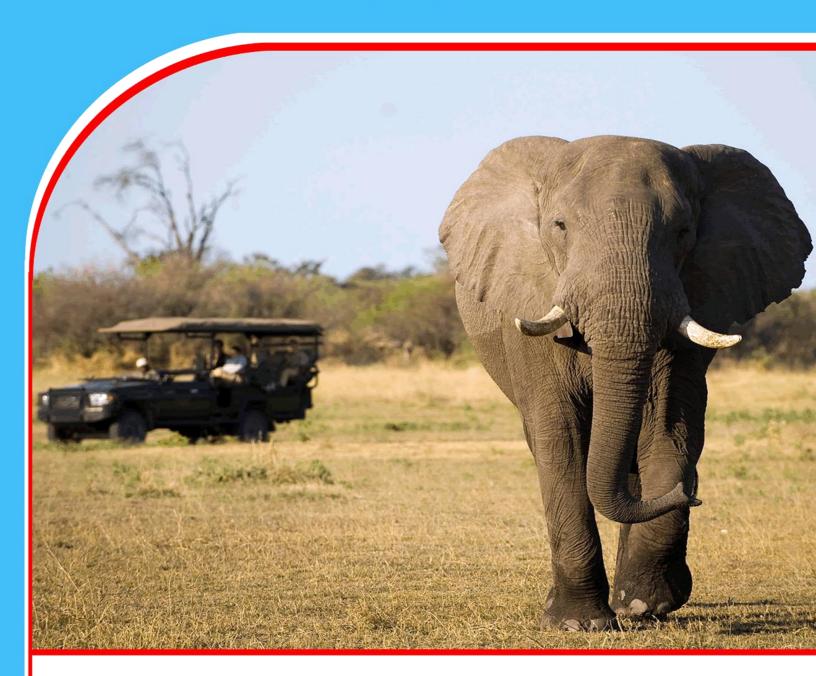
Journal of **Hospitality and Tourism**(JHT)



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Habumuremyi Faustin and Habimana Jean Claude





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Habumuremyi Faustin^{1*} and Habimana Jean Claude²

¹Hospitality and Tourism Lecturer, Rwanda Polytechnic-IPRC Musanze

²Head of Hospitality Department, Rwanda Polytechnic-IPRC Musanze

*Corresponding Author's Email: flecturermusanze@gmail.com

Article History

Received: 16th Feb 2023 Received in Revised Form: 12th

Mar 2023

Accepted on: 18th Mar 2023

Abstract

Purpose: Botanic a garden, usually open to the public, where a wide range of plants are grown for scientific, education and tourism purposes. The objectives of this project were to create the botanic garden tourism in Bwishyura sector, investigate its market demand, to explore how it can help in biodiversity conservation, improving the life of surrounding local citizens and protect the environment in the region.

Methodology: The study used mixed method. Random and convenience sampling technics were used to sample 30 respondents from 50 target population. The collected data was analyzed using statistical tables to verify hypotheses of this study.

Findings: The study found that there were no botanic gardens in the study area. Other indicators such as motivation of travellers for visiting botanic garden, level of interest, affordable entrance fees and visiting frequencies in the last twelve months were presented. Having this botanic garden in Bwishyura sector brings many benefits to the area such as education on plants and animal life, bringing tourists and day trippers, increasing the value of nearby properties, promote scientific and horticulture research.

Unique contribution to theory, practice and policy: The study recommend local authorities and stakeholders to encourage the investors to invest in botanic garden tourism, to increase the awareness of this attraction to the local citizens and visitors. This study also calls for business persons and tourism government institutions to take advantage of these findings as it explain benefits they might target.

Keywords: Botanic, garden, tourism, biodiversity, local environment, economic impact



1.0 INTRODUCTION

Botanic garden tourism, usually open to the public, where a wide range of plants are grown for scientific, education and tourism purposes. Everywhere in the world, gardens have always been a space of innovation (Downing et al., 2021). Each garden is unique, being a witness from history and an important cultural document source (Andrade, 2008). Most of the gardens in the past are not created with the aim of tourism, or for attracting visitors. They were built by private owners to embellish their property (Mwebaze et al., 2011). Only over the years, by acquiring historic importance is that these spaces were discovered by researches, visitors and nature lovers. Besides any kind of garden may turn into a touristic attraction. In Europe, some gardens may receive the distinction of Remarkable Garden, either those open to public, protected or not by law (Bennetta, 2011). These also include those with monuments and sites of national importance that present great historic, aesthetic, or botanical interest (David, 2021). The preferable remarkable gardens for visiting are those with designed gardens and that allows users to photograph.

Although this is not enough to attract visitors, some other actions are important. The attractiveness may be due to the use of a public label of quality or to have a governmental label as "Remarkable Garden". As an example of a gardens' demonstration, in France there is the «Rendez-vous aux Jardins" event which corresponds to an annual event organized by the Ministry of Culture and Communication, in association with Parks and Gardens Committee and take place on the first weekend of June (Rendez-vous aux Jardins, 2020). Communication is another important issue and websites are encouraged to have a specialized press and professional social media. Another interesting activity is to host events such as Garden Open Days, awards and prizes for professionals; training and education, lectures, culture festivals (such as music, arts), and sport events (running, yoga, and others).

From the above background, nowadays garden visiting is a popular leisure activity and has been suggested as an important segment (niche) on the tourism industry in postmodernity (Kariuki et al., 2021). Unfortunately for many districts of Rwanda, Garden tourism is still not yet developed and this shows considerable gaps in biodiversity conservation, tourism attractions, dormancy of job creation for local people, loss of tourism income and lack of alternative leisure activities in existing tourism destinations. Introducing garden tourism as a form of agri-tourism in karongi will bring added value to this region and visitors will enjoy and stay more not only depending on kivu lake as the main tourism attraction in the district.

Botanic garden tourism attract of domestic and international visitors, promote the conservation and education of biodiversity species, encourage the wide range public to support conservation, create job opportunities for local community and support economic development of the region. The project has addressed the research questions which determine how biodiversity species conserved in Karongi District, investigate the market demand perception on Botanic garden tourism at Karongi District, and demonstrate social economic and environment benefits to local community and present designing techniques of modern and attractive botanical garden tourism.

2.0 REVIEW OF RELATED LITERATURE

2.1 Conceptual Frameworks

In the modern tourism industry, what came to be referred to as "garden tourism" may be a relatively recent branch, but numbers prove it is developing at a great pace in North America, Europe and



Asia (Thomas et al., 2018). Globally, gardens are popular attractions with recent research finding that the botanical garden in Cairns is one of the city's top attractions. A tourist traveling to gardens or traveling for the purposes of undertaking gardening-related activities (festivals, shopping) becomes a major part of the tourist industry. The tourism matrix has changed over the years and now is characterized as an "industry of experiences" (Silva et al., 2013). Tourists have been looking for new and unique experiences. Thus, they seek to live and feel sensations and experiences of the places, to experience moments in a remarkable way, and seeking for everything that may be different and that goes beyond common sense (Silva et al., 2013).

Different from traditional tourism, some new categories are getting importance in the latest years, most of them related to nature and environment such as Geotourism, Bird watching, Hunting, Wine tourism, Ecotourism, Cruise lines, Archaeological, University tourism, Gastronomic tourism, Religious tourism, Volunteering, Hot air ballooning, Ethnic tourism, Sports tourism, Routing Tourism, Health and Wellness tourism, Bike tourism and Routes, and Garden tourism (Hannah et al., 2015). Demand for visiting gardens and landscapes have shown an increase, based on the characteristics of these sites for what they evoke, symbolize, and represent (Backhaus and Murungi, 2009). A garden touristic visit, besides to promote and increase a stay period on many destinations, may also contribute to nature preservation, improve an ecological conscience, exciting visitors to appreciate the natural world, and increase income which may use for preservation of the sites (Gastal et al., 2018a).

2.2 Garden Tourism Roots

Garden Visit is an activity mainly registered from the 20th and 21st centuries; there are some historic registers from the 16th century. Visiting gardens started on Great Britain before the early Victorian period (1830- 1848) when people from the upper class used to visit country houses (Connel, 2003). It was also in 16th that some aristocrats, politicians and other financially wealthy Englishmen started to build some country houses and gardens for pleasure (Connel, 2003). Michel de Montaigne, an important philosopher of the French Renaissance on 16th century, was the first garden tourist to make registrations about his impressions of gardens, in a publication from 1580, "Essais" (Michel de Montaigne, 2020).

Louis XIV, a garden lover, wrote in the 17th century, a guide for visiting Versailles' gardens, untitled "Manière de Montrer les Jardins de Versailles" (Louis XIV, 2013). This guide reflects his personnel vision of an amazing garden, detailing the perspectives and places. It was written by his own hand and is considered as a Royal Law. During the 18th century, garden ideas were diffused and stimulated for foreign and domestic travellers eager to see the landscapes by themselves (Connell, 2005). Only at the end of the 19th century, John Evelyn (1620-1706), a writer and garden lover, use to register on his diary, details of visits performed to gardens in Italy and France, including tree descriptions (Evelyn, 2020).

The effective garden tourism started in 1927, in England, with the foundation of the National Garden Scheme. In this initiative, more than 3500 private gardens in England and Wales are opened for public visitation on selected dates for charity in the event Gardens of England and Wales Open for Charity. The gardens participants are vetting by the organizers and should have quality, character and raise the interest by the public that also visit for charity (McMillan & Plumptre, 2019). Due to the way of life nowadays, with people living in crowded cities, the need



for greenspaces such as parks, botanical gardens, historic gardens, and others, has been increased, turning these spaces more and more valuable (Gastal et al., 2018a)

In many of the growing and increasingly more prosperous cities of the USA, botanic gardens were established as civic projects (Chicago, 2000; Atlanta, 2014; Dallas, 2017) while gardens established by individuals, usually possessing significant wealth, also became common (Meghan, 2019)

2.3 The Models on Botanical Garden Tourism

Amongst the various types of gardens, the botanical garden is of specific interest in this study. Botanic Gardens Conversation International identified the physic gardens of Italy in the 16th and 17th centuries as the world's first botanic gardens to be used for the academic study of medicinal plants (Garcia et al., 2017). During the age of exploration and expansion of international trade (Clement, 2020), botanic gardens became sites for the trial and cultivation of new species discovered by expeditions sent on collecting missions to Europe's colonies. Later, in the 19th and 20th century, municipal and civic gardens were established throughout Europe and the British Commonwealth. Botanical gardens are regarded as very important due to their existing collections and the scientific knowledge possessed in the propagation of plant species (Botanic Gardens Conservation International, 2012).

Botanical gardens arguably play an important role in reconnecting people with the world of plants, in educating them and in presenting models for sustainable living stimulated by recent increased awareness and concerns about the human impact upon the environment (Dodd & Jones, 2010). Based on a series of case studies, Gough, Accordino, and Lindsey (2012) and Gough and Accordino (2013) summarized the future role of botanic gardens as: Gardens as Educators of youth and the general public about the importance of greening initiatives; Gardens as Technical Experts including demonstrations or techniques of conservation; gardens as community hosts for meetings and events that promote accessibility to public garden space and gardens as catalysts for community change and promotion of sustainable community development.

Powledge (2011) recognized that even though the role of botanical gardens has expanded, gardens in general face constant funding pressures. Consequently, many botanical gardens have become places of entertainment, requiring financial contributions from their visitors. In addition to entrance fees as income, increasing numbers of botanical gardens have added gift shops and restaurants as well as marketing arms to entice the public. Today, botanical gardens are regarded as both sites for conservation and sites for recreation by locals as well as tourists (Ballantyne, Packer & Hughes, 2008; Crilley, 2008; Crilley, Hills, Cairncross, & Moskwa, 2010).

2.4 Garden Tourism as a Part of Education for Biodiversity

It is estimated that 34,000 species of plants, or almost 10% of all plant species, are threatened in the world today (Rinker, 2002). To address this serious issue, gardens, and botanic gardens in particular, have become ex situ repositories for many of these rare and endangered species. Indeed, BGCI estimates that botanic gardens around the world have almost one-third of all plant species in the world in their collections (Wyse & Sutherland, 2000). In 1998, BGCI launched an international consultation process to address plant conservation on a global scale, and the result was The International Agenda for Botanic Gardens in Conservation (Wyse et al., 2000).



The document is an extensive agenda for botanic gardens to conduct their affairs in the 21st century, but for the first time the plan recognizes the importance of tourism to (botanic) gardens and includes the recognition of and role for tourism in the practice of conservation. In the section under "Sustainable Use of Biodiversity", the document suggests: In some countries, tourism and the associated development generated is a major threat to the maintenance of biological diversity (Turner, 2019). Tourism is one of the world's fastest growing industries and some aspects have significant impacts on the physical and social environment, for tourism to be sustainable, it is dependent on some key principles including operating within the capacity of the environment so that biodiversity is not lost through the degradation of areas of natural and cultural significance (Gough et al., 2014).

The conference of the Parties to the CBD has been called upon to help develop and implement an action oriented programme of work on sustainable tourism development and within this programme botanic gardens should play a role.

2.5 Garden Tourism for Promoting Ecotourism and Agri-tourism

Ecotourism is distinct from other forms of nature based tourism in that it involves interpretation of natural and cultural environments along with ecologically sustainable management of the natural area being visited. It supports conservation and brings benefits to the local community (Beeton, 2017). The definition of ecotourism differs throughout the world. It is generally considered to be environmentally and socially responsible travel that minimizes negative impacts and promotes conservation. This fits closely with the 2010 targets for botanic gardens.

Ecotourism within a botanic garden has to include interpretation of the practices of sustainable management through appropriate horticultural systems (Ballantyme, 2008). As a botanic garden cannot be said to have a genuine Eco tour without paying attention to what goes on behind the scenes, interpretation of management of building infrastructure with waste, water and power systems must be added. The sustainable management of botanic gardens and interpretation of this allows eco tourists to take away more than simply messages on the importance of plants in natural and cultural landscapes.

Agritourism as an activity that links the economic, social and environmental components of sustainability, strongly related to local communities and their attitudes towards tourism, so one of the solutions for rural areas can undoubtedly be agri-tourism (Thomas, 2017). Agritourism can be seen as an innovative and diversifying strategy for farms, including recreational and leisure activities for tourists, with many economic and non-economic benefits for farmers, visitors and communities, with a significant emphasis on natural, organic, bio aspects, in any part of human activities, health and the environment, in a word on sustainability (Bareham, 2020).

Botanical gardens have an important function in preserving biodiversity. Botanical gardens, which are generally located in urban spaces, re-connect nature and humans and become a part of the urban ecosystem. This makes botanical gardens have various values not only ecological but also social, economic, and cultural values. Unlike primary forests, botanical gardens are an effort to conserve biodiversity by man-made methods. They are designed for multiple purposes, such as education, research, recreation, and conservation. Therefore, botanical gardens have a very important role and a high value for nature and humans. As mentioned, botanical gardens are



defined as 'institutions holding documented collections of living plants for purposes of scientific research, conservation, display, and education' (Crilley et al., 2010).

3.0 STUDY METHODOLOGY

Data for this study were collected using a mixed method approach to explore how biodiversity species are conserved in Karongi District, to investigate the market demand perception on Botanic garden tourism at Karongi District, to demonstrate social economic and environment benefits to local community and to present designing techniques of modern and attractive botanical garden tourism. The study targeted approximately 50 respondents for each group of participants (travellers, local authorities and local citizens) from which to select sample size of at least 30% by using two technics: "random sampling" for local community and local authority of Bwishyura sector and "convenience sampling" for visitors. Google form link containing seven (7) ended and pre-coded questionnaires distributed to 20 sample size of local citizens/ authorities and other six (6) questionnaires were distributed to ten (10) domestic and international travellers in Bwishyura sector. The collected data were statistically analysed and tabulated to comprehend how the research objectives have been achieved.

4.0 RESULTS ANALYSIS AND INTERPRETATIONS

4.1 Respondent's Views on Conservation of Biodiversity Species in Karongi District

Biodiversity conservation incorporates the preservation, maintenance, sustainable use, recovery and enhancement of the components of biological diversity such as plants and animals. The study aimed to know how the biodiversity is conserved in Karongi District specifically in Bwishyura Sector and by using the most common measures for biodiversity conservation; the questionnaires have been formulated and addressed to the study participants.

4.1.1 Regarding Botanical Gardens/Arboretums in Bwishyura Sector

The project wanted to know if there areas for research and exhibition of plants, documentation of local flora, preserving samples of rare and endangered species and maintenance of specimen collections for future use in the research area.

Table 1: Extent to which gardens are available and their purpose

	Yes (%)	No (%)
Available areas for research and exhibition of plants	13	87
Available areas for documentation of local flora	42	58
Available areas for preserving samples of rare and endangered species	4	96
Available areas for Specimen collections for future use.	0	100
Available of Zoological gardens	0	100
Available of Biosphere reserves	7	93

Source: November (2022)



The table 1 present variables that describe the availability of botanical gardens possible components and shows the considerable gaps of those kinds of gardens where by 100% reacted that no plants specimen collection for future use and no zoological gardens, beside this 96% of respondents revealed that there is no preserving samples of rare and endangered species with 93% who didn't know if there is biosphere reserves in the research area.

4.2 Market Demand Analysis of Botanical Garden Tourism in Karongi District

The Individual Travel Cost Model (TCM) assumes that an individual must visit a botanic garden to use its services. The non-market benefits accruing per person from the botanic site can be inferred from the relationship between travel-cost expenditures and the number of visits to the botanic site (Pak, 2003; Lamtrakul et al., 2005); Travel cost is used as a proxy for an entry price, with a change in price causing a change in consumption (Freeman, 1993; Mwebaze and Bennetta, 2011). In general, Individual TCM is formulated as follows (Wills & Garrod, 1991).

In the formula: Vij: Number of visits by individual i to botanic site j in the previous 12 months, TCij: Travel cost variables by individual i to gain access to botanic garden /site j, these include distance costs for each individual i, time costs and entry fee, Ssij: A dummy variable to capture whether individual i visited a substitute site to j, (it takes on the value 1 for substitute sites and zero otherwise), Xij: Vector of socio-economic characteristics of individual i (income, education, age), ei; Error term assumed to be normally distributed with constant variance and zero mean. The individual travel cost method was employed to achieve the objectives of this study.

The first step in the travel cost method is to estimate a regression model for predicting visits per person to the botanic garden from a sample of visitors. This model is known as the recreation demand curve. This demand curve predicts the quantity of visits made by survey respondents as a function of the price paid per visit and other explanatory variables such as income. Money and time spent for the botanic garden trip (total travel expenditure) are used as proxies for prices paid by visitors to enjoy the botanic garden

Table 2: The demographic distribution and the relationship between the independent variables and the number of visits according to the survey results of travel cost method

Variables	Frequency	Percentage (%)
Age		
18-25	2	13.3
26-35	7	46.7
36-45	5	33.3
46-55	0	0.0
56-65	1	6.7
66+	0	0.0
Gender		
Male	9	60.0
Female	6	40.0



Education		
Education	2	13.3
Primary school only	2	
Secondary school	1	6.7
Technical/university	9	60.0
Post- graduate degree	3	20.0
Income		
Less than 50 \$	0	0.0
Between 50-100 \$	1	6.7
Between 101-200 \$	4	26.7
201\$-300\$	3	20.0
301\$-400\$	2	13.3
501+\$	5	33.3
Nationality		0.0
Rwanda	11	73.3
Foreigners	4	26.7
Motivation to visit Botanical Garden		0.0
Eco-tourism	3	20.0
Aesthetic and landscape	3	20.0
Education	1	6.7
Scientific research	0	0.0
Picnic and entertainment	8	53.3
others	0	0.0
Affordable entrance fees		0.0
Less than 10\$	10	66.7
10-20\$	1	6.7
21-30\$	0	0.0
31-40\$	0	0.0
41-50\$	3	20.0
50+\$	1	6.7
Interest in visiting botanical garden		0.0
Very high	5	33.3
High	7	46.7
moderate	3	20.0
Low	0	0.0
Very low	0	0.0
Frequency of visiting botanic garden		
elsewhere in the last twelve months		
Didn't visit any	7	46.7
One time visit	4	26.7



Two to five visits	2	13.3	
Six to Ten visits	0	0.0	
More than Ten visits	0	0.0	
Don't remember	2	13.3	

Table 2: Summary

Variables	Category response	Percentage
Traveller's dominate age	26-35	46.7%
Traveller's dominate gender	Male	60%
Traveller's dominate education	Technical/University	60%
Traveller's dominate income	501+\$	33.3%
Traveller's dominate nationality	Rwanda	73.3%
Traveller's dominate motivation to visit botanical garden	Picnic and entertainment	53.3%
Traveller's dominate affordable entrance fees	Less than 10 \$	66.7%
Travellers dominate interest level to visit botanical garden	High	46.7%
Traveller's dominate frequency to visit botanic garden in the last 12 months	Didn't visit any	46.7%

Table 2 which is interpreting data describing demographic distribution and relationship between independent variables, is also presenting results related to travel cost method (TCM) for Botanic Garden in Bwishyura Sector. As researchers sought, the travellers revealed that they are likely to enjoy visiting botanic garden for their picnic while entertaining at 53.3 % and their visiting interest is high at 66.7%. As most of respondents are domestic travellers at 73.3%, most of them they didn't visit any botanic garden in the last 12 months at 46.7%, this could be result of unavailability of botanic garden in the area as presented in table 1. When discovering the affordable entrance fees for travellers to the garden, 66.7% of respondents suggested that the cost can be at least less than 10\$ (66.7%).

4.3 Social Economic and Environment Benefits to Local Community of Botanical Garden

The green spaces associated with botanical gardens are often seen as providing "health, employment, education, recreation, aesthetic and landscape benefits, as well as building civic pride and community spirit, and reducing crime" (The Green Cities, Sustainable Cities Conference 2003). More specifically botanic gardens are seen as protectors and conservers of plants and biodiversity, educators of the environment, providing for sources of economic business opportunities and tourism destinations, and providing programs and service that impact on the social and cultural health of the community.



Table 3: Respondent's views on how to benefit from botanic garden in Bwishura sector

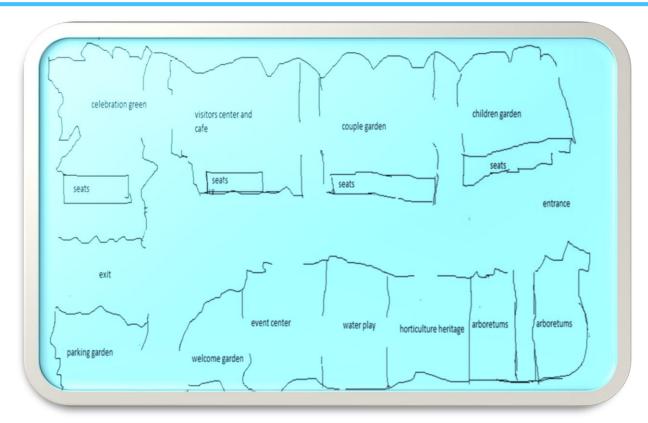
Benefits	Frequency	Percentage (%)
Education on plants and animals life	4	20
Controlling soil erosion and stabilizing dust	1	5
Reducing glare, noise and visual pollution	0	0
Lowering local air temperatures	0	0
Bringing tourists and day trippers	4	20
Initiators of capital investment	0	0
Increasing the value of nearby properties,	3	15
Improves mental health and stimulates creativity and learning	3	15
Scientific and horticultural research	4	20
Tax Revenue Generation	1	5

Table 3 presents respondent's views of botanic garden benefits in Bwishyura sector. A number of benefits have been appreciated by respondents such as contributing to education of plants and animal life at 20%, generating tax revenue at 20%, improve mental health, and stimulate creativity and learning at 15% and increasing the value of nearby properties at 15%.

4.4 Design of Modern and Attractive Botanical Garden Tourism

Diversified classifications of plants, rare flowers and uncommon trees and distinctive landscapes are the most basic conditions to attract the public for a botanical garden. Moreover, with the development of information technology, the construction and management of the botanical garden should be more and more modern. Economic plants create a lovely visual effect; they include medicinal plants, fiber plants, oil plants, spices plants, etc. Many kinds of economic plants are planted in Bwishyura Botanical Garden such as Damascus Rose, Cuckoo, Lavender and Bluegrass. Setting up floras of economic plants in the botanical garden areas benefits a lot. It can not only bring economic benefits, but also provide popular science education for the tourists.





Bwishyura Botanic garden project layout (Faustin al., 2022)

Figure 1 presents the layout of Bwishyura Botanic garden which is having different sections with different purposes, they include places for visitor's seats, designated special garden rooms, place where visitors may gather to celebrate their memories, attractive water play, horticulture heritage, arboretums and parking area. The concept and function of the botanical garden should be developed and enriched along with the progress of society and the changes of requirements in people's life. During the process of the design, the natural elements of the site should be used to create the botanical garden space with local characteristics and site characteristics. Moreover, we ought to explore the cultural connotation of the site, combine cultural landscape with plant landscape, with the introduction of modern technology to serve the public. Only designed by this way can the botanical gardens constantly enrich their own functions and connotation with the development of society and give people a more comfortable natural experience.

5.0 CONCLUSION AND RECOMMENDATIONS

Given the diversity of plant collections held in botanic gardens, and the breadth and depth of knowledge and skills of botanic garden staff, the potential to solve the big environmental challenges of our time (e.g. food security, water scarcity, energy, health, loss of biodiversity, deforestation and climate change) is enormous. Botanic gardens are special places, and each one is unique. The design and construction of a new botanic garden, or the renovation or expansion of an existing one, are in many instances a once-in-a-lifetime venture. Critical evaluation and review are vital throughout the entire development process and a flexible, adaptive management approach will have a major bearing on a successful project outcome. Botanic gardens are uniquely placed to



offer the kind of experiences that more 'environmentally aware' visitors desire. The researchers adopted the following recommendations.

Recommendations

- 1. As botanic garden is realized to be the added value for developing tourism in Karongi, the local authorities and stakeholders should encourage the investors in this kind of attraction to give a new experience to the visitors of this spot tourism region.
- 2. The sustainability, beauty, and diversity of plant species in Bwishyura Botanic Garden will be preserved if visiting tourists participate in the efforts to create sustainability. For example, by not destructing plants in the botanical garden and by placing the trash in the designated areas. Tourist visits is expected to continue, since visits to this garden will allow managers attain funding for maintenance, planting new plants, garden arrangements, as well as other economically and socially beneficial efforts.
- 3. Government officials, managers, and the general public should cooperate in all respects, especially in terms of economic benefits by applying the concept of income distribution to avoid unwanted conflicts. Stakeholders of Bwishyura Botanic Garden can give guidance to the communities around the garden in terms of sale of plants, provision of souvenirs, sale of vegetables, and sale of fruits so that the local people can feel the benefits of the existence of Bwishtyura Botanic Garden.
- 4. Business practitioners interested in developing a botanical garden tourism should take advantage of this study findings, for example this kind of garden is a good tool for promoting education of plants and animal life as long as scientific and horticulture research, they should keep in mind that entrance fees to the garden should be affordable as much as possible as is having great influence in attracting visitors (Table 3).

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