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INTEGRATING BILATERAL APPROACH TO COMBAT COMBINED IIMPACTS OF HERITAGE TOURISM AND CLIMATE CHANGE

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ABSTRACT

Climate change and sustainability does not prominently manifold with respect to tourism industry within the environmental, economic and tourism policy agendas of developing countries. Evidences shows that developing countries are most vulnerable entities to the climate change. Tourism is married to good climate conditions, any attempt to divorce them could lead to danger. Tourism is considered as one of the fast-growing sectors for economy of India as it occupies 9.4%share in annual national gross development product (GDP). Since 1990s heritage is most important as well as fastest growing entity of tourism. Rankivaav (Queen's stepwell) N23 51 32 E72 66 is a world heritage site of The United Nations Educational, Scientific and Cultural Organization (UNESCO) attracts many national and international tourists. As tourism is a growing sector it is essential to identify its promising impacts on climate change. To encounter this consequence, we tried to figure out emission of greenhouse gases by using socio-economic methods as well as establishment of the relations between sustainable development, tourism and climate change. This research suggests certain conclusion of possible relevance to climate change and sustainable developments that includes all aspects of tourism, sustainability development goals, carbon footprint, adaptation and mitigation measures, which eventually lead to the critical importance of alternative development path and assumptions about the reference case.

Keywords: *- Climate change, Heritage tourism, sustainability, carbon footprint.*

INTRODUCTION

Tourism define as activities of person traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes (Richards, 2014; Jewerson, 1996). Tourism has become an important, even vital, source of income for many regions and considered as one of the fastest growing sectors for developing as well as developed countries because of its direct impact on society, culture and economy. Tourism industry is considered as world's fastest growing industry with 5.5% of GDP as well as 6% of the employment annually worldwide.

Tourism is now not only the leading service provider sector but also a new source of foreign income for third world countries. Macau, British Virginia, Aruba, Bahamas are the countries depending on tourism in terms of their GDP, which occupies 30% of their annual GDP. Leisure, businesses, pilgrim, historical monuments, geographical and bio-diversity hot spots, internationalevents for social welfare and study etc are various key factors of determining tourism destination and purpose of tourism (Schneider&Moss, (1999); Hamilton et al (2005); Scott et al (2008)).

India, is a vast and diverse country that has always something very special to offer, and its uniqueweather system, geographically diverse features ranging from Himalayas- A solidified mountain of ice to great desert of Kutch, deltas of river Ganga, 6th rich bio-diversity hotspot of western ghats, great mountain ranges of Aravalli, and coastal areas which covers 7516.16 Km area.

Business trends are increasingly interested in the economic impacts of tourism at national, state, and local levels. In 2015 Foreign tourist arrivals was 8.03 million which was increased in 2016 up to 8.89 million which is 10.7% in just one year of time, and economic growth is also increasedby 15.1% annually. Total MoUs signed during the year of 2016 [7]. From the secondary data which is collected from department of tourism in its annual report of 2016-17 states that maximum MoUs has been signed by two states. Figure 1 indicates total number of MoUs signed and the amount allotted for development and implementation of MoUs (GoG (2015-16).

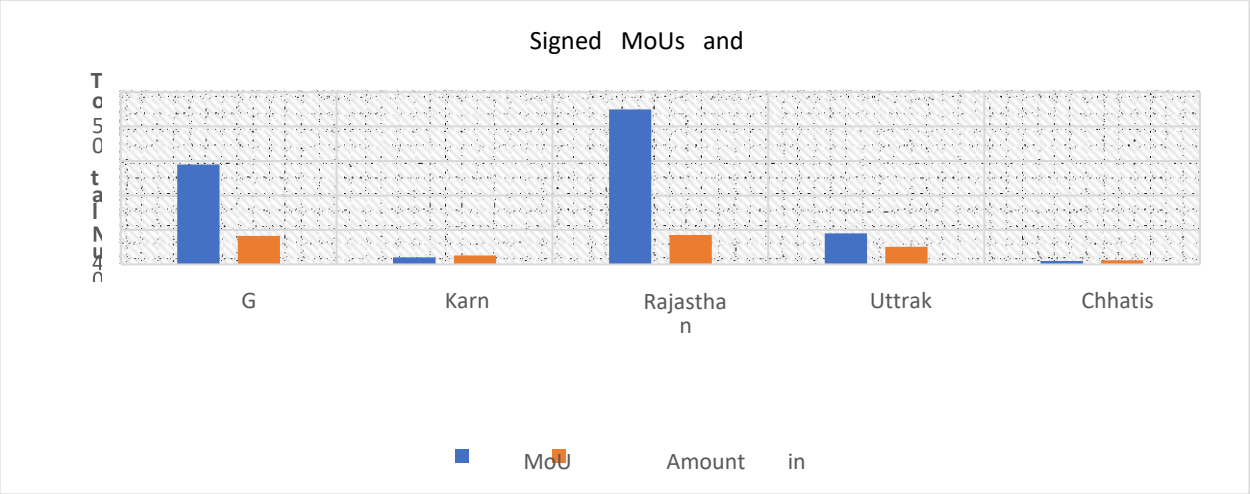

Figure 1: Signed MoUs and funds provided to state tourism agencies

As per the annual report 2015-16 Department of tourism, maximum historical visits are identifiedat Patan with annual foreign tourist inflow of 26.5%. Patan, former capital of Gujarat state is located on N23 51 32 E72 66, is famous for its well-designed Patola and its historical monument which is Rankivaav (Munasinghe, (2000)).

Development in tourism sector is major contributor to the global warming and changing climate which is also emerging issue in 21st century. [4] Climatic parameters like changes in seasonal shifts, changes in weather patterns, loss of diversity are some of the major factors impacting mountain regions, coastal areas, natural and cultural destinations that are most vulnerable tourismdestinations(Scott et al, (2008)). Between 1906-2005 global temperature rises by 0.8° C and expect rise till 2050 is between 1.8° C to 6.4° C. Any change in global temperature which is above 2.0° C is irreversible. South East Asia, African countries, Caribbean countries are covered under vulnerable tourism hotspots (GoG (2015-16).

Impacts of tourism on sustainability, environment and changes in climate are not possible to neglect at global level. Literatures on climate change and sustainable development identifies that correlating climate change and sustainability is important because of mainly two reasons at global context.1) Fundamental scientific and epistemological links between sustainability and climate change. 2) Analysis will add to cogency of argument and ultimate accessibility of strategies to address to the climate change problem (Udensi et al, (2017); Njoroge, (2015); Cohenet al, (1998); Newby, (1981);Munasinghe, (2000)).

Research objectives:

- To calculate total tourist carbon footprint through transportation and accommodation and evaluation of awareness amongst climate change and state tourism policy.
- Analysis of SDGs related practices in Patan

- Suggestion of adaptation and mitigation measures, observed physical impacts on heritagesite and future scope for research in society, economy, environment, and climate change.

Methodology:

This research is based on both primary and secondary data. Primary data was collected by socio- economic surveys. For surveys detailed binary coded and observatory text included questionnairewas designed for accommodation and transport facilities, tourists and local communities.

For the research sample size was calculated by using following equation:

$$Sample\ size = 2 \times (p) \times 2\ (1-p)$$

$$C$$

Where, Z = Z value (e.g. 1.96 for 95% confidence level), p = percentage picking a choice, expressed as decimal (.5 used for sample size needed), C = confidence interval, expressed as decimal (e.g., .04 = ±4)(Jiang, (2009).

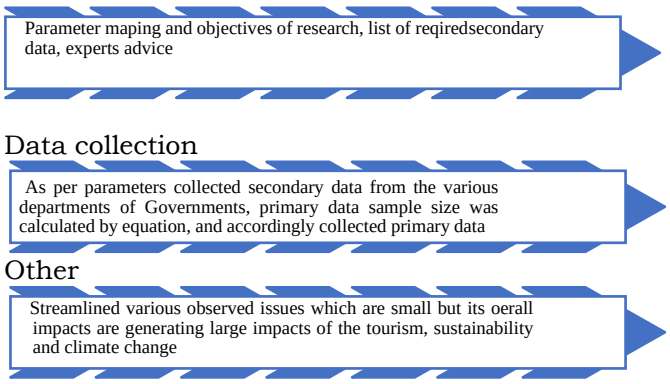

Figure 2: - Chart of methodology

Secondary data of trends in Gujarat tourism, destination facilities, occupancy are collected from Department of Tourism, Gujarat and Gujarat industrial and technical consultancy organisation limited (GITCO). On the basis of secondary dataset, calculation of total sample size of each segment was carried out, which are 3.33% for entrepreneurs, 22.66% for tourists and 74% for local community.

RESULTS

During the primary research it was observed that community resident of Gujarat tourist flow is maximum and foreign tourist inflow is least. It is always interesting to identify the factors affecting purpose of tourism and its impacts on tourist inflow. To identify purpose of tourists plays a significant role in total tourist inflow specifically sites with maximum potentials (Mbaiwa, (2003).Figure 3 clearly indicates that maximum tourist arrivals are due to Holidays or Historical importance of the monument. Figure 4 represents annual frequency of total 22.66% tourists. 1st bar shows total number of tourists in every category and 2nd bar shows their annual frequency respectively. 63.82% local tourists from surveyed data are maximum in compare to other tourist's frequency throughout the year. But at the same time overnight tourist flow is 0% for historical tourists.

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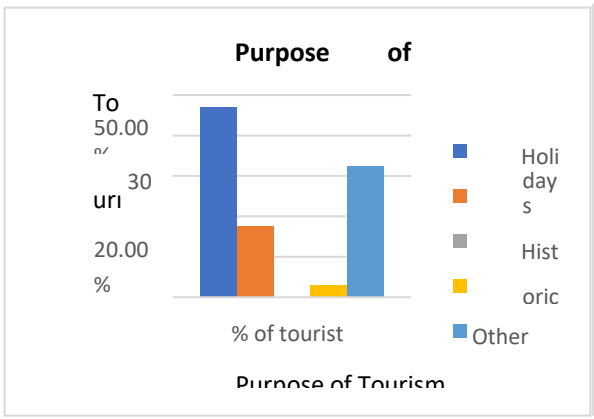


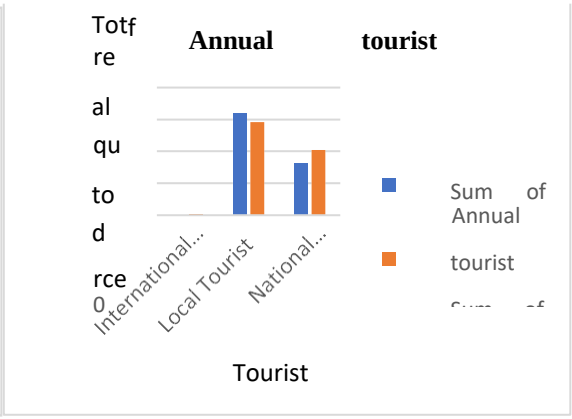


Figure 3 :- Purpose of Tourist Figure 4: - Annual tourist frequency

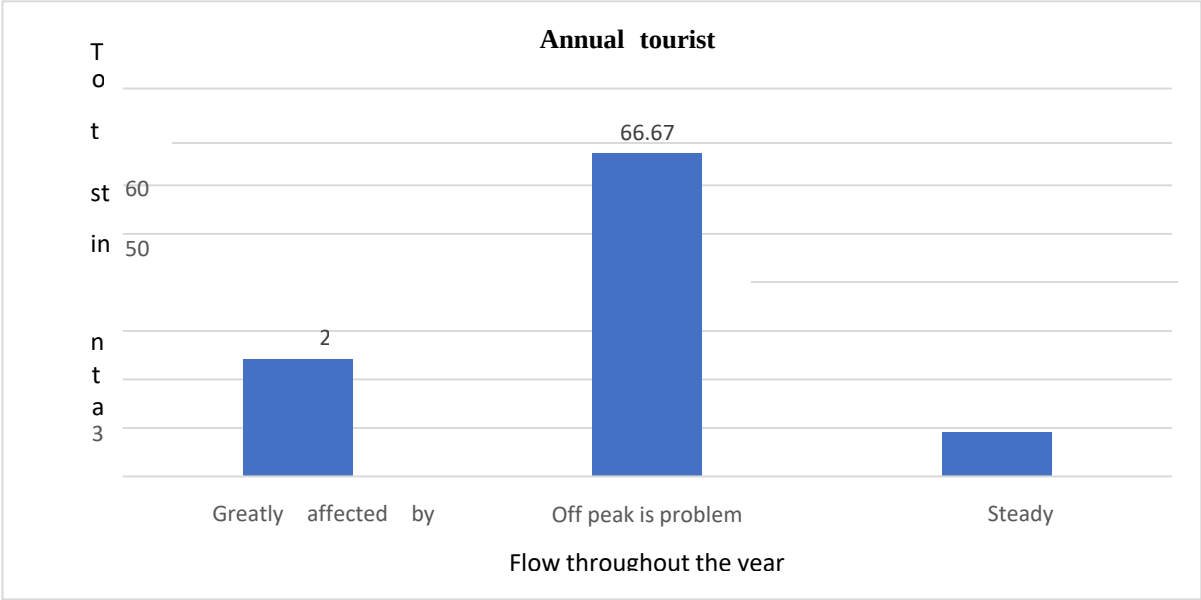
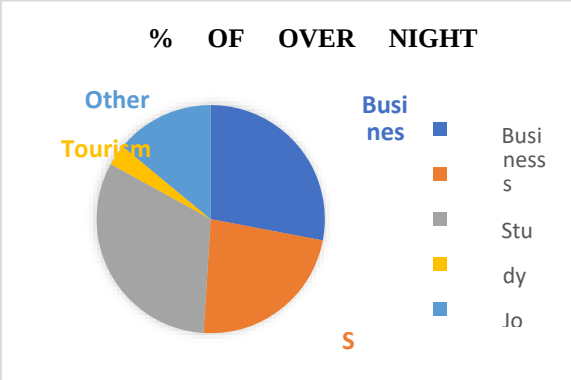


Figure 5 Annual Tourist flow



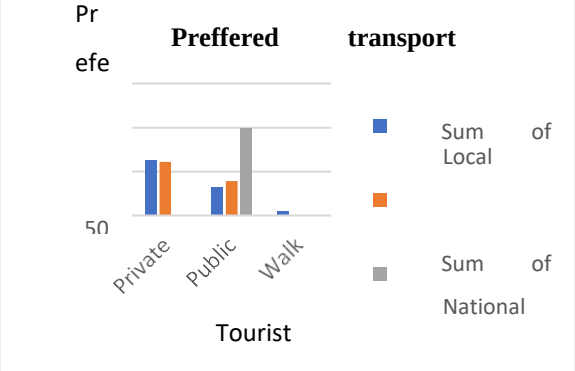


Figure 6 Overnight tourist Figure 7 Preferred transport facilities

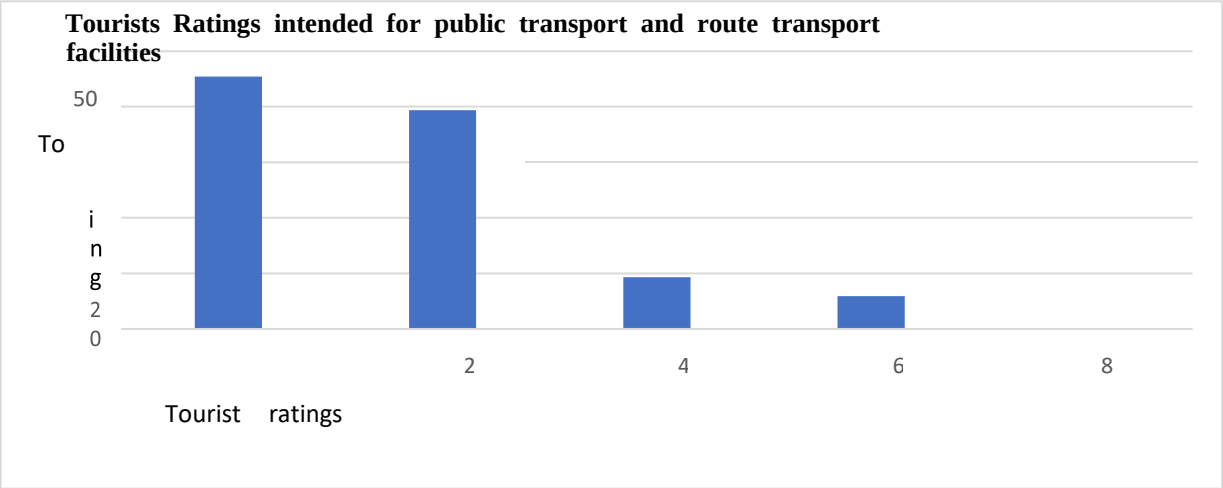


Figure 8 Tourist ratings for route transport facilities and public transport

Out of total tourists 62% tourists used private transport facilities to reach Patan. Out of total respondents some of the respondents have not used any public transport facility to reach this destination and also denied to rate the facilities because of no usage of resources. Same way maximum percent of tourist are given ratings between 0-20% and remaining are more or less equal and it clearly indicated that tourists are not satisfied with the available public transport facilities as local authorities doesn't provide any government public transport facilities to reachto the destination and also located far away from Bus station or Railway station. Route facilities are average according to tourists. Basic medical facilities, street lights, availability of food and W/C are also not available at regular intervals. And on the other hand, roads are of very good quality, proper sign board for selection of roads, other places in nearby route navigation indicators are placed in a manner which can easily understood.

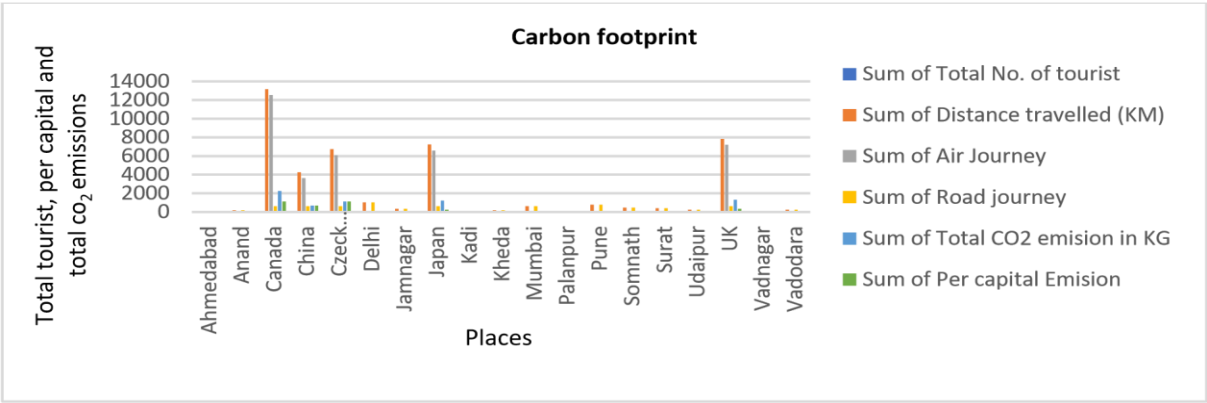


Figure 9 Tourist travelling Carbon footprint

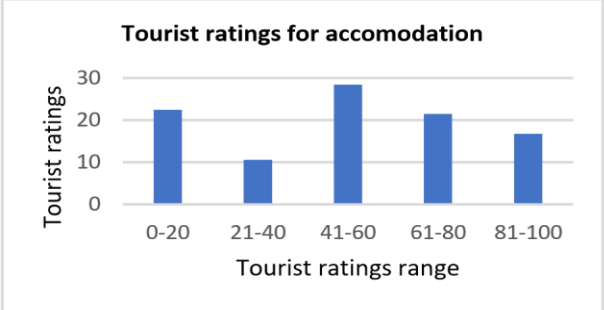


Figure 10 Tourist ratings for Accommodation

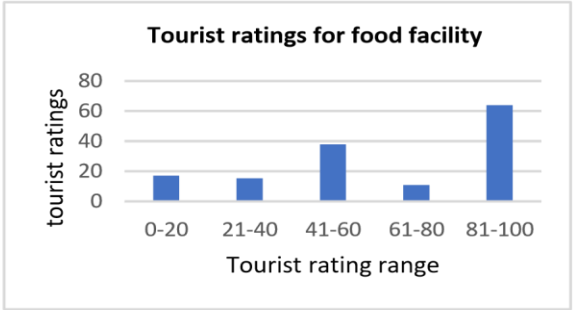
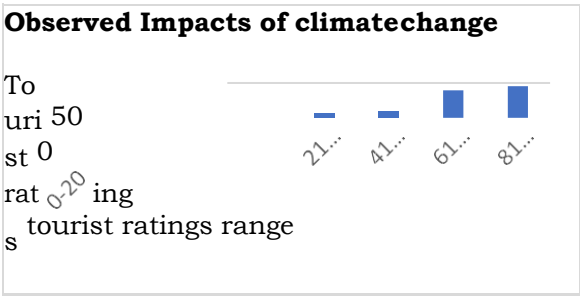


Figure 11 Tourist ratings for food

Carbon dioxide is considered as main gas amongst all greenhouse gases and also all greenhouse gases and their amount in atmosphere is always presented as carbon equivalent. Also, greenhousegases and their increase in atmosphere resulted in to present changing climate scenario. Through carbon footprint calculation it is found that Maximum per capital CO_2 emission of Canada and Czech Republic is maximum which is a 1127.77Kg and 1123.81Kg respectively. Other hand Ahmedabad, Palanpur and Kadi are leading in low carbon emissions from transportation. Total CO_2 emission of Rankivav (Queen's step well) of Patan per day is 3592.92Kg, and average per capital emission is 20.69 Kg. Accommodation facilities for tourists plays a significant role in the development of tourism site. Here, secondary data clearly indicated that overnight tourism activities are very less in the destination. Basic food facilities are very much important to sustain

any tourism site. Food comes as primary requirement for any individual. Maximum individualsclearly indicate that food facilities are not up to the mark.



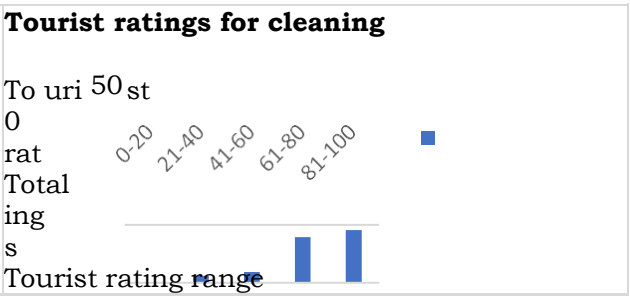


Figure 12 Tourist ratings for cleaning Figure 13 Tourist ratings for climate change

but it is an average to get some good quality food.Maximum tourists visit for historical or holidays and for that to increase tourist flow cleaning of tourism site is required and whichwill be efficiently fulfilled. Tourist rated cleaning facility above 50%. And about more than 50% population is satisfied and rated site between 80-100%. Various suggestions will be provided by local community as well as 70% of respondents are highly accepted that changingclimate and its impacts are reducing tourist inflow and also generates various critical impacts on tourist sites too. Out of total respondents its concluded that, maximum population or tourists are knowingwhat is the basic meaning of eco-tourism but on the same way local communities and tourists are less aware towards the tourism policy.

It is observed that the couple of basic facilities and it is good to know that as our data represents electricity and gas facilities are available all over Patan. Each house hold is carrying electricity connection and even for farmers 24×7 electricity facility at their respective farms also availabale which is considered as good initiative to local communities for their basic facilities.In the Patan we shown the couple of basic facilities and it is good to know that as our data represents electricity and gas facilities are available all over Patan. Quality of life, Employment opportunities and tourism awareness was increased in last decade.

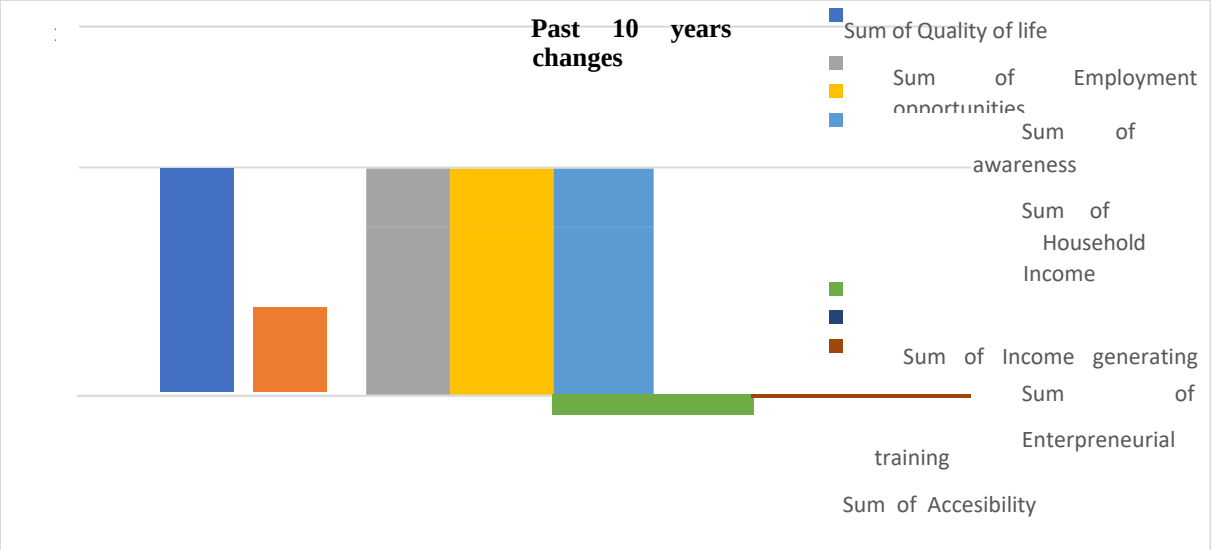


Figure 14 Development of local community in past 10 years

DISCUSSION

In Patan around 0.45 million tourists visit destination but conversion ratio of day time tourist to overnight tourist is playing a major role to the community. Only 3% overnight tourists observed in this world heritage site. As it is developing as new destination for holidays and historical architecture tourists' frequency over the place throughout the year is increasing. Same amount of population annually occupies an average of more than 63% visits a year. As tourism is one of the fastest growing industry, at local level there are various gap ups also observed. Very fewaccommodation facilities are well equipped to satisfy the need of tourists and marketing options are not developed which also resulted into low conversion rate. Foreign tourist are facingproblems to receive accommodation due to rigorous internal procedure. After accommodation facilities waste generation and waste management is largely evolving new career in applied sciences(Peeters, (2010))Increasing population is equally important in waste generation and less inflow leads to low waste generation and minimal burden on natural resources. Same way its impacts on income generation options for local community and total turnover is affected tremendously(Theobald, (1998). Good practices like organic waste are collected andused to feed livestock's as well as for organic farming(Kumar, (2005); WHO (2016); Kumar et al (2016)).

Cleaning is the key factor for developing site as sustainable eco-tourism site and in the same thing also tourists given good ratings to the destination. Observed climate change impacts and its physical and chemical impacts and damage to the destination and related awareness amongst tourists was really good. UNESCO with many other institutions or agencies promoting the destination for visit and research.

Trend of tourists clearly indicating that inflow for historical site is mainly dependent in particulartimeframes. Out of total tourists 66.26% tourists suggested to develop various nearby monumentsto develop heritage hotspot in Patan. Sahastraling lake, Sindhvai Mata step well are two other monuments with ancient infrastructural sculptures. Development of various tourist attractive infrastructures like gardens, fountains, food zones, children play area are highly required facilities.Mainly it's in either Diwali or in small vacations of winter will give a large number of inflows from local and national tourists. Summers or in weekend time great inflow was observed. Due to its unique sculpture national and international tourists are coming throughout the year but these few selected phases are the key patches for the destination. It is observed various erosional and weathering evidences on the construction of historical monuments. Awareness about changing climate its possible impacts was good and also given a reliable rating to the issue.

As tourism is an industry growing at rapid rate same way the emerging issue for a globe is

changing climate(Koenig&Abegg, (1997). The sustainable approaches are now a days trending tonegotiate issues. In 2017, around 17 sustainability goals are decided at global level and countries are trying to reach to the targets of SDGs(Peeters&Dubois, (2010) Various components like level of education, facility for energy, facilities for cooking, awareness amongst destination, health andmany more parameters like this will be covered under SDGs and its role on defining strategies to climate change are crucial. In patan its concluded that 100% of the surveyed population is receiving electricity services and proper gas facilities for cooking. Also, education level of the local community is above 71%. Female education and women empowerment related good practices are regularly practices. Awareness amongst waste management is also adds up a new value to the society. In the same way various issues also identified. As we move away from the destination, issues of water logging, lack of water for agriculture, ongoing disputable development projects, lack of industries, lack of modern infrastructure, lack of emergency medical facilities, lack of awareness to manage natural resources, Lack of developments of modern infrastructures are few of the issues which are rating down the initiatives taken to achieve targets of CO_2 reduction and SDGs. Basic medical facilities are also available at cheaper rates to the community. For accommodation facilities large scope for reducing emissions in the form of energy efficient appliances such as Star rated ACs, High efficient latest technology fans, LEDs, Star rated television and Refrigerators, smart switching, solar geysers, renewables, in kitchen Bio-gas can be used and also for energy generation and organic farming can be carried out with the use of solid waste materials, terrace and vertical gardening of operational plants, Architectural changes to benefitted the natural environment, resource availability at local sites such as fruits, vegetables and other perishables are locally grown and preferably organic.

Rain water harvesting systems can help to reduce both emissions and water scarcity issues for tourists as well as local communities. Also, leakages at destination needs to be minimal in order to reduce carbon as well as water footprint. The amount of wastage of water on daily basis reaches to the 11,95,600 liters a day at tourist destination only as leakage in borewell of sprinklers. Leakages are burning 116,68,320 units of energy every year to, maintain gardening and run the sprinklers and motors (Zhang *et al* (2007). And it results 10968220.8 KG of CO_2eq emission to the environment. Above mentioned figures are representing a single motor pumping water for 12 hours a day. Thus, one can clearly understand that what kind of emission scenario is being observed in the destination were thousands of pumps for multiple purposes are used. Carbon emission from transport sector accounts for 28% CO_2eq emissions annually through burning of fossil fuels by cars, air transport, trains, ships and trucks. For selected destination maximum emissions observed due to international tourists who travel by air transportation. Transportation belongs to the countries like Canada, UK, USA, Czech Republic, China etc. Development of carbon negative buildings and green buildings, fuel switching, Development of vertical and terrace gardening, Renewables, Energy efficient appliances, waste management, awareness amongst green options, Quality of water, are some of the new initiatives needed to access with development of destination(Metin*et al* (2003); McKercher *et al*(2010); Saarinen&tervo (2006)).

CONCLUSION

This Research enhances scope in terms of achieving SDGs by providing practical and possible solutions towards a sustainable future. This study encompasses 13 out of 17 SDGs, providing solutions in each of the 13 goals mentioned. Carbon footprint is found very high for foreign tourists, but it has been minimise by the carbon footprint of the tourist visiting locally. Further steps are also provided in order to reduce carbon emissions from the transport sector as well as the energy sector.

As we discussed this research aims to start linkages between tourism, climate change and sustainability and to address current issues for patan and future scope of research. For the future scope it is concluded that in the field of modern infrastructures using various advance technologies we further develop a sustainable and zero carbon town with proper planning and adding up multiple disciplines. Botanical studies will further help us to develop a dataset of plant species according to tourist site with included carbon sequestration capacities. Also, Energy efficiency and other alternative energy efficient techniques helps us to develop site in

sustainable manner and also it opens various routes of renewable energies. Physics or engineering students can also able to explore the scope of the destination. Sources of CO2 its sources, future modeling,possible impacts and related adaptation and mitigation measures are also helpful for further research in the field of environmental sciences and climate change. Also, as discussed water leakages, shortage of water and water quality is also major issue so environmental studies and water management studies either individually or in combine approach they can explore the further researches. Also, research for eco-tourism is also plays a significant role in furtherresearches in tourist sites.

From the entire research it is concluded that patan is one of the hotspot for tourists but some ofthe basic facilities are required. Also, carbon emissions and its per capital amount for international tourist is very high. Also, various mismanagements lead to a large number of water and electricity utilization which results in to large amount of emission of CO2 into the atmosphere. Also, it generates various local issues of water requirements. Apart from this anotherpositive observation was patan city is working on the goals of sustainability. And also, out of 17 sustainability goals 13 goals and related initiative practices are observed in the city. Some awareness for sustainable tourism site, regulatory policies like tourism policy and ecotourism siteis required for both tourists and local communities.

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