



Keynote Speech

Controlling Pollution of Aquatic Ecosystems for Sustainable Urban Development

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Aquatic ecosystems are continually polluted and degraded by pressures that are directly related to anthropogenic origin and are often a result of urbanization and rapid industrial growth. Such impacts include the loss of biological communities, chemical pollution by excess nutrients and contaminants, and alteration of structural diversity of aquatic systems, their connectivity and process dynamics. Pollution is generally the primary cause of aquatic ecosystem degradation, which directly affects water consumptive patterns, frequently with severe consequences to public health. A broad range of contaminants from the point- and non-point sources have rendered most of the water sources unfit to use as raw water intakes for public water supplies. This paper emphasizes the need to control aquatic pollution in attaining sustainable urban development by highlighting some case studies in the Western Province of Sri Lanka.

Household waste discharges, industrial effluents, and urban/agricultural runoff are detrimental to aquatic ecosystems, including coastal zones, on a scale never seen before. Prevention and/or effective control of aquatic contamination/pollution demands the knowledge of common as well as emerging contaminants, a thorough understanding of natural elemental cycling/treatment processes, and to appreciate the need for advanced waste treatment systems. To make such resources avenues for sustainable development, well-developed monitoring systems of aquatic ecosystems that are (or could be) affected by effluent discharges are essential. Appropriate waste treatment technologies, including nature-based solutions, must be developed to remove pollutants from waste discharges and ensure adequate water pollution control. These technologies need to be further developed to improve efficiency while reducing overall cost outlays – without which adoption of such technologies may not be realized. Recent developments in preventing pollution of aquatic ecosystems, including coastal zones, are highlighted in this paper.

The City of Colombo has recently been accredited as a Ramsar site, and restoration and conservation of wetland ecosystems have become imperative. With the continuous development of larger population centres in the Western Province, the hydrological properties of urban wetlands have changed, directly impacting the structure and function of wetlands. There is a persistent societal need, especially within urban communities, to reverse the decline of urban wetland systems and restore lost ecosystem functioning and services by promoting active restoration aiming at natural recovery. Despite the benefits that urban wetlands provide, restoration and protection of these spaces occur less often and face more significant barriers compared to other ecosystems. Restoration of some



wetlands in Colombo are highlighted as case studies aimed at contributing to sustainable urban development.

In Sri Lanka, we must recognize the importance of rational water management practices and water security in an environment with ever-increasing competition between water uses. We have to face significant challenges arising from irregular rainfall patterns, likely impacts due to global warming, increasing water pollution scenarios, etc. Notwithstanding many attempts thus far, Sri Lanka has yet to adopt comprehensive national-level policies to regularize aquatic resource conservation, which must be considered an essential requirement for sustainable water resource use and to ensure pollution control. Conservation and restoration of aquatic systems need clearly defined criteria and targets. Such management criteria should primarily follow a process-oriented and stepwise adaptive approach judging the success of restoration against pre-defined reference/control levels. Institutional and societal expectations must be appreciated; restoration targets must not be over-ambitious and promise too much. For instance, small-scale restoration of degraded ecosystems can re-introduce some elements of essential ecosystem services, including improving biodiversity. Every so often, ‘marginal’ ecosystems are better than nothing, especially in urban settings, and the best can be achieved with proper political will and good governance. A brief review of existing policies and approaches adopted in Sri Lanka are discussed to seek progressive avenues that promote pollution control of aquatic ecosystems, which is again imperative in attaining sustainability.