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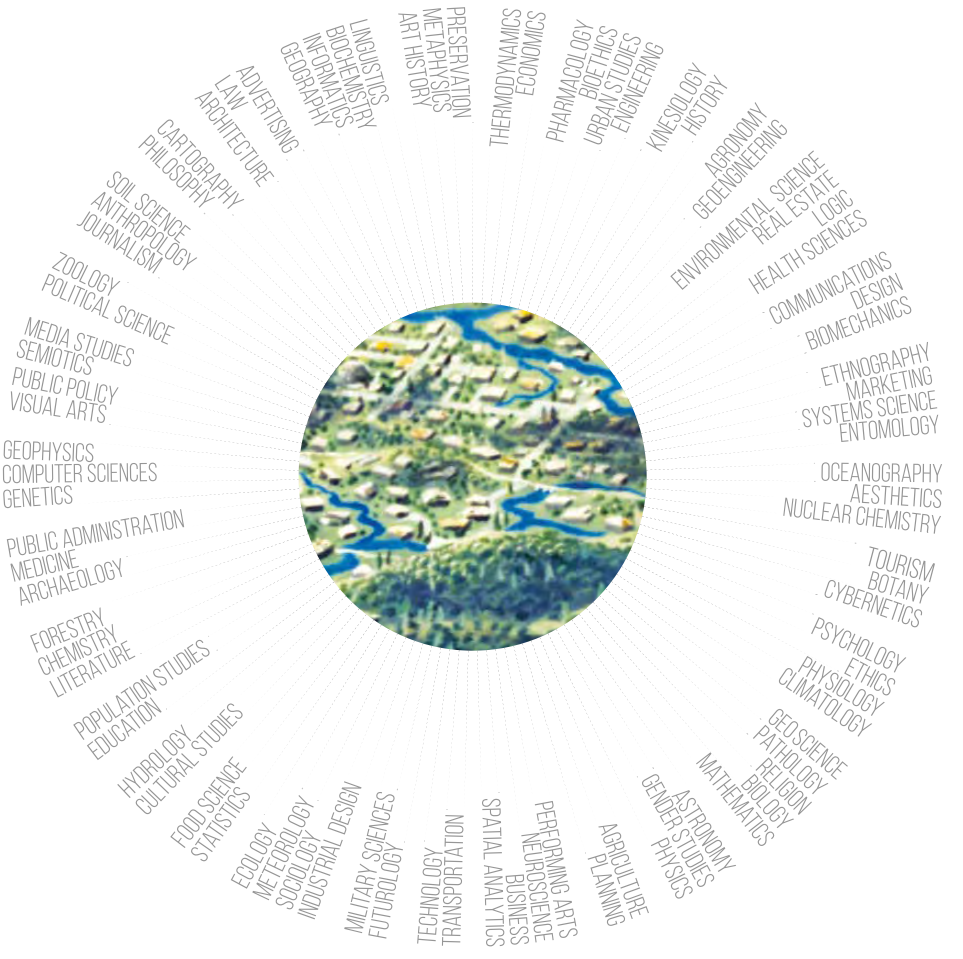

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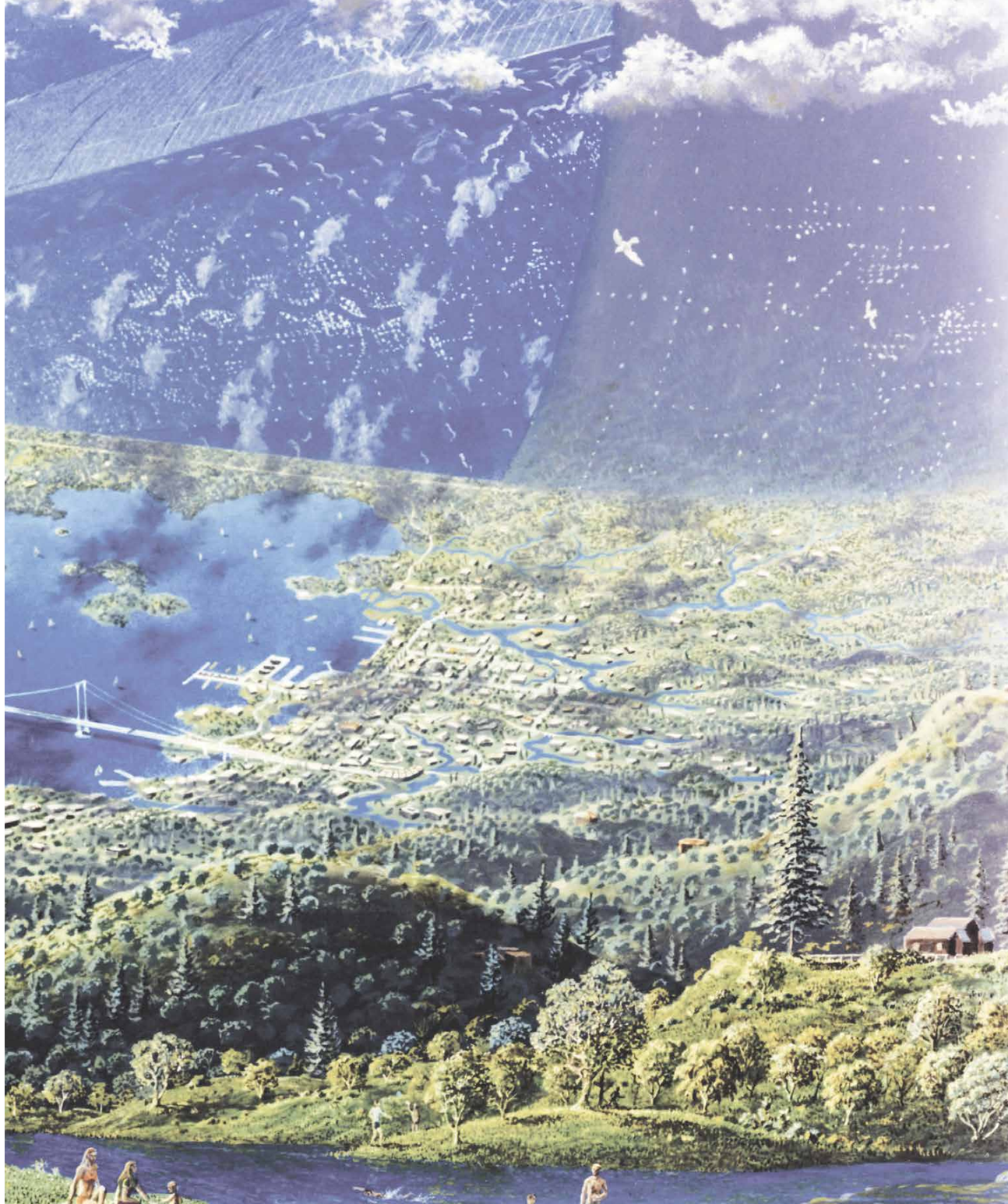

CASEY LANCE BROWN

PISCINARII

THE FISHPOND SPECULATORS OF ROME

Casey Lance Brown is a landscape futurist and visual artist. His research-based practice focuses on the unintended environmental consequences and spatial economics of resource extraction, migration, speculation, and automation. His accompanying photographic series have been awarded by Photoville's *The Fence* (2016) and Photolucida's *Critical Mass* (2020). He has held research positions at Harvard University Center for the Environment, Clemson University, and MIT's P-REX lab and is a fellow of the American Academy in Rome.

REAL ESTATE, AQUACULTURE, ECONOMICS

The Roman Empire boasts several firsts in economic history – the first apartment blocks, the first shopping mall, and perhaps the first market economy. Once a market economy permits the relatively free fluctuation of prices, speculative investors arise to take advantage of potentially lucrative market movements. Naturally, in an agrarian-based economy like that of Rome, the target assets are likely to hew closely to the fruits of the land and sea. In fact, the modern term "fund" derives from the Latin word *fundus*, originally referring to a farming estate. Likewise, the roots of modern investment funds can be found in the agricultural and aquacultural estates of the Roman era. By tracing a mixture of textual and archaeological remnants, these estates begin to look like protean versions of contemporary speculation schemes like hedge funds, real estate flipping, and new market startups.

Elite Roman landowners profited from the land through a system of villas since at least 200 BCE. Traditionally, scholarship on Roman villas has largely been focused on their opulent accoutrements and architectural styles. However, in Roman

times “villa” referred to both the land and buildings of an estate together with its productive output. Being a productive farmer held immense cultural and financial value for Romans.[1] This value was codified in the property requirement to become a senator, which stood at one million sesterces by the time of Augustus (roughly equivalent to being a multi-millionaire today). As the imperial conquests opened significant new lands and flooded the markets with slave labor, villa ownership mushroomed as an ideal mix of stable income, high profitability, and cultural clout for the patrician class.

Piscinarii

A new type of villa soon emerged that attracted an especially fervent investment class – the *villa maritima*. This villa typology merged the showy, architectural *villa urbana* with an artificial estuary built for aquacultural production. These new coastal enclaves united fresh fish and eel aquaculture with opulent retreats where fine dining halls and breezy loggia overlooked the water. In essence, they functioned like the first hedge fund mixed with prime real estate – an elite speculative investment expected to rise in value over time while continually producing income and status for the villa owner. Interest in the *villa maritima* was so great that Roman writers mockingly named the owners *piscinarii*, or fishpond lovers.[2]

The multiple mentions by the primary Roman agricultural chroniclers, including Varro, Pliny the Elder, and Columella, denote the immense value placed on aquacultural estates. Stand out accounts include stories of Sergius Orata, who likely obtained his name from the fish that he grew, the gilt-head bream (also spelled *aurata* meaning “golden”). Mr. “Golden Fish-head” expanded his wealth by inventing methods for heating thermal spa baths installed in villas and for building artificial oyster beds in estuarine lakes to supply fresh shellfish to the very same villas.[3] Pliny the Elder notes that the famed General Lucullus had a tunnel dug through mountains to ensure his Neapolis fishponds received constant water circulation.[4] Some conclude that Lucullus’s fortunes came to financial ruin due to his extensive pond works and villa expenditures.[5] Cornelia, the daughter of General Sulla, bought a prime villa on Capo Miseno for 300,000 sesterces and later sold it to Lucullus for 10 million.[6] Historical recorded transactions such as these mark villa owning as an elite activity. With new technology, coastal villa aquaculture elevated mere gentlemanly farming to an unparalleled investor class. And Varro, the preeminent Roman agricultural scholar, remarked that there may be more money to be made in aquaculture than in agriculture.[7]

Without movement and trade, the coastal villa outputs would remain local and perhaps not reach the storied letters of Rome’s literati. Loans and standard contracts for shipping maritime commodities suggest that long-distance trade occurred with regularity. In addition, the investment loans for maritime trade could be very large in scale. One documented papyrus noted a value of 6,926,852 sesterces – seven times the property threshold to become a Roman senator.[8] Also, there were pooled equity capital ventures called “societas” that acted as a kind of protean private equity fund. These are known to have been active in maritime commerce, but it is not known whether this activity was directly linked to villa aquacultural production.[9]

Critically, we know from Varro that the vast ancient sums handed over for the coastal villas partially derived from their *piscium multitudinem* (abundant fish), exemplified by a prominent eel farmer who sold his estate for four million sesterces.[10] Columella dedicated an entire book to explaining how to economically design and manage a proper aquacultural operation. His advice for aspiring coastal villa owners included hydrological and ichthyological details about water temperature, species compatibility, and artificial habitat enhancements – all in the interest of delivering financial gain through profit and marketability. For example, he recommended species-specific food and freshwater influx to induce weight gain for the farmed fish to ensure the higher price normally reserved for wild-caught seafood.[11] Columella’s advice suggests aquacultural works had advanced to a high level of sophistication and economic importance by the first century CE.

Piscinae

Because Roman aquacultural pioneers developed highly robust underwater structures to house their prized fish, eels, and lampreys, the physical remnants of their enterprise are still visible today. Rock-cut terraces and structured basins made with a type of hydraulic concrete feature right along the Tyrrhenian coast of Italy and nearby islands. The sheer number attests to the magnitude of the ancient market for building, owning, and operating aquacultural operations. The actual piscinae (pools) are so well preserved that archaeologists have attempted to calculate the potential production of the aquacultural operations. Taking into consideration the water inputs, temperature, and potential capacities, one study estimated the largest known fishpond at Torre Astura could produce in excess of 50,000 kg of fish.[12] This output vastly exceeds the likely domestic consumption of the villa's inhabitants and implies export to the open Roman market or provisioning for imperial banquets. We also know that some Roman vessels had *vivaria* (live fish tanks) and, possibly, oxygenation pumps, which would enable vendors to keep the fish alive until they reached distant ports or market locations.[13]

Advanced features of various fishponds around the Mediterranean included highly ordered enclosures, careful orientation to the tidal flows, and aqueducts to improve freshwater influx (known to increase fish production through higher levels of dissolved oxygen). The various rectangular enclosures, exedras, and symmetrical layouts could almost be mistaken for the plan of a Roman basilica. Much like the mysteries of the Pantheon’s function and oculus, we do not know precisely how the various basins, channels, and divisions were utilized. Perhaps the divisional structures managed the various ages and species of fish and eels, including their graduated salinity needs.

The Villa of Tiberius at Sperlonga indicates that habitat preferences were considered in the design of piscinae. Ceramic vessels remain visible in the constructed piscina walls, acting as an artificial version of the reef habitat where moray eels are traditionally found. Columella clearly specified matching conditions in the piscinae for rock-dwelling fishes so that they might “feel their captivity as little as possible.”[14] Incredibly, fish still populate many of these pools. North of Rome, the remains of a *villa maritima* known as Punta della Vipera continue to attract fisherman who stalk various prey among the Roman aquacultural works to this day.

Prima Facie

The 2,000-year durability of Roman piscinae provides an instructive anchoring point for speculative episodes that propagated in more recent history. New logistical technologies that open access to a marketable commodity have long driven speculative bubbles in advanced economies. In the colonial era, transoceanic ship access underpinned the Mississippi Company and South Sea Company land-rush bubbles. In the 19th century, railways kickstarted several speculative commodity bubbles in Europe and the US, and in the 20th century highways were catalysts for speculative housing developments in suburban regions.

Rome’s extravagant estate investment bears remarkable similarity to these periodic bubbles. It operated in a nascent market economy that was perhaps the first to develop the spatial sophistication to grow a speculative bubble. Roman markets were filled with tradeable goods from the edges of its empire, such as salted tuna from Spain and metals from Britain. Astute fishpond designers from the Roman era established methods for concentrated production of the estuarine species, nearshore species, and eel species using natural stock and precise control of the intertidal zone. Likely, these new products could then be transported by boat to coastal cities and up the Tiber River to Rome itself. Hundreds of senators, generals, and other patricians would likely desire owning such a productive asset. With the newfound wealth and slave labor extracted from empire expansion, the perfect conditions were set for every aspiring villa developer to exploit the resource. The scale of the aquacultural pools, the technological spread, the frequency that villas changed hands, and the growing urban markets for the freshest seafood all make a prima facie case for the investment value of these sites.

Today, vast wealth accumulation and sudden consumer access have inflated market bubbles in new areas like cryptocurrencies, meme stocks, and dubious internet startups. Unlike these digitally fabricated targets, Roman villa investors were collaborating with tangible, natural systems to concentrate an in-demand, luxury

food commodity. Fresh fish was highly valued in the markets and banquets of Rome, especially during the more inclement seasons of the Mediterranean when fishing was difficult. By the second century CE, Rome's urban population success had outgrown the natural food supply of its immediate hinterland and it thus depended on food imported from elsewhere. The Roman senatorial class, legally restricted from participating in direct commercial activities like banking and international trade, would have seen this market need as the perfect match for their valuable villas. They were required to justify their wealth through some type of societally useful production[15] and marine aquaculture offered a new technology that fed their own status banquets and augmented their villa-based wealth.

In a market where a single, fresh surmullet (a fish species that dramatically changes color as it dies) could sell for 1,200 sesterces, patricians found a lucrative overlap between a prestige property, a new technology, and a marketable commodity. By partnering with natural tides and ecological niches, they designed an asset that offered both speculative and durational value. The only comparable investment targets that meet these criteria today might be agriculture, biotechnology, and extraterrestrial mining ventures. After the financial crisis in 2008, bundled farmland assets attracted pension fund managers, like TIAA and Sweden's National Pension Fund, and private investors like Bill and Melinda Gates and the Harvard Management Company. This strategy capitalized on the notion that quality farmland assets tend to be countercyclical: holding or rising when the regular stock market drops. Concurrently, the billionaire investment mania is clearly fixated on the logistical and status-elevating potentials of space (as evidenced by SpaceX, Blue Origin, and Virgin Galactic). Farmland assets and space ventures both have the potential for long-term rises in value regardless of the vacillations in quotidian markets.

Viewed from the 2,000-year-old Roman perspective, these investments make perfectly rational, speculative sense. Urban populations are expanding globally with a parallel demand for global food commodities. Farmland for food production, rare earth minerals for technological production, and clean air, land, and water remain finite resources on Earth. With the excess capital accumulating to a new class of tech elite, an investment case could be made for sea-based, orbital, or lunar real estate as the next frontier in exclusive development. The Romans might call these investors the *lunarii* – an appropriate label given its shared Latin root with the noun "lunatic."

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10 Marcus Terentius Varro, "De Re Rustica, 3.17.3," quoted in Marzano, *Roman Villas in Central Italy*, 14.

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15 Heather Pringle, "How Ancient Rome's 1% Hijacked the Beach," *Hakai Magazine: Coastal Science and Societies* (April 5, 2016), https://www.hakaimagazine.com/features/how-ancient-romes-1-hijacked-beach/.

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