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Microplastic Pollution: A great threat to aquatic Biota and aquatic Ecosystem

Abubakar Abubakar Muhammad, AttahiruAbubakar, AbubakarIsahTambuwal, Aminu Umar

Department of Biology Adeyemi College of Education, Ondo
College of Environmental studies,Umaru Ali ShinkafiPolytechnic,Sokoto
Science Laboratory Technology Department, Umaru Ali ShinkafiPolytechnic,Sokoto
Staff Secondary School,Umaru Ali Shinkafi Polytechnic Sokoto

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ABSTRACT
Pollution is one of the prime problems that humans face in the world particularly in the developing countries such as Nigeria.Aquatic environment get contaminated from various anthropogenic activities occasioned by man. These activities result in the introduction of many plastic and Microplastic into the water bodies degrading the water quality and rendering it poisonous and toxic for aquatic biota and also making it unfit for human consumption. Recently the issues of Microplastic pollution have attracted the attention of many researchers across the globe. However this paper try to look into the implications of Microplastic pollution on the water bodies and also on the aquatic animals.It also provide some strategies or method that should be adopted to decrease the pollution of water bodies by the plastic and Microplastic.

Keyword: Aquatic environment, Aquatic biota, Pollution, Plastic, Microplastic

I. INTRODUCTION:

Pollution is the introduction of harmful substance into the environment.Pollution is also the release or introduction of any substance directly or indirectly by man into his environment which can have negative effects on his health and also his environmental resources such as water,soil,plants,air and other animals.Pollution is caused by pollutants which are release from various sectors of human economy such as mining,agricultural,pharmaceuticals,oils and cosmetics industries.The pollutants release by these industries has serious effects to man and his environments (Mendil and Uluözlu 2007).Pollution is considered as man greatest crime against himself and it's the major problem affecting the life of man and also his environmental resources particularly in the developing countries such as Nigeria. Pollution is divided into three major categories which are water pollution, land pollution and air pollution.

Water pollution which is also known as aquatic pollution is the introduction or release of substance often chemical above the threshold level of a water body that can results in damaging the quality of the water and also causing serious impairment to the people and aquatic biota (Dwivedi,2017).Various anthropogenic activities occasioned by man results in the releases of several pollutants into the aquatic ecosystem degrading the quality of water body and rendering it unfit for aquatic biota and for human consumption (Abowel and Sikoki 2005;Ekubo and Abowel 2011).Water bodies are the major sinks of pollutants.Contaminats and leaks from industries such as oil,pharmaceuticals,agricultural and cosmetics industries are emptied into various water bodies such as streams,lakes,ponds,rivers and oceans (Hampeletal,2015:Bhat et al ,2017).These pollutants that contaminate aquatic ecosystems can be heavy metals (from agrochemicals),detergents,micofibres and plastics (Hampelet al, 2015).

Water bodies get contaminated from pollutants that are release from direct or indirect sources. The direct sources of pollutants are easy to manage because there is single idenfiable culprits while indirect sources of aquatic pollutants are very difficult to manage because the pollutants get into the water bodies from diffuse sources such as fertilizer and pesticide chemicals that are washed slowly through the soil and find their way into groundwater and then into various watercourses.

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Microplastic Pollution

Plastics are among several human pressure on aquatic ecosystem posing serious danger to aquatic flora and fauna and also making the water to be unfit for human consumption.Manufacturers and consumers of plastics find them to be of great important to their society but due to their durability,improper management and control they accumulate in their habitat causing serious damage to the natural habitat (Barnes et al.2009;Andrady and Neal,2009)Microplastics (MP) are plastic fragments that are smaller than 5mm which have their origin from differents degraded plastics based products such as cosmetics,pharmaceauticals,powder used for air blasting and soon.The term MP was formally introduced by Thompsonet al in 2004 who gives potential warning on the risks that will be encounter due to the introduction or release of plastics particles into seas. Plastics items posses certain features that makes them to be of great used and important to the manufacture and consumers these characteristics include being versatile, durability,cheap,lightweight and water weight.Plastics items are manufacture in different sizes and shapes,those considered to be of small size are referred to as Microplastic.Based on the size plastics are classified into two categories, Primary MPs and Secondary MPs.Primary Microplastic which are plastic items that are contained in cosmetics and pharmaceutical products .Its estimated that there are 1.5million tonnes of primary microplastics being discharge into various water bodies yearly.while Secondary Microplastic are the plastic product that originate fromdegredation of large plastic particles by physical,chemical and biological process in the environments(Galani.,2013).Microplastic can also be classified based on their form, fragments, and spherical beads as well as based on their chemical composition.

Effects of Microplastic pollution on water bodies

Aquatic environment are facing serious threat from various anthropogenic activities occasioned by human resulting in the discharge of different kinds of plastics into aquatic ecosystem.It was noted that in 2015 global production of plastic reached 381 million tons (Ritchie and Roser2018).Large plastic items get into aquatic environment through various means such as inadequate waste disposal,littering or loss from landfill and transported into water body by wind or surface runoff.Agricultural runoff from farm land wash agricultural plastics or sewage-sludge derived fibres and microbeads into water bodies resulting in reduction of the water quality and rendering the water toxic for aquatic organisms and unfit for human consumption.

Fig 1: Showing image of plastic pollution in riverine area and in ocean.

Microplastic pollution degrade the water quality and rendering it toxic and poisonous to aquatic life and also making the water to be unfit and unused for human consumption. Aquatic Habitat include all freshwater bodies and marine habitat and there are all facing these serious challenge that results from human anthropogenic activities.

Effects of Microplastic pollution on Aquatic Biota

Aquatic Biota refers to all life in water bodies which include plants,animals such as fishes,reptiles and different kind of macroinvertebrates. These organisms lives successfully,reproduce and derived their nourishment from the aquatic ecosystem.Aquatic organisms both vertebrates and some macroinvertebrates have been consumed as food by many people especially those living in riverine area. Aquatic macroinvertebrates are very important indicators of good water quality. They

are used in assessing the water quality and indicating the level of pollution of a particular water body and also possible future occurrences associated with the water body. Any changes in their habitat will also effect their mode of life. Plastics and MPs when presence in a water body put the life of human population and wildlife at great risk and danger (Galloway 2015; Li et al. 2015; Carberyet al. 2018).Accumulation of MPs by aquatic animals endanger their population by decreasing their food consumption,decrease their growth,causing weight loss and also leading to energy depletion (GESAMP 2015;Rochmanet al.2015 ;Lusher et al.2017).Over 690 aquatic species have been affected by plastic debris and microplastics, which are negatively affecting large numbers of aquatic organisms from all trophic levels, including zooplankton, barnacles, bivalves, decapod crustaceans, fish, marine mammals, and seabirds (Carbery M. et al.,2018).Injestion of Microplastic by aquatic organisms may cause physical damage to the organism due to clogging of their guts or blocking of their respiratory track, accumulation of Microplastic will also lead to internal damage due to injestion of sharp edge plastic objects (Wrightet al.,2013).Additionally bioaccumulation of chemicals that are associated with plastics such as organic pollutants introduced into the water body either by direct or indirect sources can be available to aquatic organisms due to injestion while plasticiser chemical can get into the aquatic environment from the land (Besseling,2013)
Evidence of Microplasticsinjestion have been seen in aquatic vertebrates and macroinvertebrates found in bottom-dwelling, or benthic, and open-water, or "pelagic zone of aquatic habitat.

Possible ways of Reducing Plastic Pollution In an Aquatic Environment

Presence of Microplastic in an aquatic environment pose a great danger to aquatic biota morethan any other pollutants because of severe harmful effect it cause to the water body and leading to the death of many important aquatic vertebrates that are useful to the man (Cole et al. 2011; Graham
and Thompson 2009; Gregory 2009).Therefore there is a need to provide possible ways of controlling or removing microplastics from the various water bodies.Among the possible ways suggested by many researchers to control plastic pollution in an aquatic environment include the following;

1. Laws should be made by legislators against dumping of plastic items in the water bodies
2. Clean up of water bodies that contain plastics and Microplastic by government
3. Awareness programs on the danger of plastic pollutions
4. Proper waste water treatment should be carried out
5. Direct dumping of refuse in a water body should be discourage
6. Source control commonly achieved through legislation and awareness programs
7. Use of single-plastic bags should be restricted as they are the major potential source of Secondary Microplastic.Many countries have establish laws that restrict the used of single-plastic bags such countries include,Canada,Britain,Germany and many other European countries (EU.,2015).

II. CONCLUSION

In conclusion Microplastic pollution have been proven to be a threat to aquatic biota and also aquatic ecosystem.Microplastic pose great danger to the life of aquatic animals and also reducing the quality of water by rendeing it toxic and poisonous making it unfit for human consumption.Therefore there is need to takes measures and also to establish legislation that will control the contamination of the water bodies by the plastic items.

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