Eradication and monitoring of *Myriophyllum aquaticum* in Sardinia: a mandatory environmental obligation

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Background

Myriophyllum aquaticum (Vell.) Verdc. (Haloragaceae) is a perennial aquatic hydrophyte, typically submerged with upper stems floating, native to South America. The species reproduces vegetatively, forming dense mats that block sunlight, alter oxygen dynamics, and displace native macrophytes. Globally, it is recognized as a highly invasive alien species, with established populations in North and Central America, southern Africa, Australia, New Zealand, and parts of Europe. It is listed among the EU invasive alien species of Union concern under Regulation 1143/2014 and transposed into Italian law (Legislative Decree 230/2017), mandating eradication, containment, or control where feasible.

Study area

The species was found recently in the vicinity of Riu di San Giovanni (Arzachena, Sassari) and in a stretch of the Flumineddu stream (Serdiana, Cagliari), forming a dense population extending over a few dozen meters. In the first case, the site lies on private property with a small pond of only a few square meters of stagnant freshwater, whereas in the second case, it is located along a stream with flowing water for most of the year, extending linearly for several kilometers within public land.

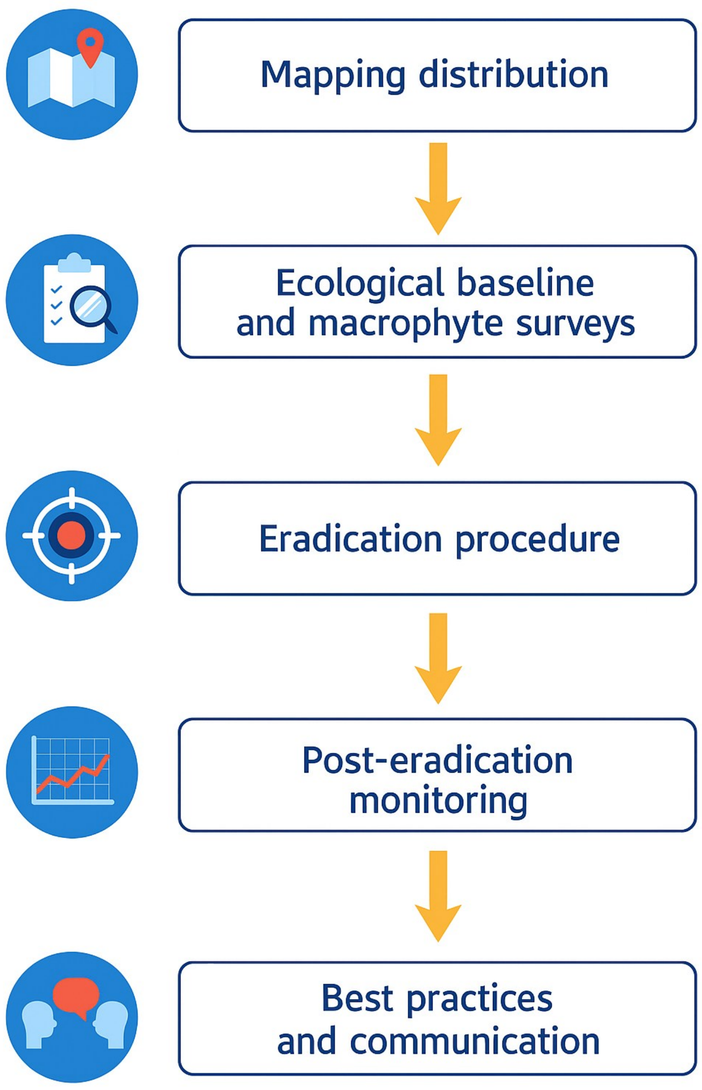
Aim of the project

This study emphasizes the urgent need for immediate, **site-specific eradication strategies**, integrating risk analyses to prioritize high-risk areas.

Planned interventions align with EU biodiversity targets, national conservation objectives, and current conservation measures in force, and are reported in accordance with Article 19 of Legislative Decree 230/2017.

Eradicating *M. aquaticum* is scientifically justified, legally mandated, and ecologically necessary.

The project proposes **immediate eradication**, **continuous monitoring**, and the establishment of long-term preventive frameworks to **prevent spread** and **minimize ecological impacts**.



Methodology

- Drone-based multispectral imaging and GIS mapping to detect *M. aquaticum* mats.
- Ground-truthing surveys at 100 m intervals.
- eDNA water sampling to detect hidden or not easily detected populations.
- Randomly placed transects using 1 m² quadrats, to document species cover and biomass.
- Assess species richness, percent cover, and biomass per species.
- Mechanical removal of surface biomass (pre flowering/seed set).
- Suction dredging aimed at rhizome removal (late summer).
- Control not infested neighbor spots to prevent downstream vegetative fragment dispersal.
- Monthly biodiversity surveys (macrophyte) for 12 months.
- eDNA analyses at 2, 6, and 12 months to detect residual presence.
- Water quality monitoring, parameters including dissolved oxygen, nutrient concentrations (N, P), turbidity.
- Documentation of protocols across all control and monitoring phases.
- Development of a decision support toolkit (e.g., flowcharts, cost-benefit analyses).
- Stakeholder workshops and reports for authorities.
- Peer-reviewed publication and data-sharing in an open-access repository.
- Training materials for regional conservation agencies across Sardinia.

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