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Significance and future perspectives of aquatic microbial diversity in the reduction of, and adaptation to water related stress

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At present, water resources are fairly inadequate worldwide and attaining their highest conceivable use is not that easy. Aquatic ecosystems are now plagued by deterioration and the loss of microbial diversity that jeopardize food security, health, clean environment as well as sustainable economic development. They are largely characterized by high pressure, salinity, temperature, absence of light, etc. that interfere with their efficient use. Microbial biodiversity in aquatic ecosystems is an amazing resource near to us; it denotes our livelihood's insurance and represents a natural capital consolidating our sustainable development and economy. Microorganisms furnish aquatic habitats everywhere for all other living species, and they play a crucial role in the geo-biochemical. They also reduce and adapt water related stress. Microorganisms incorporate a wide-ranging and diverse gathering of living organisms, predominantly bacteria, fungi, algae and Actinomycetes. Some of them are halophiles that require an aquatic ecosystem with at least 12–15% NaCl salt saturation in order to survive and grow well. Microorganisms play a major role in transforming plant nutrients in the aquatic ecosystems through mineralization & immobilization, oxidation & reduction, solubilization etc. For instance, autotrophic microorganisms oxidize plant ammonia to nitrite (*Nitrosococcus* sp.) and nitrite to nitrate (*Nitrococcus* sp.); they convert sulphur compounds to forms readily available for other aquatic biodiversity adsorption. Heterotrophic microbes, on the other hand, degrade and decompose organic matter and some of them fix atmospheric nitrogen in aquatic ecosystems. They also serve as an important source of food for a variety of aquatic organisms. At the time being it is a must

to regulate and direct microbial activity in aquatic ecosystems, in order to combat water stress and furnish a healthy ecosystem, using the developed novel biotechnologies at our disposal.

During the last decades, most countries did not invest what was needed to reach sustainable management of aquatic ecosystems related to microbial diversity, through environmental conservation, economic feasibility and social equity. The main challenges and constrains confronting sustainable management of aquatic ecosystems now include: the lack of technical experience, feeble political drive for environmental issues, limited institutional mandate, restricted available budgets, lack of proper indicators for sustainable management, and absence of systematic means to allocate secure funding.

Capacity building for the sustainable management of aquatic ecosystems dictates setting system approaches of policies and technical sustainable strategies, a full understanding of systems' implications to avoid unintended consequences, an application of the current state of scientific knowledge to achieve both short-term continuity and long term ecological integrity, and a better understanding of the links between social, economic, and biophysical systems.

Keywords: deterioration and the loss of microbial diversity, sustainable economic development, long term ecological integrity

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