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A SOCIO-LEGAL STUDY ON IMPACT OF SOLID WASTE ON WETLAND ENVIRONMENT: A CASE STUDY FROM 'DEEPOPOR BEEL' WETLAND, ASSAM

Utpala Barman

Abstract

Water is the life of all living creatures, so use of polluted water harmful for all being of this earth. But forgetting the importance of water, people are destroying our natural environment. Growth of population gradually impact on natural resources. With the increase of the urban population every year the figure of urban solid waste also increases. It creates problem for the local bodies in solid waste management as well as causes major sanitary problem which ultimately effect on human health and the environment. Solid Waste Management (SWM) or unplanned garbage disposal is a neglected area of unsustainable urban development. In most of the cities more than half of the solid waste generated remains unattended. 'Deepor Beel' is one of the largest natural wetland of Guwahati city, Assam. In 2002, the whole area of the 'beel' was declared as Ramsar site and 4.14 km was proposed as wildlife sanctuary. 'Deepor beel' bird sanctuary is recognized as a home of various rare and endangered species of flora and fauna and a huge gathering of migratory birds in every year. But the open dumping site of West Boragaon which encroached the 'beel' has created many environmental problems for nearby areas. Though various international, national and state laws exist for the protection of the environment but their implementation is vary unsatisfactory. Apart from these, the National Green Tribunal (NGT) also issued directions to the local authority (Guwahati Municipal Corporation) for unrestricted and unregulated illegal dumping of wastes on the wetland. The NGT has asked the Assam government and State Pollution Control Board to take necessary steps to control and prevent damage to the environment and the public health. But the concerned authorities failed to implement the directions so far. The Government has taken some initiatives under the Smart City Project, Swachh Bharat Mission, etc. for better protection and conservation of the water bodies including river, wetland, lake, etc. The engagement of civil society in productive utilization of natural resources offers a great significance. The role of indigenous people and local

*A Socio-Legal Study on Impact of Solid Waste on Wetland Environment:
A Case Study From 'Deepor Beel' Wetland, Assam*

communities for conservation of natural resources is also internationally accepted. Enactment of policies will not be effective, if people are not aware of reduction of pollution or recycling or waste management.

INTRODUCTION

All living or non-living creature of this Earth directly, or indirectly, depend on nature. Our eco-system is a composition of both terrestrial and aquatic ecosystems. An aquatic ecosystem is the connection among people, land and wildlife, through water. Lakes, rivers, marine and wetlands constitute the aquatic ecosystems. Aquatic organisms mostly depend on water for their basic necessities such as food, shelter, reproduction. But, forgetting the importance of water, people are destroying our natural environment and polluting water bodies, which has made them unhealthy or poisonous.¹

People, naturally, started migrating and, gradually, started settling down in city areas because of better trade and commerce, education and better medical facilities. Uncontrolled urbanization may cause many problems such as overcrowding, all kinds of pollution, water crisis and increasing solid waste in the cities. With the increase of the urban population every year, the figure of urban solid waste also increases. It creates problems for the local bodies in solid waste management and, also, causes major sanitary problems, which ultimately affect human health and the environment.

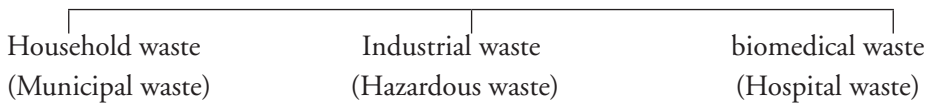
MEANING OF SOLID WASTE

In the present day scenario, due to the growth of population, urbanization, industrialization and the changing nature of standards of living, waste generation has increased. Solid wastes are those materials which are unwanted or useless products generated from society, either from household, commercial, industrial, mining or agricultural activities.

1 Jayati Ghosh, 'Destruction of Wetlands,' The Frontline, (January, 2018) <http://frontline.thehindu.com> accessed 15th February, 2020

The World Health Organisation (WHO) in 1971 defined solid waste as waste, which is not free flowing, arising out of man's activity. Solid waste refers to all non-liquid wastes (e.g., rubbish or garbage).² Though the earth has its special self purification capacity, it may result in environmental pollution if waste materials exceed this capacity and become unbearable. An unhealthy and unscientific disposal of waste leads to environmental pollution.

TYPES OF SOLID WASTE



Municipal solid waste includes all degradable, partially degradable and non-degradable materials. Paper, textiles, food waste, straw and yard waste are some example of degradable materials. On the other hand, wood, disposable napkins and sludge, sanitary residues, etc., are partially degradable. Non- degradable materials are like leather, plastics, rubbers, metals, glass, ash from fuel burning like coal, briquettes or wood, dust and electronic waste, etc.

Section 2(e) of the Environment (Protection) Act of 1986 (EPA) defines a 'hazardous substance' as 'any substance or preparation which, by reason of its chemical or physio-chemical properties or handling, is liable to cause harm to human beings, other living creature, plants, micro- organisms, property or the environment.' In modern industrialized society, industries generate, use and discard such hazardous substances without being adequately treated, which may cause acute or chronic health effects.³

'Bio- medical wastes' means any waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities pertaining thereto, or in the production or testing of "biologicals" that means

2 J.R. Rouse, 'Solid waste management in emergencies,' World Health Organisation, <https://www.who.org> accessed 16th February, 2020

3 The Environment (Protection) Act of 1986

a substance of biological origin used as a drug, vaccine, pesticide, etc., and including categories mentioned in Schedule of the Rules.⁴

SOLID WASTE MANAGEMENT

Solid Waste Management (SWM) is a neglected area of unsustainable urban development. In most of the cities, more than half of the solid waste generated remains unattended.⁵ Some local governments have managed solid waste with the help of communities, NGOs, and private agencies. The SWM includes the whole process of collection, transport, treatment and disposal of waste, along with monitoring and regulation of the waste management process. Apart from these, waste management also offers solutions for recycling from the waste to reusable products.

Unplanned communities and frequent development of the city areas create problems for developing countries in SWM. People unconsciously use drains, water bodies or open places as dumping grounds, ignoring the risk of flooding and health hazards. As per the Planning Commission's Reports of High Power Committee on Urban Solid waste Management in India, in most cities, the municipal solid waste generated remains unattended. Due to such unhealthy environmental conditions, people living in nearby areas have to suffer a lot.

The Ministry of Environment, Forests and Climate Change (MoEF&CC) of India is responsible for regulating and ensuring environmental protection. The MoEF&CC, along with Central Pollution Control Board and State Pollution Control Board, administers and regulates the pollution level in our country. The Municipal Corporation, Municipal Boards or Urban Local Bodies are responsible for management of bio-medical wastes generated in the areas under their jurisdiction.

4 Bio-Medical Waste (Management and Handling) Rules, 1998

5 Government of India, Planning Commission, Report of Power Committee on Urban Solid Waste Management in India 1 (1995)

TREATMENT METHOD OF SOLID WASTE

SWM Treatment is a method, technique or process, designed to change the physical, chemical and biological characteristics or composition of any solid or hazardous waste to make it harmless for the environment.⁶ Environmentally sound management of solid waste is a necessity to protect human health and environment from the negative impact of such waste materials.

The following are the top three methods used for the treatment of solid waste:

- 1. Landfill:** In this method a natural or man-made pit or hollow is filled with the solid waste and covered with soil after selecting the site of landfill to avoid subsequent problems. Such landfill sites can be used as a source of biogas or reclamation of derelict sites to develop landscaped gardens. It is considered as one of the cheapest and common disposal method for treatment of solid waste.
- 2. Composting:** Waste materials which are organic in nature such as plant materials, food scraps, paper products can be decomposed and use for agricultural or landscaping purposes. It can be recycled using biological composting and digestion processes.
- 3. Recycling:** Some materials are recyclable, such as ferrous and non-ferrous metals, construction debris, scrap tires, paper or cardboard, plastics, textiles, glass, wood or timber, waste oil and grease, etc. For implementing this method, waste should be collected separately. This method leads to the development of enterprises and encourage some sections to engage themselves in recycling waste to industries.

SOLID WASTE MANAGEMENT IN GUWAHATI CITY, ASSAM

The Guwahati Municipal Corporation (GMC) has the primary responsibility to collect the municipal waste. The GMC is divided into 31 wards, and there is

6 Dr. S.C. Tripathi, *Environmental Law*, (3rd ed. 2008), 475

*A Socio-Legal Study on Impact of Solid Waste on Wetland Environment:
A Case Study From 'Deepor Beel' Wetland, Assam*

one NGO each assigned for the job of Primary Collection and Street Sweeping within the respective wards. After that, the wastes are collected through modern compactor, tippers, dumpers, excavator cum loaders by GMC.⁷ There are only two functional Transfer Stations in Guwahati. After that, the waste is transported to Boragaon dumping site.

GMC has also initiated a project for segregation of waste at source and purchasing dry waste from the generators. Accepting the Daily Dump project for home composting facilities will definitely be a successful activity for waste management.⁸ Installation of Drum Composting (site composting technique) at various bulk waste generators like vegetable markets, agricultural market, hostels, etc., will make it easier to reduce the environmental effect in such areas. Apart from these initiatives, a high-powered committee was formed to monitor all the activities for solid waste management.

Every day Guwahati produces around 500 tonnes of garbage.⁹ From 2006, the GMC started to dump waste in Paschim Boragaon, close to the water body of 'Deepor Beel.' About 24 hectares area of east side of the 'beel' is covered by the dumping site. The area gradually increases due to the increase of the amount of waste collection from the cities. The solid waste management plant at Boragaon has the capacity of only ten tonnes, which is not sufficient for segregation of wastes.¹⁰ As per reports, the new plant will be set up in one of the four identified locations, i.e., Chandrapur, Sonapur, Basistha and Udalbakra. After getting official permission to start the project and after implementing the same, they will stop the dumping of waste at Boragaon.¹¹

7 Retrieved from <https://gmc.assam.gov.in> 21st February, 2020

8 ibid

9 The Assam Tribune, November 26, 2016, www.assamtribune.com, accessed July 20, 2019

10 GMC (Guwahati Municipal Corporation) for Power from waste, Staff Reporter, The Sentinel, 23rd July, 2019

11 GMC to set up a solid waste management plant, Staff Reporter, The Sentinel, 6th February, 2020

The GMC has consulted with the Indian Institute of Technology, Kharagpur, to suggest a design for the processing and disposal required for the scientific management of the dump site at Boragaon, to prevent environmental impact and to develop municipal waste management system for Guwahati city.¹² The Government has estimated a cost of Rs. 139 crore for West Boragaon dumping site with scientific processing and disposal of solid waste under the Swachh Bharat Mission project.¹³ It is assured that a properly engineered landfill will help in reducing any environmental impact on *Deepor Beel*. Though a plot of land measuring 20 bighas near Noonmati has been allotted for the construction of solid waste processing plant, it will not be sufficient.

It is great news for the people of Assam that the Oil India Ltd, Numaligarh Refinery Ltd, and the North Eastern Electric Power Corporation are planning for a plastic to fuel project. A memorandum of understanding is already signed with the OIL and the NRL for this project. The NEEPCO has also supported this waste to energy project in Guwahati. For this project, they requested the GMC to supply waste generated in the whole city, as well as an appropriate land/site for this project. But, the project is still not implemented due to the insufficiency of the land for the processing plant.

‘DEEPOP BEEL’ WETLAND- ASSAM’S LONE RAMSAR SITE

Deepor Beel is one of the largest natural wetlands of Guwahati city, Assam. It covers 40.14 km area having biological and environmental importance. In 2002, the whole area was declared as Ramsar site, and 4.14 km was proposed as a wildlife sanctuary.¹⁴ *Deepor beel* bird sanctuary is recognized as a home of various rare and endangered species of flora and fauna with a huge gathering of migratory birds every year. In 2004, the Birdlife International declared the *beel* as an important bird area, because of its unique environment where a variety

12 Retrieved from www.assam.gov.in 21st February, 2020

13 *ibid*

14 Sushant Talukdar, ‘NGT notice to Assam on garbage dumping on wetland’ (The Hindu, 16th Oct.2013) <https://www.thehindu.com> accessed 20 February, 2020.

*A Socio-Legal Study on Impact of Solid Waste on Wetland Environment:
A Case Study From 'Deepor Beel' Wetland, Assam*

of birds fly in nearby areas. The two reserved forests, Rani and Garbhanga, are home for elephants, in addition to other birds and animals, and they are mostly depending on the 'beel' for water and food. These forests increase the socio-economic importance of the 'beel.' About 80 to 120 Asiatic elephants are found in these forests (Government of Assam records, unpublished). The 'beel' attracts every nature lover, ornithologist, as well as tourist, from every corner of the world, to enjoy its natural beauty.¹⁵ The 'beel' can be called a guesthouse for 19,000 migratory water birds in winter season.¹⁶

Though the wetland was internationally recognized as Ramsar site, the area has been suffering from environmental degradation due to illegal dumping of waste as well as encroachment. The 'Paschim Boragaon' area is very much near to the 'beel' where the Guwahati Municipal Corporation dumps all the wastes collected from the city. This is one of the reasons for the degrading water quality of the 'beel' and many health hazards for aquatic animals as well as local bodies. It is reported on January 22, 2017, that 22 storks were found dead in *Deepor beel*. It is suspected that death might have been caused by eating trash at the dumping ground. India, being a signatory to the Ramsar Convention, is committed to sustainable use of their wetlands. They are bound to preserve the ecological integrity and character of these wetlands having international importance. The main objective of this study is to evaluate the impact of municipal solid waste dumping on the water and soil quality in 'Deepor Beel' wetland. The role of hydrology of wetlands like 'Deepor Beel' should be focused on mitigating the artificial flooding in nearby areas.

IMPACT OF SOLID WASTE DUMPING GROUND ON 'DEEPOP BEEL'

Research works done in various waste dumping sites in Guwahati found the scenario of degrading condition of the environment and many health hazard

15 'Assam's wetland, Deepor beel under threat,' Down To Earth, (July 4, 2015), <http://downtoearth.org.in> accessed 20th February, 2020

16 R. Barman, An Ecological Analysis of the Wetland in Relation to Waterbird Diversity of Brahmaputra Valley, Assam, Unpublished Ph.D. Thesis, Gauhati University (1997)

problems. The open dumping site of West Boragaon which encroached the 'beel,' has created many environmental problems for nearby areas. Water of the east side of the 'beel' has become dusky and smelly, which is slowly moving towards the west side, and a clean water body is becoming more dusky day by day. One can witness that, everyday, hundreds of trucks are downloading urban solid waste collected from the whole city by GMC.

The GMC is also following the rules provided under the Solid Waste Management Rules 2016, but due to lack of, or insufficient, capacities it is unable to execute scientific methods for disposal of waste generated in the city. Again, increase of population in urban areas in Guwahati minimise the land capacity for waste management facility. There is a limited area, disproportionate to a huge quantity of waste released in the city, which causes a problem in proper management of these wastes. Disturbance in the natural drainage system also affects the carrying capacity and connectivity towards the wetlands, because of which, during monsoon period, wetlands and other water bodies could not store excess water when the river Brahmaputra flows over the danger level. This is one of the reasons why people of Guwahati city have frequently faced flash floods and water logging problems in different areas. Being located in the city area, the 'Beel' plays an important role to maintain the water regime of the whole city.

There is an urgent necessity to understand the need of the *beel* because it receives water from the entire city of Guwahati through different channels. At the same time, spreading awareness among the people of the city areas about proper management of solid waste of their households and limited use of plastic materials is equally important to protect the environment from health hazards and different types of pollution.

Brick kilns located near the *Beel* areas are also considered to be a threat to land, water and the environment. Waste materials produced from such industries are dropped into the *beel* along a 2 km radius from each brick kiln, which affects the growth of flora and fauna in the *beel*. The whole brick making process not

*A Socio-Legal Study on Impact of Solid Waste on Wetland Environment:
A Case Study From 'Deepor Beel' Wetland, Assam*

only pollutes the surrounding environment, but also affects the health of the workers as well as the people living in nearby areas.¹⁷

Though the *beel* is not directly connected to the industrial effluents, a channel of Bharalu River carries the effluents of Guwahati Refinery situated in Noonmati and other industrial effluents of Guwahati city. Industries established in the periphery of the *beel* also produce industrial wastes, which flow into the *beel* through rain water.¹⁸ Untreated sewage and industrial wastes that flow into the *beel* enhance the growth of weeds like *plygonnum barbatum*, *plygonnum hydespiper*, *plygonnum orientale* and *rumex maritimus* which are harmful for the fish.¹⁹ Several dead fish were found floating around the *beel* by the local people. The Pollution Control Board of Assam ascertained that because of water contamination, the fish could not survive in the *beel*. It is a form of water pollution caused by human activities. A study conducted by the State Pollution Control Board of Assam suggested the need for dredging the Deepor beel, like the Dal Lake in Jammu and Kashmir, to save it for future generations.

The National Green Tribunal (NGT) has asked the Assam government and State Pollution Control Board to take necessary steps to control and prevent damage to the environment and the public health from the GMC's dumping ground at Boragaon which plays a drastic role in polluting the *beel* and, thereby, infecting underwater flora and fauna as well as affecting the endangered birds found on the *beel*. But, the concerned authorities neglected the issues. The State Pollution Control Board has failed to manage the waste in the city, and NGT has fined the board with Rs. 1 crore.²⁰

It is observed that 'plastification' of the *Beel* degraded the water quality and turned the wetland into a 'wasteland.' The migratory birds, which seasonally

17 Md. Sarfaraz Asgher, *Land Degradation and Environmental Pollution: Impact of Brick Kilns*, (2004, B. R. Publishing Corporation, Delhi) 1

18 Mobarque Hussain, Detailed study of Deepor Beel mooted, *The Assam Tribune*, (Guwahati, Nov.5, 2013) www.assamtribune.com accessed 21st February, 2020

19 Study lists Deepor woes- Pollution Board suggests Dal Lake dredging model, *The Telegraph*, (Sep.2, 2007) accessed 21st February, 2020

20 www.pratidintime.com, (May 10, 2019)

come here, have now chosen to stay away due to changes in the environment. In fact, the Hargila has been dying in recent times due to the increasing toxicity.

NATIONAL LEGAL PROVISIONS FOR THE MANAGEMENT AND HANDLING OF WASTES

The Constitution of India under Part IV A imposes a duty on every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife.²¹ Further, Article 48A stipulates that the State shall endeavor to protect and improve the environment and to safeguard the forest and wildlife of the country. In our Constitution, water is included in State list, i.e., List II in Entry 17. Being a state subject, it is the responsibility of each state to make appropriate rules and regulations to deal with water related problems.

People have a right to take recourse under Article 32 for removing environmental pollution, including water pollution which is dangerous or impairs the quality of life. Apex Court, extending the boundaries of Article 21, includes both right to development and clean environment as an integral part of human rights. To implement the constitutional provisions, the Government of India has enacted the following legislations for better protection of the environment.

1. The Environment (Protection) Act, 1986

The Act is enacted to give effect to the decision of the United Nations Conference on the Human Environment of 1972, in so far as they relate to the protection and improvement of environment and the prevention of hazards to human beings, other living creatures, plants and property. The Act is applicable in protecting wetlands and groups of wetlands.

The following are some of the important provisions guaranteed under the Act:

- (i) The Act prohibits activities that are harming the environment or are banned, such as discharge of environmental pollutants in excess of prescribed standard.²²

21 The Constitution of India, Article 51A

22 The Environment (Protection) Act, Section 7

- (ii) If any foreseen or unforeseen event takes place which harms the environment, the person responsible for such harm has the duty to take appropriate measures to reduce and prevent such activities and inform the proper authorities about such events having possibility of harming the environment.²³
- (iii) Any persons carrying on any industry, operation or process or handling any hazardous substance are bound to render all assistance to the Central Government and its authorized persons, and any failure or willful delay or obstruction on the part of any such person shall be treated as an offence and is punishable under this Act.²⁴

The following are some rules aimed at ensuring better management and handling of different wastes generated throughout the country.

2. The Solid Waste Management Rules, 2016

The Ministry of Environment, Forest and Climate Change released the Solid Waste Management Rules, 2016, replacing the earlier Municipal Solid Waste (Management and Handling) Rules of 2000. These rules were issued under the Environment (Protection) Act, 1986, for management of municipal solid wastes as per the powers conferred on Central Government.

Some of the highlights of the Solid Waste Management Rules, 2016, are:

- It is now mandatory to segregate waste materials into three separate streams, i.e., organic (bio-degradable), dry waste (plastic, paper, metal, wood, etc.) and domestic hazardous wastes (diapers, napkins, mosquito repellants, cleaning utilities, etc.). Again, wastes generated from hotels, hospitals, etc., are also treated as organic waste.
- The local bodies (Municipal authorities) have given the power to decide and levy the user fees for collection, disposal and processing from bulk

23 Ibid, Section 9

24 Dr. Sukanta K. Nanda, *Environmental Law*, (Central Law Publication, 2003) 239

generators. If Waste Generators are throwing, burning, or burying the solid waste generated on the streets, public spaces outside the generator's premises or in the drain or water bodies, it should not be tolerated.

- The new rules also lay emphasis on promotion of waste to energy plants. The Ministry of New and Renewable Energy Sources should provide assistance for Waste to Energy plants.
- The new rules also revise the parameters. A landfill site or dumping ground shall be 100 meters away from rivers, 200 meters from a pond, 200 meters away from highways, habitations, public parks and water supply wells and 20 km away from an airport.

3. The Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016

Superseding the earlier rule, a new rule was framed in 2016 by the Central Government under the enabling provisions of the EPA to deal with the hazardous waste problem which was generated, by the use and discarding of this waste by a large number of industries operating for urbanized societies. For the first time, rules have been made to separate 'Hazardous Waste' from other wastes.

A person generating hazardous wastes and the operator of a hazardous wastes facility are 'responsible' for the proper handling, storage and disposal of wastes.²⁵ The Rules prescribe that for handling and disposal of hazardous wastes, the person must take a permit from the State Pollution Control Board.

The following are some important features of the Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016:

- Under the new rules, prevention, minimization, reuse, recycling, recovery, co- processing and safe disposal have been incorporated in the hierarchy of waste management.

25 The Hazardous Waste (Management and Handling) Rules, Rule 4

- To safeguard the health and environment from waste processing, industries should follow Standard Operating Procedure (SOPs). The concerned State Pollution Control Board should also ensure that it is complied with, while granting such authorization.
- By simplifying the process of import/ export of waste, the co-processing of hazardous waste to recover energy has been streamlined.

4. The Bio-Medical Waste (Management and Handling) Rules, 2016

These rules are issued by the Central Government, replacing the earlier Rules of 1998, which deals with the management of bio-medical waste disposed in open garbage dumps, either within the premises of the hospitals or in the nearby municipal bins. These rules are applicable for all persons and institutions that generate, collect, receive, store, transport, treat, dispose or handle bio-medical waste in any form.

Some salient features of the Bio-Medical Waste Management Rules, 2016, are:

- These new rules will help in bringing a change in management of biomedical waste in India. Increasing the coverage area, the new rules also provide for treatment of lab waste, blood samples, microbiological wastes, etc., which will definitely make a big difference in the Clean India Mission.
- The scope of the rules has been expanded by including vaccination camps, blood donation camps, surgical camps, etc.
- It mandates the use of bar code system to control the bio-medical wastes.
- To reduce the emission of pollutants in the environment, these rules ensure more stringent standards for incineration.
- It is the duty of the Health Care Facilities (HCF) to take necessary steps to identify a safe, ventilated and secured location for storage of segregated biomedical waste within the premises.

5. The Plastic Waste Management Rules, 2016

The Government has issued the Plastic Waste Management Rules, 2016, replacing the earlier Plastic Waste (Management and Handling) Rules, 2011, to deal with the issue of scientific plastic waste management.

Some of the highlights of the new Plastic Waste Management Rules, 2016, are:²⁶

- New rules introduce the responsibility of waste generators like officers, commercial establishments, industries, etc., to segregate the plastic waste at source itself and handover to appropriate authority or agency.
- The producer and brand owners who are engaged in manufacture or import of carry bags have been made responsible for collecting waste generated from their products. They should formulate appropriate plan or system for the plastic waste management under their local bodies.
- New rules impose fine on retailers and street vendors for using plastic bags or multi-layered packaging. Only registered vendors can use plastic carry bags. The registration fees collected by the local bodies are to be used for waste management.
- In 2018, the Rules were further amended, which prescribe a central registration system for the registration of the producer or importer or brand owner. The CPCB has assigned the centralized registration system.
- By applying various recycling methods, plastic can be reused for road construction, waste to energy and waste to oil, which can reduce the environmental impact from plastic.
- The multi-layered plastic which is non-recyclable or non-energy recoverable, or with no alternate use, was supposed to be banned, but it is still circulated as earlier. Due to lack of implementation of these rules, plastic wastes are still a worldwide crisis.

²⁶ Retrieved from www.pib.gov.in 21st February, 2020

6. The E-Waste (Management) Rules, 2016

Electronic waste becomes an environmental problem when it goes to a landfill and to water bodies. According to the Global E-Waste Monitor 2017, about 2 million tonnes of e-waste are generated in India in a year. Only 20 percent of such waste is recycled.²⁷ E-Wastes generally include all waste electrical and electronic equipments that are rejected from their manufacturing and repair process, or are discarded, or are unused computer devices like monitors, motherboards, compact discs and other electrical materials like mobile phones and chargers, headphones, television sets, air conditioners and refrigerators, etc. Though e-waste should be recycled in a safe, appropriate and efficient manner, only a limited portion of total wastes are recycled due to poor infrastructure and ineffective implementation of existing legislation. People engaged in e-waste management are basically from informal sectors not having adequate knowledge to deal with e-waste. Such activities pose great health risks to the workers as well as huge damage to the environment. The E-Waste (Management) Rules, 2016, were enacted in suppression of the earlier 2011 Rules. The following are some of the salient features of these Rules²⁸:

- Introducing new arrangement entitled 'Producer Responsibility Organisation' (PRO) to strengthen the Extended Producer Responsibility (EPR) which ensures the take-back of the end-of-life products.
- Under the new rule, the manufacturers are mandated to take back their sold products with recommended mechanisms. The producers should replace their product with less pollutant electrical and electronic equipments.

Under the Digital India initiatives, the Ministry of Electronics and Information Technology has started an E-waste Awareness programme to educate the general public about the alternative process of disposing e-waste and to make them

27 Samar Lahiry, Recycling of e-waste in India and its potential, www.downtoearth.org.in accessed 20 February, 2020

28 *ibid*

aware about the hazards of e-waste recycling. 'Swachh Digital Bharat' is also initiated to encourage the public to participate in environment friendly e-waste recycling practices by giving their e-waste to authorized recyclers only. Besides, 'E-Waste Mass Awareness Campaign through Cinema' has also been initiated to encourage awareness amongst the youth.²⁹

RULES AND REGULATIONS ASSOCIATED WITH WETLAND PROTECTION

The Ramsar Convention, 1971

The Convention on 'Wetlands of International Importance, Especially as Waterfowl Habitats' is also called Ramsar Convention. It is an international treaty for the conservation and the sustainable use of wetlands. The main aim of the Convention is to halt the loss of wetlands worldwide and to conserve the remaining ones for the present as well as the future generations.³⁰ The contracting parties are obliged to consult each other about implementing obligations arising from the convention regarding conservation and the sustainable use of wetlands in their respective states.³¹ In 2002, 'Deepor Beel' (Assam) was added to the list.

Linking with the Ramsar Convention, other International Environmental Conventions are equally important for the conservation of various resources available in wetlands. Some of them are the Convention on Biological Diversity 1992, The Convention for the Protection of the World Cultural and Natural Heritage 1972, The Convention on International Trade in Endangered species of Flora and Fauna 1973 and the Convention on the Conservation of Migratory Species of Wild Animals 1979. The Government of India has enacted various laws to give effect to these International Conventions.

29 Harshini Vakkalanka, 'The A-Z of e-waste management,' The Hindu, (19th June, 2018) www.thehindu.com accessed 22nd February, 2020

30 P.C. Sinha and R. Mohanty, *Wetland Management, Policy and Law*, (edition 2002), 86

31 *ibid*

It is true that there is no particular legislation for wetland conservation in India, but there are a number of laws having some relevance to wetland habitat regulation. Some of these are as follows:

1. The Wetland Conservation and Management Rules, 2010

These rules are notified for the better Conservation and management of wetlands to implement the obligations under Ramsar Convention. These rules prohibit a range of activities in wetlands, like setting up and expansion of industries, waste dumping and discharge of effluents, etc. Setting up of State Wetlands Authority (SWA), headed by the State's environment minister along with the other officers and experts from different fields such as ecology, hydrology, fisheries, landscape planning and socio-economics, definitely helps in enhancement of wise use of wetlands. The National Wetlands Committee (NWC) is another initiative taken for monitoring implementation of these rules and for overseeing work carried out by the States.

That Committee advises the Central Government on taking up appropriate policies and actions plans and recommends international importance of Ramsar Convention for conservation and wise use of wetlands. The Committee also advises on necessary collaboration with other international as well as national agencies on issues related to wetlands, etc.

2. The Water (Prevention and Control of Pollution) Act 1974

The Act is enacted for the prevention and control of water pollution. Disposal of any polluting matter to a stream or well or sewer or land blocks the proper flow of water, and such blockage creates water pollution. Under this Act, violation of any provision is considered as against the public interest and punishable offence. Central and State Pollution Control Board is constituted as the primary authority to regulate such acts. The Act also imposes duty on the local authorities to assist and furnish information to the board.

The Act could not achieve its goal, as the court has not given the authority to take cognizance of any offence under this Act on a complaint made by a Board

or any Officer authorized in this behalf. Citizens can not directly prosecute the polluter who discharges an effluent beyond the permissible limit. Only the government has been given the exclusive power to take action for statutory remedy against the polluter.

3. Indian Fisheries Act 1897

This Act penalized the polluter for killing fish by poisoning the water or by using explosives or chemical substances that cause water pollution. This Act should be strictly implemented for the better protection of wetlands and conservation of fish diversity from water pollution. The State Government is also empowered to prohibit fishing in any specific location for some specific periods. Persons can be arrested without warrant for violating any provision under the Act.³²

4. The Indian Forest Act, 1927

The Act deals with safeguard of ecological and environmental security of the country. Forests help in regulating soil erosion, reducing pollution, mitigating flood flows, prevention of desertification and salinization. Forests depend on wetlands or groundwater for their survival and support flora and fauna. Due to such interdependency, damage to forest areas can have adverse impact on biological diversity as well as water quality of nearby wetlands, and damage in wetlands can impact on forest areas.³³ The same observation may be applicable in case of '*Deepor Beel*' and nearby reserved forest areas.

The State Government should take appropriate measures for the conservation of the '*Beel*' as well as the forests for balancing the ecosystem. Any unauthorized felling of trees, quarrying, grazing and hunting or other such acts which cause, willfully or negligently, damage to the forest area are punishable with imprisonment for a term which may extend to six months or fine which may extend to five hundred rupees, or both.

32 The India Fisheries Act, 1897, Section 7

33 Nanda, *Supra*, 239

5. *The Wildlife (Protection) Act, 1972*

The Act ensures the protection of wild animals, birds and plants, to maintain the ecological and environmental security of the country. A National as well as State Boards for Wildlife was constituted under this Act for the conservation and development of wildlife and forest.³⁴ Wetlands are generally surrounded by forest areas having dominant tree species of botanical as well as economic importance. Most of the wild animals and birds depend on wetlands for their survival. This Act is equally applicable for conservation of such wildlife.

Dumping garbage into the wetlands is also a gross violation of the Act because it pollutes the wetlands when rain water brings the contaminants into the water bodies. People have been witnessing a number of dead fish floating on the water, due to the polluted water with toxic materials and lack of sufficient oxygen and, also, the presence of decomposed grass and some kind of algae. Though there are various provisions for wildlife protection, due to lack of enforcement, the area is not well protected.

6. *The Biological Diversity Act, 2002*

The Act deals with conservation of biological diversity, sustainable use of its components and fair, equitable sharing of benefits arising out of the use of biological resources, etc. Indian Parliament has enacted the Biological Diversity Act, 2002, to give effect to the international Convention.³⁵ Both the Central and State Governments have the duty to develop strategies, plans and programmes for conservation, and to take immediate measures against any abuse or neglect of rich biological diversity. Most of the wetlands have biological and environmental value. They support a large number of plants and animal species in their deep and shallow waters and in the occasional highlands adjoining, with hills and natural forests. Having rich floral and faunal diversity, this Act is, also, applicable to provide legal protection to the wetlands.

34 The Wildlife (Protection) Act, 1972, Section 8

35 The United Nations Convention on Biological Diversity, 1992.

7. *The Guwahati Water Bodies (Preservation and Conservation) Act, 2008*

The Act was enacted by the Government of Assam, aiming to preserve the wetlands, minimize the problem of water logging in the city and develop eco-friendly environment. By enacting such an act, the government has initiated the re-acquisition of land in the periphery of 'Deepor beel' and aims to work for eco-tourism development. Considering the importance of urban water bodies, the Act provides for restoration and conservation of these wetlands for the flood mitigating programme under Guwahati Development Department (GDD).

Though the Government of Assam is fully empowered to make rules for carrying out the purpose of the Act, yet the Government has been keeping mum on the issue of adopting the Rules. The GMDA, one of the major responsible authorities for planning and development of the Guwahati metropolitan region, is competent to take up projects or schemes for eco-tourism or water based recreation for better management, preservation and conservation of the waterbodies declared in the Act.³⁶

The following activities are prohibited and declared as illegal under this Act³⁷:

- (i) Any activities, including the filling up of water bodies, which may cause damage or reduce the size of water bodies;
- (ii) Constructing or erecting any structure in the water bodies;
- (iii) dumping or throwing solid waste or garbage in the water bodies;
- (iv) extending or reinforcing of any building standing upon the water bodies;
- (v) Carrying out any kind of business, except fish curing, aqua culture, conservation measures and flood control measures, without the specific permission of the Competent Authority.

36 The Guwahati Water Bodies (Preservation and Conservation) Act, 2008 Section 7

37 Ibid, Section 4

All the above legislations are directly or indirectly related to the protection and conservation of the 'Deepor beel' and have some relevance to wetland habitat regulation. The 'beel' is surrounded by two reserve forests which are rich in biological diversity. So, the existing laws should be properly implemented to develop the 'beel' into an eco-tourism hub and a protected area for future generations. To minimize the environmental problems from dumping sites, all waste management rules must be followed by applying scientific technology and organized methods of processing the waste generated in the urban societies.

JUDICIAL ACTIVISM IN WETLAND CONSERVATION

There are many case laws where the Supreme Court has directed the States and principal municipalities to implement solid waste management rules. Considering the importance of wetlands in maintaining ecological balance, a bench of Justices Madan B Lokur and Prafulla C Pant directed the states to provide details of all wetlands and directed the Centre to frame policy for preservation of wetlands having effective carbon sinks to mitigate climate change and support biodiversity.³⁸ The court reminded the Centre that they are bound to frame a policy for the preservation of wetlands being a signatory to the Ramsar Convention on Wetlands 1971. The Apex Court had also directed the High Courts to monitor the management of all 26 sites identified in the Ramsar Convention. Though it is the responsibility of the State authority to take appropriate actions for the preservation and protection of wetlands, it has been seen that their actions are not satisfactory. In many cases, it has been seen that NGT intervened to restrict construction of industrial complexes or curb release of waste materials within the wetland areas.

In *M. C. Mehta v. Kamal Nath & Others*,³⁹ the Apex Court has opined that Article 48A and Article 51A (g) have to be considered in the light of Article 21 of the Constitution and have decided that any disturbance of the basic element

38 The Times of India, (9th Feb. 2017) <http://timesofindia.com> accessed 21st February, 2020

39 (2000) 6 SCC 213

of environment, i.e., air, water and soil, would be hazardous to 'life' within the meaning of Article 21. Enforcing Article 21, the court has also given effect to other fundamental rights and has held that people violating these rights by disturbing the environment can be awarded damages for restoration of ecological balance as well as for the victims who have suffered due to such disturbance.

In 2007, the residents nearby the 'beel' filed a PIL for the conservation and protection of the 'beel' from environmental pollution. The Gauhati High Court considering the matter formed a committee to analyze the issue and directed the local authority (Guwahati Municipal Corporation) to spray pesticides in the neighboring areas of the lake to reduce health hazards.

In 2014, Rohit Choudhury, an environmentalist, filed a legal petition (Application No. 472/2018, *Rohit Chaudhury vs. Union of India and Ors*) against environmental damage of the 'beel' due to pollution and encroachment.⁴⁰ Considering the environmental importance, the NGT issued a directive to the State Government and asked it to submit a status report on the condition of the 'beel.' After that, several times, the NGT issued directives to GMC on the unrestricted and unregulated illegal dumping of wastes on the wetlands that create an imbalance in the wetland eco-system. But, GMC had pleaded before the NGT to allow the present dumping ground for disposal of solid waste, as GMC is working on the reduction of the impact of waste disposal on the 'beel' under the instructions of the Indian Institute of Technology of Kharagpur.⁴¹

Hearing a Public Interest Petition, the Jammu and Kashmir High Court directed the government to demarcate the wetlands to protect them, and to take measures to conserve water bodies. Following such direction, demarcation was carried out with Geographic Information System (GIS) technology.⁴² In the name

40 Rajat Ghai, 'The Earth is not for humans alone, says NGT over Deepor Beel', <https://www.downtoearth.org.in> (March 2, 2019), accessed 22nd February, 2020

41 The Assam Tribune, December 12, 2016 <http://www.assamtribune.com> accessed 22nd February 2020

42 HC directs Government to demarcate wetlands, conserve water bodies, The Rising Kashmir, (19th August, 2017) <http://www.risingkashmir.com> accessed 22nd February 2020.

of development, government has done a lot of damage to water bodies. The NGT in August, 2019, also directed the government of Assam to declare the actual area around '*Deepor Beel*' and put restrictions on industrial and other human activities which affect the natural ecosystem of the '*beel*.' The NGT further directed the state to take appropriate steps to prohibit encroachment and manage the dumping ground inside *beel*'s system.⁴³ Though the NGT has directed the Assam government to shift the MSW Plant at the '*beel*,' it has still not been implemented.

ROLE OF CIVIL SOCIETY

The engagement of civil society in productive utilization of natural resources offers a significant contribution. The role of indigenous people and local communities for conservation of natural resources is internationally accepted. Enactment of policies will not be effective, if people are not aware of reduction of pollution or recycling or waste management. Every action of civil society and the latter's responsibility lies in the contribution to effective monitoring of the natural resources.⁴⁴

After declaring the Ramsar site, various campaigning programmes were organized for conservation of the '*Deepor beel*'; participating members from different sectors included the faculty members, research scholars, students, officers, employees and workers of academic institutions and, also, concerned citizens of the nearby areas. The people near the dumping site also filed a PIL to save the lake from pollution. The All Assam Student Union (AASU), an active student organization of Assam, arranged a protest demonstration along with the concerned residents, highlighting the different threats in the wetland. Some local people have taken the initiative to remind various departments to implement the developmental project on the '*beel*.'

43 National Green Tribunal seeks eco- sensitive zone tag for Assam wetland Deepor Beel, 23rd August, 2019, The Hindu

44 Role and Responsibilities of India Inc. and Civil Society in Tackling pollution, Economic times, (6th Jan, 2017) <http://www.economictimes.org.in> accessed 23rd February 2020

Some NGOs, like 'Aaranyak,' 'Early Bird' (Assam) played an important role to spread awareness amongst the general public for the protection of the environment and sustainable use of various products. Our lifestyle and unawareness very often create environmental issues. So, it is our duty to work for the protection of the environmental. Otherwise, our lives will be at risk.

CONCLUSION

The present study is to analyze how waste has harmful effects on water bodies, soil and flora and fauna. For the better implementation of the existing rules for the management of waste generated in our society, massive awareness campaigns should be organized in association with communities, NGOs, students and other stakeholders. The promotion of greener and cleaner cities can be the solution for many environmental issues. Guwahati is the only city from India's Northeastern states, among a 100 other cities, that has been included under the smart city initiative launched by the Government of India. The smart city project will be effective only when there is standard of quality and transparency in the working of the engaged authorities. '*Deepor beel*' also finds its place in the smart city project. Under the smart city project, various departments are involved in the wetlands developmental programme, such as GMDA, GMC, the Jal (Water) Board, the Water Resources Department, the Public Health Department, the Tourism Department and Assam State Electricity Board.

'*Deepor Beel*' is also included in the list identified for conservation and management under the National Wetland Conservation Programme (NWCP) because of its unique nature. The State Government works for conservation and management of wetlands, undertaking different activities through its concerned authorities, with funds provided under the scheme.

The following are some of the measures suggested to minimize the harmful effect of waste on wetlands:

1. All industries, hotels, restaurants, hospitals, nursing homes, etc., should arrange their own effluent or waste water treatment facilities. All

polluting establishment should take technical knowledge and support from the Pollution Control Authority to establish effluent or waste water treatment plants. All the departments, like Municipal Authority, State Pollution Control Board and the State Public Health Dept. should jointly work to inspect or monitor the functional condition of industries to ensure proper wastewater treatment before release into drains or wetlands.

2. The solid waste should not be dumped near drains to be carried away to the wetlands or near to any wetland areas which enhances water pollution. The solid waste should be properly disposed of to avoid pollution on wetlands. The Municipal Authority should monitor periodically to prevent dumping of solid waste near drains or wetlands.
3. Public awareness plays an important role in minimizing environmental effects from solid wastes. The Municipal Authority, in co-ordination with Pollution Control Board and NGOs, should undertake frequent pollution awareness programmes wardwise in the presence of the general public. They may organize citizen committees in every ward to implement or monitor the functions of domestic waste water treatment. For effective awareness of the public, a door to door campaign may be introduced to prevent water pollution.
4. 'Deepor Beel' is one of the main water reservoirs of Guwahati City. Waste water is carried away to the wetlands through different channels. Sewage treatment facility should be more effective to reduce the pollution load of waste water. The Connecting network of drains, to the wetlands, should be desilted regularly for proper flow of waste water.
5. Human encroachment or other such interference should be limited within the area of the wetlands for proper functioning of ecosystem and to maintain a healthy environment.
6. Existing rules regarding management of solid waste, bio- medical waste and plastic waste, etc., should be strictly implemented by the concerned

authorities. New rules may be introduced if there is any necessity to combat water pollution.

7. Many government departments and agencies have limited their jurisdiction to wetland protection and conservation. Due to lack of clarity of functional jurisdiction between different departments, action for conservation is not satisfactory. So inter-departmental coordination is the ultimate strategy for the conservation and wise use of wetlands to ensure a sustainable future.

Tourism also contributes to India's economic growth. Including other tourist places, wetlands can be developed for tourists' attraction. Various *beels* and water bodies of Guwahati city could become a tourism hub as well as sustain ecological balance. The '*beel*' is an Important Bird Area and is given more priority in conservation by Birdlife International. The "Eco-Tourism Project for the Surrounding Area of the "*Deepor beel*" is a tourism development project in and around the '*beel*.' It aims at protecting and restoring the ecological balance as well as working for development of tourism infrastructure. The project also includes assessment of natural as well as artificial linkages of drainage systems affecting the water bodies. The project will develop a sustainable way to protect the environment and a better life, not only for the present generation, but also for future generations of Guwahati city.⁴⁵

Nowadays, many countries apply the wetland recovery strategies in which the primary treatment phase helps to separate hazardous materials from organic waste streams. Such waste streams may be tapped at different points along the treatment process to remove hazardous substances before terminating in the wetland. Decomposers such as bacteria, fungi, etc., naturally exist on the surfaces of the aquatic plants and the soil of wetlands, which helps in removing the dissolved biodegradable materials from the water.

MSW will rise with the continuous growth of global population and industries. So, people should give more focus on reuse, recycling and recovery for reducing

45 www.assamppp.gov.in, accessed 29th July, 2019

*A Socio-Legal Study on Impact of Solid Waste on Wetland Environment:
A Case Study From 'Deepor Beel' Wetland, Assam*

solid wastes. Disposal of waste materials into wetlands is not the problem of a particular area or state. Many wetlands have to face such problems due to lack of awareness of people and lack of strict implementation of the existing rules and regulations. It may be due to limited understanding of the importance of wetland ecosystem among the policy makers, and a failure to realize their unique characteristics may be one of the major causes for the absence of an appropriate legal instrument on wetlands conservation. Again, effective monitoring strategies on water quality need to be developed for protection and improvement of the ecological value of wetlands.