

# Costly display or economic investment? A quantitative approach to the study of marine aquaculture

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Marine fishponds evoke a world of luxury villas in which upper-class Romans engage in extravagant works to ensure that their fish do not die. Licinius Lucullus had a tunnel dug through a mountain to connect his fishpond to the sea so as to ensure that the right amount of sea water would replenish it (gaining for his hubris the appellation of *Xerxes in toga*).<sup>1</sup> Several anecdotes tell of the emotional attachments that villa-owners developed for their fish, treating them like pets rather than material for the table.<sup>2</sup>

Various studies have been devoted to Roman coastal fishponds, investigating them from different points of view, as an indicator of the changes in sea level over the centuries,<sup>3</sup> for their technical characteristics, or for the rôle of fish farming in Roman society and in the context of villas.<sup>4</sup> The view on marine fishponds and related aquaculture has generally been that fish farming was a costly matter pursued exclusively for its highly symbolic value as an element of display and affirmation of one's social standing in the competitive climate of the Late Republic. In Varro's words, fishponds contented the owner's eyes but emptied his pockets, rather than filled them.<sup>5</sup>

However, there was also an important economic aspect to fishponds.<sup>6</sup> Fishponds and fish breeding were an investment in a particular branch of *pastio villatica* aimed at generating a surplus of a luxury food that could be placed on the urban market. The concentration of fishponds along the Tyrrhenian coast has to be seen in relation to the demand for quality foods generated by Rome and, to a lesser extent, by other urban centres. The size of many of the fishponds, varying between 700 and 1200 m<sup>2</sup> (Torre Astura at c.15,000 m<sup>2</sup> is an exceptional case), seems to indicate that these structures were intended to provide not just for the needs of the villa.<sup>7</sup> Our aim here is to quantify the potential production capacity of some fishpond installations in order to determine more precisely the amount of fish that could be grown, and whether a surplus destined for consumption outside the realm of the villa was possible. By comparing the characteristics of Roman structures with practices in modern aquaculture, we aim at determining the use of fishponds and the characteristics of Roman aquaculture. We focus on fish proper, leaving aside the well attested breeding of molluscs, especially oysters.<sup>8</sup> Two case studies have been chosen as representative of the totality of fishponds attested along the Tyrrhenian coast, to which we add Torre Astura, the remarkable scale of which reflects imperial investment and management. Calculations of the potential production and analysis of the mechanism in operation at the study sites are offered as indicators of the production potential of Italian aquaculture in general, but it has to be remembered that each fishpond could have been used in different ways according to season, location, and the fish-farmer's experience.

1 Varro, *RR* 3.17.9; *Veil. Pat.* 2.33.4; *Plut., Luc.* 39.3.

2 E.g., Q. Hortensius Hortalus shed tears for the death of his favoured *marem* (*Plin., NH* 9.81.172). Fish responding to calling by name: *Mart.* 10.30.23, *Nomenclator mugilem citat notum*; *Phn., NH* 10.193. For an overview on Roman aristocrats and aquaculture, see Kajava 1998-99.

3 Schmidt 1972; Fleming 1969 and 1972; Fleming and Webb 1986; De Maria and Turchetti 2004.

4 Giacopini *et al.* 1994; Higginbotham 1997; Lafon 2001, 158-79 and 185-86.

5 *RR* 3.17.2: *Ille autem maritinae piscinae nobilitas (...) magis ad oculos pertinet, quam ad usum, et petrus marsuppium domini exinanuit.*

6 In favour of seeing in the fishponds also commercial purposes are Gianfrotta 1972 (at least for the largest ones); Giacopini *et al.* 1994, 56; Astema and De Haas 2005, 105-6; Marzano 2007a, 47-62; *ead.* 2007b; Kron 2008, 206-13.

7 Marzano 2007b, 307-10.

8 Literary evidence indicates that the oysters of Brundisium, Antium, Baiae and Lacus Lucrinus were renowned: Dalby 2003, s.r. "oyster" for references. The oyster beds of Puteoli and Baiae are represented on a series of late glass flasks (Kolendo 1977; Ostrow 1979). For discussion of archaeological evidence of Roman oyster-breeding, see Pagano 1983-84; Hitchner 1999.