

# Chapter 15

## Water Hyacinth: Characteristics, Problems, Control Options, and Beneficial Uses

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### ABSTRACT

*This paper is a review of literature of water hyacinth (*Eichhornia crassipes*); what it is, why it is of scientific importance, problems it causes, how it can be controlled, and how it can be a source of livelihoods. The review has shown that water hyacinth is native to the Amazon Basin and one of the world's most noxious aquatic weed. Lack of natural enemies together with nutrient enriched water bodies facilitate the spread of water hyacinth in temperate, tropical and sub-tropical waters. The weed causes a variety of socio-economic and environmental problems when its rapid mat-like proliferation covers areas of fresh water. With regards to its control, the mechanical method is the most cost-effective, followed by the biological, manual and chemical methods. Regardless of its problems, water hyacinth has been found to be useful for industrial, agricultural, household and environmental purposes.*

### INTRODUCTION

Water hyacinth (*Eichhornia crassipes*) is an aquatic weed native to South America. However, because of its beautiful purple flowers, it often referred to as the noxious beauty. It can live and reproduce floating freely on the surface of fresh waters or can be anchored in mud. It is arguably ranked as one of the most noxious aquatic weed and continues to spread aggressively throughout temperate, tropical and sub-tropical climates (Dagno, Lahlali, Friel, Bajji, & Jijakli, 2007). It has become a problem in all continents apart from Europe. Water hyacinth grows over a wide variety of wetland types such as lakes, streams, ponds, waterways, ditches and backwater areas in temperate and tropical zones (Ndimele, 2012).

Ever since its introduction outside the Amazon Basin, water hyacinth has created innumerable problems for communities. It interferes with water use by directly obstructing navigation, blocking water-intake points, causing turbidity in shallow waters used for domestic purposes, and interfering with water flow in irrigation channels. It has also been responsible for drastic changes in the plant and animal communi-

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ties in freshwater environments. It is associated with fish kills and the proliferation of agents of several deadly diseases. Through water hyacinth's engulfing presence, large amounts of sunlight are blocked thereby negatively affecting fisheries, slows or even prevents water traffic, impedes irrigation, reduces the water supply, obstructs water ways, and slows hydropower generation hence the biological diversity of the invaded area is greatly reduced. Photosynthesis is limited beneath water hyacinth mats, and the plant itself does not release oxygen into the water as do phytoplankton and submerged vegetation, resulting in decreased dissolved oxygen concentration (Dagno, Lahlali, Diourte, & Haissam, 2012).

Nevertheless, water hyacinth stabilizes pH levels and temperature in lagoons thereby preventing stratification and increasing mixing within the water column. The weed is used for manure, providing an alternative income, providing an alternative source of biomass; biogas production, manufacturing household and semi-industrial products, and alleviation of pressure on other biomass fuel sources, such as wood, thereby reducing deforestation and associated soil erosion. This chapter's objective is to focus on water hyacinth: characteristics and distribution, problems, control options and beneficial uses.

## **BACKGROUND**

### **Characteristics of Water Hyacinth**

Water hyacinth, though native to the Amazon Basin in South America has caused a variety of problems when it forms dense, impenetrable mats over the fresh water surface. In more than 50 countries in the tropical and subtropical regions, the weed has profuse and permanent negative impacts (Télliez et al., 2008; Villamagna & Murphy, 2010; Patel, 2012). The spread of water hyacinth is neither easy to manage nor easy to reverse. The weed threatens not only biodiversity but also economic development and human wellbeing (United Nations Environmental Program [UNEP], 2012). Worryingly, climate change may allow the spread of water hyacinth to higher latitudes (Rahel & Olden, 2008; Patel, 2012). Intensified monitoring, mitigation and management measures are needed to keep water hyacinth at unproblematic levels. Given the complexity of control options and the potential for climate change to assist the spread of water hyacinth, it is critical to develop comprehensive management strategies and action plans. A multidisciplinary approach should be designed, which ensures that the highest political and administrative levels recognize the potential seriousness of the weed. Programs should be in place whereby government department, stakeholders, municipal councils and local community are involved in the fight against water hyacinth. Fixing this problem will not only make livelihoods better, but make the environment better.

Water hyacinth has the following systematic, morphological, developmental, biological, and ecological characteristics (Gopal, 1987):

- A perennial plant whose average size is 40 cm but can reach up to 1 m high;
- Have a high rate of vegetative growth and multiplication;
- Produce seeds that remain viable for very long periods;
- Have a fairly wide ecological amplitude;
- Stems and leaves contain air-filled tissue which gives the plant its considerable buoyancy;
- Double its population in 15-18 days by asexual vegetative reproduction;
- Each mother plant produces 4 daughter plants which are capable of reproduction after 2 weeks;

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