


Chapter 6


Hydrophytes for Sustainable Agriculture: Achieving SDG3 by Soil Reclamation

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ABSTRACT

*Hydrophytes, or aquatic plants, play a significant role in sustainable agriculture by supporting the achievement of Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being) through bioremediation and soil reclamation, water purification, and enhanced carbon storage. Land reclamation practice is the process of converting heavy metal contaminated water bodies and soil into usable land for various human activities like agriculture, urbanization, and industrial use. Phytoremediation is a cost-effective and environmentally friendly method in the revitalization of the environment by utilizing plants to restore polluted water and land sources. Some hydrophytes such as water cabbage (*Pistiastratiotes*), duckweed (*Lemnagibba*), and water hyacinth (*Eichhorniacrassipes*) are floating hydrophytes*

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famous for their pollution absorption capability mostly for metals in industrial waste water. This chapter discuss about reclamation of soil based on re-vegetation with hydrophytes.

1. INTRODUCTION

The United Nations Sustainable Development Goals (SDGs), particularly SDG 3: Good Health and Well-Being, which prioritizes healthy lives and well-being for all, is dependent on sustainable agriculture (FAO, 2020). Public health and agricultural practices are closely related due to the fact that food production requires the growing of food on healthy soil that is free from harmful toxins and residues. Nevertheless, soil degradation caused by pollution, nutrient depletion, salinization, waterlogging, and heavy metal contamination (i.e., arsenic, cadmium, lead, etc.) complicates food security and agriculture across large regions of the world.

Soil reclamation has become an important approach in attempting to restore soil health and supporting sustainable agricultural systems in order to address these problems. Hydrophytes, which are plants typically found in flooded or waterlogged conditions, represent a potential benign approach to remediation (Brix, 1997). Species of hydrophytes like *Typhalatifolia*, *Phragmitesaustralis*, *Eichhorniacrassipes*, and *Cyperusalternifolius* possess physiological and morphological features that allow them to thrive under highly saline, contaminated, or hypoxic conditions (Colmer & Flowers, 2008). The physiological and morphological properties enable hydrophytes to facilitate soil restoration through a variety of abiotic and biotic mechanisms such as promoting microbial activity, immobilizing or extracting metals, reducing salinity, enhancing organic matter content, and phytoremediation of both organic and inorganic contaminants (Shahid et al., 2018). Hydrophytes are also a source of other ecosystem services, including water quality control, reducing eutrophication, improving soil-water interactions, and creating habitats that indirectly facilitate the development of crops (Vymazal, 2011).

There are three objectives of this chapter:

- i) To provide an overview of the ecological, physiological, and remedial mechanisms of hydrophytes in soil reclamation.
- ii) To evaluate their potential role in improving public health and agriculture sustainability in the context of SDG3.
- iii) To promote the growth of hydrophyte-based soil reclamation as a scalable, sustainable, health-centered intervention by identifying gaps in the current research and outlining research goals moving forward.

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