



Evaluating Future Water; Climate Change and Urbanization in Gujrat.

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Abstract

Climate change is the major concern of the world now a days. Major effect of climate change is seen in variation in the rainfall pattern. Urbanization is exceptionally affecting the environment and climate over-all the world and exaggerating the climate change impacts. Extreme weather conditions can alter the hydrological cycle, water consumption patterns and climate of an area. The purpose of this study is to highlight the effects of climate change and urbanization on water resources in Gujrat, Pakistan. For this assessment we used a well-structured questionnaire. A total of 150 questionnaires were used. According to this study approximately 70% of the population of selected area is facing this problem. Gujrat is an industrial area due to which almost 46% of the people are facing the problems of allergic diseases while 20% are being suffered from asthma. Approximately 37 % people believed that these all are resulting from changes in climatic condition and 38% said that it's all due to man-made activities. Around 91% of the people under study were being affected by fluctuations in weather conditions that showed that Gujrat is facing problems of water supply and pollution due to urbanization and change in climatic conditions in various ways.

1. Introduction

Water plays an essential role for the survival of all living things. Due to rapid urbanization and industrialization the effect on water bodies increase because the people adopt the luxurious style. The estimated consumption of water used by industries is more than 90% of total water used by human. By the year 2025, Industrial consumption demand would be 200% greater than 1995 levels [1]. Urbanization and other construction activities, poor farming applications, and industrialization are included in those events that can change water quantity and quality in ecosystems. In major cities almost more than one billion people lived which have the scarcity of available water.

By identifying these changes, it would be possible to recognize more vulnerable regions and overcome these vulnerabilities towards climate change. In Pakistan the pollution generated from urban settlement is connected with the natural wildlife resources that are crucial for the sink of greenhouse gases. Transportation of pollutants through wind and water bodies change the pattern of plant productivity in ecosystem. Moreover drought, floods and change in climatic condition affect the crops yield. In other words it can destroy the economy of a country. Many of the above declared changes in the environment cause an adverse impact on important goods and services provided by freshwater ecosystems and will generate the challenges of human water security [2]. A huge number of population lives in coastal areas where flooding and extreme weather events are more likely to be happen. Topographically,

Pakistan has arid and semi-arid regions having both spatial and temporal climatic variations. About 59% of the total rainfall comes from monsoon in Pakistan that is a major recharging source for water bodies [3]. World food trade system may be affected and socio-economic impacts occur in the world. The resources of food become decreases and thus food scarcity occurs. People are unable to fulfill their need that leads toward food scarcity [4]. The objective of this study is to evaluate the changes that have occurred in past few years and assessing the future changes that are likely to be occurred.

2. Literature review

The most alarming consequence of urban development is global warming. Heat island makes the cities more warmer. It is predicted that the globe would face the threat of climate change from anthropogenic activities and urbanization. Kalnay [5] reported in his article "Impact of urbanization and land-use change on climate" that from the list of anthropogenic effects on climate the two most important effects are the global warming (greenhouse gases) and the urbanization. It is an unpleasant fact that cities are both the source and sink of greenhouse gases. It has been observed that all the anthropogenic greenhouse gases emission results from urban sector like from fossil fuels burning for domestic, industrial and transportation purposes. It is a natural phenomenon that forests are the natural sink of these greenhouse gases but they are greatly being cleared for the need of land for cities, roads and transportation. The strongest and direct impacts of climate change in the future will be appearing on agriculture and food system. Jury and Vaux [6] detected that one of the threats to future water supplies is pollution that causes deterioration of water quality, where agriculture grows modern, the level of surface, groundwater nitrate and pesticide dramatically increase.

Land removal and non-toxic waste cause groundwater and soil pollution respectively. Lobell [7] illuminate that the production of maize, wheat, rice and other crops will decreases. However, if seasonal changes occur, then the food production is low which causes hunger. Sutherst [8] explained that the alternation in the weather patterns can increase the crop vulnerability in pest infestation and crop reduction. Ranges of insects and diseases are predicted to expand to higher latitudes. The prediction of future climate change describes the reduction in the crop production may have to increases in the vulnerability of malnutrition and hunger in the some regions of the world. These are all happens when a suitable food system is not ensured. According to McClain-Nhlapo [9] the destruction of food security is happen when the system is in stressed. It includes the factor of climate and environmental changes. These changes maybe the change in international trade agreements and policies. Brown [10] supposed that improvement in the environmental monitoring and prediction can provide us effective early warning information, which may be helpful for the government to take actions in the preservation of food and helpful in the production of crop yield.

3. Material and methods

This study is a descriptive study. In this study, both primary and secondary data is used. Primary data is collected through observation and walk through survey. The secondary source of information used in this study includes various publications like Journals, books, newspapers and magazines. It also includes data collection through close ended questionnaire. Questionnaire includes a portion about general observation of the targeted population that contributes towards climate change. Basically, two methods are used for data collection, one is quantitative and other is qualitative method depending upon survey design.

Using quantitative approach, survey included face to face interviews using structured questionnaires. We used numbers and figures in questionnaire for the determination of climatic variables and their variations. The target population included the inhabitants of Gujrat both permanent residents and tenants. To draw samples from the targeted population, simple random sampling technique was used for data collection. For study, the sample size was 150 respondents. For data collection, researchers used a close ended structured questionnaire by using survey method. Questionnaire comprised of 27 closed format questions. The questionnaire covers the questions

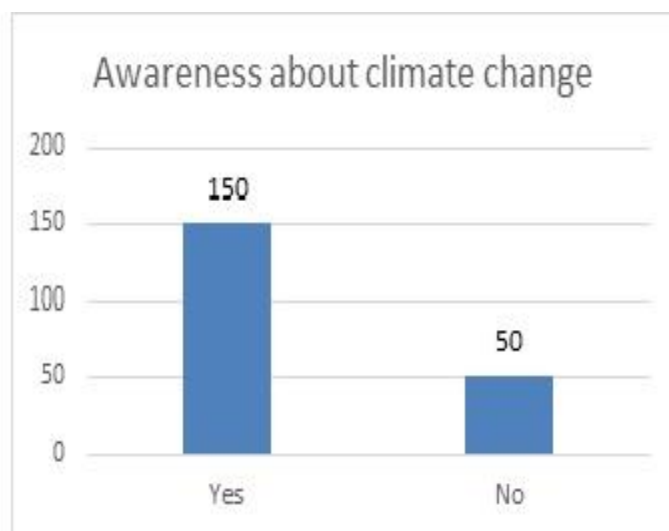
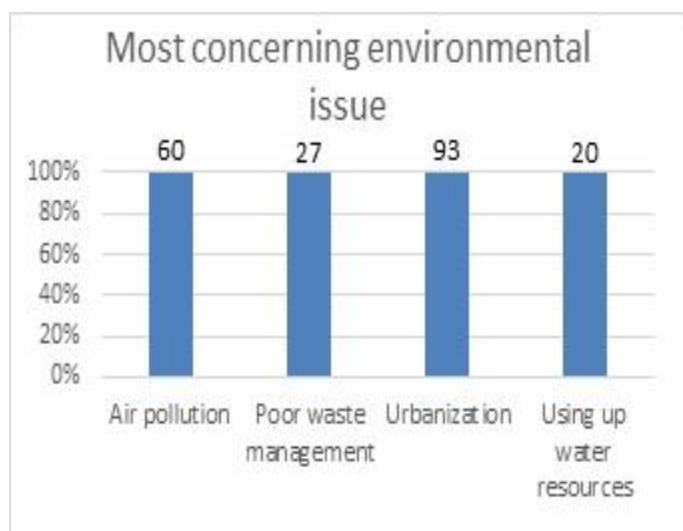
about climate change, urbanization and future water. This questionnaire also included questions about impacts of urbanization on water supply, effects of climate change due to urbanization and consumption and current status of water supply to inhabitants. After the collection of data, it was further processed into tabular form and essential features were found by figuring all the frequencies and percentages by using SPSS program. Classification of data is done to organize the data into groups and classes according to questionnaire features. As there were different types of close ended questions in our questionnaire, so the questionnaire was classified for more consistent study while working on SPSS and Excel. Data used to present is in the form of tables, and graphs. Graphs made through Excel, represent the statistical data of our analysis. Interpretation of these graphs would help for better understanding of data.

3.1 Data sheet description

This topic is “Evaluating Future Water; Climate Change and Urbanization in Gujrat”. We find out from the survey and results that most of the people are being affected from the changing climate and its events in the form of changes in water availability, severe weather conditions and temperature.

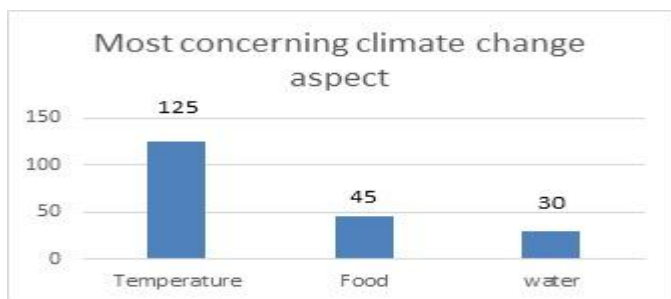
3.2 Graphical Representation of the Data

There is collected data in the form of graphs and also their interpretation which is discussed further in result and discussion.

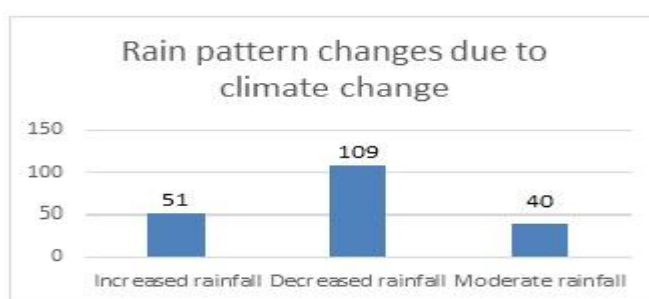


Graph 1. This graphical representation reveals about the most emerging environmental issue that is urbanization.

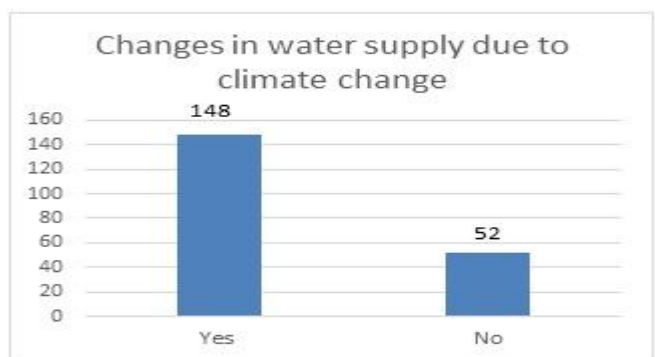
Graph 2. This graph shows that people have awareness about climate change.



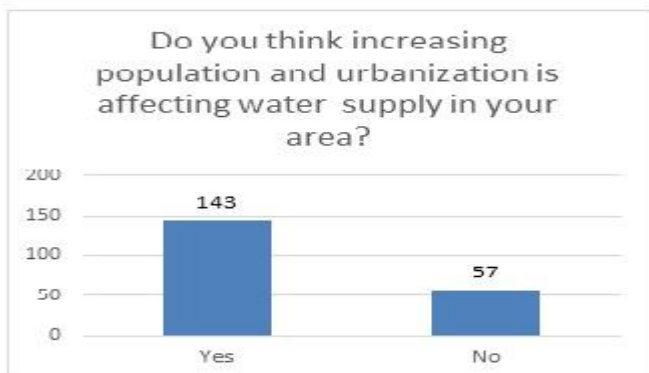
Graph 3. This graph represent that temperature is the most concerning aspect of climate change



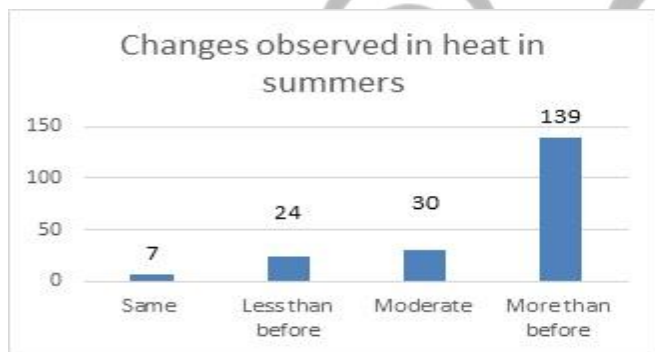
Graph 4. This graph characterize that rain pattern changes due to climate change



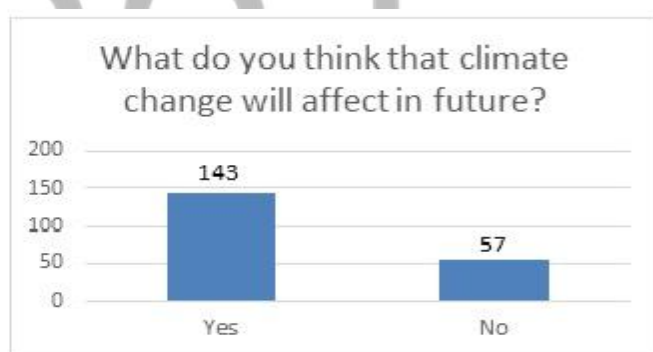
Graph 5. This graph tell about the rate of water supply change due to climate change.



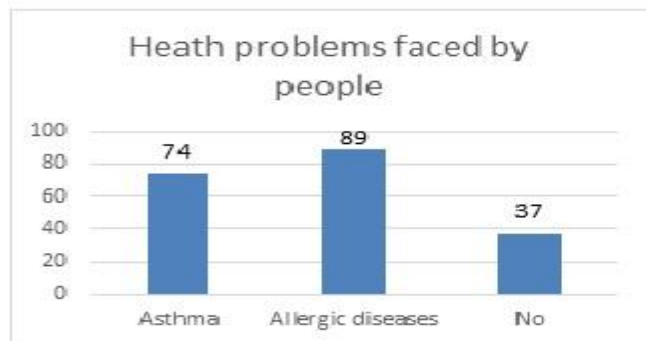
Graph 6. This graphical representation reveals that increasing population affect water supply.



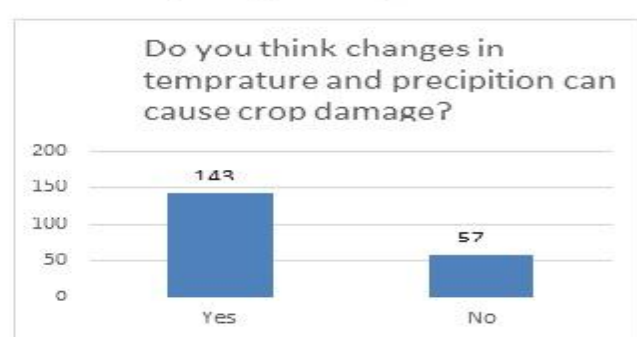
Graph 7. This graph represents that change is observed in summer that is excessive heat.



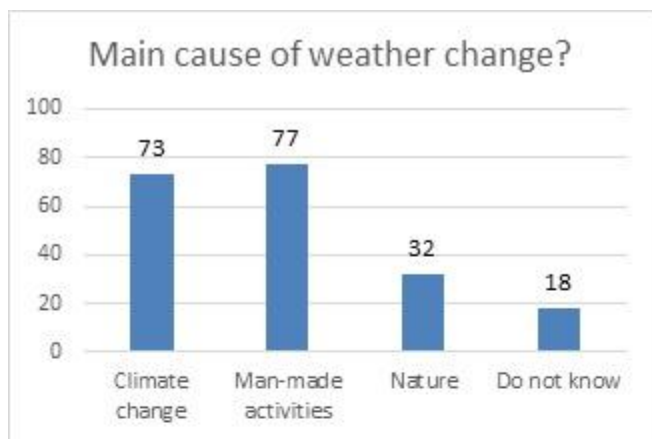
Graph 8. This graph reveals that impacts of climate change will affect in the future.



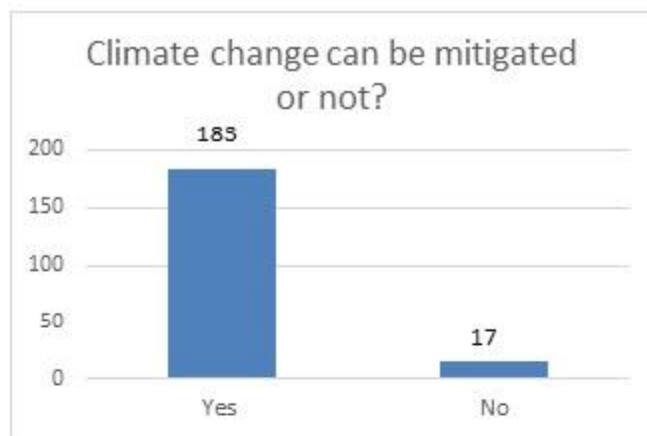
Graph 9. This graph reveals that health issues faced by people that is Allergic diseases (hay fever, rhinitis, and dermatitis).



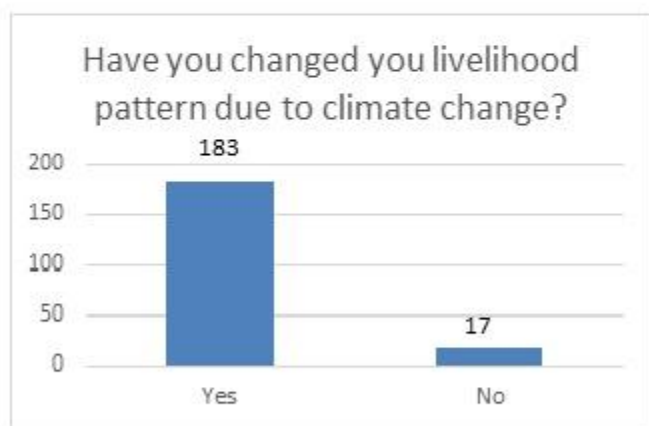
Graph 10. This graph demonstrate that changes in temprature and precipitation can cause crop damage.



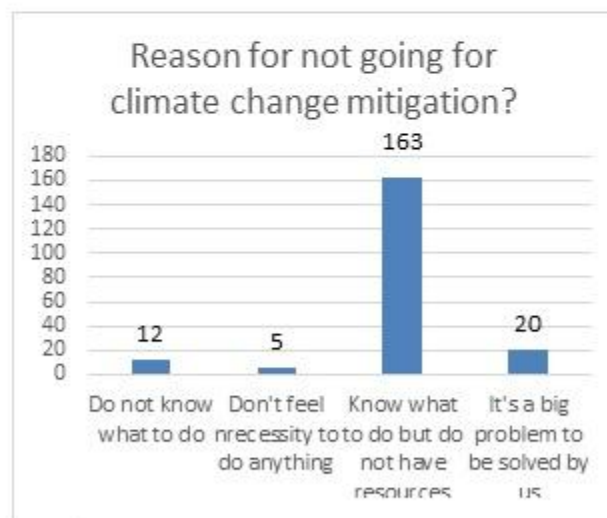
Graph 11. This graph demonstrate that weather changes by the man-made activities.



Graph 12. This graph demonstrate that people think that impacts of Climate change can be mitigated.



Graph 13. This graph tell us that people change their livelihood due to climate change.



Graph14: this geographical representation tells us that people want to mitigate impacts of climate change but neither have awareness and resources

4. Results and discussion

Almost 30% participants were of the age ranging from 18-24, 35% were from age group of 25-34, and 20% belongs to the age group 35-44 while remaining was of age between 45-54. Male participants were 32% while females were 67%. When we asked them about most concerning environmental issue about 46% participants were disturbed due to urbanization, 30% population was worried due to the air pollution, 13% were upset due to poor waste management while remaining were concerned about water resources exploitation. From the total observed population 75% were aware of climate change and its effects. About 62% respondents observed the temperature fluctuations due to climate change 22% were fearful about the food production and 15% population was concerned about the water resources. Almost 54% respondents claimed that there was a significant downfall in rain pattern while 25% were in approval of increased rainfall and 20% participants said its moderate. Approximately 48% participants were having very little greenery within 5 minute walk from their houses, 20% had fair greenery while 32% claimed that there is no greenery nearby. Around 78% population agreed that water consumption rate is too high now a day and 14% said that it is normal while only 2% said that consumption is too low remaining had no idea about consumption pattern. About 74% people examined changes in water supply due to climate change

while 26% found it normal. There were 33% people who said that they run water continuously until its cold, 31% said that water is continuously used during garbage removal, 35% claimed that it happened during hand-washing dishes. Almost 70 % of the population under study was in a favor that the increasing population and urbanization is affecting water supply in their area. About 69% of the people think that the summers are getting severe more than before in terms rising temperature. Around 71% of the people have a perception that climate change would be affecting life in future. Most of the diseases faced by people due to varying weather conditions are allergic diseases 46%, followed by Asthma 20%.

Approximately 70% of the population under study agreed that fluctuations in weather patterns can affect crop productivity and could be a cause of crop damage. Among the majority of the people 78% said that the extreme climatic conditions can result in child birth defects. It was asked that what could be the possible cause of weather change, 37% people were agreed that climate change is a major cause. Nearly 38% of the people made anthropogenic activities are responsible for this. About 89% of the respondents think that the climate change and its effects can be mitigated by proper strategic management. Around 91.5% of the population under study was being influenced by climate change in some way and have changed their livelihood style because of varying climate conditions. Almost 81% of the results decline towards a reason that we know how to mitigate climate change impacts but we do not have resources and a big proportion of the people think that it is a big issue that could not be solved by public.

5. Conclusion

Climate change is the most concerning issue of the world. Water scarcity occurs due to the climate change because during excessive heat that is result of long period of summer, the average water capacity is reduced due to the excessive usage of water resources. The most concerning environmental issue is the urbanization and temperature. The urbanization and increasing population pose a pressure on the water supply. Change in annual rainfall pattern causes water scarcity. Due to the alternation in rainfall pattern, and water shortage, the food capacity becomes decreases due to the decline in crop production and thus country face economic loss. If quick actions are not taken quickly then the country would face excessive damage of crop production, water scarcity and hunger. People are compelled to move from present area to another one to save themselves from the impacts of harsh weather conditions and thus population expansion take place. This is how water scarcity, food shortage, and urbanization take place. By this agricultural and industrial sector face scarce water supply which cause decline in food production and domestic water requirement are not fulfill. The production of food is decline then hunger take place and the vulnerability of malnutrition occur across the world. The economy become low and country goes into loss. Global warming is another factor by which climate change take place. This is due to greenhouse gas emission and burning of fossil fuels. Trees play an important role in the decline of greenhouse gas emission and absorb Carbon-dioxide (CO₂) but on the other hand deforestation occurs for the construction of roads and new buildings. Health problems such as allergic diseases (hay fever, rhinitis, and dermatitis) take place. The main cause of climate change is anthropogenic activities such as burning of fossil fuels. People want to mitigate the negative impacts of climate change but they do not have any proper knowledge that how to overcome the impacts of climate change and not have any resource and lack of awareness.

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