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MARINE POLLUTION IN THE ERA OF DEVELOPMENT : CONCERN AND CHALLENGES

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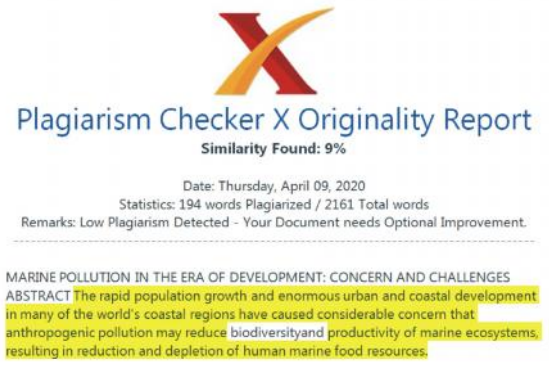

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MARINE POLLUTION IN THE ERA OF DEVELOPMENT: CONCERN AND CHALLENGES
ABSTRACT The rapid population growth and enormous urban and coastal development in many of the world's coastal regions have caused considerable concern that anthropogenic pollution may reduce biodiversityand productivity of marine ecosystems, resulting in reduction and depletion of human marine food resources.

Abstract :-

The rapid population growth and enormous urban and coastal development in many of the world's coastal regions have caused considerable concern that anthropogenic pollution may reduce biodiversityand productivity of marine ecosystems, resulting in reduction and depletion of human marine food resources. In addition, natural environments are important for recreation, and consequently for humanhealth and welfare, and there is now increased awareness that nature has its own intrinsic value. Pollution reduces the aesthetic value and perhaps also the intrinsic value of the marine environment, whether the pollution is visual (such as oil pollution and plastic debris) or invisible (such as chemical compounds). Another main reason for concern about marine pollution is related to the direct effects of pollution on human health. Because many pollutants accumulate in marine organisms, humans areexposed to pollutants when they consume food from polluted areas. Several studies have documented that human populations that consume large amounts of marine food have high burdens of persistentorganic pollutants (POPs), such as dioxins, furans, polychlorinated biphenyls (PCBs), and some heavy metals. There has been a particular focus on indigenous people who consume large amounts ofmarine food, including blubber products of marine mammals.

Key words :-

Marine, Papulation, Ecosystem, Biodiversity, Environment, Mammals, Indigenous.

Introduction :-

The world's estuaries and oceans are the ultimate repository for a vast array of substances dischargeddeliberately or accidentally via human activities. The inundate and most acute impacts of theseactivities occur in the coastal zone where population growth has increased dramatically over theyears. Concomitant with this growth have been conspicuous changes at the land-sea interfaceassociated with construction of industrial installations, maintenance of harbors and other waterways,domestic development of the coastline, demands of tourism, and other uses of coastal space. Whilethe coastal zone is clearly at greatest risk from various anthropogenic impacts, the open ocean isalso not immune to pollution. For example, the input of toxic chemicals from atmospheric transportand deposition, as well as from shipping operations beyond the continental shelf, can adverselyaffect open ocean waters. Contaminant inputs from atmospheric fallout alone can be delineated inall components of the marine environment — seawater, sediments, and biota. However, because ofthe great volume of all the oceans (137x10 km^) and their great dilution capacity, the concentrationsof these contaminant inputs usually are insufficient to cause detectable problems in deep-seaenvironments.In contrast to conditions in the open ocean, shallow estuarine and nearshore marine waterscontinue to be extensively degraded by both point and nonpoint sources of pollution. Systemscharacterized by a slow rate of exchange relative to their volume (e.g., semi-enclosed estuaries andembayments) are most susceptible to contaminant inputs. Thesesystems typically have a verylimited assimilative capacity for pollutants. Consequently, certain unassimilated materials, such assynthetic toxic organic compounds, can accumulate and persist for long periods of time, posing apotential long-term danger to marine food webs.

Methodology of the Study :-

The present study is based on secondary data obtained from the major international research articles and United Nations Environmental Conventions.Also reviewed international environmental reports to gather information. Different environmental magazines, newspapers and journals were consulted for gathering of information. Information was also collected by holding discussions and interviews with knowledgeable persons and taken inference from various sources to meet the objectives of the study.

Objectives of the study :-

The main objectives of the study are :-

1. To identify which are the major agents of marine pollution.
2. To assess the present situation of the marine pollution.

Types fo contaminants :-

In heavily impacted areas, such as the aforementioned U.S. coastal systems, the total contaminantburden derives from many land-based sources. Chief among the contaminants affecting these watersare (1) organic carbon enrichment related to elevated nutrient inputs, particularly nitrogen andphosphorus; (2) heavy metals associated with sewage effluents and sewage sludges (3) organochlorine compounds originating from widespread domestic and agricultural use of herbicides andpesticides, as well as various industrial wastes; (4) petroleum hydrocarbons from oil spills, sewage,and nonpoint source runoff; and (5) polycyclic aromatic hydrocarbons from industrial effluents,pyrolysis of organic matter, and other sources. Domestic, industrial, and municipal wastes haveaccumulated for years in some coastal waters bordering metropolitan centers. However, becauseof the enactment of stringent regulations to control

the input of these wastes, the degree of pollutionin the U.S. coastal marine environment appears to be declining in many areas

From a global perspective, five classes of contaminants are considered to be critical to theenvironmental health of the ocean :

1. Petroleum hydrocarbons (crude oil and its refined products)
2. Halogenated hydrocarbons
3. Heavy metals (particularly mercury, cadmium, and lead)
4. Radionuclides (especially cesium-137, strontium-90, and pIutonium-239, 240)
5. Litter

Presents status :-

There is evidence for a decline in concentrations of at least certain constituents of the first fourclasses of these critical contaminants. The amount of litter, however, seems to be on the increasearound the world. Perhaps most alarming is the occurrence of persistent plastics which has beenon the rise in oceanic waters for a number of years. McIntyre identified three pollutant categories of priority concern today in coastal marineenvironments (i.e., sewage, nutrients, and synthetic organic compounds). Sewage input, eutrophication from excessive nutrients, and the toxic effects of persistent organic compounds in estuariesand nearshore oceanic waters pose significant public health risks. Three other pollutant categories(i.e., heavy metals, radionuclides, and oil) are seen as less threatening in the sea. As recounted by McIntyre, more general impacts of heavy metals on marine communities are evident only in theimmediate vicinity of metal-rich discharges or mine-tailing effluents where concentrations are veryhigh. Aside from nuclear accidents, marine inputs of radionuclides are now restricted to the relativelysmall number of discharges from nuclear power stations and reprocessing plants, which are rigorously controlled by various national or international agencies. After enactment of the Partial TestBan Treaty of 1963, oceanic input of radionuclides from atmospheric testing of nuclear weaponsdecreased sharply, considerably reducing the atmospheric influx of anthropogenic radionuclides.Damage from oil pollution at sea, while potentially severe, is localized in space and time, with theworst impacts arising from oil moving ashore and contaminating coastal wetlands or becomingburied in sandy beaches. The main global concern regarding oil pollution appears to be operationaldischarges from large tankers which circulate on ocean currents and affect beach amenity far fromthe original source. Used oils from land-based sources may pose a potential risk to the coastal zone worldwide.

International initiatives :-

Marine pollution problems generally are controlled by coastal nations with their own legislativeprograms. To control marine pollution both regionally and globally, however, international treatieshave been developed periodically and signed by member states. Most notable in this respect is the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter of 1972 (commonly known as the London Dumping Convention) which was brought into force on August 30, 1975. National legislation and regulations of states contracting to the London DumpingConvention provide the principal legal framework for controlling waste dumping at sea. A numberof regional conventions also protect against ocean dumping of waste in marginal and semi-enclosedseas. Included among these regional conventions are the Oslo Convention for the North Sea, theHelsinki Convention for the Baltic Sea, and the Barcelona Convention for the Mediterranean Sea.

A second international agreement of major significance is the Partial Test Ban Treaty of 1963,which prohibits the testing of nuclear weapons in the atmosphere by nations signatory to the treaty.Between 1945 and 1963, numerous atmospheric nuclear explosions resulted in elevated levels ofradionuclides in the open ocean. Deep-sea sediments have served as a repository for substantialquantities of these radionuclides, although concentrations declined markedly after enactment of thetreaty.

A third global treaty of note is the International Convention for the Prevention of Pollutionfrom Ships of 1973, which largely deals with oil pollution from ships. Amended by a Protocol in1978 (MARPOL 1973/78), the main part of this treaty entered into force in 1983. Annex V of thisconvention places restrictions on the dumping of garbage at sea. One of the most importantprovisions of Annex V is the ban placed on the dumping of all plastics in the ocean.The approach and general framework of action of the United Nations Environment Program(UNEP) for protecting coastal and open ocean areas against marine pollution involve three closelylinked elements dealing with the global marine environment, regional seas, and living marineresources. Globally coordinated marine pollution monitoring is being pursued through the GlobalOcean Observing System developed in cooperation between the Intergovernmental OceanographicCommission, the World Meteorological Organization, and UNEP. An integral component of theplanned global monitoring system will be surveys conducted at the regional level. The oceans andcoastal areas program of UNEP is supported by intensive cooperation of many international,regional, and intergovernmental organizations, as well as numerous national institutions.

Countries can no longer view marine pollution as strictly a national problem. Hence, manygovernments are responding to environmental degradation of their coastal marine waters throughthe development of broadly-based interagency coordinating bodies. Such an integrated and wellcoordinated management approach is necessary to mitigate the growingenvironmental deteriorationand resource-use conflicts in the coastal zone, to curb the pursuit of unsustainable coastal development, to correct narrowly focused conservation and protection strategies, and to formulateeffective marine pollution prevention programs.^ Sectoral approaches to marine policy and management will have only limited success in mollifying global ocean problems of the 21st century

Findings :-

Because construction of treatment facilities for sewage isunlikely to catch up with increasing human activities, especiallyin developing countries, eutrophication and hypoxia will be apersistent problem. Also, exposure of marine organisms toincreasing concentrations of human bacteria may pose a threat tocoastal ecosystems. High levels of natural and synthetic compoundswith estrogenic properties in sewage effluents have beenlinked to feminization of fish. There is also concern about otherchemicals with endocrine-disrupting properties. One example isthe marine antifouling paint ingredient tributyltin, which hasbeen shown to cause imposex in gastropods, to affect coastal andestuarine molluscs populations, and to cause reduction of speciesdiversity in marine estuarine benthic and epibenthic invertebratecommunities (Matthiessen and Law 2002). Until now, moststudies concerned with the effects of marine pollution havefocused on biochemical and physiologic effects.

In the future,studies should address the effects of pollution on behavioral traitsthat can potentially alter biodiversity and ecosystem functioning.Examples of such ecologically significant behavioral traits areantipredator behavior, reproductive behavior, parental behavior,and feeding success (Wibe 2003).Recent reports have documented dose relationships betweenmercury, dioxins, furans, and PCBs and several reproductive, cognitive, and neurologic

factors in humans. Obviously, there is a clearneed to pursue such studies, and there is a particular need to identifypossible confounding factors. Breast-feeding and the quality ofthe home environment are examples of identified confounding factorsthat may modify and actually counteract harmful effects ofPOPs (Jacobson and Jacobson 2002; Walkowiak et al. 2001).Many marine mammals are highly dependent on well-developed cognitive abilities and must have a normal behavior to survive. Theselection against cognitive and neurologic dysfunction or retardationis most likely much more significant in wildlife than inhumans. Thus, there is also a great need for wildlife studies thatfocus on the effects of marine pollution on cognitive abilities andrelated neurologic effects, and it is of greatinterest how such effects can affect biodiversityand ecosystem functioning. The harmful effects of many POPs onhuman and environmental health havebeen recognized, and in 2000, an internationalban was implemented on the 12most noxious POPs, the so-called "dirty dozen" (Kaiser and Enserink 2000). During the last two decades, the concentrations ofmany pollutants in marine biota have declined. However, everyyear thousands of new synthetic chemicals are produced, andrecently there have been reports of so called "novel" POPs inhumans and in marine biota. The best known are brominatedflame retardants (BFRs), such as polybrominated diphenyl ethers(De Wit 2002). The capacity of these chemicals to bioaccumulate,biomagnify, and provoke effects in marine organisms and humansis still unclear. This is also the case for other "novel" POPs such asperfluorooctane sulfonate and polychloronaphtalenes, which havebeen detected in marine food webs (Corsolini et al. 2002; Giesyand Kannan 2001). These pose a new threat to the health of individualsand both human and wildlife populations.

Conclusion :-

To meet the future needs and challenges in studying marine biodiversity, werecommend improved coordination between institutions, including museums,fisheries institutes, government and intergovernmental agencies, and universities atthe international, national, and regionallevels to (1) formally agree on key gaps inknowledge, (2) appoint staff to fill gapsstrategically as positions become available,(3) facilitate staff exchange to fill gaps andtrain staff in other countries, (4) facilitategraduate training to address gaps, andspecifically to cope with the progressiveloss of taxonomic expertise, (5) hostworkshops (including field studies) andsymposia to generate team-building anda sense of urgency and momentumamongst participants to address gaps, (6)support low-cost, open-access publicationof knowledge through e-journals andauthoritative online species informationsystems (including digital species identification guides), (7) develop new technologies for ocean exploration, knowledge discovery, data management and dissemination of results, and (8) encourageinternational collaboration between countries to facilitate field work, strategicallybuild specimen collections, and publishdata and knowledge online. Leadership forsuch coordination will need to come fromchampions in the scientific community,key institutions (e.g., those that hostdatabases and publications), and countriesthat fund the institutions and scientists.This study comes at the end of a decade ofthe Census of Marine Life. We show thatthere remain major gaps in basic knowledge of marine biodiversity, taxonomicallyand geographically. Science and societywould thus benefit from another decade ofdiscovery that strategically builds on ourfindings.

References :-

1. *Gerges, M. A., (1994), Marine pollution monitoring, assessment and control; UNEP's approach and strategy.Mar. Pollut. Bull., 28, 199.*

2. *GESAMP, State of the Marine Environment, GESAMP Reports and Studies No. 39, United NationsEnvironment Program, Nairobi, 1990.*

3. *GESAMP, Scientific Criteria for the Selection of Waste Disposal Sites at Sea. Reports and StudiesNo. 16, Inter-Governmental Maritime Consultative Organization, London, 1982.*

4. *Clark, R. B., (1992), Marine Pollution, 3rd ed.. Clarendon Press, Oxford.*

5. *Capuzzo, J. M. and Kester, D. R. (Eds.), (1987), Oceanic Processes in Marine Pollution, Vol. 1, BiologicalProcesses and Wastes in the Ocean, Robert E. Krieger Publishing, Malabar, FL.*

6. *Kennish, M. J., (1992), Ecology of Estuaries: Anthropogenic Effects, CRC Press, Boca Raton, FL.*

7. *McIntyre, A. D., (1992), The current state of the oceans. Mar. Pollut. Bull., 25, 1, .*

8. *Capuzzo, J. M., Burt, W. V., Duedall, I.W., Paric, P. K., and Kester, D. R., (1985), Future strategies fornearshore waste disposal, in Wastes in the Ocean, Vol. 6, Nearshore Waste Disposal, Ketchum, B. H.,Capuzzo, J. M., Burt, W. V., Duedall, I. W,, Park, P. K., and Kester, D. R. (Eds.), John Wiley & Sons,New York, 491.*

9. *NOAA, Recent Trends in Coastal Environmental Quality: Results from the Mussel Watch Project,Tech. Rep., Department of Commerce, Rockville, MD, 1995.*

10. *Waldichuk, M., (1989), The state of pollution in the marine environment. Mar. Pollut. Bull., 20, 598.*

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