Toxicology, Leonandology and Public Health

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Ecological Change and Diseases

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There is much direct evidence have caused much greater incidence of such diseases. There are many examples of such diseases. agriculture in developing countries. There are many examples of such diseases. There are many examples of such diseases of the debilitating tropical diseases. There are many examples of such diseases of the debilitating tropical diseases. of the debilitating tropical diseases of the debilitating tropical diseases of the debilitating tropical diseases. We shall briefly examine the interrelationship of ecological and cultural change of two diseases viz. malaria and trypanosomiasis We shall briefly examine and trypanosomiasis, with the prevalence of two diseases viz. malaria and trypanosomiasis,

Malaria

Malaria Malarial parasite (Plasmodium spp.) are spread by bloodsucking formal Malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are spread by bloodsucking formal malarial parasite (Plasmodium spp.) are specifically specifica Malariai parasite (a mosquitos of the genus Anopheles. Standing water is needed to complete the mosquitos of the genus Anopheles. Standing water is needed to complete the mosquitos of the genus Anopheles. mosquitos of the genderal stage. Felling of forest for agriculture production cycle as they have an aquatic larval stage. Felling of water at ground level many permanent or temporary bodies of water at ground level of varying many permanent or temporary bodies of water at ground level of varying dimensions. Even in deforested areas, changes in agricultural patterns may change dimensions. Even in deforested areas, changes in agricultural patterns may change dimensions. the potential for malarial mosquitos. In Western Kenya when irrigated rice field replaced scattered maize cultivation, seasonal swamps, and water holes with profuse plant growth, the proportion of malaria causing mosquitos increased

Industrial agroecosystems based on indiscrimate heavy applications of pesticides have resulted into resurgence of malaria in Central America and the Indian subcontinent. In the late 1960s and early 1970s the number of infected people was much higher, upto several millions in India. During the same period in both areas there occurred large-scale cash cropping of cotton and other similar crops which demand high pesticide applications. This increase use of pesticide caused the malarial parasite to evolve resistance to chemicals that previously had reduced malaria. Since 1969, the number of cases of malaria in India has increased exponentially in direct relation to increased applications of DDT to agroccoss tems and the concurrent changes in agricultural practices. An irony of his situation is the conflicting policies within the United Nations. WHO was strive to eliminate malaria by judicious use of insecticide. At the same time FAOw advocating the use of high-yielding cultivars which demand heavy pesticite applications.

Trypanosomiasis

The trypanosomes which cause sleeping sickness in Africa and Chapter in Latin America disease in Latin America, are transmitted by biting flies and bugs respective (BC-4) (BC-4)

Paricology Ecotoxicology and Public Health which have wholly terrestrial life cycles. All trypanosomes in Africa are transmitwhich have wholly seems which are ecologically segregated to some extent by environnent and by the species bitten.

Both the African and Latin American diseases have spread due to increase Both the Allies for the vectors. In East African case study, it has been shown of favourable habitats for the vectors. In East African case study, it has been shown a sequence of cultivators and pastoralists replaced the forests with a sequence of the vectoria. The new sequence of the vectorial takes are sequenced to the forests with a sequence of the vectorial takes. offavourable natural values and pastoralists replaced the forests with savannah that a sequence of cultivators and pastoralists replaced the forests with savannah that of a sequence of cultivators and pastoralists replaced the forests with savannah that of the sequence of cultivators and pastoralists replaced the forests with savannah that of the sequence of cultivators and pastoralists replaced the forests with savannah that of the sequence of cultivators and pastoralists replaced the forests with savannah that of the sequence of cultivators and pastoralists replaced the forests with savannah that of the sequence of cultivators and pastoralists replaced the forests with savannah that of the sequence of cultivators and pastoralists replaced the forests with savannah that of the sequence of cultivators and pastoralists replaced the forests with savannah that of the sequence of cultivators and pastoralists replaced the forests with savannah that of the sequence of cultivators and pastoralists replaced the forests with savannah that of the sequence of cultivators are sequenced to the sequence of cultivators and pastoralists replaced the forests with savannah that of the sequence of cultivators are sequenced to the seque that a sequence of Lake Victoria. The new savannah environments led to the respection of Glossina morsitans (tsetse fly). The disease was most like regelation around morsitans (tsetse fly). The disease was most likely introinvasion of Olossan porters of the European explorers in the 1880s. There was an duced by the African porters killing about one-third of the local porters was an duced by the Allican sickness killing about one-third of the local population in the epidemic of sleeping sickness killing about one-third of the local population in the epidemic of years. It is thus clear that how the mobility of human population in the epidemic of sheeps. It is thus clear that how the mobility of human populations can next 20 years. It is thus clear that how the mobility of human populations can pext 20 years. The second results of human populations can introduce diseases to new geographical areas. Much of the decline in populations in the 16th introduce diseases following the arrival of Europeans in the 16th century can be of pative Affective Affect attrious also important in Chaga's disease.

Water in Relation to Human Health

In ancient times the solution to pollution was dilution i.e. disposal of wastes pair, water and soil. However, living space is becoming limited due to congestion mair, water and therefore, dilution is no longer a solution and some other means are to be developed to reduce the ratio of waste to space.

Water quality

The standards for potable water or drinking water recommend that it must befree from pathogenic microorganisms and chemicals that are harmful to human health. Most of our urban population is served by surface waters (rivers, streams and lakes). The raw water obtained from these sources is frequently contaminated with (i) industrial wastes and (ii) domestic (chiefly human) wastes or sewage. These wastes are usually disposed of in the abovesaid water bodies.

1. Industrial wastes. Industry is the largest user of water. Industrial waste waters contain a wide variety of toxic inorganic and synthetic organic pollutants, most of which are not readily susceptible to biodegradation. Solvents, oils, plastics, plasticizers, metallic wastes, suspended solids, phenols and various chemical derivatives are common. The quantity and chemical composition of domestic or industrial sewage varies from hour to hour and from day to day. Packing plant sewage is rich in nitrogenous organic matter as manure, blood, fresh grease and hair. Sewage from wood-pulp plant is rich in cellulose, lignn and bisulphates. Almost all industries (dairy, tannery, cannery, distillery, oil refinery, extile, coal and coke, synthetic rubber, steel etc.) produce their own characteristic Sewage. These are known to be highly toxic to living organisms including wildlife.

2. Human waste (sewage). The term sewage is sometimes used in collecthe sense for used water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or industries, or polluled water supplies of homes, communities, or polluled water supplies of homes, communities and complete the polluled water supplies of homes, communities and complete the polluled water supplies of homes, communities and complete the polluled water supplies of homes, communities and complete the polluled water supplies of homes, communities and complete the polluled water supplies of homes, communities and complete the polluled water supplies of homes, communities and complete the polluled water supplies of homes, communities and complete the polluled water supplies of homes, communities and complete the polluled water supplies of homes, communities and complete the polluled water supplies of homes. polluted waters. The excreta of alimentary canal are called faeces. Generally we use the tothe term sewage for wastes from homes or communities especially faecal (BC-4)

Toxicology, Ecotoxicology and Public Health matter. They consist primarily of intestinal bacteria. Faeces are the most common matter. They consist primarily of intestinal bacteria. Faeces are the most common matter. Many microbes produce bad taste and odour to went matter. They consist primarily of interesting pollutant of potable water. Many microbes produce bad taste and odour to water to water alone produce colour and out of water and odour to water alone of the state and odour to water alone of the state and odour to water alone of the state and odour and out of the state and odour and out of the state and odour to water alone of the state alone o pollutant of potable water. Many microscope produce colour to water. These include algae, protozoa and iron bacteria. Some produce colour to water and slime closering of water filters and water pipes. Sulphur bacteria These include algae, protozoa and non-which causes clogging of water filters and water pipes. Sulphur bacteria also actic of cultivators and pastoralis

Contaminated water and diseases of the Victoria. The characteristic and the characteristic The potable water contaminated with faeces is the chief cause of some The potable water community of some important diseases of man. The enteric diseases are transmitted mainly by swallowing food or drink contaminated with faeces. Typhoid fever, dysentry (bacterial and amoebic), cholera and other enteric diseases are caused by con-(bacterial and amoeurcy, choices sumption of contaminated water. Some common human bacterial diseases transmitted by faecally contaminated water are given in Table 14:1 suspings

Table 4. Some common diseases transmitted by faccal contamination (water-borne) important in Chaga's disease.

Disease	(Causal agent muli of noi)	Gram-Reaction
Typhoid feverall a i monu	Salmonella tunhi (S. tunhora)	
om Cholera notucios a regno	ovibrio cholerae	air, water and noting
4	Shigella dysenteriae 1 bogolove	Negative curved rod
Enteric fevers.	Salmonella typhimurium	White mality
gastroenteritis, MINGOOT 103	S. schottmulleri Bluw Sidelog	Negative rods 10) Phisbook and
Salmonella septicemias (bacterial food-poisoning).	S. choleraesuis neinsproordim	ters from pathogenic
(Dacterial rood- poisoning).	m population is served by 8.0	ath, Most of our urb

Index organisms of faecal contamination in alex water obtained and lakes). The raw water obtained in a lake the result of the raw water obtained in a lake the result of the raw water obtained in a lake the raw water obtained in a l

There are some parameters that indicate the level of water pollution by faecal matter. These are as follows: edi in to besoughty disposed of in the saves are usually disposed of in the saves are as follows:

- 1. Coliform group. Among the most common organisms of the intestine or sewage (or faeces) are the bacteria of the coliform group. These are aerobes and facultative anaerobes, gramn-negative, non-sporeforming rods that produce acid and gas from lactose fermentation within 48 hours at 35°C. The most prevalent in the group are strains of Escherichia coli followed by Enterobacter (Aerobacter) aerogenes. Their number in polluted water is in millions. Leinzubni 10 ollesmol
- 2. Other index organisms. Other group of bacteria present invariably in human (and animal) faeces are (i) faecal streptococci, especially Streptococcis faecalis (ii) Clostridium, especially C. perfringens and (iii) certain anaerobic bacteria as Lactobacillus bifidus.

The survival time of these index organisms in water is of significance. There is one significance. There is one significance. presence in considerable numbers suggests relatively recent pollution a few hours lor used water supplies of homes, communities or days.

holluted waters. The exercia of alimentary canal are called freees. Gene the term sewage for wastes from homes or communities especially faxed (BC-4)

Urbanisation Stress and Health

Lavoansion results into congestion. The personal design of Industrial expansion results into congestion. The pressure is building up on Industrial expansion. The pressure is building up on big cities in developed world. But the process is more complicated in third world prices, particularly tropical ones as ours where bacterial diseases now. big cities in development tropical ones as ours where bacterial diseases flourish in an countries, particularly tropical ones as ours where bacterial diseases flourish in an countries for many diseases flourish in an analysis flourish in an analysis for many diseases flourish countries, particularly congestion of cities leads primarily to air and water pollutions, and the starting points for many diseases. Due to congestion quality of epidemic form. Construction many diseases. Due to congestion quality of air and water pollutions, that are greatly affected becoming unfit for human consumption. The confidence of the starting points for many diseases. Due to congestion quality of air and that are the statute of industrial growth has been the stress on urban areas due to congestion quality of air and water is greatly affected becoming unfit for human consumption. The unfortunate water is greatly and water is of rural population.

The picture in next 20 years or so would be that India would become The pictual and there would be even more people (about 70%) in urban settlements arise in metropolitan cities due to accuse slum settlements arise in metropolitan cities due to acute shortage of areas. Sluin social poor into urban areas in search of some means of housing. Due to influx of rural poor into urban areas in search of some means of housing. Due to housing. Due t subsistence in subsis civic facilities of insanitation that breeds social complication of insanitation that breeds social complications are not only over-crowded, but present an accomplication of the complication of the complete of the comp social evils and insanitation that breeds social complications and health and environment of According to a survey of National Building Organisation, there are about 25 million people in slum settlements of which 40% live in metropolitan cities of Ahmedabad, Pune, Bombay, Nagpur, Bangalore, Madras, Calcutta, Lucknow, Kanpur, Delhi and Jaipur. About 67% of population in Calcutta and over 45% in Bombay are slum dwellers.

Slum dwellers face environmental, social, economic, health, educational and cultural problems. The most prone element are the children on account of poverty, malnutrition, poor drinking water and insanitary environment together with sickness and disease and lack of education. Pt. Jawaharlal Nehru once had remarked "if you cannot provide buildings for those dwelling in slums, give them open space to live and give them atleast some social services like good sanitation and water supply. The result will follow. " " " good native arrow was assessed to assign and water supply.

Since there are no basic amenities of drinking water, sewerage, sewage, storm water drainage, paved lanes, bathrooms and latrines, there develop health hazards not only in slum dwellers but also in other people of the urban areas. Slum dwellers and those living in areas without proper water and other supplies, dispose of their wastes in unplanned way that contaminate water and air.

Housing should not be taken as an isolated issue but it is interrelated with many aspects. The unchecked growth of metropolitan and other big cities needs 10 be drastically cut down. There is need to work out carrying capacity of urban areas not only in terms of physical space but also with reference to services, supplies (food, water etc.), transport and shelter etc. A scheme for Environmental Improvement of Urban Slums (EIUS) was launched in 1972, that envisaged one per 150 persons, one lavatory seat for 20-50 persons, one bath for 20-50 Prisons. Also improvement in health services needs to be made under the plan Health for all by 2000 A.D". On November 10, 1980 an "International Drinking

Water Supply and Sanitation Decade" was launched to supply clean water and Water Supply and Santation Devaster. It is not only supply of piped water and disposal of night soil as also dirty water. It is not only supply of piped water alone disposal of night soil as also directly also health education that will help. If water alone but also proper sanitation system as also health education that will help. If water but also proper sanitation system to the but also proper sanitation, there will be dirty water and encouragement is supplied without proper sanitation, there will be dirty water and encouragement is supplied without proper samuely to vectors of diseases. More than 50% of water supply poses health hazard due to negative pressure whereby pollutants get sucked in. Water supply and sanitation programme was launched in 1954. The targets for India for 1990 five year plans are:

- Urban water supply All people. (1)
- Rural water supply All area. (2)
- Sewerage and Urban sanitation—100% in class I cities; 50% in class II; (3)overall coverage in each state would be 80% of the urban population the stoke before the sufference and the
- Rural sanitation -25% coverage. (4)

Questions

What is toxicology? Give an account of harmful effects of physical and chemical toxicants on 1. on weight a state who had to be multiplested to statement as

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- Define ecotoxicology. Describe in the light of recent information, behaviour of any toxicant 2. studied in test model.
- 3.
- Explain the following:

 (i) Biological magnification (ii) Ecotoxicology (iii) Fall out problem.
- Describe the toxicological relations of atomic power plants. 4.
- Give an account of behaviour, alongwith the toxic effects of DDT, lead or mercury in the 5. environment.
- With suitable examples, discuss the impact of developmental processes on environmental 6. degradation and human health.
- Explain the following:
 - (i) Urbanisation stress and health (ii) Water, vehicle of diseases.
- What are the main ecological and environmental disruptions that resulted into spread of diseases in tropical developing countries?
- What types of diseases are common in tropical countries? Discuss the role of ecology in diseases.

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of their wastes in applications were their come contract a series which he