

13th Living Lakes Conference

Lake Management Challenges in a Changing World

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Lake Trasimeno (Italy) and invasive exotic fish: problems and tentative solutions

Trasimeno is a large, shallow lake located in the centre of Italy. It is the largest lake on the Italian peninsula south of the Po river. It has a tectonic origin with a surface of 121 Km² and a maximum depth of 5,5 m. A depression formed by geologic fractures allowed the birth of the present-day lake. No river flows directly into or out of Lake Trasimeno, and the water level fluctuates significantly according to rainfall levels.

From a trophic point of view, the lake is characterised by a high productivity having a positive influence on the fish population. In fact on the lake operates one of the largest groups of professional fishermen working on inland Italian lakes.

The fish population was always very abundant, but sustained just by six native species.

A well known problem, very common in almost all freshwater habitats, is the introduction of exotic fish species. Exotic fish affect native fish through direct competition for food and space, predation, habitat alteration and the introduction of exotic diseases and parasites. The question of exotic invasive species has been recognized as a great threat to biodiversity. Lake Trasimeno too has been affected by this global problem. Marked changes have occurred mainly in the 20th century due to the introduction of numerous exotic species, most of which have acclimated well, but causing a decline in the abundance of native ones. At present the fish fauna includes 18 species, only five of which are native, dominated by cyprinids (seven species). Almost every time a new species was introduced, it spreaded widely and fishery was seriously affected. The annual catch in forty years has dropped from 1500 tons to 200 tons. This change doesn't mean a reduction of the fish population or of the lake productivity, but only a reduction of marketable fish. The fish population is still abundant but it consists mainly of low value fish. Among the exotics the most problematic is the common goldfish (*Carassius auratus* L.) which is in competition with tench (*Tinca tinca* L.), once the most abundant fish in the lake. Also common carp (*Cyprinus carpio* L.), an exotic introduced three centuries ago and in good balance with native species, was affected by the introduction of goldfish. To try to restore an acceptable equilibrium many efforts were made even though it is impossible to recover the initial condition.

Since 1985 a fish farm managed by the Province of Perugia produces fingerlings of pike (*Esox lucius* L.), carp (*Cyprinus carpio* L.) and tench (*Tinca tinca* L.) which are released in the lake to increase the populations of these three species. Fish production on site for restocking also prevents the genetic pollution of native species and a further introduction of exotics. Restocking with these species has been shown to be insufficient and other additional strategies have been developed. Goldfish has a low market value due to the presence of many bones in the fillet, but the flesh nutritional value is good. To solve the problem a processing plant has been realized to produce fishburgers within which bones are finely crushed and no longer constitute a problem. Recently goldfish fishburgers started to be marketed successfully on an experimental scale. Processing can help to make low value exotic fish marketable thus increasing fishing. This action, in combination with restocking with natives produced in fish farms, could help to fight the lost of biodiversity associated with the introduction of exotic fish.