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Point for discussion this month **Water Towers of World – The Himalayas**

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Eternal Words

He who has drunk Thy refreshing waters
Verily has tasted of the Highest;
He, Thy worshipper, O Mother Ganga!
Never will be seized by the king of Death.

Rather a fish or a turtle in Thy waters,
A tiny lizard on Thy bank, would I be,
Or even a shunned and hated outcaste
Living but a mile from Thy sacred stream,
Than the proudest emperor afar from Thee.

- Shri. Shankaracharya



Dear Readers,

The cover photograph is of Phewa Lake of Pokhara, Nepal. A very beautiful lake is being beautified with modern concepts of architecture and development. It shows different transparent colours throughout the day offering a very calm and peaceful environment. Tourism centric development on its shores should not deteriorate its natural look and feel. All eco-tourism, religious tourism, medical tourism, education tourism are going to affect the the places being visited by the tourists. To maintain the attraction of the places, the development processes should involve the environmental planning and waste management with priority otherwise it becomes like Pune.

Pune – a world famous education centre – has become now an example of inept planning and failed city services as per various surveys conducted by research groups including Urban Development Ministry of India. Only survey results appearing in the news is not sufficient to change the liveability of the cities, but a long term planning with short term but effective measures to be taken to improve the healthiness of the places for better living conditions at affordable prices. So, it is essential for the supporters of economy to pay attention to ecology also. Urban Ecosystem Approach with the principle of Urban Systems with Ecological Security (USES) as suggested by Sandeep Joshi will be useful in maintaining the cities' liveability sustainably.

Sandeep Joshi is constantly stating that ecotechnology is not just product or brand to manage the human wastes but it's a pure stream of knowledge which comprises various subjects such as ecological biochemistry and ecogenetics in addition to environmental chemistry, environmental microbiology, microbial ecology, environmental instrumentation, and environment management etc. In his article, Sandeep Joshi has given a food for thought that successful application of ecotechnology is based on the understanding of ecological biochemistry and ecogenetics.

We congratulate Dr. Rita Colwell, a distinguished professor for securing this year's water prize for outstanding work on control of spread of cholera disease throughout the career from 1960. It's an illustration of dedicated for the cause of world community health.

Thank you,
Chief Editor

News Views

Stockholm Water Prize- 2010:



Dr Rita Colwell, distinguished Professor from the University of Maryland and Johns Hopkins University's Bloomberg School of Public Health in the United States, has been named the 2010 Stockholm Water Prize Laureate.

The Stockholm Water Prize is a global award founded in 1990 and presented annually by the Stockholm International Water Institute to an individual, organisation or institution for outstanding water-related activities.

H.M. King Carl XVI Gustaf of Sweden, who is the patron of the Prize, will formally present Dr Colwell with the 2010 Stockholm Water Prize at a Royal Award Ceremony in Stockholm City Hall on September 9 during the 2010 World Water Week in Stockholm.

Dr Colwell, 76, has made exceptional contributions to control the spread of cholera, a waterborne pathogen that infects 3 to 5 million people and leads to an estimated 120,000 deaths each year. Her work of 1960's on *Vibrio Cholera*, causative agent of Cholera has given new dimensions to the scientific community in studying the spread of disease. Dr Colwell has shown how changes in climate, adverse weather events, shifts in ocean circulation and other ecological processes can create conditions that allow infectious diseases to spread, and through that link she has led the ability to craft pre-emptive policies to minimise outbreaks.

Throughout her career, Dr Colwell has bridged the forefront of science and technology with a lifelong dedication to craft practical solutions to provide access to clean drinking water and protect human and ecosystem health. She has helped create and lead the study of bioinformatics, a field that combines biology, computer science and information technology and has exponentially advanced the understanding, diagnosis, treatment, and prevention of many genetic diseases. She has also led the adoption of remote sensing technology to track the movement of diseases globally. Dr Colwell developed the first model that applied remote satellite imaging to track and predict outbreaks of cholera before they occur. This model has become the archetype for infectious disease monitoring and prevention used around the world.



Ecological Biochemistry (Eco-Biochemistry), Ecogenetics and Ecotechnology

- Sandeep Joshi

The response of living organisms to environmental changes (physico-chemical factors, which may be differentiated into limiting factors and promoting factors) is dependent on their existing set of metabolic (bodily – anabolic/catabolic) reactions and genome (chip of original intelligence). The individual's metabolome and genome are responsible for its phenotypic expressions to brave the adversities and to survive in the optimum conducive environment. Fighting against the adversities leads to the creation of an entirely new set of biochemical reactions which can be stored in the form of eco-chips – genes for the next encounter with other adversities. In colloquial language, this may be called as “experience”!

Routine photoperiodism of flora and fauna, wet and dry cycles plentiful food or scarcity lead to a cyclic response from the metabolome and genome of a living organism in an ecosystem, which results in multiplication or extinction of the species. The gradual changes in environmental conditions stimulate alterations in the biochemical reactions which lead to adaptation of an individual to a new set of physico-chemical factors of the environment. Here, the basic urge is “survival” – the continuation of life.

Ecological biochemistry is the study of biochemical reactions or changes in the body of living organisms to sustain life in a given set of environmental conditions or to adapt to changes due to the introduction of new materials or processes. Photoperiodism or the reproductive cycle of plants is the best example of ecological biochemical adaptability. Certain species bear flowers in the summer whereas others do so in the monsoon. Plenty of food stimulates the enrichment of a particular animal species.

The growth of water hyacinth in water-bodies contaminated by sewage is an expression of ecological biochemical processes in the external as well as internal environment, which eliminates the competition for food. This mono-culture, sometimes, does not support multiversity, so the ecological equilibrium of materials and energy is not attained. Ecological equilibrium is a state where all the processes of absorbing or releasing the material are in balance. Balancing the vital processes is done by the ecological biochemistry of the individual, community and ecosystems.

When this information gets stored in the genes or gets expressed by the genes depending on experiences in time and space, it is termed as ecogenetics. It is wonderful to understand the migration of birds from one continent to another as

well as their identification of suitable water-bodies, all this without physical guidance during the travel.

Flowering of plants is also dependent on ecological biochemistry. In spite of seasonal changes, flowering of perennial plants and germination of seeds is regulated by response-reactions to adapt to suitable environmental conditions.

Introduction of new chemicals, disruption of the natural biogeochemical cycles, or alteration in the energy flows in the aquatic or terrestrial ecosystems causes pollution and the resources are no longer in acceptable form for human consumption or use. An anthropo-centric economy fails to reckon with environomics – ecological economics!

Discharges from the Indian capital, New Delhi, into the Yamuna, are killing the alligators in the Chambal sanctuary. As per the studies of a group of scientists, it has been revealed that pollution in the Yamuna reached its tributary Chambal and took a toll of about 150 fish species except the one on which the alligators thrived. Investigations on dead animals brought forth the effects of pollution leading to the extinction of the alligators.

Ecological biochemistry and ecogenetics, on one hand, are helpful in analyzing the health of an ecosystem; while on the other hand, they are used as effective tools in correcting the aberrations created by pollution. Ecological biochemistry and ecogenetics, in combination with environomics (environmental economics), lead to better ecotechnological treatments like the Green Bridge and Soil-scape filter in treating non-point sources or point sources of pollution effectively.

The experiences of ecological restoration of Ahar River in Udaipur, Rajasthan State and Pune's Anandnagar's sewage contaminated stream are opening up of Pandora's box of ecobiochemical reactions and ecogenetic responses of green plants and animals. It's entirely new approach of study – Ecosystem approach which integrates the complex food chains with different trophic levels existing in the ecosystem.

Ecotechnology uses all these ecological principles to detoxify the pollutants and convert them into easily digestible eco-products at various trophic levels so that the residues are negligible from the treatment system. Therefore, it would interest for the Environment Technologists to work on ecotechnological treatment systems based on the ecobiochemistry and ecogenetics principles. Thus, a well understood and developed ecotechnological treatment system can reduce the loads of wastes discharged into the water bodies substantially while increasing the bio-utility of those resources as it happened in ecological restoration project of Udaipur's Ahar River. It's a manifestation of nature to convert pollution into nutrition and transferring it into ecological cycles leaving no residue which needs another artificial techniques to take care of.

Cities: Centres of Environmental Anarchy

Sandeep Joshi

The regular reporting of the findings of research groups on the liveability of the cities all over the world and by the urban development ministry in India has given a new dimension of environmental anarchy in the urbanised area. The evaluation of this anarchy in terms of economics will open up a Pandora's box of the disastrous impacts of economic growth without giving heed to ecological planning and healthy environment for the citizens who pay for the services for better living. Presently, they are disadvantaged as though they pay, they don't get proper services and healthy places to live, that's the conclusion one can draw from all these observations and reports.

Many times, city managers argue that their work and services are limited up to the physical, geographical boundary of their cities. They are not legally responsible what happens to the ecosystems or populations beyond their command area. These statements go against the fabric of social and democratic order of the world. For example, Pune city receives rainwater 1.6 lit per sq. m per day in a year but it uses minimum 50 lit. /per sq m per day. It's using about 25 times water that what it gets. It draws the water resources from the surrounding area depriving the populations and ecosystem there. So, while releasing the used water into the environment again, isn't it responsibility of Pune city to attain the quality as it was when used and then discharge? So that other populations should not pay for the pollution created by the urban sprawl.

There are so many examples of cities like Pune as documented by research groups and various agencies such as Delhi, Hyderabad, Bangalore etc. These are Indian cities but the cleanest cities of the world which are always quoted must have certain impacts on their areas due waste discharges and management in terms of space, water quality, air quality and health of ecosystems and population.

Another example of environmental anarchy is the management of solid waste generated in the city. Depending on its composition, it has been categorised into electronic waste, hazardous waste, municipal waste, dry waste, wet waste and what not. The need is to develop a system which will utilize the waste not useful for human being in an ecosystem way. In the natural ecosystems, nothing is waste.

City managers always have the issues of quantification of wastes generated in their cities. One never get the correct information about the waste being generated and treated or disposed off as standard guidelines, procedures and technologies. It's horrifying to know from the scientific literature that the west coast of USA full of plastic layers of several thousand square kilometres. There are reports of landfill and hazardous waste facilities that these sites environmental menace causing harm not only to surface waters but they are degrading the quality of ground water and air at distant places. Really, environment processes and impacts are not bound by political boundaries. They don't categorize good or bad people, rich or poor people and developed or undeveloped.

Therefore, a new order of governance is needed to give better living in the urbanised sprawls, whether it is termed as democracy or socialism or communism or anything for that matter. This governance must work towards the goal of controlling ecological warfare for the environmental resources for better sustainability of human life on this mother earth and the basic unit of this governance is City. It should be the centre of better civility rather than agglomeration of exploiters of resources at the cost of other populations and ecosystems. The governance with the concept of Urban Systems with Ecological Security (USES) will alleviate the environmental anarchy created by the modern city processes. This has to be the integrated approach of local city managers, state and national managers to maintain the liveability of not only profit making urban centres but also the areas at the cost of which cities prosper.

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