

AN ECOLOGICAL ASSESSMENT OF SITU BABAKAN LAKE FOR AGROTOURISM DEVELOPMENT IN JAKARTA

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ABSTRAK

Situ Babakan telah ditetapkan sebagai salah satu daerah tujuan wisata di wilayah Propinsi DKI Jakarta karena berada ditengah-tengah lokasi pengembangan Perkampungan Budaya Betawi di Kotamadya Jakarta Selatan. Sebuah pengkajian telah dilakukan dalam upaya membantu pemerintah untuk mengembangkan danau ini sebagai wilayah agrowisata. Tujuan dari pengkajian ini adalah untuk a) mempelajari kualitas air dari danau tersebut dan b) mengetahui persepsi tentang pengembangan danau sebagai wilayah agrowisata dari masyarakat yang tinggal di sekitar danau dan dari tamu yang mengunjungi danau. Dari pengkajian ini diperoleh hasil bahwa a) danau Situ Babakan mempunyai potensi yang baik untuk dikembangkan sebagai wilayah agrowisata yang diperlihatkan oleh kualitas air danau yang cukup baik; b) baik penduduk yang tinggal di sekitar danau maupun tamu yang mengunjungi danau sangat mengharapkan agar danau ini dikembangkan secara profesional dan berkelanjutan sebagai wilayah agroturisme. Saran kebijakan untuk pengembangan situ Babakan adalah : a) perlu penataan tata ruang di wilayah sekitar situ, b) perlu melibatkan masyarakat setempat dalam pengembangan situ Babakan, c) sumber-sumber pencemar perairan situ Babakan perlu dikendalikan dengan sebaik-baiknya, sehingga kualitas perairan situ dapat dipertahankan, d) penataan KJA (Keramba Jaring Apung) perlu dilakukan agar keindahan dan kelestarian situ dapat dipertahankan.

Kata Kunci : *pengkajian lingkungan, pengembangan agro wisata, danau Situ Babakan*

ABSTRACT

Situ Babakan Lake is determined as one of tourism areas in DKI Jakarta province due to its strategic location in the center of Betawi Cultural Village development in South Jakarta municipality. This assessment was aimed at assisting the local government in developing the lake as an agro-tourism area. Specifically, objectives of the study were (a) to study water quality of the lake, and (b) to know perceptions of surrounding community and visiting tourists regarding the development of the lake as an agro-tourism area. The results showed that (a) Situ Babakan showed its potential for an agro-tourism area due to its good water quality, (b) local community and visiting tourists expected that the local government should promote the lake as sustainable and professionally developed agro-tourism area.. Policy recommendations of the study are: (a) local government has to properly design the surrounding area of the lake, (b) involving local community in developing the lake as an agro-tourism area, (c) controlling sources of pollution to sustain water quality of the lake, and (d) existing floating nets are to be maintained for its best scenic views of the area.

Key words: *environmental assessment, agro-tourism development, Situ Babakan lake*

INTRODUCTION

The Government of DKI Jakarta Province issued a Governor Decree No. 92/

2000 on August 18, 2000 concerning the Environmental Management of Betawi Cultural Village, including the Situ Babakan Lake, in Srengseng Sawah, Sub-district of Jagakarsa, Municipality of South Jakarta. Issuance of the

Decree is aimed at motivating and giving opportunity to the people living in and adjacent to Betawi Cultural Village to develop and utilize the local potential for cultural tourism, agro tourism, and water tourism along with increasing people's welfare.

The Situ Babakan Lake has an area of 32 hectares in which its water flows in from the Ciliung River and currently is used for fish culture by the people living in the vicinity of the Lake. There are more than 100 floating net cages (KJA) placed in the Lake to breed different kinds of fish, including Carp, Tilapia, and ornamental fishes. The Lake also functions for water tourism activities, such as water rafting (*bebek air*), and fishing. The garden surrounding the lake is cultivated for growing fruit plants, such as banana, coconut, and guava.

The population of *Kelurahan Srengseng Sawah* in 2000 was 43,161 persons, consisting of 22,366 males and 20,795 females, with growth rates ranged from 1.67 to 7.17 percent during the period of 1996-2000, and the density was 6,397 persons per km² (Anonymous, 2001).

Agrotourism development is an effort to utilize agro tourism potential in a certain area (Tirtawinata and Lisdiana 1999). Based on the Joint Decree between Minister of Tourism, Post and Telecommunication No. KM.47/PW. DOW/MPPT-89 and Minister of Agriculture No. 204/KPTS/HK/050/4/1989, agro tourism as a part of tourism objects is defined as a form of farm business used as a tourism object aimed at increasing knowledge, recreation, and activities related to in the field of agriculture. Relating the issue above, DKI Jakarta as the Indonesian Capital Metropolitan City has an opportunity to develop urban tourism.

Establishment of Situ Babakan Lake as a tourism area in DKI Jakarta is facilitated by the local government with some earlier programs, such as upgrading the road conditions leading to the lake, construction of the fence surrounding the lake, and

dissemination of information regarding the lake. All of these efforts have significant impact on the attractiveness of the lake indicated by number of visitor to the lake increase over time.

Some people surrounding the lake utilize floating-net cage technique for fish farming. However, if the resource in the lake is exploited freely without any restriction, in the near future the lake will lose its function and result in bad impacts. To avoid those effects, management of the Lake should be based on the water resource, interest of the local around the lake, and the visitors.

In relation to the problem mentioned above, a study was conducted and aimed (a) to investigate water quality of the Lake, and (b) to gather the perception of local people and visitors regarding the Lake existence. The results of this study will be very useful for the community and local government of DKI Jakarta in managing the Situ Babakan Lake as one of the tourists' destinations in the Province. At least there are two important advantages may be obtained from this study, i.e., (1) scientific information on the conditions and potential of the Situ Babakan Lake and in its vicinity; (2) policy recommendations to the local government in determining programs for developing the Lake as a sustainable agro tourism area.

METHODOLOGY

The research was carried out for six months period, starting in May 2002 until October 2002 in Sub district of Jagakarsa, Municipality of South Jakarta. The types of data collected were primary and secondary. Primary data consisted of water quality of the Lake, the perception of the local people and local tourists visiting the Lake. Secondary data consisted of demography, infrastructure, and management of the Lake as an agro tourism site in DKI Jakarta Province and were collected from related offices in South Jakarta

Government District, including offices of the Tourism Service, Agriculture Service, and Provincial Government. The parameters of water quality analyzed were temperature, pH, total suspended solid (TSS), ammonia, nitrate, phosphate, and dissolved oxygen (DO).

Water samples were collected from five sampling locations inside the Lake, i.e., (1) Water inlet channel (inlet -1, (2) middle or the center of the lake, (3) around floating net cages, a location supposed to be one of sources of pollution, (4) water inlet channel 2 (inlet-2), a location of drained pollutant; and (5) water outlet channel. Measurements of temperature, pH, and DO were carried out in duplo and in-situ. TSS, nitrogen, phosphate were analyzed in duplo at the Physical and Environment Laboratory of the Faculty of Mathematics and Natural Sciences, Institut Pertanian Bogor. Total respondents of the research were 100 persons, consisting of 50 people living in the vicinity of the Lake (as far as 20 km away from the Lake), and 50 persons visiting the Lake during the study.

Water quality of the Lake was analyzed by comparing it to the standard established in the Government Regulation No. 82/2001 (Anonymous, 2002). A descriptive analysis was used to describe the differences between the knowledge and the perception level of the people visiting the Lake (Vincent, 1992 and Walpole, 1997). All primary data collected were analyzed using the *Statistical Package for Social Science* (SPSS) version 10.01 (Santoso 2001).

RESULTS AND DISCUSSION

Water Quality

Temperature

Water temperature of the Lake could be categorized as normal as it ranged from 30.02 to 30.33°C (Table 1). The Lake was not suitable for fish farming, especially for Carp fish.

Wardoyo (1982) stated that the growth of Carp fish in temperature of 30°C is half less than that in temperature of 20°C and feed consumption of Carp fish decreases as water temperature increases. Carp fish breed naturally in temperature of 20-22°C.

Total Suspended Solid (TSS)

Total suspended solid (TSS) in the water of the Lake was 92.33 ppm at the inlet area and this was significantly ($P < 0.05$) higher compared to other sampling locations (Table 1). The lowest TSS ($P < 0.05$) was in the middle of the lake (76.00 ppm). Nevertheless, all values of TSS were above the official standard of second class based on PP No.82 of 2001, i.e., only 50 ppm (Bapedal 2002). This condition showed that the Lake has been polluted by many kinds of pollutants particularly by erosion and other urban pollutions. Erosion containing mud flows in from the upstream of the Lake where the people live and cultivate their farms. To avoid the erosion potential to flow in to the Lake, conservation measures should be done in the buffer area in the upstream area. Alaerts and Santika (1987) found that suspended solid inside the water generally consists of organic and inorganic materials. Inorganic materials were clay and quarts, and organic materials were protein, garbage, bacterial, and other domestic waste products.

Level of water pH

The water pH in the Lake varied from 7.09 to 7.29 and the difference was not significant ($P > 0.05$) among water sampling stations (Table 1). Based on the pH level, the Lake had a good condition. Water pH is an important indicator in determining water quality, because it characterizes a balance between acid and base. Water containing hydroxide and bicarbonate is classified as base, while that containing mineral acid and carbonated acid is classified as acid.

Table 1. Water quality of Situ Babakan Lake, Jakarta, 2002

Parameter	Quality Standart ²⁾	Sampling Station				
		Water inlet	Floating cage	Middle	Garbage	Water outlet
Value of observation parameter ¹⁾						
<i>Physical</i>						
Temperature	±30°C	39.02 a	30.15 a	30.13 a	30.18 a	30.33 a
TSS(ppm)	50	92.33 a	85.00 b	76.00 c	75.00 c	84.00 b
<i>Chemical</i>						
pH	6-9	7.29 a	7.16 a	7.09 a	7.17 a	7.29 a
DO (ppm)	Min 4	8.41 a	8.32 a	8.28 a	8.31 a	8.22 a
Ammonia (ppm)	0.02	0.18 a	0.16 a	0.13 a	0.10 a	0.03 a
Nitrate (ppm)	10	18.50 a	20.63 a	19.21 a	14.65 b	14.30 b
Phosphate (ppm)	0.2	0.25 a	0.25 a	0.12 b	0.12 b	0.12 b

Note:

- 1) Number followed by different letters in the same line means significant ($P < 0.05$)
- 2) Quality standard is based on PP No.82 of 2001.
- 3) Number with bold type means exceeding water quality standard of secondary class of PP No 82 of 2001.

The normal pH of fresh water usually ranges from 5 to 9. pH level of polluted water will change and depend on pollutant materials and is also determined by interaction among substances inside the water, and to some extent usually unstable (Saeni 1989). The level of water pH indicated that the Lake was suitable for fish farming, namely as one of the agro tourism packages. To support fish grow naturally, it requires the water pH level of 5.0-9.0 (Wardoyo, 1982). Furthermore, Sastrawijaya (1991) also stated that water pH of 6.7-8.6 will sustain fish population in ponds in which it will be safe for fish growth and breeding.

Dissolved Oxygen (DO)

The dissolved oxygen (DO) in the Lake was good enough with a value ranged between 8.22 and 8.41 ppm, but the values were not significantly different ($P > 0.05$) with other sampling locations (Table 1). The lowest DO was in the water outlet (8.22 ppm), while the highest was in the water inlet (8.41 ppm).

Based on the water DO value, the Lake was suitable for fish farming, as well as for agro tourism. Sastrawijaya (1991) stated that most animals living in water depended upon the dissolved oxygen because it was essential for breathing, and as one of the main components for fish metabolism and other water living organisms. Therefore, DO concentration is an appropriate indicator of water quality. Water living organisms can survive if minimum water DO is 5 ppm, but also depend on the organism endurance, activated degree, pollutant existence, and water temperature.

Nitrogen

The Nitrogen was measured in two forms, i.e. ammonia and nitrate. The results of the research showed that ammonia concentration in all locations of water sampling was above the standard quality of 0.02 ppm (Table 1). The highest ammonia concentration was 0.18 ppm, namely in the water inlet, but it was not significantly different ($P > 0.05$) with those at around the floating net cages (0.16

ppm), in the middle of the lake (0.13 ppm), around the domestic wastes (0.10 ppm), and in the water outlet (0.03 ppm).

This condition showed that there was some sewerages brought by water into the Lake leading to a high concentration of ammonia in the water inlet than that in the other sampling places. This finding was in accordance with Sastrawijaya (1991) that ammonia was an additional product of protein dissolved from plants or animals or animals' dung. If water contains ammonia, probably the water is polluted by ammonia from animals' dung. Garbage disposed into water can also cause an increase in ammonia.

Nitrate concentration levels in the Lake at all sampling stations were above the water quality standard of 10 ppm. The highest concentration of nitrate was 20.63 ppm to be near the floating net cages (Table 1) and it was supposed to come from the waste products of the fish feed applied by farmers in the floating net cages. Henry and Heinke (1989) mentioned that nitrogen as one of the nutritious feed and rich in protein is the main composition of planktons which functions as basic feed in the food chain for living organisms in the fresh water. In addition, the high concentration of nitrate in the Lake also comes from the sewerages brought by water flowed into the Lake. The main water source of the Lake is Ciliwung River flowing in through some regions and containing many kinds of waste products.

Phosphate

The concentration of phosphate in the Lake in all sampling locations was above the water quality standard of 0.10 ppm. The highest phosphate concentration level was 0.25 ppm and it was found in the water inlet and near the floating net cages. At the middle of the lake, near domestic waste disposal site, and in the water outlet, the phosphate concentration levels were the same (0.12 ppm) such as shown in

Table 1. High concentration of phosphate indicated that the water in the Lake was polluted by various pollutants, generally containing high organic materials, coming from urban and agricultural wastes and. Sastrawijaya (1991) mentioned that phosphorus (P) is an important part in an ecosystem, because protein and other organic compounds.

Perception of the People in the Vicinity of the Lake

People's Knowledge

All respondents (100%) stated that they knew about the Lake and they got the information from their friends or Neighbors (27.8%), from their parents (7.3%), and had known it since they were children (65.9%). The data, however, did not indicate that all of them had visited the Lake. As many as 7.3 percent of the respondents never came to the Lake. Most of them (92.7%) had visited the Lake with some reasons, such as for fishing (53.7%) and recreation (39.0%). There were high visit intensities of the respondents because 48.9 percent of them stated that they visited the Lake almost everyday, 14.5 percent visited once a week, 19.5 percent visited once a month, 9.8 percent visited less than 6 times, and 7.3 percent never visited the Lake during last year (Table 2). The findings showed that the respondents were staying close to the Lake. Therefore, the statements that they knew about the Lake were reliable.

The respondents' knowledge about the Lake significantly correlated ($P < 0.01$) with age, length of stay, and educational level with the correlation coefficients of 0.634, 0.540, and -0.574, respectively. These showed that the knowledge of the respondents improved along with increase of their ages and their length of stay in the vicinity of the Lake. On the contrary, knowledge level of respondent on the Lake decreased along with increase of educational levels of the respondents. This finding was

Table 2. Respondent's knowledge on Situ Babakan Lake, Jakarta, 2002

Respondent's knowledge on Situ Babakan Lake	Category	Status of Citizenship (%)		
		Local	Visitor	Total
Knowing about Situ Babakan Lake	1. Yes	68,3	31,7	100,0
	2. No	0,0	0,0	0,0
Knowledge Sources on Situ Babakan Lake	1. Friends/Family	9,8	17,1	26,8
	2. Parents	2,4	4,9	7,3
	3. Since a child	56,1	9,8	65,9
Attendance to Situ Babakan Lake	1. Yes	2,4	4,9	7,3
	2. Never	65,9	26,8	92,7
Reasons to visit Situ Babakan Lake	1. Never	2,4	4,9	7,3
	2. Fishing	41,5	12,2	53,7
	3. Recreation	24,4	14,6	39,0
Visit intensity to Situ Babakan Lake	1. Never	2,4	4,9	7,3
	2. Less than 6 times	2,4	7,3	9,8
	3. Once a month	9,8	9,8	19,5
	4. Once a week	12,2	2,4	14,5
	5. Everyday	41,5	7,3	48,8

reasonable because before the Lake was established as one of tourism destinations in DKI Jakarta, it was used as a fish farming site by local people living in the vicinity of the lake. Fish farming is the main occupation of local people (87.8%).

This research indicated that knowledge level of the respondents on the Lake will be influenced by respondents' experience in their interaction with the Lake as their daily activity as fishermen. It is in line with Sarlito (1999) that someone should do something prior to know that thing better. Jalaluddin (2002) also mentioned that using their senses, men will be able to understand their physical environment quality. Moreover by those means, men are able to receive knowledge and all capacity to interact with their world.

Perception and Behavior of the People

About 9.8 percent of the respondents stated that the condition of the Lake nowadays was good, 26.8 percent said it was good

enough, 56.1percent stated that it was not good, and 7.3 percent of them stated that they did not know. Nevertheless, compared to the condition of the Lake at 3-4 years before, 31.7percent of the respondent stated that the condition of the Lake was worse off than that of 3-4 years ago; 24.4 percent of the respondent stated that it was the same; 36.6 percent stated that it was better off; and 7.3 percent of them stated that they did not know. The reason they proposed were (a) the Lake was shallow with dirty water (43.9%), (b) the Lake was nicer (39.0%), (c) the Lake was clearer (9.8%), and (d) 7.3 percent of the respondents stated that they did not know. It seemed that the respondents who did know they never visited the Lake before. Therefore, their knowledge was limited on information they received, and not because they had ever visited the Lake.

The perception of the people living in the vicinity of the Lake was quite good (positive). This was related to the knowledge of the respondents about the Lake and its function

role for fish farming. Jalaluddin (2002) mentioned that perception is the experience of object evidence, or relations received by concluding information and understanding messages. Perception of someone on an object is influenced by their interest with the object, and function of the object for a man who makes the perception. In addition, the people in the vicinity of the Lake have their own vision and opinion on the Lake, based on personal and situational factors of those people's experience. This is possible because of difference in experience or cultural environment, besides the capacity of their senses.

Most of the respondents (78.0%) stated that existence of the Lake was very important, and 22.0 percent of them stated it was important. This was in line with the existence of the Lake as a place to culture fish where the local people use it as their main occupation to earn for living. Nevertheless, 48.8 percent of the respondents stated that they agreed to the Regional Government's policy to manage the Lake as agro tourism in DKI Jakarta, and 36.6 percent stated that they agreed, and 14.6 percent stated it was usual. This condition reflected the positive behavior of the people in the vicinity of the Lake, and did not refuse changes, as long as the changes made by the government made them better off. The behavior of the people was influenced by their interest of the Lake existence as a location for their occupation. Sarlito (1999) mentioned there are two characteristics of someone's behavior: (1) they have a certain object (people, behavior, concept, situation, and things); (2) it contains a value (agree or disagree, like or dislike). Therefore the behavior of somebody is influenced by this own individualism.

The Visitors of the Lake

The Lake Attraction to Visitors

As many as 40 percent stated that they had visited the Lake for more than 12 times during the last year period, 18 percent (for 6-12

times); 20 percent (less than 6 times) and 22 percent had just visited the Lake for the first time. The data showed that the Lake was an interesting place to people from Jakarta. However, 74 percent out of them had no fixed time to visit the Lake. The findings were also supported by visitors' statement that 82 percent of them had no fixed schedule to visit the Lake, but consecutively 12, 4, and 2 percent of the visitors had visited the Lake frequently once a week, twice a month, and once a week, respectively.

Situ Babakan Lake is a good place for recreation and it was mentioned by 62 percent of the visitors saying they came to the Lake because they were informed by their friends, or family, and another 6 percent with other purposes, such as fishing, which was in fact it was one of the tourism packages offered by the management. As many as 16 percent of the visitors came to the Lake on feet, because the place was not far from their homes, whereas the other 44 percent, 24 percent, and 16 percent came to the Lake by their own motor bikes, or their own cars, and public cars, respectively.

The visitors spent their time in the Lake to enjoy the natural panorama. A number of 26 percent of the visitors stated that they spent more than 5 hours everytime they visited the place, whereas consecutively 22 percent, 22 percent, 16 percent, and 14 percent of the total visitors spent their time for 4-5 hours, 2-3 hours, and less than 2 hours respectively. Therefore, a great part of the visitors spent quite some time, i.e. more than 5 hours for each visit to the Lake. All of these conditions showed that the Lake did not made the visitors bored and therefore the Situ Babakan Lake had a great potential as one of tourist objects in DKI Jakarta. This is in line with Sulistyantara (1990) who stated that urban agro tourism could give some advantages, among others: (1) agro tourism could support vegetation which in turn give an advantage to micro-climate quality improvement, (2) agro tourism development can help in keeping the conservation in urban

environment, besides to improve micro-climate, it also keeps hydrological cycle and decreases erosion; (3) agro tourism can also increase the quality of urban healthy environment which at last will support the user's health; (4) agro tourism object can also give beautiful environmental work if it is carried out with a good management and paid attention to planning requirements' (5) agro tourism could be used as income resources for individuals, private companies, and the government.

Perception and Behavior of Visitors

The Situ Babakan Lake nowadays was more to visit, but most of the visitors (76%) stated that the Lake management needed improvement, and the other 24 percent of the visitors stated that the Lake was necessary to improve. The visitors who stated that the Lake existence was necessary and its management was very necessary to improve, most of them came from DKI Jakarta region, i.e., (1) 75 percent out of 24 percent of the visitors who stated that the Lake was necessary to be improved came from DKI Jakarta, and the other 25 percent came from outside of DKI Jakarta; (2) 66 percent out of 76 percent of the visitors who stated that the Lake was necessary to be more improved came from DKI Jakarta and another 10 percent came from outside of DKI Jakarta. This statement was based on the fact what visitors felt about the Lake that 86 percent stated that the Lake management was not good, 10 percent stated that they had no idea and only 4 percent of the visitors stated that the management of the Lake was good enough.

From 86 percent of the visitors who stated that the Lake management was not good, most of (72%) of them came from DKI Jakarta and only 14 percent of them came from outside of DKI as be an agro tourism area was positive. This condition had relationship with visitors' experiences compared to visitors from outside of DKI Jakarta. In addition, visitors had their

own opinions or views on the Lake, based on personal and situational experiences. It is in line with Jalaluddin (2002) who stated that the object stressed from the perception is an object that fulfill individual goal. The need, mental preparation, emotional situational and cultural background influence the perception. Differences in the need cause differences in someone's perception.

The majority of the visitors (74%) stated that the existence of the Lake was necessary, 22 percent of them stated that it was necessary to be kept in existence and only 2 percent of them stated that it was not necessary to be kept in existence. This was in accordance with the result of the research by interviewed 50 visitors, 48 percent of them stated that the Lake was attractive enough to be visited as a recreation object in DKI Jakarta; 6 percent stated it was attractive and the other visitors, 4 percent and 2 percent stated it was less attractive and not attractive, respectively.

Visitors who stated that the Lake was attractive enough as a tourist object, majority (44%) of them came from DKI Jakarta and 4 percent of them came from outside of DKI Jakarta. Visitors who stated that the Lake was not attractive as a tourist object also majority (34%) came from DKI Jakarta and only 19 percent of the visitors came from outside of DKI Jakarta. Visitors' opinion was a perception of someone towards a certain object or environment. This is in line with Edmund and Letey (1973) who were supported by Calhoun & Acocella (1993) who stated that someone's perception towards his environment reflected his state of sight, awesome, satisfied, and expectation from his environment.

CONCLUSION AND RECOMMENDATION

1. The Situ Babakan Lake is potential to develop as an agro tourism area shown by good quality of the water in the Lake. The

Lake is deserved to be developed as an agro tourism area in DKI Jakarta as it was shown by its importance, including knowledge, perception, opinion, and behavior, to the people living in the vicinity and visitors of the Lake.

2. The policy recommendations for the development of the lake are (a) need of good planning for the area surrounding the lake, (b) involvement of the local community, (c) contamination sources to the lake need to be well controlled to keep good quality of the water, and (d) the floating net cages (KJA) in the lake need to be kept beautiful to maintain the best scenic views of the area.

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