ENVIROMENTAL POLLUTION AND WILDLIFE HEALTH

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ABSTRACT
Pollution is one of the primary ways in which humans have caused drastic modifications of wildlife habitat. Historically we have regarded the air, water, and soil that surround us as waste receptacles and have given little consideration to the ecological consequences of our actions. As a result, wildlife populations are confronted with a bewildering array of pollutants that we release into the environment either by intent or accident. The extent of contamination is global, with synthetic organic chemicals, toxic metals, and acid deposition present at even the most remote portions of the earth. Furthermore, it is probable that numerous effects of pollution on wildlife have not yet been detected due to the relative youth of this field of study.

KEYWORDS: Pollution, Wildlife, Health.

INTRODUCTION
Wildlife and humans are exposed to toxins via air, water, land, and food. People are responsible for introducing many types of toxins into the environment through industrial emissions, pesticides, medications, fertilizers, oil spills, sewage, garbage, and even lead bullets. The effects of toxins on wildlife can be difficult to ascertain and, usually, harder to remedy. Once toxins enter the environment, they accumulate in the food chain, affecting all levels of the ecosystem. Understanding the intricacies of these systems and the effects of these contaminants often requires extensive scientific research, and many years and conservation dollars to reverse [11].

The natural wealth of the Indian subcontinent has remained unique, mysterious diversified and fascinating for nature lovers. In Indian philosophy, life in any form is believed to be sacred and needs sympathy for sustenance in the nature. The worship of nature in all its
different forms is an essential part of our cultural legacy. According to recent information generated by Ministry of Environment and Forests of India[6] has rich biodiversity and fascinating variety of wildlife which can be visualized in the 586 Protected Areas (89 National Parks including 27 tiger reserves and 497 sanctuaries). The present protected areas network represents about 4.5% of total geographical area of the country covering an area of 3441 sq. km. More than 500 species of mammals, 1,220 species of birds, 1,600 species of reptiles and amphibians, and 57,000 species of insects populate the subcontinent. India harbours 60% of the world's wild tiger population, 50% of Asian elephants, 80% of the one-horned rhinoceros and the entire remaining population of the Asiatic lion.

The wildlife reserves in India have rich sources of flora and fauna that helps in the ecological balance in the environment and thus help in the growth of animal and plant kingdom. However, environmental pollution leads to complexity and hazardous situation for wildlife health owing to unwarranted alteration on biotic and abiotic components of the ecosystems resulting into harmful effect on flora and fauna. The abiotic components of the natural environment such as air, water and land provide basic means of sustenance to the living organisms and exchange of energy and matter takes place with abiotic components vice versa. The nature's unique design of self sustenance and self correcting homeostasis remains intact during this exchange, and the harmony is maintained between different components of the environment[9]. However, man's dominance over environment in recent years has disturbed the self-sustaining environment. This has resulted in the emergence of several environmental problems including pollution.

**Pollution:** Pollution is the introduction of a contaminant into the environment. It is created mostly by human actions, but can also be a result of natural disasters. It has a detrimental effect on any living organism in an environment, making it virtually impossible to sustain life. In recent times, humans release thousands of synthetic chemicals into the environment that has altered the distribution of many naturally occurring substances, thereby creating conditions that human, animal and wildlife species had never experienced before. At one time environment referred to only public health and sanitation, and pollution was defined in relation to human health hazard. But today, the environment and pollution has assumed vast connotation with ever widening frontiers involving several disciplines. As such, the effects of pollution are considered far extensive affecting various units of the biosphere. The major emphasis is now placed on
multidisciplinary problem-solving approaches, and the animal scientists can contribute greatly to issues related to animal production, quality of the produce and the environment\[10\].

**Impact of pollution**: - Reports from developed countries have documented adverse effects of pollution on domestic and wild animals in form of specific chemical toxicities, behavioural changes or population decline. Pesticides, heavy metals, fluorine, and other agro-chemicals are the major causes of environmental toxicity, especially in farm animals. Many domestic and wild animals have natural instinct and behaviour to protect themselves against untoward environmental hazards. For example, grazing ruminants generally reject certain harmful plants; horses excrete in certain areas, which they avoid for grazing, and dogs instinctively take emetics to protect themselves. Birds are unusually sensitive to odourless coal gas and other air pollutants in coalmines. Fish behavior pattern of avoidance of contaminated water and nesting behaviour of birds on water bodies are used as indicators of water pollution and population trend of birds in a habitat provides indication to the quality of ecosystem. Pheasants are important indicator species and their presence or absence in an area is a good indicator of the health of ecosystem.

In general, impact of the environmental pollution on domestic and wildlife can be categorized as: Pollutant burden without adverse effects and minor adaptive physiological or behavioural changes by minor pathological changes- including decreased predator avoidance capacity resulting in increased susceptibility to predators, diminished foraging efficiency or success in prey capture, decreased fecundity, and impaired nest- building, courtship and prenatal behavior.

Specific toxicity characterized by high morbidity and mortality Population and community effects characterized by change in population structure and function i.e, change in age structure or sex ratio, and density, abundance, or bio-mass of indigenous organisms. The impacts of pollution on animals result in serious economic losses and environmental consequences. Undernourished, young, old, physiologically stressed and debilitated animals are more susceptible to pollution effects. Pollutants effects on animals and wildlife observed in the affected birds were severe emaciation, muscle atrophy, liver degeneration and abnormal loss of feathers. Some adult birds tolerated the contamination well enough to survive, but they often had stillborn or deformed off springs.

Noise is unwanted sound, and noise pollution is a major environmental problem for the modern society. Major anthropogenic sources of noise are industrial and transport activities. Air traffic causes significant noise pollution when aircrafts fly supersonically. Information about the
effects of noise pollution on wild animals is widely scattered and frequently inconclusive. In general, reaction of wild life to noise exposure varies considerably with variation in frequency and intensity of sound, species of animals, their stage of life, ecological niches, population density and physical status of animals. Many reports indicated that noise pollution mainly induced with the variety of physiological damages in wild animals by affecting auditory and CNS system or by inducing stress symptoms alike that are produced by physical agents. Fireworks and rocket noises are reported to create strong fear reaction in number of wild animal species. Pressure waves generated by audible and sonic boom of supersonic aircraft may also create fright and light reaction in free-range wildlife. However, many animals become adapt to continuing exposure to a noise. Various wildlife species use acoustic signals as aids to navigation, to maintain or establish contact with other members of a family or larger social group and to convey many types of message such as distress or danger, the presence of food and extent of territory. The noise pollution may interfere with communication of these signals.

Acid rain is primarily caused by the release of sulfur and nitrogen into the atmosphere as a result of the combustion of oil and coal by power plants and automobiles. It is, at present, one of the most familiar forms of environmental pollution. Acid rain increases acidity of aquatic ecosystems leading to poor performance of sensitive species of fish and other organisms to reproduce and survive. Juvenile fishes and many organisms, lower in the aquatic food-web, are particularly sensitive to the effect of increasing acidity. Direct toxicity to adult and juvenile fish is another important factor in these declines. Modern animal production resulted in disposal of large quantity of unprocessed manure which through emissions produces ammonia. Ammonia is hazardous to both man and animal and it disturbs delicate ecological balance and produces acid rain.

Diclofenac residue: Vultures belonging to 9 to 10 species are the main raptorial birds in the Indian subcontinent. Oriental white backed vultures (Gyps bengafensis) are the commonest among these species with the distribution range extending to South Vietnam and Malay Peninsula. The species inhabited mainly cultivated tracts with scattered trees and a high human population and was attracted to larger towns and cities where slaughterhouses and waste heaps provided better opportunity for their food. The population of the vulture particularly G. bangalensi.s and G. indicus (Indian vulture) recorded a drastic decline during the past decade. Prakash recorded > 95% decline in population of each species between 1988 and 1999 at Keoladeo National Park in Rajasthan [11]. It is hypothesized that vultures scavenging on
diclofenac treated carcasses ingest sufficient concentration of diclofenac to cause renal failure and death\(^7\). However, there are many questions to be addressed before establishing diclofenac as the only cause of vulture population decline.

**Pesticide residue:** The principal sources of the pesticide exposure are due to their extensive and indiscriminate use in agriculture and veterinary practices. Some organochlorine chemicals and persistent organic pollutants (POPS) can persist in the environment and concentrate in the food chain through deposition in the adipose tissues of animals and human beings. Residues of such compounds disrupt the mammalian oocyte maturation and follicle physiology resulting in reproductive failure. Organochlorines were linked to eggshell thinning in raptors such as peregrine falcons, bald eagles, and ospreys, and fish-eating birds such as brown pelicans and double-crested cormorants\(^1\). Organophosphorus pesticides are the potential immunotoxic agents even in higher vertebrate wildlife that cause pathology of immune organs, decreased humoral and cell mediated immunity resulting in higher susceptibility to infectious agents, hypersensitivity and autoimmunity (Galloway and Handy 2003). Sex-reversal and behavioural alteration have also been attributed to the adverse effects of environmental residues in birds (Brunstrom et al. 2003). PCBs are the suspected cause of decreased hatching success, abnormal parental behavior, and developmental abnormalities in Forster's tern.

**Toxic metal residues:**
A wide variety of materials used by society contain toxic metals and, because discharge into the environment is a widely practiced form of modern waste management, hazardous concentrations of toxic metals can be found in some locations. Household and industrial waste water often carry high concentrations of toxic metals into aquatic environments. Various products used in households that are washed down drains and flushed down toilets, such as laundry detergents, bleaches, bathroom cleansers, and even shampoos, contain measurable quantities of toxic metals. Plumbing systems with metal components are an additional source of toxic metals to household wastewaters. An even larger array of solvents, cleansers, and other chemicals are used in industrial activities, and contribute quantities of toxic metals and other pollutants to industrial wastewaters\(^5\). Bioaccumulation of toxic heavy metals, especially lead, cadmium and mercury in animal tissues, milk, meat and poultry products have evoked great concern during the recent past. Heavy metal contaminants enter in the animal system through pollution of air, water, soil and feed sources and need to be overcome.
**Conclusion and future research needs:**

It is clear that pollution has had severe impacts on wildlife populations. The extent of contamination is global, with synthetic organic chemicals, toxic metals, and acid deposition present at even the most remote portions of the earth. Furthermore, it is probable that numerous effects of pollution on wildlife have not yet been detected due to the relative youth of this field of study. The quality of life on the earth is linked inextricably to the overall quality of the environment. Growing pressures on air, water, and land resources and increasing incidence of animal and human health problems due to industrial pollution have focused global attention in recent years on finding new ways to sustain and manage the environment. Reports indicate increasing incidence of pollution related adverse effects on wildlife and drastic decline in population of some common birds’ species may be linked to impact of pollution. However, researches are scarce to investigate impact of pollution on wildlife in India, which needs to be strengthened. The development of biosensors promises to revolutionize the way pollutants are detected for monitoring of the environment. Combinations of biosensors in arrays can be exploited to deal with a diversity of toxicants and pollutants. Biotechnology can be used to assess the well-being of ecosystems, transform pollutants into benign substances, generate biodegradable materials from renewable sources, and develop environmentally safe manufacturing and disposal processes and the potential benefits of the new environmental biotechnology are far from fully realized.

**REFERENCES**


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