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Environment-human-economy nexus: An overarching study in Indian context

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Abstract
The impact of industrial revolution in the form of the growing industrial activities thereby, generating high financial gains was experienced in almost each and every corner of the world including India. This passion for industrialization in India deepened post-1991 when economic reforms were introduced. Rampant utilization of natural resources mainly for industrial activities became quotidian however, in this process severe lesions were caused to essential environmental components that endangers the environmental sustainability and calls for an effective remedy. This cure passes through the trade-off between environment and economic activities which is mainly decided by imprudent, insatiable and gluttonous human beings in the light of revenue generation. This turned out to be perilous for the priceless nature and hence, threatens environmental sustainability. This study therefore, analyses the tradeoff between environment and economic activities in India. The study found that in post-reform period India preferred to choose in favor of commercial activities. However, this is somehow justifiable on the ground of being a developing economy, the need to feed huge population and employment requirements.

Keywords: environment, economy, human interference, industries, pollution

1. Introduction
Starting with the dawn of civilizations up until the eighteenth century, one could not find any records of environmental degradation. Population was small, level of production and consumption activity was low and wastes or pollutants level that were produced could be easily cleansed up by the nature. Hence, pollution as a problem did not exist. Industrial revolution was the turning point which leads to the beginning of environmental degradation process and slowly environmental issues became a universal issue.
The history of air pollution control in England and the United States indicates that only when pollution causes substantiated damage to human health and human well-being does pollution become a major concern for local people (Davis, 2002) [15]. Consequences of industrialization and urbanization, including degraded ecosystems, depleted natural resources, and impaired human health, as well as the significant effects of ozone on plants, all have major economic impacts (Selin *et al*., 2009) [64]. The economic implications of the wide-ranging damage on human health and the environment have been suggested to exceed the benefits of GDP growth (Daly, 1997) [13].

2. Literature Review
In a stimulating study by Goldar and Banerjee (2004) [20], a positive relationship was found between rainfall and water quality, while for water quality and industrialization, irrigation intensity and fertilizer, a negative correlation was confirmed by the study. Several studies from India (Kumar *et al*., 2006 [38]; Krishna *et al*., 2009 [36]; Mondal *et al*., 2010 [51]; Chakrabarty and Sharma 2011 [6]; Singh *et al*., 2011 [69]; Mahato *et al*., 2016) [46]. and other parts of the world (Liao *et al*., 2005 [42]; Wang *et al*., 2005 [36]; Katsoyiannis and Katsoyiannis 2006 [33]; Leung and Jiao 2006 [41]; Zhou *et al*., 2008; Jan *et al*., 2010 [80]; Linhua *et al*., 2013 [44]; Wongsasuluk *et al*., 2014 [77]; Kumar *et al*., 2018) have held rapid industrialization and urbanization responsible for the presence of trace metal accumulation in water and soil.
The increase in economic growth has been directly linked with environmental pollution by Mani *et al* (2012) [48]. Their study found that with an accelerated use of fossil fuels, particle pollution is increasing day by day causing severe health consequences. Pathak *et al* (2015) [59]. has blamed industrialization as prime reason behind soil pollution in India contributing around 46% of pollution among the selected variables in India. In order to control land pollution, Ganguly (2016) [19], urged the industrial units to control the discharge of waste from their industrial units. He considered industrialization as a key factor behind land pollution in India. He called for an immediate remediation of large polluted lands in India in order to use them for productive purposes. Saha etal (2017) [61]. argued that in the light of high revenues, land pollution has largely been an overlooked and ignored aspect in India. They have considered industrialization as a key source of land pollution.
A study by Gordon *et al* (2018) [22]. and Brauer *et al* (2019) [5]. claimed that India has one of the highest air pollution levels in the world. An intriguing study by Chen *et al* (2019) shows that in Less Developed Countries public awareness regarding environment plays an important role in bringing turning points in Environmental Kuznets Curve earlier. He, & Lin. (2019) [25]. in an empirical analysis proves the existence of Environmental Kuznet Curve in China which again state that environmental considerations are largely ignored in the initial stages of economic growth. The study shows that as economic growth increases, the sulphur dioxide (SO_2) emissions contents also increases but after the turning point, the pollutant declines with the increase in national income. According to Kumar *et al*. (2019) [39], in

contrast with the quality of water in southern India, the groundwater in the industrial vicinity in northern India contains a high amount of lead (Pb) and manganese (Mn) concentration, which makes it toxic and unfit for consumption purposes. Kumar *et al* (2019) [39]. found a significantly higher level of heavy metals in Indian soil particularly lead (Pb) and zinc (Zn).

The study by Yao *et al* (2019) [78]. shows a U-shaped relationship between renewable energy and Gross Domestic product (GDP). This was called U shaped Renewable Energy Kuznets Curve. Zhang *et al* (2019) [78]. found that out of 121 selected countries, Environmental Kuznet Curve exists for 95 countries from 1960-2014. Their study has used CO_2 data to conduct the empirical analysis, which implies that in the initial stages of development environmental dilapidation takes place. The non-existence of inverted 'U' shaped curve in 14 European countries in case of CO_2 emissions has been depicted in a study by Altıntaş and Kassouri (2020) [1]. The selected countries are- Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland and The U.K. Another study by Kacprzyk and Kuchta (2020) [34]. confirms the existence of Environmental Kuznets Curve in 161 countries where initially per capita CO_2 emissions from fossil fuels increase with increase in national income/growth and later on it declines. The period covered is 1992-2012. Kopas *et al* (2020) [35]. asserted that poor and marginalised population are more prone to the adverse consequences of coal pollution linked with coal based industrial activities. Sarfaraz *et al* (2020) [63]. found an improvement in the air quality due to lockdown in Delhi and Mumbai which signifies the atrocious effects of largely industrial activities on environmental indicators.

3. Environment, Economy Relationship

Today one of the most important and vital relationship to be studied is the environment economy relationship and how human interference plunders it. As the world is heading towards environmental catastrophe it becomes imperative to maintain the balance in order to sustain life of earth. There is no denying of the fact that human interference with nature, artificial intelligence all together are working hastily to guzzle up this planet. According to EcoWatch (2017), Stephen Hawking has warned that humankind faces a slew of threats ranging from climate change to destruction from nuclear war and genetically engineered viruses and therefore, humankind must find an alternative planet in next 100 years.

In terms of environmental sustainability, there is threefold connection between the environment, human society and its economy. These areas-

1. The environment provides the economy with raw materials which are transformed into consumer goods through production process.
2. The environment provides services which are used directly by consumers. e,g oxygen to breathe and water to drink. It also provides aesthetic or recreational services such as recreational activities in forest or boating in river.
3. Environment act as a sink for all the harmful waste generated during consumption and production activities. This is a key service which environment provides.

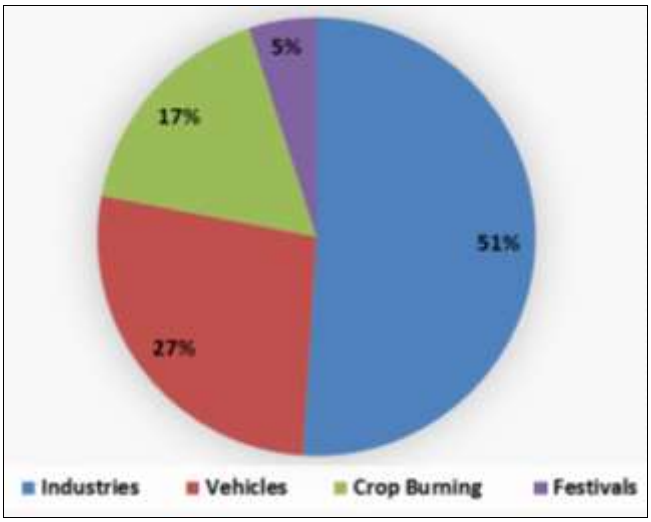
All the degradation of environment relates somehow to an interference that occurs in this relationship between environment, human and economy. This interference is caused by undue economic activities which leads to deceleration or complete breakdown of the natural cleanup process of environment and thereby, causes pollution of various kinds. It is this unsolicited prying that lies in the root of all environmental snags and imbalances. Such interference in the environment is usually observed during the production and consumption activities. The level of production and consumption in the economy is decided by economic interaction. The moment economy decides the level of production it also decides the level of pollutants and obliteration it is going to add to the environment. Therefore, there always exists a trade-off between economic activities and environmental sustainability. Environmental pollution associated with economic activities can be broadly classified into: air pollution; water pollution and land degradation discussed below.

a. Air Pollution

The scientific evidence about the health effects of air pollution is compelling (HEI, 2004; Dominici *et al*., 2006; Jerrett *et al*., 2009; HEI, 2010a; Atkinson *et al*., 2011; Pope *et al*., 2011). The longer and more intense the exposure of people to air pollutants like particulate matter (PM), nitrogen oxides (NOx), carbon dioxide (CO2), and ozone, the greater the impacts on their health, ranging from minor eye irritations, respiratory symptoms to decreased lung and heart function, hospitalization, and even premature death. Usually countries in the initial stages of development experiences this combination of high economic growth and substandard health statistics linked with pollution. Studies in India and in other countries, have consistently demonstrated higher rates of respiratory and cardiovascular disease in populations exposed to PM, NOx, and ozone pollution (Chhabra *et al*., 2001 [8]; Pande *et al*., 2002 [57]; Gupta *et al*., 2007 [24]; Siddique *et al*., 2010 [67]; Balakrishnan *et al*., 2011) [3]. Air pollution caused by particulate matter <2.5 μm in diameter ($PM_{2.5}$) imposes a severe health burden to people worldwide. Across the globe, and even within cities, the health burden of air pollution is not equally shared by citizens. Despite being the region suffering from the most severe air pollution, studies examining the inequity of the burdens of air pollution in Asia are limited. (Huang, etal 2019) [7].

Air pollution is one of the most apprehensive environmental issues in India. Out of 30 most polluted cities in the world, 21 are in India. Fig.1 reveals that industries are the main source of air pollution in India. India is also the world's third largest emitter of greenhouse gases after China and United States. The rapid surge in electricity generation is mainly coal based however, India is gradually moving towards finding alternative renewable sources. Around 76% of electricity in India was generated by coal in 2017 (Statistical Review of World Energy, 2018) [71]. India is the world's second largest user of coal after China. There is concern in India over the health impact of coal plants. One in every eight deaths in India is due to air pollution, according to report in the Lancet Planetary Health (Timperley, 2019) [74]. High emission level of pollutants at industrial clusters has been reported in Raipur-Durg, Korba-Bilaspur, Vapi-Ankleswar, Dhanbad-Bokaro, Vizag, Tarapur and Ludhiana. This is despite the fact that the

number of power plants switched over to super-critical technology. Steel, cement, chemicals and petroleum refineries have adopted state-of-the–art technologies (Lahiry, 2017) [40]. All these evidences suggest that economic activities mainly associated with industrialization are largely responsible for perilous air quality. Environmental indicators have suffered badly due to industrialization in India.



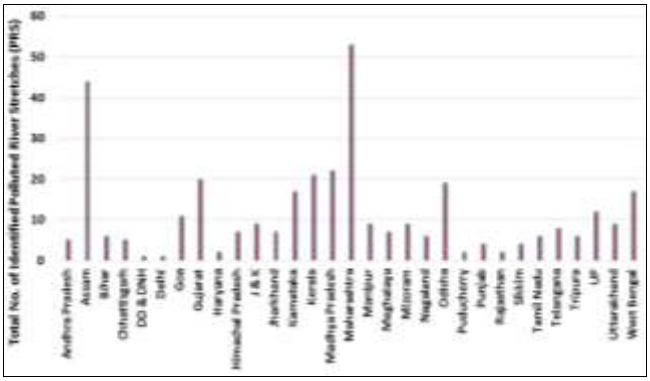
Source: Central Pollution Control Board, Ministry of Environment and Forests, Government of India, 2017.

Fig 1: Sources of Air Pollution in India

Air pollution is a global environmental burden, and has been identified as a significant public health risk. Human exposure to ambient (outdoor) air pollution (AAP) and household air pollution (HAP) are important risk factors for morbidity and mortality, particularly in the developing countries (Lim *et al*. 2012) [43]. Very little is known about exposure to air pollutants in developing countries in Asia, Africa and Latin America where communities are saddled with burgeoning population levels and face rapid growth in urbanization and industrialization.

b. Water Pollution

The contamination of water bodies mostly due to human activities is termed as water pollution. These water bodies could be- groundwater, lakes, ponds, rivers, oceans etc. However, the most worrisome aspect of water pollution is associated with groundwater, river and nowadays with ocean pollution as well. In India untreated sewage is the main source of water pollution. The main issue in this context is the large gap between the generation and its treatment since in India most of the treatment plants are closed. Along with this another major source of water pollution in India is the agricultural run-off. In addition to this there are number of pollutants which are released by industrial production and are dumped in nearby water bodies. Water pollution is accelerated when floods or flash floods occurs which intensify the water pollutions of various kinds including groundwater pollution. In India, the main polluters are thermal power plants, leather industries, chemical and dye industries, plastic-based industries, sugar mills, pulp and paper mills, tanneries, and many more. The highest number of polluted river stretches are found in Maharashtra (53) followed by Assam (44), Madhya Pradesh (22) and so on (Fig.2).



Source: Researchers contribution based on data from CPCB, 2020

Fig 2: State-Wise Number of Polluted River Stretches Identified in Year 2018

River Pollution

Approximately 75 percent of urban waste in India ends up in the country's rivers, and unchecked urban growth across the country combined with poor government oversight means the problem is only getting worse. This situation has arisen despite the huge investments made by subsequent governments in cleaning them up. As a result, our survival and that of rivers is at stake. According to the Centre for Science and Environment, approximately 75 to 80 percent of the river's pollution is the result of raw sewage, industrial runoff and the garbage thrown into the river and it totals over 3 billion litres of waste per day (Misra, 2010) [50]. Besides other rivers, Ganga and Yamuna are the two most polluted rivers in India.

1. **Ganga River:** Ganga, the largest river of the Indian sub-continent, originates from the Gaumukh ice cave of the Gangotri Glacier system at an altitude of 4100 m and discharges into the Bay of Bengal after traversing for over 2525 km through the plains of Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, and West Bengal (Basu, 1992; Singh and Singh, 2007) [69]. It is lifeline to more than 400 million people who lives along its course and depend on it for their daily needs. Ganga is the most sacred river of India, personified as goddess and given the reverence of mother. It is believed to be soul purifier and has been reported to have antimicrobial and medicinal properties (Nautiyal, 2009a, 2009b) [55, 56]. Also, major ancient cities are situated on the bank of Ganga, such as Haridwar, Kanpur, Allahabad, Varanasi, Patna and Kolkata. From Gaumukh to Rishikesh it flows on hills of Himalayas, thereafter, it enters the Gangetic plain. (Dwivedi, 2018) [17]. However, due to pollution, today the regular consumption of Ganga water or taking dip in it may cause serious health effects.

The Ganges River is the largest river in India and, along with the Brahmaputra and Meghna Rivers, the third largest in the world in terms of water discharge. Along the 2525 km long course in India, the Ganges crosses a steep environmental and socioeconomic gradient. Its average annual discharge is 12,400 m3 /s and the hydrological basin covers 861,452 km2 (MoWR, 2014 [49]; UNESCO, 1971) [75]. Surface water and groundwater resources of the Ganga River Basin are extensively used to support the livelihood of 43% of the Indian population through irrigation, provision of drinking water and of water for industrial purposes,

Ultimately contributing to 40% of India's Gross Domestic Product (GDP). There are around 764 industries and 36 class I cities (population N 100,000) situated along the Ganges River (Narain, 2014) [52].

An estimated 1.4 × 106 m3 /day of mostly untreated domestic wastewater and 0.26 × 106 m3 /day of industrial sewage are discharged into the Ganges River and its tributaries (Natarajan *et al*., 2016) [54]. Along the Ganges river channel, there are about 27 chemical plants including production of fertilizers, pesticides, and pharmaceuticals which generate about 98 × 103 m3 /day of wastewater. Chemical industries situated along with sugar and pulp industries generate 79% of the total industrial wastewater along the Ganges River (CPCB, 2013; Sharma 2019) [39]. The pollution of Ganga river is a matter of grave concern. Starting from mainly commercial/economic activities, this river is a lifeline for large section of population who are directly or indirectly depended on Ganga river. Its contamination puts several unimaginable frightful mostly baffling challenges before society. The pollutants also pose threat to marine ecosystem which in case of Ganga river has almost vanished at many locations. Wastes from various types of sources such as industries, agricultural activities etc are directly dumped into this river which over the period of time had led to further chemical reactions and hence pollution of river water. Discharge of untreated industrial effluents from industries such as tanneries, power plants, textiles, jute units and chemicals along the entire stretch of the river from Kanpur to Kolkata is one of the major causes of pollution of Ganga river, despite the centrally-funded Namami Gange project. (Lahiry, 2017) [40]. Singh *et al*. (2020) [70]. have considered industries as the worst polluter of the Ganga river. As a result of discharge from industries the water of the Ganga river was found heavily contaminated with heavy metals and toxic chemicals. (Katiyar 2011 [32]; Madhulekha 2016 [45]; Hussain & Rao., 2018) [29]. This signifies the level of importance given to the revenue generating activities by sideling the environmental concerns.

2. **Yamuna River:** Yamuna river is the largest tributary of Ganga river, which flows through the states of Uttar Pradesh, Himachal Pradesh, Haryana, Rajasthan and Madhya Pradesh and the entire Union Territory of Delhi. Originating from the Himalayas its total length is 1376 kms.

Yamuna river passing through 22 km in Delhi was once described as the lifeline of the city, but today it has become one of the most contaminated rivers in the country. According to the Central Pollution Control Board (CPCB), the water quality of Yamuna river falls under the category "E" which makes it fit only for recreation and industrial cooling, completely ruling out the possibility for underwater life. The pollution of the Yamuna river from domestic as well as industrial discharges from Delhi, Ghaziabad, Noida, Faridabad, Mathura and Agra has rendered the river unfit for any use. Yamuna's water quality in the Himalayan segment and in the segment after confluence with the Chambal river is relatively good. In Delhi around 3296 MLD (million litres per day) of sewage by virtue of drains in Yamuna river. Because of the low flow (due to different barrages) and huge quantity of waste it receives, the Yamuna river within the limits of the city have been given the dubious distinction of being one of the worst polluted rivers of the country by the Central Pollution Control Board (CPCB). A few centuries ago, Yamuna river prompted the Mughals to build one of their most magnificent monuments; the Taj Mahal on its bank; but today it has been reduced to a pale and stinking drain. With an annual flow of about 10,000 cubic metres (cum) and usage of 4,400 cum (of which irrigation constitutes 96 percent), the river accounts for more than 70 percent of Delhi's water supplies. Available water treatment facilities are not capable of removing the pesticide traces.

Waterworks laboratories cannot even detect them. Worse, Yamuna leaves Delhi as a sewer, laden with the city's biological and chemical wastes. Downstream, at Mathura and Agra, this becomes the main municipal drinking water source.

Here, too, existing treatment facilities are not capable of detecting pollutants contained by river water. Thus, consumers in Mathura and Agra ingest unknown amounts of toxic pesticide residues each time they drink water. In Agra and Mathura districts, the domestic and industrial users produce large quantities of waste products and the waterways provide a cheap and effective way of disposing them (Misra, 2010) [50]. Discharge of effluents from industries located in Haryana (Yamuna Nagar, Ambala) has been polluting the Yamuna since long (Lahiry, 2017) [40]. Table.1 provides a brief description of the water quality levels for Yamuna river.

Table 1: Major Water Quality Levels and Segments of the Yamuna River

Segment	Reach	Length (km)	Water Quality Levels
The Himalayan Segment	From origin to Tajewala Barrage	172km	BOD (03 mg/L), COD, TDS and DO (6-10 mg/L) & more or less no pollutants.
The Upper Segment	From Tajewala Barragae to Wazirabad Barrage	224Km	BOD (1-3 mg/L), COD and DO (10- 7 mg/L).
The Delhi Segment	Wazirabad Barragae to Okhla Barrage	22Km	BOD(3-25 mg/L), COD and DO(7-1 mg/L) values of the river water are seriously bad
The Eutrophicated Segment	Okhla Barrage to Chambal Confluence	490km	BOD: 18-6 mg/L, DO: 1-12 mg/L.
The Diluted Segment	Chambal Confluence to The Ganga Confluence	468Km	BOD: 13-1 mg/L, DO: 11-7 mg/L.

Source: Sharma and Bhadhuriya (2019) [39], CPCB, 2009

c. Land Pollution

Land pollution related to mainly industrialization and poor agricultural practices is increasing day by day which in turn implies that in view of revenue generating activities mainly industrialization, environmental sustainability seems to be the least concern. Soil or land is very important for the sustenance of flora and fauna on earth. However, owing to unhealthy agricultural practices followed by dumping of

industrial wastes, soil is being polluted at a rapid rate. Therefore, nowadays along with air and water pollution, land or soil pollution is also debated excessively. Land pollution is emerging as a significant issue since in India it has Started affecting the productivity of crops particularly in most of the northern India region. Also due to land pollution quality of groundwater is perilously affected. Table. 2 shows the adverse consequences of industrialization on soil in India.

Table 2: Heavy Metals Accumulated In Soils around Different Industrial Areas

Location	Nature of Industries	Heavy Metals Accumulated
Pithampur (Dhar), Madhya Pradesh	Automobile manufacturing, food processing, chemical processing, distilleries, textile industries and other manufacturing industries	Cr, Zn, Co
Debari (Udaipur), Rajasthan	Zinc smelter	Zn, Cd, Pb
Korba, Chhattisgarh	Thermal power plant, Metallurgical (Al), Textiles, Engineering workshops, Tyre retreading, and others	Cd, Cr
Coimbatore, Tamil Nadu	Electroplating, Textile, Dye	Ni, Pb, Cd, Cr
Kanpur-Unnao (UP)	Textile, leather tanning, fertilizer, miscellaneous small scale chemical factories	Ni, Zn, Cr, Sn

Source: Panwar *et al* (2010) [58], Saha *et al* (2017) [61].

The chief reasons for soil/land degradation are the following economic activities

1. Deforestation.
2. Excessive use of chemicals fertilizers, insecticides, weedicides in agricultural practices.
3. Landfills.
4. Mining, etc

1. Deforestation

One of the major sources of land pollution is soil erosion. The main cause of soil erosion is deforestation which ultimately causes land degradation. Large scale deforestation has taken place in India for the commercial use/economic activities. This inturn lead to soil degradation thereby, posing environmental threats of various kinds. Over the last 30 years, forests nearly two-third the size of Haryana have been lost to encroachments (around 15,000 sq km) and 23,716 industrial projects (around 14,000 sq km) (GOI, 2016 [21]; The Print, 2016) [73]. According to D.N and Karmakar (2019), which invites landslides, floods, loss of biodiversity and ecological imbalances.

Around 11,467 hectares of land was diverted for non-forestry economic activities mainly irrigation and mining projects in the year 2019 (Kukreti, 2020) [27]. Haryana was the main beneficiary with this diversion catching 251 projects (Table.3).

Table 3: State wise Diversion of Forest Land in India for Non-Forestry Projects

State	Number of Projects	Total Forest Land approved for diversion (in ha)
Andhra Pradesh	3	37.82
Bihar	28	453.43
Chhattisgarh	1	207.99
Goa	1	0.93
Gujarat	99	114.01
Haryana	251	519.53
Himachal Pradesh	52	434.36
Jharkhand	11	869.99
Karnataka	11	162.61
Kerala	2	0.26
Madhya Pradesh	220	795.36
Maharashtra	2	151.81
Mizoram	1	23.69
Odisha	14	4514
Punjab	123	411.07
Rajasthan	27	370.34
Tamil Nadu	6	18.45
Telangana	11	2055.05
Tripura	2	1.8
Uttar Pradesh	1	63.27
Uttarakhand	64	159.74
West Bengal	2	102.33
Total	932	11467.83

Source: Kukreti (2020).

2. Use of chemicals fertilizers, insecticides, weedicides in agricultural practices.

In India, chemical fertilizers, insecticides and weedicides were used intensively as well as extensively in post-green revolution period in most of the states to enhance production levels. The intensity and frequency of its use were very high particularly in northern India where land has been polluted to such an extent that soil has become unserviceable at many places for any further production of crops. Desertification is a phenomenon which has been happening in many places in Punjab where due to excessive use of

pollutants in the land (since green revolution was introduced) soil has lost its nutrients.

3. Landfills

Landfill is another major source of land pollution which is emerging as a matter of concern specially in post economic reform period in India. The solid waste generation is increasing day by day due to rapid industrialization, and hence management is becoming a cumbersome issue. Landfilling is one of the most economical disposal methods that are used worldwide. Most of the solid waste management practice which is use in developing countries lies somewhere between open dumps and control dumps as there is no need of specific equipment and expertise for dumping waste in open dumpsite. (Daskalopoulos *et al*, 1998) [14]. These sites pose a great risk to environment and the human health. Open dump sites have caught great attention of researchers who described its possible effects which led to the closure of such sites in many of the developing countries. The generated waste is disposed off in the landfills whether they are residual materials from materials recovery facilities, residential waste, residue of the combustion of solid waste, industrial waste, or hospital waste. The improper segregation, or complete absence of segregation facility at the waste generation site, causes the accumulation of toxic waste mixture in landfills. Toxic waste mixture contains PCBs, PAHs, pesticides, insecticides, etc. The disposal of these toxic chemicals not only leads to the exposure of rag pickers to these chemicals but also causes soil and groundwater pollution (Swati *et al*, 2018) [72].

The landfills are meant for reducing the exposure of humans and environment to toxic waste. But due to their unengineered nature, Indian landfill sites are posing a threat to environment. The crude landfill sites prevail in Indian scenario that lack baseliners, gas ventilation system, and leachate treatment ponds. This results in environmental hazards and ecological imbalances due to dumping of unsegregated waste from mainly from industries, hospitals, and houses on open land (Narayana, 2009) [53]. The excessive rain water percolation through the different layers of landfill generates a contaminant laden liquid called leachate. The leachate is the primary cause of mobilization of waste from landfill site to the surrounding environment (Christensen and Kjeldsen, 1989 [9], Swati *et al*, 2018) [72]. These landfills have an adverse effect on the quality of land as land gets contaminated with all sort of chemicals and harmful elements disposed from industries, hospitals, pharmaceutical companies, agricultural wastes, chemical industries etc, which are dumped thereby, polluting the land and over the period of time groundwater also.

Ghazipur landfill in Delhi is India's largest landfill which is only 7-8 metres shorter than famous historical landmark-Qutub Minar. Other famous landfills in India are- Dhapa, Kolkatta; Deonar, Mumbai; Perungudi and Kodungaiyur, Chennai; Jawaharnagar, Hyderabad; Mavallipura, Bangalore. These are the most overburdened and exhausted landfills in India which are also a cause for land pollution in these regions.

4. Mining

Owing to rapid industrialization, mining activities in India has accelerated which has further led to land degradation in India. The mining activities lead to environmental threats of various kinds. Despite various efforts mining remains one of the most widely used tool for income generation for a particular section of business class. Mining removes the greenery of that area and exposes land to erosion.

The coal mines of Coal India Limited (CIL) removed about 500 million cubic meters (Mcum) of overburden (OB) to produce 260 MT of coal in 2003-04 at an average stripping ratio of 1.92 m^3 of OB against per tonne of coal production. As demand for coal increases to meet the country's energy requirement, the coal companies are digging deeper and deeper and even opting for lower grades of coal. The country is even planning for production from 300 m depths at stripping ratio of 1:15 for D and F grade quality of coal. The operation of these mines would mean that even if 1 million tonnes of coal were extracted, it would generate 15 million tonnes of waste material. This is huge quantity and in a country like India where land is at premium, it would be very difficult to find enough land to store this waste. Impact of mining on land environment gets reflected in land-use pattern of the respective area because the more the land gets exposed to erosion by losing its green cover or by getting disturbed otherwise due to mining (excavation, overburden dumping etc.) and related activities, its water resources gets damaged, soils get contaminated, part or total of flora and fauna gets lost, air and water gets polluted and the more damages go on proceeding in accelerated rates and the cumulative effects push the land towards degradation. The process works through a cycle known as land degradation cycle (Sahu and Dash, 2011) [62]. Through the customary practice of mining coal, the country is earning good revenues, but at the same time, it has resulted in serious health and environmental issues within its gamut (Guha, 2014) [23].

The above description clearly shows how an increase in the commercial activities to earn more revenues causes environmental degradation of various types. The increasing economic activities had led to the pollution of air, water and land which inturn causes threat to the healthy working of the ecosystem and hence, threatens the sustenance of life on planet earth. The higher the lure to earn money either at micro or macro level, the higher the chances of environmental degradation which nowadays has become irreparable in many regions of the world.

5. Conclusion

The economic activities have a direct association with the environmental deterioration of various kinds in India especially in big metropolitan cities which are largely hub of industrial establishments. Mostly, the more developed a city is, the worst are its environmental indicators. In India rapid deterioration in the environmental quality can be observed in post economic reform period. Commercial activities have been largely preferred over environmental sustainability. Air and water quality in many big cities in India are perilously deteriorated. Delhi is the prime example of the city which is slowly fading out primarily due to pollution of various kinds. Delhi has lost its old charm as a dream city and has now become literally a gas chamber. Interestingly, all the most polluted cities in India possess large number of huge revenues earning industrial establishment such as in place like-Delhi, Kanpur, Ghaziabad, Gurugram, Noida, etc. Also, migration in these big cities in search of economic opportunities have further accelerated the environmental degradation process.

India for decades was facing the problem of air and water pollution but for the past few years soil degradation or land pollution has emerged as an important worrisome environmental aspect which has started adversely affecting agricultural productivity, quality of groundwater, etc in many parts of the country. Not much has been done yet to tackle with this crisis however, its impact can be easily observed on a very large section of population. This land degradation is again a consequence of large-scale dumping of particularly industrial wastes and subsequent accumulation of such chemical laden garbage on land which over the period of time had perilous consequences for the population residing in the nearby regions.

The study asserts that economic activities had a direct cost in the form of environmental deterioration. The higher the level of economic activities, greater will be the level of pollutants and higher will be the process of environmental degradation in India. The best way to tackle the problem of environmental degradation arising from economic activities is to encourage the use of environmentally friendly techniques of production.

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