Sustainable Integrated Climate Friendly interventions for water pollution management through Bio-engineering techniques

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Introduction

Water is one of the most important natural resources of mankind. Quality of life depends on the health of Water, Soil, Air and the essential components such as energy and food. All life – human, animals and plants – relies on sufficient and dependable supplies of water. There is a massive environmental degradation due to human interventions - unorganized urbanization, industrialization lead to the contamination of our precious life line - Water Resources.

Symbio Greentech Pvt.Ltd. at EKTA Incubation Centre – MAKAUT supported by Department of Science & Technology (DST) Govt. of India. has developed an innovative Bio-engineering techniques on water pollution management by using natural materials to protect & restore our natural resources.

The integrated climate friendly technologies to protect & restore the contaminated canals, water bodies, Lakes, river embankments, thermal power plant fly ash ponds, CETP RO water recovery through biotechnological Interventions using natural fibres (Jute & Coir), biomass and beneficial microbial consortium and sustainable plants such as Vetiver, Arundo and many other plant species for sustainable water reclamation to create healthy, clean & green environment.

The integrated approach for restoration of contaminated canal using natural fibres & biomass as growing substrate for hosting the beneficial microbial consortium and growing medium for plants. The entire system work as bio-remediation and phyto-remediation platform for reclamation of canal water through in-situ water treatment by reduction of organic & inorganic load and de-contamination by a natural process before discharging in to the river.

Restoration of Contaminated Canals & Water Bodies

In the present situation, most of the Canals & waterbodies are contaminated due to the lack of organic and Inorganic waste management and un-organized urban development. This has adversely affected the health and hygiene of the population in the area and has become a severe problem for those living on the banks – increase in vector-borne diseases, etc.

There are two ways of improving the quality of polluted water. One is to control the input of pollutants, particularly N and P, and organic pollutants to the water body, and another is to remove these substances from water.

As soluble N and particularly P are usually considered to be key elements in water pollution, which normally leads to blue green algal bloom in inland waterways and lakes, the removal of these elements by vegetation is a most cost effective and environmental friendly method of controlling algal growth.

The restoration of the contaminated & Canals & body through Bio-engineering techniques by the application of microbial techniques to create clean water, decontamination, odour free and create green ambience with sustainable plants to access clean water for secondary applications.

The Canal & Water body Restoration through the application of an advanced microbiology, biotechnology, Natural substrates (Coconut geotextiles & Jute Geotextiles), Biomass substrates and sustainable plants based technology applications.

The Bio-engineering techniques incorporated with Beneficial Microbes (BM), Natural fiber (Jute / Coir Geotextiles), Biomass substrates and sustainable plants can reverse these situations in a natural and economic way. The Beneficial Microorganism accelerates the natural decomposition of organic compounds which produces bioactive substances and eliminates pathogenic microorganisms through a process of fermentation. Pathogenic microorganisms promote decomposition and controls and ultimately near elimination of the production of harmful gases that contaminate water and produce bad odours. Therefore, applications with BM can possibly restore the natural equilibrium of aquatic systems and bring forth beneficial and sustainable effects.

The water Pollution Management process based on bio-remediation and phyto-remediation by the application of Coco / Jute geotextiles as a bio mulch to host the microbial colony. The beneficial microbes will be degrading the organic contaminants and the sustainable plants will act as a bio filter and soil stabilization & to absorb the toxic components in the water. The whole methodology will establish with clean water canal to enjoy the green nature and healthy environment. This process is a unique integration of biological techniques for water decontamination and may be only technology today to clean the contaminated canals & water bodies.

The Jute Geotextiles mulching would act as a mulching for biomass base and the Jute fibers and the biomass substrates will act as a host for microbes to and support plant rapid growth.

The biomass substrates and the coir / jute logs charged with Beneficial Microbes (BM) & the mixture of substrate would cause rapid growth of plants. The type of plants which are proposed to be used in the restoration having a capability to produce heavy root system for acting as host for the beneficial microbes for proper activity to stabilize the biomass bed by root anchoring and phytostabilization.

The installation of floating garden on water bodies & Lakes in a floating structure with natural fibre like coir & jute geo logs, sustainable plants and beneficial microbial consortium for the bio-degradation of organic matters and phyto-remediation of inorganic components.

The floating garden island creates a green ambience with native selected plant species and suspended roots promote the establishment of beneficial aquatic biofilms, absorption of excess nutrients to minimize the growth of algae and other aquatic weeds, reduction of BOD & COD and eventually transforms in to clean water bodies & Lakes

The integrated biotechnological intervention and bio-engineering techniques works on bio-remediation & phyto-remediation concept incorporated with various green technologies to protect our natural resources through removal, trapping, bio-filtration, Greening, Protection & restoration using natural materials and it can be widely replicable with easy maintenance.

One of the most unique features of the climate friendly intervention for urban management is synergizing a number of green technologies – microbiology, biotechnology & Bio-engineering integrated with natural fiber & Geo textiles, beneficial microbes, Sustainable plants for providing green solutions to a complex problem in a practical way through community participation.