



A Different Perspective to Tackle the Aggression of Alien Species



Mauro Lenzi*

Lagoon Ecology and Aquaculture Laboratory, Italy

*Corresponding author: Mauro Lenzi, Ecologist, Lagoon Ecology and Aquaculture Laboratory, Orbetello, Italy

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Introduction

I believe that greater reflection should be made on alien species. In my opinion, the hypothesis on which to work, should be to put the aliens more in relation with the weakening of the ecosystem structure caused by direct or indirect human actions. In this perspective, we could call the invasive allochthones “foreign opportunists”. Many examples could be given of how the resilience of a given ecosystem, if healthy or restored, allows the return to the original state, after an event has perturbed it, such as that of an invasive species (or at least that we think is to be attributed to this). In such cases, the alien species may disappear or remain completely resized. I have observed a similar case concerning invasive Chlorophyta *Caulerpa cylindracea*, which had previously completely covered an area behind an emerging barrier of *Posidonia oceanica* [1] and subsequently had been almost completely replaced by the typical communities of the phytobenthos [2]. The deterioration of the seagrass meadows is a phenomenon that affects the whole world [3]. Many colleagues are committed to transplanting seagrasses where they have disappeared or relegated [4].

With the exception of slow-growing species, which require very evolved substrates, such as those of the genus *Posidonia*, most seagrasses have high growth potential and can repopulate an area relatively quickly. I have seen to reconquer tens of hectares in a few years by *Cymodocea nodosa*, *Zostera noltii* and *Ruppia cirrhosa*, when their habitat had been restored [5,6]. If the seagrasses have disappeared, in that area there are no longer suitable conditions, or there are disturbing factors that prevent their return. In a stretch of the Venice lagoon, it seems that the transplant has worked [7]: evidently the right conditions existed. But the right corollary of the transplant project was to make the area not accessible to clam fishermen, which use substrate plowing tools. It is to think that perhaps it would be enough to do only this last thing. An example, we needed it, of how man’s behavior can be deleterious if not controlled. I then observed - but it is not my field of study - an abundant development of seedlings of holm oaks (*Quercus ilex*), in an agricultural field abandoned for several years, where ailanthus (*Ailanthus altissima*) grew in sparse wood. A species, this last one,

native of China and North Vietnam, that, after its introduction in Europe as an ornamental species, has become invasive on almost all the continents [8]. Why only after more than fifty years from its introduction it becomes invasive? Constán Nava & Bonet [9] seek this answer in the genetics of the plant, but I don’t think that the possibility the phenomenon could be due to environmental change has ever been considered.

What surprised me in that abandoned field (which is mine) was to see the small holm oaks grow at the foot of the ailanthus plants. This record contrasts with many studies describing ailanthus as a species capable of altering the structure of vegetation in the woods, and to weaken native species [10], producing allelopathic substances and herbicides located in leaves, stems and roots [11]. A conclusion could be drawn: *Quercus ilex* is the climax species of the Mediterranean scrub and has a great advantage over any other species, when the pedological characteristics have returned to be suitable for its return. And we cannot rule out that ailanthus has helped make the land once again colonized by the holm oak. The red swamp crayfish (*Procambarus clarkii*), native to northeastern Mexico and southcentral USA [12], and the European green crab (*Carcinus maenas*) [13,14] exchanged continents and showed invasive and highly destructive capacities in some areas, but not in others. The optic was to consider the aggressiveness of the two species and their performances, but we did not ask ourselves the question: why was a given ecosystem so weak that it collapsed when an alien arrived?

In Zanzibar (Tanzania), the marine coastal ecosystem has been seriously degraded by anthropic causes, such as rapid coastal population growth, uncontrolled tourism development [15], overfishing and destructive fishing practices, cutting of mangrove forests, and discharge in the lagoons and in the sea of solid and untreated urban wastewater, containing nutrients and toxic substances, so that microplastics and marine litter are everywhere along all the beaches [16], and toxic substances accumulate in the sediment [17]. To make matters worse, a species considered to be allochthonous, the Echinodermata Asteroidea *Acanthaster planci*, is

devouring the coral reef [18]. It is not even certain that this species is allochthonous in Zanzibar, certainly it has proved opportunistic. It is possible that its formidable development was made possible by the weakening of the ecosystem structure, for which the defenses against voracious and invasive species have disappeared. This would find explanation in the environmental degradation and in the multiple stresses to which the species present in the coral reef are subjected. With this view, it is not *A. planci* the real problem, even if it is necessary to intervene against this species, but the direct and indirect anthropic stresses. We have known in the last forty years abundant cases of species that become invasive, which is the explication of opportunistic behavior, e.g. the Chlorophyta of the genera *Ulva* [19], *Cladophora* [20] and *Chaetomorpha* [21], but yet, where they create problems, they are not alien species. An old doctor, when I was a boy, told me: "if a dog bites your calf, it makes no sense to inject morphine: first remove the dog". Well, we cannot run after the allochthones or exuberant natives, which will be more and more, we should heal our ecosystems, but this is a complex problem, not only scientific, but above all social. I think we should be afraid not so much of the outsiders as of ourselves.

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