

Alarming Pollution in the Mahanadi River Basin: Bracing for a Turbulent Future

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Abstract

The water quality of the Mahanadi and its tributaries goes downwards owing to discharge of municipal wastes and human intervention. The chemical compounds in industrial wastes and sewage are so toxic that it has long term impact on a river's ecological balance. The crazy drive for establishing coal-fired power plants has put the river to severe strain. The waste disposals of fertilizer plants are detrimental to the environment, as it promotes algae growth. Industrial wastes are not treated properly before these are disposed into the water bodies owing to weak Government legislations.

Key Words: Pollution, Industry, Mining, Sewage, Rejuvenation

Introduction

The process of rapid industrialization and growing urbanization has become the prominent variable of modernization in recent years. This has led to the establishment of mega projects without considering the livelihood requirements and survival of human and animal communities in the vicinity. Uninterrupted human intervention in and around the river basins such as establishment of the industries, mining, quarries etc have ruthlessly destroyed the eco system thereby disturbing the balance of nature and environmental sustainability. Massive deforestation and damming of rivers add considerably to the devastating problem of pollution in the river basin. In urban areas because of poor town planning and lifestyle changes, sanitation becomes inferior in standard and waste water flows uncontrollably into neighboring rivers. In the age of urbanization and industrialization, the river has been converted into dumping ground particularly for fly ash due to growing number of thermal power plants. River systems have at present turned into one of the most deeply human-affected ecosystems in the world.

Water is considered to be a very valuable resource in a state. Pollution of water is one of the alarming issues faced by Odisha and Chattisgarh in the present situation. Mahanadi, one of India's major rivers in the East-Central belt runs through the states of Odisha and Chhattisgarh. Flowing for a total of 851 kilometres, the river covers a distance of 494 kilometres in Odisha and 357 kilometres in Chhattisgarh. But the condition of the river continues to remain deplorable in the current scenario. With growing population and increasing number of industrial units coming up in both the states, the dependence on Mahanadi river water has also become inevitable phenomenon. The Mahanadi, the largest waterway of the state has been contaminated due to the presence of pollutants. The quality of river water is fast worsening. The towns lying on the river bank are primarily held accountable for contaminating the river water. The drain water released from the towns is adding to pollution considerably in the river. The alarming pollution of the river is visible all the way from Jharsuguda to Paradip in Odisha. The drain water discharged to the IB River, a tributary of Mahanadi in Jharsuguda and Brajarajnagar is getting into the Hirakud water reservoir. The wastes and drain water of the cities of Sambalpur and Cuttack located on the Mahanadi banks are the main medium for defiling the river water. Along with the city's waste water, the industries such as the one in Paradip are also playing major role in polluting the water of the Mahanadi. The amount of fluoride is higher in the river water coming out of the fertilizer plants. The water quality of the Mahanadi and its tributaries goes downhill following discharge of municipal wastes and human activity. Sheer lack of attention of urban local bodies, municipal corporations and sewerage boards located near the Mahanadi and its tributaries may be responsible for growing pollution of the river. Disposal of industrial and municipal wastewater has contaminated several stretches of the Mahanadi River to a considerable extent.

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Throwing away of wastes by the factories, industries, dumping of various toxic and poisonous substances into the river has been found to be the basic cause of the increasing pollution of water in the river. The contamination of the river ultimately makes human life quite complex. The contamination of the river ultimately makes the continued existence of human life quite complex. Even though all rivers are narrated as "mokshdayini" (goddess of salvation) by Hindu scriptures, but in the 21st century, the Indian rivers are themselves battling for life with no exception to the Mahanadi. The Mahanadi is grossly polluted in the downstream and the water is not suitable for consumption, bathing or irrigation. The present article is a modest attempt to explore the real grounds of pollution and its potential impact on the environment by establishing the fact that enforcement as well as a socially inclusive approach respecting the river and its inhabitants is of dire necessity to address the problem. Unfair utilization of Mahanadi river water by the residents and industrial units established in the Mahanadi Basin will be a matter of anxiety in times to come.

Industrial Effluents

The Mahanadi basin endowed with rich mineral resource and adequate power resource entices a favourable industrial climate. The chief industries presently existing in the basin are the aluminium factories at Hirakud and Korba, thermal plants of Orissa Power Generation Corporation (OPGC) at Banharpalli (near Brajrajnagar), Indian Aluminium Co.Ltd., Smelter and Captive Power Plant at Hirakud, Tata Refractories at Brajrajnagar, L & T Cement at Jharsuguda, ACC Cement, Bargarh, Shakti Sugar at Baramba, Indian Chargechrome Ltd. (ICCL), Choudwar, CPP of ICCL at Chaudwar, Paradeep Phosphates Ltd. (PPL), Paradeep, Oswal Ltd. at Paradeep and East Coast Breweries and Distilleries, Paradeep, Paper mill near Cuttack and cement factory at Sundargarh. Other industries based primarily on agricultural produce are sugar, textile and oil mills. Mining of coal, iron and manganese are other industrial activities. There are at present two hydroelectric projects on river Mahanadi Burla Hydroelectric project having a capacity of 235.5 M.W and Chiplima Hydro-electric project of 72 M.W capacity (Choudhury, 2016). The drainage of untreated effluents to river Mahanadi from the major industries like Hindalco industries limited at Hirakud, COS Board industries and SMV Beverages Private Limited at Jagatpur (Cuttack) and paper industry at Brajarajnagar has brought the river into the threshold of crisis. The effluents hold heavy metals like lead, chromium, cadmium, zinc, mercury and harmful bacteria & viruses. A 2012 report of the Central Pollution Control Board (CPCB) establishes the fact that 65 per cent of Odisha's industrial units are polluting in nature and are engaged primarily in manufacturing of textile goods. 15 large industries including aluminium and thermal plants are found in Mahanadi basin. More than 5,000 kilolitres of industrial sewage are put down carelessly daily in the Mahanadi by Odisha's large industries alone. Small ones account for an accumulated number of roughly 2,000 kilolitres daily, as stated in 2014 report by the Centre for Science and Environment (Dutta, 2017). Thus, the Mahanadi continues to exist an industrially exploited and polluted river in India.

Hindalco Industries' smelting plant located at Sambalpur release untreated wastewater, laced with toxins such as cyanide and fluoride, into the state's largest river, the Mahanadi. Hindalco's Hirakud smelter produces aluminum from alumina--100,000 tonnes a year. This results in production of wastes carrying cyanide and fluoride. While cyanide is a killer, fluoride causes vegetation to shrivel and shed leaves. Drinking fluoride-contaminated water can give rise to bone deformities. Hindalco's waste samples revealed that fluoride concentration at these outlets was up to 18 times against the permissible limit of 2 mg/litre. The fluoride level in the wastewater released by the power plant was also very high, i.e. three times the norm. The protective layer of the dump sites is already damaged. The chemical compounds in industrial wastes and sewage are so poisonous and deadly that it has long term effect on a river's ecological balance. It is a matter of grave concern that people continue to use this water for daily needs and the contamination gradually extends over the land as well. The thermal power plants near water bodies may prove to be the death knell for the rivers in days ahead. The governments of both states continue to provide opportunities for industrial projects and investment to come up in the state without caring for ecological costs.

Odisha has also left no stone unturned to draw plans for exploiting the last drop of water in the race to industrialization. A Unit of Vedanta Aluminium Limited (val), a subsidiary of the mining giant Vedanta Resources Plc, pollutes the air and water in the basin considerably. Wastewater from the plant gets directly discharged into the Kharkari drain at two points. The drain flows into the Bheden river that joins the Mahanadi.

The Power plant's ash pond too has heavy seepage in its embankment thus polluting the drain. The fluoride contamination was also high--6.44 mg per litre--in the drain where wastewater seeps into the drain. The ash from the plant was found deposited all along the drain area. Instead of putting a stop to the discharge of untreated effluents, the company started multiplying the number of outlets through which effluents were being released (Mishra,2009). Apart from it, three major industrial units of the state -- the Talcher Thermal Power Station, Rourkela Steel Plant and Ms Oswal Chemical and Fertilisers continue to discharge pollutants in violation of the directions of the pollution control board (Barik,2002). The most shocking thing is that storing of effluents by all these industries for years together get opened up during rainy seasons but the industries instead of assuming responsibility colour it as an accidental outcome. Alok Shukla, head of the Chhattisgarh Bachao Andolan, alleges that when it comes to giving water to farmers, the matter is deferred sine die by sending it to the Water Utilisation Committee and other such bodies. But when it comes to providing water for industrial purposes, all rules and regulations are put aside (Soni,2017)

Municipal Sewages

Three important urban centres in the basin are Raipur, Durg and Cuttack. Urbanization can be divided into four sub basin parts. The upper Mahanadi, the middle Mahanadi, the lower Mahanadi and delta Mahanadi. Upper Mahanadi basin has 7 municipalities and 15 NACs? Sundargarh, Jharsuguda, Belpahar being the important towns. Middle Mahanadi basin consists of 1 Municipality and 3 NACs? .Sambalpur in the middle Mahanadi is one of the big cities of Odisha. Lower Mahanadi has 4 NACs, Athagarh and Nayagarh town being the important ones. Mahanadi Delta the lowest part of the basin is highly urbanized area in the basin. It has 5 municipalities and 10 NACs? .Cuttack, Bhubaneswar, Paradeep, Kendrapara, and Puri are big towns/cities in Odisha (Choudhury,2016). It is observed that the Mahanadi basin requires 63,89,11,400 lpcd of water for its urban population whereas waste water generated calculated is 41,83,42,867 lpcd (Kamyotra & Bhardwaj, 2011). The cities like Bhubaneswar, Cuttack, Rourkela, Sambalpur and Berhampur generate approximately 10,7.5,6,3 and 5 lakh litres of sewage effluents respectively everyday. The effluents contain heavy metals like lead, chromium, cadmium, zinc, mercury and harmful bacteria & viruses.

Municipal sewage from these centres are the main pollutants of river water. Most of the sewage in all the cities of Odisha remain untreated when discharged. According to 2013 monitoring report, the annual average of BOD level in the Daya on the outskirts of Bhubaneswar was alarmingly high at 4.2 milligram for a litre whereas the tolerance limit prescribed for BOD is 3 mg/l or less. In the upstream of Daya, the annual average of BOD was found to be higher than the tolerance limit. Although annual average of BOD in upstream and downstream of Kuakhai, which is a major source of drinking water for Bhubaneswar, has not gone beyond tolerance limit, it has violated the limit at some places. Similarly, total coliform bacteria level in Daya and Kuakhai river around Bhubaneswar has been unusually high. OSPCB says the prescribed TC level has been entirely flouted in the case of Daya and Kuakhai. In respect of TC level, the violation in Mahanadi has been found to be 100 per cent .According to the report of OSPCB, Mahanadi River, the largest river of Odisha, is contaminated with harmful substances by Sambalpur, Cuttack and Paradip municipalities (The Hindu, 2014). Sambalpur, one of Odisha's oldest cities is also one of the worst violators affecting the Mahanadi. As a slum dominated city, Sambalpur hosts around 101 slums in which 60 per cent of the city's 4.35 lakh population resides. The western part of the city is from where the entire town's sewage is discharged directly into the river. A total of 12 outfalls release the sewage directly into the river. The sewage consists of faecal sludge, grey water from toilets, kitchen wastes and several other contaminated forms of liquid waste. In summer, when water from the Hirakud dam is barely released, the river gets dry and it is only the sewage water that is available, and continues to be used. More than 130 kilolitres of untreated sewage is moved daily into the Mahanadi from Sambalpur alone. With both Odisha and Chhattisgarh continuing to dump sewage in the river, the problem of Mahanadi has worsened to a considerable extent. The sewage from Odisha especially comes from major towns and given the high population density, carries large amounts of pollutants. These get deposited along the river's banks. People however, continue to use the polluted water, particularly in summer when the water levels are lower than normal (Dutta, 2017).

Draining an area of around 1,41,600 sq km and having a course of 858 km, Mahanadi has on its banks several urban areas, including Hirakud, Sambalpur, Sonapur, Boudh, Birmaharajpur, Banki, Cuttack and Paradip.

Sewage and drain water from these towns enter the Mahanadi untreated. The industries in Chhattisgarh and upper catchment areas of Jharsuguda, Brajaraj Nagar and Bargarh discharge industrial and urban wastes mindlessly into the river through its tributaries. Apart from it, medical wastes generated from major towns and urban centres of Odisha and Chhattisgarh are definitely hazardous, toxic and even lethal. Drains containing contaminated and hazardous wastes from dispensaries, hospitals and the small-scale industries are carried into the river. The Mahanadi is RED [critical] because 250 kms stretch of the river water out of 494 Km inside Odisha, is highly polluted. A thick layer of drain-mud is currently noticed on the river-bed.

During Bali yatra at Cuttack, the officials of the State water resources department of Odisha expressed concern over unchecked disposal of debris that had led to mounds of solid waste in wavy forms. It appeared in a vast stretch of the Mahanadi embankment near Gadgadia Temple for which the riverbed got systematically buried. For the annual religious extravaganza at the holy confluence of the Mahanadi, Soudur and Pairi rivers in Chhattisgarh, the state government organises various religious events every year. The Rajim Kumbh mela is responsible for depletion of the Mahanadi river on which around 70,000 residents of Rajim and Nawapara depend on its water for domestic consumption. As per opinions of the residents of Rajim-Nawapara, the sand from the Mahanadi basin is dug out and carried to the state capital and nearby areas to address the growing infrastructural needs on a regular basis without any regulation. Every year, temporary morrum roads (red soil roads) are made on the Mahanadi basin for the kumbh, and after each kumbh, the government does not even try to bring back the river bed to its original state. The overall ecology of the river and its flow gets affected by the morrum roads. "Every year, water-borne diseases such as jaundice, typhoid, etc., are on the rise, and the groundwater table in our area is going down, says Kamlesh Kansari, a resident of Nawapara". For the purpose of kumbh mela, the State government built more than 600 temporary toilets within the Mahanadi river basin. But owing to poor maintenance of the toilets, people were forced to discharge faeces in the open. The identity of the river continues to lose as sewage water discharged from temporary toilets pollutes the river water. The government authorities were unsuccessful to act in accordance with the much-advertised objective of Swachh Bharat mission. (Purohit, 2018)

Mining operations

The river is being killed by mining activities in several ways. The presence of the power plants is further adding to the woes. Fortunately or unfortunately, the basin is gifted with a huge coal reserves. The crazy drive for establishing coal-fired power plants has put the river to severe strain. Coal has been the principal fuel in the energy industry. The fast rate of industrial growth in the country is now driving both the state governments to enlarge coal mining activities being oblivious to the environment. Coal ash carries about 48 elements including radioactive elements and toxic-heavy metals. While Chhattisgarh has 16% of total coal deposits of the country, Odisha has over 24%. Unfortunately, the maximum of this rests in the Mahanadi basin. Coal mining has not only worn away the basin's forests and top soil, thereby imposing a lot of ecological destruction, but also polluted the river to a large degree. It is also the largest source of greenhouse gas emissions. Coal-fed power plants are not only water guzzlers but also the largest source of greenhouse gas emissions. They pollute local lands, crop fields and water bodies to a great extent. Coal fly ash contains carcinogenic-heavy metals and has been a matter of concern for the Mahanadi and the Hirakud reservoir. Power plants have been openly flouting environmental laws by releasing fly ash into the Mahanadi River time and again. Ironically, both the Chhattisgarh and Odisha governments have been supporting the actions of polluting coal plants and as such there is hardly any penalty for these power plants. The Ib Valley in Odisha is a "critically polluted area", according to the Central Pollution Control Board norms (Sahu, 2018). The burning of coal at power stations amounts to increased emissions of sulphur and nitrogen oxides into the atmosphere. Acid rain which bears a harmful impact on the natural environment and human health is caused by these gases. Mines bring out wastes thereby increasing the amount of minerals and salts in the water and make it murkier.

Disposal of Fertilizers Plants

Considered as the hub of industrial activity, the Paradip town has two major phosphate based fertilizer plants located within 5 km radius of it. It also houses a phosphoric acid plant claimed to be the world's largest

plant 1. Besides there are large sulphuric acid plants in the nearby locality. Paradeep Phosphates (PPL) and Indian Farmer's Fertilisers Cooperative (IFFCO) produce 3.0 mt of di-ammonia phosphate (DAP) fertilisers. Their effluent load on the Mahanadi is 5,280 KLD released into the Atharbanki creek of Mahanadi. Their total industrial pollution load on Mahanadi is BOD at 15 kg/d, COD at 35kg/d and oil and grease (O&G) at 7.5 kg/d. The town's untreated domestic sewage too drains into the creek. The water quality at Paradeep, according to OSPCB does not qualify even for class E due to several parameters like TC, EC, SAR, Chloride, TKN etc. TC was tested at an annual average of 17,386 MPN/100ml in 2006. Against tolerance limit of 2,250, the presence of EC was 2,412 microsiemen/cm in winter 2006. SAR [Sodium Absorption Ratio] which indicates the concentration of sodium, was 31.06 in April, 2006 against the tolerable limit of 26 for E class water. Chloride findings whose marginal presence of 250 mg/l can make water salty is as high as 3497 mg/l against a surprisingly scheduled tolerance level of 600mg/l for E grade water. The presence of 39.8 mg/l of TKN in April 2006 indicates higher levels of ammonia. Even 02 to 2.0mg/l can be more lethal to some variety of fish. The process of the production of DAP has a high pollution potential. Phosphoric acid is produced when the mineral rock phosphate is mixed with sulphuric acid. The phosphoric acid thus produced is again mixed with ammonia gas, and DAP fertiliser is prepared. The potential water pollutants mainly come from leakages, spillages and washings from the sulphuric and phosphoric acid plants as well as effluents from the captive power plants. This wastes of fertilizer plants is detrimental to the environment, as it promotes algae growth (Jena, 2008). The high phosphate level in water is known to support over-production of algae and water weeds, which is observed in all water bodies in and around Paradeep. Acidic conditions and contaminants in the form of toxic metal ions, phosphorous and ammonia have also been reported even in the ground water in and around such plants.

The fertilizer-manufacturing unit (IFFCO Paradip Plant) is now faced with accusation of discharge of toxic gaseous substances in the air affecting residents of at least three GPs in Kendrapara district. The PRI members of Ramnagar, Kharinasi and Barakanda GPs located at the outskirts of the fertilizer plant had recently brought the attention of district administration after complaints were lodged that toxic emission is causing health risks in their localities. The Oswal plant while in operation had often faced with large number of charges on the discharge of effluents to water bodies and discharge of toxic gaseous substances into air. As the pollutant plants posed a threat to vegetation, aquatic lives and human health, public resentment was witnessed in Jagatsinghpur and neighboring Kendrapara district. (<http://www.sulphuric-acid.com/sulphuric-acid-on-the-web/acid%20plants/Oswal%20Chemical%20-%20Paradeep.htm>)

Idol Immersion

Festivals like Ganesh Puja, Viswakarma Puja, Durga Puja, Kali Puja, Gajalaxmi Puja etc. are being celebrated in various towns and villages of Odisha and Chattisgarh. These festivals are celebrated in public domain or marquee where idol worship is the common practice. Not only number of such marquees are rising with every passing year but also new public domain festivals are being added too. Often, large size, colorful idols, decorations are the hallmark of these festivals. At the end of the celebrations these idols are immersed in water bodies like rivers, ponds and lakes. These immersion activities are rarely regulated keeping the ecological and environmental consequences in mind in towns and villages of Odisha and Chattisgarh. Apart from this, Odisha, small boats are found sailing in the river Mahanadi during Boita Bandana (worshipping of boats) to observe the state's maritime legacy. These miniature boats which were earlier made from plantain leaves, then from shola wood, are now increasingly made from thermocol which is adding to pollution of the river in alarming proportions.

District administration and local authorities while are proactive in terms of law and order situations during immersion of idols, there is hardly any sensitivity and action linking to environmental and ecological consequences due to idol immersion in water bodies. In addition to the idol, several other decorative items, food wastes, wood and clothes used on the idols and marquees are also thrown into the water bodies. Colors used in these idols contain environmentally harmful chemicals. Besides, several non-biodegradable materials too are used. Immersion of idols in water bodies thus, result in polluting the water impacting the aquatic resources as well as users. Dumping of discards and idols into the water body disrupts its oxygen level thereby lowering of dissolved oxygen (DO). Increase in BOD[Biochemical Oxygen Demand] and COD[Chemical

Oxygen Demand] values at the immersion site on the day of idol immersion were also observed. Apart from idols, other accompanying materials such as clothes on idols, flowers, decorating materials (made of paper and plastic), also add to the risk of contamination of water bodies. This, in turn, may affect the aquatic ecosystem at the immersion sites as well as the same in downstream in the long run. The colors and polish on the idols are toxic in nature and harmful to animals and humans, when the water is used for drinking or bathing. There has also been increased use of plaster of paris materials in idol making replacing traditional clay. It is cost effective, dries faster and stronger than the traditional clay. Plaster of Paris is indissoluble and contaminates water bodies by creating a watertight layer on the river bed preventing bio-degradation. This causes to build up poisonous gases affecting aquatic plants and fish. The use of baked clay, coconut husk, aluminum foil, clothes and debris impede the smooth flow of the river. While the big and organized pujas are kept under surveillance by the civic body, thousands of other pujas performed on a smaller scale are hardly monitored. These idols remain in the water bodies after the immersion. There is no regulatory check whether these idols use lead-free paints.

These festivals witness a strong social and emotional involvement of the respective communities. While with passing years, there has been modernization in the representation of these idols and marquees where new materials are put to use, there is little attention to the issues of environmental impact of such materials and process of idol immersion leading to harmful impact on the flora and fauna of the aquatic ecosystem. A study was conducted by State Pollution Control Board, Odisha to identify the impact of immersion of idols on water quality of the river in the context of the River Mahanadi at one of the immersion site in Sambalpur town. Significant changes in results of all selected parameters were observed after the immersion. The study found [significant change between during the event time in comparison to pre and post event] that the extent of pollution in the Mahanadi water due to idol immersion. The test report shows that almost all ingredients of water get distorted due to idol immersion barring "PH". The 'DO' particle which should be 4mg/l or more comes down to 2 mg/l. The 8 mg 'BOD' element which is already above the tolerance limit of 3 mg/l or less increases further to 12 in the post immersion period. However the presence of 'PH' in water whose normal range has been fixed up between 6.5 to 8.5 remains moderate at 7.8 in the post immersion period. The report also shows increase of COD, EC and Turb. NTU from their respective pre immersion level of 38 mg/l, 298/l and 7.8NTU to 46.mg /l, 390us/cm and 11.6 NTU respectively after immersion. Though the level of TDS was well below the tolerable level of 1500 mg/l, it also increases from 168 to 216 mg/l. The level of TS experiences an increase from 212 mg/l at the pre immersion period to 281 mg/l at the post immersion period. Against the tolerable limits of 0.01 mg/l and 0.05 mg/l of 'Cd' and 'Cr6+', their respective levels increase from 0.0008 and from 0.016 mg/l to 0.11 mg/l and to 0.018 mg/l after immersion. The test report shows an increase from 0.074 mg/l of TCr content to 0.056 mg/l after immersion.

The increase of 'Fe' finding from 0.502mg/l to 0.614 mg/l against a tolerable limit of 50 mg/l causes serious concern among environmental activists. Water in the post immersion period tested a marginal increase from 0.002 to 0.004 mg/l of 'Pb' compared to its normal level of 1.5 mg/l. Though the presence of Zn has increased from 0.008 to 0.085mg/l but it is still below the agreed limit of 15 mg/l. There is also marginal increase of 'Cu' from 0.002 to 0.003 mg/l well below the manageable level of 0.1mg/l (State Pollution Board, Odisha, 2016). The results show deterioration of water quality after the immersion of idols. . Some of the parameters were above the permissible limit leading to harmful effect on aquatic, animal and human lives. Rise in temperature was also noted after the immersion of idols. This may be due to the chemical and biological reactions caused by immersion of idols and other materials. The higher concentration of some of the parameters is probably due to heavy pollution load on the sites of the immersions. Idol immersion activities also increase the load of nutrients affecting the microbial organisms as well as the organic matter which reduces the oxygen level.

Telling Impacts

The river is becoming a polluted mess moving towards gradual decay. A great deal of damage was reported in respect of plants and paddy crops in the vicinity of the smelting unit of Hindalco Limited. On September 17, 2008, lush green paddy in about 80 ha in Gundurpada and Nuagujatal villages turned burnt

yellow overnight. Crop loss was observed in a definite direction from the plant. Even leaves of big trees falling in that direction had dried up suddenly. Farmers had been complaining of similar crop damages almost every year since 2003. But the extent of damage in 2008 made them suspicious of toxic releases from the aluminium plant, which they reported to the district agriculture officer of Sambalpur (Mishra, 2009). The local residents belonging to both Jharsuguda and Kolabira block of Jharsuguda district and adjoining areas of Sambalpur district as well as some part of Jharsuguda municipality have been withstanding the action of industries actively to save the river, agricultural fields, forests and the overall environment. The withdrawal of water and rampant pollution has threatened the existence of the Bheden river. The river is now polluted as a result of the breaking of ash pond wall of Vedanta's smelter releasing huge flow of ash water into the river Bheden. The river water has turned out to be of deep ash white colour and foam is being created along the river banks. The damage to the aquatic life of Bheden's water is very conspicuous as fishes of the river are seen floating here and there. The conflict in the river crops up largely on account of water drawn from the river and hazards of pollution created by industries. Although the protests against environmental degradation is lacking of political support, the people continue to make groups and show dharnas and rallies, organize meetings, present memorandum, etc. on a regular basis in short period of time. Various non-government institutions and environmentalists are spearheading these protests for the affected population. Members of Burla Manab Seva Sangathan led by Haldhar Nag, Padmashree awardee, had drawn the attention of District Collector regarding the proposal of releasing the medical wastes in the river Mahanadi with probable consequences that people would suffer from various diseases if the plan is executed. Nature Care Initiative (NCI), a social organization, had requested earnestly NGT to initiate stringent action against the industries, which are drawing water illegally from Mahanadi and polluting the river by throwing down untreated garbage in a large mass into it. Both the migratory and non-migratory species of fishes are badly affected by significant ecological variations in the basin. The community structure of an aquatic environment gets disrupted by the contaminated water containing many toxic compounds. Even the river and its tributaries fail to maintain their minimum ecological flow, having a terrible impact on agriculture. The untreated industrial wastes on surface water might affect the physical, chemical and biological characteristics of river ecosystem. During monsoon, water from various stock piles like coal, minerals, solid wastes etc gets drained into river. Exposure to various stomach and skin-related diseases by the users is found owing to improperly treated effluents in its lower region. Coal-fed power plants not only swallow water but also add greenhouse gas emissions to the atmosphere. They contaminate local lands, crop fields and water bodies at an alarming rate. The huge pumps installed by the factories have polluted the groundwater to such an extent that particles of iron are visible in the water drawn from village hand pumps. Widespread greasy and black substances in large quantities are easily noticeable in the water of the basin which is very toxic to animal and humans. Wastewater from urban areas are composed of substances such as grit, debris, suspended solids, pathogens, organic wastes, nutrients, and a mixture of approximately 200 known chemicals. The polluted rivers have varied dangerous impacts, starting from negative impact on health of humans to that of other species; from health of aquatic and terrestrial organisms to health of economy (Panda, 2017).

Who is to blame?

Neither Odisha nor Chhattisgarh has done a great deal to control industrial pollution in the Mahanadi. Despite Odisha government and the state pollution control board being categorically told by the Comptroller and Auditor General (CAG) in 2001 to spend at least 5 crores per year to restrain industrial pollution of the Mahanadi, no report has been presented for consideration by the state government on the nature of steps and expenditure incurred to fight for pollution in Mahanadi till 2016. In Chhattisgarh, the work for completing two effluent treatment plants is on the anvil but the state pollution control board is well aware that at least 10 effluent treatment plants would be needed to treat the industrial sewage from Chhattisgarh's major polluting points. Regrettably, the state government has found only two to be acceptable. Pollution control authorities, however, downplay the contamination of the river. Construction of sewerage projects is under progress in all major towns on the banks of the Mahanadi. No concrete step on behalf of the authorities has been initiated so far and the waste water is being released to the river directly through drain (Tathya, 2015). Instead of dealing with

the pollution issue together, both the states are entrapped in a legal wrangling over water allocation. Proper biological and chemical treatment of domestic sewage and industrial effluents before these are discharged to river system by the concerned institutions is the need of the hour. But the administration doesn't take any remedial measure in this regard. Water treatment plants are not efficient enough to treat dyes and other chemicals. Unplanned urbanization and industrialization suffocate a river to a considerable extent. Due to weak Government legislations, industrial wastes are not treated properly before these are disposed into the water bodies. The state pollution control boards only serve notices, but no noticeable action is initiated to control industrial pollution. Municipalities and local governments are faced with serious resource crunch in the management of sewerage facilities. The politicians promise to provide drinking water and irrigation facilities to the electorates during the time of election, but how will they deal with it without protecting the rivers? Although the OPCB tasked with to prepare a regional environmental management plan (REMP) for the Mahanadi basin, took no concrete action for preparation of a REMP since 1995. In the absence of REMP, no action was also taken to control deterioration of the quality of Mahanadi river. The Government stated that preparation of REMP could not be performed for deficiency of financial assistance (Das, The Hindu, 2006). Pollution has lots of long term ramifications over livelihood, health and social environment, flora and fauna of the locality which cannot be revived in a short span. The State Pollution Control Board (SPCB) has been doing routine work without any legal intervention. Apart from it, despite serious warnings by environmental scientists and the imposition of fines, citizens turn a blind eye to the hazardous consequences of idol immersion. People rejoice during the Durga immersion, forgetting the environmental effects of their actions.

Need For Course Correction

Idols are to be made from natural materials-traditional clay rather than baked clay or plaster of Paris. Besides, non-toxic natural dyes and water soluble colours should be used. Flowers and plastic or paper materials used to decorate idols should be removed before immersion. Biodegradable materials should be separated for recycling or composting while non-biodegradable materials should be disposed of in sanitary landfills. The problem lies with implementation of guidelines and awareness among the people. The authorities should run a campaign before such festivities, appraising the people and artists involved in making idols about non-toxic dyes to be used for colouring and means to dispose them in eco-friendly ways. People should be sensitized and encouraged not to immerse idols but bury them for better safety of the rivers.

Public opinion is mounting against the state government to take appropriate measures to make the Mahanadi river system pollution-free. Meaty restrictions on industries and treatment of wastes produced from urban areas are urgently called for to protect the Mahanadi from its utter disaster. Appropriate legal action should be initiated against industries operating near the river without prior environmental approval. New norms for abatement of pollution and stringent actions against violators can help a lot to bring down the production of wastes from industrial units. River conservationists have appealed for both the states to come forward to resolve the bigger problem of pollution. The failure of this may result in the river itself extinct there to fight for. Thus, there is an urgent need to discuss and find ways to address all these causes that are direct outcomes of poor water management. A strong policy is urgently required which can state exactly the distance of industrial sites from water bodies. Many industries are found along the bank which throws away effluents at night and it all goes downstream. Rural people who are water-sensitive and water-judicious should be brought on board in policy making to save the river from its utter decay. It is time to revive and restore the river through participatory ways along with volunteers and communities of the Mahanadi (Panda, 2013). Implementing a series of initiatives to reduce water pollution is the viable option to keep the river in right track. In stead of treating water as a commodity, people of both states have to look upon it as a public trust, a resource in safeguarding for future generations. It is warranted by time to understand the complex set of activities which destroy a river. The right institutional architecture with right multi-sectoral expertise is the key area of focus to save the river from the stage of decadence. To save the river from a turbulent future demands not just involvement of citizens or the community, but the determined efforts of government, the civic bodies and the monitoring agencies.

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