**General impacts of the aquatic fern: Salvinia molesta**

Prepared by the IUCN SSC Invasive Species Specialist Group

*Salvinia molesta* may completely cover slow-moving or standing water-bodies. Wind or water currents may cause plants to pile up and accumulate in one area, forming vegetation mats up to 60cm thick. Mats reduce the amount of light and oxygen penetrating the water surface, preventing submerged aquatic plants from photosynthesizing efficiently. Submerged plant biomass decreases, reducing the vegetation available to herbivorous fauna, increasing carbon dioxide levels and decreasing oxygen levels. In contrast to the thick mats, a single layer of *Salvinia* can increase oxygen levels. Anaerobiosis occurs when dead *Salvinia* plants decompose. Anaerobic conditions, disruptions to the food web and changes in the pH and humic acid levels alter the wetland ecosystems.

*Salvinia* may be a catalyst of habitat alteration. The buildup of vegetation and decaying matter reduces water flow and increases siltation, which further reduces the water flow. The vegetation mats provide a suitable substrate for non-aquatic plants to take root in, increasing the buildup of vegetative matter. *Salvinia* causes more water to be lost due to evapotranspiration than would be lost from an open water body of the same size. This problem is more serious in areas where water is scarce or infrequently replenished. Shallow open water-bodies may be converted into marshes.

In summary, *Salvinia* degrades freshwater habitats by:

(i) Competing with and/or shading other aquatic plants

(ii) Causing an accumulation of decaying debris and secondary vegetation which lowers oxygen levels and encourages anaerobic conditions and water stagnation (harming aquatic fauna)

(iii) Covering open water bodies

(iv) Increased siltation rates

(v) Causing habitat alteration or loss (by reducing the water flow and increasing water loss).

These changes may result in a habitat becoming unsuitable for the original faunal and floral inhabitants. Different birds and mammals may be enticed into the area and previous animals excluded. Migrating birds, for example, find it difficult to access resources in water bodies covered with *Salvinia*. As a consequence *Salvinia* may alter primary ecosystems and reduce native biodiversity (Mitchell and Thomas 1972; Howard and Harley 1998; Pieterse *et al* 2003; Mitchell D. Pers. Comm. 2005).

In terms of socio-economic consequences, heavy infestations of *Salvinia* have the potential to ruin industries that depend on clean water-bodies. *Salvinia* may infest cultivated rice fields, irrigation channels or inlets to electricity generating stations, affecting the economy. It is a
serious pest in rice fields in Southeast Asia. If an irrigation channel is used frequently the water current may be sufficient to reduce the infestation, but this depends on the construction and shape of the canal. Salvinia mats block access to water bodies, hindering boat use. Both local fisheries and commercial fisheries may be affected by the restricted access to fishing spots, the decreased fish densities, and the difficulty of using long lines and nets. Local economies that rely on water transport face an even greater threat from Salvinia; livelihoods and even the sustainability of the whole village could be ruined. Near the Sepik River, Papua New Guinea, entire villages had to be abandoned because they were entirely dependent on water transport. The lakes and lagoons beside the villages were choked with Salvinia and water hyacinth and the villagers could no longer travel to trade, fish or harvest staple foods. Villagers were also isolated from health care centres, schools and markets. In Asia and Africa Salvinia has caused a decline in the tourism, hunting, and fishing sectors (Howard and Harley 1989; Swearingen et al. 2002; McFarland et al. 2003).

Salvinia may increase the level and spread of some human diseases, including rural filariasis (elephantiasis), encephalitis, dengue fever and malaria. This is due to the dense Salvinia vegetative mats and the development of stagnant shallow water, which provide an ideal breeding ground for disease-carrying species of snails and mosquitoes. Finally, by blocking drainage channels and dams, Salvinia may increase flood water levels, amplifying the amount of damage caused by floods (McFarland et al. 2003; Howard and Harley 1998).