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POLLUTION: A THREAT TO BIODIVERSITY IN EASTERN INDIA WITH SPECIAL REFERENCE TO BIHAR AND JHARKHAND

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ABSTRACT

In India there are so many aspects of environmental and biodiversity degradation. It ranges from population growth and density, deforestation, urbanization, consumerism, poor waste disposal, lack of leadership, increased usage of pesticides and insecticides in agriculture, vehicular pollution, use of biomass and radiation etc. the ill attitudes of people such as not using alternatives and eco-friendly methods of cooking, food processing, agriculture, horticulture, sanitation, heating and cooling devices.

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1. INTRODUCTION

Major pollution world over may be described as in terms of air pollution, water pollution, soil pollution, land pollution, thermal pollution, pollution due to electromagnetic radiations and nuclear pollutions. Ultimately it contributes to several adverse atmospheric and environmental effects such as acid rain, ozone depletion, global warming, climate change and green house effects. They may ultimately cause degradation of biodiversity, ecology, seasons and eco systems in total. We can call it the environmental degradation. According to the bureau of Indian standards air pollution is the presence of the ambient air / atmosphere of substances generally resulting from the activities of mankind in sufficient concentration present for a sufficient time and under circumstances which interfere significantly with the comfort, health, and welfare of people or with full use of enjoyment of property. The WHO defines air pollution as limited to situations in which outdoor ambient atmosphere contains material air concentrations which are harmful to mankind and his environments. In other words air pollution is "the presence of one or more contaminants in the atmosphere which are injurious to human beings, plants and animals or which reasonably obstructs the life process and property. Man inhales about 15-16 kgs of air and breathes 22000 times in a day. In india there is a provision of National Ambient Air Quality Standards (NAAQS) having objectives such as indicating the levels of air quality a necessary within an adequate margin of safety to protect the public health, vegetation and property assigning in establishing priorities for abatement and control of pollutant level providing uniform yardsticks for assessing air quality at national level and indicating the need and extent of monitoring program.

Table 1 shows the details of standards set for different emissions.

Table 2 shows a level of different pollution level in Ranchi.

Table 3 shows the index of quality in Ranchi.

2. DISCUSSION & FINDINGS

Air Pollution

High air pollution in ranchi is posing a threat of not only respiratory trouble among the city dwellers but may also spawn cardiac problems. It is also likely to increase the mortality rate among the heart patients. According to a survey of Jharkhand State Pollution Control Board, the air pollution situation in the city is really increasing reaching to the environmental degradation. The standard annual mean respirable suspended particle matter (RSPM) of upto 60 microgram per cubic meter which is the permissible limit. But the RSPM mean is almost triple in ranchi. The board's data reveals that the annual average of RSPM recorded in the year 2006 was 117 which has increased upto 122 in 2007 last. In 2012 RSPM rate grew to 167 micrograms per cubic meters. JSPCSB's study on health hazards of air pollution also revealed that with long exposure to RSPM a person may develop diseases like bronchitis and pulmonary emphysema and thus consequently C or pulmonate.

A recent study correlation cardiac deaths and air pollution by the London school of hygiene and tropical medicine, the largest study of its kind found that an increase in the volume of particulate matter 2-5 particles by 10 micrometer per cubic meter of air raises the death amongst heart patients by 20%, smoking increases the risk of heart diseases but air pollution can prove to be a bigger menace. A smoker develops a disease called coronary pulmonate and those in constant exposure to dust particles too may develop the disease. Coronary pulmonate is the enlargement of right ventricle of heart as a response to increase resistance or high blood pressure in the lungs. There was increase in the

cases of disease in Ranchi that may result in Chronic Obstructive Lung Disease (COPD) caused due to accumulation of particulate matters in the lungs. The small blood vessels become very stiff and rigid. Many physicians have found that the relationship between pollution, lung disorder and coronary pulmonale.

Noise pollution in Jharkhand has stridden ahead in tackling the noise pollution from casual to scientific approach. Earlier pollution level was monitored randomly mainly during festivals but with the setting up of continuous automatic monitoring station, noise level would be monitored during pollution level at 65 different places in Ranchi for 3 days and all exceeded the specified limit. During Dussehra Ranchi and other 8 cities in India and the first in the state where the continuous monitoring stations are installed. Currently there are 35 such stations across 7 cities namely New Delhi, Mumbai, Lucknow, Kolkata, Bengaluru, Hyderabad and Chennai. Five automatic ambient noise pollution stations would come up in the city to help Jharkhand State Pollution Control Board (JSPCB) keep a tab on noise level in the state capital. The eight digital screens at these stations would automatically display the noise level and keep people informed about it. The checkpoints would be set up at Gandhi Maidan bus stand, Patliputra industrial state, Patna City Chowk and some other places in Patna to monitor the noise level in Patna town like wise. Noise pollution monitoring station must be installed in Ranchi to monitor the pollution level in Jharkhand.

Water Pollution

According to WHO report 9 lacs Indian die each year from drinking contaminated water and breathing in polluted air. Water supply and sanitation in India is matter of great concern. The proportion of the population covered with the access to safe water was 85% while the proportion of population covered with the access to improved sanitation was 52% in 2001 as per WHO report in 2014.

Ensuring availability of safe drinking water for a large population always remains a challenging occupation. Bihar, in fact has been naturally gifted with surplus underground water in almost every part of the state except some of the hilly areas and hard to reach areas i.e. now the Jharkhand state. The underground sources of water used through handpumps are considerably safer in comparison to wells and ponds. The supply of underground water by municipalities in different towns get polluted due to leakages and mixing up with drainage water. Therefore water purifiers have become the most needed items in each household in every part of the state. However in rural areas people still don't have access to any water safety except for boiling and filtering before use. Several diseases can be prevented and lives saved and expenditure on health may be minimized, if drinking water in Bihar and Jharkhand are made safe. The underground water level usually goes down in several parts of Bihar and Jharkhand specially during the summers the period of consumption of water is maximum causing tremendous shortage to people. In several parts of Bihar and Jharkhand underground water has been found having some permanent impurities like arsenic high iron contents and other impurities that are termed hazardous to health. The arsenic and fluoride contamination of ground water along with poor sanitation facilities in both the states has become major challenge in water supply in rural and urban areas, particularly the risk high in rural areas because the affected aquifers (less than 70m below ground level) are the main suppliers of drinking waters. The arsenic contamination is confined within the younger alluvial belt along the river Ganga. The affected areas are flood prone, geochemically representing reducing environment resulting in mobilization of arsenic ground water. The Pleistocene aquifers are free from arsenic contamination. However a lot of water quality data generated and there correlation with contamination, presently the safe limit is considered as 5ppb. If the international guideline of 10ppb is adopted the affected areas and population at risk will be many times higher (D.S Mishra, 2009). The arsenic affected wells in particular and the contaminated aquifers in general required to avoid. Arsenic free deep aquifers with sufficient potentiality required to tap for community water supply. However care required for leakage of contaminated water from shallow aquifers downwards due to faulty design and construction of wells. Surface water may be long term sustainable source for the villages along river Ganga. A detailed health data is an essential input for understanding the scale of problem which is lacking. Research work is needed to study the impact of arsenic fixation and magnification through the food chain, arsenic treatment based solution may not be viable because of several constraints such as difficulty in operation recycle and safe disposal of sludge and maintenance of system. At last efficient water management is required for preventing further deterioration of water quality and its sustainable usage. As per the estimate by the government of combined Bihar about 53.87% of total population covered by water supply schemes, out of these 30% are covered by ground water sources.

Total number of habitations in this area being 107640 and out of that number habitation with 100% coverage was 76064, remaining partially covered. The rate of coverage in terms of SC/St minority and LWE concentrated habitation were respectively 92.65%, 93.75%, 94.35% and 91.86% respectively. It was estimated that 1058 habitations were affected by contamination of water of one or more kind of contaminant. Almost 1504, 727, 8355 and were found to be contaminated by fluoride, arsenic, iron and nitrate respectively. Several schemes have been launched in eastern India covering several habitations such as PWSS, handpumps/borewells and others were respectively 4632, 90312 and 12696 testing of drinking water performed in 21744 habitations.

Improved portable water supply and facilities and services are critical to enhance public health and improve human development outcomes more so for rural households. Though the state of Bihar and Jharkhand, we can say combined Bihar, has recorded an impressive performance in providing safe drinking water to its rural households. Further improvements required in terms of quantity, quality, equity and sustainability. Further it needed improved sanitation specially for the people living in rural areas. For addressing these issues in a coherent, concerted and urgent manner new initiative have been taken in a mission. New sustainable water supply and sanitation schemes were expected in a time bound manner along with effector operations. Community participation is also necessary at all stages starting from planning and execution of operations and maintenance of the schemes. Government of India to assist the states and union territories to accelerate the pace of coverage of drinking water supply. The entire programs has been started with mission approach with the launch of technology.

Radiation Pollution

There are many sources that generate low level of radiations and which remains unnoticed. It is estimated that about 20% of radiations, we are exposed to be due to human activities. We use cellphone so frequently which is a source of radiation. Cell phone towers, cord less phones as well microwave, tv, computer, broadcast antennas, military and aviation radars, satellites and wireless internets are all sources of radiation. In addition medical X rays, CT scans and MRIs are also sources of radiation. Considering all this the radiation pollution increases significantly. Radiation is essentially the energy that travels and spreads out as it goes. This is referred to as electromagnetic radiation. Example includes visible light, radio waves, micro waves, infrared and ultraviolet light, X rays and Y rays. The differences between this various kinds of radiation consists of some physical properties such as energy, frequency and wavelength. Thus there are variety of electromagnetic radiation. However the magnitude of generated pollution varies with higher risk pollution generated by radiation of higher energies such as Y radiation regardless of exposure time. This radiation is generated through detonation of nuclear weapons or in power plants. Therefore the meaning of radiation pollution is that while there ubiquitous sources of radiation mostly the, high energy radiation causes serious health risks such as cancer or death. That's why we will focus on sources for high health risk radiation which may cause health problems including neurological, reproductive and cardiac problems. For better or worse people are exposed to higher limit of radiation as never before. As the solar system if the largest supplier of EMR however that has certain natural protection. The increasing number of mobile towers, induction cook tops and other electrical and electronic items. During CT scans and MRIs, our body is exposed to extremely dangerous and high level of radiation especially the X rays. Several plastic products used in micro wave cooking sold in the market with declaration. For decades scientists and consumers have debated over the possible effects of non-ionising EMR on living tissues.

In practice emissions from modern domestic microwaves substantially below this international limit and interlocked that can prevent people exposed to microwaves while the oven is on. Moreover exposure decreases rapidly with distance. Example- a person 500mt from the oven receives about one hundredth of the microwave exposure of another person 5cm away. This product emission limits define for the purpose of compliance testing not specifically exposure protection. The international commission on non ionizing radiation protection (ICNIRP) published guidelines on exposure limits for the whole EMF part of spectrum. Exposure limits for the workers and the public set well below levels where any hazardous heating occurs from microwave exposures.

Thermal Pollutions

It is the act of altering the temperature of natural water body which may be a river, lake or ocean. This condition chiefly arises from the waste heat generated by an industrial process such as certain power generation plants. The concept is most frequently discussed in context of elevating natural water temperature, best way also be caused by the release of cooler water from the base of reservoirs into warmer rivers. Elevated river temperatures can also arise from deforestation and urbanization that can reduce stream shedding. Thermal pollution is one parameter of broader subject of water pollution. There can be significant environmental consequences of thermal pollution with respect to surface receiving water such as rivers and lakes in particular decrease in bio diversity and creation of an environment hospitable to alien aquatic species may occur. Regulation of thermal pollution has been more elusive then for other forms of water pollution. Although straight forward mitigation measures are available especially in the case of elevated temperature discharges. Early works on mathematical modeling of thermal pollution to the place in the 1960's works by Edinger, geyer and addressed the equilibrium geometry of the thermal plume or isocontour of elevated temperature within the receiving waters. These models considered the mixing of a stream of admixed differing temperature water into a natural water body. Slightly later more advanced models arose which allowed the analysis of thermal plumes across the extensive database of historical meteorological statistics, so that the full impacts of thermal pollution could be considered in relation to diurnal seasonal and climatic change fluctuations. In any case the technology exists to forecast 14 thermal contours in receiving water for a proposed or hypothetical thermal source. Given the dem&for cooling in power generation&other industrial processes, the extent of thermal pollution worldwide is considerable, particularly in

the industrialized countries of Europe, North America, Asia & Australia. For eg; in the UK, it is estimated that one half of all the river flow is used for cooling purposes & hence leads to some elevated discharge of higher temperature water. As early as in 1980s in USA thermal discharges amounted to one sixth of the total national river flow. In Australia, there are many instances of warm water discharge subsequent to cooling uses, however cold water releases downstreams of the reservoirs is atleast a great problem. For example- in New South Wales it is thought that up to 3000 kilometers may be adversely affected by such cold water releases. The adverse effects of the thermal pollution are often conjoined with other forms of water pollution such as chemical or biological contamination such that the combined effects of two or more pollution types can create severe stresses on aquatic ecosystems. Waste heat discharge to natural water typically depresses the dissolved oxygen content affecting aquatic species such as fishes, amphibians & copetroids. The resulting higher water temperature typically raises the metabolic rate of aquatic organisms. For example- increasing enzyme activities occurs that causes plants & animals to take in greater quantities of nutrients & either carbon dioxide or oxygen. These metabolic changes can alter the balance of species composition & may lead to migration, as species attempt to adapt to changed thermal conditions.

As a result original species may migrate away & alien species may enter a local aquatic system. In some cases significant loss of biodiversity can arise & in some instances total bio productivity can increase at the expense of species decline. The most readily observable phenomena is that of mass fish kills in a surface water body. In this case there are often large numbers of dead fish seen floating in the water or watershed on the water banks. Juveniles or fish fry are particularly vulnerable to small changes in water temperatures.

Many aquatic organisms are very sensitive to small temperature changes of as little as one degree Celsius, not only can be temperature changes alter metabolic rate but adverse changes in other cellular biology can arise including reduction of cell wall permeability harming osmotic pressures; in addition alteration of enzyme metabolism can be affected as well as coagulation of cell proteins. In many cases these cellular level impacts can affect reproductive success & even impact organism mortality. A large increase in temperature can lead to denaturing of life supporting enzymes by breaking down hydrogen & disulphide bonds within the quaternary structure of the enzymes. Decreased enzyme activities in aquatic organisms can cause problems such as the inability to break down lipids which leads to mal nutrition. Primary producers are affected by thermal pollution since elevated water temperature increases aquatic plant growth rates, potentially resulting in a shorter life span of species over population. This can cause algal bloom which reduces 15% of water's oxygen contents in water. The higher aquatic vegetative density leads to an increased plant respiration rate & also to a reduced under water light intensity. The outcome is similar to the eutrophication which takes place when water courses are polluted with leached agricultural inorganic fertilizers.

Some countries & even individual states & provinces require limit on discharges that lead to thermal pollution of receiving waters. Although this aspect of water pollution has proven to be more elusive than conventional chemical discharge, in many cases regulations have come about through judicial application of United Nations clean water act & other statutes. For example- in a state stature challenge the court found that anticipated thermal pollution impacts were sufficient grounds to reverse approval of construction of two nuclear power plants. Regulation may take very different approaches in some laws, a best practice is required such as use of cooling ponds or cooling towers for waste heat discharge. In some cases a numerical limit on acceptable temperature increase in the receiving waters is applied i.e. the World Bank standard provides a maximum increase of 3°C at the margin of mixing zone

Table 1

S.No.	Pollutants	Concentration in Ambient Air	
		Industrial/Residential	Ecological Notified by C.Gov.
1.	SO ₂ μg/m ³	50	20
		80	80
2.	NO ₂ μg/m ³	40	30
		80	80
3.	Particulate matter < 10 μm or PM ₁₀ μg/m ³	60	60
		100	100
4.	Particulate matter < 2.5 μm	40	40
		60	60
5.	Ozone O ₃ μg/m ³	100	100
		180	180
6.	Lead (Pb) μg/m ³	0.50	0.50
		1.0	1.0
7.	Carbon Monoxide μg/m ³	02	02

		04	04
8.	NH ₃ , µg/m ³	100 400	100 400
9.	Benzene C ₆ H ₆ µg/m ³	05	05
10.	BenzoPyreneµg/m ³	01	02
11.	Arsenic µg/m ³	06	06
12.	Nickel µg/m ³	20	20

Table 2: An Index Of Different Pollution In Eastern India

Pollutants	Value %	Impression
Air Pollution	87.50	Very High
Drinking Water Pollution		
Potable water pollution	52.27	Medium
Dissatisfaction with garbage disposal	90.90	Very High
Dirty and untidy	81.85	Very High
Noise and Light Pollution	64.00	High
Water Pollution	53.25	Moderate
Dissatisfaction to speed and time	65	High
Dissatisfaction with Greenery	63	High

Table 3: Purity And Cleanliness Index In Eastern India

Parameters	Value	Impression
Air quality	12.50	Very low
Drinking water quality	47.75	Moderate
Garbage disposal dissatisfaction	9.09	Very low
Cleanliness and Tidiness	18.20	Very low
Quiet and No problem in Night Lights	36.10	Low
Water quality	47.00	Moderate
Comfortable to spend life in cities	36.00	Low
Quality of Greeneries in cities	38.00	Low

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