Ecotourism development impacts on plant diversity in a cultural park of Setu Babakan, Jakarta Indonesia

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Abstract. Improving ecotourism areas was a part of the strategy to the welfare of local people, but its would be impacted by their local knowledge to maintain plant diversity-related, alongside the tourism attitude has shown to their surroundings unfriendly. The aim of this research is to discover the plant diversity index (H') and Evenness (E). For the data collection method, the line transect was carried out by plotting the site where each site of location research has a size of 20x20 m, and the lake and the road on the side of the location were the object research. The result of this research obtained at least 83 plants species in all areas, which each of site of research were the lake of site is H' = 2.377 and the road of site is H' = 2.887, whereas E = 0.118 in the lake of site and the road of site is E = 0.084. Therefore, the ecotourism paradigm would be increased to the welfare of local people and its part of sustainable development.

Keywords: ecotourism, local people, waste pollution, plastic, sustainable tourism development

1. Introduction
There are numerous studies about Setu Babakan park called as cultural of Betawi settlement or cultural park, it is a potential area for ecotourism development which offers the beauty of Betawi natural scenery and all varieties of Betawi tradition. Therefore, Setu Babakan park which is based on a cultural is reputed as part of a sustainable paradigm based on a cultural dimension that leads to maintain flora and fauna (Biodiversity) goals. It concerns not only to economic aspect but also to ecological aspect to get sustainable tourism development goals [1,2] and of course, it has impacted to environmental protection or conservation dimension [3,4,5]. Ecotourism development needs full attention as a part of development pattern with advantage to the richness of natural potential resources, for example; many rivers, mountains, flora and fauna which potential to the welfare of local people (higher of biodiversity value index), mainly in rural areas. Ecotourism development should have become one of development to promise in diminishing unemployment and it could increase of income to local people, alongside, it is able to maintain environmental quality of well-being. The ecotourism paradigm would be promoting to invite all sides, especially the visitor and the local people because it has many positive impacts on local people, kinds of self-human and their environment-related [6].

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Developing of tourism (ecotourism) areas based on cultural dimension in Setu Babakan park is one strategy to develop economic local, which has been illustrated on paragraph (above), alongside in optimizing of natural resources potential for human wellbeing devoid of impair of ecological systems (ecosystems) kindly and its part of trend development. at this end, it reputed that pattern development is able to increase foreign exchange (income of state) [7]. The other side of “conflict Interest” [8] is one of the one big problem that occurred at this long time, which is no agreement between local people and government yet, so it has impacted to the management of natural resources by optimal and sustains. Numerous studies about the rich of natural resources or view of nature in Indonesia (called of wonderful of beautiful Indonesia), which it has famous in the world by cultural, language, arts, ethnic, diversely, and it’s mainly by natural of view. Those natural potential and diversity in Indonesia must be preserved and protected, one of the protected areas is Setu Babakan park that located in site of Jakarta, where is part of urban development in rural areas or cultural of Betawi settlement.

Refers to description above it should be explained that ecotourism become one of mainstay to increase earnings and tourism visit. alongside to devoid of environmental hazard which is called sustainable development of tourism. Therefore, it needs having advisability of ecological studies [9], alongside how to use the role and give contribution to the government (local or central) and the local people to support a dynamic ecotourism development. The Setu Babakan park based on cultural dimension is one of ecotourism development of type in South Jakarta that considered as a tour of cultural type, alongside as education process is used to introduce arts or culture of Betawi ethnic, but the other side which has many challenge and opportunity in preserving and protecting it, and it is caused to human activities (visitor or tourist) impacts, therefore it necessary to step, detect and identify for knowing of tourism of behavior impact, mainly to ecological dimension, for example of plant diversity index (H’), where is used to measure of ecotourism impacts and it should be used to parameters for knowing of conservation goals.

2. Methods
Understanding of ecotourism development would impact environmental surroundings at Setu Babakan park that has become a type in this research, which one is knowing of plant diversity index (H’), therefore there were some methods that used to measure it, which one was used to vegetation analysis methods by inventories approach. These two-sites (plot) of research that considered of suite to data collected in Setu Babakan park (figure 1), where were in surroundings of river (river of side) and the road (road of side) as data collected to analysis, which the each of site research (plot) is 5 plot, so the sum of total plot in this research completely of aggregate was 10 plot areas.

Data collecting process for measuring of plant diversity, which is 20x20 m (level tree, with diameter >20 cm) methods to inventories, then to analysis steps with Shannon-Wiener index which formula is $H' = \sum p_i \ln(p_i)$, this formula indicated to diversity index of plant, whereas $E = H'/\log S$. These formula would be able to detected of environment change with shown how to far index of plant diversity (H’) and (E) has gotten it, alongside this matter could be lead to explained ecological system (ecosystems) disturbance has caused of human activities (anthropogenic) impacted as visitors of tourist in their surroundings, alongside it could be measured to discussed of ecosystem stability process and its would become been guidance of managing natural resources of potential, especially in managing of tourism development areas potential to ecotourism based on natural by sustainable, for example in Setu Babakan park that as water or river and cultural of a tour was shown.
Historically, Setu Babakan Park based on cultural dimension has been recording, which is site of village area that claimed by the government of Jakarta as conservation areas and cultural of Betawi development by continuous, alongside Setu Babakan Park or Babakan Lake administratively in Srengseng Sawah, Jagakarsa sub-district, South Jakarta. Setu Babakan Park is newly as a tour areas development, which has official announced in 2004, until now going on change and development, alongside it has large of land ± 20-30 ha including of as garden area, as building of Betawi arts, and as wide of lake areas, it is of course given to pleasurable for visitors and in additional their amount of plant diversity that ecologically lead to comfortable of nuance.

There are many plant diversity gained in Setu Babakan park areas, where a lot of plant species, which was the number of plant species that exist in lake of side areas is the sum at least of 36 plant species (table 1), meanwhile in the road of side areas is the sum of 47 plant species (table 2), but the sum of plant species in every of plot (site of research) has value of difference. The plant species of diversification caused of many factors, which abiotic or biotic aspect would be influenced to plant diversity and its distribution, but the most of dominant effects is the human activities [10,11], especially in a tour of location where many tourists did unfriendly to environmental surroundings, for example trampling, wasting of plastic and forth, that it accumulates lead to environmental hazard or un equilibrium impacts.
Table 1. Plants species in the lake of side areas and on the road of side areas

| No. | Local name | Scientific name | Local name | Scientific name |
|-----|------------|-----------------|------------|-----------------|
| 1   | Seri       | Muntingiacalabura L | Mangga     | Mangiferaindica |
| 2   | Ketapang   | Terminalia catappa | Ketapang   | Terminalia catappa |
| 3   | Mangga     | Mangiferaindica | Beringin   | Ficusbenjamina |
| 4   | Bintaro    | Cerberamanghas | Tanjung    | Mimusopselengi |
| 5   | Belimbing  | Averrhoa carambola | Kemuning   | Murrayapaniculata |
| 6   | Petaicina  | Leucaena leucocephala | Seri       | Muntingiacalabura L |
| 7   | Mahoni     | SwieteniaMahagoni | Mahoni     | SwieteniaMahagoni |
| 8   | Beringin   | Ficusbenjamina | Mangga     | Mangiferaindica |
| 9   | Petaicina  | Leucaena leucocephala | Belimbing  | Averrhoa carambola |
| 10  | Mangga     | Mangiferaindica | Rambutan   | Nepheiliumlappaceum |
| 11  | Kemuning   | Murrayapaniculata | Tanjung    | Mimusopselengi |
| 12  | Angsana    | Pterocarpus indicus | Petaicina  | leucocephala |
| 13  | Mahoni     | SwieteniaMahagoni | Jambu bol  | Syzygiummalaccense |
| 14  | Tanjung    | Minusopselengi | Durian     | Duriozbibethinus |
| 15  | Pucuk merah| Syzygiunmoleana | Bambu jepang | Pseudosasa japonica |
| 16  | Seri       | Muntingiacalabura L | Pakis haji | Cycas |
| 17  | Glodogantiang | Polyalthialongifolia | Jambu biji | Psidium guajava |
| 18  | Glodogan   | Polyalthialongifolia | Sirsaq     | Annona muricata |
| 19  | Bintaro    | Cerberamanghas | Bintaro    | Cerberamanghas |
| 20  | Palem      | Areceaeae | Pucuk merah | Syzygiunmoleana |
| 21  | Kemuning   | Murrayapaniculata | Kelapa     | Cocos nucifera |
| 22  | Angsana    | Pterocarpus indicus | Glodogan   | Polyalthialongifolia |
| 23  | Tanjung    | Minusopselengi | Bintaro    | Cerberamanghas |
| 24  | Bintaro    | Cerberamanghas | Melinjo    | Gnetumgnemon |
| 25  | Glodogan   | Polyalthialongifolia | Angsana    | Pterocarpus indicus |
| 26  | Mahoni     | SwieteniaMahagoni | Kemuning   | Murrayapaniculata |
|     |            |                 |            | Swietenia         |
| 27  | Pace       | Morindacitrifolia | Mahoni kecil | Macronphylla |
| 28  | Seri       | Muntingiacalabura L | Sawokecik  | Manilkarakauki |
| 29  | Tanjung    | Minusopselengi | Belimbing wuluh | Averrhoa bilimbi |
| 30  | Beringin   | Ficusbenjamina | Belimbing  | Averrhoa carambola |
| 31  | Kelapa     | Cocos nucifera | Pisang    | Musa sp.          |
| 32  | Rumput     | Poaceae | Pepaya jepang | chayamansa |
| 33  | Seri       | Muntingiacalabura L | Keladi     | Caladium          |
| 34  | Pace       | Morindacitrifolia | Bambu      | Bambuseae         |
| 35  | Pletokan   | Ruelliatuberosa | Mangga     | Mangiferaindica |
| 36  | Jambu biji | Psidium guajava | Jambu air  | Syzygiunmaceum    |
3.1. Potential and its Challenges of Setu Babakan or as Cultural Parks Areas

The other side, that ecotourism has to scenic areas based on a natural view, which the visitors can be enjoyed or pleasurable of sense and it has been giving of many advantages for visitors as a tourist. This matter can show in Setu Babakan park, which has prepared to a rich of natural or cultural view, for example to the culture of a tour, the river a tour, culinary, and forth, it has become of potential a tour that it would be interested domestic or national visitors will come to it. Therefore, directly or indirectly ecotourism development has given many advantages, which the local people can bargain of diverse souvenirs to visitors and the others, so it is argued that ecotourism able to increase to local economic growth, but it's a part of challenges and opportunities to develop it [12]. In Setu Babakan Park has famous of culture a tour as Betawi culture, which there some of Betawi artistry, culinary specific, and forth that it has exhibition, so according to it is opined that it has called as cultural ecotourism a tour of type [13], which every week in Setu Babakan Park are many of reciprocating of artistry, so like that many of visitors come while enjoying it, and forth. Many media mold of electronic has reported about Setu Babakan or as cultural Park, which is called as Betawi Cultural Village (Kampung Budaya Betawi) so it is famously with cultural aspects.

Refers to table 1 and 2 related to challenges and opportunities of ecotourism development, of course economically has advantage for local people surroundings, but ecologically has many impacts that brought to environmental hazard and environmental effect, which should lead to loss of biodiversity (flora) that caused of unfriendly human activities [14]. To maintain the process of natural potential for ecotourism development is needed to do it that can increase many advantaged economically as well as ecologically, specifically it would be explained how to impact ecotourism to biodiversity and how to cope it, These were one of all challenges and opportunities in managing a tour development continuously based on a sustainable development paradigm [14]. Specifically of opportunities in developing a tour of Setu Babakan park based on cultural dimension and it can showed how to create local economy development, which is utilized by diverse economic activities dimension (income) (Figure 2).
Economic activities that occur in Setu Babakan park have influenced their living of local people (figure 2), which one is wellbeing goals and of course it would be decreased of poverty or unemployment, who everyone able to create of activity effectively in the framework of enhancing economic dimension. Lately, ecotourism development has reputed able to the sustainable development of direction [15] or it is part of the sustainable tourism development dimension [16], so the center of the Indonesia government passes through a touring ministry ever supporting in developing it. Therefore, Setu Babakan park has become of one the ecotourism model developed, including numerous of economic activities lead to economic increased of human of welfare (figure 2), without set aside of cultural assets as like culture of Betawi art, for example a dance of Betawi (Pencak Silat), house art of unique, dance's Betawi, and of course culinary of rice crust of egg (Kerak Telur).

3.2. Plant Diversity in the Surroundings of Setu Babakan Park Based on Cultural Dimension

In the common sum of total plant species obtained, at least 83 obtained in surroundings of Setu Babakan Park (table 1 and 2), where two sites of research characteristic were in surroundings of road and riverside, which are in the road of side obtained ± 47 plant species and the rivers of side ± 36 plant species. These plant species are part of key role of importance factor to support equilibrium of ecological systems (ecosystems), which it's dependend on plant diversity and maintained of plant diversity, those are ways to keep ecological functions, especially to biodiversity enhanced of index that has completely brought to benefits of local people, but ecologically is also necessary to pay any attention, therefore [17] ecotourism could develop to economic and ecological of local people, because it also supported to

Sources: Nurdiania(2016)

Figure 2. Creative Economy Model and Its Activities Type in SetuBabakan Park Areas Development, which were (a) Culinary of station, (b) Rest of Spot to Pleasurable, (c) Be parked of spot, (d) River of a tour, (e) Betawi of art specially[Ondel-ondel], and (f) Traditional self-defence arts [pencaksilat]
biodiversity conservation effectively and dynamic, and [12] also given expression to ecotourism developed, which is not easy to manifest it.

Existing of plant diversity in the surroundings of Setu Babakan Park (tables 1 and 2) indicated that ecological nuance was good and balanced (table 2). Refers to table 3, it described about plant species or diversity obtained in the field (two-sites of research type) quantitatively have a high diversity of value index, which in surroundings site of the river is $H' = 2.38$, while in surroundings site of road is $H' = 2.89$ (table 2). The value of plant diversity shown in the surroundings of Setu Babakan park that has been led to an equilibrium of the ecological process, directly and indirectly, it would be supported to biodiversity conservation [17] and its able to carry capacity of formed [18]. Numerous studies about of ecotourism developed effect to environmental impacts that indirectly able to create of biodiversity conservation, especially created plant biodiversity [19], where stability of ecosystems and it's able to support to another of life process, it's also that ecotourism development would be decreased of ecological disturbance, for example; increased of air fresh, decreased of pollutant, and forth or it was contrary (table 3). Multi-functions of plant diversity to environmental dimensions, and it's gradually able to the wellbeing of a human being to basic demand of local people, and it is able to ecological functions in maintaining ecological systems continuously.

| Site of research | The Total of plant diversity | $H'$ | $E$ |
|------------------|-----------------------------|------|-----|
| River of side    | 272                         | 2.38 | 0.119|
| Road of side     | 359                         | 2.88 | 0.084|

In table 2, empirically shown to different of the total number of plant species (plant diversity), those cases caused some of the factors which are environment component (soil, weather and climate, and forth) and the human activities (tourist of behavior) related. In the surroundings of Setu Babakan Park, which has described in the paragraph above that it has given support of ecological nuance to equilibrium and it finally contributes to the biodiversity of conservation zone formed, and it's indirectly brought to social resilience systems. The most of local people used to plant diversity to wellbeing, which is used to medicinal plant, food supply, timber, and the other ecological functions, therefor in Setu Babakan park has become of an ecotourism development model that must to do it. The other side that ecotourism development brought to environmental hazard where caused was tourist activities unfriendly by the human of waste for example to plastic waste and forth, then the tourist could be impairing of plant habitat and its lead to endangered or loss of plant diversity [11,19], but the human or local people can contribute to maintain and preserve of plant diversity [21] kindly.

3.3. Ecotourism development impacted to quality of environmental aspects

In various of studies that ecotourism development has brought to advantage for local people as income secondary and its part of protected areas [22,23,24], which income aspect as part of one is ecotourism development goals or targeted, so everywhere site of Indonesia territory interested or expect to exploit of natural resources to developing of tourism areas based on nature or cultural dimension. As usually of developing areas (tourism) is more lead to the use of the natural potential that tourism developing based on nature or ecological or cultural perspective in which many of offered living pleasurable or enjoyable. There some impacts of ecotourism development, when this matter related to Setu Babakan Park areas, which has related to negative impacts [14] (table 3), so it needs to pay any attention or evaluation in minimizing to loss of flora diversity, especially the environment aspects [25].
Table 3. Kind of ecotourism development impacted to negative effects and its type

| Component of environment | Negative impacts                          |
|--------------------------|-------------------------------------------|
| Flora and Fauna          | The loss or extinction of animal          |
|                          | Changes in migration or distribution patterns |
|                          | Damage to vegetation                      |
| Pollution                | Water pollution                           |
|                          | Air pollution                             |
|                          | Noise pollution                           |

Sources: [14]

In table 3, it should be explaining about a kind of negative or positive impact [26], which so far implicated to plant diversity or biodiversity of flora caused by ecotourism developed, alongside how to adapt and to cope it. Many of studies that ecotourism is one of all development models to shape of natural resources potential with preserving and sustaining of biodiversity goals, so it is purposed to ecotourism development is taken of advantage a rich of natural resources ecologically or friendly, alongside to economic achieved [19], for example in Setu Babakan park that representative of this phenomenon. Therefore the Setu Babakan park has discussed, which it's can be illustrating how to ecological condition around, which still many of plant diversity has obtained been grown and developed by optimal and kindly, so this case showing to stability of ecosystem characteristic (equilibrium), therefore it needs to be maintaining and preserving did continually, then this is a part of invitation also warning of all side because environmental hazard has caused of human activities (anthropogenic). This case can show how an attitude of visitor a tour in Setu Babakan Park is still not the attention of environmental surroundings, which many wastes invented including plastic waste, although so the visitors don't care about it. In Setu Babakan Park indirectly many of natural potential and it's lead to biodiversity zones which many of plant diversity has grown and developed by optimal, so it would be become one of solution in a tour development as conservation areas, alongside it's a part of responsibilities together in preserving and maintaining of biodiversity (flora).

The other side of ecotourism development also brought to environmental hazard [25,27], which the most of people attitude or behavior their activities is unfriendly in the tour areas, this matter could be shown how many of waste plastic in the environmental surroundings a tour occurred, this case is a part of one example of people attitude that not wisdom or unfriendly to their environmental relationships, so those matter is a part of accumulated cause of water pollution and its impact to water quality and soil quality degradation. Numerous human activities (economic dimension) would environmental been hazards, which it has mentioned on this page, but there are some ecological problems or symptoms of ecological disturbance. Lately, ecotourism development has become of develop trend, which is based on the natural potential or cultural dimension as like as Setu Babakan park that is used to support of eco-development paradigm, alongside this paradigm reputed able to sustainable development goals kindly, and it is lead to welfare of local people obtained (figure 2).

4. Conclusion

Ecotourism development is one strategy to develop local economic dimension, alongside as part of coping to environmental hazard, where Setu Babakan park is one of representative research, how to cultural dimension is the one of approach that is used to develop tour visit, alongside as part of the sustainable paradigm and Setu Babakan park based on cultural dimension is one of ecotourism type developed, which put in the front of cultural dimension as a tour of areas, and it would be designed to develop, and it’s become one solution in ecotourism development. That matter was part of preserved of biodiversity process, mainly to flora diversity, then Setu Babakan park has inventoried at least 83 plant species obtained, which Quantitatively in lakeside of a sum is $H'= 2.37$ and $E = 0.118$ and its roadside
of the sum is $H' = 2.88$ and $E = 0.0084$. Therefore, in Setu Babakan park based on cultural dimension is suitable to tour development and it would be opened for many vocation of local people to gain their earnings, so there some of beneficial has achieved to local people of surroundings by various economic activities. Therefore developing ecotourism has become trend development at this time, which is a part of a sustainable development paradigm and one of the solution ways in this development by sustain without impaired to the environment.

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