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Smart City Project and Reducing Green Spaces A Case Study of Dehradun City

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Abstract

Smart City Mission is an initiative by the go vernment of India to transform cities to Smart Cities. The report is an analysis of the Smart City Mission of Dehradun cityand its impact on the green spaces of Dehradun. Present time demands efficient networking, connectivity and industrialisation. The Smart City mission in India focuses on bringing economic growth and development along with sustainable development. While the government is making every effort, there is still significant deforestation which causes pollution and environment degradation. The report consists of a city survey, analysing the impacts of the smart city work on human life and related discussions. To test the hypothesis, the Chi Square test is used at a 5% significance level.

Introduction

The report is based on the Smart City Work is Dehradun, Uttarakhand. Under the Smart City Mission, the Government of India has listed 100 cities, Dehradun being one of them. The objective is to promote cities that provide core infrastructure and give a decent quality of life to its citizens. (DSCL, 2021)

The purpose of smart cities is to provide a clean and sustainable environment. Smart City mission is launched with the aim of replicating smart conditions both within and outside the cities. It emphasises on providing economic growth and to improve the quality of urban life. The concept of Smart City began in 1990s when the focus is on how the applicationof new ICT (information and communications technologies) can enhance quality andperformance of the city. (Ho, 2016)

The definition of a city can be called smart when there are investments in human capital, social and modern communication infrastructure and in quality of life managing the natural resources. (Meena et. al., 2017) Therefore to provide the growing population with the best of services, amenities and resources the government has come up with the

idea of Smart City Mission in India. In the phase 4, Dehradun is one of the cities to witness the significant transformation under the mission

Dehradun being the capital city is the core of the state of Uttarakhand. To meet the needs of the Smart City Mission in Dehradun 6 flagship missions are launched in the City. These include Smart City Mission, AMRUT, HRIDAY, Swachh Bharat, Pradhan Mantri Aawas Yojana and National Urban Livelihood Mission. It also aims to develop the city in order to

accommodate the growing population in the urban areas and at the same time extend amenities to the rural areas.

For implementing all these projects the Dehradun Smart City Limited (DSCL) and Special Purpose Vehicle (SPV) is launched in Dehradun under the Companies Act of 2013. It receives the funding from government of Uttarakhand.

Despite the efforts of the sustainable development some parts of Dehradun city of facing major deforestation. Due to the delay in the work of the Smart City many parts of the city are facing issues like bad conditions of road, pollution, deforestation, increased traffic and health related issues.

The aim of the research is to assess if the area under green spaces in Dehradun are decreasing due to the Smart City work. Along with the Smart City work, the sustainable development program should also be implemented in order to cater the needs of development as well as sustainable living. Dehradun is an area vulnerable to earthquakes and so safety of the citizens along with preserving the natural resources should be another important objective of the Smart City mission. Sustainable development is important so is the protection of resources around us.

In order to analyse the hypothesis, the Chi Square test is used in the end. The hypothesis for the report is tested at a 5% significance level. It determines whether the data matches the population. The Chi Square is a test for independence that compares two variables in a contingency table to check their relation.

Objectives

1- To analyse the green spaces reduction in Dehradun city during the Smart City work. 2-

To analyse the impact on health due to the Smart City work in Dehradun city.

Hypothesis

1- Deforestation has increased after the implementation of smart city work in Dehradun city.

2- The Smart City work affects the daily life of people as well as has negative impact on human health in Dehradun City.

Data Base

The data for the report is obtained from both primary as well as secondary sources. Dehradun Smart City portal provides for the Foundation of the report. The portal is equipped with the information about the smart city layout, missions, Dehradun Smart City Limited (DSCL), the board of directors, tenders and the organisational structure of the plan.

Along with the secondary source primary source in the form of survey was conducted in Dehradun city. Along with this the locals were interviewed with purpose of getting an insight on their opinion about the Smart City work being carried out in Dehradun.

Sources including, Academia and Shodh Ganga are used for the related articles and reference studies.

Methodology

The first step for preparing the report was to thoroughly analyse the literature work done on the topic. In order to get access to the literature work sources like Shodh Ganga and Academia were used to get access to the research papers, articles and reports based on the Smart City work, Smart City mission and sustainable development.

Data for the secondary source was obtained from the Dehradun Smart City portal and it also provided for the map work of the report. The data extracted was used to fulfil the objectives of the study.

The data for primary source was collected through a survey form made on Google forms. The Form was then distributed among residents of Dehradun city. Using the Raosoft software a sample size of 271 was obtained how to get a 90% confidence level on the research. The data collected from the forms are represented in the forms of Pie Charts and tables.

In the end the Chi square test is performed to check the hypothesis of the study and check the level of significance. Formula used for the Chi Square test is, $x^2 = \Sigma (0–E)^2E$

Where, O = Observed and E = Expected Values

The chi-squared statistic is a single number that tells you how much difference exists between your observed counts and the counts you would expect if there were no relationship at all in the population. A chi square test will generates a p-value. The p- value determines if the test results are significant or not. A low value for chi-square means there is a high correlation between your two sets of data.

Study Area

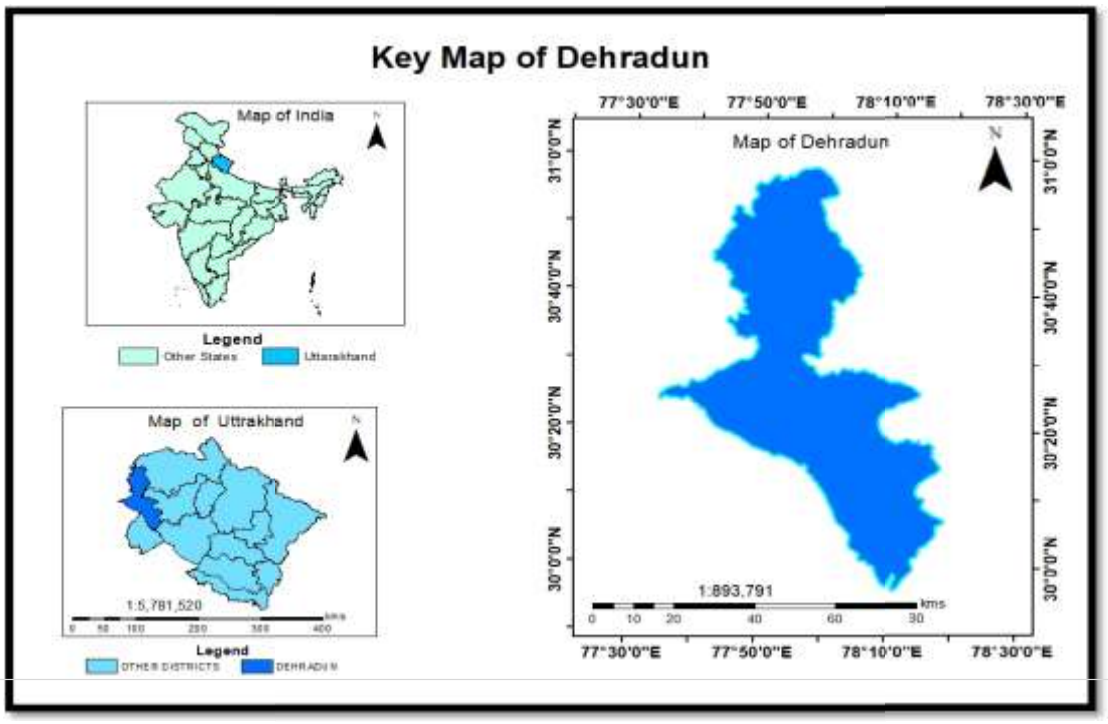
Study area for the study is the city of Dehradun, located in Nothern India in the state of Uttarakhand.

Dehradun is the capital city of Uttarakhand. It is located on the foothills of Himalayas falls under the Garhwal region of Uttarakhand. The latitudinal and longitudinal location of the city is 30.3165 N and 78.0322 E. Dehradun has an area of 3088 square kilometre and a population of 16, 96,694. It is divided into 7 tehsils and six blocks and constitutes of 767 villages.

According to the Skand Puran, Dehradun comes from the part of the region called Kedar Khand and included in Ashoka's Kingdom by the third century BC. It was annexed by the British in 1815. Finally in 1968, it was made a part of the Garhwal division. The main languages of this city are Hindi, Punjabi, Garhwali and Urdu.

Surrounded by mountains, the city has a varied topography. Dehradun constitutes of the montane as well as sub montane tract. The mountain tract includes Chakrata Tahsil and Jaunsar area. The mountain tract is followed by the submontane tract leading to the Dehradun Valley which is bounded by the Shivalik Hills in the south.

It has major portion under the Sal forest boost its economy. Total forest area of Dehradun is 1477 km2 43.7 % of the total area of the district. The Ganga runs on the north of the district and the Yamuna on the east and the west respectively.



Literature Review

India is the fastest developing economy is in the world, with time its infrastructure networks are changing drastically. People are trying to change their life and the shifting from rural areas to urban areas. (Mehra, 2015) In 2015 the Government of India launched the Smart City mission and its objectives to promote sustainable and inclusive cities that will provide core infrastructure.

During the latest years, smart cities and digital city have been recurring topics, especially after 2010. Smart city development is used to improve the quality in the cities. (Rana and Mohan, 2019) Smart cities include smart governance, smart education, Health Care, smart building, mobility, smart Infrastructures, smart Technology, energy and smart citizens. (Frost and Sullivan 2003) The concept of smart cities and its Vision India broadened when Prime Minister Modi introduced his concept of digital India.

Finally in 2015, June the Smart City Awas Yojana Mission was introduced in the country. The smart city concept evolved under the European policy makers and applied to most countries of the world.

Smart City mission also includes the construction of new municipality and the renovation of existing cities as the rural population shifts into urban areas. (Suma et. al.,

2016) Smart City mission is an emerging strategy to mitigate the problems generated by the urban population growth and Rapid urbanisation. (Hafedh and Tewoo, 2012)

Smart cities are defined by a number of factors which include sustainability economic development and high quality of life. Smart cities are not a science fiction or a long chain of Analytics. (Meena et. al., 2017) It not only deals with the scientific and economical development but also with the issues including poverty, environment disasters, global phenomenon and fast urbanisation.

In India the Smart City mission has focused on physical infrastructure and supported a healthy economic and socio cultural development. It focuses on engaging with the local people and local governance in order to understand their decision making and innovation process. The Smart City mission focuses on learning, adapting and then creating innovation in different Indian cities. (Dani and Bhalla, 2014)

Dehradun is one of the cities selected under the Smart City mission, Phase 4. The goals of the Smart City mission in Dehradun are specific measurable the realistic and time- based. (Smart City Mission Portal, 2015) Some of the initiatives made are introducing solar panels, the concept of smart parking, he beginning of metro and construction of plastic roads. Dehradun is a small city which is now becoming the hub of urbanization as most of the people from the rural villages in Uttarakhand are moving to Dehradun. Under the Smart City mission Dehradun will be made suitable to occupy such a large population. Some of the steps taken Dehradun urban under the Smart City work include the introduction of smart traffic light. The traffic lights will be made traffic control system

along with sensors in artificial intelligence. Traffic control is put into consideration and weighs flyovers are constructed in different part of the City. The metro project in Dehradun will also be beginning soon, connecting Roorkee Haridwar Rishikesh and Dehradun.

(DSCL, 2021)

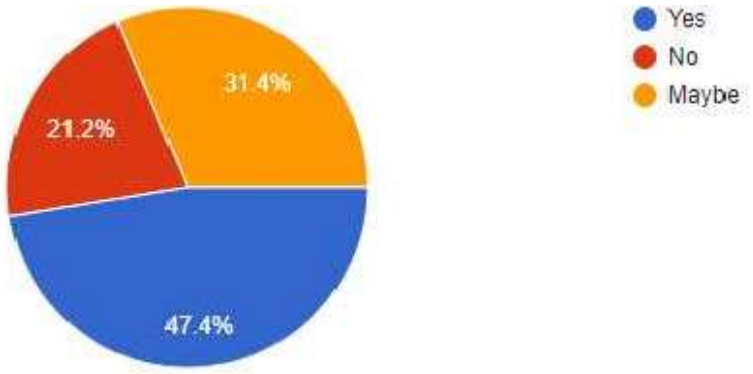
Despite the goals of sustainable development in the smart cities mission Rapid urbanization has created stress on the local resources. The four efforts should be taken by the city planner's, policymakers and urban local bodies to make urbanization more sustainable. (Thapliyal and Panwar, 2020) Sustainable organisation puts into consideration all the social economic and environmental factors.

Dehradun city is famous for its natural beauty and tourism. It has not been long since Dehradun was declared as the capital of the state of Uttarakhand and ever since then there has been a boom in the population of the city. Be it education or tourism, Dehradun faces a large cluster of population and therefore, urbanization is the demand of the time. Therefore urbanization should meet with sustainable development in along with the Smart City work the resources and heritage of Dehradun should be preserved. (Kishore, et.al., 2014)

Sample Respondent

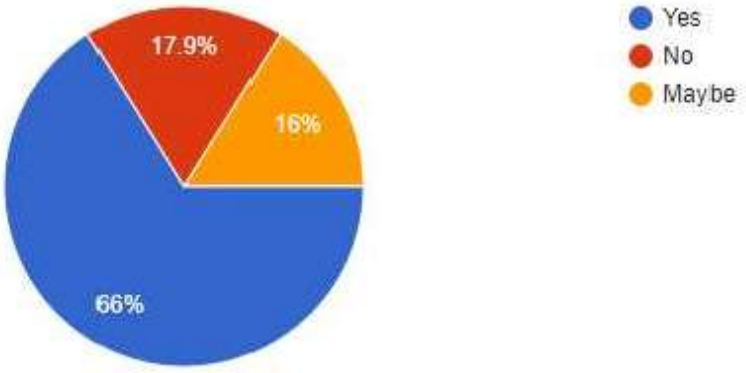
A survey was conducted in Dehradun city regarding status of smart city work. To calculate the sample size, Raosoft software was used. The sample size obtained was 165 at a confidence level of 80%. Following are the results and observations from the survey:

1- Has the smart city work in Dehradun affected your daily life?



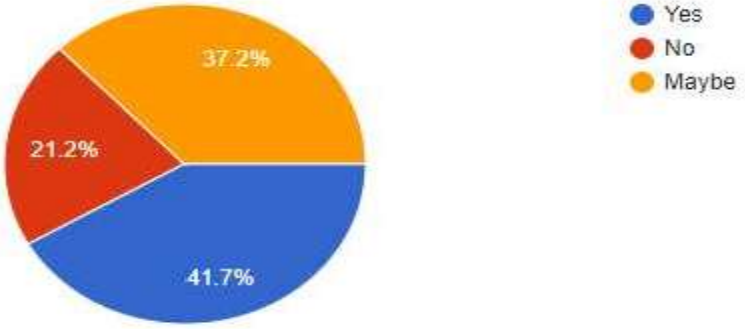
According to the survey, 47.7% state that the smart city work has affected their daily life. This is in terms of pollution, road ditches and health issues (breathing problem, eyes irritation and accidents). People who visit Dehrdaun from different states or cities witness the changes in temperature, tree cover and pollution in the city. 31.4% people are unsure about the affects of smart city work on their daily life and 21.2% people state they do not witness any affect.

2- Do you feel like the green spaces around you have been reducing due to the Smart City work in Dehradun?



66% of the people believe that the smart city work has led to significant deforestation and reduction of green spaces in Dehradun, while 17.9% feel that it is untrue. The major deforestation areas include, Rajpur, Sahastradhara, Thano, Chakrata, GMS Road and Clement Town.

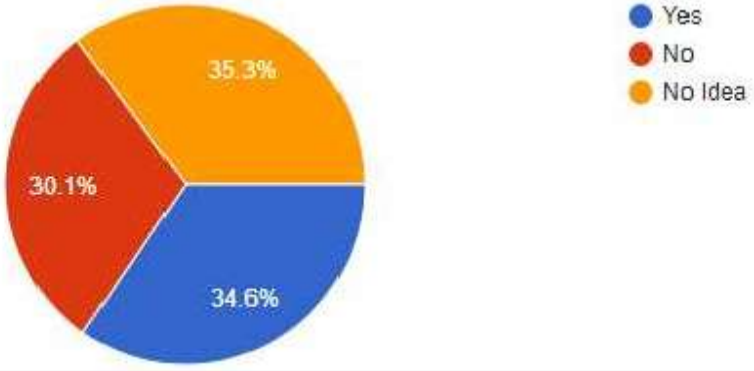
3- Are there any n gative impacts on health due to the smart city work?



Among the other effects of the smart city work, one of them is impact on health. 41.7%

people have either witnessed or experienced the negative impact on health. The concerns regarding health involve, respiratory issues, allergies, impact on visibility, increased pollution and accidents.

4- Are there initiatives made to increases the green spaces in Dehradun?



The people strongly believe that due to the reducing pace of the smart city work deforestation has increased. 34.6% people have information about the plantation drives being carried out in the city while, 30.1% people feel no initiatives are being made.

Among 165 people, 35.3% are unsure about any plantation or forestation practices in the city. Some NGO's and organisations that have contributed fruitfully include, Making A Difference (MAD), JOY NGO, Samarth India Foundation, Rotary Club, and Dhad Foundation.

Discussions

In order to assess the responses received and test our hypothesis, the Chi Square test is performed and its significance is checked at 5% confidence level.

1- Hypothesis testing for - Deforestation has increased after the implementation of smart city work in Dehradun city. (Alternate Hypothesis)
Deforestation has not increased after the implementation of smart city work in Dehradun city. (Null Hypothesis)

Degree of Freedom = (c-1)(r-1) where, r = Number of rows and c = Number of columns.

Therefore, Degree of Freedom (p) = (3-1)(2-1) = 2 At p = 2, table value is 5.99.

Observed Value Table

	YES	NO	MAYBE	TOTAL
Deforestation	110	31	24	165
Initiatives Taken	54	55	56	165
TOTAL	164	86	80	330

Expected Value Table

	YES	NO	MAYBE	TOTAL
Deforestation	82	43	40	165
Initiatives Taken	82	43	40	165
TOTAL	164	86	80	330

Calculation Table

O	E	(O-E)	$(\square - \square)^2$	$\frac{(0-E)^2}{E}$
110	82	28	784	9.6
54	82	-28	784	9.6
31	43	-12	144	3.3
55	43	12	144	3.3
24	40	-16	256	6.4
56	40	16	256	6.4

Since, $\square^2 = \Sigma \frac{(0-E)^2}{E}$

Therefore, $\square^2 = 38.6$ (Calculated Value)

Since the calculated value is higher than the table value therefore the null hypothesis is rejected. Hence, it can be concluded that the deforestation has increased since the smart city work commenced in Dehradun.

2- Hypothesis testing for - The Smart City work affects the daily life of people as well as has negative impact on human health in Dehradun City. (Alternate Hypothesis)
The Smart City work affects the daily life of people but has no negative impact on human health in Dehradun City. (Null Hypothesis)

Degree of Freedom = (c-1)(r-1) where, r = Number of rows and c = Number of columns.

Therefore, Degree of Freedom (p) = (3-1)(2-1) = 2 At p = 2, table value is 5.99.

Observed Value Table

	YES	NO	MAYBE	TOTAL
Negative Impact on Health	74	33	58	165
Impact on Daily Life	77	39	49	165
TOTAL	151	72	107	330

Expected Value Table

	YES	NO	MAYBE	TOTAL
Negative Impact on Health	78	36	51	165
Impact on Daily Life	73	36	56	165
TOTAL	151	72	107	330

Calculation Table

O	E	(O-E)	$(\square - \square)^2$	$\frac{(0-E)^2}{E}$
74	78	-4	784	10.1
77	73	4	784	10.7
33	36	-3	144	4.0
39	36	3	144	4.0
58	51	7	256	5.0
49	56	-7	256	4.6

Since, $\square^2 = \Sigma \frac{(0-E)^2}{E}$

Therefore, $\square^2 = 38.4$ (Calculated Value)

Since the calculated value is higher than the table value therefore the null hypothesis is rejected. Hence, it can be concluded that the smart city work has affected the daily life of people and also caused negative health impacts.

Results

The report can thus be concluded by stating that while the smart city work is going on, sustainable development needs to be practised. Growing economically is the need of the time. Growth means rising in terms of industrialisation and urbanisation for which the smart city mission is beneficial.

Along with the benefits of the smart city as responsible citizens we need to make our contribution towards increasing the green spaces by planting and preserving greenery. At the same time the smart city work requires efficient functioning which needs to be kept under proper checks under the government.

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