Environmental Biotechnology for Environmental Problems abatment Camparing with our Indian Traditional Way

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ABSTRACT

Environmental Biotechnology Encompasses all the biotechnological approaches applied to the management of environmetal problems. It employes genetic engineering techniques to improve the effeciency of mircroorganisms to reduce the burden of toxic substances ill the environment. To be more specific environmental biotechnology in the context of environment and at the same time implications of bio-technological development to the environment also will be encompassed.

The two problems which are receiving constant attention of environmentalists are.

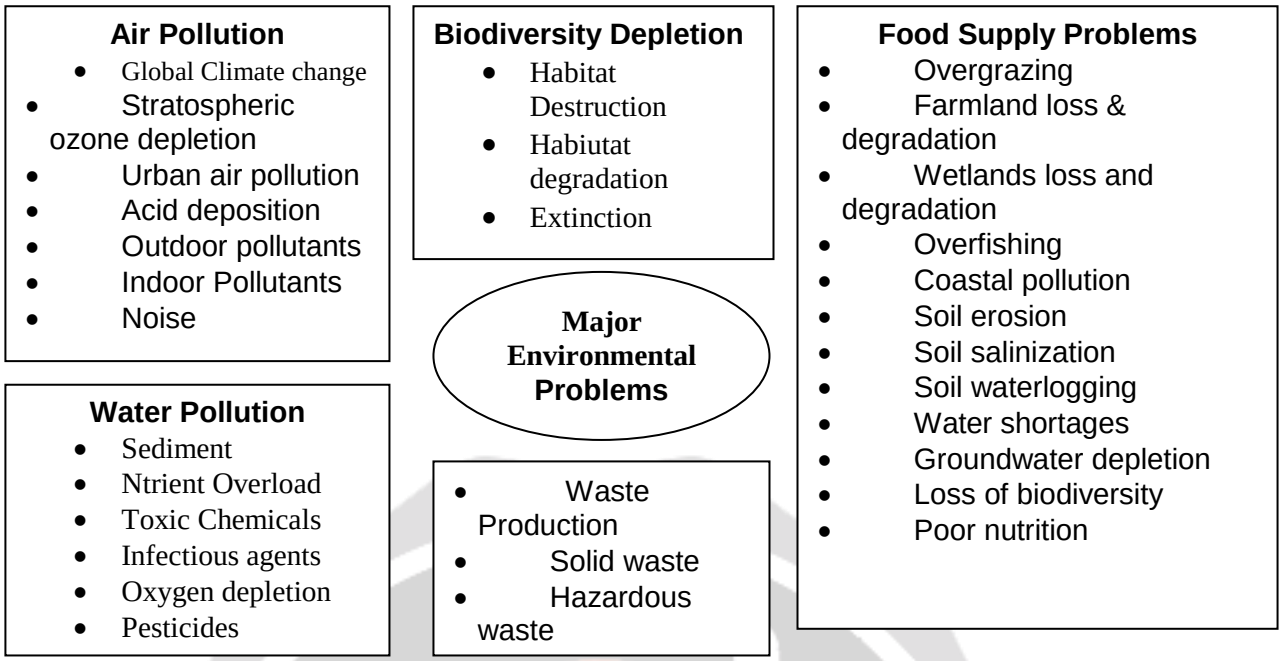
1. Control of environmental pollution.
2. Conservation of nature and natural resources.

The environmental problems we face – population growth, wasteful use of resource destruction and degradation of wild life habitats, extinction of plants and animals, the widening income gap between the rich and the poor and pollution are inter connected and are growing exponentially.

Science and Technology as part of their contribution to economic and social contribution to economic and social development, must be applied to the identification, avoidance and control of environmental risks and the solution of environmental problems and for the common good of mankind bio-technolgoy to protect the environment from pollution and to conserve natural resources. The natural resources are plenty on one side and poor on the other and the gap between these two is increasing. So, as the world commission on environment and development has stressed, both developed and developing countries should find a developmental path which meets their needs. Efforts are being made to achieve this through many approaches including biotechnolgical ones.

But Indian metaphysics a holistic viewpoint is adopted for the nature or the world, so, that morality is not only related to the human world but extends to plants, animals and natural resoruces. In fact, man is regarded as a part of the nature community and shares equal importance with all other components as God has created them all. This paper also suggests that the broader values of Indian tradition might contribute in the overall effort at preserving and sustaining the world.

We face a number of interconnected environmental and resource problems. According to environmentalists, these include :



- Rapid and wasteful use of resources with too little emphasis on pollution prevention and watste reduction.
- Simplification and degradation of parts of the earth's life support systems.
- Poverty, which can drive poor people to use potentially renewable resources unsustainably for short term survival and often exposes the poor to health risks and other environental risks.
- Failure of economic and political systems to have market prices include the overall enviornmental cost of an economic good or service.
- Our urge to dominate and manage nature for our use with far too tittle knowledge about how nature works.

Environmental Biotechnology encompasses all the biotechnological approaches applied to the management of environmental problems. It employs genetic engineering techniques to improve the efficiency of microorganisms to reduce the burden of toxic substances ill the environment.

Biotechnological techniques to treat waste before or after it has been brought into the environment are described and exemplified in the section on bioremediation. Biotechnology can also be used to develop products and processes that generate less waste and use less non-renewable reasources and energy. In this respect biotechnology is well positioned to contribute to the development of a more sustainable society. Bioremediation is the use of biological systems for the reduction of pollution from air or from aquatric or terrestrial systems. Bioremediation techniques can be used to reduce or to remove hazardous waste which has already polluted the environment. They can also be used to treat waste streams before they leave production facilities; end-of-pipe-processes. Some applications of bioremediation are discussed below.

Waste water and industrial effluents : Micro-organisms in sewage treatment plants remove the more common pollutants from waste water before it is discharged into rivers or the sea. Increasing industrial and agricultural pollution has led to a greater need for processes that remove specific pollutants such as nitrogen and phosphorus compounds, heavy metals and chlorinated compounds. New methods include aerobic, anaerobic and physico-chemical processes in fixed-bed filters and in bioreactors in which the materials and mincrobes are held in suspension. The costs of waste water treatement can be reduced by the conversion of wastes into useful products. For example, heavy metals and sulphur compounds can be removed from waste streams of the galvanisation industry by the aid of sulphur metabolising bacteria and reused. Another example is the production of animal feed from the fungal biomass which remains after the production of penicillin. Most anaerobic waste water treatment systrems produce useful biogas.

Drinking and Proces Water : Abundant supplies of water are vital for modern urban and industrial development. By the turn of this century, it is estimated that two-thirds of the world's nations will be water stressed – using clean water faster than it is replenished in acquifers or rivers. A very important aspect of biotechology is therefore its potential for the reclamation and purification of waste waters for re-use. Public

concern has also increased over the quality of drinking water. Not only does water need to be recycled in the development of sustainable use of resources, overall quality must also be improved to satisfy consumers. In many agricultural regions of the world, animal wastes and excess fertilisers result in high levels of nitrates in drinking water. Biotechnology has provided successful methods by which these compounds can be removed from processed water before it is delivered to customers.

Air and waste gases : Originally, industrial waste gas treatment systems were based on cheap compost-filled filters that removed odours. Such systems still exist. However, slow processing rates and the short life of such filters drove research into better methods such as bioscrubbers, in which the pollutants are washed out using a cell suspension and biotrickling filters, in which the pollutant is degraded by micro-organisms immobilised on an inert matrix and provided with an aqueous nutrient film trickling through the device. The selection of micro-organisms that are more efficient at metabolising pollutants has also led to better air and gas purifying biofilters. Examples are a bioscrubber based system for the simultaneous removal of nitrogen and sulphur oxides from the flue gas of blast furnaces which has been developed as an alternative to the classical limestone gypsum process, and the elimination of styrene from the waste gas of polystyrene processing industries by a biofilter containing fungi.

Solid waste : Domestic solid wastes are a major problem in our consumption society. There elimination is both costly and warrants constant surveillance in terms of groudwater and air pollution. Yet, for a major part they are composed of readily biodegradable organics. In this respect, source separated bio-wastes can be converted to a valuable resource by composting or anaeroubic digestion. In recent years, both processes have ssen remarkable developments in terms of process design and control. Praticularly, anaerobic digestion of solid wastes in high-rate anaerobic digesters has gained increasing public acceptance because it permits the recovery of substaintial amounts of high-value biogas together with a high quality stable organic residue and this without giving rise to environmental nuisance. Moreover, anaerobic digestion of mixed solid wastes is under intensive development because in the near future it may be an impiortant step in recycling of solid wastes and constitute an alternative to incineration.

Progressively more industrial companies are developing processes with reduced environmental impact responding to the international call for the development of a sustainable society. There is a pervading trend towards less harmful products and processes; away from "end-of-pipe" treatment of waste streams. Biotechnolgoy is pre-eminently suitable to contribute to this trend and it has already done so in many cases, both by the improvement of existing processes and by the development of new ones.

They are non toxic and biodegradable, work best at moderate temperatures and in mild conditions and have fewer side reactions than traditional methods becuase they are highly specific. New techniques and approaches to protein design and molecular modelling are enabling researchers to develp novel enzymers active at high temperatures, in non-aqueous solvents and as solids.

So environmental biotechnology has a career extending back into the last century.
But we go back to our traditional way .

The idea of global society the concept of 'vasudhaiva kutumbakam' – the whole world as a family is very old in Indian tradition. It as an inclusive concept which conceives of the 'world family' giving equal place to humans, animals, plant as well as other nature elements. In the Indian view the force that creates and sustains the world is a conscious will (saccidananda) the purpose of the creation is – welfare of all (save bhabantu sukhina) on the earth, which is to be attained by awakening of ethical sensibility and responsibility on man's part.

But even while the development in the field of science, technology and communication work towards creating a global society, they also throw up challenges for sustaining the nature and ecologically balanced world conforming to the purpose of the great creator.

Vedas the most ancient of all religious scriptures, emphasized the permanent link between man and all creation as illustrated through some invocatory hymns.

Atharvaveda says-

Supreme Lord, let there be peace in the sky and in the atmosphere peace in the plant world and in the forests let the cosmic powers be peaceful let Brahma be peaceful, let there be undiluted and fulfilling peace everywhere.

Rigveda says - Oh Tree, May you develop in a hundred ways. By your grace we will also progress in a thousand ways".

"Oh tree may the fire be away from you. May the axe also away from you, Let it rain, without gate. May you be harry always. May we also be happy by your grace."

The scriptures also warned the human kind against the thoughtless destruction of trees.

"He who destroys the trees completely will suffer destruction of his entire family.

He who cuts trees for reason will suffer hundreds of physical and mental illnesses."

The Quran says –

"By water everything lives."

The Prophet Mohammed exhorted,

"The world is green and beautiful and God has appointed his stewards over it".

Abu-Baker, the First Muslim Caliph exhorted, "Do not cut down a tree, do not abuse a river do not harm, animals and be always kind and human to God's creatures, even to your enemies".

Guru Nanak Dev, the founder of Sikhism said.

"Air is the vital force, water the progenitor, the vast Earth the mother of all ; Day and night as nurses, founding the creation in their lap."

In Indian metaphysics a holistic viewpoint is adopted for the nature or the world, so, that morality is not only related to the human world but extends to plants, animals and natural resources. In fact, man is regarded as a part of the nature community and shares equal importance with all other components as God has created them all.

The Vows and Virtues : The Indian ethical thought which is normative and practical guides man for the practice of different vows and virtues. The practice of the five vows of non-violence (ahimsa) truthfulness (satys) not stealing (asteya), sexual restraint (brahma charya) and non possession (aparigraha) which are given importance in Indian ethics can minimize harm to all living beings. In the jain and the Bouddha ethics the vow of 'ahimsa' referes not only to overt non killing of living beings but also to non-harming or non-injuring any creature in any way. In a positive sense it means traits of love kindness etc. so, "we should pervade the whole world with love, pity, sympathy and equanimity."[14] To develop a feeling of unity and intimacy with all beings and natural component is possible by awakening the feeling of friendship (maitri), compassion (karuna) and love (sneha). A truthful person can be the interdependence of every being and interrelatedness of everything. Such a person will not be the cause of suffering to any other. The vow of non-stealing may be re-interpreted in the ecological context, i.e. if we take anything from Nature for our use, we must compensate it in some way. The concept of 'non-possession' or 'aparigraha' means non-attachment to worldly objects. Due to our attachment to worldly objects we want to possess more and more by exploiting natural resources. To avoid this and minimize our personal needs the virtue of contentment (santosa), is to be practiced, Jainism and Buddhism stress on taking only that much which is necessary (parimita parigraha). As we have seen that the ever increasing population is the cause of the present ecological crisis, the vow of celibacy or 'brahmacharya' may guide people to control passion and help to minimize population growth. Therefore, one has to practice to control one's senses (indriyanigraha) so that one may follow these vows.

Conclusion :

Traditional knowledge an technology should be conserved simultaneously. Here we may say that holistic approach of the Indian Philosophy towards the world can help us in developing a better understanding of our environment. Its emphasis on self realization by identifying one self with the world and one's fellow inhabitants proves its ecological sensibility. Indian ethics can guide us to make proper choice through a proper appreciation of value significance as there is a message to preserve the integrity and maintain stability of the biotic community.

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