:4000
TOA ĐỘ 105,77;21,04
ĐỊA CHỈ
Đổi diện nghĩa
tràng Mai Dịch,
Phường Mai Dịch,
Quận Cầu Giấy,
Hà Nội



2010	2015
------	------

DIFFERENCES

GENERAL INTRODUCTION

This is a natural pond opposite the Mai Dich cemetery, at the border between Cau Giay district and Nam Tu Liem district.

Occupation of the pond shore reduces aesthetic and pollutes the environment.

SHORE AND CORRIDOR

The pond shore was an earth bank without embankment. Near the shore was uncultivated land, a vegetable field and shrubs. Nobody lived next to the pond and relatively less waste was on the shore.

The pond still has no embankment. A part of the shore is used to gather building materials and household waste so it smells. The other part of the pond shore adjacent to Ho Tung Mau St. is a parking lot so its landscape is cramped.

Water area is being seriously encroached and shrunk.

WATER AREA

The pond surface was almost completely covered by water morning glory and water-taro. Water was black-colored, smelly, and had no signs of aquatic fauna. The pond was likely to be filled gradually and disappear.

Sanitary condition has not improved since 2010; the pond continues to be encroached. Water surface near the shore contains lots of plastic garbage, construction and domestic wastes.

Water analysis results in 2010 and 2015 both showed the pond water is polluted by organic substances and has strong algae growth. However, levels of organic matter and algae contamination in 2015 are lower than in 2010.

RESULT OF WATER ANALYSIS

Sampling date 12/7/2010	Sample ID CG26	QCVN 08(B1)
pH	8.61	5.5-9
DO (mg/l)	3.68	≥4
BOD ₅ (mg/l)	55	15
Chlorophyll-a (mg/l)	0.188	-

Sampling date 21/7/2015	Sample ID CG26	QCVN 08(B1)
pH	6.9	5.5-9
DO (mg/l)	0.84	≥4
BOD ₅ (mg/l)	35	15
Chlorophyll-a (mg/l)	0.117	-

WASTE SOURCES

Waste in the pond is mainly household waste and construction waste; the other is water runoff from the surrounding area.

NGUY CỒ

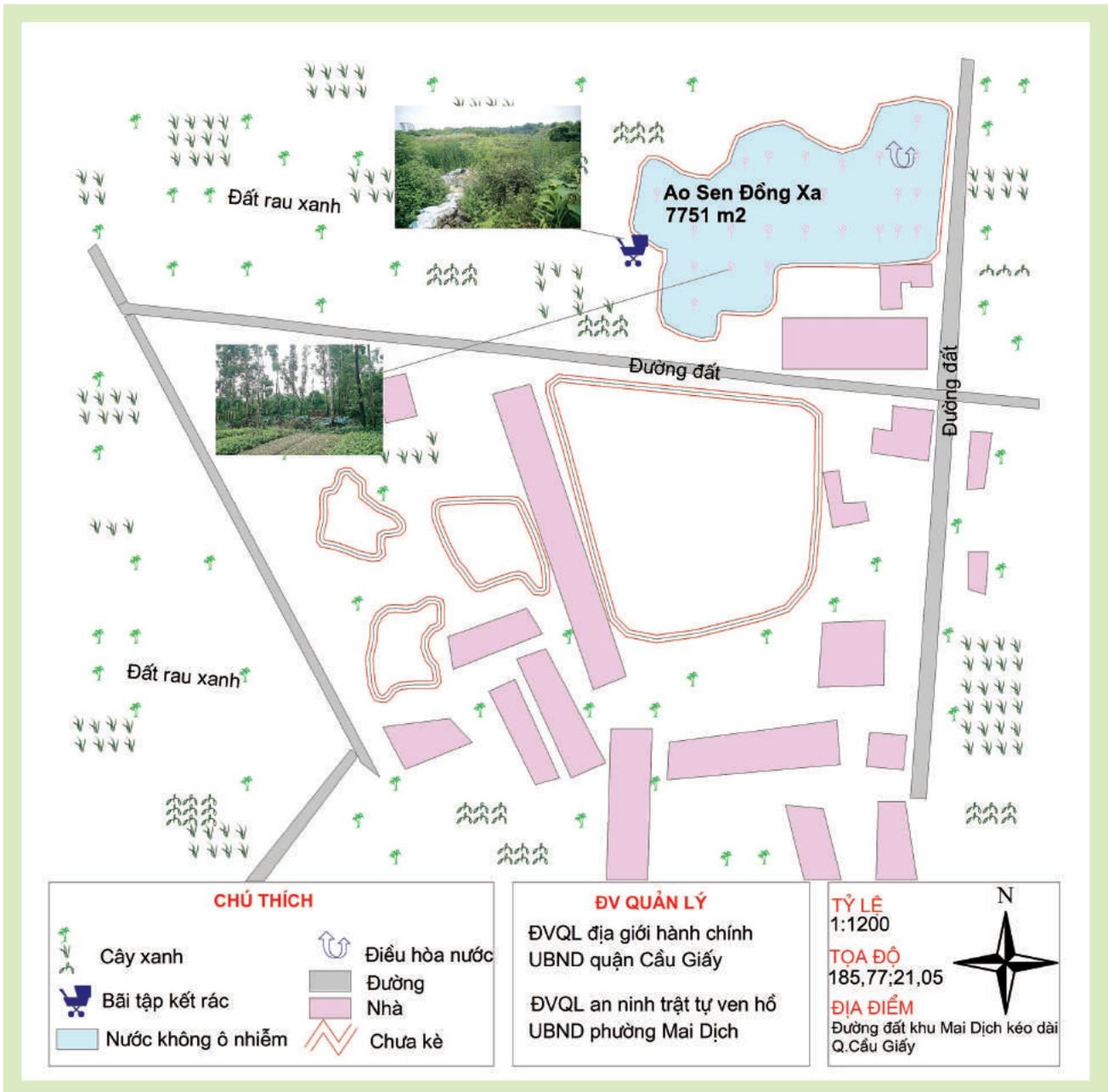
The pond is being encroached and faces the risk of disappearance.

RECOMMENDATIONS

The pond needs to have an embankment soon to secure the area and the appropriate landscape design to become the highlight of the local landscape.



DONG XA SEN POND



2010	2015
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DIFFERENCES

GENERAL INTRODUCTION

The pond is located in Dong Xa, Mai Dich ward, Cau Giay district.

SHORE AND CORRIDOR

The pond had no embankment or surrounding sidewalk. Soil and construction waste was being dumped into it for leveling. Around the shore was a huge pile of soil and lots of vegetation including mainly shrubs and some fruit trees belonging to locals.

The pond still has no embankment and the corridor is still encroached by garbage and construction materials. Around the pond are many shacks.

WATER AREA

The pond was very shallow. Water was not foul and its color could not be determined. Aquatic flora included mainly lotus, pistia, water morning glory and weed.

The pond water is shallow, dark green colored and not foul. Animals in the pond are mostly fish, loaches and eels. Plants are mostly lotus, pistia and weed.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID	QCVN	Sampling date	Sample ID	QCVN
21/7/2010		08(B1)	21/7/2015		08(B1)
	CG27			CG27	
pH	7.61	5.5-9	pH	6.9	5.5-9
DO (mg/l)	2.4	≥4	DO (mg/l)	2.76	≥4
BOD ₅ (mg/l)	12	15	BOD ₅ (mg/l)	8	15
Chlorophyll-a (mg/l)	0.015	-	Chlorophyll-a (mg/l)	0.020	-

WASTE SOURCES

In 2015, the waste discharged into the pond is mainly household solid waste and construction waste. The other is wastewater from surrounding households.

RISKS

Because the pond is hidden from view and not planned, it faces the risk of encroachment and total leveling.

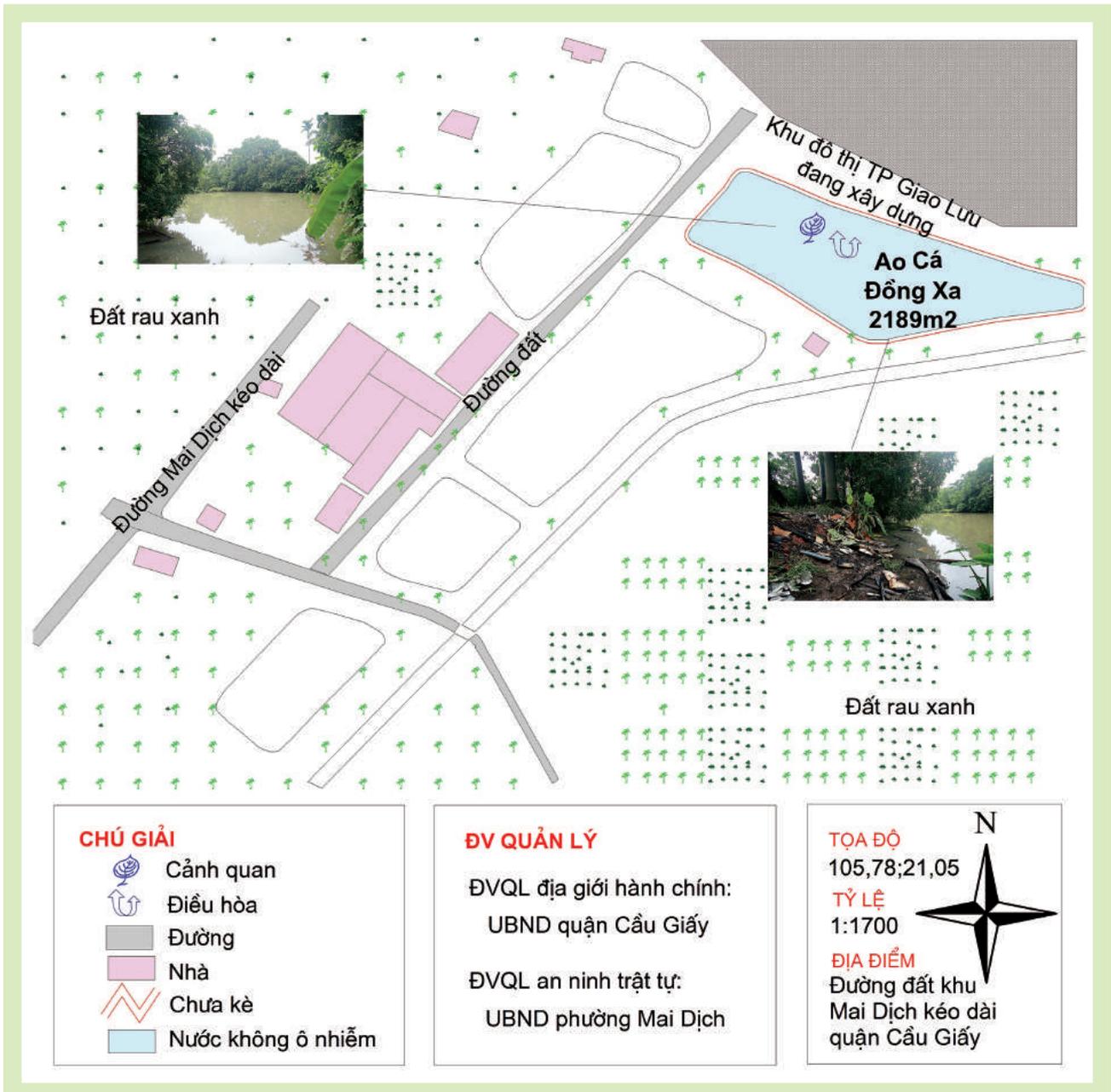
RECOMMENDATIONS

The pond needs to have an embankment to preserve its area.

Results of water analysis in 2010 and 2015 both show that the lake water has the growth of algae. However, concentration of organic substances in 2015 has decreased compared to 2010.



DONG XA FISH POND



2010	2015
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DIFFERENCES

GENERAL INTRODUCTION

The pond is located in Dong Xa, Mai Dich ward, Cau Giay district, adjacent to the urban area Giao Luu City. It is used for fish farming for business.

SHORE AND CORRIDOR

The pond had no embankment, fence or surrounding sidewalk. On the corridor were mainly banana, bamboo and fruit trees.

The pond still has no embankment. Shore corridor is earth road leading to the urban area Giao Luu City. The pond shore has household and construction waste.

In 2015, the pond shore has been occupied to gather waste.

WATER AREA

The pond mainly received rainwater, being fairly clean due to the good management of the private sector.

The pond water is very turbid, gray-colored and odourless. Fauna in the pond includes mainly farmed tilapias; the others are loaches and pupas. Flora includes water grass and water-taro growing at a low level.

Result of water analysis in 2015 shows that algae grow in the pond at a low level.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	CG30-1	CG30-2	
21/7/2015			
pH	8.3	8.8	5.5-9
DO (mg/l)	2.9	1.38	≥4
BOD ₅ (mg/l)	14	10	15
Chlorophyll-a (mg/l)	0.039	0.043	-

WASTE SOURCES

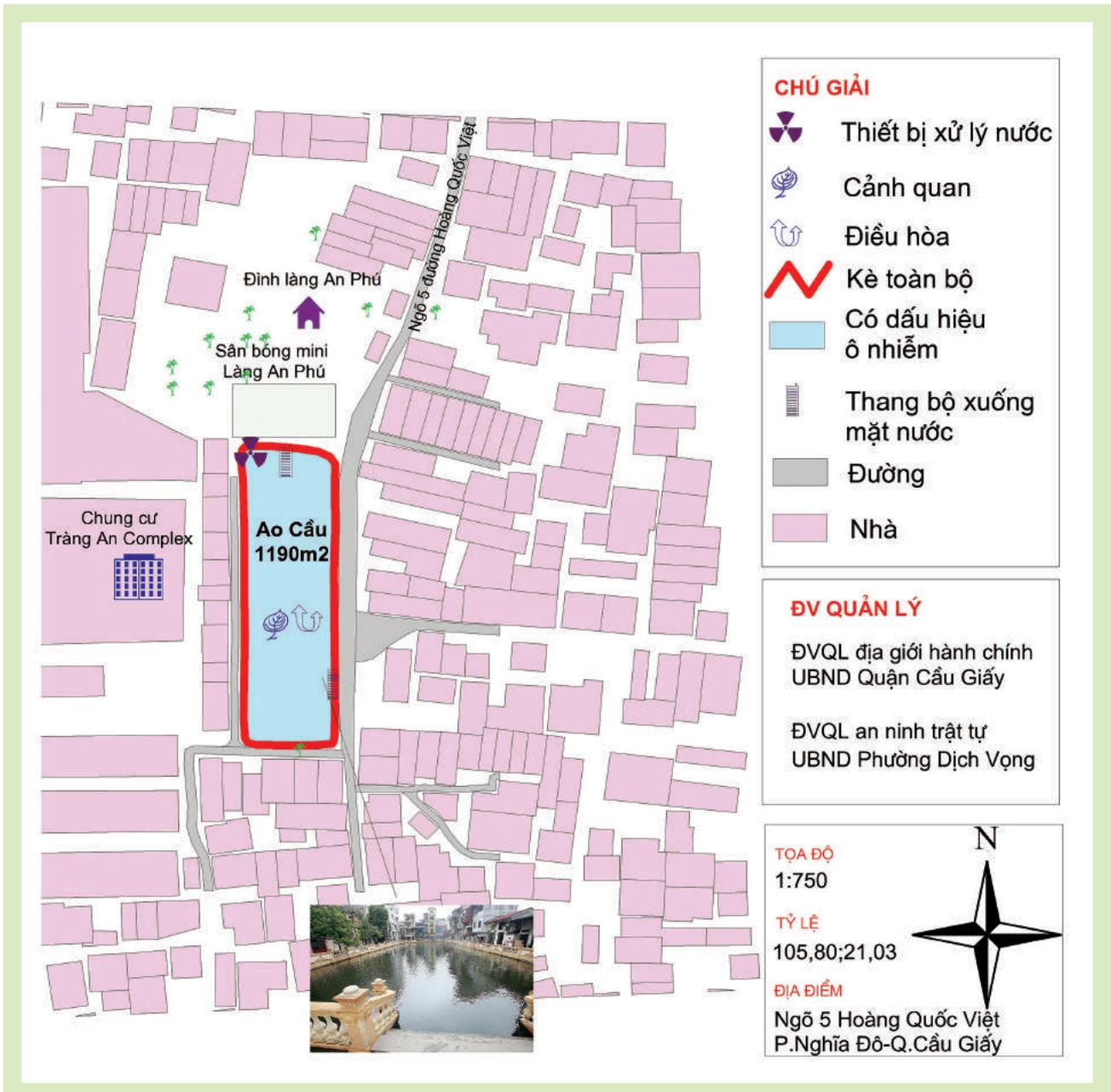
The pond receives waste mainly in the forms of fish feed and water runoff from the shore.

RECOMMENDATIONS

The pond needs to have an embankment to preserve its area.



CAU POND



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

Cau pond is located on lane 5 Hoang Quoc Viet St., Nghia Do ward, Cau Giay district. Its entire area is devoted to renovation and water quality treatment by the private sector.

SHORE AND CORRIDOR

The pond had an embankment, was fenced in entirely by a brick wall. The corridor was very narrow, adjacent to the road, people's houses, and stalls. The residents' garbage yards around the pond ruined aesthetic of the area.

The pond has a full embankment. The brick wall has been rebuilt to be 1m high adjacent to road. There is almost no garbage on the shore.

WATER AREA

Water was dirty, dark green-colored and strongly fishy. Pond cleaning had not yet been implemented well by the surrounding residents.

Pond water is clear, odorless and can be used for bathing. Flora and fauna in the pond are not nearly present. At northern corner of the pond is a water filtration system installed by the private sector, operating continuously, thus the water quality is maintained well.

RESULT OF WATER ANALYSIS

Sampling date 21/7/2015	Sample ID CG32	QCVN 08(B1)
pH	6.6	5.5-9
DO (mg/l)	2.88	≥4
BOD ₅ (mg/l)	10	15
Chlorophyll-a (mg/l)	-	-

WASTE SOURCES

In 2010, the pond connected to the city's drainage system and received wastewater. In 2015, sewers for discharge into the pond are not seen. The pond receives waste mainly as water runoff.

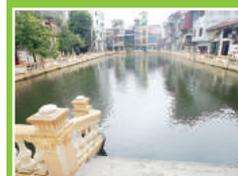
RECOMMENDATIONS

Model of private participation in water protection and treatment at Cau pond should be studied and encouraged at other ponds and lakes in the city.

In 2015, the pond's shore is clean, free of garbage due to the private sector's care for the pond. Water quality has significantly improved due to the private sector's investment in water treatment. Currently, the pond is used for bathing by the local people.

FOCUS

For 5 years under the private care, Cau pond has changed its face from a dirty, polluted pond to a pond so clean and clear that it can be used for bathing. It can be used as a typical case in lake rehabilitation and preservation.



TRUNG KINH THƯƠNG LAKE



GENERAL INTRODUCTION

This is one of the newly added lakes to the survey in 2015. The lake is in the Trung Kinh Thuong village, which is located in lane 171, Nguyen Ngoc Vu St., Yen Hoa ward, Cau Giay district. It has function in landscaping and regulating water in the region. Currently, the private sector is invested in the lake for fish farming.

SHORE AND CORRIDOR

The lake had a full embankment with a 1-meter high wall adjacent to 3-meter sidewalk. A part of the sidewalk is occupied by refreshment and food stalls. The lake is next to the residential area, a small yard, and concrete road.

WATER AREA

The lake water is green-colored, and not foul. The lake surface water is quite clean; there are leaves and some plastic bags on it. Many fish and almost no plants except green algae are in the pond.

RESULT OF WATER ANALYSIS

Sampling date 21/7/2015	Sample ID	QCVN 08(B1)
	CG34	
pH	9.4	5.5-9
DO (mg/l)	2.17	≥4
BOD ₅ (mg/l)	42	15
Chlorophyll-a (mg/l)	0.281	-

WASTE SOURCES

Wastes in the lake are mainly water from the drainage system of the area, wastewater from the lakeside refreshment and food stalls, and fish food.

RECOMMENDATIONS

Fish farming in the lake should be forbidden so that the lake becomes a scenic highlight of the area.

The result of water analysis shows that the lake water is alkaline, heavily eutrophicated and polluted by organic substances.



TU LIEN LAKE



CHÚ GIẢI

- Điều hòa nước
- Chứa kè
- Quán cốc ven hồ
- Cống xả thải
- Bãi tập kết rác
- Cây xanh
- Đường
- Nhà
- Nước ô nhiễm nặng

ĐV QUẢN LÝ

ĐVQL địa giới hành chính:
UBND Phường Tứ Liên

ĐVQL an ninh trật tự:
UBND Phường Tứ Liên

TỶ LỆ

1:3500

TỌA ĐỘ

105,83; 21,07

ĐỊA CHỈ

Đường Xuân Diệu,
phường Tứ Liên,
quận Tây hồ



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

Tu Lien lake has another name of Belly Fish Lake, which is located near No.43 of Xuan Dieu Street, Tu Lien Ward, Tay Ho District. The lake is used mainly for planting vegetable. Although it is one of the lakes considered in the lake renovation project in 2010, but so far the project has not been implemented.

The renovation project has been suspended since 2010 making local communities feel pressing. Results of the water analysis in 2015 show that the lake was contaminated with organic matters and algae. Lake landscape is degraded, many stalls are likely to expand.

SHORE AND CORRIDOR

The lake did not have embankments, was located near households, had no barrier and sidewalk around. On the lakeshore, there were many fruit trees like banana, labels, shrubs, bamboos.

Since the project of lake renovation has not been implemented, the status of lakeshore is still being degraded with serious pollution.

There were houses on the lake which discharged wastes into the lake. Much garbage and construction waste near Xuan Dieu street.

The side at Xuan Dieu street is filled with garbage from households and small business establishments. On the lakeshore, there were ten small stalls, snack restaurants, tents. The lakeshore opposite to Xuan Dieu street is adjacent to residential areas with no stall.

WATER AREA

The lake is a closed lake. Inflow is from rainwater and wastewater from residential areas. The lake's surface was entirely covered with water spinach. Water was green, had bad smell, plenty of fishes.

Water is opaque gray, stinky. The lake's surface is still entirely covered with water spinach. Only black catfishes can live in the lake. However, local communities said that vegetables and fishes here are unable to eat because the lake is too dirty.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID		QCVN 08(B1)
	TH11-1	TH11-2	
16/7/2010			
pH	8.51	8.70	5.5-9
DO (mg/l)	6.72	7.25	≥4
BOD ₅ (mg/l)	22	90	15
Chlorophyll-a (mg/l)	0.273	0.364	-

Sampling date	Sample ID	QCVN 08(B1)
	TH11-1	
7/7/2015		
pH	6.7	5.5-9
DO (mg/l)	5.18	≥4
BOD ₅ (mg/l)	22	15
Chlorophyll-a (mg/l)	0.131	-

WASTE SOURCES

The lake received wastewater through sewers of surrounding houses, and wastes dumped directly around and into the lake.

RISKS

Lake being narrowed, water quality being heavily polluted

RECOMMENDATIONS

Lake should be embanked, mud dredged immediately.



DOC BAO BI POND



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

The pond is a natural pond, also called Cong Truong pond. Currently, the pond is fully renovated and planned to become a landscape for Veterinary Department in Tay Ho district.

The pond has been renovated with full embankment. Lakeshore has been cleaned. No water spinach on water surface. Landscape is significantly improved. Results of the water analysis in 2015 show that the levels of chlorophyll-a and BOD₅ are higher than those in 2010. Also, pond water is contaminated with algae and is organic polluted.

SHORE AND CORRIDOR

The pond is isolated, no embankment, no fence. The pond was surrounding by gardens and houses. Large amount of construction waste on the pond shore.

The pond has full embankment with fence separating the concrete road. Since located inside Veterinary Department in Tay Ho district, the pond is isolated from the residential areas. Pond shore is kept clean.

WATER AREA

Water was grey due to mud, had bad smell. The pond was shallow, surface was completely covered with water spinach and water potatoes. The pond was likely to be filled if no renovation occurred.

Water is green, odorless, no garbage. Inside the pond are water potatoes, weed in low density. Animals in the pond are fishes, small shrimps, staggered. The pond is currently maintained very well.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID	QCVN	Sampling date	Sample ID	QCVN
23/6/2010	TH14	08(B1)	07/7/2015	TH14	08(B1)
pH	7.72	5.5-9	pH	7.8	5.5-9
DO (mg/l)	0.93	≥4	DO (mg/l)	7.0	≥4
BOD ₅ (mg/l)	25	15	BOD ₅ (mg/l)	30	15
Chlorophyll-a (mg/l)	0.036	-	Chlorophyll-a (mg/l)	0.159	-

WASTE SOURCES

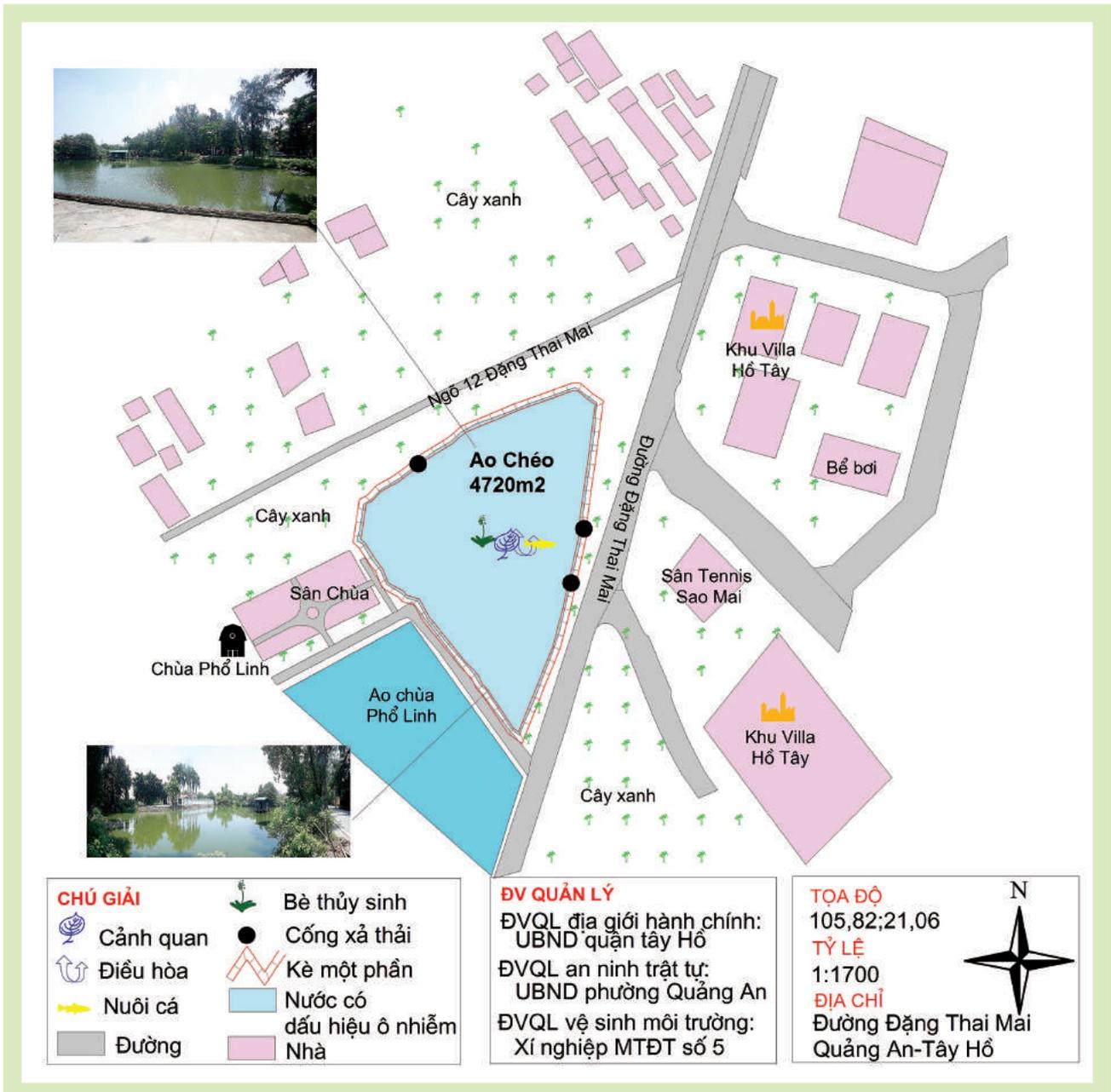
No wastewater discharged into the pond

RECOMMENDATIONS

Install treatment equipments or use aquatic plants. Annual clean-up activities should be implemented



CHEO POND



2010

2015

DIFFERENCES

GENERAL INTRODUCTION

The pond is a natural pond located next to Pho Linh pagoda, Dang Thai Mai Street, Quang An Ward, Tay Ho District. In the last 5 years, the pond is renovated by the local government and people of Quang An Ward, thus, has a good view

Pond's view is improved.
Water looks clean.
No discharge of wastewater from pig farming into the pond.
Levels of Chlorophyll-a have decreased compared to 2010. The pond is still organic polluted and in danger of algae growth.

SHORE AND CORRIDOR

The pond was 30 percent embanked, with 2 meter wide shore. Vegetations on the lakeshore are mostly scrubs, with some shaded trees. There were some temporary houses of people farming pigs which wastewater was discharged directly into the pond.

The pond was dredged in 2014, fenced and cleaned-up. On the lakeshore there were many trees such as flower milk, eggs-fish trees, bananas planted. No more pig farming and temporary houses.

WATER AREA

The pond was connected to Pho Linh pagoda pond and Dam pond. Water was moss green, had bad smell of decomposed plants. There were much garbage on the pond's surface. There were many hyacinth, wild spinach on the water; moss, algae covered the entire surface.

Water is golden brown, fishy, with bubbles, green algae, yellow algae, little garbage. Plants in the lake are lilies, water spinach, hyacinth. Animals are water spiders, farmed fishes.

FOCUS
Cheo Pond is used to be a closed pond, which received wastewater from pig farms, suffered from encroachment, and was used as a landfill. With positive activities of the local community, the pig farms and landfill were removed in 2014. Pond's shore was cleaned-up, bamboo fence was built, lotus were planted. Cheo pond was visited by the US Environmental Minister in 2014.

RESULT OF WATER ANALYSIS

Sampling date 16/7/2010	Sample ID		QCVN 08(B1)
	TH20-1	TH20-2	
pH	8.63	8.62	5.5-9
DO (mg/l)	3.13	4.35	≥4
BOD ₅ (mg/l)	20	19	15
Chlorophyll-a (mg/l)	0.259	0.210	-

Sampling date 07/7/2015	Sample ID	QCVN 08(B1)
	TH20	
pH	7.4	5.5-9
DO (mg/l)	0.92	≥4
BOD ₅ (mg/l)	33	15
Chlorophyll-a (mg/l)	0.112	-

WASTE SOURCES

Pond received garbage from Dang Thai Mai street and food for fish farming.

RECOMMENDATIONS

Cheo Pond is attached with Pho Linh pagoda, currently has beautiful landscape. Fish farming should be prohibited. Only lotus should be allowed to plant in the pond. Aquatic plants should be planted around the pond for improving water quality and contributing to landscape.



LANG POND



CHÚ GIẢI

-  Trồng sen
-  Đường
-  Nhà
-  Chưa kè
-  Nước có dấu hiệu ô nhiễm

ĐV QUẢN LÝ

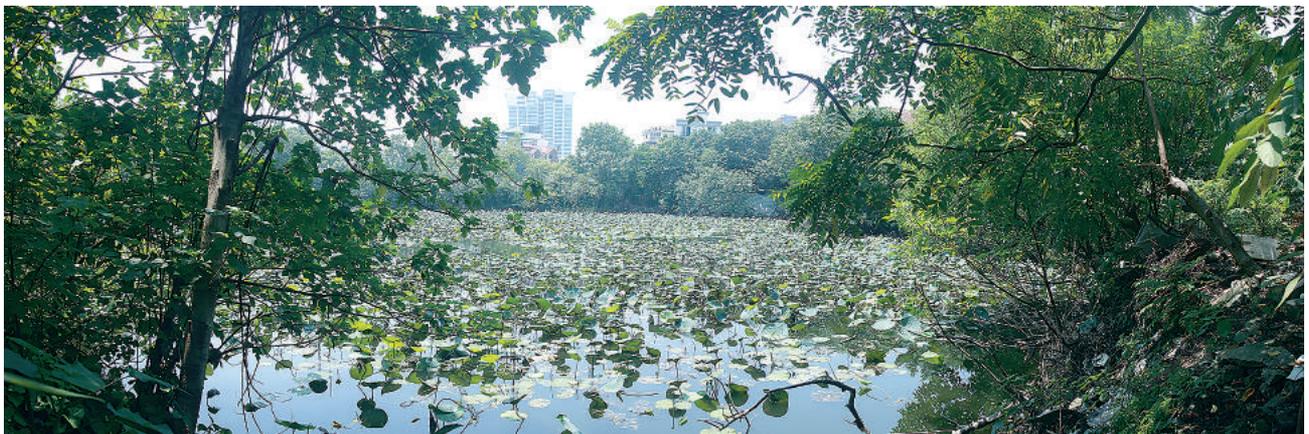
- ĐV quản lý an ninh trật tự
UBND quận Tây Hồ
- ĐV quản lý địa giới hành chính
UBND phường Quảng An
- ĐV quản lý vệ sinh ven hồ
Nhà thầu trồng sen

TỌA ĐỘ
105,83;21,07

TỶ LỆ
1:1700

ĐỊA CHỈ

Đường Xuân Diệu
Quảng An, Tây Hồ



2010	2015
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DIFFERENCES

GENERAL INTRODUCTION

Lang Pond is a natural pond located in a residential area, next to Xuan Dieu Street, Quang An ward. The pond is used for commercial lotus planting.

A company built iron fences around the pond for lotus planting. More garbage in the water near pond shore.

SHORE AND CORRIDOR

Pond did not have embankment, no barrier. Pond is located in a residential area. Around the pond are mostly bamboos, fruit trees in people's houses. Pond's shore is used to gather garbage and construction waste, with many landfills.

The side on To Ngoc Van street is protected by 2 meter high iron fences. Much garbage on pond's shore.

Results of the water analysis in 2015 show that the level of pollution has declined compared to 2010. However, it still has high algae pollution.

WATER AREA

Pond water is heavily polluted, dark blue colored, has bad smell from garbage on pond's shore. The pond also received wastewater from residential areas.

Water quality has not improved. Water is moss-green, has bad smell, more white bubbles appeared, green algae, yellow algae. Plants are mainly lotuses, duckweed. Despite lotus planting, the landscape is still degraded due to large amount of garbage.

RESULT OF WATER ANALYSIS

Sampling date	Sample ID	QCVN	Sampling date	Sample ID	QCVN
16/7/2010	TH22	08(B1)	07/7/2015	TH22	08(B1)
pH	8.66	5.5-9	pH	6.8	5.5-9
DO (mg/l)	2.40	≥4	DO (mg/l)	1.46	≥4
BOD5 (mg/l)	33	15	BOD5 (mg/l)	17	15
Chlorophyll-a (mg/l)	0.232	-	Chlorophyll-a (mg/l)	0.110	-

WASTE SOURCES

The pond received domestic wastewater from three sewers and garbage dumped from the side at Xuan Dieu street.

RISKS

Pond could be heavily polluted and seriously narrowed due to no embankment

RECOMMENDATIONS

There should be solutions to prohibit encroachment of corridor, pond's shore and surface water.





PART 4. POLICIES AND SOLUTIONS ON LAKE MANAGEMENT AND COMMUNITY PARTICIPATION ACTIVITIES FOR HANOI'S LAKES PROTECTION 2010 - 2015

Part 4 of the Institutional Study of Lake Management in the Baseline Report on Hanoi Lakes in 2010 provided a general picture of the mechanism and management system of Hanoi lakes. It also presented difficulties, challenges and constraints of the lake’s management system. The Study tried to answer the question: why are lakes still seriously polluted even when there is a such complex management systems exists and the local government has issued policies for a top-down approach for lake protection?

How has the lake management system changed in the past five years? To answer this question, the research *“Policies and Solutions on Lake Management and Community Participation Activities for Hanoi’s Lakes Protection 2010 - 2015”* was carried out to review the management system of the lakes, and to assess policy changes, and analyze the challenges, gaps, and shortcomings of the policy changes, as well as the opportunities for community participation in activities that promote Hanoi’s lakes protection. The results would help to define specific direction for future management of Hanoi’s lakes.

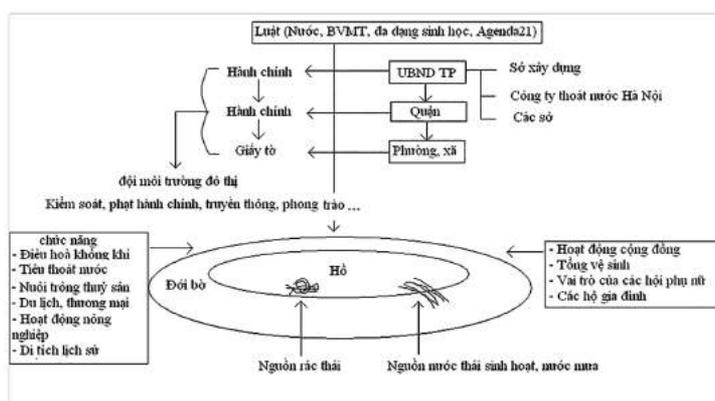
In this research, the research team has collected documents and policies related to lake management from 2010 to 2015, reviewed and analyzed the policies, as well as interviewed community members who live in areas around lakes in order to get updated information about the protection of Hanoi lakes. The content of this research report is divided into five parts:

- Summary of 2010 Institutional Study on the Management of Hanoi lakes
- The management of Hanoi lakes from 2010 to 2015
- Challenges and shortcomings in the management of Hanoi lakes
- Community participation in the protection of Hanoi lakes
- Recommendations

1. Summary of 2010 Institutional Research Report on the Management of Hanoi Lakes

The 2010 Institutional Study of Hanoi’s Lake Management has been presented in five sections: (1) Legal framework; (2) The management of ponds and lakes in Hanoi; (3) The challenges and shortcomings in the management of Hanoi lakes; (4) Management of ponds and lakes using an approach of community participation; (5) Recommendations.

The management system of Hanoi lakes are shown in the following diagram:



From the diagram, in order to manage and protect the ponds and lakes in Hanoi there are a system of laws, rules and legislation that involve all levels of management authority, from the People's Committee (PPC) of Hanoi, to PPC of districts, communes, and sector Departments. This management system follows a top-down approach and is relies heavily on controlling and sanctioning. Each pond or lake has many functions and features that are managed by several different agencies. In terms of ecology, every lake has a particular aquatic ecosystem and this ecosystem cannot be separated. The fact that multiple parties manage one lake is contradictory to the conservation of lake ecosystems. Current mechanisms cause conflict in management of lake water and the lakeside corridor. This approach is the biggest challenge in the conservation of lake ecosystems, leading to the degradation of the landscape, water regulatory functions, and the environmental function of the lake.

The report also refers to the model of overall resource management of Elinor Ostrom (who received the Nobel Prize in Economic Sciences in 2009). The model is based on eight principles in the management of common community resources. Hanoi lakes are a common community resource, so these principles can be used to create community models for protecting the lakes. The study also provided some reference in lake management from Japan and the Philippines, which are examples of this management approach. In addition, the report analyzed models used at two lakes in Hanoi, Den Lu and Huu Tiep (also known as Ngoc Ha Lake), which used community participation to effectively protect the lakes.

The report gave 23 recommendations about the management of the lakes for different stakeholder groups, where it emphasized that the success (or lack of success) of the protection and conservation of the Hanoi lake system is dependent on each lake's ecosystem for restoration and protection. Restoration work requires scientific collaboration between structural measures, non-structural measures and the monitoring of the community participation around the lake for its protection, as well as the appropriate changes in the institutional case management.

2. The management of Hanoi's lakes from 2010 - 2015

2.1. Institutional Framework

The Law on Environmental Protection 2014, Chapter VI, Section 2 "Protection of other water sources", Article 56 "Protection of water sources of lakes, ponds, canals and ditches" states:

1. Water sources such as lakes, ponds, canals and ditches must be investigated and assessed for quantity, quality, and protected to regulate water sources.
2. Lakes, ponds, canals and ditches in urban and residential areas must have plans for improvement and protection.
3. Organizations and individuals are not permitted to occupy, build constructions and houses illegally on the water surface, or on the bank adjacent to lakes, ponds, canals and ditches; minimize the filling of lakes and ponds in urban and residential areas.

4. Provincial People's Committees have responsibility for organizing investigation, assessment of quantity, quality and making plans of protection and regulation of water regime of lakes, ponds, canals, and ditches; Preparing and implementing plans of renovation, or relocation of constructions and houses on lakes, ponds, canals, and ditches, that cause environmental pollution, flow clogging, degradation of wetland ecosystems and loss of urban aestheticism.

According to the Law on Environmental Protection 2014, Hanoi's lakes are under the management of Hanoi's People's Committee. For the last 5 years, there were many environmental regulations and policies enacted by the City. One important document related specifically to the management of Hanoi's lakes is the Decision No. 2249 /QĐ-UBND dated 05/18/2011 about Regulation of management, and maintenance of lake water quality after treatment (the Regulation). This is an important regulation reflecting the management of Hanoi's lakes. The Decision has 11 articles, 5 pages, including: Identifying technical standards after treatment; assigning tasks for water quality management and maintenance units; provisions about funding, administrative sanctions and responsibilities of Hanoi Department of Natural Resources and Environment and other Departments.

Under this Regulation, for the lakes which water has been successfully treated, the maintenance of water quality is delivered to agencies, units including: People's Committees of districts/towns; Hanoi Sewerage and Drainage Limited Company; Units running services on the lake; In addition, other specialized management agencies which are involved in the management of Hanoi's lakes must follow this Decision.

The expenditures for operating lakes and maintaining water quality is allocated differently. Under Article 8, Hanoi Sewerage and Drainage Limited Company uses the company's annual environmental non-business fund; People's Committees use annual non-business funds; Units running services on lakes use revenue from services.

About sanctions against violations, Article 9 of the Decision also states that any violation regarding environmental protection of the lakes which water has been treated will be fined according to the Decree 117 / 2009 / ND-CP dated 12/31/2009 of the Government on sanction against violations regarding environmental protection. Hanoi Environmental Protection Department is assigned to monitor water quality every 6 months, to guide agencies/units in management of lake water quality following technical instructions.

The Decision shows that, one lake could be managed by multiple agencies: by Hanoi Drainage Limited Company, by a company/unit operating services on the lake, or by the People's Committees at different administrative levels. However, water quality depends a lot on the effluents discharged from sewers and waste management of areas around lakes. If sewerage and waste management is not well managed, water pollution continues. This is a big shortcoming in the management of lake water quality.

Lake ecosystem is a criteria reflecting the health of a lake. However, according to this Regulation, in technical standards there is no regulation mentioning the ecological quality of lakes, or consideration for the protection of lake ecosystem.

The compliance with the Regulations is difficult due to lack of funding and staff. The environment non-business funds for Hanoi Drainage Limited Company and People's Committees are allocated to various tasks. It is hard to say that financing for activities to protect lakes are prioritized and guaranteed.

In order to ensure good quality of lakes, clean water, healthy ecosystems, and beautiful landscapes, officers in charge of environmental management of lakes must have basic knowledge and skills for lake ecological conservation, surface water quality protection, understanding of the risk of contamination, as well as have the right to impose sanctions against violations. However, this document only considers responsibility of authorities. There is no guarantee that officers in charge can achieve these standards.

As analyzed in the 2010 report, the management of Hanoi's lakes faces big challenges because there are too many agencies responsible for the lakes. The above Regulation could not resolve these problems, not reflect the ecosystem approach in the protection of lakes, so, surely it is difficult to achieve the desired efficiency in protecting lakes.

Besides that, an important point of this Regulation is to ban fish farming (Section 3, Article 7). In reality, very few lakes comply with this regulation, including the famous lakes like Nam Dong, Den Lu, Thanh Nhan where fish farming is widespread. Benefits of urban fish farming are not really obvious, while this could lead to lake water pollution and take away urban aestheticism. This is a typical example showing that enforcement is one of the biggest challenges in management.

Furthermore, a lake's environmental quality also depends on the activities of the communities living around it. Recently, there have been many communities who have organized by themselves great activities to protect the lakes. However, the Regulation does not highlight the important role of communities in the protection of lakes. Although, responsibilities have been assigned to agencies at different administrative levels from City to Communes, the terms are unclear, overlapping and difficult to implement.

For example, if a specific lake is managed by the People's Committee of the district, the lake environment is managed by the Environmental Management Division of that Committee. But water level in some retention lakes in Hanoi is managed by the Hanoi Drainage Limited Company, thus, the company also manages these lakes' water quality (Point 1, Article 5). On the other hand, the monitoring of water quality is a responsible of the Department of Natural Resources and Environment in Hanoi. Therefore, if the lake is polluted, people do not know whom to inform and who is really responsible for keeping the lake clean? As long as the lakes are still components of the urban drainage system that receive wastewater without treatment, lake water pollution and lake landscape degradation will continue. The task of making the lakes cleaner and keeping the landscape green and beautiful, therefore is still a major challenge.

According to the Decision No 5038 / UBND-XDGT dated 7/10/2014 of the People's Committees of Hanoi, there are 85 lakes capable to regulate urban storm water, which consist of 8 lakes in Ba Dinh district, 8 lakes in Hai Ba Trung district, 8 lakes in Dong Da district, 4 lakes in Tay Ho district, Hoan Kiem lake (Hoan Kiem

district) and Nghia Tan lake (Cau Giay district). These lakes are connected through sewers to the drainage system of the city. On rainy days they receive rain water from city drainage system, along with rubbish and municipal waste water. Not only is the lake water polluted, but the lake surface is also filled with rubbish. An officer from Hanoi Sewerage and Drainage limited Company, who is in charge of management of water levels of lakes said: *"The current role of Hanoi's lakes is drainage instead of ecosystems conservation, and as long as this is true, Hanoi's lakes are still being polluted despite any level of renovation"*. Therefore, the key functions of Hanoi's lakes should be clearly identified and consensus should be made in order to develop possible alternatives for lake ecosystems protection.

It can be seen that the complexity and overlap in the management and exploitation of urban lakes for different purposes is one of the major reasons of the decrease of efficiency in lakes management and conservation. Therefore, benefits from ecological services, micro climate conditioning, landscape, entertainment are not fully utilized.

2.2.Lake restoration and pollution treatment projects:

From 2010 - 2015, authorities has implemented many programs to restore ponds and lakes and treatment project. For example as: Program on control river, marshes, ponds and lakes pollution in the city from 2009 to 2012; Hanoi lake renovation; Water Pollution Treatment projects on Truc Bach lake; Pilot program of lake protection with community participation; Monitoring program on water quality of lakes in city from 2010 - 2015; The communications program and the research cooperation programs for finding solution in Hanoi lake pollution treatment.

The program was conducted by many organizations: *Department of Natural Resource and Environment, Ministry of Science and Technology, Green Company Ltd., Chemistry Institute, Environmental Treatment Company, Center for Environmental Technology Research and Sustainable Development, the Committee of Ngoc Khanh, Thanh Nhan and communities around the lake.*

The Program on "Control river, marshes, ponds and lakes pollution in Hanoi" which was implemented since 2009 with two periods: Period 1 from 2009 – 2010 which has conducted water pollution treatment at 7 lakes includes Quynh Lake, Ngoc Khanh Lake, Xa Dan lake, Hai Ba Trung Lake and Ngoc Ha lake, Dai lake, Kim Lien lake; Period 2 from 2010 – 2012 which had continuously scaled out of 5 lakes included Thanh Nhan, Thanh Nhan 2B, Den Lu, Van Quan, Vo Lake. The program has adopted four different technologies: Treatment to reduce ground water pollution by integrated management and technology ; Recovery of lake landscape by combining biological solutions combined with precipitation; Complex solutions Mechanical - Biology - Chemistry and Microbiology IDRABEL Technology - Belgium.. For some lakes that were affected by receiving many wastewater sources, results of water quality treatment were limited. These include lakes Ngoc Khanh, Quynh, Kim Lien, Den Lu, and Thanh Nhan 2B. For Ngoc Ha pond and Dai lake, which have a large volume of mud, water treatment also did not result in adequate quality. In general, the odor issues of lakes had significantly reduced, less events that cause fish dying, better hygiene conditions and better landscape.

Another program on control water quality, the project “Improvement the urban Hanoi lake environment” was carried out by the Department of Construction. The main objective of the project was to restore 45 lakes. The project has been divided into 3 periods: 15 lakes in period 1, 8 lakes in period 2; 22 lakes in period 3. Currently, dredging and installation of embankments have finished in 12 lakes, on-going dredging continues with two lakes, and the rest of the other lakes still are waiting to be renovated. This is a big project with a large budget focusing on lake infrastructure improvements. With this project, many lakes have escaped the risk of encroachment, and we hope that there will be better landscapes which serve the surrounding community.

Project of water pollution treatment in Truc Bach: The project was carried out by Center of Incubator Business high Tech, Hoa Lac High Tech Company under the Ministry of Science and Technology. The project has finished and the water treatment system was handed over to Department of Construction to continue to use. At the same time, in order to strengthen the effectiveness of water pollution treatment in Truc Bach Lake, Hanoi People’s Committee has issued Document No. 8455/Committee-NRE 22/10/2010 to ask families who live around Truc Bach Lake to use special products to treat household wastewater. The program was applied in two wards: Quan Thanh and Truc Bach from September 2010 to April 2011. There were many media campaign technical guides to provide information to household living there. The results showed that there was a significant reduction of the blackish wastewater in sewers there. Besides measures that were applied to improve water quality of lakes, DONRE also has monitored water quality of 37 lakes in the city to assess water quality, timely detect pollution in lakes and to provide timely corrective measures.

A pilot model of combining exercise with community participation to protect lake has been carried out by the Environmental Protection Agency with financial support from Hanoi Environmental Protection Fund, and in collaboration with Hanoi Institute for Water and Environment. The project has been conducted at two lakes: Ngoc Khanh and Thanh Nhan 1. The program installed 2 exercise machines where people could cycle on the pedals of the machines for exercise and create movement of wheels half deepened in water. The movement helps bring oxygen from the air into the water to help clean the water. This model was appreciated because it makes the lake healthy, and raises awareness for the community in environmental protection in general, and environmental lake protection in particular.

Clearly in the last 5 years, the city has made a large investment for the renovation of Hanoi Lake. However, most of the projects have been at the pilot level, and not yet able to be implemented in other lakes. Most of projects have not involved community participation in the implementation, therefore, after the projects finish, water quality quickly declined, and are now as seriously polluted as Ho Me Lake, Uncle Ho fish Lake (Vinh Tuy, Hai Ba Trung).

3. The challenges and shortcomings of the management of lakes in Hanoi

3.1. The challenges of the functions of Hanoi Lake

Hanoi lake and wetland ecosystems have played an essential role in the

environment by promoting socio-ecological functions, regulating storm water discharge to reduce catastrophic flooding and inundation, and the creation of a “green lung” for urban small landscape. However, many lakes in Hanoi today remain economically exploited by fish farming, or grow vegetables, or serve as sewers to receive wastewater. Those functions are conflicting with each other. In the context of rapid urbanization and modernization there should be a clear definition of functions of each lake, and management of each lake by function, with priority of regulating rain water, air, ecological and landscape functions.

Many lakes in Hanoi have been invested by Hanoi authority in restoration and water treatment to ensure effective rain water regulatory function and maintaining landscape for the surrounding community. However these lakes sometimes have been used for fish farming, and they still receive untreated waste water from the surrounding areas, which cause increase of nutrients for the algae and degradation of water quality seriously degraded. Fish farming makes lakes prone to severe eutrophication, smelly, and much polluted, especially on hot days. During times of unusual weather changes, fish have been killed due to the weather shock, causing serious water pollution of lakes. The continuation of fish farming does not bring much economic benefits in comparison to the cost of water treatment and cost of environmental degradation of the lakes.

3.2 Challenges in the enforcement of legal documents

As explained in section 2.1 above, although the system has been comprehensive, including the Law, decrees, and different decisions made by the authority of the City, which include aspects from general management to the treatment program, all of these documents are quite general and lack specification for implementation. The decentralized management has divided the functions of the lakes and do not protect water quality and lake ecology. Overlap in management functions creates a heavy system focusing mainly on process, but has little to do with protection and improvement of water quality.

Through the above analysis, clearly there are many difficulties in the management of the Hanoi lakes, mainly reflecting in two main aspects: overlapping in management responsibilities and discrepancies in the determination of functions of each lake. To gradually resolve these conflicts, there is a need to take measures to make drastic changes in management, starting from defining the functions of the lake in Hanoi with a priority given to functions that are in line with modern urbanization: landscapes, ecological, social and cultural, regulate water flooding and adaptation to changing weather. Specifically, fish farming needs to be completely eliminated. There is a need to create a strategic roadmap for the protection of Hanoi lakes for the long term with adequate funding to ensure effective lake restoration.

4. Community participation in protecting Hanoi Lakes

In 2010, a model for community participation for protecting lakes in Hanoi was presented in the 2010 book part on Den Lu Lake. This model by Women Union of Hoang Van Thu Ward was successfully initiated and implemented.

At the International Conference “Sustainable use of Hanoi-based Lake Community

in an Environment of Urbanization and Climate Change" on 22/06/2012 organized by CECR, initiative to establish Hanoi Lake Club was proposed and some of delegates and experts attending the workshop have registered as members. The CECR and the Institute for Urban Research and Infrastructure Development were patrons of the club. Shortly after its establishment, Hanoi Lake Newsletter was developed to maintain updated information about the lakes. Women's groups in Ngoc Khanh Ward, Hoang Van Thu, Quang An became core members of the Club. They organized many activities to clean up the lakes in events such as World Water Day, Wetlands Day, International Coastal Cleanup Day, campaign during religious holidays...and rallying other community members to participate in these events. Other programs that add a meaningful and practical contribution to the "Hanoi Lake Community Protection" movement include trying to build community support for youth groups in the Nam Dong Ward and Ha Dinh and Kim Lien communities to encourage awareness for Environmental Protection and Climate Change.

Presented below are community activities that have occurred in recent years that have supported the protection of Hanoi lakes, including the typical activities of the Women's Union ward and the participation of many businesses and young students.

4.1. Community participation in protecting Hanoi lakes

Women Union of Hoang Van Thu Ward and movement "Green - Clean - Beautiful" in Den Lu lake.

Den Lu lake is a large retention lake and it is the only entertainment space for the people in Hoang Van Thu district, so the Women's Union in the district becomes protective of the lake at the early stage. Its members were aware that the lake gives them a healthier living environment. The association held events reminding people to not litter to the lake and they planted flowers and plants around the lake. The Women's Union launched the district's Green – Clean – Beautiful – Bloom movement, put more trash bins around the lake and gave to each household information to guide how they can help to keep the lake clean. In particular, the group regularly organizes cleanups events around the lake on weekends. Since 2012, the WU has placed signs around the lake to remind people not to throw away old altar ashes into the lake. These activities have attracted participation of many people and were strongly supported by the local authorities.



In 2010, WU Hoang Van Thu Ward welcomed Ms. Anne Castle, Assistant Secretary for Water and Science of the U.S. Department of the Interior on their visit to Vietnam, where local ladies discussed about their works in protection of lake. Ms. Anne Castle expressed admiration for the work of the women and said

“This is a huge success. This is a success not only for the present generation but also for the future generations”.

With their dedication and effort, the WU of Hoang Van Thu District makes Den Lu Lake to become a social center for community activities of the area and neighborhoods.

Women Union of Ngoc Khanh Ward protect Ngoc Khanh lake

Ngoc Khanh Lake is a beautiful lake in a famous area of the Dong Da district. The Ngoc Khanh Ward WU have had many activities at the Ngoc Khanh Lake, such as cleaning the pool, planting, maintain a clean area and reminding people to not allow their dogs to defecate in the park around the lake to try and promote preservation of the lake. In addition, the Women Union worked



together with youth and students of Watewise Organization, RMIT students and the Standard Chartered Bank staff to organize many campaign to raise awareness of people in environmental protection and promote environmental culture in the area every year on World Water Day and Earth Day.

People Group 76, O Cho Dua Ward pioneers in protecting Dong Da Lake



Dong Da Lake is a lake in Dong Da District and it has border with O Cho Dua Ward and Trung Liet Ward. Workers from Ha Thuy Co. are responsible for maintaining sanitation conditions around Dong Da lake, but the cleaning is not done thoroughly. The area and the lake suffer a lot of trash and smell by water pollution.

People Group 76, a group located near to Dong Da lake, to improve this problem: 76 households worked together to organize cleaning up the surrounding of the lake twice a month. The goals of the community are to keep lake clean timely, increase awareness for lake protection for future generations and to promote attitude change of people. The habit of littering of the people living around the lake has been increased steadily since 2014. Thanks to these efforts most households now enjoy clean street and lake area.

The work of People Group 76 has attracted other partners to join their efforts. These partners include staff of Standard Chartered Bank, student group of Hanoi University of Science and Technology join cleaning activities twice a month. This is a great example of how small initiative could turn into a meaningful partnership and in long term it could affect attitude of people for the better.

The model of community participation in protection Cheo pond and Pho Linh pond at Quang An Ward

Cheo pond and Pho Linh pond are two ponds in front of the gate of the Pho Linh pagoda located in Quang An ward, Tay Ho district, Hanoi. This is also an area of spiritual significance attached to the Phu Tay Ho legend. Before 2010, the two ponds were faced with a situation of encroachment by the dumping of waste and construction materials, especially the Cheo pond since it received waste from pig farming.



Since 2011, the CECR has carried out study on the status of the two ponds and proposed model for community participation to improve conditions of the ponds. On the basis of the model, Women Union and Veterans Association in the Quang An ward work together to develop a management plan for Cheo pond and Pho Linh pond. This plan includes activities such as dredge sediment from water, clean up shore and installed ecological embankment, planting aquatic plan and bamboos fence, organize regular clean up events, and campaign to advocate for community's responsibility and participation in improvement works of the ponds.

The activities above were implemented by WU since 2012 as pioneer group with the support of the local government and the involvement of young students. As a result the pig pen was removed from Cheo pond in 5/2013. Flower bed and gardens have been planted along the corridor to Pho Linh pagoda. In water, lotus has been planted. The landscape of the area has been changed to the very attractive place.

So far, WU Quang An ward and Pho Linh pagoda buddhist take responsibility to maintain cleaning activities that help to keep the status of the lake after restoration, and water quality is gradually being improved.

4.2. Business Engagement in Protection of Hanoi Lakes

For the past 5 year, the community activities not only attracted the participation of people and students but they have also attracted the participation of companies. These include FPT Corporation, New Quantum, Standard Chartered Bank, Lock & Lock and Vietnam Asian Bank. These businesses not only act as a sponsor for events like Earth Day and World Water Day, but their staff also actively participate in activities such as cleanups, cycling and jogging for Hanoi lakes.

In particularly staff of the Vietnam Standard Chartered Bank, besides joining big events, they also actively involved with local communities of Ngoc Khanh Lake, Dong Da Lake on routine regular activities in weekend cleanup events.

4.3. Youth Engagement in Protection of Hanoi Lakes

In 2012, the CECR organized the Youth Pioneer School on Environmental Protection and Climate Change to help students get the basic knowledge about environmental protection no matter the place or job they have in the future. The program is a 3-5 day training course that combines classroom and applied activities that provide students in different universities with knowledge about the environment, ecosystem and experience in monitoring lake water and community activities.

At the end of training, the participants work in groups propose initiatives that they will work with communities to help protect lakes in Hanoi. Examples of these initiatives include monitoring of water quality of lakes, organizing signing of commitment for families who are living around the lakes; waste recycling program for small communities; organizing environmental clubs in their universities... The students of the program play core role in organizing activities for big event such as annual Earth Day in Ha Noi.

In 2015, the CECR organized Action Month for Hanoi lakes from 22 March to 22 April. Students of Hanoi University of Agricultural organized cleaned up for 4 ponds on campus; Student Club of Hanoi University of Science and Technology helped to clean Dong Da and Nam Dong lakes and talked with people around lake on their commitment to keep lakes clean. Youth Volunteer Club C25 worked on cleaning Kim Lien lake; Green Club at the Public Health University worked on Thanh Cong Lake; Volunteer Student Club of Hai Duong organized clean up at Ba Mau lake.

One of very good example of youth movements in the protection of lakes was the Lake Project established by the Vietnam Water Wise Organization. Main activities involved in teaching young children about the importance of lakes and basic understanding of ecosystem.

Other youth project "The Flow of Hope" has worked on Ha Dinh Lake and some students of the projects have participated in ASEAN Youth LEAD Summit in Manila, Philippines on May 12th, 2013.

4.4. Media engagement in protection of Hanoi Lakes

Along with the activities at the community level, there were bigger media events organized in Hanoi promoting and advocating for people participation in protection of lakes. These events include annual Earth Day celebration on 22 April. The main media messages focused on protection of Hanoi lakes such as “Join Hands to Protect Hanoi Lakes”, “Stop Activities that Pollute the Lakes”. These events attracted thousands of participants and effectively communicated the importance of lake protection in the press and television.

Main television stations like VTV1, VTV2, InfoTV and press carried out news on these events and the messages have been disseminated all over the countries. Many documentaries have been produced about lake topics in the last few years.

In addition to the main even on Earth Day, many districts hold smaller events to promote cleaning lakes on Wetland Day (2/2), World Water Day (22/3), International Coastal Cleanup Day, World Environmental Day.

These media events, combined with the influence of the press and television have contributed immensely to raising awareness for protection of lakes in Hanoi, environmental protection and they promote the protection of the community ponds. As a result, the community involvement in the protection of Hanoi lakes is greatly increased and pushed in a more dynamic direction.

5. Recommendations

For the last five years, the number of lakes is quite stable; however, the surface area of lakes has decreased. Water quality of some lakes has improved significantly and embankments of all lakes in Hanoi were nearly completed. The environmental status of landscape of many lakes was cleaner and more aesthetically pleasing. Another positive point is that the community activities that raise awareness and promote participation in lake protection have formed and spread, with the pioneers being the Women’s Union and student youth groups. Media activities are implemented frequently and shown on television, in newspapers and in online media, which also contribute to the promotion of more successful lake protection.

However, water pollution and degradation of landscapes of lakes remain big challenges. In order to reach to better and ideal lakes, meaning with the best water quality, the cleanest ecosystems and beautiful landscape, much more need to be done. Based on analysis of the shortcomings and difficulties in the management of the lakes and from the cases of community activities, we propose the following recommendations:

Recommendation 1: Each lake should have an identified specific water zoning and defined landscape area around the lake. This area of lake should be considered as core area of absolute non-infringement. Each lake should have identified specific functions.

Recommendation 2: Fish farming in lakes for economic purposes should be considered carefully and where is possible, should be completely eliminated. Number of fish species in each lake need to be controlled only to best serve functions of that lake.

Recommendation 3: Each lake in Hanoi should have an independent general management body responsible for the upkeep of the lake. The management body would be responsible for restoring the environmental quality to the lake, including water quality and the surrounding core area of each lake, ensuring that the lake with gradually be restored to its functions.

Recommendation 4: The management body of lake should be responsible for planning the long-term management for each lake in a strategic way, in order to gradually restore the function of each lake and in order to create clean, beautiful landscape.

Recommendation 5: The management group should be responsible for the coordination among different departments and agencies responsible for the lake to promote integrated management of the lake to reach common goals.

Recommendation 6: Hanoi should have an adequate budget for lake management body in order to operate effectively.

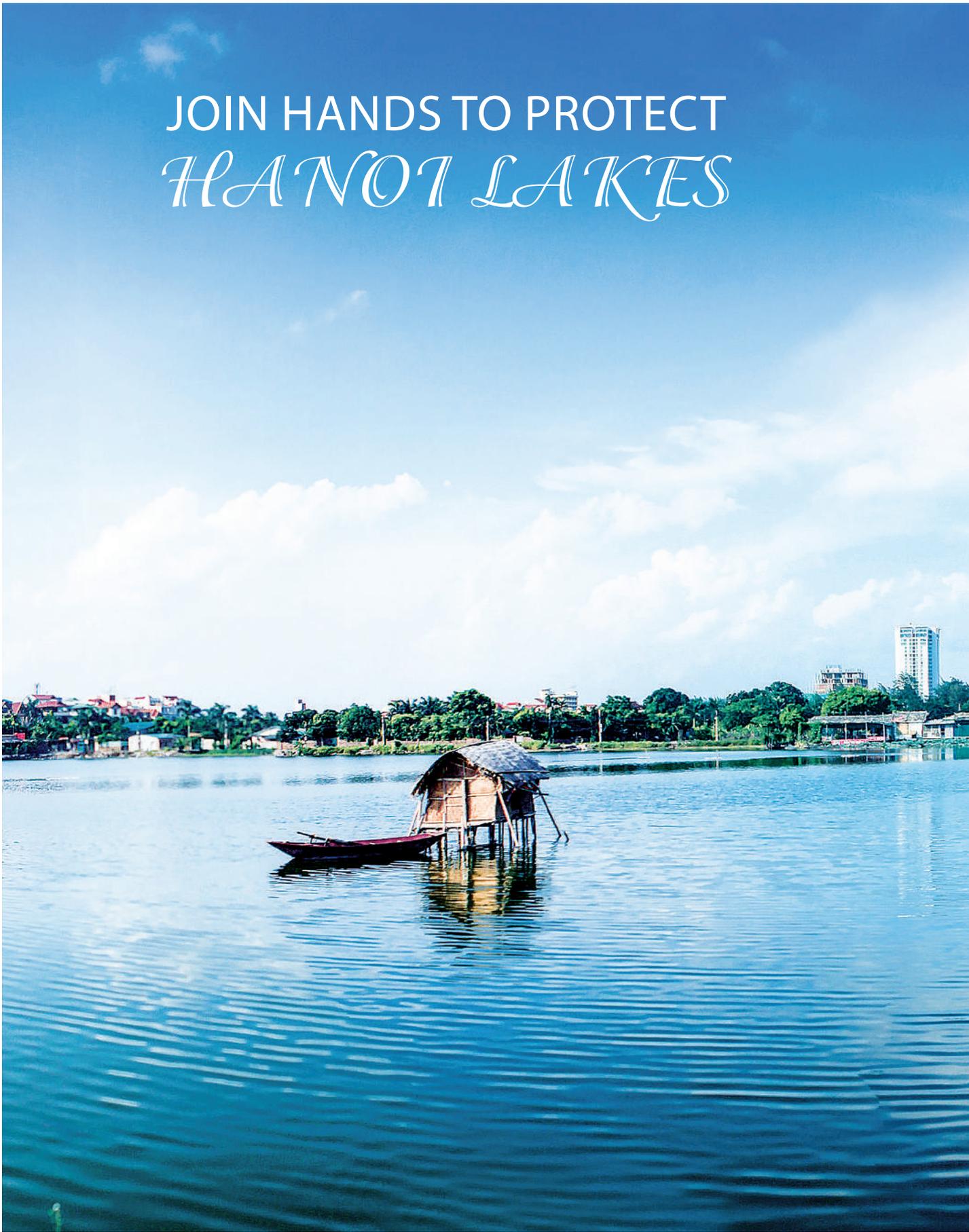
Recommendation 7: Hanoi needs to have a high consensus of the view that Hanoi lakes are an asset of Hanoi and it requires great attention and long-term investment. Investing in protecting the lakes would have indirect and direct benefits such as jobs creation, attraction of tourism, reduce diseases, increase social, educational values, creating intangible values for the city, and help city to adapt to climate change.

Recommendation 8: Community activities need to be encouraged and promoted in systematical manner. There should be a strategic plan to advocate for partnership and cooperation between stakeholders, business, communities, scientists, NGOs, and communities to work together in protection of Hanoi lakes, and this could be a foundation for creating environmental culture for Hanoi.

Recommendation 9: There should be a monitoring system of Hanoi lakes. The baseline data should be carried out for expansion areas outside the six core districts. The baseline data will be an information platform based on GIS / ArcView that serves basis of information for the scientific and social activities.

Recommendation 10: Media to raise awareness for the people of Hanoi about lake environmental protection and to create environmental culture for Hanoi should be continued and encouraged.

JOIN HANDS TO PROTECT
HANOI LAKES





APPENDIX

Appendix A: Application of GIS/ArcView to description of the current state of the lake.

Data of lakes from survey have been used to create an attribute table for each lake. The data included in the attribute table are data about features and functions of the lake such as name, location, area of the lake, number of sewers, location of garbage yard. Digitation and encodes of additional information on roads, labels and legends have been carried out for each map. The layout of map has been processed for each lake displaying attributes. The latest action was to export to create maps needed for the book.

Appendix B: Assessment of the water quality of 30 lakes

School of Environmental Science and Technology - Hanoi University of Science and Technology

I. Methods of measurement

Water quality of lakes is assessed through 6 basic parameters as pH, temperature, DO, turbidity, BOD5 and concentration of chlorophyll-a. Of which the first four parameters are determined by the multi-parameter water quality instrument in the field. To measure parameters of BOD5 and chlorophyll-a, water sampling at the field is conducted and then the sample is transported to the analytical laboratory. Methods of measuring and analyzing these six parameters are the ones meeting relevant Vietnam standards and Standard Methods for the Examination of Water and Wastewater of United States. Methods of sampling methods, preservation and handling for lake/pond water are applied under the guidance of national standards:

- *TCVN 5992:1995 (ISO 5667-2: 1991) - Sampling: Guidance on sampling techniques*
- *TCVN 5993:1995 (ISO 5667-3: 1985) - Sampling: Guidance on preserving and handling water samples*
- *TCVN 5994: 1995 (ISO 5667-4: 1987) - Sampling: Guidance on sampling in natural and artificial lakes/ponds*

II. Methods of data processing

Results of measuring and analyzing the 6 parameters of water samples of each lake are summarized in the tables of analysis results, accompanied by a description of the weather conditions at the time of sampling, and comments on the results. The analytical results are compared with QCVN 08:2008 column B1 - National technical regulation on surface water quality applied to water resources for purposes of irrigation or other purposes that have similar or lower water quality requirements. This comparison allows the assessment of whether the lake water quality meets current standards.