

**Nexus between Tourism and Biodiversity Conservation: A Case
Study of Galiyat, Khyber Pakhtunkhwa**



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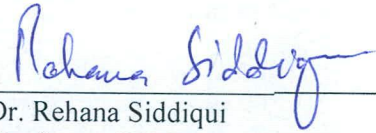
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CERTIFICATE

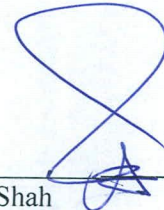
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Dedication

This thesis is dedicated to my beloved father **Muhammad Ali** (May his soul rest in peace) and my Brother **Shahid Ali** and Sister **Zulaikha Ali**, who always believed in me and encouraged me to be honest and fair with my work

Declaration

I, Ghulam Nabi, 2016PIDEFMPHILENV08 hereby declare that this thesis entitled “*Nexus between Tourism and Biodiversity Conservation: A Case Study of Galiayt, Khyber Pakhunkhwa*” submitted by me for the partial fulfillment of **Master of Philosophy** in Environmental Economics is my own tough work under the full supervision of my respected supervisor. Furthermore, this thesis has not been submitted simultaneously to any other university for any other degree.

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Abbreviations

BAP	Biodiversity Action Plan
CBD	Convention on Biological Diversity
GDA	Galiyat Development Authority
GEF	Global Environment Facility
IUCN	International Union for Conservation of Nature
TEV	Total Economic Value
UNWTO	United Nations World Trade Organization
WTP	Willingness to Pay
TEEB	The Economics of Ecosystem and Biodiversity
GHG	Green House Gases
WWF	World Wildlife Fund

Abstract

The aim of this study is to explore the nexus between tourism and biodiversity conservation in the Galiyat region of Khyber Pakhtunkhwa. This region is very popular for its unique biophysical features and a famous tourist destination possessing high use and non-use value properties but over time its biodiversity has declined. Promotion of eco-friendly tourism can play an effective role to conserve the biodiversity.

Tourists' number of days stay has been used to measure the demand, while the biodiversity is measured by diversity of plants (forest), mammals and birds. In order to address the research objectives, a questionnaire was developed to collect data from tourist. A sample size of 200 was selected for the survey. The result showed that there is significant positive impact of biodiversity and other features in defining choices, concerning the tourists duration of stay. The estimated results show that the number of days stay (tourism) increased by -0.289% (p value < 0.05) due to the reduction in biodiversity loss. The calculated recreational value of Galiyat's biodiversity is about PKR 86.09 million. Thus, the policies supporting biodiversity conservation seem to have a positive impact on tourism.

Chapter No. 1

Introduction

1.1 Background

Tourism plays an important role to promote the conservation of biodiversity. The United National International Year (2010) of Biological Diversity recognized that tourism is a significant beneficiary of biodiversity and Convention on Biological Diversity (CBD) indicated in 2004 that the tourism is an essential indicator of biodiversity conservation, whereas the CBD (2015) guidelines aim to make “biodiversity and tourism are more mutually supportive and also engage private sector, local community, indigenous people, promote infrastructure and land use planning based on the principle of conservation and sustainable use of biodiversity”.

The term biodiversity defined by the Convention on Biological Diversity (CBD, 1992)¹ as

“the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems”.

¹ The Convention on Biological Diversity (CBD) is a multilateral treaty. The convention has three goals:

- 1 Conservation of biological diversity.
- 2 Sustainable use of biodiversity and its components.
- 3 Equitable sharing of the benefits.

On 5th June 1992 at the United Nations Conference on Environment and Development also known as Earth Summit Convention’s text was opened for signatures, the convention has received 168 signatures at the end of 4th June 1993. The documents of the convention recognized the conservation of biological diversity "a common concern of humankind" and is an integral part of the development process. The agreement covers all ecosystems, species, and genetic resources.

Table 1. 1 - Biodiversity Services

Functions	Sevices
Support	Soil formation, Nuteirnt Cycle, Production
Provisioning	Food, fiber, freshwater, fuel wood and other resources
Regulating	Water purification, watershed management, climate regulation, carbon sinking and pollination
Cultural (Non-material services)	Recreation, tourism, aesthetics, educational spritual, and regioious.

Melleniuem Assessment: 2003

Biodiversity, noted by Vermeulen & Koziell (2002) is the synonym of life on earth. The definition of CBD linked biodiversity into species and ecosystem. It is key element which enhances the ecosystem services, the variety and variability among the living thing. The biodiversity produces different functions such as supporting, provisioning, regulating and cultural (MA, 2003). Table 1 shows the tye of services provided by biodiversity functions.

Biodiversity reflects the key supply side of environmental amenities, source to attract tourist to any destination (Loureiro et al, 2012). The protected areas are considered as an essential part for conservation of nature. The World Commission on Protected Areas (WCPA) defined the purpose of protected area management as scientific research, tourism and recreation, wilderness protection, preservation of species, maintenance of environmental services, education, sustainable use, cultural features, maintenance of cultural traditions and attitudes (Dudley, 2008). Additionally, the CBD demands the government to establish a system of protected areas to meet their goals of conservation of biological diversity. In 1994, the International Union for Conservation of Nature (IUCN) has divided the protected areas into six major categories which aim to conserve

biodiversity, landscapes and establish conservation strategies, habitat management and maintenance.

Tourism is fundamentally linked with biodiversity. First, it totally depends on the wide variety of nature, landscapes and huge quantity of flora and fauna. Secondly, there are positive or negative impacts of tourism on the environment (Song et al, 2012), whereas Tribe (2011) argued that tourism activities often disturb natural resources. Despite the negative effects, tourism provides a source of income which causes less damage to biological reserves than any other activity e.g. cattle farming, hunting and wood collection etc.

There are many businesses associated with the tourism industry, from the small shop to large businesses. The businesses facilitates tourist by providing an accommodation, transport, catering food and beverage, ground transport, ground services, cultural and social events (Swarbrooke & Horner, 2001).

Wells (1992) said the empirical work and analysis establishes a link between the economic valuation and identification of necessary and practical steps to be taken for biodiversity conservation. The economic valuation of biological resources can help to protect and conserve and it also identifies the wide range of values that determine the importance of biodiversity loss. According to the Markandya et al, (2008) the valuation of biodiversity is considered as an instrumental perspective to recognize its total economic value. Further, economic valuation of biodiversity is categorized into use value and non-use value. The use value is the willingness to pay for the use of its product, it is further categorized into direct use value, indirect use value and option value. The non-use value includes the existence value, altruistic value and bequest value.

1.1.2 Pakistan's Biodiversity Action Plan:

Pakistan recognized the importance of biodiversity and became signatory to Convention on Biological Diversity in 1994. Biodiversity Action Plan (BAP) is an agreement between World Bank and Government of Pakistan under the Global Environment Facility (GEF)² and IUCN-Pakistan³ was selected as the leading agency, partnership with World Wide Fund Pakistan (WWF-P)⁴.

Biodiversity Action Plan (BAP) is the first effort to meet the conditions of Convention, which provide a brief assessment and status of biodiversity, strategic goals and objectives, identifying the action plan. BAP carries 13 main components⁵ for strategy action in response of Article of Convention on Biological Diversity. BAP also reported the total number of species in Pakistan in its first report (Table 1.2).

² GEF trust Fund: The Global Environment Facility administer several trust funds and provides secretariat services, on an interim basis, for the Adaptation Fund. The Global Environment Facility (GEF) Trust Fund was established on the eve of the 1992 Rio Earth Summit, to help tackle our planet's most pressing environmental problems.

³ IUCN-Pakistan: The IUCN Pakistan country office was established in 1985 and has been an important contributor to environmental work in the country at both policy and community levels, working toward sustainable development.

⁴ WWF-Pakistan: the office of the world wildlife fund formed in 1970 aimed to sustainable utilization of natural resources, biodiversity, and pollution reduction and reduce over harvesting.

⁵ The 13 main components of BAP to the Article of CBD: Lanning and Policies, Legislation, Identification and Monitoring, In-Situ Conservation, Ex-Situ Conservation, Sustainable Use, Incentive Measures, Research and Training, Public Education and Awareness, Environmental Impact Assessment, Access Issues, Exchange of Information and Financial Resources.

Table 1. 2 - Biodiversity Status in Pakistan

Biodiversity	Total Species	Threatened	Endemics
Mammals	174	20	6
Birds	668	25	?
Rapitles	177	6	13
Amphibians	22	1	9
Insects	<5000	-	-
Fish (Sea)	788	5	-
Fish (Fresh Water)	198	1	29
Algae	775	?	20
Fungi	<4500	?	2
Echinoderms	25	2	-
Molluscs (Marine)	769	8	-
Crustaceans	287	6	-
Annelids (Marine)	101	1	-
Angiosperms	5700	-	380
Gymnosperms	21	-	-
Pteridophytes	189	-	-

Source: Biodiversity Action Plan 1999

1.1.3 Biodiversity, Tourism and Pakistan:

Pakistan covers a land area of 882,000 Km² and is blessed with a huge variety of biodiversity, evergreen forests, lakes, mountains, rivers and beautiful natural landscapes. The ecosystem of Pakistan stretches from the coastline in the south to the north of mountain ranges of Himalayan, Hindu Kush and the Karakorum, whose peaks are more than 8000 metres, the coastline is about 1046 km and territorial water is about 22820 Km² (BAP, 1999).

According to the Wildlife of Pakistan⁶ total number of species in Pakistan as categorized above, there are 6000 thousand plants species, 188 species of mammals, the birds species including migratory birds are 666, reptiles species 174, amphibians are 16, 525 species of fish and insect species 2000 species/ marine 700.

There are many threats to biodiversity in Pakistan. The principal threat to the biodiversity is the population growth. According to census 2017 the population has grown 56.98% as compared to 1998 census. Other threats are the extension of agricultural land use, hunting, deforestation and habitat loss, tourism development and other intervention of human.

There are about 230 Protected Area (PA) in Pakistan and these PA are categories as National Parks (NP), Wildlife Sanctuaries (WS), Ramsar Protected Wetland, Biosphere Reserves and Game Reserves (GR) (WWF-Pakistan, 2008). The summary of these PAs mention in table 1.3 below:

Table 1.3 - Summary of Protected Areas of Pakistan

	National Parks	Wildlife Sanctuaries	Game Reserves	Unclassified
Azad Kashmir	6	0	8	0
Balouchistan	2	15	7	7
Punjab	2	37	19	0
Khyber Pakhtunkhwa	3	6	38	6
Sindh	1	35	14	4
Federal	1	1	1	0
Gilgit-Baltistan	4	5	9	0

Source: Biodiversity Action Plan, 1999

⁶ <http://www.wildlifeofpakistan.com/WildlifeBiodiversityofPakistan/existingwildlifeinPakistan.htm>

Pakistan is very attractive for the tourists around the world due to its ecosystem range from the coasts in the south to the mightiest mountainous ranges in the north. In northern Pakistan the attraction places for the tourist are Swat, Kalam, Kaghan, Malam Jabba, Galiyat, Murree, Shigar, Skardu, Chitral, Gilgit, Hunza and other mountainous ranges, peaks and high altitude lakes, as well as the junction of three biggest mountain ranges Karakorum, Hindu Kush and Himalayan, gives a unique view of Northern Areas. These tourists' spots not only offered the natural landscapes but also offered a huge variety of biodiversity.

1.2 Problem Statement:

Due to the tourism the nature became economical where it gives an ambivalent position in relation to biodiversity (Duim & Caalders, 2002; Ross & Wall, 1999). The Region Galiyat of Khyber Pakhtunkhwa possess the unique biophysical structures where its landscape represents mountain ecosystem features which characterized by vertical forest along rough sloping terrain. A diverse natural environment for the existence of wild species because of the habitats. According to the document of Galiyat Development Authority (GDA)⁷, the region support 1300 plants, 18 mammals, 149 birds and 19 reptiles' species. The tourism inflow continue through the year but pressure increases in summer.

The tourism demand is high in those areas which are well characterized by bio-ecological to develop its activities (Ros, 2018). The biodiversity is considered an important part to determine the destination. (Sinclair & Thea, 1997) showed the tourism to some extent

⁷ Galiyat Development Authority has published its "Integrated Regional Master Plan for Galiyat Region, Khyber Pakhtunkhwa" Final integrated Regional Master Plan for Galiyat Review August, 2017.

destroys the natural resources on which it is based, where it is also indicates that it may hurt environmental resource in the same way a chemical factory does (Spenceley & Keyser, 2008).

In the same lines, the tourist's arrival in Galiyat creates many environmental problems such as the landscape degradation, biodiversity (flora and fauna) loss, habitats destruction, solid waste, pollution, congestion and uproar of the watershed. Ironically, tourism significantly contributes to the loss of the Galiyat's biodiversity. Habibullah, et al (2016) said there is a negative impact of tourism on wildlife, tourists activities often affect threatened mammal species. According to the office of the chief conservator, wildlife, parks and protected areas (KPK) reported in GDA reported (Table 1.4) that there are 18 mammals, seven of them are endangered.

Table 1. 4: Endangered Mammals of Galiyat

	Mammals	Status
1	Common Leopard	Endangered
2	Musk Deer	Vulnerable
3	Himalayan Palm Civet	Endangered
4	Common Red Fox	Endangered
5	Wooly Flying Squirrel	Endangered
6	Murree Vole	Endangered
7	Jungle Cat	Critically Endangered

Source: IUCN Red List, WWF-Pakistan

Additionally, the same source reported following birds of Galiyat just escaped from extinction, but still listed as endangered and their number is decreasing at a fast rate. Hussain & Shaheen (2018) said, birds are caused the healthy environment and habitat. BirdLife International (2016) identified the human activities such as hunting, development, overexploiting and recreations cause the decline of bird species in Pakistan. A study found, due to the construction and extension of roads, parks, hotels, shops and public places contribute to destroy the natural habitat and alter the forest (Abbas, et al., 2013). The following (table no. 1.3) are the few endangered bird species in Galiyat.

Table 1. 5: Endangered Birds of Galiyat

	Birds	Status
1	Koklass pheasants	Endangered
2	Khalij pheasants	Endangered
3	Ring-necked pheasants	Endangered
4	Monal pheasants	Endangered
5	Chakors	Endangered
6	Host of small bird	Endangered

Source: IUCN Red List, WWF-Pakistan & Office of Chief

The biodiversity of flora provide excellent ecosystem services in term of climatic condition to every living species. Additionally, Pickering & Hill (2007) found the adverse impact of tourism on plants biodiversity, as said tourist intentionally or unintentionally uprooted, churches and cut off the plants. Resultantly, the plant’s loss its heights, growth, biomass, damage seeding process and loss reproduction process. Galiyat’s floral species are also listed in the IUCN Red as endangered species.

Table 1. 6: Endangered Flora of Galiyat

	Plants	Status
1	Alanthus	Endangered
2	Indian horse-chestnut (bankhor)	Endangered
3	Eucalyptus	Endangered
4	Granda	Endangered
5	Kangar	Endangered
6	Crataegus	Endangered
7	Sheesham/Tali	Endangered

Source: IUCN Red List, WWF-Pakistan & Office of Chief

There are many factors that contribute to the destruction of biodiversity, these include the atmosphere impact (climate change, air and noise pollution), overgrazing, poaching solid waste and littering, land degradation, congestion, infrastructural development, illegal hunting, forest fire, deforestation and population settlement (Sunlu, 2003 ; Daniela, et al, 2012). Tourism is somehow interlinked with all these factors affecting the biodiversity of Galiyat. It contributes to the destruction of landscapes, natural habitat, and ecosystem which cause the ultimate loss of Galiyat’s biodiversity.

Although, the tourism industry creates many opportunities. It can be used as a tool of awareness to conserve biodiversity (Mwakima, 2013). The major products of Tourism

(plants, mammals and birds) primarily counts as the main source of attraction and if they continually decreased the demand for the tourism will ultimately decrease (Sinclair & Stabler, 1997) in Galiyat.

1.3 Significance of Study:

Galiyat's tourism is based on its natural resources including habitats, landscape and biodiversity; (mammals, birds and plants). Over time the demand for eco-friendly tourism has increased (Gartner & Lime, 2000). Sanz and Niskanen (2002) indicated protected areas can help in conservation of biodiversity, protection of endangered species and also support the development activities especially in tourist spots. United Nations World Tourism Organization (UNWTO, 2010) recognized the positive relationship between tourism and biodiversity. It has also identified, several threats to biodiversity from the tourism activities.

The study highlighted the need to explore the nexus between tourism and biodiversity conservation in Galiyat. The research study will identify the how tourism will help to conserve the biodiversity. It generates valuable economic opportunities for the conservation and preservation of Galiyat's biodiversity. The study will help to formulate the policy recommendation for the tourism and biodiversity conservation.

1.4 Research Questions.

- a) Does biodiversity attract tourists in the study area?
- b) What is the impact of rise in tourism on biodiversity? Are tourists willing to pay for conservation?
- c) What is the perception of tourists about biodiversity decline?

1.5 Objectives of the Study:

The overall objective of the study is to explore the relationship between the biodiversity and tourism activities.

The specific objectives:

- a) Investigate the impacts of tourism on biodiversity.
- b) Estimate the willingness to pay (WTP) for biodiversity conservation from tourists.
- c) Estimate the recreational value of Galiyat's biodiversity.
- d) Formulate a policy brief.

1.6 Organization of Study:

The study is organized into six chapters. Chapter one includes; a brief introduction to the topic. Different themes have been discussed which are nearly parallel to topic in the literature review in chapter two. The third chapter describes the methodological framework of the study. The data analysis including graphs, descriptive statistics discussed in the chapter four. The chapter five included the measurement of econometrics regressions along with the results discussion. Conclusion and policy recommendation have discussed in chapter six.

Chapter No. 2

Literature Review

The variety of life on earth is called Biodiversity. It include all genes, species and ecosystem. Its conservation is very important in both economic and moral reasons. It provide many services to livelihood, e.g., water purification, clean air, medicines etc. It also enable to adapt the changing circumstances. Biodiversity also provide opportunities of recreation, education, cultural and spiritual services. There are many benefit to mankind from the biodiversity. It is important to look into the major issue to biodiversity loss (Virk et al., 2003; Alonso et al, 2001).

2.1 Biodiversity Loss

Biodiversity is very important and considered as our natural wealth. Alonso et al (2001) said in a gathering of biodiversity experts identified the leading factors of biodiveristy loss. It include deforestation, changing climate (rail fall and temprature), land use change (conservation), soil erosion, firewood collection, pollution, congestion, carbon dixoide and over-use of resources (grazing, and harvesting) (Baig & Al-Subaiee, 2009).

2.1.1 Deforesting

Deforestation is the principle cause of biodiversity loss. It is a process that associated with the direct causes e.g., agricultural expansion, land conversion, forest products, infrastructural development, and many other activities (Mahapatr & Kant, 2003; Tindan, 2013). The deforestation produced many negative externalities such as global warming, biodiversity loss, loss of aesthetic beauty, soil degradation etc. (Mahapatr & Kant, 2003).

Environmentalists argue that due to deforestation, the forest will no longer support the biodiversity and services (Knox & Martson, 1998). Where Bergman & Renwick (1999) put the good example of how the wild birds were endangered due to deforestation in Oregon and Washington. Pakistan is a forest-poor country as compared to with the countries in the region (South Asia). Forest covered only 5.36% of land in Pakistan. In the same lines as above Pakistan also faced similar issues. The table 2.1 showed the status and type of forest area in Pakistan.

Table 2.1 - Forest Cover and Type in Pakistan

Forest Type	Total area (ha 000)	Percentage
Coniferous	1930	40.92
Irrigated	259	5.49
Riverain	332	7.03
Scrub	1639	34.75
Coastal	512	10.86
Mazri land	24	0.51
Linear plantation	21	0.44
Total	4717	100

Source: Forestry Statistics of Pakistan (2004)

2.2.1 Climate Change

The evidence demonstrated, by burning fossil fuel such as coal, gas and oil and clearing forest have increased the amount of carbon dioxide in the atmosphere. The increasing of amount carbon dioxide may contribute to increased temperature, disturbed rain fall pattern, raise in sea level and overall climate change (Alonso, Francisco, Granek, & Raven, 2001).

Pakistan is facing many climate challenges. Asian Development Bank report on Climate Change Profile of Pakistan⁸ found, over the last fifty year the average temperature has been change by 0.5° C and huge number of heat waves has been record were record per year. While the annual precipitation showing fluctuation over the past 50 years (Chaudry , 2017).

The report further said, the sea level raised by 10 centimeter over same period.

Studies demonstrated that many terrestrial vertebrates were shifted due to climate change (Chen, Hill , Ohlemüller, Roy , & Thomas, 2011), where found in his study that in increased temperature and decreased perception showed the negative effect on birds survival while the mammals were less effected (He, et al., 2008). He et al (2008) concluded that climate change have an interactive effective on biodiversity loss.

2.2.3 Other Causes of Biodiversity Loss:

There are many other factors that contribute to the biodiversity loss. It include the land use change it involved such as agriculture expansion, urban sprawl and infrastructural development are recognized as major factors to biodiversity loss (Slingenberg, et al., 2009). The pollution also effect the biodiversity on a bid scale. First air pollution affect the plants more, because plats frequently take atmospheric gases (Slingenberg, et al., 2009). Second water pollution, the source of water pollution is the introduction of various substances into the water bodies that result to negative effective on biodiversity. The major factor that cause the biodiversity loss is the unsustainable utilization of natural resources; fishery, mining, invasion alien species, over grazing, forest fire, hunting etc., (Tindan, 2013; Slingenberg, et al., 2009).

⁸ Report Asian Development Bank on Climate Change Profile of Pakistan.

2.2 Biodiversity Conservation

Biodiversity is defined as the variety of life among the plants, birds and animals (Hunter & Gibbs, 2006). Several approaches have been used for conservation of biodiversity around the world. Three famous approaches are implemented for managing the conservation of biological resources and sharing other benefits in many countries. These approaches are a). Establishing protected areas, b). Payment mechanism for environmental services and c). Community involvements (Lopez, et al., 2014; Daniela, et al, 2012).

2.1.1 Establishing Protected Area:

The protected areas always considered as the fundamental strategy for the conservation of biological diversity. About 15%⁹ land of the protected areas are fall under the combined developing countries. The protected area provides valuable services for the wellbeing of human-like tourism, fuelwood, climate regulation, watershed management and purification and many other resources (Dudley, et al., 2003). The effectiveness of protected areas is critical for biodiversity conservation (Rodrigues, et al., 2004; Bruner, et al., 2001). According to the IUCN categories (I-VI) of protected areas, governments establish protected areas to meet the goals of biodiversity conservations.

Lee, et al (2007) concluded, protected areas are haven for the threatened species, where it cover large area of forest with many variety of flora and fauna. They further concluded the protected areas are essential for conservation of avifauna on the island of Sulawesi forest to increases avifauna density which reduces the risk of extinction. Muluk, et al, (2010) conducted household survey based on sustainability of non-timber forest product reveal

⁹ World Database on Protected Areas <http://www.wdpa.org>

that 76% of the respondent knew the term protected area and the importance of conservation.

A study suggested a guideline for leopard conservation in Ayubia National Park to conserve because the increasing number of leopard cause human conflict that how increasing population of leopard can co-exist with human, for successful conservation should focus on biological monitoring and social issue evaluation (Lodhi, 2007).

2.1.2 Payment of Environmental Services (PES):

Payment for Environmental services is becoming an essential tool for conservation and national development strategies to finance the biodiversity conservation. The benefit derived from the nature and services of biodiversity are categories as provision, regulating, supporting and cultural services and the impact of all these services important for life support of human health, wellbeing and economic growth. The payment mechanism enables biodiversity's services promote the conservation activities, sustainable use and sharing equitable benefits (Secretariat, 1992).

The research recognizes that the environmental services are valuable and scarce, it is essential to establish a market for the payment of environmental services, the services beneficiaries making direct, condition and contractual payment to local people for secure conservation of biodiversity (Kanounnikoff, 2006) (Wunder, 2005). (Blackman & Woodward, 2010) found, there are 300 PES program has been implemented world, most of them are directly financed by user-specific environmental service. Kanounnikoff (2006) identified the different payment schemes in developing and developed countries for biodiversity conservation. In developing countries the payment tend to be public nature

and “open trading” payment scheme such as biodiversity credits. He also identified that ecolabeling approach in developing countries is growing for PES.

A study found, the payment mechanisms ensure the upstream and downstream management without altering the welfare of the upstream community (Rai, et al., 2014). His study also recommended that there are three levels of institutions for the implication of PES; the service consumer, service producer and government institutions as representative of both.

2.1.3 Community based Conservation:

The community based conservation is an approach to conserve the biological diversity in which the conservationist involved or empower the local community to participate in conservation of biodiversity. In the study of (Berkes, 2004) found that the conservation of biological diversity becomes participatory when the stakeholders and civil society rise for thinking about biodiversity. (Lopez, et al., 2014) concluded in his study that community involvement is an effective way to protect biodiversity.

A primary survey based study in Chitral found that 100% respondent knew the importance of Chitral Gol National Park (protected area) and 68% of them are willing to participate in the conservation of biological resources (Khan & Bhagwat, 2010). The protected areas and community based land rights are important for livelihood, cultural and opportunities (Springer & Almeida, 2014).

2.3 Tourism and Biodiversity:

2.3.1 Tourism and Biodiversity Loss:

The interaction between tourism and biodiversity cause to attract the tourists around the world. The growing concern of CBD for deteriorating nature and extension of species, aims to promote the biodiversity conservation (Ruin & Caalders, 2002). Whereas Sanz and Niskanen (2002) established a connection between protected areas and tourism development activities and also indicated the protected areas as conservation of biodiversity, protection of endangered species and support the tourism development activities. Biodiversity in relation with tourism generate the revenue for an economy and play an important role in sustaining livelihood through its ecosystem services (Alphonse & Gu, 2009).

While considering the role of tourism activities and biodiversity, a word of caution should always be remembered because tourism is “a double edged sword” but with appropriate management practices the tourism can contribute to create the positive synergies between the biodiversity conservation, tourism activities which enhances the livelihood of local people (Ross & Wall, 1999). Green & Higginbottom (2001) concluded that adverse effects of tourism activities can be categorized into three groups: first the tourists create noise, and spotlight and tourists approach to feed animals, if it happens daily then number of animals population ultimately decline in the region. Second, intentional and unintentional killing, hunting, fishing and third, habitat destruction for infrastructure development.

South Africa is very famous for bird watching and huge diversity of bird species available, a research study in South Africa on avitourism conservation found that on average 16300

birdwatcher tourist per year contribute US\$ 19 million to the economy (Biggs, et al., 2011). There are several opportunities for the small businesses in bird watching tourism and it also create source of employment and conservation of biological diversity (Biggs, et al., 2011).

The adverse impacts of tourism which cause biodiversity loss due to cosmetic make up for the beautification of tourist places by degradation of site, construction of roads, deforestation, artificial arrangement and alien species, without management control and effective planning tourism activities remains major threats to biodiversity (Mwakima, 2013).

The study in Gol National Park Chitral suggested that 34.3% of the local community is directly associated with the tourism industry, this number can increased if government establishes a resource center and train the local people about the biodiversity and its conservation effects in their areas (Khan & Bhagwat, 2010).

2.3.2 Tourism and Biodiversity Conservation:

People in the developing countries directly depend on the biological resources. The tourism impacts is being adopted as an instrument for economic development and poverty alleviation in many developing countries (Ijeomah, 2007). The tourism effectiveness as a tool for poverty alleviation depends on the management strategy of maximizing positive impacts, and eliminating or minimizing negative impacts on households and communities (Ijeomah, 2012). Muluk, et al., 2010 concluded that products of protected area are significant for household livelihood and income. The increasing pressure of tourism put positive impact on socioeconomic aspect, in the same way it also biodiversity conservation and livelihood are interlinked with each other (Pretty & Smith, 2004; Mwakima, 2013).

PES are not only designed for the conservation of biodiversity but also design to enhance the livelihood of local community. PES also reduces the conflict between the protected area management (Karri, et al., 2014).

The research study by Muluk, et al., (2010) concluded that 13% of household were totally dependent on the forest resource and remaining were partially dependent on the surrounding forest resources for their livelihood.

2.3.3 Economic Valuation of Biodiversity:

The aim to measure the value of biodiversity loss is to allocate the standard economic incentive. CBD (2011) recognized as the global assets which carries extraordinary value for present and future generation whereas it also contributes to economic and social development, it includes the timber, food, fiber, climatic regulation, medicines, nutrient, recreation, tourism, carbon sequestration and carbon storage. The economic valuation of biodiversity provide the greater chance of accurate measure of biodiversity's ecosystem (Brown, Bergstrom, & Loomis, 2007). The result show that there is significant portion of the general public who put different value for biodiversity and willing to pay in order to promote management actions like conservation (Meyerhoff, Liebe, & Harjte, 2009)

There are four different method used to estimate the value of non market goods: that include revealed preference methods includes travel cost, hedonic and averting behavior methods, while the stated preference methods which includes contingent valuation and attribute-based methods. These two category based on individual's utility maximization (Brown, Bergstrom, & Loomis, 2007). There is a limit due to the complexity of biodiversity

and the cognitive limitation of human that includes the respondent stated preference based valuation (Bartkowski, Nele, & Bernd, 2015).

2.3.3.1 Economic valuation and Willingness to Pay

For the public good there is no market exist to price while these methods provides an opportunity to the individuals that they can purchase public good under the hypothetical situation. Under these techniques established the policy guide for environment (Pettorelli et al., 2012). The willingness to can be describe as the maximum amount that a tourists willing to pay. The willingness to pay usually estimate for the non-market products particularly in tourism (Reynisdottir et al., 2008), willingness to pay can be identify by socio economic and demographic characteristics and other variable such as number of day stay, number of visits in a year and other information about environment through likert scale and attitude (Bhandari & Heshmati, 2010).

2.4 Summary:

The link between the tourist's activities and change in biodiversity are difficult to determine (Duim & Caalders, 2002). Tourism can be used as an economic incentive to conserve the biodiversity. Maintaining the attractiveness of natural resource result more tourist and generating more revenue for conservation. However this positive relationship is not always the case, especially where the tourism is unmanaged and unplanned. If it fallows the standard practices and guidelines of CBD seek to promote biodiversity conservation.

Chapter No 3

Methodology

The chapter descriptive, research design, data collection, and explain the methodology for data are discussed in this chapter. It also discuss the sampling approach, data collection technique and econometrics tool to analyze the data.

3.1 Study Area:

3.1.1 Galiyat, Khabar Pakhtunkhwa:

Galiyat is very famous for its scenic vistas pine and oaks covered mountains, dotted lawn and orchards and crisscrossed with water streams. On clear day, it also give a view of snowy peaks of Kashmir and Crest of Nanga Parbat.

Galiyat is extended in the both sides of Khyber Pakhtunkhwa and Punjab Province with an area of 250,000 acre and it stretch about 40 km long, it is best representative of moist temperate forest (Jamal & Khadija, 2009; Arshad & Khan, 2012). Galiyat is very popular for its biodiversity. There are many species of flora and fauna in Galiyat. Biodiversity faced many threats from tourists, local community and the forest mafia.

Galiyat represents a unique landscape of mountain ecosystem and vertical vegetation. Out of twelve habitat of Khabar Pakhtunkhwa's three are found in this region. According to Galiyat Master Plan the region support approximately 1300 species of plants, 18 wild mammals, 149 birds' species and 19 reptiles.

Galiyat region contain many protected areas and a national park called Ayubia National Parks. The park was established in 1984 and managed by Khyber Pakhtunkhwa Wildlife Department. Its head quarter is located in Dunga Gali. The famous tourist spot in Galiyat are Nathia Gali, Dunga Gali, Ayubia, Khanaspur, Khaira Gali and Changla Gali.

The growing demand of tourism in Galiyat possess two type of threats to environment, one is long lasting threat of deforestation, land degradation and biodiversity loss and other impacts is time bound like pollution in respect of emission, solid waste, noise and littering.

3.1.2 Major Fauna in Galiyat:

Leopard, Barking Deer, Giant Red Flying Squirrel, Small Kashmir Flying Squirrel, Rhesus monkey, Asiatic Jackal, Wild Boar, Murree Vole, Indian Crested Porcupine, Indian Hare, Black Partridge, Grey Partridge, Indian Sparrow hawk, Plum Headed Parakeet, Koklass Pleasant (Saikh), and Kalij Pleasant (Jangli Murgi). See appendix-II

3.1.3 Major Flora in Galiyat:

Diopyros lotus, Alanthus, Indian horse-chestnut (bankhor), *Pyrus pashia (bhatangi)*, *Myrsine affrican (bebarang)*, *Justicia adhatoda*, Blue Pine, Cedrus Deodara, Silver Fir, Eucalyptus, Granda, Kanair, Kangar, Kau, Phulai, Populus, Dhrekr, Chir Pine, Rein/Barungi, Rubina, Crataegus, Sanatha, Shamshad, Wiilow and Sheesham/Tali. See appendix-III

3.2 Methodology:

3.2.1 Steady Design:

The study based on primary data and followed by two approaches, descriptive and analytical, whereas the descriptive approach involve the field observation and analytical approach used to determine the relationship between the variables.

Sampling: Gathering data from all tourist who came every data at Galiyat is impossible for the research, therefore a suitable sampling technique selected. Sampling technique can be probability sampling also known as simple random sampling where each individual has equal chance of selection in the survey. Non-probability sampling techniques where sample being selected as a result of researcher's judgment to target a specific objective of research, tourism, health and science experimental research followed non-probability sampling techniques. There are different type of non-probability sampling techniques that include convenience sampling, quota sampling, and purposive sampling and snowball ball sampling. We applied convenience-sampling technique applied in this study. Convenience sampling is easiest method because the participants selected on the bases of their availability and willing to participate in the field survey.

Sample Size: By following convenience-sampling technique, study selected 200 tourists sample for survey interview. There was no special focus group to gender specific or any age group while conducting field survey.

3.2.2: Observation Tools:

It is another approach to collect during survey. In this study, observational study has used to examine the local people who are engaged in an activities such as vendors who were deal with biodiversity of Galiyat. There are several biodiversity products that can be sale to the tourists.

3.3 Questionnaire Design

The questionnaire was design according to the requirement of the research to discuss the relationship between the tourism and biodiversity in Galiyat (Appendix – I). The

questionnaire contained different sections and some questions contained instruction if questionnaire filled by other than principal investigator. The table shows the different section of questionnaire.

Table 3. 1: Questionnaire Structure

Sections	Contents
Section – I	Socio Demographic Information
Section – II	Tours Information
Section – III	Travel Cost
Section – IV	Willingness to Pay

There are four section in the questionnaire. The first section contained the socio demographic information of the respondent. Including their name, age, gender, working status, profession, working hours, education and their monthly income. In the second section of the questionnaire, there are eight questions including the number of visit in a year and days stay, the services at Galiyat in likert scale form, family or group size, attraction to biodiversity rank, overtime decreased in biodiversity, and cause in likert scale. The third section about the travel cost that include the mode of transport along with distance and expenditure, we asked them about the recreational services at Galiyat that include hiking and walking tracks, chairlift and camping etc., along with expenditures. We also asked about their accommodation at Galiyat.

The last section of the questionnaire is about the willingness to pay for conservation of biodiversity, we also offered four different bids to the tourist to respond for entry fee in different spots of Galiyat.

3.3.1 Operationalization Framework

Operational framework defined the details of dependent and independent variable, this include socio demographic factors, travel cost and other variables.

- **Socio demographic factors.**

Demographic factors are considered as an important variable because these variable are also considered as influential variable in research. The tourism activity has strongly related with these variables. These variables are:

- 1 Age.
- 2 Occupation
- 3 Education level.
- 4 Income.
- 5 City name (home).
- 6 Travelling with.

- **Trip cost**

Travel cost is the major cost in tourism and negatively related with tourism, travel cost include:

- 1 Individual travel cost considered as round trip.
- 2 Individual accommodation charges.
- 3 Entry fee.
- 4 Individual Other expenditure.
- 5 Opportunity cost of time spend for tour.

- **Attitude Variables:**

These variables explained about the tourist's attitude toward the characteristics of Galiyat. Respondents has different views about the characteristics that effect their decision about

the number of visit and number of days stay in Galiyat. It measured the Galiyat from the different prospective:

a) **The attitude regarding the infrastructural quality (Very Good to Very Bad) of:-**

- 1 Roads Condition.
- 2 Ayubia National Parks.
- 3 Publich toilets.
- 4 Overall beautification.
- 5 Hiking and walking tracks condition.

In analysis section, we predicted an infrastructural variable through Principle Component Analysis (PCA). It is a process that can use to reduce a large set that contain the most information in the large data set. We use statistical package STATA 14.2 to create the infrastructural variable for the analysis through giving simple commands.

b) **Attitude toward biodiversity characteristics (Positioning) of:-**

- 1 Biodiversity among the plants and trees.
- 2 Watching variety of birds and their sounds.
- 3 Animals watching.
- 4 Any other.

Perception Variables about the biodiversity loss (strongly agree-to-strongly disagree) of :-

- 1 Deforestation
- 2 Climate change factors (Decreased Precipitation and Increased Temperature).
- 3 Tourism effect (development, congestion and pollution).
- 4 Other impact.

3.3.2 Data Collection

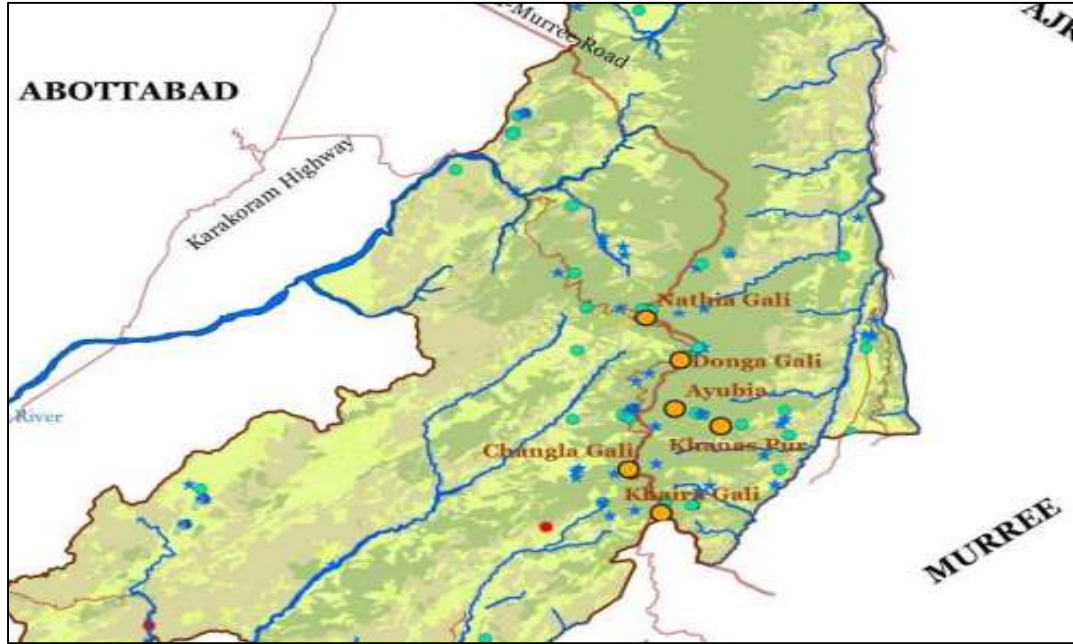
Data collected through face-to-face interview with tourists, it made possible to conduct a complete interview and remove the incomplete response from questionnaire. The survey was conducted from 8th May 2018 to 25th June 2018.

The site for research survey is about 20 km Galiyat, the major tourist spots were selected for the tourist interview. The following tourist's spots were selected for the field survey.

Tourist Sots	Survey Conducted
Nathia Gali	20
Lalazar Zoo and track	20
Donga Gali Pipeline track	50
Ayubia	40
Kuza Gali	35
Bander Point	20
Changla Gali	15
Total	200

Source: Author

The map given below is the map of Galiyat taken from the Galiyat Developmental plan for the year 2017. This map defining the above survey table 3.2.



Source: GDA, 2017

3.4 Utility Function of Tourist:

Estimation of non-marketed good provide a mean to estimate the monetary values based on actual behavior, by using the individual's expense with the marketed good that are weakly complementary with non-marketed one as an indirect way to reveal individual preferences (Freeman III, 2003). The method establishes a relationship between the cost incurred by travelers to a site and the number of trips taken. This relationship is further exploited to derive the Marshallian consumer surplus for access to the site, for recreation experience by simple integrating the area under the demand recreation curve , between two level of price that is actual price and choke price. The representative visitor's preferences are represented by utility function.

$$U = U(x, r, q) \quad 1$$

Where:

- U = Utility Function.
- r = Number of visit/Days spent.
- x = Market of goods and services.
- q = Environmental Quality (Biodiversity characteristics in Galiyat).

Subject to Income & Time Constraints:

$$I + w \cdot t_w = p_r r + p_x \cdot x \quad 1.1$$

$$T_r = T - T_w$$

Where:

- I = Exogenous income.
- w = Wage Rate.
- p_r = Monetary cost of trip.
- p_x = Monetary cost of Goods and services.
- T_r = Total discretionary time.
- T = Total time available for tourist.
- T_w = Working hours.

The demand function of Galiyat is following:

$$r_i = f(p_x, p_r, I, q)$$

2

The demand curve between two prices produce the consumer surplus (CS) Marshallian welfare measure:

$$CS = \int_{p_r^1}^{p_r^0} f(p_x, p_r, I, q) dp_r \dots \dots \quad 3$$

Where p_r is the cost occur by tourist to generate the demand, it include the tripe onsite expenditures, and opportunity cost of time and p_r⁰ is the chock price. The onsite activities of tourism benefits in term of money measure gain by consumer is known as consumer

surplus. The CS measured the benefits which derived by tourists when they enjoy the different type of biodiversity.

3.5 Variables Estimation:

The measurement of tourism activity depend on the socio demographic characteristics and other important independent variables that influence the number of days stay or number of visits in a year. According to Freeman III (2003), estimation of recreation demand represents the individual representatives and then calculates aggregate value as sum of individual's recreation values. The Travel Cost Method (TCM) is preferred to all other measure of non-market methods to estimate the economic use value. Estimate the marginal consumer surplus of individual Galiyat visitor who seeks this natural site by producing several activities. We used the travel cost, number of days spent on the site treated as dependent variable, not number of trips because it includes the onsite travel cost and out of travel cost, as well as travel and on site time opportunity cost.

3.5.1 Regression Analysis:

The basic model used in this study is the simple linear regression model, where the number of days stay is treated at Galiyat is the function of price as recreation, socio economic characteristics (income, age, education, family size, occupation) and biodiversity characteristics.

$$Stay = f \left(\begin{matrix} price_i; Available Recreation_i, Socio economic characteristics_i, \\ biodiversity characteristics, \beta \ \varepsilon \end{matrix} \right) \dots$$

4

Econometrics Specification of Equation 4 as follows:

$$\begin{aligned}
Sty = & \beta_0 + \beta_1tc_i + \beta_2inc_i + \beta_3tp + \beta_4Edu_i + \beta_5age_i + \beta_6dis_i + \beta_7fm + \beta_8maml \\
& + \beta_9biolos + \beta_{10}tp + \beta_{11}brd + \beta_{12}ovl_q + \beta_{13}inf + \varepsilon_i
\end{aligned}
\tag{5}$$

Where TC, \dots, Fm are explanatory variables and β 's are unknown coefficients to be estimated. Explanatory variable include minimum cost of one day of stay in Galiyat.

3.5.2 Willingness to pay (WTP):

A) Willingness to pay for conservation: The questionnaire will also contain a section about the WTP for conservation of biodiversity, this section contain few questions regarding the behavior of tourists. The dependent variable is dummy variable, those who are willing to pay denoted as "1" and those who are not willing to pay are denoted as "0".

Equation for the tourist WTP:

$$\begin{aligned}
\text{logit}(WTP_{BioCon}) = & \beta_0 + \beta_1tc_i + \beta_2inc_i + \beta_3sty + \beta_4edu_i + \beta_5ege_i + \beta_6dis + \beta_7fm + \beta_8tp \\
& + \beta_9maml + \beta_{10}brd + \beta_{11}nvst_i + \beta_{12}biolos + \beta_{13}inf \varepsilon \dots
\end{aligned}
\tag{6}$$

B) Determinants for Willingness to Pay: There are many factors that determine the respondent willing to pay. Where in this study, different determinants were in the equation that could play an important role to for tourists WTP. Maximum willingness to pay is treated as dependent variable and estimated linear regression. The equation 7 is arranged to estimate the WTP.

$$\begin{aligned}
WTP = & \beta_0 + \beta_1inc + \beta_2edu + \beta_3age + \beta_4sty + \beta_5dis + \beta_6nvst + \beta_7fm + \beta_8tc_i + \\
& \beta_9biolos + \beta_{10}brd + \beta_{11}tp + \beta_{12}maml + \varepsilon \dots
\end{aligned}
\tag{7}$$

Table 3. 3: Variable & Expected Signs

Notation	Variable		Sign
<i>tc_i</i>	Individual Travel cost.	Rupees (Thousand)	-
<i>inc_i</i>	Income.	Rupees	+
<i>edu_i</i>	Education level.	Year (1 Year)	+
<i>age_i</i>	Age	Year	+
<i>km_i</i>	Kilometer Travel	Kilometer (1 Km)	-
<i>Fm</i>	Family Size	Count (Person)	-
<i>tp</i>	Trees Plants	Scale Variable	+
<i>maml</i>	Mammals	Scale Variable	+
<i>brd</i>	Birds	Scale Variable	+
<i>mwwtp</i>	Maximum willing to pay	Rupees (Thousand)	+
<i>sty</i>	Number of days stay	Day (1 Day)	-
<i>biolos</i>	Biodiversity Loss	Dummy Variable	+/-
<i>inf</i>	Infrastructure	Scale	+
ϵ_i	Error Term		

3.5.3 Biodiversity Loss

There is a section contained in the questionnaire about the biodiversity loss. Addressed the underlying causes of biodiversity loss using the available studies. Questionnaire was designed according to the study about the biodiversity loss from tourist. They were asked to respond, based on their perception toward biodiversity loss. In this study, a dummy variable has created for the biodiversity loss where “1” for loss and 0 for “no” loss. The Questionnaire also designed to ask sub question after the biodiversity loss, the loss in terms of tree/plant, mammal and bird loss.

The equation “8” measure biodiversity loss as a whole. Biodiversity loss treated as a dependent variable and dependent variables gathered from the questionnaire from the tourists.

$$\begin{aligned} \text{Biolos} = & \beta_0 + \beta_1 \text{eststy} + \beta_2 \text{fm}_i + \beta_3 \text{tc}_i + \beta_4 \text{trk} + \beta_5 \text{inf} + \beta_6 \text{df} + \beta_7 \text{rf} + \beta_8 \text{tmp} + \\ & \beta_9 \text{tor} + \beta_{10} \text{cong} + \beta_{11} \text{plu} + \beta_{12} \text{Bioloss} + \varepsilon \dots \end{aligned} \quad 8$$

Biodiversity loss in term of tree and plants were also investigated in this study. In the survey we asked from the tourist sub question after the biodiversity loss.

$$\begin{aligned} \text{Biolos}_{tp} = & \beta_0 + \beta_1 \text{eststy} + \beta_2 \text{fm}_i + \beta_3 \text{tc}_i + \beta_4 \text{trk} + \beta_5 \text{inf} + \beta_6 \text{df} + \beta_7 \text{rf} + \beta_8 \text{tmp} + \\ & \beta_9 \text{tor} + \beta_{10} \text{cong} + \beta_{11} \text{plu} + \varepsilon \dots \end{aligned} \quad 9$$

Mammals Loss in the equation “10”.

$$\begin{aligned} \text{Biolos}_{maml} = & \beta_0 + \beta_1 \text{eststy} + \beta_2 \text{fm}_i + \beta_3 \text{tc}_i + \beta_4 \text{trk} + \beta_5 \text{inf} + \beta_6 \text{df} + \beta_7 \text{rf} + \beta_8 \text{tmp} + \\ & \beta_9 \text{tor} + \beta_{10} \text{cong} + \beta_{11} \text{plu} + \varepsilon \dots \end{aligned} \quad 10$$

Birds Loss in equation below.

$$\begin{aligned} \text{Biolos}_{brd} = & \beta_0 + \beta_1 \text{eststy} + \beta_2 \text{fm}_i + \beta_3 \text{tc}_i + \beta_4 \text{trk} + \beta_5 \text{inf} + \beta_6 \text{df} + \beta_7 \text{rf} + \beta_8 \text{tmp} + \\ & \beta_9 \text{tor} + \beta_{10} \text{cong} + \beta_{11} \text{plu} + \varepsilon \dots \end{aligned} \quad 11$$

Table 3. 4: Variable & Expected Signs

Notation	Variable	Unit	Sign
<i>bioloss</i>	Biodiversity loss	Dummy Variable	
<i>Biolos_{tp}</i>	Biodiversity loss in terms of flora	Dummy Variable	
<i>Biolos_{maml}</i>	Biodiversity loss in term of Mammals	Dummy Variable	
<i>Biolos_{brd}</i>	Biodiveristy loss in terms of Birds	Dummy Variable	
<i>eststy</i>	Estimated Stay	Predicted Variable	+/-
<i>fn_i</i>	Family Members/Group Size	Count	+
<i>trk</i>	Tracks	Scale	+
<i>inf</i>	Infrastructure	Predicted Variable	+
<i>dp</i>	Deforestation	Scale Variable	+
<i>rf</i>	Rain Fall	Scale Variable	+
<i>tmp</i>	Temprature	Scale Variable	+
<i>tor</i>	Tourism	Scale variable	+/-
<i>plu</i>	Pollution	Scale Variable	+
<i>Bioloss</i>	Biodiversity Loss	Dummy	
ϵ_i	Error Term		

Chapter No. 04

Data Analysis

4.1 Introduction:

This chapter presents data in form of graphs; bar charts, composite bar chart and pie charts and descriptive statistics. It also discuss the variable construction in the study.

4.2 Data Analysis:

Data has been collected through the questionnaire. Primary data had loaded on MS Excel-2013 and graph has been prepared, where data transfer to the Statistical Package STAT\SE 14.2 has been used to estimate regressions. For analyzing the data different variable has been constructed which is defined is sub-section of data analysis.

4.2.1 Total travel cost:

Total travel cost is the sum of all the costs which occur during the tour, it include the transportation expenditure, accommodation, entry fee and other expenditure.

The total travel cost can be expressed in following equation:

$$Tc_i = (t_{tc} + acc_{cst} + e_{fee} + oth_{exp} + Opp_{cst}) / sty \quad 12$$

Table 4. 1: Travel Cost Components

Sign	Explanation
Tc_i	Total travel cost
t_{tc}	Total individual travel cost (round trip)
acc	Individual Accommodation Cost
e_{fee}	Entry Fee
oth_{exp}	Other expenditure
Opp_{cst}	Opportunity Cost of Time

- **Total Individual Travel Cost**

The transport expenditure are the central part of travel cost estimation. The total individual travel cost include all type transportation expenditure, the respondents were asked about the mode of transportation (personal, private or public). Different categories used to ask about the cost incurred to reach Galiyat e.g., for personal transportation the fuel expenditures were asked for private mode of transport and charges they paid for hiring the private vehicle and public transport is also interrogated in the same way and asked for the fare charges they paid to reach Galiyat.

$$t_{tc} = (trns_{cst} / n_p) * 2 \quad 12.1$$

Where “ t_{tc} ” is the total individual transportation cost for Galiyat, $trns_{cst}$ is net transportation cost paid by the tourist and n_p is the number of person in the group or family.

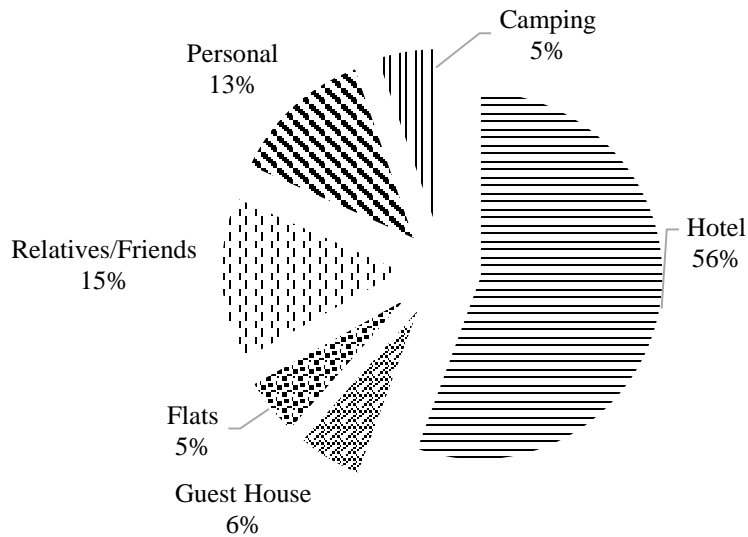
The travel distance to the Galiayat is measured in kilometer, tourists were asked to report the kilometer they travel. For those tourists who did not know about distance they travel, Google map has been used to measure the distance from their leaving city. Distance is also treated as round travel back to their station.

$$km_{rnd} = km * 2 \quad 12.2$$

Where “ km_{rnd} ” is the round distance to their living station from Galiyat, where “ km ” is the one side distance to Galiyat.

- **Accommodation cost**

According to the estimation 85.50% of the tourists who stay for more than one day. The tourists were asked about the mode of accommodation during their stay at Galiyat. It has categorized the into the hotel rooms, guest house, flats, relative or friends, personal accommodation and camping.



Graph 4.1 Mode of Accommodation

The accommodation cost has calculated through the number of days stay as per night charges of staying at Galiyat.

$$acc_{cst} = (sty_n * cst_{pn}) / n_p \quad 12.3$$

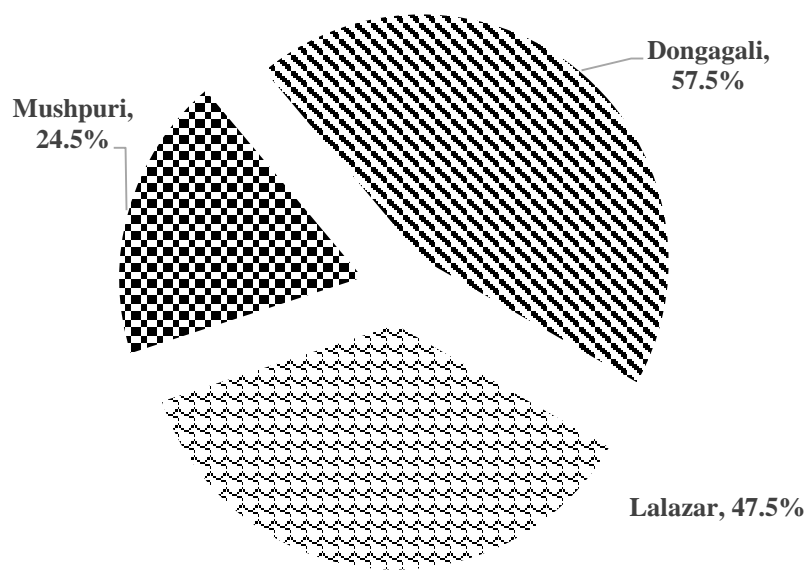
The “ acc_{cst} ” is the average accommodation cost paid by the tourist, where “ sty_n ” number of days stay at Galiyat during the tour into by “ cst_{pn} ” per night cost of living divided by “ n_p ” number of people in group or family so that we can get an average per night cost paid by an individual tourist.

- **Entry Fee and other Cost:**

Galiyat’s hiking tracks are the source of watching the biodiversity (animals, birds and various species of plants) and it influence tourist to visit. The trails went through the forest and give a pleasant view of nature. There are three major hiking tracks named as Dongagali Pipeline track, Mushkpuri top, Lalazar hiking track and Miranjani top. The entry fee is same for all tracks except. Where it expressed in term of following equation:

$$e_{fee} = (dg_{fee}/n_p) + (lz_{fee}/n_p) + (mp_{fee}/n_p) \quad 12.4$$

“ e_{fee} ” is total individual entry fee paid by tourist whereas the “ dg_{fee} ” entry fee for Dongagali track, “ lz_{fee} ” is entry fee for Lalazar hiking track and “ mp_{fee} ” mushkpuri hiking track. Each track’s entry fee is divided by the number of people in the group or family.



Graph 4. 2: Track and Visitors Ratio

The graph no. 4.2 shows that 57.5% of tourist from the sample visited Dongagali Pipeline track, 47.5% of the tourist visited to Lalazar Hiking track and only 24.5% of the tourist visited to Mushkपुरी hiking track.

Other expenditures were also asked to the tourist during the hiking such as short transport cost, entertainment, food, drinks, climbing sticks etc.

- **Opportunity Cost**

Opportunity cost is always considered as an important part in term of economic estimation. It is the time, an individual spend in any activity in which an individual scarified his/her wage (Cesario, 1976). The opportunity cost consists of time spent on traveling and staying at tourist spot. The opportunity cost is calculated by hourly wage, I asked tourist about their monthly income and converted it into daily wage, where daily income is expressed the

equation 7.5. The opportunity cost of time calculated by multiplying the total hours spent in an activity. The expression of opportunity cost to Galiyat is as followed in equation

$$opp_{cst} = sty_{hr} * inc_{hr} \quad 12.5$$

Where “ opp_{cst} ” is the opportunity cost of time to Galiyat is obtained by total hours stay “ sty_{hr} ” multiplied by hourly income of the tourist “ inc_{hr} ”. The calculation of the hourly wage rate of the tourist, daily income is divided with the working hour which a tourists spent at workplace. “ inc_{hr} ” is hourly income received by tourist and “ w_{hr} ” is tourist daily working hour.

$$Y_{hr} = Y_{daily} / w_{hr} \quad 12.5.1$$

The total working hour a tourist spent is considered as the loss of wage during his/her trip to Galiyat. The travel time is also added along with the number of day stay. The total hours spent in Galiyat is defined in the equation 7.5.2:

$$sty_{hr} = (sty * w_{hr}) + trv_t * 2 \quad 12.5.2$$

The calculation for the time spend in Galiyat expressed in the above equation which showed “ sty_{hr} ” is the total time or hour spent which depend on the number of days stay “ sty ” multiplied by tourist working hour “ w_{hr} ” and added round travel time is also considered to calculated the total hour lost. Assume that the minimum day stay is one for a tourist who planned to visit Galiyat he/she has to scarify his/her whole working day.

4.2.2 Attitude Variables

“An attitude is a mental and neural state of readiness attitude variable is organized through experience, exerting directive or dynamics that influence the individual response to the object or situation in which is it related” (Kaplan, 1972). The questionnaire contained some

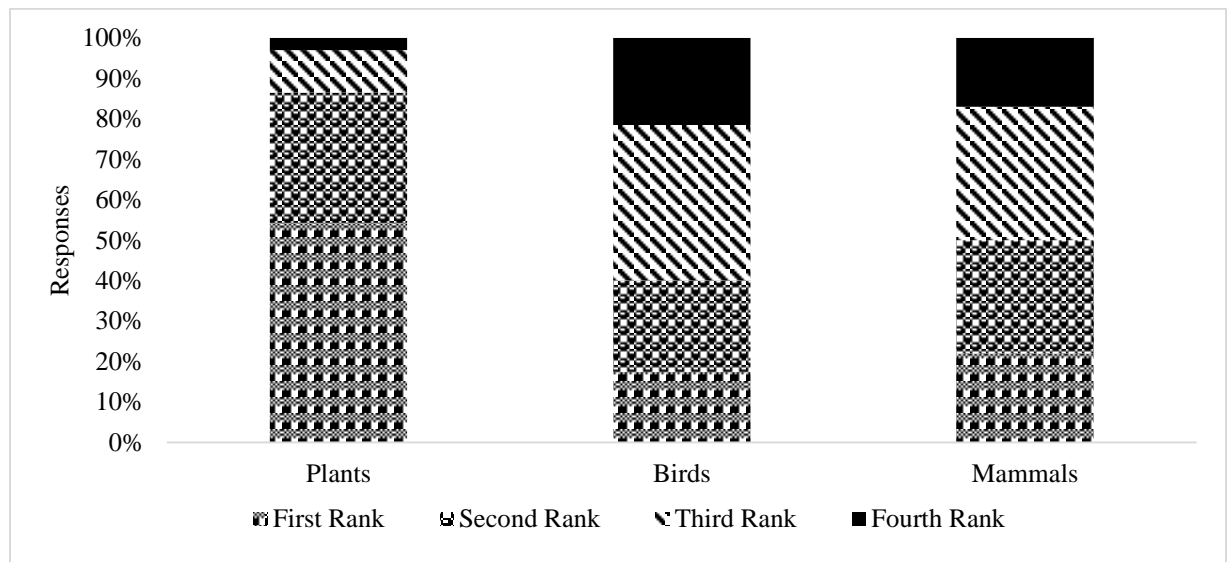
attitude variables regarding the biodiversity and other characteristics of the Galiyat, the tourists were asked about which biodiversity characteristics most influence them or their evaluation on view of decision to visit in Galiyat.

- **Biodiversity Ranking**

The respondents were asked to rank their attitude according to their preference which explained the level of attractiveness toward the biodiversity. The respondents were asked to answer rank wise (see section iii, question number of 1 for the biodiversity ranking in Appendix-1). The first rank is considered a higher score toward the biodiversity attractiveness. The Graph 4. 3: Biodiversity Ranking showed preference to the attraction toward the biodiversity.

The first rank of all biodiversity rank showed in the first four bars e.g., 54% of tourists respond that they had been primarily attracted due to the plants of Galiyat, where 32.5% tourist said that plants of Galiyat attract them secondly. Where the mean of value of trees and plants is 1.365 (2.635) and t-statistics stands for 28.3524(p value < 0.05) with the degree of freedom 199. It means that there is significant effect of plants regarding tourist's decision. Those respondent who visit the track said that their primary attraction to Galiyat is the variety of birds here. Total out of 18% tourist indicated that birds are primary attraction where 23% and 39% indicated that the variety of birds attract to Galiyat is their second and third cause of attraction to to visit. The Statistics shows the means value for the birds 2.64 (1.36) and t-test resulted for 37.0496 (p value < 0.05) and degree of freedom is 199. It indicated that there is significant effect of bird watch on tourist behavior. In the same way the respondent indicated that mammals of Galiyat attract them 22%, 28%, 33% and 17% as their first to fourth priority. Where, on the degree of freedom is 199 and mean

value for the mammals of Galiyat is 2.456 (1.544) and t-statistics 33.3253 (p value <0.05) indicated that there is significant effect of mammals regarding the decision tourists. The Graph 4. 3: Biodiversity Ranking indicated biodiversity ranking and calculation in the appendix 4



Graph 4. 3: Biodiversity Ranking

- **Likert Scale Variables:**

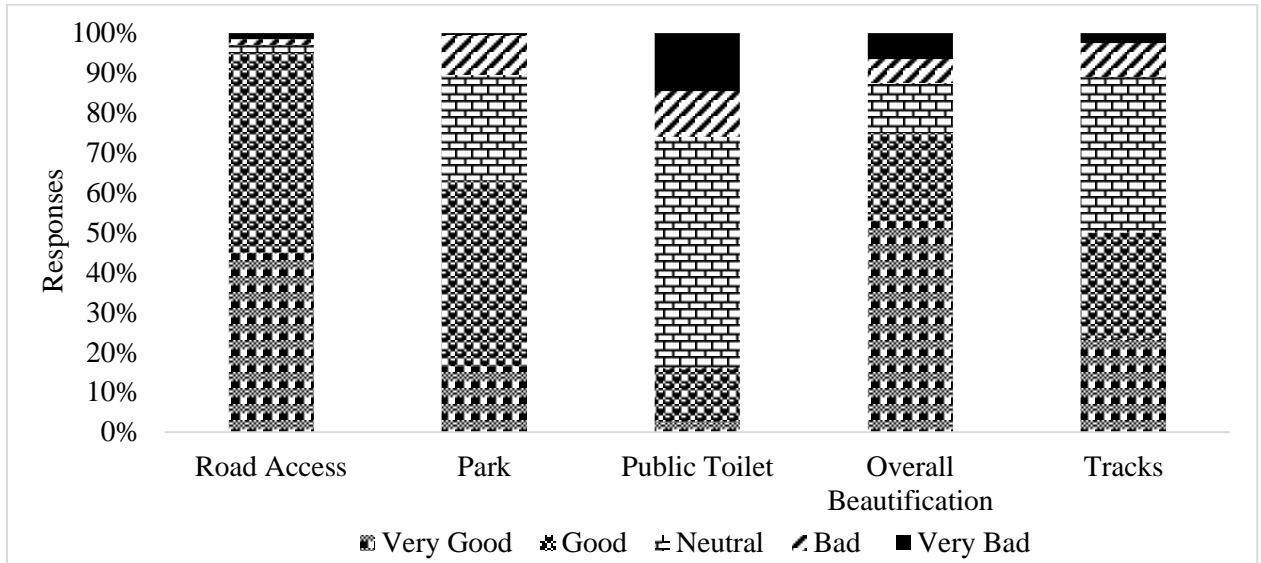
Likert & Hayes in (1957) defined likert scale as a series of written statement that express the range between positive to negative expressions, claims, sentiment or views regarding an object. The questionnaire contained two different questions, first question appeared in the section II about their views of infrastructural condition in Galiyat (Question 2 of Section II, See Appendix-I) and second likert scale question, respondent were asked about their claim of biodiversity decline on the biases of their experience of visit in Galiyat (Question 7 of Section III, See Appendix-1).

- **Infrastructural Condition of Galiyat:**

Infrastructural condition always consider as an important tool in tourism demand. A good infrastructural facilities attract the tourists all around the year and bad conditions are the barrier in tourism demand. The study also asked the tourist about the infrastructural condition of Galiyat. Questionnaire were designed according the study and it also contained infrastructural questions, these were divided into five different conditions to know about the tourist respond regarding the facility.

Road access is a major indicator in tourism demand. The tourists were asked about the road quality 45% responded that the road condition is very good where 50% indicated that it is good in condition and about 2%, 2% said the road condition is bad. The statistics showed the mean value for the road is 4.355 (0.645) and t stat 83.6817 (p value < 0.05) which indicate that tourists were satisfy with the road condition of Galiyat. Similarly, parks condition 16.5%, 47%, 27%, 10% and 1% responses from very good to very bad respectively. The mean value of statistics 3.685 (1.315) and t-stats were 59.0196 (p value < 0.05), the result suggested that tourist are satisfied with park condition. In the same way public toilets were 2.5% (Very Good), 14% (Good), 58% (Never use), 12% (Bad) and 15% (Very Bad). Where the statistical analysis indicated that the mean value for the public toilets condition 2.78 (2.22) and t-statistics was 41.7627 (p value < 0.05) significant effect the tourist decision. Overall Beautification considered as an infrastructural condition (waste management, horticultural) became as 53% and 22% for good where 6% and 7% said bad management. The mean value for the overall beautification is 4.09 with the t test 47.5566 (p value < 0.05) indicated the tourist satisfaction toward the beautification. Tracks played a major role in tourist activities and the estimation showed that 24% (Very Good)

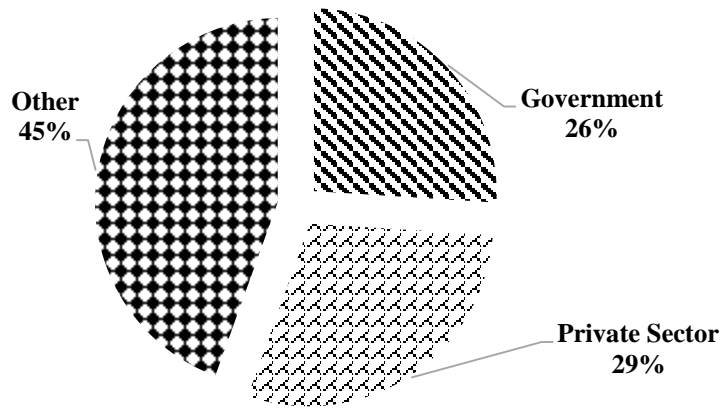
27% (Good), 39% (Do not Visit to Track), 9% and 3% said that the track condition is very bad. The mean value for the track was 2.6 and t-test 50.0392 (p value < 0.05) it clearly indicated that tourist are satisfied with the tracks condition of Galiyat. The graphical presentation showed in Graph 4. 4: *for Infrastructural Condition*



Graph 4. 4: for Infrastructural Condition

- **Tourist Professions**

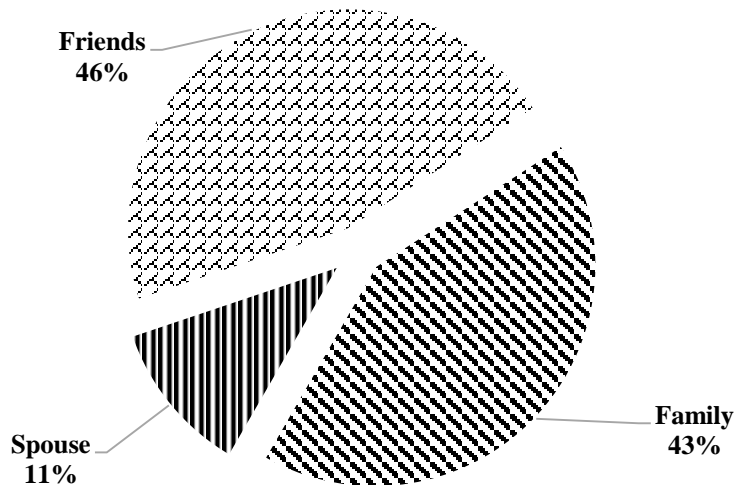
The socio demographic characteristics tourist defined the tourists profile that play an important role to determine the number of trips and number of days stay in single trip. Common variable were considered for graphical presentation. The results showed, 26% of the respondent's occupied in government sector whereas the 29% employed in private sector and 45% of the respondents were engage in other which include: personal business, sales and students.



Graph 4. 5: Tourist Occupation

- **Traveling with**

The tourism is mutual activity, it could be with spouse, family and friends. According to the gGraph 4. 6: Traveling With 11% of the tourist from sampling were with spouse, and 43% were with their family and 46% of data showed that they came with their friends.



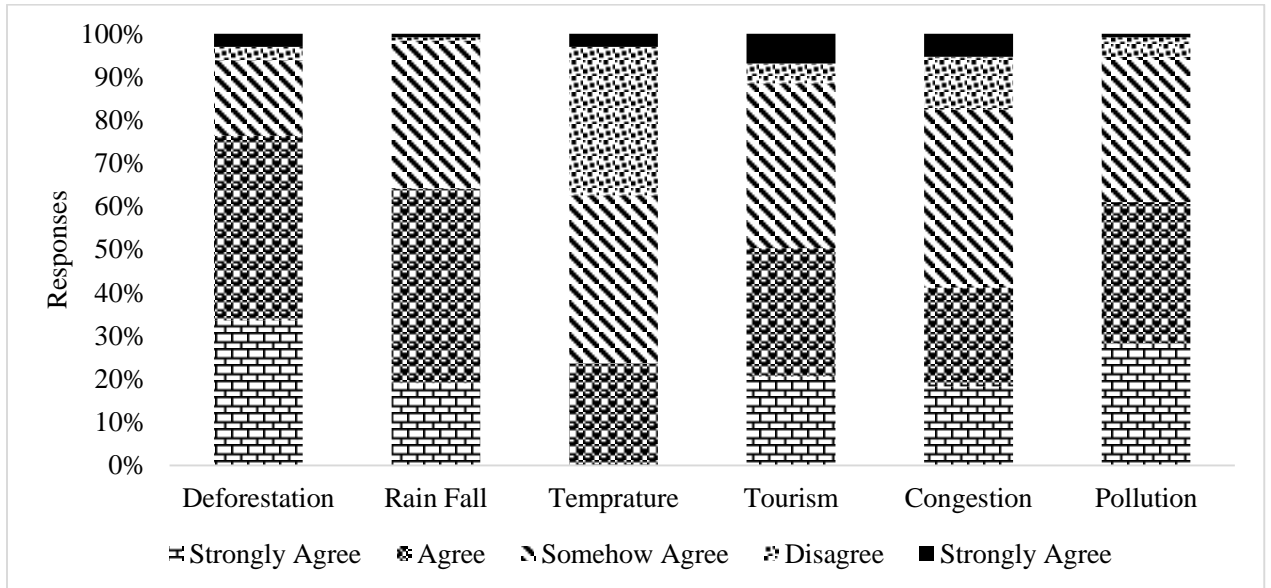
Graph 4. 6: Traveling With

- **Biodiversity loss**

Several factors contribute to the biodiversity loss. During the survey I also collected the perception based information about the biodiversity loss. The loss based on tourist visit experience to the Galiyat. The questions were form into likert scale that contained five different stages which indicated tourist's attitude (Butler, 1980).

Tourists also indicated that the deforestation is a primary reason which cause the biodiveristy loss. The response we received from touirsts as 33.59% (strongly agree) and 42.75% said, the deforestation taken place in Galiyat. The calculation showed the mean value for the deforestation is 4.0064 with the t-statistics showed 47.9442 (p value < 0.05) with degree of freedom 130, it indicated that deforestation significantly effect the biodiversity loss. Two climatic variables (rain fall and temprature) has been formed into likert scale. Tourist agree (19.08% and 45.05%) with the response that the rain fall has been reduced where the (0%, 23.66% and 34.35%) responded that the temprture has been increased in Galiyat. The mean value 3.80916 and 3.832061 for rain fall and temprature respectively. The t-stats for rain fall 26.221 (p value < 0.05) and temprature 53.2165 (p value < 0.05), it indicated that the rain fall and temprature played significant role in reduction of biodiversity. The respondent also indicated that the tourists activity in Galiyat cause the biodiversity loss to 20.61% and 29.77%. The the calculation showed the means value for this indicator is 3.526718 and t-stats is the 37.2495 (p value < 0.05). The result showed that the tourism is significantly effect the biodiveristy loss. The congestion and pollution indicated a significant result 35.5845 (p value < 0.05) and 47.6147 (p value < 0.05) respectively where th mean value for the congestion is 3.366412 and pollution mean

value stand for 3.832061 with degree of freedom is 130. The graphical presentation given below in the Graph 4. 7: Biodiversity Loss:



Graph 4. 7: Biodiversity Loss

4.3 Descriptive Statistics:

The descriptive statistics are the primary tool that shows the brief summary of the data. It also provides a quantitative representation of variables and help to quantify the large data into a sensible way. **Error! Reference source not found.** showed the data summary; mean valued, standard deviation, minimum value and maximum value for the different variables.

Table 4. 2: Descriptive Statistics

Variable	Sign	Mean	Std. Dev.	Min	Max
Age	<i>age</i>	35.015	9.37144	18	70
Income	<i>inc</i>	55690	63441.22	10000	500000
Education	<i>edu</i>	12.32	3.719783	0	18
Stay	<i>sty</i>	3.115	2.679116	1	15
Visits	<i>vst</i>	3.31	4.016786	1	20
Family/Group Size	<i>np</i>	5.88	3.979293	2	25
Kilometer	<i>km</i>	351.435	235.3467	33	970
Individual Willingness to Pay	<i>wtp_i</i>	310.1337	828.3833	0	5000
Time to Reach Galiyat	<i>trv_tim</i>	6.46375	4.353737	1	21
Working Hours	<i>wh</i>	9.235	2.059364	4	15
Experience of Visit	<i>exvst</i>	9.25	7.486504	1	30
Biodiversity Loss	<i>bio_los</i>	0.68	0.4676467	0	1
Individual Travel Cost	<i>tc_i</i>	3929.041	4030.036	227.44	26383.33

Note: Obser: Observation, Std. Dev: Standard Deviation, Min: Miniumu, Max: Maximum

According to the data, average age of the tourist in 35 years and maximum value age of the tourist is 70 years. Average income in the data is about PKR 55690, maximum income of the tourist is PKR 500000, and mean value of the education in the data is 12.32 years of education. Average tourist spent their days and number of visits along with their family is 3.115, 3.31 and 5.88 respectively.

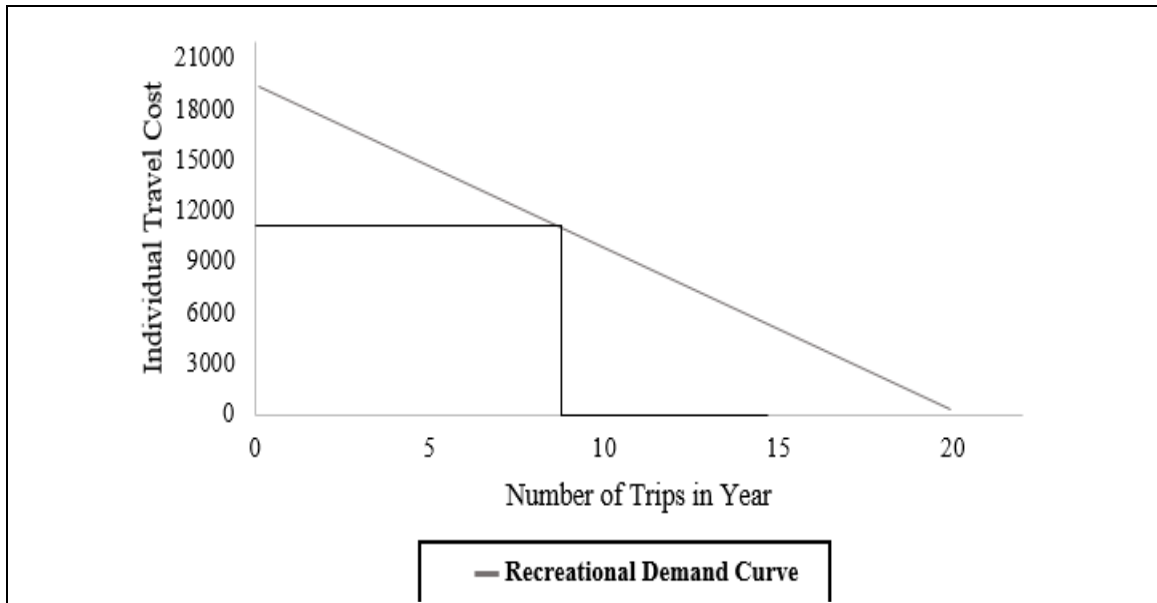
In the data set the tourist came of almost every province of the Pakistan and their average travel is 351.435 kilometer and the average time they took to reach Galiyat is 6.46 hours. The average individual willingness to pay for the conservation biodiversity is PKR 310.1337.

Most of the tourist usually came very year to Galiyat, it is also asked from the tourist about their visit experience, where the average experience for a tourist showed 9.25 years. The travel expenditure is an important element to any tourist destination, the average travel expenditure to Galiyat for a day is PKR 3929.041.

4.3.1 Recreational Demand Curve and Consumer Surplus:

The recreational demand curve is derived against the number of trips taken by tourist in a year. The Graph 4. 8: Demand Curve below showed the individual travel cost on “vertical” axis and number of trips on “horizontal” axis. Where, it followed the law of demand and showed the negative relationship between the cost of the trip and number trip taken to Galiyat.

In the questionnaire, tourist were asked about their willing to pay for biodiversity conservation as their maximum voluntarily contribution. I multiply the voluntarily contribution as willingness to pay and individual travel cost, and draw another demand curve with willingness to pay, the demand curve rotated upward. Increased in travel cost due to willingness to pay showed the same results but compared with the simple travel cost, the rotated demand curve showed that there are more trips than simple demand curve.



Graph 4. 8: Demand Curve

- **Consumer Surplus**

The travel cost at PKR 21000 there is zero trip, as cost decreased the number of trips increased. To find the consumer surplus. Check price and actual price paid

$$CS = \int_{p_r^1}^{p_r^0} f(p_x, p_r, q) dp_r$$

$$CS = \int_{11,000}^{21,000} (20 - 8) (21,000 - 11,000)$$

$$CS = (12)(10,000)$$

$$CS = 1,20,000$$

The consumer surplus 120000 for the individual tourists. Consumer surplus for the total sample size of is PKR 24.00 million.

- **Recreation Value:**

Table 4. 3: Recreation Value

	Recreational Value (PKR)
Recreational Value As per visitor (Million)	4.30471
Total Recreation Value (Million)	86.094108

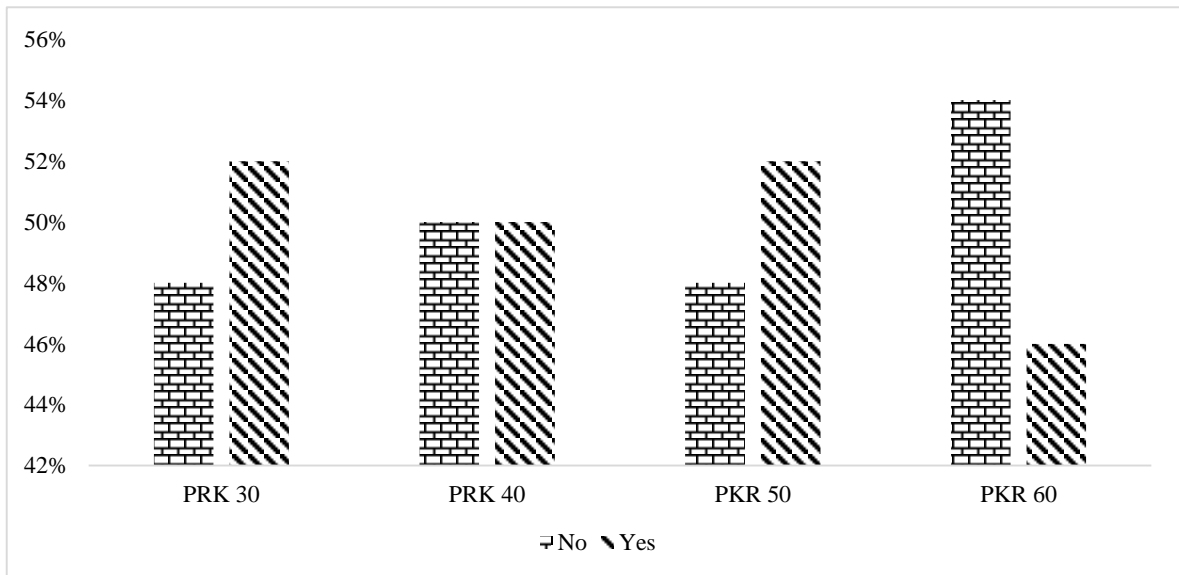
Average travel cost and average willingness to pay has been added for recreational value.

It multiply by the number of days spent for conducting survey in Galiyat for data collection.

Than multiply the value with the total number of sample data.

- **Bids Offered for Entry Fee:**

The last section of the questionnaire was about the bids for the entry fee, tourists were offered to respond on bids. The four bids were offered to the tourist and each bid was asked from 50 tourist.



Graph 4. 9: Bids for Entry Fee

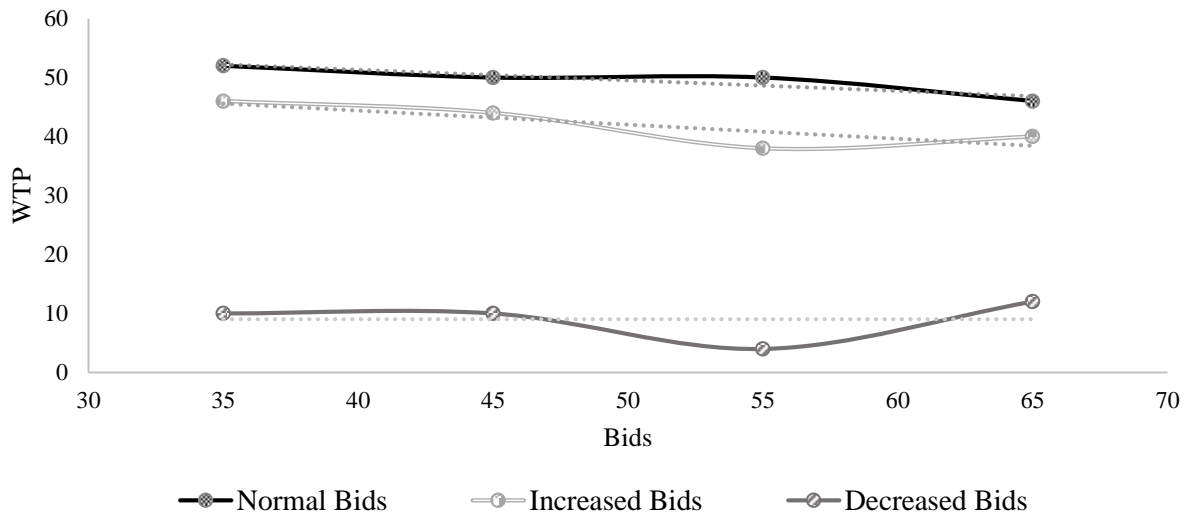
- 1 The first bid, I asked the respondent/tourist about the voluntarily contribution for biodiversity conservation as entry fee, the question was “are you willing to

pay entry fee PKR. 30 as entry fee”. 52% of the respondent were told yes, they are willing to pay entry fee PRK 30. For those who respondent who were willing to pay, I offered them to pay RK 35 and those who refused to pay PRK 30 were offered they to pay PKR 25.

- 2 The second bid, I asked fifty respondent “are you willing to pay PKR 40 as entry fee”. Where, half of the respondent respond to yes and other half said no they are not willing to pay any entry fee. Similarly we offered new bid to them
- 3 The third bid category, I offered to the tourist, “Are you willing to pay PKR 50 as entry fee”. The responses were similar as for the first bid then I offered new bids.
- 4 The last bid we offered to the tourist “are you willing to pay PKR 60 as entry fee”. 46% of the respondent answered yes they are willing to pay PKR 60.

- **Entry Fee Demand Curve:**

The graph showed that as the bid for the entry fee increased the responses or willing to pay entry fee goes down:



Graph 4. 10: Double Band Demand Curve

There are only 46% people respondent that they will pay if government impose entry fee PKR 60 as entry fee. Total 50% respondent that they were willing to pay entry fee PKR 40 and PKR 50 and 52% of the respondent told that they were willing pay PKR 30 as entry fee.

Chapter No. 05

Econometrics Estimation

5.1 Introduction

This chapter has estimated the different variables by using econometrics techniques. The linear and logit technique have applied for the analysis.

5.2 Regression Estimation

5.2.1 Number of Days Stay (Tourism)

Estimated different model for the desired results. Log linear model has been used to estimate the regressions. The dependent variables in the regression model is the number of days at Galiyat as “sty” dependent variable.

Table 5. 1: Regression Analysis of Tourism

Variables	(1) Stay	(2) Stay	(3) Stay	(4) Stay	(5) Log Stay
Age	6.564*** (1.417)	6.761*** (1.394)	6.500*** (1.416)	8.410*** (1.941)	-0.0250** (0.0110)
Income	7.025*** (0.730)	7.045*** (0.720)	7.102*** (0.705)	5.689*** (0.583)	3.07e-06*** (5.12e-07)
Family Size/Group Size	3.243*** (0.583)	3.219*** (0.577)	3.300*** (0.576)	3.156*** (0.459)	0.0626*** (0.0106)
Distance	-0.903*** (0.299)	-0.923*** (0.299)	-0.844*** (0.292)	-0.481* (0.272)	-0.00206*** (0.000345)
Individual Travel Cost	-0.154** (0.0751)	-0.163** (0.0785)	-0.167** (0.0792)	-2.868*** (0.487)	-1.06e-05*** (3.84e-06)
Trees/Plants	0.471** (0.226)	0.363* (0.197)	0.438* (0.224)	0.288 (0.190)	
Mammals	-0.125 (0.102)		-0.0584 (0.0428)	-0.0508 (0.0777)	-0.0184* (0.0108)
Biodiversity Loss	-0.303** (0.153)	-0.312** (0.153)	-0.284* (0.149)	-0.289** (0.123)	-0.0617** (0.0262)
Birds	-0.174 (0.223)				
Overall Quality			0.0945* (0.0515)		
Education				-0.118 (0.160)	
Infrastructural Quality				0.0777* (0.0394)	-0.00905 (0.0109)
Constant	-93.38*** (11.59)	-93.92*** (11.33)	-94.02*** (11.15)	-90.94*** (11.13)	2.075*** (0.265)
Observations	200	200	200	196	200
R-squared	0.913	0.912	0.914	0.943	0.943

Robust standard errors in parentheses

***** p<0.01, ** p<0.05, * p<0.1**

In the first model, all the variable are significant except biodiversity of birds and mammals whereas the income increases by PKR. 1000, the number of days stay increased by 5.689%

(model 4) (p value < 0.05) showed the significant effect of income on tourist stay at Galiyat. In all estimation the income is positively associated and showed significant impact.

Age is an important determinant in the tourist activities, the results in first four models showed there is direct relationship between the numbers of days stay with the tourist age. According to fourth model, if the one year increased in age will lead to increase the number of days stay by 8.410%, (p value < 0.01) showed the significant at 1%. In model-5 the age is negatively associated with the number of days stay at Galiyat and results showed that if age is increased by 1%, the stay decreased by 0.0250% and it is significant at 5%.

The family or group size variable is estimated in all models and it showed that there is positive and significant results, where the model fourth, as family or group size increased by one person will lead to increased number of days stays at Galiyat by 3.156% (p value < 0.01) which showed a significant relationship at 5%. The distance has estimated which determine the negative relationship, the increased one kilometer distance will decreased the number of days stay by 3.156% and significant at (p value < 0.1).

The estimations of individual travel cost in all models and determine that there is negatively relationship between the travel cost and the number of days stay at Galiyat. In model-4, if the travel cost increased by PKR 100 the number of days stay will decreased -2.868% (p value < 0.01). The biodiversity among tree and plants has been estimated in first four models and the significant result appeared as positive relationship in first three models, where in fourth model there result in insignificant. The biodiversity result for animals is estimate model (1,3,4 and 5), and showed insignificant result in log linear model and showed significant in model five linear log. Birds variables is also insignificant.

The biodiversity loss has considered in all models, where it showed the significantly negative results as the one unit of biodiversity decreases, tourist will not stay or tour in Galiyat. The model 4 estimation showed that if one unit decreased in biodiversity will lead to decrease the number of days stay by -0.289% (p value < 0.05).

Overall beautification of Galiyat is significant in model 3rd (p value < 0.1). The education model is insignificant (p value > 0.1). The infrastructure variable has generated (road, track, public toilets, park and beautification) through Principle Component Analysis (PCA) and treated as independent variables in the model (4 and 5), where it showed the significantly relationship. The estimation of model, as the infrastructural quality increases by one unit the number of days stay increases by 0.077%.

5.2.2 Willingness to Pay for Biodiversity Conservation

In the table 5.2, estimated four logit models. The dependent variable is dummy (0, 1), 1 for willing to pay for conservation and 0 for not willing to pay. The estimation showed in the table 5.2:

Table 5. 2: Logit Model for Willingness to Pay

Willingness to Pay	(1) Marginal Effect	(2) Marginal Effect	(3) Marginal Effect	(4) Marginal Effect
Income	7.91e-07* (4.83e-07)	5.38e-06*** (1.67e-06)	4.99e-06*** (1.69e-06)	0.669** (0.318)
Education	0.0236*** (0.00907)			-0.0244 (0.104)
Stay	-0.0616*** (0.0196)	-0.0456** (0.0196)	-0.0484** (0.0215)	
Kilometers	-6.24e-05 (7.47e-05)	-6.60e-05 (0.000126)	-4.76e-05 (0.000128)	0.288* (0.168)
Number of Visits	-0.0110 (0.00881)	-0.0171* (0.00998)	-0.0170* (0.0104)	
Family Size/ Group Size	0.0411*** (0.0113)	0.0258** (0.0105)	0.0261** (0.0107)	0.366 (0.295)
Individual Travel Cost	0.000111*** (3.23e-05)	6.31e-05*** (2.42e-05)	6.12e-05** (2.41e-05)	0.00793 (0.0413)
Biodiversity Loss	0.150** (0.0749)		0.126* (0.0752)	
Mammals	-0.217 (0.145)			
Birds	-0.248* (0.133)			
Infrastructural Variables		-0.0618* (0.0316)	-0.0572* (0.0319)	
Biodiversity (Index)		-0.0527 (0.0338)	-0.0467 (0.0332)	
Age				-0.268 (1.000)
Constant	-0.5960534 (0.9551833)	0.4942410 (0.773304)	-0.796 (0.496)	-38.72 (28.05)
Observations	200	200	200	196
R-Square	0.1617	0.1483	0.1618	0.0332

Robust standard errors in parentheses

***** p<0.01, ** p<0.05, * p<0.1**

Income is an important variable in the model as the coefficient is positive and significantly 1% in model (2) and (3), where it is significant at 5% in model four and significant at 10%

in model (1). Where the third model shows, if the income increases by PRK 1000 than the willing to pay will likely to increase by 4.003-06% (p value < 0.01). The education and age estimated in model (1) and (4) respectively, where the coefficient of education is positively sloped and showed statistically significant in model first as the education increased by one year, the WTP will likely to increase by 2.36% (p value < 0.01) means tourists with higher number of education as more sensible to conserve the biodiversity. The age along with distance, biodiversity index and mammals are insignificant in the estimations, which indicated that age is not an important variables for WTP.

Number of days stay as Galiyat is also major important variable to determine the WTP for conservation of biodiversity. Where all models showed that the coefficient is negatively sloped and statistically significant relationship, in the model third showed that the as willingness to pay decreases by 4.84% as the number of days stay at Galiyat increased by one day. It means that tourists are already paying high cost for stay, that's why there WTP to decrease.

The family size showed that the coefficient of (fm) is positively sloped and statistically significant relationship for conservation of biodiversity. The third model showed that if the family size increased by 1 person the WTP will likely to increase by 2.61% (p value < 0.05). The individual travel cost in the estimation showed the coefficient as positive and statistically significant effect, it's because the tourist came to enjoy the biodiversity of Galiyat, tourist already spent high to reach to see the variety of birds, flora and fauna that is the reason statistically significant and positive relationship appeared in estimations. The WTP over biodiversity loss is also statistically significant and positive related, those tourist who think that Galiyat's biodiversity has reduced are more likely willing to pay for

conservation, if one unit biodiversity loss in Galiyat will lead to increase the WTP for 12.6% (p value < 0.1). Bird watching variable is significant and positive in the estimations. The infrastructural variable in the model showed, there is significant and negative relationship.

5.2.3 Determinants for Willingness to Pay

There are several variables that determined the biodiversity loss, social demographic and economic characteristics are central part of determining the determinants of WTP. In this thesis, different determinant are considered such as income, education and age of tourist, number of days stay and number of visit in Galiyat, distance, family size, individual travel cost, variety of birds, mammals and trees/plants. The estimation showed in the table 5.3:

	(1)	(2)	(3)
<i>Table 5. 3: Determinants for Willingness to Pay</i>			
Variables	Average Willingness to Pay	Average Willingness to Pay	Average Willingness to Pay
Income	-0.00113** (0.000440)	-0.00127*** (0.000476)	-0.00126** (0.000497)
Education	3.095 (14.48)	5.889 (14.01)	7.075 (15.17)
Age	-0.650 (6.580)	-0.478 (6.900)	-0.585 (6.618)
Stay	-39.74* (23.92)	-43.15* (22.34)	-42.86* (22.63)
Distance	-0.382** (0.164)	-0.360** (0.165)	-0.381** (0.167)
Number of Visits	-18.53** (8.794)	-17.89** (8.644)	-17.90* (9.980)
Family Size/ Group Size	37.07 (25.03)	38.68 (25.28)	39.76* (25.58)
Individual Travel Cost	0.0960 (0.0604)	0.0995 (0.0611)	0.103* (0.0616)
Biodiversity Loss		252.4** (97.88)	256.5** (101.3)
Variety of Birds			111.1 (302.5)
Trees Plants			373.6* (244.5)
Mammals			-123.2 (280.8)
Constant	193.3 (250.2)	63.70 (235.1)	-344.1 (462.7)
Observations	200	200	200
R-squared	0.128	0.120	0.127

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The mean willingness to pay is a monetary term. The results presented in Table 5.3 shows that the amount coefficient of income is 0.00126 (p value < 0.05) and its sign is negative in model 3 which shows the significantly negative impact of amount on mean willingness

to pay, by increasing 1000 PKR income visitors are 0.00126 are less willing to pay which is unusual result our observation could not capture this. However, education, age, variety of birds, and mammals have statistically insignificant impact on mean willingness to pay. While distance in kilometers is significant which has statistically negative impact on mean willingness to pay in model 3, by increasing one kilometer visitors are 0.382 (p value < 0.05) less willing to pay in term of money. Hereafter, the number of visits has negatively significant impact on mean willingness to pay. Those visitor who visit frequently are less willing to pay so if 1 more visit increased in tourists decision to visit, it will lead to decline the visitors willing to pay by 17.9 (p value < 0.1). However, family size has significantly positive impact on mean willingness to pay which means by increasing one member in family size/group size so the visitors are more willing to pay by 39.76 (p value < 0.1). While individual travel cost has statistically significant positive impact on willingness to pay which showed that by increasing one unit in individual travel cost visitors are 0.103 (p value < 0.1) more willing to pay.

Biodiversity loss has positive relationship with mean willingness to pay which is statistically significant impact on maximum willingness to pay which shows that visitors are 256.5 (p value < 0.05) more willing to pay, whereas trees/plant (flora) is also statistical significant with positive sign which shows that visitors are 373.6 more willing to pay.

5.2.4 Biodiversity Loss

The biodiversity loss has been estimated through the dummy variable. The binary variable (0, 1) were considered as biodiversity loss to investigate. “0” for no biodiversity loss and “1” for the biodiversity loss.

Table 5. 4: Biodiversity Loss

VARIABLES	Biodiversity Loss mfx dydx	Biodiversity Loss mfx dydx	Flora Loss mfx dydx	Mammals Loss mfx dydx	Birds Loss mfx dydx
Estimated Stay	-1.65e-07** (7.83e-08)	-1.64e-07** (7.77e-08)	-1.03e-07* (5.25e-08)	-1.51e-07* (8.30e-08)	-1.41e-07** (6.42e-08)
Family Size		0.0105 (0.00844)	-0.00477 (0.00554)	0.000379 (0.00854)	
Individual Travel Cost	-2.20e-05*** (7.49e-06)	-2.40e-05*** (8.55e-06)	-7.19e-06 (6.37e-06)	-7.71e-06 (8.84e-06)	
Track	-0.0418 (0.0378)	-0.0430 (0.0397)	0.0123 (0.0349)	0.0187 (0.0354)	0.0323 (0.0255)
Infrastructural Condition		0.0443 (0.0380)	-0.0117 (0.0360)	-0.0121 (0.0426)	0.0300 (0.0219)
Deforestation		-0.0122 (0.0499)			
Rain Fall	-0.133** (0.0535)	-0.122** (0.0526)	-0.0442 (0.0409)	-0.0850* (0.0448)	0.000973 (0.0510)
Temperature	0.120*** (0.0457)	0.118** (0.0526)	0.0580 (0.0432)	0.104** (0.0493)	0.0356 (0.0473)
Tourism	0.0120 (0.0383)	0.00433 (0.0375)	-0.0472* (0.0248)	-0.0764** (0.0355)	-0.0132 (0.0202)
Congestion		-0.0120 (0.0382)	0.0246 (0.0284)	-0.0500 (0.0340)	-0.0792 (0.0270)
Pollution	-0.0742** (0.0371)	-0.0647 (0.0414)	-0.0323 (0.0276)	-0.00572 (0.0306)	0.0256 (0.0355)
Willingness to Pay	0.438*** (0.0945)	0.450*** (0.0951)			
Observations	130	130	130	130	130
Pseudo R Square	0.0850	0.1003	0.1018	0.1438	0.2129

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The logit regression has estimated into different logistic models. However, these variables may play critical role to determine biodiversity loss, but these variables somehow contribute to the biodiversity loss. Independent variables such number of days stay, family

size/group size, tracks, infrastructure, tourism effect, congestion, climatic variables, and biodiversity loss in term of flora, fauna and birds.

This table 5.4 showed the results that contribute to the biodiversity loss. Where family size, tracks, infrastructural condition, congestion and pollution are statistically insignificant in the models of biodiversity loss, which means they do not contribute the biodiversity loss. While estimated stay, individual travel cost, temperature and rain fall are statistically significant in first two models. The estimated stay showed a negative sign which means as the number of stay at Galiyat increases will likely to decrease biodiversity loss by $1.58e-07\%$ (p value <0.01) (model 2). It means the longer stay of the tourist will create an opportunity to reduce the biodiversity loss. The travel cost also showing the negative relationships with biodiversity loss. As individual travel cost increases the biodiversity loss will likely to decrease by $2.24e-5\%$ (p value <0.05). It means that those tourist who came far way to the Galiyat are interested to watch the biodiversity instead of those who came from nearby areas. The rain fall is negatively related to the biodiversity loss with the coefficient of -0.112 (p value <0.10), it means the increase in rainfall will reduce the biodiversity loss in Galiyat. The temperature is showing the positive response in the result with the coefficient value of 0.101 (p value <0.10) means the higher the temperature will likely to cause the biodiversity loss by 0.101% . Both climatic variables are affecting the biodiversity of Galiyat. Lastly in the first model, the willingness to pay showed the positive sloped with biodiversity loss. Means that the tourist will pay if biodiversity loss likely to increase by 0.44% (p value < 0.01).

In model third of biodiversity loss in term of trees plants: the family size, individual travel cost, tracks, infrastructural condition, deforestation, rainfall, temperature, congestion and

pollution are insignificant variable in model. The estimated stay is showing the same response as in the previous models of biodiversity loss and tourism is also affecting biodiversity loss negatively with the coefficient value of -0.0472 (p value < 0.10). This mean that as the activities increase by biodiversity loss will likely to decline by 0.0472% in Galiyat.

In the fourth model of biodiversity loss in term of mammals: the family size, individual travel cost, tracks, infrastructural condition, deforestation, congestion and pollution are insignificant variable in model. Where the estimated stay, rainfall, temperature, and tourism are statistically significant. The estimated stay is negatively related with the loss of mammals, if the stay increase by one day the loss will likely to decline by $-1.51e07\%$ (p value < 0.10). Rainfall and tourism are negatively related with the biodiversity loss. Increase in these variable will like to reduce the biodiversity loss by -0.0850% (p value < 0.050) and -0.0764% (p value < 0.05) cause the reduction in biodiversity loss respectively.

In the fifth model of biodiversity loss in term of birds where the family size, individual travel cost, tracks, infrastructural condition, deforestation, rainfall, temperature, tourism and pollution are insignificant variable in model. While the estimated stay and congestion is positive and statistically significant in the model. Where the coefficient for estimated stay is $-1.141e07$ (p value < 0.05) means that the stay increase the probability of loss will likely to decrease by $1.141e07\%$.

4.5 Tourism, biodiversity and local people:

There are different types of engagement in consideration with the nexus between tourism and biodiversity. The people who lived in Galiyat are deeply associated with the

biodiversity that directly engage the tourism. During the survey I observed that local people were using biodiversity for their livelihood. The types of business they were doing at Galiyat are as follows:

1 Daisy Flowers

Galiyat is enrich with the daisy flowers, it grows in summer. The daisy flower consists of white petals and yellow in center. A huge quantity of daisy flowers available during summer. The people made hat from the daisy flowers to sale.

Each hat consisted about 15 to 20 daisy flowers and the average price is PKR 50. There are about 20 to 25 seller on different spots of Galiyat who sale hats of daisy flowers. Each seller sold about 20 to 30 daisy flowers hats.

2 Corn Sellers:

Corn is also grown in Galiyat but majority of the corn seller bring corn from different cities. There are many of corn seller in Galiyat. Corn sellers used different types to cook the corn, they roasted on fire, boiled corn and frying corn in salt.

They tourists bought for self-feeding but usually buy uncooked corn to feed the monkeys. Galiyat is also famous for the monkeys. The corn sellers were available on different tourist spots in Galiyat, who sold their corn to tourist so that they could feed tourist.

Each tourist spots there are four to five corn sellers were available in Galiyat.

The average corn price is PKR 20 and the average corn sold is 50. Daily income they earned is about PKR 1500 to PRK 2000.

3 Wild Berries

In the Galiyat forest different kind of wild berry available. People collected the berries from forest and made cups from leaves and sold it to the tourists. Price for the each cup of wild berry is PKR 50.

4 Other Business and biodiversity

There are some other types of business that include: dry arrangements from the forest products (dry leaves, roots and cons). People sold local fruits that includes apple, apricot, wild berries, pears and walnuts etc.

Chapter No. 6

Conclusion and Policy Recommendations

6.1 Conclusion

Over the time concept of eco-friendly tourism has been developed and people usually visit those area where the variety of biodiversity of plants, mammals, reptiles and birds exist.

The responses showed that tourists came to Galiyat because of its biodiversity. The scale of attraction for the biodiversity showed the result about 54% responses received as a first category of attraction toward the floral biodiversity (trees and plants), even at the second ranks it stood at 33% of attraction. While the regression results showed that the biodiversity of tree and plants is positively related to the tourism (number of days stay) at Galiyat as one unit increase in the plants and trees will lead to increase 0.438 days. The family size and distance are negatively related to with tourism means that the number of days stay will declined 0.902% and 0.154% respectively.

The tourism industry also depend upon the developmental condition and accessibility to the tourists spots. In this study accessibility and infrastructural condition has asked to the tourists in terms of road, park, public toilets, and track/trial conditions. Where the responses showed the infrastructural condition of Galiyat is very good except of public toilets. The responses received as satisfied as 45%, 47%, 14%, 53% and 27% for road, park, public toilet, beautification, and track respectively. Where the infrastructural quality is positively linked with the biodiversity loss in the regression analysis. The number of days stay increased by 0.077 days, if a good infrastructural quality is provided. The result showed

that if the biodiversity loss takes place at Galiyat then number of days stay will decrease by 0.28% days of stay. This finding guide us, the relationship between the biodiversity loss and tourism and satisfy the objective of the study. This will lead us to recommend the authority to conserve and protect the biodiversity on the emergency basis.

The result showed, the tourist's WTP for the conservation as income and education is positively sloped with the willingness to pay for conservation. As income and education increase the WTP increased by 7.91% Rupees and 0.024% will likely to increase. The number of days stay is negatively linked with the WTP for conservation. The result showed that the WTP will likely to decrease by 0.084 if the stay increased by one day. Interestingly, as biodiversity loss increased the chances of willing to pay will likely to increase by 0.126%. The probability of WTP will likely to decreases by 0.057% with the poor infrastructural.

It is also confirmed from both regression analysis of number of days stay and biodiversity loss, in the regression analysis of tourism showed the negative effect with the loss of biodiversity while in the biodiversity loss model, estimated stay is negatively linked with its dependent variable (biodiversity loss, '0' or '1'). The estimations showed if probability of biodiversity loss will likely to increase by 0.45%, the WTP for conservation will also increase. It also creates an opportunity for entrepreneurs to invest in the biodiversity because the tourists are willing to pay for conservation to reduce the biodiversity loss.

The estimation showed the recreational value of biodiversity of Galiyat is PKR 86.094108 million. By imposing additional entry fee, more revenue can be generated for the different services at Galiyat (Dongagali Pipeline track, Mushkpuri track, Lalazar track and zoo.

Many tourists said they are willing to contribute for conservation of biodiversity not financially but physical efforts. The local people deeply associated with biodiversity for their earnings, they used different type of biodiversity to exchange it with tourist. Seasonally their biodiversity changes according to the availability.

5.2 Policy Recommendations:

It is our responsibility to protect the biodiversity because the all species have right to live and have value, we must understand their importance to human (Alonso et al, 2001). Recognising opportunity cost of biodiversity loss and biodiversity conservation an important step for the tourism. Tourists are responsible for the damages they done to a site, it is need to address, what they left behind after their visit. To meet the desired results, the following recommendations should be considered as a tool to sustain to the pressure of tourists:

- 1 Raising the awareness among the tourists that biodiversity has an economic social and environmental value as defined by TEEB and making sure its value as high as other issues (e.g., climate change, GHG and other economic issues) (Slingenberg, et al., 2009).
- 2 It is a need of time to establish a visitor management cell (deals with the direct negative and human induced impacts) specifically to the targeted tourist's areas. Which could enable to "principle of the polluter pay and sharing responsibilities" to reduce these impacts in order to conserve the biodiversity (UNESCO¹⁰; Slingenberg, et al., 2009).

¹⁰ United Nation Educational Scientific and Cultural Organization's (UNESCO)

- 3 According to the results of the regression, there is positive relationship between the tourism (stay) and trees/plants. The tourists came to Galiyat because they were attracted by the variety of tree and plants, so it is recommended to the Forest Department, Wildlife Authority and GDA:
 - a. To establish a small setup of nurseries in the different spots. Distribute the sapling of plants among the tourist to plant them in the different spots of Galiyat while their stay.
 - b. They should bring the entrepreneurs to invest in biodiversity conservation. The tourist are WTP for the conservation and it will be an eco-friendly and memorable activity. Or
 - c. They should engaged the local vendor in sale of saplings to the tourist. This involve the local people into another business activity.
- 4 Government should give an opportunity to the local people to remove the fallen trees from tracks and engaged them to convert these into valuable furniture and other material (fuel wood).

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Appendix-I

Nexus between Tourism and Biodiversity Conservation:

A Case Study of Galiyat, Khyber Pakhtunkhwa

Dear Respondent,

I am preparing this thesis as a partial fulfilment of MPhil Degree requirements at Department of the Environmental Economics, Pakistan Institute of Development Economics, Islamabad.

You are requested to respond the following questions. The purpose of this questionnaire to study the people's perception/attitude towards **Nexus between Tourism and Biodiversity Conservation**. The identity of the respondent will be kept strictly confidential.

I will be grateful for you cooperation

Principal Investigator: Ghulam Nabi (+92-345-5886691)

Research Supervisor: Dr. Rehana Siddiqui (+92-51-9248026)

Questionnaire Code	<input type="text"/>	← To be given by research coordinator
Name of Spot	<input type="text"/>	← To be given by research coordinator
Enumerator Name	<input type="text"/>	← To be provided by Enumerator
Date	<input type="text"/>	← To be provided by Enumerator

Section-I
Personal Information

Name	Age	Gender	Job Nature	Job Specification	Working Hours	Income Per Month	Education Years
		1= Male 0= Female	1= Public Sector 2= Private Sector 3= Other_____		Daily hours <input style="width: 50px; height: 20px;" type="text"/>	PKR <input style="width: 50px; height: 20px;" type="text"/>	Completed <input style="width: 50px; height: 20px;" type="text"/>

Contact No or E-mail: _____.

Section-II
Tour Information

1 Please answer the following:

S.No	Questions		Answer
1	Where did you come from?	City	
2	For how long you have been in Galiyat?	Days	
3	Number of visits in Galiyat (in a year)?	Number	
4	How many years you are coming to Galiyat?	Years	

2 Please mark the overall condition of Galiyat?

S.No	Particulars	1	2	3	4	5
1	Roads Condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Parks Condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Public Toilets Condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Beautification of Galiyat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Tracks/Trails Condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Specify if other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ranks: 1 = Very Good, 2 = Good, 3 = Don't Know, 4th = Bad, 5= Very Bad

3 Are you traveling?

Alone. With Spouse. With Friends. With

Family.

4 How many persons in the family/group? _____.

1	Number of Children below 18 year	
2	Number of Male	
3	Number of Females	

5 Please rank the Biodiversity that attract you to visit Galiyat?

S.No	Particulars	1	2	3	4	5
1	Watch the Variety of Plants & Trees (Biodiversity among Flora).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Watch Variety of Birds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Watch the Variety of Animals (Biodiversity of Fauna)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Specify if other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Ranks: 1 = 1st Position, 2 = 2nd Position, 3 = 3rd Position, 4th = Position, 5th = Position

(Note: Please do not select the same rank for other biodiversity)

6 Do you think the biodiversity decreased overtime?

<input type="checkbox"/> Yes.	<input type="checkbox"/> No.
-------------------------------	------------------------------

(Note: The term biodiversity is collectively considered as their perception regarding the trees, animals, birds)

7 If yes, please answer the following options:

S.No	Particular	Yes	No
1	Trees/Plants	<input type="checkbox"/>	<input type="checkbox"/>
2	Animals	<input type="checkbox"/>	<input type="checkbox"/>
3	Birds	<input type="checkbox"/>	<input type="checkbox"/>
4	Butterflies	<input type="checkbox"/>	<input type="checkbox"/>

8 If you think biodiversity decreased overtime than identify the factors along with their options

S.No	Particulars	1	2	3	4	5
1	Deforestation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Decreased Precipitation (Rain/Snow)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Increased Temperature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Tourism Development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6	Congestion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Any other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Any other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note: 1: Strongly Agree, 2: Agree, 3: Neutral, 4: Disagree, 5: Strongly Disagree

- 9 What measures / actions are required to control such environmental degradation?

Comments:

Section III

Travel Cost (Round Trip)

1. Please identify your mode of transport, distance and expenditure:

Option	Transportation Mode	Distance (km)	Cost PKR.	Time (hrs)
<input type="checkbox"/>	Personal Transport			
<input type="checkbox"/>	Private Transport			
<input type="checkbox"/>	Public Transport			

(Note: You may select more than one option)

2. What kind of services you enjoyed in Galiyat during your stay?
Please enlist the services along with expenditure?

S. No	Eco-Service	Entry fee	Other cost
--------------	--------------------	------------------	-------------------

		PKR	PKR
1	Mushkpuri Hiking Trek		
2	Dongagali Trail		
3	Lalazar Hiking Trek		
4	Chairlift		
5	Any other		

10 Where are you staying/mode of accommodation?

Option	Accommodation Mode	Number of Room	Average Per Night Stay Cost
<input type="checkbox"/>	Hotel		
<input type="checkbox"/>	Guest House		
<input type="checkbox"/>	Flats		
<input type="checkbox"/>	Relatives		
<input type="checkbox"/>	Personal Accommodation		
<input type="checkbox"/>	Camping		

(Note: Please select only one option)

Section IV

Willingness to Pay

This section of questionnaire is about the willingness to pay for the conservation of Biodiversity. Different question about your behavior and attitude about the environment where you visit.

Question Regarding Biodiversity

1 If government want the tourist to participate in conservation of biodiversity than will you be willing to pay?

<input type="checkbox"/> Yes.	<input type="checkbox"/> No.
-------------------------------	------------------------------

2 If yes, what is your maximum willingness to pay for a single trip? PKR.

_____.

Please also answer

S. No	WILLINGNESS TO PAY	Yes	No
1	Would you be willing to pay PKR. 30?		
	i. If yes, would you be willing to pay PKR. 35?		
	ii. If no, would you be willing to pay PKR. 25?		

(Note: Option for 50 Respondents only)

S. No	WILLINGNESS TO PAY	Yes	No
2	Would you be willing to pay PKR? 40?		
	i. If yes, would you be willing to pay PKR. 45?		
	ii. If no, would you be willing to pay PKR. 35?		

(Note: Option for 50 Respondents only)

S. No	WILLINGNESS TO PAY	Yes	No
3	Would you be willing to pay PKR. 50?		
	i. If yes, would you be willing to pay PKR. 55?		
	ii. If no, would you be willing to pay PKR. 45?		

(Note: Option for 50 Respondents only)

S. No	WILLINGNESS TO PAY	Yes	No
4	Would you be willing to pay PKR. 60?		
	i. If yes, would you be willing to pay PKR. 65?		
	ii. If no, would you be willing to pay PKR. 55?		

(Note: Option for 50 Respondents only)

4 Please Comment why are you willing to pay for Biodiversity Conservation?

Comments:

5 If no, why you are not willing to pay for Biodiversity Conservation?

Comments:

6 What improvements would motivate you to visit again?

Comments:

Appendix-II

Status of Fauna in Galiyat:

S.No	Particulars	Status	Source ¹¹	Status in Murree/Galiat
1	Leopard	VL	IUCN Redlist, 2016	Endangered: WWF Pakistan ¹²
2	Barking Deer	LC	IUCN Redlist, 2016	Vulnerable: Wildlife of Pakistan
3	Giant Red Flying Squirrel	LC	IUCN Redlist, 2016	Common: Wildlife of Pakistan
4	Small Kashmir Flying Squirrel	LC	IUCN Redlist, 2016	Endangered: WWF Pakistan
5	Rhesus monkey	LC	IUCN Redlist, 2016	Common: Wildlife of Pakistan
6	Asiatic Jackal	LC	IUCN Redlist, 2008	Common: Wildlife of Pakistan
7	Wild Boar	LC	IUCN Redlist, 2008	Common: Wildlife of Pakistan
8	Murree Vole	LC	IUCN Redlist, 2008	Endangered: Conservator office
9	Indian Crested Porcupine	LC	IUCN Redlist, 2016	Common: Final Report, 2007
10	Indian Hare	LC	IUCN Redlist, 2008	
11	Black Partridge	VL	IUCN Redlist, 2008	
12	Grey Partridge	LC	IUCN Redlist, 2016	
13	Indian Sparrow hawk	LC	IUCN Redlist, 2016	
14	Plum Headed Parakeet	LC	IUCN Redlist, 2016	
16	Koklass Pleasant (Saikh)	LC	IUCN Redlist, 2016	
17	Kalij Pleasant (Jangli Murgi)	LC	IUCN Redlist, 2016	

VL: Vulnerable, LC: Least Concern

¹¹ IUCN: International Union for Nature Conservation.

¹² WWF: World Wildlife Fund.

Appendix-III

Status of Flora in Galiyat:

S.No	Particulars	Status	Source	Status in Murree/ Galliat
1	Diopyros lotus	LC	IUCN Redlist, 2007	
2	Alanthus	ED	IUCN Redlist, 1998	
3	Indian horse-chestnut (bankhor)	VL	IUCN Redlist, 2013	
4	<i>Pyrus pashia (bhatangi)</i>	-	-	Common: NCBI ¹³
5	Myrsine affrican (bebarang)	-	-	Common: FoP ¹⁴
6	Justicia adhatoda	-	-	Common: FoP
7	Blue Pine	LC	IUCN Redlist, 2013	
8	Cedrus Deodara	LC	IUCN Redlist, 2013	
9	Silver Fir			Common: PFD ¹⁵
10	Eucalyptus	ED	IUCN Redlist, 1998	
11	Granda	ED	IUCN Redlist, 1998	Endangered: FoP ¹⁶
12	Kanair	LC	IUNC Redlist, 2013	Common: FoP
13	Kangar	VL	IUCN Redlist, 2016	Vulnerable: FoP
14	Kau	--	--	Common: FoP
15	Phulai	-	-	Common: ICARDA ¹⁷
16	Populus	LC	IUCN Redlist, 2007	Common: FoP
17	Dhrekr	-	-	Common: FoP
18	Chir Pine	LC	IUCN Redlist, 2013	Common: FoP

¹³ NCBI: National Centre for Biotechnology Information.
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4364991/>

¹⁴ FoP: Flora of Pakistan.

¹⁵ FRD: Punjab Forest Department.

¹⁶ FoP: Flora of Pakistan

¹⁷ ICARDA: International Centre for Research in Dry Area.

19	Rein/Barungi			Common: FoP
20	Rubina	VL	IUCN Redlist, 2013	
21	Crataegus	LC	IUCN Redlist, 2007	Rare in Murree
22	Sanatha	-	-	Vulnerable: FoP
23	Shamshad	-	-	Common: FoP
24	Wiilow	LC	IUCN Redlist, 2013	Common: FoP
25	Sheesham/Tali	-	--	Vulnerable: FoP

LC: Least Concern, ED: Endangered, VL: Vulnerable

Appendix IV

Estimation

Attitude Variables

1 Biodiversity Rank

	Plants	Birds	Mammals
First Rank	54%	18%	22%
Second Rank	32.50%	23%	28%
Third Rank	10.50%	39%	33%
Fourth Rank	3%	22%	17%
Average	1.365	2.64	2.456
t-test	28.3524***	37.0496***	33.3253***
Degree of Freedom	199	199	199

2 Likert Scale Variables about the infrastructure Conditions

	Road Access	Park	Public Toilet	Overall Beautification	Tracks
Very Good	45%	16.50%	2.50%	53%	24%
Good	50%	47%	14%	22%	27%
Neutral	2%	27%	58%	13%	39%
Bad	2%	10%	12%	6%	9%
Very Bad	2%	1%	15%	7%	3%
Mean value	4.355	3.685	2.78	4.09	3.6
t-test	83.6817***	59.0196***	41.7672***	47.5566***	50.0392***
Degree of Freedom	199	199	199	199	199

3 Factor that Contribute to the Biodiversity Loss:

	Deforestation	Rain Fall	Temprature	Tourism	Congestion	Pollution
Strongly Agree	33.59%	19.08%	0%	20.61%	18.32%	28.24%
Agree	42.75%	45.04%	23.66%	29.77%	22.90%	32.82%
Somehow Agree	17.56%	34.35%	38.93%	38.17%	41.22%	33.59%
Disagree	3.05%	0.76%	34.35%	4.58%	12.21%	4.58%
Strongly Agree	3.05%	0.76%	3.05%	6.87%	5.34%	0.76%
Average	4.004634	3.80916	3.832061	3.526718	3.366412	3.832061
t-test	47.9442***	56.221***	53.2165***	37.2495***	35.5848***	47.6147
Degree of freedom	130	130	130	130	130	130

Determinants for Willingness to Pay

Model 4:

Linear regression		Number of obs		200		
Robust		F(12, 187) =		1.52		
		Prob > F =		0.1214		
		R-squared =		0.1273		
		Root MSE =		798.33		
Willingness to Pay	Coefficients	Std. Err.	t	P>t	[95% Confidence Interval]	
Income	-.001259	.0004969	-2.53	0.012	-.0022392	-.0002788
Education	7.074598	15.16656	0.47	0.641	-22.84494	36.99414
Age	-.5847797	6.617582	-0.09	0.930	-13.63949	12.46993
Stay	-42.8586	22.63322	-1.89	0.060	-87.50785	1.790653
Number of Visits	-17.90141	9.980178	-1.79	0.074	-37.58962	1.786796
Family Size	39.75565	25.58175	1.55	0.122	-10.71026	90.22155
Kilometers	-.3808915	.1673246	-2.28	0.024	-.7109779	-.0508051
Individual Travel Cost	.1026113	.0616399	1.66	0.098	-.0189877	.2242102
Plants and Trees	373.5674	244.4763	1.53	0.128	-108.7185	855.8533
Mammals	-123.1895	280.84	-0.44	0.661	-677.2112	430.8322
Birds	111.1235	302.5286	0.37	0.714	-485.684	707.931
Biodiversity Loss	256.5201	101.3256	2.53	0.012	56.63198	456.4082
_cons	-344.1234	462.7099	-0.74	0.458	-1256.926	568.6788