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A STUDY OF ENVIRONMENTAL CLIMATIC CHALLENGES IN BIHAR

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ABSTRACT

The present research paper outlines the environmental climatic challenges in Bihar, highlighted the climatic environmental issues describes the measures undertaken by Government of Bihar and reviews an extensive number of studies to address the environmental issues of different districts of Bihar state. The major aim of and objective to this present dissertation of environmental issue and challenges is to provide a sound foundation for the framework of future strategies to came out with these environmental issues to secure clean environment for future generations. Furthermore, the Government of India has also introduced the National Rural Drinking Water Supply Program in order to address the environmental issues in Bihar. The present dissertation highlights the potential future, risk and justifies a comprehensive research effort directed to obtaining definitive results. Indeed, a quick assessment, and adoption of remedial measures without delay, is imperative for the future of this aquatic system. The results indicated that, if the state address and talking into account the environmental climatic issues, there will be a great positive impact on state economy.

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INTRODUCTION

Bihar faces complex economic development challenges with an estimated population of 13.00 Crore in 2021, Bihar is a densely populated region, with no less than 1102 persons living per sq. km. of its area. As per the Planning Commission figures, in 2004- 05, 41.4 percent of the population lived below poverty line in Bihar. As nine out of ten people on the average live in the villages, poverty is more visible in rural areas. The state is profoundly capable with water resources, in terms of ground water, resource and the surface water resource not only by rainfall but it has extensive amount of proper water supply from the rivers which flow within the territorial jurisdiction of state. Above and beyond lakes, ponds and other water bodies also supply water to some population. Apart from all availability of natural resources the state is facing environmental climatic challenges in states of India is facing multi diversity of environmental problems. Bihar including other states of India that tend to share similar sustainable development challenges, including small but growing populations, limited resources, remoteness, susceptibility to natural disasters, vulnerability to external shocks, excessive dependence on international trade, and fragile environments. Their growth and development are also held back by high communication, energy and transportation costs, irregular international transport volumes, disproportionately expensive public administration and infrastructure due to their small size, and little to no opportunity to create economies of scale. Climate change will have wide-ranging effects on the environment, and on socioeconomic and related sectors, including water resources, agriculture and food security, human health, terrestrial ecosystems and biodiversity and coastal zones. Rising temperatures will cause shifts in crop growing seasons, which affects food security, and changes in the distribution of disease vectors putting more people at risk from different diseases. The state head address the environmental challenges like curb pollution, water conservation, promote greenery and air pollution, furthermore he elaborated that improving these issues will greatly benefited in future and its reflection can be seen very quickly in coming years[1]. India's economy and a majority of its population are highly dependent on climate sensitive sectors such as agriculture, animal husbandry, fisheries, tourism, etc. Since climate change is expected to impact natural and human systems adversely by inducing changes these systems. As a consequence, climate change is highly likely to impact livelihoods by disrupting social, cultural, economic, ecological systems, physical infrastructure, and human assets, accentuating health risks, and as such, posing severe risks to the

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[1] Secretary level meeting by CM Bihar, https://timesofindia.indiatimes.com/city/patna/environ-protection-govts-priority-cm/articleshow

development of the state. To clean the air pollution action plan was implemented by state government Pollution Control Board BSCB[2] in three non-attainment cities of Patna, Gaya and Muzaffarpur in April 2019 but progress on the front has been observed very slow according to expert environmentalists. The clean air action plan had identified road dust, vehicular emission, domestic fuel burning, open waste burning, construction activities and industrial emissions as major sources of air pollution. The government has taken major several steps in order to control environment in Bihar by imposing concern laws. Apart from the law it is also emphasized that the laws have been made to control and clean environment but need to create awareness among citizens about environment conservation is more important. Keeping in view of spreading awareness activities various NGOs will involve for enhancing awareness program. In this connection the leading NGOs YMCA, Rotary, Lions and Peers India will extend their services in order to increase and spread awareness towards environment conservation. The state government of Bihar highlighted steps being taken towards the targeted project environmental protection from different climatic challenges by implementation of Jal Jeevan Haryali mission.[3]. It is observed that the state rain fall was 1200 mm to 1500 mm in 2019 and it came down to 1027 in 2020. In order to maintain the rainfall, the government will start plantation with the help of different NGOs in all district of state and they allotted around RS 24524 crore for that. It can be said that on the basis of different research conducted shows that there is high probability of increase in the frequency and intensity of climate related natural hazards due to climate change and hence increase in potential threat due to climate change in Bihar.For better environment, all its components should be protected from pollution and the surroundings should be clean. We need to take good care of our land, water resources, forests and atmosphere. It is also necessary to ensure a balance between these resources and living creatures to meet our needs.

Literature Review: Bihar is one of the most climate-sensitive states in India due to its geographical setting, hydro-meteorological uncertainties, dense rural population and high level of poverty. Agriculture contributes 21.3% of Bihar's GDP and will continue to play an important role in the economic development of the state and as a prime source of livelihood for about 90% of the population. The State Government of Bihar acknowledges that climate change is one of the major challenges of agriculture in the state, and its overall strategy is to transform agriculture and its allied sectors into climate-resilient and vibrant production systems while developing their full potential and ensuring sustained food and nutritional security. It is important to mentioned here that by end of the 20th century, the pollution in the cities, the effect of the greenhouses and the global climate changes resulted in new researches. In this case, towards the end of the century, natural gas replaced coal. As soon as the global dimensioned environmental problems started threatening the civilization create by the mankind, new researches were inclined to the understanding came out as a new trend of expression of environmental challenges can be seen very clearly of the balance among the economy, society and the environment claimed by Keleş, Hamamcı, 2002,65. According to data collected and environmental assessments studied by World Bank[4] experts, between 1995 through 2010, India has made some of the fastest progress in addressing its environmental issues and improving its environmental quality in the world. Still, India has a long way to go to reach environmental quality similar to those enjoyed in developed economies. Pollution remains a major challenge and opportunity for India. Environmental pollution and challenges and its impact is a major challenge for this age of industrial development, expansion and suburbanization. It is becoming difficult to breathe fresh air in the cities of Bihar state and industrial areas. Chandra Mahadab[5] et, al Vol 32, issue 3, 2020 in Environmental claim journal, mentioned in his research paper as titled Air Pollution from Cement Plants: Case Study on Particulate Matter in Bihar, India to find out the level of particulate matter concentration inside a village near to a cement plant located in Bihar, India to know the impact of the cement plant on the ambient environment. The present research paper entitled "A Study of Environmental Climatic Challenges in Bihar" clearly highlighted that groundwater quality in many parts of Bihar. Mark J.Pruset.al raised the issues of pure drinking water in International Conference on Human and economic resources held in state university of USA Cortland in 2006 [6] it is found that the poor owing to natural presence of contaminants like Iron, Fluoride, Arsenic, Chloride, Nitrate etc. at concentrations exceeding the permissible levels for drinking water use and claimed that it provides monthly water quality information in the four surveyed districts Data source: PHED, Patna[7]. Furthermore, it is also emphasized that the quality of groundwater may also be affected by bacteriological infection. According to PHED estimates, 13 districts in Bihar suffer from Arsenic contamination, 11 districts with Fluoride contamination and 9 districts with Iron contamination. World Sustainability development Summit 2020[8] held in Delhi, significant research and development activities are encountered in the environmental history of Bihar. Some studies have also been done by different institutions and by individual experts and consultants associated with different institutions and organizations. Some of these studies have been highlighted the Environmental Assessment and Environmental Management Framework for the state of Bihar[9] analyzed the Bihar state Government economic policy planning to provide gas fuel based and battery-operated vehicle subsides on rate in order to control environment pollution in Bihar

Objective of the Study: The development objective of the Water Supply in throughout the States is to increase access to improved piped water and sanitation services for selected rural communities in the target states through decentralized delivery systems. The key development objective level targets and goal indicators for the proposed project are the following:

Number of rural households having access to piped water services;

- Improvements in O&M cost recovery and collection efficiency;
- Rural households adopting improved hygiene and sanitation practices.

The Scope of the study

The targeted tasks of the study are:

- Conduct an analysis of the environmental issues in the program catchment area
- Identify issues, impacts and effectiveness of environmental management program
- Assess state policy, legal and regulatory requirements relevancy of the program
- Review of the existing organized arrangements for environmental management program
- Develop an Environmental Management Framework for the state.

METHODOLOGY

This present study is conducted using both participatory and consultative approaches. The methodology basically comprised collection and collation of secondary and primary data. A review and analysis of this data led to the delineation of the baseline status of relevant environmental components pertaining to the State and

[2]https://india.mongabay.com/2020/12/three-cities-of-bihar-continue-to-wait-for-cleaner-air/

[3]https://timesofindia.indiatimes.com/city/patna/environ-protection-govts-priority-cm

[4] World Bank Report 2020

[5]Chandra Mahadab[5] et, al Vol 32, issue 3, 2020 in Environmental claim journal

[6]Mark J. Prus, International Conference on Human and economic resources held in state university of USA Cortland in 2006 [6]

[7] PHED Patna, Bihar government

[8]World Sustainability development Summit 2020, January 29-31,https://wsds.teriin.org/2020/img/pdf/WSDS_Folder_2019.pdf

[9]Environmental Assessment and Environmental Management Framework for the state of Bihar 2013

provided the basis for assessment of the potential environmental impacts due to the proposed project and preparation of Environmental Management Framework EMF for mitigating negative impacts and enhancing positive impacts.

Key Environmental Issues in Bihar: Environmental issues are one of the primary causes of disease, health issues and long term livelihood impact for Bihar. An analysis of the baseline environmental situation, observations during site visits, Focused Group Discussions, Household surveys, as well as discussions with State, District and GP level functionaries have identified the following key environmental issues in the rural areas.

- Inadequate water supply because of improper rainfall.
- Air pollution because of high sand storm increasing chest infections in elderly people
- Presence of Iron and Fluoride concentrations exceeding the permissible levels in drinking water.
- Lack of adequate sanitation facilities.
- Lack of adequate waste solid and liquid disposal systems

Poor Governance in state: It is observed that there is basic governance issue in Bihar and the government always in state of dilemma and confusing situation in terms of development issue of environment claimed by a local minister. Under Nitish Kumar CM, Bihar, there has been some improvement can be seen very clearly but it is not up to the mark in term governance and environmental issues addressed.

Environmental Issues: The environmental issues in the state have been discussed in detail below. The EMF includes environmental monitoring and management plans for the proposed schemes in Bihar. Institutional arrangement and capacity building for environmental safeguard have also been provided in this present research paper. Major environmental issues are forests and agricultural degradation of land, resource depletion such as water, mineral, forest, sand, and rocks, environmental degradation, public health, loss of biodiversity, loss of resilience in ecosystems, livelihood security for the poor. The major sources of pollution in Bihar include the rapid burning of fuelwood and biomass such as dried waste from livestock as the primary source of energy, lack of organized garbage and waste removal services, lack of sewage treatment operations, lack of flood control and monsoon water drainage system, diversion of consumer waste into rivers.Air pollution, poor management of waste, growing water insufficiency, falling groundwater tables, water pollution, preservation and quality of forests, biodiversity loss, and land/soil degradation are some of the major environmental issues India faces today The wire claimed[10].

Air Pollution: The major cause of air pollution problems is the unplanned industry set up that releases a large number of air pollutants. Bihar's second largest city – Gaya, lies 100km south of the state capital, Patna, on the banks of the Phalgu river. The two cities are well connected by bus and rail and there is significant movement of people between both cities. Religious tourism is the largest sector in the city as the area has great significance to Hindu's, Jains, and Buddhists. It is here that the Buddha obtained enlightenment. There are several temples and monuments across the city. The Mahabodhi Temple complex at Bodh Gaya is a World Heritage site. According to the BSPCB, brick kilns are one of the major contributors to air pollution. As per available data, 14% of air pollution in the state is caused by brick kilns while 22% is caused by domestic burning. Transportation causes 19% pollution, dust 15%, industry 14%, waste burning 11% and diesel generator sets 5%. It is further argued that an emissions inventory for the Gaya -Patna region for the following pollutants – sulfur dioxide SO2, nitrogen oxides NOx, carbon monoxide CO, non-methane volatile organic compounds NMVOCs, carbon dioxide CO2; and particulate matter PM in four bins a coarse PM with size fraction between 2.5 and 10 μm b fine PM with size fraction less than 2.5 μm c black carbon BC and d organic carbon OC, for year 2015 and projected to 2030.

Water Pollution: Bihar is facing severe water pollution. The disposal of wastewater both industrial and domestic is the major environmental problem encountered in Bihar. Around forty percent of the district of Bihar is having arsenic in its groundwater. The causes of arsenic contamination are mostly through geogenic channel. Excess use of arsenic in drinking water over prolonged period leads to primary, secondary and tertiary health impacts. According to National Water Commission[11], "Water is polluted if it has not been of sufficiently high quality to be useful for man in the present or future"Water pollution can be defined as alteration in physical, chemical or biological characteristics of water which damages the water quality and it becomes unfit for any purpose.

Agriculture Pollution: Modern agriculture mainly stresses on the use of pesticides and chemical fertilizers. Spraying of poisonous insecticides and wee dicides over the crops also causes air pollution because some amounts of these poisonous substances are carried away by the wind to distant places during their application. The agriculture problems may be summarized as erosion of soil, under use of organic fertilizers and overuse of synthetic chemicals. Over cultivation is also common. These result in addition to the atmosphere and when inhaled, cause trouble to the animals including human also. Intensive cultivation of crops causes chemicals from fertilizers e.g. nitrate and pesticides to seep into the groundwater, a process commonly known as leaching. Routine applications of fertilizers and pesticides for agriculture are increasingly being recognized as significant sources of water pollution. The high nitrate content in groundwater is mainly from irrigation run-off from agricultural fields where chemical fertilizers have been used indiscriminately.

Solid Pollution: There is practically no solid waste management in Bihar. Around 40% of the waste is thrown in the streets or at collection sites. Only half of the urban wastes are disposed in sewers, with most remaining untreated. In general, solid waste includes garbage, domestic refuse and discarded solid materials such as those from commercial, industrial and agricultural operations. They contain increasing amounts of paper, cardboards, plastics, glass, old construction material, packaging material and toxic or otherwise hazardous substances. Since a significant amount of urban solid waste tends to be paper and food waste, the majority is recyclable or biodegradable in landfills. Similarly, most agricultural waste and mining waste is left on site. The portion of solid waste that is hazardous such as oils, battery metals, heavy metals from industries have needed to pay particular attention.

These can in the long run, get deposited to the soils of the surrounding area and pollute them by altering their chemical and biological properties. They also contaminate drinking water aquifer sources. Solid waste treatment has been privatized in order to meet the demand for solid waste treatment services. Hospital wastes are being classified into infectious and non-infectious waste out of former is incinerated without taking into consideration the fact that this process leads to the production of a number of gaseous secondary air pollutants that even more dangerous than the primary solid pollutants. Moreover, the heat energy that can be otherwise used to create electricity is dissipated in the atmosphere to cause energy pollution. In addition to that In 2000, India's Supreme Court directed all Indian cities to implement a comprehensive waste-management program that would include household collection of segregated waste, recycling and composting. These directions have simply been ignored. No major city runs a comprehensive program of the kind envisioned by the Supreme Court.

Climate Change: The term climate change is often used interchangeably with the term global warming, but climate change is preferred use to global warming because it helps convey that there are other changes in addition to rising temperatures. Climate change refers to any significant change in measures of climate such as

[10]https://thewire.in/agriculture/climate-change-hits-bihar-farmers

[11] Bihar Envis Centre, state of environment, http://bhenvis.nic.in/water_pollution.html

temperature, precipitation, or wind lasting for an extended period decades or longer. It can be seen very clearly that climate changing rapidly now as the general warming of the earth has been characterized as "global climate change" meaning the general weather everywhere isn't going to "be like it used to" in the near future. Climate may change in a single region or across the whole planet. There are various causes of change which can be brought about by a variety of factors. These include natural external factors, such as changes in solar emission or slow changes in the earth's orbit; or natural internal processes of the climate or earth system such as volcanic activity; or, as has occurred recently, human-induced anthropogenic factors.In recent years, the impact of climate change has been pronounced due to frequent occurrences of extreme weather events such as erratic monsoon rainfall, extended dry spells, short duration rainfall, abnormal rise and fall of temperature particularly during the Rabi season in winter. As 60% to 70% of cultivation in Bihar is dependent on rainfall, any deviation, especially any deficit, is bound to impact production, particularly rice cultivation in the Kharif summer season and pulses, maize and wheat in some pockets in the Rabi winter season, Abdus Sattar[12], an expert at Rajendra Prasad Central Agricultural University RAU at Pusa.Agriculture is the backbone of Bihar's economy and 77% of its workforce is dependent on it. It generates nearly 24.84% of the state domestic product, according to official data.The impacts of climate change are clearly visible, according to Ujjwal Kumar[13], head of the division of socio-economics and extension at ICAR Research Complex for Eastern Region, Patna. Extreme cold in winter resulted in the problem of grain setting, he said. "All crops require a proper temperature.

Soil Pollution: The top layer of earth is called soil. More than 80% of the land is covered by soil and it is 3 to 4 meter in depth on the earth surface. It is one of the most important natural resources. It consists of a mixture of minerals, organic material, living organism, air and water that together support the growth of plant life. The traditional meaning of soil is the natural medium for the growth of land plants. Many terms are used to refer to the non-water surface of the earth. The soil scientist calls it soil, a geologist may call fragmental rock or overburden, an engineer may call land. Land is a general term to describe the non-water portion of the earth, usually in reference to a large surface area. Soil pollution is also an issue of serious concern because it is the soil on which we live and get our food supply. Rapid industrialization, urbanization and consequent increase in population have resulted in soil pollution. Soil pollution is quite different from air pollution and water pollution as in soil pollution, pollutants remain in direct contact with soil for a relatively longer period. It can be defined as, "Undesirable changes in physical chemical and biological characteristics of soil, which are harmful for all living organisms".

With reference to industrial wastelands and it can be claimed that most of the manufacturing industries produce wastes of one kind or the other such as harmful gases and chemicals with polluted water discharged from factories. These wastes are being generated and dumped on the land, mainly include the following:

- Toxic pollutants
- Heavy metals
- Organic compounds
- Inorganic complexes
- Non-biodegradable materials
- The industrial pollutants which pollute air and water also pollute the soil.

Forests: Deforestation of the forests poses a big problem in Bihar. Forests are divided on the basis, whether they are state-owned or privately-owned. The state-owned forests are again divided into 4 categories: reserved, protected, unclassified and resumed lands. Two-thirds of the public forests are non-commercial and it is important to mention here that forest and wildlife are an important component of Bihar economy. Forest covers around 6.87% of the total geographical area of Bihar[14]. Forestry of Bihar have contributed wood and various other raw materials of good quality which has made the state to earn good revenue. Out of the total land area, 3,208.47 km2 of land in Bihar falls under the protected forest area and located in West Champaran, some parts of Darbhanga, Jamui, Nalanda and Rohtas. The remaining one-third, located mostly on steep and unstable slopes of Himalayas are harvested. This structural situation leads to the management problems, Moreover, area wise, current forests are unable to meet the requirements of growing population. The deforestation leads to the soil erosion that causes soil losses, siltation of reservoirs, which lead to the inefficiency of irrigation system. The deforestation is reported to be due to poor forest management. The obvious result is deforestation and erosion. Air pollution in mining areas causes respiratory diseases and eye ailments, lung diseases caused by inhalation of dust and sand storm.

Biodiversity: Bihar is one of the most important states in the Hindi heartland of India. It is situated on the banks of the river Ganges. The river Ganges flows through the state and passes through districts of Buxar, Bhojpur, Chapra, Patna, Vaishali, Begusarai and Bhagalpur. The state of Bihar presently has 6845 sq. km notified natural forest area which is 7.27 % of the geographical area of the state.Biodiversity encompasses all biological entities occurring as an interacting system in a habitat or ecosystem and plants constitute a very important segment of such biological systems. Biodiversity of plants collectively known as "plant genetic resources" is a key component of any agricultural production system, indeed, of any ecosystem, without which natural evolutionary adjustment of the system to the changing environmental and biotic conditions would be impossible. Plant biodiversity is an irreplaceable resource, providing raw materials for introduction, domestication as well as improvement programs in agriculture and forestry. Conservation and use of genetic diversity for sustainable ecosystem or agro-ecosystem should be continuous to meet food, clothing, shelter and health requirements of India's growing population.

Water, Scarcity, Use and Sanitation: The availability of fresh water is decreasing due to losses of water during the movement of water from the canal to the croplands and pollution from industrial and agricultural chemicals. A research-based reports claimed that the groundwater level has fallen in eight of Bihar's 38 districts compared to last year, according to a recent survey by the state's Public Health Engineering Department PHED[15]. As many as 11 districts of the eastern state have been put in the 'water-stressed' category and highlighted districts are Muzaffarpur, Patna, Darbhanga and Gaya are already facing water shortage with pumps, wells and ponds drying, according to media reports. It is also claimed that the forty percent of urban deaths are caused by water-borne diseases. Special focus is also needed in terms of solidity, water mining and the accumulation of salt in commercial crop roots. As 60% to 70% of cultivation in Bihar is dependent on rainfall, any deviation, especially any deficit, is bound to impact production, particularly rice cultivation in the Kharif summer season and pulses, maize and wheat in some pockets in the Rabi winter season, Sattar said[16]. Agriculture is the backbone of Bihar's economy and 77% of its workforce is dependent on it. It generates nearly 24.84% of the state domestic product, according to official data.It needs a lot of integrated water and soil improvement in this state region. Bihar is suffering from the adverse soil, air and occupational effects caused by the use of chemicals in textile and leather industries.

DISCUSSION

It can be argued that and taken into the consideration on basis of preliminary surveys by some agencies indicate a lack of environmental awareness and sensitivity in a large percentage of people of Bihar. An earlier study is evident and established how a

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[14]http://bhenvis.nic.in/economy.html
[15]https://www.downtoearth.org.in/news/water/bihar-staring-at-water-crisis-in-summer-months-with-groundwater-levels-declining-76174
[16]Rajendra Prasad Central Agricultural University RAU

large percentage of population are migrated from the. There is hence an urban stakeholder are facing challenges of environmental issues crisis in state which needs to be overcome through spreading proper environmental education and enhancing environmental awareness amongst people. India's annual population growth rate of 1 % and as per study of demography it is declining with reference to previous year. India's population is expected to grow by 25%, with reference to 2011, to 1.52 billion by 2036, according to the final report of the technical group on population projections dated July 2020. The group was constituted by the National Commission on Population NCP[17] under the Ministry of Health and Family Welfare with the mandate to provide population projections for the period 2011 to 2036. This astonishing increase in population has increased the demand on agriculture land to meet the food needs Poverty and population growth go hand-in-hand in contribution to the degradation of the environment. It is evident that extensive unemployment and poverty encountered in all the provinces of Bihar. Poor farmers, for example, are unable to afford to make investments in natural resource conservation to provide positive returns in future and also are unable to afford means to cope with the risks and have limited access to market outlets. In certain cases, producers are left with no choice except to overexploit the available resources. Moreover, a poor and fragile environment is a major cause of poverty.

CONCLUSION

There are many other issues that critical challenge and demanded solutions and it is indeed the environmental climatic changes of Bihar, is likely to reduce biodiversity and the goods and services that ecosystem supplies to Bihar by increasing desertification and so on. The population increase in urbanization and rural migration taken places very fast for proper education and moreover because of unemployment. It is quite evident that a sizable population of Bihar going through the lack of public awareness due to low literacy rate that is the big source of ignorance and unawareness, need of capacity built up to cope with the environmental issues, etc. The causes of air pollution in state include vehicular exhaust from the large number of very old model vehicles which release in high amount of carbon dioxide and it badly affect the environment. It is also observed that Noise pollution on the roads and some localities is a common problem because of old vehicles. Some of the cities are highly density in population in the state also poses threat to public health issues in terms of cleanliness. Quality of life is also significantly under question especially in densely populated area. claims It is evident that if the state address and talking into account environmental climatic issues, there will be a great positive impact on state economy. Additionally, calamities, as and when they occur, are exacerbated by a number of factors.

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