PURWODADI BOTANIC GARDEN: CONSERVATION AREA WITH SUSTAINABLE ECOTOURISM POTENTIAL

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Rony Irawanto S.Si., MT

ABSTRACT

Purwodadi Botanic Garden, in addition to its primary functions as conservation, tourism as well as environmental education area, also positions itself as an interesting tourism object in Pasuruan Regency, East Java. Purwodadi Botanic Garden, in the constellation of tourism products of East Java, plays a significant role because it is the only conservation area with biodiversity that functions as an environmental education and tourism site. Its status as a natural tourism object category is attributable to its constitution as a protected conservation area. This concept that leverages the trend of the back-to-nature market represents an effort of biodiversity preservation by establishing partnerships with relevant parties to raise citizen’s awareness in maintaining and preserving biodiversity, especially flora. Another focus is to promote citizen’s interest in natural tourism development in conservation package and to preserve the continuity of endemic yet threatened species in East Java and Indonesia in general. The botanical garden pours its resources into studying and conserving floras, as well as promoting the diversity of plant species and its benefits to the public. Botanical gardens devote their resources to the study and conservation of plants, as well as making the world’s plant species diversity known to the public. These gardens also play a central role in meeting human needs and providing well-being. In this mini-review, a framework for the integrated missions of botanical gardens, including scientific research, in/ex-situ conservation, plant resource utilization, and citizen science are committed to exploring the ecotourism potential moreover.

Keywords: Purwodadi Botanic Garden, Conservation, Ecological Education, Ecotourism

INTRODUCTION

Ecotourism is a sub-component of the field of sustainable tourism. Ecotourism's perceived potential as an effective tool for sustainable development is the main reason why developing countries are now embracing it and including it in their economic development and conservation strategies (Kiper, T., 2013). Ecotourism also helps in community development by providing the alternate source of livelihood to the local community which is more sustainable. It aims to conserve resources, especially biological diversity, and maintain sustainable use of resources, which bring ecological experience to travelers, conserve the ecological environment and gain economic benefit. However, achieving the aims in ecotourism depends on whether they are environmentally and ecologically sustainable and economically applicable (Kiper, T., 2013). Ecotourism is believed by development and conservation experts to be the ideal forest management to generate sustainable economic, cultural and social benefits. Ecotourism is one of the sustainable development mechanisms. Ecotourism represents an effort to preserve an area that needs protection by providing economic opportunities to the surrounding communities. The concept that leverages the trend of the back-to-nature market represents a biodiversity preservation effort by establishing close cooperation between the people who live around the protected area and tourism industry. Therefore, ecotourism is defined as an amalgamation of conservation and tourism where revenues earned from tourism are returned to the protected area for biodiversity protection and preservation purposes as well as socio-economic betterment of the surrounding community. However, not in line with the development of tourism reality in Indonesia, that regards natural tourism as one of the three main 'engine' that is projected to generate foreign exchange, parties that are working on ecotourism as a measure to explore the tourism potential in Indonesia more seriously are few and far between. Purwodadi Botanic Garden, in the constellation of tourism products of East Java, plays a significant role because it is one of the conservation site that assumes both educational and tourism roles and functions. In terms of organizational structurally, Purwodadi Botanic Garden is under the management of the Indonesian Institute of Sciences (LIPI) and under the auspices of the Indonesia Foundation of Botanical Garden headquartered in Bogor, which formerly known as the Conservation Center for Bogor Botanic Garden Plants. Concerning this matter, efforts of service product development related to both education and research and conservation of ecotourism areas are needed to better manage the selling points of Purwodadi Botanic Garden. This is important so that Purwodadi Botanic Garden can realize its duties and functions that benefit the public.

THEORETICAL REVIEW

Ecotourism and Sustainable Development

Hector Ceballos-Lascurain first put forward the definition of ecotourism in 1987. He expressed that "nature or ecotourism can be defined as tourism that consist in traveling to relatively undisturbed or uncontaminated natural areas with the specific objectives of studying, admiring, and enjoying the scenery and its wild plants and animals, as well as any existing cultural manifestations (both past and present) found in the areas." In the early 1990s, The International Ecotourism Society (TIES) refined it to become “Ecotourism is responsible travel to natural areas which conserved the environment and improves the welfare of local people.” In this setting, Zifer (1989) viewed ecotourism from an active stance highlighting ‘the conservation, natural-based, economic and cultural components of ecotourism’. Western in Fandelli (1998) defines ecotourism as responsible travel to natural areas that protect the environment and improve the welfare of local communities. Fennell (1999) defines ecotourism as a sustainable form of natural resource-based tourism that focuses primarily on experiencing and learning about nature with low, non-consumptive
and locally oriented ethical impacts (control, benefits and advantages and scale). Indonesia has the potential of natural wealth and beauty that is of high value in the nature tourism industry market, especially ecotourism. As a trending form of tourism, ecotourism has a special purpose that is to promote environmental conservation, environmental education, the welfare of residents and respect for local culture (Iwan Nugroho, 2011). Furthermore, Iwan Nugroho (2011) puts forward the concept of tourism business integration with the agricultural or rural sector, known as Community-Based Tourism (CBT). In the CBT concept, there are three supporting tourism activities, namely adventure travel, cultural travel, and ecotourism. Ecotourism development in Indonesia can refer to biodiversity conservation efforts as stated in the Indonesian Biodiversity Strategy and Action Plan (IBSAP) 2003-2020, which has now reached national development planning, specifically related to biodiversity management. In the IBSAP, it is stated that the utilization of biodiversity resources is carried out for the welfare of the Indonesian people.

Based on the Quebec Declaration on Ecotourism, ecotourism is: “Ecotourism implements sustainable tourism principles” and the following are what separate it from the wider sustainable tourism concept:

- Active participation in conservation of the natural environment and cultural heritage;
- Involving local people in the planning, development and operation process to improve their welfare;
- Shedding light on the natural environment and cultural heritages to visitors;
- Enabling tourists, either independent travelers or organized tours to enjoy it in better ways.

Ecotourism itself is meant to be a sustainable form of nature-based tourism. Even though ecotourism lacks a concrete definition, many well-recognized definitions have formed a clear picture of its core principles, which are shown in the table below (Kiper, T 2013):

<table>
<thead>
<tr>
<th>Name of Author (years)</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceballos Lascurain (1987) (Joshi, 2011)</td>
<td>Ecotourism is defined as traveling to relatively undisturbed natural areas with the specific objective of studying, admiring and enjoying the scenery and its wild animals and plants as well as existing</td>
</tr>
<tr>
<td>Conservation International (Ziffer, 1989)</td>
<td>A form of tourism inspired primarily by the natural history of an area, including its indigenous cultures. The ecotourist visits relatively undeveloped areas in the spirit of appreciation, participation, and sensitivity. The ecotourist practices a non-consumptive use of wildlife and natural resources and contributes to the visited areas through labor or financial means aimed at directly benefiting the conservation of the site and the economic well-being of the residents</td>
</tr>
<tr>
<td>The National Ecotourism Strategy (1994) QuickStart Guide to a Tourism Business (2006) Weaver (2001)</td>
<td>Ecotourism is nature-based tourism that involves education and interpretation of the natural environment and is managed to be ecologically sustainable. This definition recognizes that the ‘natural environment’ included cultural components and that ‘ecologically sustainable’ involves an appropriate return to the local community and long-term conservation of the resource. Ecotourism is a form of tourism that fosters learning experiences and appreciation of the natural environment, or some component thereof, within its associated cultural context</td>
</tr>
</tbody>
</table>

The (International) Ecotourism Society in 1990: Responsible travel to natural areas that conserves the environment and improves the well-being of local people in 1996 by the World Conservation Union (IUCN) which describes ecotourism as Environmentally responsible travel and visitation to natural areas, to enjoy and appreciate nature (and any accompanying cultural features, both past and present) that promote conservation, have a low visitor impact and provide for beneficially active socio-economic involvement of local peoples (Joshi, 2011). Ecotourism tries to raise environmental consciousness by exploring ecology and ecosystems and by providing environmental type experiences. Taking part in ecology actively and getting first-hand impressions of how ecosystems work influence peoples’ ways of thinking, which finally raises awareness of conservation and protection (Ecotourism – Sustainable Tourism in National Parks and Protected Areas, 2005).

According to Chesworth (1995), Ecotourism has six characteristics. These are: a) ecotourism involves travel to relatively undisturbed natural areas and/or archeological sites, b) it focuses on learning and the quality of experience, c) it economically benefits the local communities, d) ecotourists seek to view rare species, spectacular landscapes and/or the unusual and exotic, e) ecotourists do not deplete resources but even sustain the environment Role of Ecotourism in Sustainable Development 777 or help undo damage to the environment, and f) ecotourists appreciate and respect local culture, traditions, etc. It focuses primarily on experiencing and learning about nature, its landscape, flora, fauna and their habitats, as well as cultural artifacts from the locality. A symbiotic and complex relationship between the environment and tourist activities is possible when this philosophy can be translated into appropriate policy, careful planning and tactful practicum (Rahman, 2010).

While the details vary, most definitions of ecotourism boil down to a special form of tourism that meets three criteria:
• It provides for environmental conservation;
• It includes meaningful community participation;
• It is profitable and can be self-sustained.

Standards of ecotourism (Weaver & Lawton, 2007);

a. Protection of the Ecosystem
   • Maintenance of the ecosystem where the ecotourism attraction is located
   • Protection and maintenance of wildlife especially endangered species
   • Wildlife live harmoniously with people
b. Maintenance of the physicochemical conditions of the area
   • Maintenance of the quality of freshwater and marine resources
   • No wastes overflow and contamination of the environment (water, soil, and air)
c. Conservation of local culture and history
   • Culture of locality is maintained
   • Historical structures are maintained as part of cultural heritage
d. Infrastructures and signboards blend with the environment
e. Sustainability
   • Maintenance of Carrying Capacity of the environment;
   • Environmental education program is part of the ecotourism package;
   • Livelihood must benefit more to the local community than outside entrepreneurs;
   • The local government supports the ecotourism project through ordinances and resolutions; and
   • The Management Board (community-based) and appropriate government agencies, e.g. DENR, support the project through strict enforcement of environmental laws
   • Experience and product management should follow principles and practices associated with ecological, socio-cultural and economic sustainability.

Sustainable development through ecotourism is a concerning issue in the world today. Many countries have ensured their regional development by this concept. In this concept, sustainable development may be occurred by ecotourism and regional development (Figure 1) simultaneously in an area. Dimensions of ecotourism development refer to the environmental, economic, and social aspects of tourism development, and a suitable balance between these dimensions must be established to maintain its long-term sustainability (Bhuiyan et al, 2012). Ecotourism entails a combination of conservation and tourism (the economics related to it) to benefit local communities, especially focusing on sustainability (Myburgh & Saayman, 2002). In examining the issues of sustainability within ecotourism, however, it is generally associated with the direct and indirect cost and benefits of the impact of tourism on the natural environment, economy, and local communities from destination to destination (see Table 2)

Table 2: Hypothetical costs and benefits of ecotourism

<table>
<thead>
<tr>
<th>Environmental impacts</th>
<th>Direct benefits</th>
<th>Direct costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• provides an incentive to protect the environment, both formally (protected areas) and informally</td>
<td>• potential for linkages with other sectors of the local economy</td>
</tr>
<tr>
<td></td>
<td>• provides an incentive for restoration and conversion of modified habitats</td>
<td>• rapid growth rates</td>
</tr>
<tr>
<td></td>
<td>• ecotourism actively assisting in habitat enhancement (donations, policing, maintenance, etc.)</td>
<td>• difficulties in identifying, measuring and monitoring impacts over a long period idea that all tourism induces stress</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• fragility areas may be exposed to less benign forms of tourism (pioneer function)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• may foster tendencies to put a financial value on nature, depending upon attractiveness</td>
</tr>
<tr>
<td>Indirect benefits</td>
<td>• exposure to ecotourism fosters a broader commitment to environmental well-being</td>
<td>• revenue uncertainties to in situ nature of consumption</td>
</tr>
<tr>
<td></td>
<td>• space protected because of ecotourism provide various environmental benefits</td>
<td>• revenue leakages due to imports, expatriate or non-local participation, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental impacts</th>
<th>Indirect costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• revenue uncertainties to in situ nature of consumption</td>
</tr>
<tr>
<td></td>
<td>• revenue leakages due to imports, expatriate or non-local participation, etc.</td>
</tr>
<tr>
<td></td>
<td>• opportunity costs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Direct benefits</th>
<th>Indirect costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>• revenues obtained directly from ecotourists</td>
<td>• start-up expenses (acquisition of land, establishment of protected areas, superstructure, infrastructure)</td>
</tr>
<tr>
<td>• creation of direct employment opportunities</td>
<td>• ongoing expenses (maintenance of</td>
</tr>
<tr>
<td>• strong potential for linkages with other sectors of the local economy</td>
<td></td>
</tr>
<tr>
<td>• stimulation of peripheral rural economies</td>
<td></td>
</tr>
<tr>
<td>Indirect benefits</td>
<td></td>
</tr>
<tr>
<td>• indirect revenues from ecotourists (high multiplier effect)</td>
<td></td>
</tr>
<tr>
<td>• tendency of ecotourists to patronize cultural and heritage attractions as ‘add-ons’</td>
<td></td>
</tr>
<tr>
<td>• economic benefits from sustainable use of</td>
<td></td>
</tr>
</tbody>
</table>
protected areas and inherent existence • damage to crops by wildlife

Sociocultural impacts

Direct benefits
• ecotourism accessible to a broad spectrum of the population
• aesthetic/spiritual element of experience foster environmental awareness among eco-tourists and the local population
Indirect benefits
• option and existence benefits

Direct costs
• intrusions upon local and possibly isolated cultures
• imposition of elite alien value system
• displacement of local cultures by parks
• erosion of local control (foreign experts, immigration of job seekers).
Indirect costs
• potential resentment and antagonism of locals
• tourist opposition to aspects of local culture (e.g. hunting, slash-burn agriculture).


Ecotourism development is in principle similar to tourism development in general. However, there are two important aspects to note. First, the aspect of the destination and second is the aspect of the market. Ecotourism development is carried out with a product-driven concept. Although the aspect of the market is important, types, nature, and behaviors of objects and attractions of nature and culture are seeking to preserve their existence and existence. In essence, ecotourism that preserves and utilizes nature and culture of the community is far more stringent than just sustainability. The development of ecotourism with environmental insight guarantees better results in preserving nature compared to sustainable development. The reason is that ecotourism does not exploit nature, but only uses nature and community services to meet the knowledge, physical and psychological needs of tourists. Ecotourism is a form of tourism that leans toward meta-tourism. Ecotourism is not selling destinations but selling philosophies. In consequence, ecotourism will not experience market saturation (Chafid Fandeli, 2000).

Generally, nature-based tourism is claimed to have to at least have three main components (Valentine, 1992: 109):
1. Dependency on nature with high intensity of interaction with nature and social sensitivity.
2. Exhibiting important and distinct product elements such as willingness to pay, sizes and types of visitor groups.
3. Accessibility to, location and level of damage risk of the use of the resource.

According to IUCN (International Union for Conservation of Nature), conservation areas are divided into six categories, presented in the following table:

<table>
<thead>
<tr>
<th>Categories</th>
<th>Area Types</th>
<th>Area Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ia</td>
<td>Strict Nature Reserve</td>
<td>The nature reserve area is an area with certain characteristics, both on land and in the water, which has the main function as a preservation area of plant and animal diversity and its ecosystem, which also functions as a life support system region (Law No. 5 of 1990).</td>
</tr>
<tr>
<td>Ib</td>
<td>Wilderness Area</td>
<td>Wildlife reserve is a nature reserve area that is characterized by its diversity and/or unique types of animals for which their habitat can be managed (Law No. 5 of 1990).</td>
</tr>
<tr>
<td>II</td>
<td>National Park</td>
<td>National park is a natural conservation area that has native ecosystems, managed by a zoning system that is utilized for research, science, education, supporting cultivation, tourism, and recreation (Law No. 5 of 1990).</td>
</tr>
<tr>
<td>III</td>
<td>Natural Monument or Feature</td>
<td>Natural or special monuments that include world heritage sites.</td>
</tr>
<tr>
<td>IV</td>
<td>Habitat/Species Management Area</td>
<td>Grand forest park is a nature conservation area to collect natural or artificial plants and/or animals, native and/or non-native species, which are used for research, science, education, supporting cultivation, culture, tourism, and recreation (Law No 5 1990).</td>
</tr>
<tr>
<td>V</td>
<td>Protected Landscape/Seascape</td>
<td>Nature tourism park is a nature conservation area which is mainly used for tourism and nature recreation (Law No 5 of 1990).</td>
</tr>
<tr>
<td>VI</td>
<td>Protected area with sustainable use of natural resources</td>
<td>Conservation areas whose ecosystems and habitats are protected, with original cultural values and natural resource management systems. In general, the area is vast and still relatively pristine. Part of the area is well managed using natural resources with conservation as the main objective in the management of the region.</td>
</tr>
</tbody>
</table>

Source: IUCN

METHOD

This article is a literature review about the potential of the Purwodadi Botanical Gardens as a sustainable eco-tourism area in East Java Indonesia which is referring to the above category, Purwodadi Botanic Garden falls into the national park category.
Although nominally, the national park status is not awarded to Purwodadi Botanic Garden. Functionally, Purwodadi Botanic Garden falls into the conservation area. This review showed that the enhancement of the natural-based component of ecotourism requires an approach that evaluates the different frameworks of stakeholders’ involvement at three different levels (Charters, 1995):

a. at the ecotourism enterprises level the emphasis is on the change of perceptions;

b. at the organizational field level, the focus is on collaboration; and

c. at the industry level, the emphasis is on management and marketing issues.

As with any case of tourism product development, the natural-based component of ecotourism often relies on the degree of cooperation between various providers of this product, and as such, the conflicting interest between these parties is inevitable (Charters, 1995). Facilitating formal training, information educational programs, and industry networks, as well as management of the different sub-elements of ecotourism components such as recreational activities could ideally assist a minimization of such conflict.

PURWODADI BOTANIC GARDEN

Geographical Location

Purwodadi Botanic Garden is located in Purwodadi Village, Purwodadi Sub-District, Pasuruan Regency. It is on the edge of a major road connecting 3 cities namely Malang, Surabaya, and Pasuruan. The distance from the city of Malang is 24 km to the north and from the city of Pasuruan is 30 km to the southwest and from the city of Surabaya is 65 km to the south. The area of Purwodadi Botanic Garden is around 85 ha, at an altitude of 300m above sea level with a flat to undulating topography. The average annual rainfall is 2366 mm with wet months between November and March with temperatures ranging from 22-32° C.

The History of Purwodadi Botanic Garden

Purwodadi Botanic Garden, known as Hortus Iklim Kering Purwodadi, was founded on 30 January 1941 by Dr. L.G.M. Baas Becking. It is one of the 3 branches of the Indonesian Botanic Gardens (Bogor Botanical Gardens) which assumes the task and function of collecting plants that live in the dry lowlands within an area of about 85 ha. This Botanical Garden was first led by Johannes Viets who was a Dutchman in 1941-1942. With his appointment on 30 January 1941, Johannes Viets laid out the basic scheme of developing a botanical garden. The first important thing he did was to fill the Purwodadi Botanic Garden area that had just been obtained from the community, in the form of rice fields and yards, with ground cover plants and lamtoro (river tamarind) to boost soil fertility naturally.

In 1943, Purwodadi Botanic Garden was led by the Japanese, Tanaka. During his leadership, Tanaka built the main road which split the garden into two, as well as other roads from north to south. Since the Independence Day until now, the Purwodadi Botanic Garden was led by Indonesians except in 1949-1954, who was then led by a Dutch national H.O. van Leusen. Moestopo (1945-1949) was the first Indonesian to lead Purwodadi Botanic Garden. In its early days, this garden was used for the research of plantation crops. Then in 1954, the foundations of the botanic garden began to be laid out, marked by the start of making plots of collection plants. Purwodadi Botanic Garden was first opened to the public during the tenure of Sarwana. The opening inauguration took place on 10 March 1963. After the Garden was opened to the public, the construction of physical facilities and the development of a garden management system were undertaken at a rapid rate. Since 1980, some of the plants have been reorganized according to familial groups that adhere to the classification system of Engler and Prantl. Located in a very strategic route, Purwodadi Botanic Garden is expected to be one of the tourist destinations along the way to Malang and Batu.
Profile in The Global Community Of Botanical Gardens

There are many key players engaged in the utilization and conservation of plant diversity in sectors as diverse as agriculture, forestry, the pharmaceutical and biofuel industries, protected area management and ecotourism. Botanic gardens have a unique opportunity, as places that are simultaneously popular visitor attractions and scientific institutions, to contribute directly to the documentation and preservation of plant diversity, while engaging with citizens to shape and mobilize their response to the global environmental challenges of our times.

The increasingly alarming rate of forest destruction and the extinction of plant species in Indonesia has made the broader community aware of the importance of conservation, which then positions botanical gardens as a scientific institution that carries important and strategic tasks in plant preservation. As a manifestation of the important role of botanical gardens in the field of plant conservation, in 2001 the status of four botanical gardens was changed. Bogor Botanical Gardens became the Center for Plant Conservation, supervising under its wings the three branch botanical gardens (Cibodas Botanic Garden, Purwodadi Botanic Garden and Bali “Eka Karya” Botanic Garden) which acquire the status of the Plant Conservation Agency Technical Implementation Unit. This institutional status change augments botanic gardens’ responsibilities that they now act as conservation, research, education and tourism institutions (Darnaedi, 2002).

Botanic gardens are defined as ex-situ plant conservation areas that possess a documented collection of plants and are organized based on taxonomic, bio-regional, thematic classification systems, or a combination of those systems with the purpose of conservation, research, education, tourism activities and environmental services (Perpres, 93/2011).

Purwodadi Botanic Garden is also part of the global botanical community. Therefore, Purwodadi Botanic Garden is associated with global conventions, agendas and/or strategies; and actively contributes to the implementation of said activities. One of the main elements of the global mission is: “Promoting botanical gardens as an information center on plant diversity and conservation.” Besides, a botanical garden also has an important function following what is stated in the International Agenda, namely to prevent the loss of plant species and their genetic diversity and prevent further degradation of the natural environment, by performing the task of functions:

- Improving public understanding of the value of plant diversity and the threats it faces.
- Implementing practical actions in the context of improving environmental education.
- Promoting and ensuring sustainable use of the world's natural resources for present and future generations.

The strategic and important role of a conservation area, in this case, botanical gardens, is how the botanical garden acts as the world's largest resource for the cultivation and conservation of individuals by planting species and providing advice on ways in which botanical actions can be directed to promote integrated biodiversity conservation (both combining and utilizing ex-situ and in-situ techniques).

This can also be a consideration for botanical gardens in contributing to conservation efforts and in the context of sustainable preservation through research and educational activities by collaborating and forming networks to bolster efforts to strengthen collaborative partnerships.

The unique function of Purwodadi Botanic Garden as an ex-situ conservation is its role in managing and conserving plant species outside their natural habitat. This certainly requires special skills and expertise in the maintenance of samples of all individuals, as well as seeds, pollen, vegetative propagation, and tissue or cell culture in plant propagation to preserve flora.

The basic purposes of ecotourism are to preserve and utilize natural and cultural resources in a sustainable way and to enable the economic development of local people. However, achieving the aims in ecotourism depends on whether they are environmentally and ecologically sustainable and economically applicable. To achieve these, a participative tourism planning is required (Kiper, 2011). Figure 1 illustrates the multiple and diverse elements essential for ensuring that communities fulfill their role in ecotourism development (Drumm & Moore, 2002). Now that ecotourism has reached such stature, it is especially important to scrutinize its effectiveness as a strategy for sustainable development and search for ways to improve policies and practices. Ecotourism is not a universal remedy, but its potential to promote sustainable development deserves considerable attention.

Ecotourism should be seen in direct relation to nature conservation (protected areas), with preservation of the authentic and involving local communities in all stages of the process. The development process is a lengthy process, which requires a sustained effort from all those involved but can bring major benefits in the long term, contribute directly to the creation of a ‘sustainable existing’ target area (Roxana, 2012).
Purwodadi Botanic Garden is attractive to tourists because it stores a plethora of dry lowland flora species in an area of 85 hectares, at about 300 m above sea level. This botanical garden is known as the “Hortus Iklim Kering Purwodadi” (Purwodadi Dry Climate Garden) because the region experiences a relatively dry climate compared to the other three botanical gardens in Indonesia. In the dry season, there are four to six months without rain. The table below presents the types of plants that exist in the Purwodadi Botanic Garden

Table 4: Collection of Purwodadi Botanic Garden as a conservation area

<table>
<thead>
<tr>
<th>No.</th>
<th>Types of Plants</th>
<th>Collection Sums</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Legumes</td>
<td>3 families namely Mimosaceae, Caesalpinioideae, and Papilionoideae, with a total collection of plants reaching 157 species from 70 genera included in these families. Various types of legumes are used as ornamental plants such as the genera of the Amherstia, Brownea, Cassia, Senna, and Saraca. Besides, some species are used for their timbers such as Sonokeling (Indian rosewood) (<em>Dalbergia latifolia</em>) and Wangkal (white siris) (<em>Albizia procera</em>) and greening and roadside plants such as Angsana (red sandalwood) (<em>Pterocarpus indicus</em>), Acacia (<em>Acacia auriculiformis</em>) and Soga (yellow flame tree) (<em>Peltophorum pterocarpum</em>). Some are used as medicinal plants such as Johar (yellow cassia) (<em>Senna siamea</em>), Kedawung (tree bean) (<em>Parkia timoriana</em>), Dadap srep (<em>Erythrina subumbrans</em>), and Dadap Ayam (<em>Erythrina Orientalis</em>).</td>
</tr>
<tr>
<td>2</td>
<td>Orchids</td>
<td>About 1,998 natural orchid specimens are consisting of 65 genera and 201 species of epiphytic and terrestrial characteristics. 139 Asclepiadaceae specimens, consisting of 2 genera and 19 species; 104 fern specimens, consisting of 20 families, 30 genera and 19 species. This collection is mostly collected from exploration to various regions in Indonesia, while a small amount of the rest is obtained from other sources. What's interesting is that this collection focuses only on dry lowland species. All collected data can be seen in the greenhouses and collected systematically.</td>
</tr>
<tr>
<td>3</td>
<td>Palms</td>
<td>Palm belongs to the family Arecaceae and is the oldest species that have been found since the Cretaceous time, approximately 120 million years ago. Arecaceae is very interesting in terms of botany, the beauty of form, diversity of types and uses. In the world, there are an estimated 200-300 genera in the family Arecaceae and around 2000-3000 species are spread across tropical and subtropical regions. Indonesia is the center of world palm diversity. Of the total number of palms in the world, 46 of them (576 species) can be found in Indonesia and 29 genera are endemic palms. (Irawanto, R. (2011). Koleksi Palem Yang Berpotensi Pangan Di Kebun Raya Purwodadi.). As one of the ex-situ plant conservation organizations, the Purwodadi Botanic Garden assumes the task of carrying out an inventory, exploration, planting collection and maintenance of dry lowland plants that have scientific value and have the potential to be collected (conserved). In this area of 845,148 m2, there are 174 families, 904 genera and 1,896 species, with Arecaceae collections reaching 60 genera, 117 species and 435 individuals based on the 2006 catalog (Suprapto et al., 2006).</td>
</tr>
<tr>
<td>4</td>
<td>Bamboos</td>
<td>Around 30 types of bamboo have been collected by the Purwodadi Botanic Gardens. 16 species originated from Java, 2 species originated from...</td>
</tr>
</tbody>
</table>
Maluku, 2 species originated from Sulawesi, and 10 species originated from several Asian countries (China, Japan, Thailand, India, and Burma). *Gigantochloa manggong* (Manggong Bamboo) is an endemic bamboo in East Java. *Gigantochloa apus* (Apus Bamboo) is often used for furniture, handicrafts or roofs. *Dendrocalamus asper* shoots (Petung Bamboo) are edible, and *Schizostachyum silicatum* (Wuluh Bamboo) can be used for flutes.

Ferns

Fern plant collection is arranged under large and shady trees because this group of plants likes shade and damp places. The collection reaches 60 species from 36 genera and 21 families. Among these are bird’s nest fern (*Asplenium nidus*), suplir (*Adiantum spp.*), hata (*Lygodium circinnatum*), and deer antlers/simbar Menjangan (*Platycerium coronarium*). There are several other useful collections of ferns, such as vegetable fern (*Athryrium esculentum*) which can be eaten by their buds, *Asplenium sp.* and *Adiantum sp.* which can be used as an ornamental plant, *Equisetum debile* horsetail that can be used as a medicinal ingredient, *Cyathea contaminans* that can be used as an orchid growing media, and *Lygodium circinnatum* which can be used as a craft material.

Medicinal Plants

Located on plots XIV G and V A, this group of plants is arranged in such a way that they become an attractive park to enjoy. The collection includes noni (*Morinda citrifolia*), the fruit of which can be a cough medicine and high blood pressure, caricature plant (*Graptophyllum pictum*), the leaves of which can be used to treat hemorrhoids, Widoro upas (*Merremia mammosa*), the tubers of which can be used for diabetes medication, Sembung (*Blumea balsamifera*), the leaves of which can be used to treat asthma, heart disease, Wudani (Rangoon creeper) (*Quisqualis indica*), the leaves of which can be used to treat worms and others.

Source: Purwodadi Botanic Garden

In addition to various types of plants, Purwodadi Botanic Garden also has several thematic parks developed by the existing collection to attract visitors to get to know the characteristics of existing collection plants. Some of these theme parks are Bougainville Park, Aquatic and Nail Plant Garden, Mexico Park and Medicinal Park and Labyrinth Park and Local Fruit Park.

One of the main tasks and functions of the Purwodadi LIPI Botanical Garden Plant Conservation Center is to carry out research on plant species in the dry lowlands of Indonesia. Research activities are focused on the types of native Indonesian wild plants, especially those that have high scientific and conservation value and have promising prospects for sustainable development and use. In some cases, research has also been carried out at an infraspecific level or below the species level, for example in the diversity of banana, mango, and Dioscorea diversity studies. To be more focused, the research activities at the Purwodadi Botanical Garden were organized through 2 research groups, namely Conservation and Domestication, Introduction and Economic Botany.
Purwodadi Botanical Garden also conducted plant exploration activities at the Lawu Ds Forest Management Unit (KPH) in April and June 2019. This activity was expected to be more intensive and sustainable in an effort to preserve the biodiversity of plants with dry lowland habitats through various program activities. 433 numbers were successfully obtained from plant exploration activities at KPH Lawu Ds which included herbs, orchids, ferns, lianas, shrubs to trees. Some of these plants are plants that are classified as rare, interesting and potentially as medicinal plants and new collections for the Purwodadi Botanical Garden. Of these 433 numbers, there are interesting plant species mainly from orchid species namely Coelogynespeciosa, Corymborkisveratrifolia Macodes; and fern groups such as Selaginellaplana, Cyathea; and Smilax zeylanica (Smilacaceae). Plants that were included in the category of rare plants of the fern species namely Pterissemipinnata were also obtained by the exploration team.

Purwodadi Botanical Gardens in collaboration with PT. POMI-PT. Paiton Energy built an 8000 m2 Biodiversity Garden. The educational park is located in the Housing area of PT. POMI Sumberanyar village, Paiton sub-district, Probolinggo district. The purpose of the Biodiversity Garden development is to provide green open space, in the future, the facility can also be used as an educational park in Probolinggo, as a learning medium for students from various schools in Probolinggo. In addition to collaborating in the development of biodiversity parks, Purwodadi Botanic Garden with PT. POMI-PT. Paiton Energy also collaborates in research activities, which include: Floristic studies, ecology, carbon stocks, satellite imagery of vegetation and land use in situ conservation areas located in Selobanteng, Banyuglugur, Tampora, and the Steam Power Plant area.

Several major activities were held at Purwodadi Botanical Gardens which also serve as a stage to introduce the Botanic Garden more widely to the community as one of the tourist attractions with many functions of conservation and environmental education. There is a guest house in the area of Purwodadi Botanic Garden. Besides, there are also nurseries for various types of plants that are propagated for collection needs and to sell plants. In addition to the guest house, there are several supporting facilities for tourism such as meeting rooms, multipurpose buildings, playgrounds, footpaths, and extensive parking facilities.
Purwodadi Botanical Gardens is one of the objects and attractions of educational tourism in Pasuruan Regency which carries out promotional activities through participating in exhibitions of potential tourism activities in various regions and direct selling activities in the Media and Travel Agent Gathering event facilitated by the Office of Culture and Tourism of Pasuruan Regency. The activity brought together representatives of travel agents from Singapore and Malaysia and managers of tourist objects and attractions in the Pasuruan Regency including the Purwodadi Botanical Gardens. The main goal is that the travel agents are more familiar with and can offer tourist objects and attractions to tourists and bring tourists from their countries to visit Purwodadi Botanical Gardens.

Then, ultimately, a process of combining the concept of ecotourism with conservation efforts is a manifestation of sustainable tourism. Sustainable tourism is a broader economic sector of ecotourism that includes sectors that support tourism activities in general including marine tourism (beach and sun tourism), rural tourism (rural and agritourism), natural tourism, cultural tourism, or business travel. Sustainability, in this case, is an emphasis on how efforts to preserve the existing flora and biodiversity can be supported by the development of nature tourism which is one of the functions of Purwodadi Botanic Garden as a conservation area.

The management of conservation areas in the future will become more dynamic in responding to the future needs for scientific research, conservation and utilization of ex-situ which is the duty of a botanical garden, including Purwodadi Botanic Garden. Education, raising awareness, and capacity, which involve the community and staff in the botanical garden, are vital functions of a modern botanical garden (Blackmore et al., 2011). These functions provide unique opportunities for research into plant biodiversity, horticulture, and conservation biology in popular public places. Raising public awareness about the various problems facing our earth may be enough to bring about fundamental behavioral changes.

There are several key parties involved in the utilization and in the context of developing and strengthening the function of conservation of plant diversity in various sectors such as agriculture, forestry, the pharmaceutical and biofuel industry, protected area management, and ecotourism. The botanical garden itself is unique in its opportunity as a place that simultaneously attracts visitors and scientific institutions, to contribute directly to efforts to preserve plant diversity, which will always be involved with the community in shaping and mobilizing their responses to the challenges of managing the global environment today. Wyse Jackson (2001) states that it is very significant to move with more than 2000 botanical gardens that accommodate 80,000 species of living collection plants and receive hundreds of millions of visitors per year. The botanical garden has the carrying capacity of human resources with a variety of special skills, for example, research human resources with special expertise for each type of plant, supporting human resources who are in charge of propagation and nurseries and human resources who are in charge of conveying important information about plants, and those human resources in their entirety cooperate in dedicated institutions for systematic management of biodiversity, especially flora, and are engaged in conservation, education, and the delivery of information to the public.

The Indonesian Institute of Sciences (LIPI) as an institution that manages 4 botanical gardens continues to make Purwodadi Botanic Garden a research area for flora from the arid lowland eco-region of Indonesia. Purwodadi Botanic Garden is expected to be a reference for the surrounding botanical gardens. LIPI continues to be committed so that the existence of the botanical garden can accommodate the endemic flora of the archipelago's biological wealth that can integrate the functions of conservation and research activities. Participation of various parties is needed so that other functions can meet the expectations of the community as service users. With public involvement, Purwodadi Botanic Garden can develop various educational services related to the importance of environmental conservation in more effective ways to the wider community. All definitions of ecotourism, regardless of their founding (active or passive), include nature-based components. The inclusion of nature-based components in the definition of ecotourism in many cases has not been linked to the element of sustainability, because current efforts focus on the former rather than the latter to operationalize the concept. This emphasis creates certain limits on the estimated size of the ecotourism market, all of which indicate that current estimates of the size of the ecotourism market refer to the size of the natural tourism market. Developing countries such as Central America and Latin America, the Caribbean and Australia, New Zealand and Antarctica have long been claimed as countries with components of nature-based ecotourism activities (Diamantis, D. 1999).

CONCLUSION

Botanical gardens, through their programs, can improve the understanding and contribution of the community to be engaged in realizing a sustainable environmental life in the corridor of conservation efforts related to education and tourism in it. The wealth of natural resources owned by Purwodadi Botanic Garden has selling potential and can further developed as a conservation area that supports natural tourism, especially ecotourism. As an area with eco-tourism potential that offers the concept of education and conservation as well as an alternative open place of recreation, Purwodadi Botanic Garden must compete with many more interesting areas. This is achieved by developing eco-tourism potential through interesting presentations, including through the development of programs that have a tourism role in the conservation and maintenance of ecosystems in Purwodadi Botanic Garden. This is because the development of ecotourism must generate economic profits and social benefits for local people as well as environmental benefits to ensure its sustainability.

In conclusion, it is clear that ecotourism aims to achieve Sustainable Tourism, which can be realized with and by:

- The key role of a botanical garden in supporting biodiversity sustainability is essential as the basis for the development of conservation areas that have the potential for ecotourism (Botanic gardens are the key player for sustainability ecotourism);
• Using socio-cultural and economic impacts analysis on ecosystems (Ecosystem, socio-cultural and economic analysis) as “Ecotourism”;
• Employing an ecological approach, including biodiversity - (Ecological and Bio-diversity Approach), - because this is often referred to as “Ecological Tourism”;
• Involving the responsibility of all tourism stakeholders, not only the government and private providers of tourism services but also the local community and tourists, - for this reason, various parties refer to it as “Responsible Tourism”;
• Minimizing negative impacts on the natural and socio-cultural environment, such as frequent conflicts and maximizing positive impacts on the preservation of the natural, socio-cultural, economic, local, regional and national environment to create a lasting tourism life, commonly referred to as “Sustainable Tourism”.

Lastly, ecotourism is a more complex and interesting field of research with different components consisting of various things such as research, marketing to environmental management. By referring to the emphasis of some literature which highlights that ecotourism is only a new term in the old tourism world, it turns out there is a special need to support orientation from different perspectives. In such a reorientation process, the traditional idiom of ecotourism as an environmentally friendly form of tourism does not necessarily have to be abandoned, but there must be a natural force, education, and conservation that can be expanded by linking it with theories of environmental management and resources.

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