



Original article

# The impact of tourism on local communities and their environment in Gilgit Baltistan, Pakistan: a local community perspective

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## ABSTRACT

The northern area of Pakistan, Gilgit Baltistan (GB), has huge tourist potential due to its exotic mountain beauty. According to the GB Tourism Department, a large number of tourists (around 200651) visit GB every year from across the country. Due to a large influx of tourists in the area both positive and negative impacts have been felt especially on the environment and on the local communities. The environmental impacts of tourism were investigated in this research in two districts of GB. Three villages were selected from each of the districts of Hunza and Diamer as the basis of this research. This study was based on the perceptions and attitudes of the respondents. The total number of questionnaires completed was 340 filled from different respondent categories. Results showed that deforestation, loss of biodiversity, generation of solid waste, water, air and noise pollution, damage cultural and heritage sites and are the main environmental issues caused by tourism activities in the villages in these districts. About 42% of respondents said that deforestation and loss of biodiversity were high in the Diamer district while in Hunza 39% of respondents said that solid waste generation was high. Similarly, 21% respondents in Hunza and 14% respondents in Diamer agreed that water pollution is caused by tourism activities. Microbial analysis of water confirmed the presence of *Salmonella typhi*, *E. coli* and *Enterobacter* sp. There were positive impacts of tourism with results revealing that 87% of villagers and 98% of businessmen responded that tourism had provided them with jobs and business during the peak tourism season. Hotels and restaurants are the main source of jobs in GB mainly as porters and guides. According to the data collected dry fruits, medicinal herbs, gemstones and handicrafts provided considerable attractions for tourists. It is recommended that a combined effort be made by the local communities, tourism departments and other Govt. Agencies to ensure the cleanliness of tourist attractions.

KEY WORDS: tourism; water pollution; air and noise pollution; health, solid waste generation; cultural and heritage damage

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## 1. Introduction

Tourism has become an important business sector and has a positive impact on the economic development of any country. The phrase “impact of tourism” has been used and discussed in the literature related to tourism. Researchers have

evaluated and assessed these impacts by doing field surveys and collecting data from local residents. During the last few years, a large number of studies have been conducted to evaluate and examine the perception of local communities towards the impacts of tourism in their area (ALMEIDA-GARCÍA ET AL., 2016). Researchers and stakeholders associated

with tourism have shown a keen interest in studying the impacts of tourism after knowing that development in the tourism sector has both positive and negative impacts and effects at the local level (KO & STEWART, 2002; NUNKOO & RAMKISSOON, 2011).

Researchers and professionals who are associated with tourism have recognized both the favorable and negative aspects of tourism affecting local communities and their environment (BUCKLEY, 2012). During the last few decades, the tourism sector has grown and diversified, making it a vital element of socio-economic development worldwide. CROTTI & MISRAHI (2017) in a conference titled “World Economic Forum” organized in Geneva, Switzerland, suggested that the tourism sector is expanding and is considered to be one of the world’s largest industries contributing 10 percent of the world’s Gross Domestic Product (GDP).

### 1.1. Background

The impacts of tourism can be broadly categorized into economic, socio-cultural and environmental (ALMEIDA-GARCÍA ET AL., 2016). The

attitudes and perceptions of the local population in relation to the impacts of tourism activities and development have been studied and investigated by various researchers around the world (Table 1). Variables which are related to these impacts were discussed by scientists, providing information about the relationships of these variables and the impacts of tourism.

In general, the economic impact comprises financial streams connected directly and indirectly with tourism activities. Socio-cultural impacts cover the fluctuations in societal, cultural, traditional and inflexible standards and are connected with emotional variations within a society indirectly. Environmental impacts comprise the devastation of natural and man-made settings (SHUJAH & HUSSAIN, 2016). Tourism is known for its major contribution to the economic development of a country, however, a study revealed that the positive and negative impacts of tourism depend upon the attitudes and perceptions of the local residents in each community (HARRILL & POTTS, 2003). Apart from economic growth, which is generally accepted as positive, environmental, legal and socio-cultural impacts are perceived as negative (TOSUN, 2002).

Table 1. Worldwide studies on the impacts of tourism by various researchers

Impacts	Countries/Regions	Tourism studied
Environmental	Arizona State (US)	Andereck & Nyaupane, 2011
	Benalmádena (Spain)	Almeida-García et al., 2016 and 2015
	Malaysia, Singapore and Thailand	Azam et al., 2018
	Northern Areas (Pakistan)	Hussain et al., 2019
	Cheju Island (Korea)	Ko & Stewart, 2002
	Pyeongchang (Korea)	Lee, 2019
	Taiwan	Lee & Hsieh, 2016
	Belize (Central America)	Wells et al., 2016
	China	Zhong et al., 2011
Economic	Asia, Latin America and Sub-Sahara Africa	Lee & Chang, 2008
	Spain	Garau et al., 2018
	Pakistan	Hussain et al., 2018
	Australia	Nunkoo & Ramkissoon, 2011
	Malaysia	Tang et al., 2015
	North-Eastern Morocco	Tekken & Kropp, 2015
Socio-cultural	China	Piuchan et al., 2018; Lin et al., 2017
	Turkey	Ekinci, 2014; Yolal et al., 2016
	Greece	Trivellas et al., 2016
	Northern Areas (Pakistan)	Hussain et al., 2018 and 2019, Karim et al., 2013

## 1.2. Economic impacts of tourism

On the positive side, tourism is an important source of welfare in terms of being a good source of income and employment for local people (ANDERECK & NYAUPANE, 2011). (LEE & CHANG, 2008) have discussed the role of tourism in the reduction of poverty and increasing economic growth. From this we can understand the role tourism can play in the economic growth of a country. Moreover, tourism is also the source of foreign exchange income for developing countries where it contributes to the alleviation of poverty with major fiscal activities.

## 1.3. Socio-cultural impacts of tourism

With the development of the tourism sector, local customs, socio-cultural characteristics, social life and religious beliefs of local residents living in a community have been affected. GARAU-VADELL ET AL., (2018) suggest that wherever there is mass tourism, local ceremonies, entertainment activities, accommodation and food, etc., lose their originality and this transformed culture prevails everywhere to engage and amuse the mass tourist.

Some of the adverse impacts of tourism have been identified and discussed by various researchers all around the world. For example, tourism destinations have the potential to become overcrowded, making traffic worse and creating parking problems (ALMEIDA-GARCÍA ET AL., 2016; LINDBERG & JOHNSON, 1997), which ultimately cause problems for local people. As tourism creates jobs for local residents, it can also cause some major problems related to drugs and increased consumption of alcohol (DIEDRICH & GARCÍA-BUADES, 2009).

## 1.4. Environmental impacts of tourism

Tourism activities can pose direct impacts on air, soil, water and the biota of local environments, while indirectly its impacts are associated with manufacturing, production and transportation of materials (AALL ET AL., 2011; CHARARA ET AL., 2011). Natural areas including parks and protected lands may be affected directly with the introduction of waste and pollution or indirectly by disturbing wildlife (BUCKLEY, 2011). Furthermore, the addition of solid waste and increased pollution is associated with development in the tourism sector (ANDERECK ET AL., 2005), causing serious damage to the local environment. When tourism in any area starts to bloom, local residents start to construct buildings without proper planning permission which can

cause huge damage to the natural environment and depletion of natural resources like wood, water and soil. Such changes in the environment pose effects on both local ecology and human livelihoods (ALSHUWAIKHAT, 2005).

Natural resources are used by visitors, local residents and government bodies. When these resources are used for the development of tourism, the pressure on these resources is increased causing them to deplete. It is certain that tourism is one of the major causes of pollution and the production of carbon dioxide. For example, European Union (EU) data tells us that tourism is one of the first causes of carbon dioxide production in Europe, and that over 20% of polluting emissions are associated with accommodation (hotels, guest houses etc.) (SOFRONOV, 2017). Moreover, a study conducted in 2001 revealed that during a single transatlantic return flight the amount of carbon monoxide emission is equal to half of the CO emissions produced from different activities and sources consumed by a person in one year. These activities are the usage of cars, lighting and heating, etc. (SUNLU, 2003). Besides air pollution, the tourism sector also contributes to the degradation of terrestrial land. Tourism has consumed approximately 0.34% of the world's land with an approximate consumption of 14,000 PJ.a<sup>-1</sup> of the world's total energy during the year 2001 (GÖSSLING, 2002).

## 1.5. Sustainability in eco-tourism

The adverse impacts of tourism in any area occur when the number of tourists, or visitors, cross the threshold of the environment's ability to carry on its activities. The majority of the world's countries are considering tourism as an emerging sector for revenue generation and development in the social sector. However, they are paying less attention to environmental concerns and issues (MOTTALEB, 2007) without which achieving the Sustainable Development Goals (SDGs) become difficult.

Ecotourism is a type of tourism which reduces the negative effects, protects the ecological resources, guides monetary advantages to the community, and further gives chances to local residents to enjoy natural areas (CHIUTSI ET AL., 2011; FENNELL, 2001). Ecotourism is thought to have low impacts with restricted biological and social effects when contrasted with ordinary tourism. Ecotourism constrains the number of visitors who visit a destination, as there is adherence to the physical capacity which limits the visitors' natural resource base (CHIUTSI ET AL., 2011).

The definition of ecotourism suggests that environmental and cultural tourism can also be involved, by providing benefits to the local population which is one of the vital part of this activity. The attitudes and concerns of the local people towards the sustainable development of the tourism sector is vital for the policy makers. The local people, or the community, is the most important stakeholder, as it is the one which will be affected either in a positive way, or in a negative way due to unstable tourism development in the area (ESHLEKI & KABOUDI, 2012). Every community has its own concerns about tourism, as well the impacts associated with the tourists who bring different norms and values with them. The attitude and perception of the local community will define how the local residents accept and absorb these changes into their social system (MANSFELD, 1992). With the help of the local community, the living conditions of residents and the conservation of natural resources can be achieved by implementing different interventions, which will help to achieve the sustainable development goals in effective way.

According to ASHLEY & MITCHELL (2009) tourism activities are responsible for the transfer of money to poor countries from rich nations making positive impacts on the socio-economic status and environment of the communities living in such areas. After such huge progress and socio-economic development in developing countries, there is an urgent need for working plans for the management of tourists, which enhance the positive impacts and reduce the worst impacts on biodiversity.

#### 1.6. Tourism in Pakistan

Tourists travel to different places for business, recreation and adventure purposes. Some of the tourists visit areas with unique cultures, norms and traditions, to see their art, historical buildings, mountains, lakes, hear the language and experience the weather and local food. Surprisingly, Pakistan is one of the countries where all the features, fascinating landscapes and natural scenarios are present. It has tremendous assets for tourism due to its long rich archaeological history, diverse culture, beaches, deserts, charming scenery, glaciers and mountain ranges providing lots of attractions for international and domestic tourists. According to ARSHAD ET AL., (2018) tourism in Pakistan can be categorized into four different types namely: religious tourism, archaeological and historical tourism, ecotourism, and adventure tourism.

The Travel and Tourism Competitiveness Index (TTCI) publish an index report of countries having

potential for tourism. According to the TTCI report published in 2017, Pakistan ranked 124 out of 136 countries (CROTTI & MISRAHI, 2017). The contribution of tourism and travel in Pakistan's economy for the year 2016 was USD 7.6 bn (2.7% of GDP) (WTTTC, 2017) and the government of Pakistan is hoping to increase the share of tourism in its country's GDP. In Pakistan, the tourism industry has come into focus after recognizing the economic importance of tourism as a source of employment opportunities. Now in Pakistan PTDC is the tourism development body which works under the Ministry of Tourism but this business is weakening in most areas due to a lack of facilities and infrastructure, and the adverse law and order situation (ZAMAN, 2011). Besides economic growth, less attention has been given to the environment which is an essential element of sustainability.

#### 1.7. Inflow of tourist to G.B.

The number of tourists who visisted Gilgit-Baltistan in 2015 was approximaltely 204733 as reported by the Gilgit-Baltistan Tourism Department. Table 2 shows the basic information about the foreign and domestic tourist arrivals in Gilgit-Baltistan during 9 years (2007-2015). In terms of numbers, the year 2007 witnessed the highest number of foreign tourists, while this number decreased to 2014 where it had the minimum number of foreign visitors. The decreased number of international tourists was attributed to the War on Terror, security issues and terrorism events in the country. Due to poor security issues in the country the tourism industry has also been irreparably damaged. Such uncertain situations in Pakistan has prevented the majority of tourists from visiting northern-areas especially Gilgit-Baltistan.

For domestic tourists the data shows an increasing trend from 2007 to 2011 with a slight change in 2010 and a major shift in 2012. The year 2012 marked the minimum while 2015 marked the maximum number of tourists visiting GB. The year 2015 had the highest number of domestic visitors which shows a great change in people's perceptions about security. One of the reasons for such increased numbers of domestic visitors was the use of social media and electronic media. People have shared hundreds of scenic pictures on social media platforms and a large number of news reports were also published from media houses which helped in the promotion of domestic tourism.

According to a statistical report by Pakistan Association of Tourism, before the terrorist attacks



on the US in September 2001, more than 20,000 foreign tourists visited Gilgit-Baltistan each year. The number of visitors decreased more than fivefold in 2002 following the 9/11 terrorist attack event in USA.

Table 2. Number of foreign and domestic tourists arrivals in Gilgit-Baltistan (2007-2015) (Source: G.B Tourism Department)

Year	Total No of tourists	Foreign tourists		Domestic tourists	
		Total No	%	Total No	%
2007	34 108	10 338	30.31	23 770	69.69
2008	62 544	8 504	13.60	54 040	86.40
2009	62 341	7 739	12.42	54 602	87.58
2010	53 028	7 728	14.58	45 300	85.42
2011	66 475	5 242	7.89	61 233	92.11
2012	33 217	4 324	13.00	28 893	87.00
2013	56 415	4 501	8.00	51 914	92.00
2014	53 746	3 442	6.40	50 304	93.60
2015	204 733	4 082	2.0	200 651	98.00

## 1.8. Description of Gilgit-Baltistan

Gilgit Baltistan (GB) lies in the north of Pakistan, It provides tourism opportunities for domestic and foreigner tourists. GB is famous for adventure tourism because of its high mountain peaks like K2 (8611 m) and some of the longest glaciers in the world. In Gilgit-Baltistan, forests are located between 750 to 3,900 m elevation and are comprised mainly of Conifers. Due to the specific precipitation and humidity, four different groups of forests are found in GB namely: sub-tropical forests (*Pistacia Mutica*, *Pistacia Khinjuk*, *Olea europaea* subsp. *cuspidata* (wild olive), *Dodonnaca Viscose*), temperate forests (*Cedrus deodora*, *Pilea* and *Morida*, *Pinus gerardiana*, *Abies pindrow* and *Juniper macropoda*), and sub-alpine forest (*A. Pindrow*, *A. Spectabilis*, *P. wallichiana*, *Betula utilis*, *Salix* and dwarf Junipers). Apart from forests, GB is blessed with diverse wildlife. Notable wildlife species in GB are black and brown Himalayan bears, snow leopard, Marco Polo sheep, ibex, markhor, blue sheep, urial, lynx, eagle, Chikor, falcon and vulture. There are, four national parks, three wildlife sanctuaries, nine game reserves, and 200+ bird species, 20 species of freshwater fish, 50 species of mammals, 20+ reptile species and 6 species of amphibians.

In GB, its cultural tourism and beautiful scenery are very famous. It is home to various cultural, linguistic and ethnic groups. Its cultural, physical environment and landscape are reasons for attracting tourists from inside and outside the

country. Hiking, climbing, paragliding and camping are adventurous activities for tourists.

Tourism plays a key role in producing income in the Gilgit Baltistan region of Pakistan. However, the increased economic activities from tourism have also increased the level of pollution, noise, congestion, and puts additional burdens on water and energy resources. Furthermore, mismanaged and unplanned tourism have certain effects on local communities and the ambient environment. Recent research on tourism in Gilgit-Baltistan have mainly focused on the potential for ecotourism, sustainable development, the role of social media for tourism development, perspectives of local people for assessing environmental impacts and constraints of international tourism (IMRAN ET AL., 2014; KARIM ET AL., 2013; NAEEM, 2016; NIGAR, 2017; RAHMAN ET AL., 2013). As far as we know, no previous researchers have conducted the same study on such a large area and population. The majority of researchers have only evaluated the socio-cultural, economic, or environmental impacts separately or have measured the general attitude of local respondents. Along with the perspectives of local people, we have incorporated the views and attitudes of tourists visiting Gilgit-Baltistan. This approach may help local government bodies to formulate a comprehensive tourism plan and to understand the relationship between local residents and visitors. In a nutshell, all the information can be used to improve the development of tourism, sustainability and hospitality in Gilgit-Baltistan.

Thus, our research attempts to identify the perspectives of local people and tourists about the impacts of tourism on the economy, socio-culture and the environment of two mountainous areas of Gilgit-Baltistan. The research also identifies the available knowledge of environmental pollution, ecotourism, the role of tourism in the economic growth and living standards of local respondents.

## 2. Methodology and data collection

### 2.1. Study area description

Gilgit-Baltistan (formerly Northern Areas) is an administrative unit with three divisions and 10 districts located in the extreme north of Pakistan (Fig. 1). It has a total area of 72,971 km<sup>2</sup> and covers a forest area of 1,582 km<sup>2</sup> extended within the high mountain ranges of the Himalayas, Hindu Kush, Karakorum and Pamir (ISMAIL ET AL., 2018).

To achieve our objective, we have selected two districts of Gilgit Baltistan, which are the Hunza

District and the Diamer District shown in Fig. 1. Moreover, it should be noted that no studies have yet explored the impact of tourism in the Diamer district of GB. By knowing the perspectives of the local residents of Diamer towards the effects of

tourism and its effects on their livelihoods it would allow us to comprehend the scenario of tourism development and its likely impacts in the study area. Three villages from each district were selected for survey, as listed in Table 3.

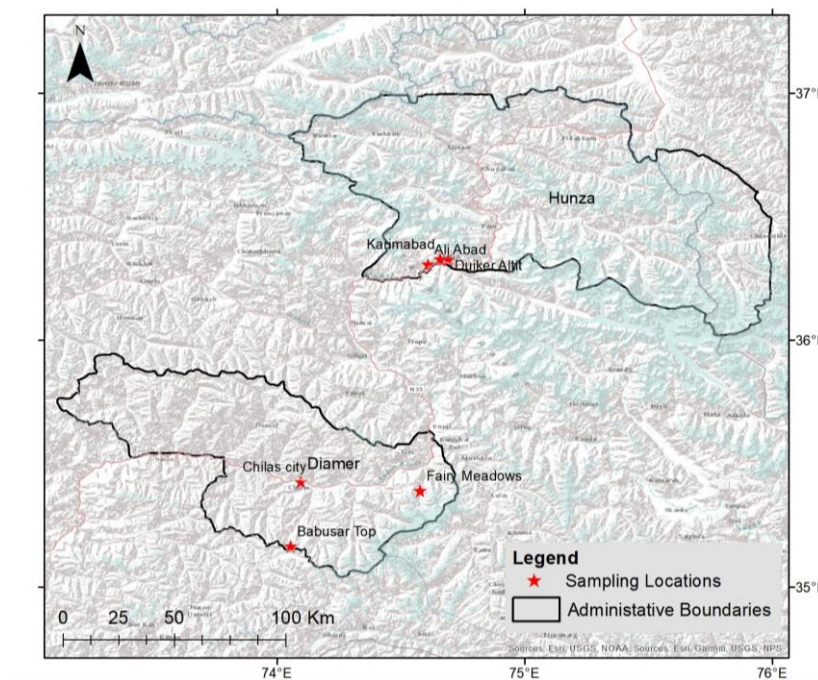


Fig. 1. Map of Gilgit-Baltistan

Table 3. Selected villages

S. No	Districts	Villages
1	Hunza	Aliabad
		Karimabad
		Duiker Altit
2	Diamer	Chilas City
		Fairy Meadows
		Babusar Top / Pass

During the field visit, questionnaires were filled from 220 respondents from 6 different locations (three from each district) of which 151 were male and 69 were female. The participants were selected using the simple random sampling technique. Questionnaires were distributed at markets, camps, lodges, hotels, and trekking routes where tourists spend their day. Before distributing the questionnaires, we have asked for respondents' consent to fill the questionnaires and briefed them about the study.

In order to measure the water quality of the study area, water samples from 5 different points in both districts were collected. Basic water quality parameters (pH, turbidity, electric conductivity, DO, and hardness) were tested and microbial contamination tests for *E.coli*, *Enterobacter*, and *Salmonella typhi* were performed to compare the

results with NEQS. The drinking water in the Hunza district comes from two sources, one is from Ultar glacier and the second is from a natural water spring near Hassanabad village. In the Diamer district the drinking water comes from water stream locally known as Butogah Nallah (stream).

Interviews and personal observations during the field survey helped us to collect information which cannot be collected from questionnaires. This approach helped us to make our research more reliable. Moreover, secondary data was collected from the tourist department of GB and reports published by the Gilgit-Baltistan Environmental Protection Agency (GB-EPA). Demographic features of respondents are given in Table 4.

Table 4. Demographic features of respondents

Variables	Number	Percentage (%)
Gender Ratio	–	–
Men	151	68.63
Women	59	31.37
Total	220	100.00
Age group		
Between 10–20 years	38	17.27
Between 20–40 years	91	41.36
Between 40–60 years	52	23.63
Above 60 years	39	17.72

## 2.2. Sampling instruments

Well-structured questionnaires (to be precise 8 different ones) were used as the data survey instrument. The questionnaires were designed for eight different target groups which were: local resident, visitor, local businessman, porters and guides, foreign tourist, hotel management, relevant government departments and tourism companies. In general, the questionnaires were designed with three parts. The first part was related to the demographic characteristics of the respondent, the second part inquired about the respondent's opinion and knowledge about the environment and ecotourism, and the last section was related to tourist behavior in the study area. The questionnaire was expressed by using the Liker scale: 5-strongly agree, 4-agree, 3-neither agree nor disagree, 2-disagree, and 1-strongly disagree. Apart from Liker scale, there were some Closed questions (Yes/No) which were also asked of respondents (JOSHI ET AL., 2015).

In addition to questionnaires, informal interviews and personal observations were also used as a tool for data verification. Informal meetings were held with native people, domestic tourists, representatives of tourist departments, and hotel management in the study area. Primary and secondary information concerning the study objectives were also collected during the interaction. It happened so many times during data collection that communities in the study area did not pick the text of the questions or they did not respond to the questions the way they should have been answered. In such a scenario personal observation of their routine daily business was used as a tool to rectify the collected data in its true context and spirit. Distribution of questionnaire among different respondents is given in Table 5.

Table 5. Distribution of number of questionnaires

Sr. No	Questionnaires divided	Numbers
1	Local Tourist (LT)	100
2	Foreign Tourist (FT)	20
3	Tourist Companies (TC)	15
4	Villagers (V)	100
5	Local Businessmen (LB)	40
6	Hotel Management (HM)	40
7	Concern Government Departments (CGD)	5
8	Potter and Guides (PG)	20

## 3. Results and discussion

### 3.1. Ecotourism awareness in respondents

Results from the field survey data collected from different respondents in Hunza and Diamer districts shows that 80% Concerned Government Departments (CGD), 45% Local Tourists (LT), 44% Local Businessmen (LB), 38% of Villagers (V), 35% Potter & Guides (PG), 27% (Hotel Management) HM, and 20% of Tourism Companies (TC) have knowledge of ecotourism (Fig. 2). It is very clear that government officials have more knowledge about ecotourism while very astonishingly tourist companies don't know about ecotourism. The reason behind the little knowledge about ecotourism is due to the fact that the majority of the owners of tourist companies don't have a professional tourism degree, and all the companies work within their districts. Furthermore, local tourists were also aware of ecotourism and during the interaction with them we came to know that majority of young respondents were aware of ecotourism and the consequences of tourism on the environment. Also, local villagers in both districts have very little knowledge of ecotourism, which may lead to the unintentional degradation of the environment and natural resources.

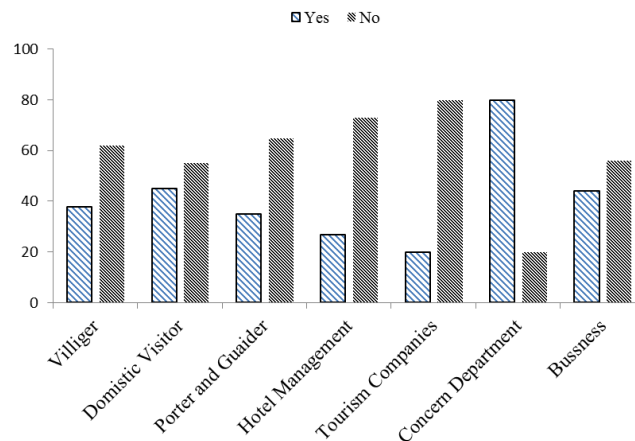


Fig. 2. The understanding of all stakeholders about ecotourism

### 3.2. Water, air and noise pollution impacts

Data collected from both districts revealed that approximately 85% of PG, 80% TC, 77% CGD, 71% of V, 70% LB, and 53% of HM believed that the water resources of the study area are being polluted due to tourist activities (Fig. 3). As the Potter & Guides and owner of tourism companies mostly interact and spent days with the tourists, helping them to understand the attitude of tourists towards the environment. During their interaction



with tourists they have seen how tourists discard their plastic bottles, wrappers and other packaging materials into water channels. Physicochemical test results of the water samples collected during the field visit are presented in Table 6, which shows that not all the collected samples met the NEQs parameter for hard water, while all other mentioned parameters were under the NEQs limits.

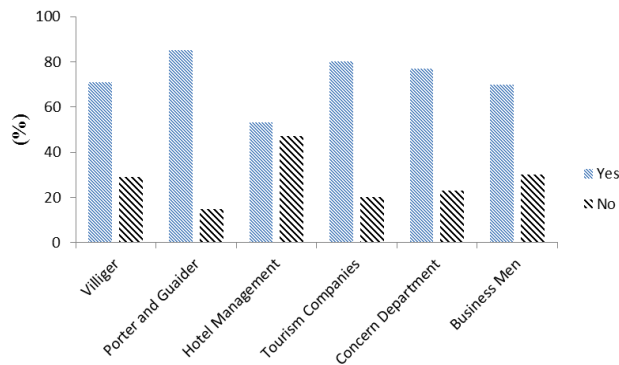


Fig. 3. Opinions about pollution of water resources due to tourist activities

Poor quality of drinking water can cause adverse effects on the health of people and health-related expenses (FORDE ET AL., 2019; KHAN ET AL., 2011). Among respondents drinking water quality was a serious issue. In urban areas of GB the water supply systems are based on the utilization of surface waters. According to the Health Department statistics showed that 25 % of overall deaths in GB are due to water-borne diseases (GB-EPA, 2012c). Poor people are susceptible to water-borne diseases such as typhoid, cholera, and hepatitis A. Notorious

diseases typhoid, malaria, hepatitis A and diarrhea were identified by the respondents. Surface water quality in GB urban areas is highly affected by the improper sewerage and drainage systems of the hotels. Microbial analysis of the water confirmed the presence of disease causing microbes and showed good agreement with respondent perceptions about the diseases and poor drinking water quality in Table 7. Microbial results showed the presence of *E.coli*, *Enterobacter* sp., and *Salmonella typhi* in drinking water samples. The water analysis also revealed the poor water quality of Hunza and Diamer which are two of the most visited places in GB. All the samples collected from different sources failed to meet the NEQs which is an alarming situation for both government agencies and local communities (FAROOQ ET AL., 2008). *Escherichia coli* is one of the most frequent causes of many common bacterial infections, including cholecystitis, bacteremia, cholangitis, Urinary Tract Infection (UTI), and traveller's diarrhea, and other clinical infections such as neonatal meningitis and pneumonia (FURYK ET AL., 2011).

Significant presence of microbes was investigated by GB-EPA during the microbial tests of drinking water sampled from the villages and towns of GB (Gilgit town: 8-30 *E.Coli*/100 mL, Skardu town: 2-6 *E.Coli*/100 mL, Chilas town: 1-10 *E.Coli*/100 mL, Khaplu town 2-22 *E.Coli*/100 mL, Astore 1-2 *E.Coli*/100 mL, Hunza/Aliabad 71-300 *E.Coli*/100 mL) (GB-EPA, 2012c). While NEQs limit is 0 *E.Coli*/100 mL in drinking water. These results also validate our findings presented in Table 7.

Table 6. Physicochemical test result

Parameters	Hunza			Chilas			NEQ Level
	Spring	Ultr Glacier	Villager House	Ranoi	Panorama	Fairy Medows	
pH	7.47	7.3	7.54	7.76	7.99	7.52	6.5–8.5
Turbidity	2.32	66.36	1.28	1.61	1.86	1.34	5 NTU
Electric Conductivity	3.12	138.5	122.4	108	109.23	3.44	0–800 $\mu$ S/cm
DO	5.8	5.99	5.84	5.72	5.66	5.93	–
Hardness	80.9	107.9	55.36	67.9	67.3	666.8	<60 mg/L

Table 7. Microbial test result

Microbial Contamination	Hunza			Chilas			NEQ Level
	Water Spring	Ultr Glacier	Villager House	Ranoi	Panorama	Fairy Medows	
<i>E.coli</i> (CFU/100ml)	13	6	18	12	12	16	0 <i>E. coli</i> /100ml
<i>Enterobacter</i> (CFU/100ml)	7	12	4	10	6	8	0 <i>Enterobacter</i> /100ml
<i>Salmonella Typhi</i> (CFU/100ml)	24	16	6	18	16	4	0 <i>Salmonella Typhi</i> /100ml



Generally, the water quality of the study area is very poor for consumption and can pose various diseases to local residents. However, it is very difficult to identify the sources of contamination of drinking water. It should be noted that no proper filters and piping systems are installed in the areas except for a few places. Open water channels all over Hunza and Diamer are the main source of contamination of pathogenic bacteria, because the excreta of cattle and other animals enters the water course and contaminates the drinking water.

Moreover, a report published by G.B-EPA in the year 2013 named the “outdoor air quality report” stated the presence of high concentrations of nitrogen oxides NO<sub>x</sub> and sulphur oxides SO<sub>x</sub>, carbon monoxide and particulate matter (PM<sub>10</sub>) measured in the air of both Hunza and Diamer districts as shown in Table 8 (GB-EPA, 2012a). The burning of waste in the open air, forest fires and heavy traffic are the main sources of these pollutants. According to the Space and Upper Atmosphere Research Commission (SUPARCO) and the International Union for Conservation of Nature (IUCN) the air quality in GB was relatively better than other cities like Lahore and Karachi. During questioning session with one of the G.B-EPA employee, he told us air pollution in GB is higher during the winter season because of the domestic burning of wood, old tyres, and coal for heating purposes. The topographic conditions of GB are comprised of gigantic mountains and narrow valleys that do not support discharge of the pollutants out of the valleys. Vehicle emissions remained in the air for a longer time and resulted in high concentrations of pollutants in the ambient air.

Table 8. Concentrations of air pollutants in major city/towns of study area (GB-EPA, 2012a)

Parameters	Hunza	Chilas	NEQs Level
Particulate Matters (PM <sub>10</sub> ) (µg/m <sup>3</sup> )	238.64	173.84	250
Carbon monoxide (mg/m <sup>3</sup> )	0.93	1.45	10
Nitrogen oxide (µg/m <sup>3</sup> )	1320	870	80
Sulfur dioxide (SO <sub>2</sub> ) (µg/m <sup>3</sup> )	–	–	80
Hydrocarbon (ppm)	< 5	< 5	
Noise pollution (dB)	62–90	60–88	80

Similarly, it is observed from the collected data that 85% of PG and TC, 84% LB, 81% of V and LGD, followed by HM who believed 72% of air pollution can be increased due to tourist’s

activities. Moreover, 86% of villagers agreed that traffic produces noise pollution while 14% disagreed about noise pollution due to traffic. Figure 4 shows the percentage of respondents who suffered from different health problems due to exposure to noise pollution. According to the data collected during the field survey, 58% of the respondents suffered from sleeping disturbance, 16% from tiredness, 12% from hearing impairment and 14% from mental disturbance. There is a relationship between exposure of noise and sleeping problems, even if the level of road traffic noise is lower (FYHRI & AASVANG, 2010). It is very noticeable that the majority of the respondents are facing sleeping problems, they told the researchers that during the summer season tourists drove their vehicles near residential areas and guest houses where the nearby roads are narrow, which leads to congestion of traffic. These blockages in traffic ultimately cause air and noise pollution leading to health and ultimately sleeping disturbance affects human health.

Traffic congestion is a condition characterized by slower speed, traffic jams, longer trip time, and increased vehicles (WANG ET AL., 2016). Results indicated tourist’s activities cause traffic congestion because of poor and narrow roads, which ultimately cause the disturbance in local community movement.

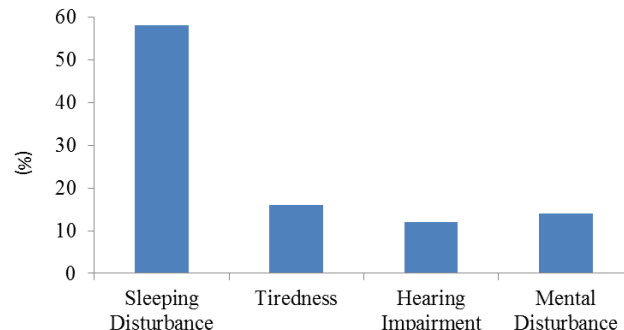


Fig. 4. Response of health effects caused by noise pollution

### 3.3. Environmental and health issues

Figure 5 shows the perceptions of villagers about environmental issues created by tourists in the districts of Diamer and Hunza. The results reveal that approximately half of the respondents (42%) in Diamer district believed that deforestation and destruction of biodiversity due to tourism is the major environmental issue in the area. After deforestation and biodiversity loss, a ¼ of local respondents (24%) believed that the generation of solid waste, followed by water, air and noise pollution which are 14% and 11%, respectively are caused by tourist activities. The other 9% indicated that tourism activities damage the culture and heritage of their local area.

It should be noted that due to the inflow of a large number of domestic visitors to GB, the local people are destroying the natural environment by constructing resorts and restaurants to facilitate the tourists and to generate income. During the field visit, we observed that the majority of hotels, restaurants and guest houses were constructed recently and had used local forest wood for construction. Diamer district is known for its forests and range land. Local people utilize the forest wood for construction, income generation, and as fuel throughout the year. With an increased number of tourists, the utilization of forest wood in Diamer has also increased making environmental conditions worse in terms of deforestation and biodiversity loss.

Figure 5 shows that 39% of respondents indicated that solid waste generation is the major environmental issue along with deforestation and destruction of biodiversity (12%), water (21%), air and noise pollution (14%), and 14% of respondents indicated that tourist activities have damaged the culture and heritage of their area. In Diamer deforestation and biodiversity loss is the major environmental issue while in Hunza it is the generation of solid waste.

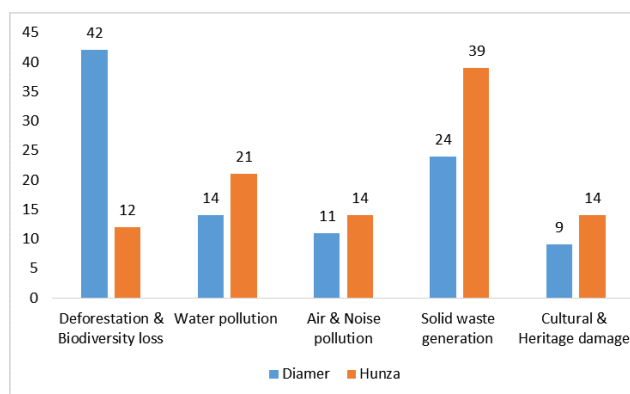


Fig. 5. Environmental issues in the districts of Diamer & Hunza

Waste generated by tourist activities are characterized into water bottles, containers for juices and other beverages, plastic bags, food waste from restaurants, diapers and disposable plates/spoons. Figure 6 shows the percentages of solid wastes generated by tourists in the districts of Diamer and Hunza. The local people of Diamer and Hunza perceive that tourists are the major cause of solid waste with the major proportions of which are polythene bags (34%) and diapers (29%). The remaining 19% say plastic bottles and 9% say paper and food waste is generated by tourist activities. Moreover, during field visit researchers have seen the majority of tourists carrying polythene bags, and plastic bottles. They carry majority of their things in bags while travelling

and use mineral water bottles throughout their journey. The villagers also claimed that tourists don't follow the environmental rules for solid waste disposal. The lush green highlands and lakes of GB are littered by wrappers, bottles and shopping bags (GB-EPA, 2012b). One of the worse examples related to solid waste generation was at Jarba-xo Lake located in Shigar Valley which was not formerly frequently visited by people except local fishermen and others who truly enjoyed the beauty of the place. The number of tourist at Jarba-xo Lake has increased over the last few years. Now plastic bags and bottles are floating in the lake water and many people are leaving waste in the surrounding area. Results of these activities threaten the aquatic life of Jarba-xo Lake (Shigri, 2016).

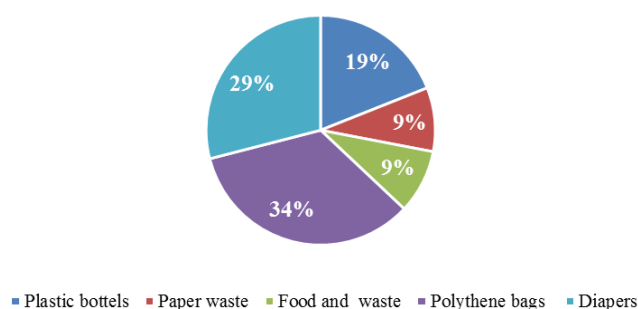


Fig. 6. Types of solid waste generated by tourist activities

Figure 7 illustrates the respondents opinions of the environmental effects of waste and shows the severest environmental effect is the generation of odours which was commented on by 63% of the respondents, the second most severe was thought to be facilitating insect breeding which was stated by 17% respondents, the third most common response was it was thought to be the reason for diseases (14% of respondents) and some other environmental effects were also indicated (by 6% respondents).

To fulfil the requirements of tourists, a large number of restaurants and hotels were constructed. For the construction of these resorts, restaurants and hotels forests have been cut down. This study shows that 42% of the people from Diamer district declared that most of the wood used for furniture and construction purposes came from local forests. The process of deforestation has increased due to urbanization and increased tourist flow. In the Hunza district 12% of respondents reported deforestation and loss of biodiversity as the main environmental problems because most of the people use the forest wood as a source of energy (Fig. 5). Construction of a new resort for lodging often requires clearing forest land.

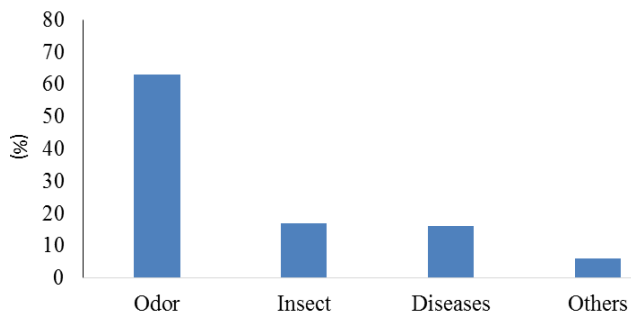


Fig. 7. Respondents opinions of the environmental effects of garbage

Tourism is closely linked with biodiversity and attractions in the environment. When land and resources are strained by excessive use, and when impacts on the biodiversity including the vegetation, mountains, marine and coastal environments and water resources exceed their carrying capacity it can cause loss of health and wealth.

The forests of GB are important watersheds for low lying areas where settlements exist and agriculture practices are conducted. Many species

of plants and wild animals are dependent on these forests, as they provide food and shelter to species which have national and global significance. In GB, due to increased tourism activities different development projects including the construction of resorts, hotels, restaurants and link roads have been increased to meet the demands of tourists. During construction of such buildings and infrastructural development, forest is being cut down and the entire environment is being affected to a large extent. Deforestation also contributes to global warming and to climate change.

### 3.4. Socio-cultural and economic impacts

To assess the perception of local people about various socio-cultural and economic impacts of tourism different questions were asked of the local residents. Before filling the questionnaire, all respondents were asked to select the option which closely reflects their personal belief (Table 9).

Table 9. Shows questions and responses of villagers about socio-cultural and economic impacts of tourism

Impacts	Questions	Yes (%)	No (%)
Socio-cultural	Does tourism have any impact on your social life?	64	36
	Is there any impact of tourism on the language of the area?	59	41
	Do you think tourism brought any changes in the behavior of local people?	68	32
	Any record conflict with visitors and local people?	33	67
	Have you observed any effect of foreigners on the youngsters?	68	32
	Do you want that tourism should be promoted in your area?	83	17
Economic	Has tourism provided any jobs for local people?	87	13
	Has tourism brought any change in your economy?	73	27
	Do you observe any shortage in your income with the reduction of tourists?	82	18
	Is there any effect of tourism development on Handicrafts Business?	68	32
	Is there any change in the rates of local consumable goods/especially during tourist off-season and on-season?	30	70

Table 9 contains the results from 100 respondents from both Diamer and Hunza districts. The culture and heritage of G.B attracts tourists from other parts of the country and from around the world. The historic places in Diamer and Hunza attract tourists. The old forts (Baltit and Altit Forts) in Hunza and stone carvings in Diamer portray the old traditions, customs and culture of the area. These historical places are being damaged due to the high inflow of tourists. This study revealed that 9% of local people in Chilas and 14% local respondents in Hunza thought that the culture and heritage of the area is being negatively affected. Approximately 1/3rd of all respondents said that tourism has impacted their social life, while 36%

respondents disagreed with this statement. Furthermore, it was stated by the majority of local respondents that, they become more sociable when they interact with foreign tourists. And approximately 69% of villagers have perception that their language is under the influence of tourists, which mean the local people of GB use some of the words used by tourists in their native language during interaction with local residents of GB. However, only 33% of local villagers believed that they hadn't experienced any major influence of tourism on their language.

The proportion of employed and unemployed is 55:45% (ANNANDALE & BAILLY, 2014). In GB, most of the people's livelihood is associated with

tourism. Tourism contributes the largest proportion of employment (having 44%) followed by agriculture and forestry (24%), finance and real-estate (17%) and trade and commerce (15%) (ANNANDALE & BAILLY, 2014). Thus, nearly half of the population in GB depends upon the tourism sector, which means it has positive impacts on the economic condition of GB. These facts also seems to relateto our findings in which 87% of the local residents agreed that tourism has created jobs for local people, while the remaining 13% disagreed. As the Hunza district is very famous for its embroidery and handicrafts and Dimer is famous for its woollen products, a question was asked about the relationship between the handicraft bussiness and tourism development, in which 68% agreed while 32% rejected this statement. One of the most important question which was asked of the local villagers about the pricing of products during the tourism season and the off-season and 70% said there was no change in the pricing of products while 30% of local people said they had noticed a change in price in products during the tourism season. Some of the visitors stated that shopkeepers charged them an extra 5 to 10 ruppes on every product sold near to tourist spots which is unfair.

#### 4. Conclusion

This research has shown the perception of local residents towards the development of tourism and its impacts on the local environment, socio-culture and economy. Apart from villagers, 7 different respondents/stakeholders were included in the questionnaire survey. Most of the respondents rated higher positive impacts of tourism on the local community in the sense of job creation and business development. Moreover, the results showed that tourist activities have caused major environmental problems like an increase in solid waste generation, while on the other hand the positive impact of economic growth of GB is associated with tourism. A mix behavior and perception of local residents for socio-cultural impacts of tourism was seen in the study area. This research identified the various environmental health issues related to tourists' activities and mismanagement by local government. Water quality testing of parameters including physicochemical characteristics and the identification of infectious bacteria in water was also conducted. These analyses discovered that the drinking water from all natural sources in both districts is not suitable for consumption. This water could be the cause of a major outbreak in the study area. On the basis

of respondents' opinions we conclude that tourism has positive impacts on the economy and the negative impacts on the environment of the local area, while it has no significant impact on the socio-cultural state of the area.

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