

FRESHWATER (AQUATIC) PLANTS

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There are many facets to the subject of aquatic plants. Although aquatic plants can be quite beautiful and beneficial, they often present a very serious weed problem in all types of water bodies. The state of Florida currently spends approximately twenty million dollars annually to control aquatic weeds in lakes and rivers. The problem, however, is world-wide in scope. Aquatic weeds can interfere with recreational uses of water bodies such as boating, swimming and sportfishing; they can obstruct navigable waterways used for commercial shipping; they can alter the ecology of water bodies leading to decreased biodiversity and degraded water quality; and they can reduce real estate values of waterfront property by diminishing the aesthetics of the water. Large mats of floating weeds can threaten the structural integrity of docks, bridges and dams, and can hamper flood control in canals. In less developed countries, weeds can threaten local economies and human health. They can harbor disease carrying insects such as the snail hosts for schistosomiasis and mosquitoes that carry malaria. Mats of floating weeds can clog water intake structures for farm irrigation, electric power generation, and potable water. Where people depend on their waterways for subsistence fishing, transportation, and drinking water, aquatic weeds can be life threatening.

An extreme example of this occurred in the 1970's-1980's when entire villages in Papua New Guinea were abandoned after an aquatic weed infestation prevented villagers from fishing or traveling from their homes to gather and trade food. Thick mats of floating *Salvinia molesta*, native to Brazil, covered approximately 80 kilometers of the Sepik River and 90% of Chambri Lake in Papua New Guinea. Village inhabitants attributed the weed infestation to various punishments from God, the weakness of Chambri ancestors and the shortcomings of Chambri women. The infestation was eventually brought under control by the release of a tiny weevil as a biological control agent. Recently, this very same weed was discovered in the southeastern United States and managers here are very concerned.

Another extreme example of an aquatic weed infestation is Lake Victoria, the second largest water body in the world at 26,500 square miles. There has been a severe water hyacinth infestation around the perimeter of the lake in recent years, preventing fishing and transportation. Because the lake is bordered by three countries (Uganda, Kenya and Tanzania), reaching a consensus on managing the problem has been difficult. Authorities

have tried mechanical harvesters which have helped very little, if at all. They have tried releasing biological control insects that damage the plant. They decided against aquatic herbicides, primarily due to fears that the international market for fish from the lake would collapse upon learning that chemicals had been used in the water. Recently, the water hyacinth population declined dramatically, and no one is certain why. Many believe it is due to the insects that were released. In a natural setting, however, it is difficult to know what factor or combination of factors may have contributed to the decline of the weeds, or how long the decline will last.

Aquatic weeds grow very rapidly and cause ecological problems as well; they can outcompete native species and destroy plant and animal diversity; they can affect water quality by changing water temperatures and water chemistry; they can degrade habitat for fish, waterfowl, reptiles and other animals. Some of these creatures can adapt to the changes wrought by aquatic weeds; some can not.

Aquatic weed problems have been around for a long time and research continues on the best ways to manage them. Methods range from mechanical control (using machines), to biological control (using insects or herbivorous fish or fungal pathogens), to chemical control (using aquatic herbicides) to kill weeds.

The State of Florida has 24 aquatic plants that may not, by law, be possessed, collected, transported, cultivated, or imported without a special permit. The U.S. Department of Agriculture has 19 aquatic plants listed as federally prohibited. Many other states either have, or are compiling, their own prohibited aquatic plant lists, depending on what problem species occur in their areas or what problem species might thrive in their areas if introduced. Florida has had a particularly severe problem due to the subtropical climate and nutrient rich waters which provide an ideal habitat for many weeds that come from tropical and subtropical countries.

Of course, not all aquatic plants are weeds. Native species provide food and habitat for many different animals. They are used by people for water gardening and aquaria; for wetland restoration and mitigation; for wastewater purification; for compost, livestock feed and other products (primarily in developing countries); for shoreline enhancement and erosion control. There are important historical references to aquatic plants from ancient Egypt and ethnobotanical literature from ancient times to the present.

Other aquatic plant subject areas include species distribution, ecology, morphology, physiology, reproduction, taxonomy, utilization, economics, remote sensing and other forms of mapping, utilization, and more.