

ECOTECH EDUCATION AND ECOSYSTEM CONSERVATION OF THE LAKE *CHILIKA*, ORISSA.

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ABSTRACT

Any technological application that uses ecological system is the Ecotechnology (ET). ET is a multibillion dollar industry. The ecological world is the panacea of novel genes. Ecological diversity and novel products; molecular diversity; bioremediation and pollution control; organisms as factories for producing proteins, pigments, medicines etc. through cutting edge biotechnologies is for societal transformation, sustainable development, food security and environmental conservation. Lake *Chilika*, technically a coastal or estuarine lake of Orissa is the second largest lake of the world. The services of ecosystem of Lake *Chilika* that produces eco-resources are critical to the functioning of our life support system. Mother *Chilika* contributes to our welfare and the economic value is much more than billions of rupees per year. *Chilika* regulates air, water, soil and food, fibre, fuel of the state Orissa. *Chilika* ecosystem goods (e.g. food) and services (e.g. recycling of resources) present a challenge for our education in conservation, restoration, management and development of *Chilika* lake-ecotech industries in our state Orissa.

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Introduction:

In good olden days Lake *Chilika* was Orissa's vista or window to the world and a blue gateway of Orissa. *Chilika* lake ecosystem is one of the highly productive habitat that function at optimum physiological level to generate maximum biomass. *Chilika* is a unique assemblage of saline and sweet water ecosystem with estuarine habitats-present a challenge to physiologists and biochemists. *Chilika* lake – the largest brackish water lagoon in Asia as productive super power is *mirable visu* (L) Wonderful to see. *Chilika* is a very rich preserve of ecological diversity and an unique hot spot of biodiversity with rich bioresources. Floristic survey revealed the occurrence of 726 species of plants-most exotic hotspots of phytodiversity. *Chilika* lake as a Ramsar Site has attracted world wide attention for her ecorestoration from a multiplicity of pressures and presents a challenge for thorough investigations on her industrial potential, (Lata and Behera, 2004).

Potentials and prospects of lake *Chilika* ecotech education and ecosystem conservation is an Aladdin's cave, we can reveal it through the application of cutting edge technologies of frontier science for the conservation and utilization of lake *Chilika* resources. So living in the neighborhood of a lake is a security to the sustenance of livelihood, as the lakes are well known as the highest productive ecosystems of the world. Lake *Chilika* the largest brackish water lagoon of India, designated as Ramsar site, is a wetland of international recognition has a reputation for trade in fish, crab and prawn throughout the year and migratory birds in winter season from Siberia and faraway places. The ecosystem of lake *Chilika* is unique as it is a combination of saline water from the Sea-Bay of Bengal with the fresh water discharged from the rivers and rivulets to the lake that creates a unique biodiversity, which resist both to sweet and saline conditions. Therefore the lake ecosystem is extremely important from biodiversity point of view for conservation and sustainable utilization of bio-resources of lake *Chilika*. But now the unique biodiversity is threatened as the lake ecosystem is shifting to a freshwater ecosystem due to reduction in salinity caused by decrease of the mouth or outer channel (lake-sea inlet) linked to the sea and also over-exploitation of bio-resources demand for eco-restoration of lake *Chilika* for sustainable use of biodiversity and ecosystem productivity. (Behera 1999)

The ecological integrity of lake *Chilika* is threatened due to the problems of siltation, eutrophication, and changes in salinity regimes, freshwater weed proliferation and over exploitation of bio-resources. Ecotech influences on production, control, human health, atmospheric composition, climate, soil fertility etc. Ecotech is a solution in search of a problem. Ecological diversity is the biological capital of human society. The working knowledge of the natural world is the natural technology or ecotechnology. Loss of biodiversity is the loss of natural wealth. Biodiversity is living library and ecotechnology is a living laboratory. Biodiversity provides free goods and services to society and ecotechnology provides new and more goods and services. The value of the world's ecosystem services and natural capital is estimated to be in the range of US \$ 16-54 trillion per year with an average of US\$33 trillion per year (Costanza *et al*, 1997) and ecotechnology will enhance the value of earth's life-support system.

Potentials:

The vegetation area of the lagoon covered with macrophyte is 179 sq kms, which varies seasonally. The lagoon is an estuarine one having a unique assemblage of marine, brackish water and freshwater ecosystem. It supports many endangered and endemic species of flora and fauna. Thus it is a hotspot of biodiversity and a wetland of international importance. The interaction of biotic and abiotic factor plays a vital role in *Chilika* ecology. In gold olden days replete with green and blue wealth Lake *Chilika* was vista of Orissa and a gateway as well to the world of eco-resources. Ecosystem of lake *Chilika* is highly acknowledged as the most productive habitat that function at optimum physiological level to generate maximum biomass. *Chilika* is an attractive and unparalleled fusion of marine and river water ecosystems with estuarine habitats presenting a challenge to physiologists and biochemists. The lake is the largest brackish water lagoon in Asia and also the productive super power. In the backdrop of her bounties, beauties and bio-resources *Chilika* lake has become a *mirable visu* (L) i.e., wonderful to see. *Chilika* lake is a very rich preserve of ecological diversity and an unique hot spot of biodiversity with rich bio-resources. Floristic survey revealed the occurrence of 726 species of plants as most exotic hotspots of phyto-diversity. *Chilika* lake as a Ramsar Site has attracted world wide attention for her eco-restoration from a multiplicity of pressures and presents a challenge for thorough investigations on her industrial potential.

Lake *Chilika* is a Lake Net Biodiversity Priority site and home to great biodiversity, including endangered species listed in the red data section of the Book of International Union for Conservation of Nature and Natural Resources red list. It is the wintering ground for more than 1,000,000 migratory birds, and breeding and staging ground for nearly three dozen water-bird species. About 200 bird species have been identified of which, reportedly about 100 are intercontinental migrants. Several hundred fish species have been identified (including commercially important species) and 40% are reportedly dependent on sea water migration. A 1980s survey claimed to have identified over 800 species of fauna. Rare species include the Limbless skink (*Barkudia insularis*), found only in *Chilika*, and the Irrawaddy Dolphin (*Orcaella brevirostris*). Nearly 400 species of flora were identified; with some having medicinal properties and others being used as vegetables, fodder, thatching, fish food, bird food and nesting material. Little is known about the microbial populations. This data reflects a relatively small number of studies mostly conducted prior to the hydrological activities.

Prospects:

One of the core competencies of lake *Chilika* is biodiversity, which combined with technology will yield value-added products.

Biotechnology has made tremendous growth, particularly in the field of DNA techniques, cell and tissue culture, enzymology, bioprocess engineering, immunology and vaccinology

Biotech Industries:

Aquaculture: Feed Development, production of transgenic fish, extraction of bioactive compounds, cryopreservation of embryos, development disease diagnostics.

Biofertilisers: Algae, bird's excreta

Industrial Biotechnology: Gene cloning, pigment industrial, cosmetic Industrial, Drink and Food Industries, Bird's Culture Industries, Bird's Feather Industries, Bird's Egg Industries, Crab Culture Industries, Prawn Culture Industry, Fish Culture Industry, Dolphin Culture Industry, Medicinal Plant Culture Industry, Aquatic Plant Culture Industry and Bio Gus Industry.

Air, Water, Soil, in organic nutrients (sedments), navigation, irrigation, eco-tourism industry and for defence bioterrorism Industry.

Cutting edge Technology cycle for the future: In improving the quality of life.

Ecotechnology (ecological services & goods) ↔ Biotechnology (Biochips, bioinformatics) ↔ Nano technology (Thinking machines) ↔ Space technology (Exobiology)

Chilika lake Ecotech: Vision for the Orissa State

Food security (Lake Biodiversity) ↔ Employment Security (employability) ↔ Life security (Human society) ↔ State Security (Economic prosperity)

Conclusion:

Lake *Chilika* has the potentials to play a lead role in transforming Orissa into a Biotechnology Society. There ample opportunities in small scale biotech industries. Lake *Chilika* biotechnology is a multibillion Dollar Industry. Biotechniques can now be exploited at many new frontiers. The ultimate mission is to have a pollution free technology. Engineering genes and proteins to improve nature *Chilika's* selection and bioremediation and pollution control is an opportunities. The potential of Lake *Chilika* as the basis for new biotechnology remains largely unexplored. Indeed, the vast majority of Lake micro-organism have yet to be identify. Salt resistant enzymes of Lake *Chilika* is of great advantage in industrial processes, such as cleaning reverse osmosis membranes. Biosenser enzymes responsible for bioluminescence, lux genes can be worked out. Genetic diseases and gene therapy, a technology for the future, mapping and sequencing of genomes of living systems produced unprecedented amount of information for revolutionizing our life systems. It is suggested to establish Lake *Chilika* biotech bank.

If we support to conserve and technically utilize global biodiversity, we are one among those who have chosen to demonstrate concern for our planet which is in trouble. If we support ecotech we are joining the esotech scientists to stop environmental destruction. Let us dedicate to save our environmental and the life it supports. Together we shall work to protect the environment from pollution and destruction for environmental security and support gene banks for 'world life-security'. Let us try to solve and support for our survival and for "Freedom from war". Let us work to preserve our beautiful planet for our future generations to make it more beautiful and more peaceful.

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