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Review on Issues and Challenges to Sustainable Urban Development in the State of Uttarakhand

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ABSTRACT

State of Uttarakhand in India have gone through transitional change in the last decade. Urban population share has increased from ten percent to near about thirty percent of the total population. Due to this rapid urbanization of the state of Uttarakhand, the state is finding difficulty in attaining sustainable development. Through this study, the researchers tried to identify the major challenges and issues which are blocking the urban areas of Uttarakhand from attaining sustainable development through a systematic review framework given by Arksey and O'Malley. The framework is a six-stage methodological framework for conducting scoping studies with the sixth stage being optional. The article attempts to highlight the issues and challenges which can be evaluated by researchers, academicians and policy makers in India and the world to study, evaluate and analyze the sustainable urban development of Uttarakhand. The methodology can also be used by researchers, academicians and policy makers to identify the challenges of sustainable urban development for any hill or mountain side terrain.

Index-words: *Sustainable Development, Urban, Challenges, Uttarakhand, Himalaya.*

I. INTRODUCTION

State of Uttarakhand in India is passing through a chain of transformations on all fronts to achieve the objectives of growth that must be sustained over time. During the process of growth, the changes take place at all the fronts of development, namely social, economic, and cultural. These fast social and environmental changes have come along with stark challenges of population growth, ecological decay and unbalanced land. In addition, challenges are also with creation of affordable housing markets, stabilizing poorly resourced public sectors units, lack of jobs in both formal/informal sectors and unhygienic living conditions.

The state Uttarakhand is a state in the north of India as shown in figure 1. The state is split into two parts: Garhwal and Kumaon, with a total of 13 districts. Dehradun, the winter capital, and largest city in the state, also serves as a railhead. Bhararisain, a town in Chamoli district's Gairsain Tehsil, has been designated as Uttarakhand's summer capital. On November 9, 2000, the state of Uttaranchal became India's 27th state that was formed out of Uttar Pradesh, and in January 2007, the new state changed its name to Uttarakhand, which means "northern region," the old name for the area. The state is having 113 town and cities divided into eight municipal corporations, 25 municipal councils, 32 notified areas, nine army cantonment board and 40 census towns for administrative purposes.



Fig. 1. State of Uttarakhand (Source: veethi.com)

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Being one of the newest states of India, its urge for economic development have put up a stain on the infrastructure within cities (Prakash C, Abhinav, & Bhagwati, 2018; Colantonio & Dixon, 2011). Unplanned urban development is leading to major environmental concerns such as the depletion of forest area, loss of biodiversity, and landslides. The proportion of the urban population living in environmentally unsafe areas, below the poverty line, without access to sanitation, without access to drinking water, and without access to roads, has increased, respectively, by 20, 25, 10, 7, and 6 per ent in Uttarakhand over the past two decades (Tiwari, 2023).

It is known that urban areas must develop in a planned way where the needs of the present generation do not conflict with those of the future. The objectives of any development activity are to satisfy the needs of the population without distorting the relations between nature and society. If the needs are not reached, then the development will not be inclusive. It will result in inequality in the use of natural resources, reduced efficiency in energy system and imbalance in socio-demographic system. At the end, this will lead to emergence of crisis and reduced economic growth. These challenges are driving the policymakers to go for sustainable development.

In hilly region, climate change has created stress to urban ecosystems by increasing the rate, severity and power of extreme weather events (Durga Rao, Rao, Dadhwal, & Diwakar, 2014; Prakash C, Abhinav, & Bhagwati, 2018). Growth of an urban area or urbanization cannot slowdown, but it can be framed in a sustainable way through synergy between urban-rural land use planning. For campaign of sustainable urbanization, policymakers at various levels are looking for the optimal urban sustainability significance. The region of Uttarakhand had experienced fast urbanization during the last two decades. The process of urbanization has been unplanned, uncontrolled and unregulated (Prakash C, Abhinav, & Bhagwati, 2018; HPEC, The High Powered Expert Committee, 2011). Recently, the remote areas of the region are facing the problem of unregulated urbanization. This happened because of promotion of these areas as a tourist destination without proper land use plan. These is disrupting critical ecosystem, reduction of natural resources and increased inequalities in socio-demographic and finally resulted in decreasing drinking water availability prone to natural extreme weather events, health insecurity and increase in waste generation.

In the course of urbanization of a region, there are certain challenges that will come in front of institutions and policymakers. These challenges are employment, improving access to social infrastructure, reducing impact of pollution, natural disasters, energy conservation and other risks. In the urban area of developed countries, those who are having accessibility to basic public services are facing the issues of becoming more resourceful in the use of water and energy. They are also unable to reduce and reuse the waste generation. Cities like New York and London in particular, may have well-planned resource systems but they also have higher carbon footprints. In addition, climate change impact is increasing cities' susceptibilities. It is also putting stress on the adaptive abilities of the deprived (Nations, 2013).

Available studies of researchers on the issue of sustainable development did not give importance to the social aspect as to the economic and environmental aspects (Vallance, Perkins, & Dixon, 2011). The less attention to social aspect might be due to its intangible nature and challenge in defining its goals. Therefore, it is difficult to be executed and judged (Hikmat , Yamen , & Hadeel., 2019; Al-Dahmashawi, Hassan, Sabry, & Mahmoud, 2014). To understand the framework of development of urban areas in a sustainable urban boundary, a set of indicators, frameworks and assessment tools have been developed (Li-Yin, Jorge, Mona, & Zhang, 2011; Briassoulis, 2001). The urban indicators for understanding sustainability are critical for helping on target setting, performance assessments and enabling communiqué among the policy makers, experts and people living with urban boundary (Verbruggen & Kuik, 1991; Li-Yin, JJorge, Mona, & Zhang, 2011).

The rest of the paper is organized as follows: a brief discussion of available literature, limitations of existing literature as well as the theoretical underpinning that has been mentioned in the second section. Methodology has been presented in section three in which the deduction method has been applied to understand the issues and challenges faced by the region of Uttarakhand during the process of urbanization. Finally, findings, conclusions and policy implications of the study has been given.

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A. Issues and Challenges for Sustainable Urban Growth for the State of Uttarakhand

One of the rapid growing states in India is the Himalayan state of Uttarakhand. According to World Bank's study on the state's GSDP growth, the economy is mainly dependent on the tertiary and non-agriculture sectors. The report also highlighted that decrease in poverty in the state was the most rapid among all the states in the country after 2005. In spite of this, some of Uttarakhand's hilly districts record higher levels of poverty than its other areas. Economic inequality is an issue of the state.

Twenty four percent of the land surface of earth are either hills or mountains (UNEP, 2002) and inhabitants of twelve percent of the world's population (Huddleston, Ataman, & d'Ostiani, 2003; Prakash C, Abhinav, & Bhagwati, 2018). Macro-climate change, limits of land, ecological sensitivity, geographic remoteness and less infrastructural growth becomes a crucial issue for sustainable society for this region (Meybeck, Green, & Vörösmarty, 2001; Prakash C, Abhinav, & Bhagwati, 2018). Mountains and hilly regions are sources of a various ecosystem services, which include water sources and soils that directly affect the economy and social life of a large population both in mountains and in adjoining plains. These types of regions provide water to nearly half of the world inhabitants living along the river valleys situated far away from hilly regions (Viviroli, Dürr, Messerli, Meybeck, & Weingartner, 2007). The major rivers of the world have their origin from glaciers or mountains. The largest share of world's forests is in the mountains also which does not only start universal biodiversity hot spots, but also regulates and checks climatic circumstances and contributes towards reduction in global warming because they serve as carbon sinks. The region is also home to various indigenous people. They have progressed from diversity of cultures that comprise traditional knowledge, resource development and environmental conservation practices, agricultural and food systems, and adapting and coping mechanism to environmental changes (ICIMOD, 2010).

The natural landscape, the difficult terrain and the economy of the region were not conducive to the development of urban centres until very recently. Settlement used to be scattered with no considerable industry and even the tradition of crafts that was there was not meant for commercial transaction. The population were not able to make full exploitation of the local resources. The road and communication networks were not developed and even the number of wheeled vehicles was limited. Because of all of this, there was no urban centres in the region as late as the 20th century.

Tourism is one of the key segments of the economy for the state of Uttarakhand and can subsidize the future development in the region. It will give push for sustainable growth of the state. The growth of tourism must be inclusive (focusing on equity and wealth distribution) and sustainable (promoting domestic culture and job creation) to contribute to achieving the Sustainable Development Goals (SDGs).

Therefore, to go for sustainable urban development, first one needs to understand the challenges and issues that are impeding the sustainable growth for the urban areas of Uttarakhand.

II. LITERATURE REVIEW

In September 2000, world leaders embraced the United Nations Millennium Declaration (Nations, 2013) (United Nation General Assembly resolution 55/2). This created the platform of the beginning for the pursuit of the MDGs. An agreement was framed around the importance of human development and poverty reduction. The world touched the poverty target before 2015. In developing countries, the percent of people living on lower than $1.25 a day fell from 47 percent in 1990 to 22 percent in 2010 (Nations, 2013). There was a decrease of 700 million people of extreme poverty in 2010 compared with 1990 according to UN report. Still, results were below expectations. It is vital that the international community of institutes and policy makers to take bold and joint steps to fast-track development in achieving the Millennium Development Goals (Nations, 2013).

Sustainable development aims towards an ambitious agenda to transform the world by 2030, where everyone benefits from development efforts. Though an essentially challenging concept, it still holds a broad moral interest. The concept of sustainable development lies in an endeavour to combine global concerns on environmental issues with holistic economic issues such as inequality, job creation, climate change and building peaceful and inclusive societies.

Sustainable Urban Development must be the aim of

all developing countries. The International Union for Conservation of Nature and Natural Resources was first to coin the term 'sustainable development' in 1980 (IUCN, 1980). Sustainable city is a city "where achievements in social, economic and physical development are made to last" was defined by The UNCHS (United Nations Conference on Human Settlement). A Sustainable city will be a city that will possess lasting supply and optimum utilization of the resources on which its growth depends and a lasting protection from environmental hazards which may impede any progress achievements.

Sustainable urban development is important because urban areas nowadays contribute significantly to the Gross Domestic Product. They contribute increasingly to export and is a rich place for capital formation. Cities offer quality education and healthcare; arts and science; technology and innovation and transport and communication.

Many cities in the world are experiencing growth in urban population. The globalization and migration of population from the rural to urban areas has hastened the process of urbanization in India. In India, the metropolitan cities like Delhi, Mumbai, Chennai and Kolkata are experiencing pressure of urban population growth. The same can be seen in hilly cities like Dehradun, Dharamshala, Darjeeling, etc. The growth of urban population has given rise to sundry of urban problems such as unemployment, housing, sanitation, safe drinking water, etc. So, there is an utmost need to study the issues and challenges for sustainable development facing the cities in Himalayan range belt.

For promotion of sustainable development, international institutions, governments at different levels, policymakers and researchers are seeking the best urban sustainability value. Study of understanding on the state of, or changes to, cities and towns in relation to better urban sustainability performance, sets of monitoring indicators, plans, policy and assessing tools, have been framed (Li-Yin, Jorge, Mona, & Zhang, 2011; Briassoulis, 2001). Identifying challenges and urban sustainability indicators helps in setting the target, assessing performance and facilitates communication between policy makers, experts and the public (Verbruggen & Kuik, 1991; Li-Yin, Jorge, Mona, & Zhang, 2011). An extensive range of urban sustainability indicators is therefore in use through the range of different cities and regions, which vary according to their particular needs, challenges and goals. However, one is getting diverse results in applying urban sustainability indicators in various situations and sometimes little gain in sustainability performance. This poor result is due to practical field conditions and not identifying correct challenges that vary from one place to other (Selman, 1999; Seabrooke & Ma, 2004). Poor selection of challenges and indicators monitoring the sustainable urbanization process is becoming an issue (Briassoulis, 2001; Li-Yin, Jorge, Mona, & Zhang, 2011; Vladimir, Annette, & Evans, 2016).

A. Theoretical Underpinning Behind Sustainable Urban Development

Rapid development of cities and towns, urban development is increasingly getting complex in nature. Physical urban forms were only taken into consideration for designing urban areas and studying its dynamics previously. At present time non-physical factors (e.g. human and society) are present and more fundamental rules are hidden for the sustainable development of cities.

Studied by researchers and policy makers, urban system is becoming more and more complex in both forms and nature. Thus, how to understand, analyze and depict such a complex dynamic system has become an urgent problem to be solved by planners and policy makers (Wensheng & Qiang, 2013).

Past research based on reductive thinking encountered great challenges in interpreting the formation of urban structure, urban spatial evolution, and laws of human activities in cities, etc., which fails to reveal deeper causes and rules of urban dynamics. By the end of 1980s, the founding of Santa Fe Institute directly facilitated and led to the emergence of complexity science. The complexity science achieved rapid development within less than 20 years and has become the focus of attention in the scientific social research field at present. On one hand, the theories of complexity science greatly change people's ideas of urban system. On the other hand, research methods of complex system particularly make powerful means available to explore urban system (Wensheng & Qiang, 2013). The view of living systems as self-organizing networks, whose components are all interconnected and interdependent, has been expressed repeatedly, in one way or another, throughout the history of philosophy and science. However, detailed models of self-organizing systems could be formulated only very recently, when the new mathematical tools

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that allowed scientists for the first time to describe and model the fundamental interconnectedness of living networks mathematically became available.

Although there is a variety of theories and no consensus has been fully reached on complexity and complex systems, some important conclusions have been approved by the scientific circle. Complex systems exist objectively and they are not determined by human knowledge. There are nonlinear interactions among microscopic individual components of complex systems and it is impossible to deduce all overall characteristics according to partial attributes. Complex systems are definitely dynamic, some novel characteristics of which spontaneously come into being during evolution. Complex systems are not intuitively presented, and openness is the fundamental condition for complex systems. Adapting to the urban dynamics is the major cause of complexity. Overall, complex systems theory is still a theoretical system remaining to be constantly improved and expanded by the concerns and efforts of scientists from different fields of all countries. The research methods of complex systems theory and complex systems have made some crucial concepts and methodologies available to study urban problems.

Many elements within an urban area such as social organizations, people flow, material flow and accumulation of historical culture, etc. are assembled, blended, fermented, and synthesized. So, a city can be regarded as a complex giant system. All complex systems have different characteristics, structures and functions. An urban system is just such a structure made up of several issues and challenges. The issues and challenges constituting cities are both in material form (including air, sunshine, soil, water, building and organisms) and in nonmaterial form such as belief, religion, thought, ideology, economy and society. There are not only a great variety of such elements, but also various connections among these elements and their sub-elements. Thus, different kinds of coupling mechanisms constitute a huge system like a city.

III. METHODOLOGY OF THE STUDY

The researchers conducted a systematic scoping review of peer-reviewed literature for this paper, with focuses on urban development and sustainability for the state of Uttarakhand (Shephard et al., 2006; Bryman, 2012). Arksey and O'Malley's systematic review framework was taken as reference for the review process (2005). The review has been into five stages. The first stage is identifying the research question, the second is to identify relevant studies, the third is selecting relevant studies, the fourth stage is to chart the data in tabular form if possible and the final stage is to collate, summarize, and report the results.

The central research question of the paper is "what are the issues and challenges for sustainable urban growth for the state of Uttarakhand". For review of the literature, particular journals were not predetermined; instead, the researchers used the following sources: EconLit (EBSCO), JSTOR, ScienceDirect and Wiley Online Library. With respect to research questions, journals and articles were searched from electronic databases with systematic review procedure. For identifying relevant studies, the first inclusion criteria were using the key terms like "sustainability", "sustainable development" and "Urban development" to search for identifying journals and articles. Terms like "social", "ecology or environment" and "economic" were also used to identify more papers. Government reports of country and the state have been considered for this study. Reports from NITIAAYOG planning and implementation body of India were especially helpful. For exclusion criteria, the reearchers specifically targeted the papers and articles relevant to the state of Uttarakhand. The flow chart given below in Figure 2 describes the process.

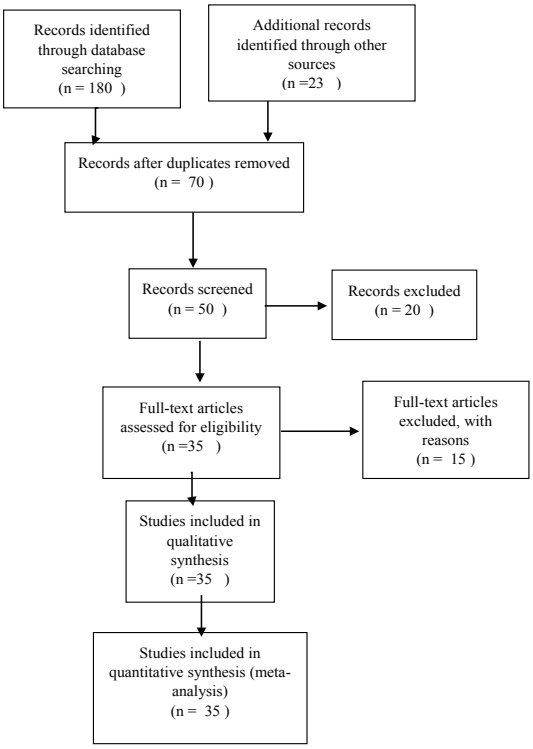


Fig. 2. Systematic review process

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Findings of the study after the systematic review process are represented in Table I.

TABLE I
MAJOR FINDINGS AFTER SYSTEMATIC REVIEWING PROCESS

SL. No	Author	Journal/Report/ Book Chapters	Key Issues and challenges identified
1	Prakash C. Tiwari, Abhinav Tiwari and Bhagwati Joshi, 2018	Journal of Urban and Regional Studies on Contemporary India	Land use patterns, Water management, Economy & employment, Environment impact, Natural resources
2	Michel Meybeck, Pamela Green and Charles Vörösmarty, 2001	Mountain Research and Development	Water resource management, Land use pattern
3	Vladimir Strezov, Annette Evans and Tim J. Evans, 2016	Sustainable Development	Economic, Social, Political
4	Govt. of India	Water and Sanitation Program	Water
5	William Seabrooke, Stanley C.W. Yeung, Florence M.F. Ma, Yong Li, 2004	Habitat International	Reconciling public and private ordering of land use, Environmental impact, Electricity, Transport, Buildings
6	Deena Mahmoud Al Dahmashawi; Doaa Kamal Eldin K. Hassan, Hanan Mostafa K. Sabry and Shaimaa Mohamed K. Mahmoud, 2014	Journal of American Science	Work & income, Education and skills, Social capital, Wellbeing
7	Harmen Verbruggen and Onno Kuik	Book Chapter	Natural resources, Economic, Social
8	Hikmat H. Ali, Yamen N. Al-Betawi and Hadeel S. Al-Qudah, 2019	International Journal of Urban Sustainable Development	Urban form and land use, Access to services, Open spaces, Transportation Availability, job Accessibility, Place to live
9	Dr. I. C. Awasthi and Dr. Bhaskar Awasthi, 2016	International Journal on Arts, Humanities, Social Sciences & Business Studies	Migration, Economy, Per capita income
10	Sandeep Tambe, Ghanashyam Kharel, M. L. Arrawatia, Himanshu Kulkarni, Kaustubh Sandeep Tambe, Ghanashyam Kharel, M. L. Arrawatia, Himanshu Kulkarni, Kaustubh Mahamuni, and Anil K. Ganeriwala, 2012	Mountain Research and Development	Ground water, Rainwater harvesting, Climate change adaptation
11	Sultan Singh Jaswal, 2014	Journal of Tourism & Hospitality	Tourism, economy, Undesirable social and cultural change:
12	Helen Briassoulis, 2001	Journal of Environmental Planning and Management	Environment, Waste management, Natural resource management, Economy, Energy Supply, Green spaces
13	Niti Aayog, 2018	Govt. of India Report	Tourism, Water management, Waste management, Economy, Air pollution, Health, Natural resources, Energy, Traffic management

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14	Li-Yin Shen, J. Jorge Ochoa, Mona N. Shah and Xiaoling Zhang, 2011	Habitat International	Transport efficiency, Economy, Policy, Governance, Land use plan, Social welfare, Waste management
15	Wilhelm Lerner	Arthur D. Little Future Lab	Multimodal transit system, Pollution
16	Abdul Bari Naik, Subita Sharma and Rajni Sharma, 2012	International Journal of Scientific and Research Publications	Energy Consumption, Education, Gender Equity, Employment, Waste management, Tourism, Local economy
17	Tara Vishwanath, Somik V. Lall, Siddarth Sharma, Nancy Lozano-Garcia, Hyong Gun Wang and David Dowal, 2013	The World Bank	Tourism, Water management, Waste management, Economy, Air pollution, Health, Natural resources, Energy, Traffic management
18	Mussorie Dehradun Development Authority, 2017	Govt. of Uttarakhand Report	Energy Consumption, Education, Transport, Gender Equity, Employment, Waste management, Tourism, Local economy
19	Ministry of Urban Development, 2014	Govt. of Uttarakhand Report	Energy Consumption, Education, Transport, Employment, Waste management, tourism, local economy
20	Ministry of Urban Development, 2014	Govt. of Uttarakhand Report	Energy Consumption, Education, Transport, Employment, Waste management, Tourism, Local economy
21	Institute For Human Development, 2018	Govt. of Uttarakhand Report	Education, Transport, Employment, Waste management, Tourism, Local economy
22	Ravi Chopra, 2014	Oxfam India	Governance, Local Economy, Climate Change
23	Pooja Singh, P.S. Chaini and M. Parida, 2014	Journal of Environmental Research and Development	Transport, Pollution, Land use
24	I. C. Awasthi and Bhaskar Awasthi, 2016	International Journal on Arts, Humanities, Social Sciences & Business Studies	Local economy, Synergy of rural and urban area, Tourism, Poverty
25	Abdul Bari Naik, Subita Sharma and Rajni Sharma, 2012	International Journal of Scientific and Research Publications	Tourism, Economy, Waste management, Social security
26	Shipra Rajesh, Suresh Jain and Prateek Sharma, 2018	Ecological Indicators	Water, Economy, Energy, Gender equality
27	Vanessa Rauland and Peter Newman, 2016	Journal of Economic Literature	Economic, Real estate, Employment
28	Debolina Kundu And Dibyendu Samanta, 2011	Economic And Political Weekly	Governance
29	Jitender Saroha, 2016	Springer (Book Chapter)	Sanitation. Water, Transportation, Employment
30	Eric Denis, Partha Mukhopadhyay And Marie-Hélène Zérah, 2012	Economic and Political Weekly	Governance, Employment
31	Harsimran Kaur and Pushplata Garg, 2019	Cities	Land use, Environment

32	Kavitha Shanmugam, Anju Baroth,Sachin Nande, Dalia M. M. Yacout, Mats Tysklind and Venkata K. K. Upadhyayula, 2019	Sustainability	Transportation, Environment
33	Pradeep Rawat, Charu Pant and Hari Nipanupud, 2016	Earth Science Informatics	Land use
34	Anoop Kumar Shukla, Chandra Shekhar Prasad Ojha, Ana Mijic, Wouter Buytaert, Shray Pathak, Rahul Dev Garg and Satyavati Shukla, 2017	Hydrology & Earth System Sciences Discussions	Land use, Water
35	Mahesh Chandra Sati and Rajendra Prasad Juyal, 2008	Mountain Research & Development	Economy, Gender

From systematic review of the various issues and challenges the researchers identified the following:

1. Degrading urban water management
2. Unplanned urban sprawl and land use
3. Inefficient public transport
4. Lack of employment opportunities and migration of population
5. Unplanned tourism development
6. Clean energy
7. Waste management
8. Urban governance

1. Degrading Urban Water Management

Zhou, Shi, Wang, Yu, & Gao in their study using GIS and remote sensing applications analyzed the river network changes of Shenzhen from 1980 to 2005. They concluded that rapid urbanization has led to ecological degradation of water sources and rivers, such as disappearance of water bodies and wetland and the outward expansion of the urban land. The same is happening to state of Uttarakhand. Nearly 65% census cities and towns in the state of Uttarakhand located on the ridges and the mountain slopes in Uttarakhand are the sources of a large number of springs, rivers and streams. These natural springs, rivers and streams do not only create sources of water supply to the towns and cities themselves, but they also provide 15–50% freshwater to the downstream rural areas of the state. The changing land use pattern and decline in forest area have disrupted the hydrological system of towns and cities in Himalaya and have also decreased ground water recharge (Ives, J.D, 1989; Prakash, Abhinav,& Bhagwati, 2018). Since, portion of the rainfall has vanished through surface runoff without recharging the groundwater reserves in urban areas, the groundwater reserve is diminishing alarmingly (Rai & Sharma, 1998; Tambe, et al., 2012; Prakash, Abhinav & Bhagwati, 2018). Some studies mentioned that the above changes had resulted into (i) Decrease of stream discharge; (ii) springs are getting dry and (iii) declining size of urban lakes (Rawat, 2009; Valdiya & Bartarya, 1991; Tiwari and Joshi, 2012a).

The hydrological investigations revealed that 25% to 41% of natural springs had dried up; 3% to 7% of wetlands were exhausted; and 11% to 47% water discharge had declined in springs and streams within and around urban areas of Shimla, Solan and Hamirpur in Himachal Pradesh and Almora, Pauri and Ranikhet towns in Uttarakhand during 1985 and 2015. Further, some researchers observed that 45% natural sources had dried, 21% had become seasonal, and stream discharge had declined by 11% in the heavily urbanized Lake Region of Nainital during 1985–2015. Consequently, 87% urban centres and 65% villages situated in the rural fringe of towns and cities in Himalaya are facing acute shortage of freshwater (Prakash, Abhinav, & Bhagwati, 2018; Tiwari and Joshi, 2012). Drinking water quality of urban lakes had degraded due to their silting and pollution. Bathymetric investigations revealed that capacity of lakes in Uttarakhand had decreased on an average by 5,494 m3 due to silt formation. It has also been observed that runoff generated by urban systems is much higher than that of forests and agricultural lands (Valdiya & Bartarya, 1991) , consequently, the deluge rate of urban areas was 35 times higher compared to flood rate of forests in the region (Rawat, 2009; Prakash, Abhinav & Bhagwati, 2018).

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According to government of India's report on water supply and sanitation for some districts in the states of Uttar Pradesh and Uttarakhand (popularly known as Swajal Project) during 1996-2003, they became a successful model to be implemented in India (Lall, 2015). The success of the project stimulated the Government of Uttarakhand to improve its coverage to other districts within the state, adopting a program approach. The project had a total budget of US$ 224 million of which the World Bank has allotted US$ 120 million credit limit (Lall, 2015). Operations started in November 2006 and concluded in June 2012. However, the benefit of the project is yet to be passed on to the population. Groundwater springs in the state, which gives support to millions of people across the state of Uttarakhand, are either increasingly parching, or becoming periodic. This causing despair to urban population of the state. According to the report published by NITIAAYOG (Report of Working Group II Sustainable Tourism in the Indian Himalayan Region, 2018), of some four million springs in the hilly region of northern India, at least thirty three percent is drying up and more than fifty percent decreased their water release.

2. Unplanned Urban Sprawl and Land Use

Negative sentiment against urban sprawl has emerged in last few years. Many researchers had concluded that key pushing forces that are changing the natural landscape and affecting ecosystem of sustainable development in the mountain regions is land use (Ives, J.D, 1989; Jandl, Borsdorf, van Miegroet, Lackner, & Psenner, 2009; Prakash, Abhinav & Bhagwati, 2018). Rapid land use changes because urban growth is creating dreadful conditions and disorder of the ecosystem services (Buytaert, Cuesta-Camacho & Tobón, 2011). Countless loss of biodiversity and interference to ecosystem in the mountains is happening due to a change in structure and functions (Borsdorf, Tappeiner & Tasser, 2010). Some literature had also identified that the urban growth and resulting land use have disrupted the hydrological regimes of Himalayan headwaters (Ives, J.D, 1989; Prakash, Abhinav & Bhagwati, 2018). The studies on middle Himalaya, Shiwaliks and Terai region have shown that the quantity of runoff from urban areas is much higher compared to the amount of overspill from other categories of land, particularly, forests and horticulture (Shukla et al., 2018). The increasing density of construction in urban areas of Himalaya is causing great depletion of underground water resources due to reduction in groundwater recharge (Tiwari and Joshi, 2015; Haigh, 2002; Rawat, 2009). In addition, if one considers land use along major transport corridors, he/she will discover that challenges lie there also. All the primary radial transport routes, particularly in cities of Dehradun, Haridwar, Roorkee and Haldwani the cities are noticeable with high-density unregulated developments. This leads to underutilization of the transport, increase in travel times, increase in pollution, and fall in the productivity of the urban economy (Smart City Dehradun, 2017).

3. Inefficient Public Transport

There has been extensive research by both government, financial and academic institutions on urbanisation trends and the need for infrastructure development as a vehicle for economic and social development. Both locally and internationally, there is an increasing realization that cities are the engines of growth and transportation acts as a backbone to social and economic development of the world.

Transport overtakes all other infrastructure concern and has the biggest impact on city competitiveness and transportation is the most serious challenge facing the city's infrastructure across cities of the world. In a survey conducted by Siemens and presented in the 'Megacity Challenges: A stakeholder perspective' 522 stakeholders were surveyed in 25 cities across world. The report concluded that there is a general consensus of the largest proportion of 85% of population which put investment requirements in the coming 5-10 years which is the highest in the transportation sector with transportation ranked much higher above housing, water, healthcare, environment etc. (Hazel, 2007).

Developed and developing cities in the world are facing the challenge of traffic congestion, increasing rate of road accidents and higher emission of greenhouse gases. In the words of Rudyard Kipling "transport is civilization". "Cities are sprawling with the 'haves' escaping to areas with better living conditions and the 'have nots' trapped and increasingly marginalized" (ADB, 2009).

Little assessed the mobility performance of 66 cities and found that most of the cities fail to meet the challenge of fulfilling urban mobility needs of growing population and that the traffic situation in most of the cities is chaotic (2011). IEA vehicle ownership trend projection shows that "India, China and other Asian countries would have a high rate of vehicle

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ownership by 2050 leading to more carbon emission and transportation issue like traffic congestion, pollution etc." (IEA, 2012)."For workers to access jobs and for businesses to access suppliers and markets, a reliable and affordable transport system is needed to enhance urban mobility. Limited transportation options can turn commuters to Indian cities into arduous treks, and many people are forced to live in substantial housing and slums too close to jobs when transport is inaccessible and unaffordable" (World Bank, 2013). "Transportation provides vital support to the economic and social development" (Hidalgo, 2013). A study on city of Dehradun showed that approximately forty eight percent of roads are being utilize for on-street parking. Pathetic Intermediate public transport named vikrams and e-rickshaws are running without proper permit or license. This is increasing the pollution level of the city. There is a notable amount of negligence in terms of transport planning for the vikrams and city buses (Smart City Dehradun, 2017). Private operator through bus and IPT is operating the existing city public transport system for the urban areas of Uttarakhand. The private buses are running on various routes having a fleet of about 100 busses. Vikram (Transport service) is the main mode of public transport in the cities and is operating from the roadside, utilizing the road ROW as terminal and causing the delay of other vehicles plying on the road (Singh, Chani, & Parida, 2014). The scenario in the other cities on the hills is far more worse. There is no proper intra- and inter-city transport. This is leading to traffic congestion and tourism, which is the main source of revenue for the state, is being affected.

4. Lack of Employment Opportunities and Migration of Population

According a report published by Govt. of Uttarakhand in 2011, the workforce participation ratio was about 34:66. Thirty three percent of the workforce is made up of main workers, while the other sixty six percent is made up of marginal and non-workers (PWC, 2016). There is an absence of enough employment opportunities in the service sector in line with the employable population of the cities and towns of Uttarakhand. Income and expenditure vary from one urban area to another. Mean per capita income of the families is Rs.2372 and mean household income is Rs.10461 (GHK International, 2007). There is also variation in population residing below poverty line (7%-40%) in the urban areas of Uttarakhand. Nearly nineteen percent of the workers migrated to cities in hope of better economic prospects as per government documents. The importance to cities is rising due to the unhappy life of villages on hills reflected in poor transport connectivity, no recreational facility, lack of drinking water, inadequate health facilities, and poor informative facilities. Besides, remote markets have further pushed the migration especially the young generation (Mamgain & Reddy, 2014).

According to Awasthi and Dev in their working paper report, many indicators of growth and development in the Uttarakhand display the below par levels of development disparities with districts (Awasthi & Dev, 2015). In the districts of the state, namely, Dehradun, Udham Singh Nagar, Roorkee and Hardwar, the economic development is healthier than the other districts in terms of economic indicators due to plain terrain (Awasthi & Awasthi, 2016). Also, change in the structure of workforce or employment is of need for successful transformation to increase the income level of population. However, due to substantial changes in the income level of the primary sector, the job scenario has not shown the expected changes over the years. Awasthi et. al also stated that in the State of Uttarakhand about forty nine percent of the working population in the primary sector is contributing about eleven percent of income, while twenty two percent in the secondary sector and twenty percent in the tertiary sector are contributing about thirty seven percent and fifty two percent of GSDP, respectively in 2011-12 (Awasthi & Dev, 2015).

Entrepreneurship base seems to have wrinkled sharply during 2004-05 to 2009-10 both for the urban area by an equal measure and the process has somewhat been prevented during 2011-12. For rural area, entrepreneurship has been the major mode of livelihoods (Awasthi & Awasthi, 2016).

5. Unplanned Tourism Development

The existing service sector focusing on tourism helps in the growth and development of a state. It takes an approach that connects as many new tourist spots as probable. The northern India hill tourism, in particular Uttarakhand, has seen growth and expansion over the last few decades in the tourism sector. The growth rate in the tourism of Uttarakhand is in line, which is to grow at an average annual rate of eight percent from 2013 to 2023 as given in the report of a government body (Report of

Working Group II Sustainable Tourism in the Indian Himalayan Region, 2018).

All northern Indian hill and mountain states have developed tourism/eco-tourism frameworks but they have not addreseds the issues the sector is facing or can harness prospects that the change can bring. Moreover, tourism frameworks may not create synergy with the eco-tourism plan. The framework or strategic plan will vary from one state to another and it will define the scope of policy and framework formulation. Although this framework, formulates a common objective and is driven by the level of tourism development constraints in different states, the impacts of the huge tourist influx and disregard to ecology in the tourism progress trajectory of the state of Uttarakhand has led to serious apprehensions among policy makers, residents and visitors (Jaswal, 2014; Report of Working Group II Sustainable Tourism in the Indian Himalayan Region, 2018).

Tourism dependent economy works in an eco-system, which is a topographical area that includes all the living creatures whose physical environs and natural cycles help sustain them. The main tourist's attractions in the state are as follows: holy Ganga River in Haridwar, lake in Nainital and its surroundings, Gangotri and Yamunotri Glacier, and Mountains. The threat to such ecosystem is often severe as these sites are very attractive to both tourists and developers.

- Climate change: Tourism does not only affect the climate, but is also responsible for the environmental change. It can be observed by the increasing frequency of storms, disasters such as flood, land slide, sever weather events, which created a disastrous effect not only on tourism but also on the destination.

6. Clean Energy

After COP21, the major focus of the government was on sustainable development and harnessing its natural resources. All hydroelectric projects use the energy of run of water whether it is a run off river type or accumulated water type, hence every small or large hydro project fits the description of renewable sources. The main advantage of hydro power is that it is a green source of energy. There is no pollution or emissions in hydro power generation and it is basically harnessing the force of nature and using it in a manner which helps and empowers mankind. The second factor is that there is no requirement of fuel in the generation of fuel. This scenario has two aspects; first of all, there is no pollution and greenhouse gas emission from the generation, and secondly, the energy security is increased for the nation. In other types of power generation, such as thermal power, the main component which is coal is imported from another nation, hence it is dependent on the other nation and its policies. However, in case of hydro power there is no fuel requirement hence there is no dependencies on other countries. This increases the energy security of the country. This gives hydropower the title of sustainable development because it addresses the needs of today without compromising the needs of the future. Moreover, multipurpose hydroelectric project will help in flood control, irrigation purposes, navigation issue and drinking requirement (Kumar, Verma, Ghosal, & Biswas, 2018).

Hydropower potential-wise, Uttarakhand, Himachal Pradesh and Arunachal Pradesh are the top three states in India with hydropower potential of 18,175 MW, 18, 820 MW and 50,328 MW, respectively. Uttarakhand and Arunachal Pradesh have 71.85% and 93.40% potentials respectively lying unutilized. The State of Uttarakhand India is situated in Central Himalayan Region. The Himalayan glaciers feed the perennial rivers of the State, that makes it suitable for the development of hydropower projects. In Uttarakhand, out of the total hydropower potential of 18,175 MW, only 3,988 MW of capacity has been developed and 1,640 MW of capacity is in the construction phase. However, due to urbanization and economic growth, demand for electricity has been growing in the State. During 2015-16, against the energy demand of 12,889 MU, the state faced a shortage of 214 MU (deficit of 1.7%). During the year 2016-17, the State is expected to face increased energy demand of 13, 574 MU with a deficit of 336 MU (2.5%) (Mishra et al., 2018). With the State facing power shortages and with significant unutilized hydropower potential, policymakers of the state need to promote hydropower development for electricity generation being cheap and clean source of energy, which will be leading to sustainable development of the state.

7. Waste Management

Uttarakhand's urbanization is at a rate of forty percent. This is due to huge influx of fixed and

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floating population. Fixed population increase is mainly observed in the plains due to natural growth and migration of population from hilly areas. Floating population makes an upward trend so as to increase of tourist footfall. With this upward trend, one can certainly see an impact on urban services including waste management. Approximate three thousand metric tons of municipal solid waste is accumulating per day. It is true that the level of waste will not come down as urbanization and tourist influx rate will not come down. Due to the fragile ecosystem of Uttarakhand, waste management is a critical issue for the future. Hundred percent waste disposal should be achieved so as to achieve sustainability.

Uttarakhand does not have organized waste management service, which includes waste collection, segregation, disposal and recycling services. Some cities in the state have waste collection mechanism but at the end, waste ends up in the open land surrounding the cities. The cities of the state are not following the mandatory responsibilities under the Solid Waste Management Rules of 2016. Waste management requires immediate control as cities of the state are being burdened up with an inefficient collection operation, lack of eco-friendly disposal mechanism and uncontrolled dumping. It is the responsibility of municipalities of Uttarakhand for looking after the services of sweeping and solid waste management. However, the service quality is poor and irregular in service. Inhabitants of economically weaker section and below poverty line are facing its harmful effect. Due to lack of awareness within the population, the inhabitants dump the waste in the open ground, street side, drains and down the hill slope. As per government data for the capital city of Uttarakhand i.e. Dehradun, eighty-five percent of population does not segregate the waste at point of source. Collection of waste is not uniform across the city. Therefore, a proper waste management plan and service is required to achieve sustainability.

8. Urban Governance

Good urban governance means transparency of system, accountability, predict issues and challenges and allows populations participation during development. The challenge in Uttarakhand is that the state's municipality bodies or corporations have limited participation in a city's development planning and infrastructure service unlike other parts of India. Para-statals or other state agencies looks after the functions of planning, urban transport, water distribution and sewage. After 74th Constitutional amendment not all eighteen functional power were given to local bodies. There is also absence of local population participation for city management.

The last decade has seen a lot of urban development in India with policies like JnNURM, AMRUT, smart city mission, etc. Many reforms were suggested and service benchmark were made available. Till now, not all reforms were implemented in the cities of Uttarakhand. Complexity of city management will increase, as cities will grow demographically and socio-economically. To handle this complexity holistic governance framework is required.

IV. CONCLUSION AND RECOMMENDATIONS FOR FUTURE POLICY DIRECTION

The policy structure for the holistic development should be inclusive as well as substantial. As happening in the other parts of the India, urbanization cannot be stopped but can be controlled. It can be in a more sustainable nature through a synergized mixed land planning on usage. Current land utilization rules and regulations need to be reframed and executed for the protected ecosystem, forests and water resources. It would also be vital to develop a balanced plan for sustainable growth in urban agglomeration zone, as it is a significant economic activity area. The unplanned urban growth in Uttarakhand is not only diminishing natural resources and disrupting the bio-system services, but also increasing the socio-economic and environmental inequality both within the towns and in their surrounding per-urban zones. Besides, the rapid and unplanned urban growth is also increasing the vulnerability of intensively changed and densely populated weak gradients to the active processes of right of way and landslides.

The prejudgment in cash flow for important economy segments is another instance where the financial institutions prefer to provide support specific to districts of plain terrain and abstain from taking unnecessary risks in the rough terrain of hilly districts. In this particular process, the crack in the economy and sustainable growth is bound to increase. As a result, one is unable to visualize the progress made towards developing employment opportunities in non-farm sectors like MSME industries for most of the urban areas. Agriculture ancillary products and services need a new policy to improve their outcome and effectiveness. Projects like carbon sequestration projects should be

promoted in the state as they will create sustainable waste management and the pollution level will come down and employment opportunities will be available. The tourism framework as outlined in the Tourism Policy of the State needs to be updated with market expectations in a given period with the development of eco-tourism sector. This will increase opportunities for local population by getting decent jobs and halt migration. Promotion of Public Private Partnership both in tourism, transport system and MSME segment is needed to bring in private investment in the state. As Uttarakhand is having a huge potential of Hydro Power generation, one needs to exploit it.

Hydroelectricity has always been one of the meters of development of the modern society. Implementation of hydro power plants can lead to various aspects that can aid in economic development and growth of society and local sociology and ecology. Throughout history, man has been harnessing the raw potential of nature to his aid; hydropower is one of the shining examples of this. By using the natural resource to its maximum potential, the researchers can ensure that proper growth and evolution of society will take place. Hydropower ensures sustainable development and a manageable future for the next generation.

This article argued that when the theory of complexity is combined with urban development, then new insights on the urban sustainable development debate arise. This sort of insight will vary geographically, and the identified challenges will also defer.

The behavior of natural and human systems in the world is complex, and so complexity is central to the urban sustainable development argument. Even though scientific research will continue to deepen one's understanding of natural systems, the complexity and non-linearity of global urban biogeochemical systems raise serious concerns about the prospects of policy approach to urban sustainable development based on predictive modelling, optimization, and finding the one right answer. The underlying complexity also allows for the emergence and persistence of many perspectives on what sustainability entails and the policies required to achieve it. The quest for a single concept of sustainable development will thus remain unsuccessful.

References

[1] (HPEC), The High Powered Expert Committee. (2011). Report on Indian Urban Infrastructure and Services. New Delhi: Ministry of Urban Development.

[2] ADB. (2009). Changing Course : A new Paradigm for Sustainable Transport. Asian Development Bank.

[3] Al-Dahmashawi, D., Hassan, D., Sabry, H., & Mahmoud, S. (2014). Incorporating social sustainability themes in the built environment. J AM Sci, 141-151.

[4] Awasthi, I. C., & Awasthi, B. (2016). Uttarakhand: Livelihood Constraints and Policy Options. International Journal on Arts, Humanities, Social Sciences & Business Studies, 1(2), 1-13.

[5] Awasthi, I. C., & Dev, N. (2015, September). Poverty and Gender Analysis of Uttarakhand:. Lucknow, Uttar Pradesh, India: Giri Institute of Development Studies.

[6] Borsdorf, A., Tappeiner, U., & Tasser, E. (2010). Mapping the Alps. In A. Borsdorf, G. Grabherr, K. Heinrich, B. Scott, & J. Stötter, Challenges for Mountain Regions, Tackling Complexity (pp. 186-191). Vienna: Bohlau.

[7] Briassoulis, H. (2001). Sustainable development and its indicators: through a (planner's) glass darkly. Journal of Environmental Planning and Management, 409-425. doi: 10.1080/09640560120046142

[8] Bryman, A. (2012). Social Research Methods. Oxford Publishers.

[9] Buytaert, W., Cuesta-Camacho, F., & Tobón, C. (2011). Potential Impacts of Climate Change on the Environmental Services of Humid Tropical Alpine Regions. Global Ecology and Biogeography, 19-33.

[10] Colantonio, A., & Dixon, T. (2011). Urban regeneration and social sustainability best

practice from European cities. London: Wiley-Blackwell.

[11] CSIS. (2011). Seizing the opportunities in Public Private Partnerships. Centre of Strategic and International Studies, www.csis.org.

[12] Durga Rao, K., Rao, V., Dadhwal, V., & Diwakar, P. (2014). Kedarnath Flash Floods: A Hydrological and Hydraulic Simulation Study. Current Science, 598-603.

[13] GHK International. (2007). City Development Plan. Dehradun: Government of Uttarakhnad.

[14] Hidalgo, D. a. (2013). Implementation of sustainable urban transport in Latin America. Research in Transportation Economics, 40, 66-77.

[15] Hikmat H., A., Yamen N., A.-B., & Hadeel S., A.-Q. (2019). Effects of urban form on social sustainability – A case study of Irbid, Jordan. International Journal of Urban Sustainable Development, 1-20. doi:10.1080/19463138.2019.1590367

[16] HPEC. (2011). Report on Indian Infrastructure & Services. High Powered Expert Committee, Ministry of Urban Development, Government of India.

[17] Huddleston, B., Ataman, E., & d'Ostiani, L. (2003). Towards a GIS-based Analysis of Mountain Environments and Population. Environment and Natural Resources, United Nations.

[18] IEA. (2012). Global Land Transport Infrstructure Requirements Estimating road and railway infrastructure capacity and costs to 2050. International Energy Agency. www.iea.org.

[19] J.D., I. (1989). Deforestation in the Himalaya: The Cause of Increased Flooding in Bangladesh and Northern India. Land Use Policy, 6, 187-193.

[20] Jandl, R., Borsdorf, A., van Miegroet, H., Lackner, R., & Psenner, R. (2009). Global Change and Sustainable Development in Mountain Regions. COST Strategic Workshop, Innsbruck University. Innsbruck: COST Strategic Workshop, Innsbruck University Press.

[21] Jaswal, S. (2014). Role of Tourism Industry in India's Development. Journal of Tourism Hospitality. doi:10.4172/2167-0269.1000126

[22] Kumar, A., Verma, S., Ghosal, A., & Biswas, S. (2018). Opportunities and Critical Success Factors for Economic Development of Uttarakhand due to Implementation of Hydro Projects. Journal of Advance Management Research, 10-15.

[23] Lall, K. (2015, 7 9). Swajal Uttarakhand. Retrieved from http://swajaluttarakhand.blogspot.com/2015/07/urwss-project-flag-bearer-of-swap-case.html

[24] Little, A. D. (2011). The Future of Urban Mobility : Towards Networked, Multimodal Cities of 2050. www.adl.com/URban_Mobility.

[25] Li-Yin, S., J. Jorge, O., Mona, N. S., & Zhang, X. (2011). The application of urban sustainability indicators - A comparison between various practices. Habitat International, 35, 17-29.

[26] Mckinsey. (2010). India's Urban Awakening : Building Inclusive Cities, Sustaining Economic Growth. Mckinsey Global institute.

[27] Meybeck, M., Green, P., & Vörösmarty, C. (2001). A New Typology for Mountains and Other Relief Classes: An Application to Global Continental Water Resources and Population Distribution. Mountain Research and Development, 34-44.

[28] Mishra, B., Nautiyal, A., Kumar, A., Pandey, D., Yaqoot, M., & Santosh, H. (2018, January). Review of Policies, Programs and Initiatives regarding Growth and Development of Hydropower in India with special reference to State of Uttarakhand. International Journal of Management Studies, 62-68. doi:10.18843/rwijms/v5i1(1)/10

[29] MoUD. (2006). National Urban Transport Policy. Ministry of Urban Development, Government of India.

[30] Nations, U. (2013). World Economic and Social Survey 2013: Sustainable Development Challenges. New York: Department of Economic and Social Affairs of the United Nations.

[31] P. Mamgain, R., & Reddy, D. (2014). OUTMIGRATION FROM HILL REGION OF UTTARAKHAND: Magnitude, Challenges and Policy Options. Hyderabad: National Institute of Rural Development and Panchayati Raj.

[32] Prakash C, T., Abhinav, T., & Bhagwati, J. (2018). Urban Growth in Himalaya: Understanding the Process and Options for Sustainable Development. Journal of Urban and Regional Studies on Contemporary India, 4(2), 15-27.

[33] PWC. (2016). Mussorie Dehradun Development Authority. Retrieved 2019, from Dehradun Smart City Proposal: https://mddaonline.in/downloads/schemes/draft_proposal.pdf

[34] Rai, S., & Sharma, E. (1998). Comparative Assessment of Runoff Characteristics under Different Land Use Patterns within a Himalayan Watershed. Hydrol Process, 12, 2235–2248.

[35] Rawat, J. (2009). Saving Himalayan Rivers: Developing Spring Sanctuaries in Headwater Regions. In B. Shah, Natural resource conservation in Uttarakhand (pp. 41-69). Haldwani: Ankit Prakshan.

[36] (2018). Report of Working Group II Sustainable Tourism in the Indian Himalayan Region. New Delhi: NITIAAYOG.

[37] Seabrooke, W., Y., & Ma, M. F. (2004). Implementing sustainable urban development at the operational level (with reference to Hong kong and Guangzhou). Habitat International, 28, 443-465.

[38] Selman, P. (1999). Three decades of environmental planning: what have we really learned? In M. K. Meadowcroft, Planning sustainability. London: Routledge.

[39] Shephard, J., Harden, A., Rees, R., Brunton, G., Garcia, J., Oliver, S., & Oakley, A. (2006). Young people and healthy eating: a systematic review of research on barriers and facilitators. Health Education Research, 239-257.

[40] Singh, P., Chani, P., & Parida, M. (2014). Assessing The Performance Of Public Transport Operation In Dehradun. Journal of Environmental Research And Development, 8(4), 1021-1025.

[41] Smart City Dehradun. (2017). MDDA. Retrieved from http://smartcities.gov.in/upload/uploadfiles/files/Annexures_Dehradun.pdf

[42] Tambe, S., Kharel, G., Arrawatia, M., Kulkarni, H., Mahamuni, K., & Ganeriwala, A. (2012). Reviving Dying Springs: Climate Change Adaptation Experiments From the Sikkim Himalaya. Mountain Research and Development, 32(1), 62-72.

[43] UNEP. (2002). United Nations Environment Programme—World Conservation Monitoring Centre. Nairobi: Mountain Watch: Environmental Change and Sustainable Development in Mountains.

[44] Valdiya, K., & Bartarya, S. (1991). Hydrological Studies of Springs in the Catchment of Gaula River, Kumaon Lesser Himalaya, India. Mountain Research and Development, 17-25.

[45] Vallance, S., Perkins, H., & Dixon, J. (2011). What is social sustainability? A clarification of concepts. Geoforum, 342-348.

[46] Verbruggen, H., & Kuik, O. (1991). Indicators of sustainable development: an overview. In H. Verbruggen, & O. Kuik, In search of indicators of sustainable development.

[47] Viviroli, D., Dürr, H., Messerli, B., Meybeck, M., & Weingartner, R. (2007). Mountains of the World, Water Towers for Humanity : Typology, Mapping, and Global Significance. Water Resource Research, 43(7), 1–13. Retrieved from http://onlinelibrary.wiley.com/ http://onlinelibrary.wiley.com/

[48] Vladimir, S., Annette, E., & Evans, T. J. (2016). Assessment of the Economic, Social and Environmental Dimensions of the Indicators for Sustainable Development. Sustainable Development. doi:10.1002/sd.1649

[49] WG 12th FYP. (2011). Recommendations of Working Group for 12th Five YEar Plan. Planning Commission, Five YEar Plan Documents, Government of India.

[50] World Bank. (2013). Urbanisation beyond Muncipal Boundaries- Nurturing Metropolitan Economies and connecting Peri-Urban Areas in India. Washington,D.C.: World Bank.