

Developing a zooarchaeological approach to studying the impacts of the Manila Galleon Trade on the landscapes and cultures of the Philippines

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ABSTRACT

After the discovery of the *tornaviaje*, or return trip to New Spain (Mexico), numerous galleons sailed from the Philippines to Mexico and back again for nearly two and a half centuries (1565–1815 CE). The Manila Galleon Trade played a major role in solidifying a maritime trade network between East and Southeast Asia and the Americas during the Spanish colonial period, stimulating the introduction of plants and animals that had major ramifications for the environments, economies, and societies of the Philippines. However, formal archaeological analyses of animal remains from the Spanish colonial period remain limited. Most studies related to the Manila Galleon Trade focus on shipbuilding, tradeware ceramics, and plants. Historical accounts have provided clues as to what animals may have been introduced to the Philippines during the Manila Galleon Trade and how they were integrated into the local economy and society. Demonstrating these introductions archaeologically is nevertheless an ongoing effort. By undertaking zooarchaeological research (study of faunal materials), we seek to improve the level of detail about the animals that arrived on Philippine shores during this time period. We recommend that extending the study of the Manila Galleon Trade to explore its impact on the landscape and culture of the Philippines will yield novel insights to animal translocations, animal husbandry practices, land-use, and changes in dietary preferences during the Spanish colonial period.

Keywords: Galleon Trade, zooarchaeology, maritime archaeology, underwater archaeology, Spanish colonial period

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INTRODUCTION

The Philippines was under Spanish rule for more than 300 years (1565–1898 CE), and this period witnessed major changes in the economies (e.g., Legarda 1999), cultures (e.g., Dakudao 1992; Barretto-Tesoro 2015), and landscapes (e.g., Amano et al. 2021; Findley et al. 2022) of the Philippines. After Ferdinand Magellan reached the Philippines in 1521 CE (Field 2006), Spain had sent several expeditions to the archipelago, with an initial goal of penetrating the spice trade in Southeast Asia (Iaccarino 2011). These expeditions saw an already existing maritime trade network between China (as well as other

southeast and east Asian regions) and some islands in the Philippines, highlighting the benefits of a trade network with China to European colonizers (Blair and Robertson 1903). By the 1570s, Spanish explorers led by Miguel López de Legazpi headed to Manila and designated it as the capital of its new colony of the Spanish East Indies (Iaccarino 2011). Fray Andrés de Urdaneta, one of the members of López de Legazpi's expedition, also successfully mapped the *tornaviaje*, or the eastbound return trip to Mexico, which shortened the voyage from the Philippines to the Americas. This ushered the beginning of the Manila-Acapulco Galleon Trade: a 250-year (1565–1815 CE) trans-Pacific maritime trade network that bridged together the two Spanish colonies (Legarda 1999; Reyes 2017).

Archival records provide accounts of faunal introductions to the Philippines through the Manila Galleon Trade (Morga 1609; Iaccarino 2011; Javellana 2015). The thriving maritime trade in the Philippines at that time, particularly in Manila, not only welcomed plants and animals from New Spain (Mexico) but also from other East and Southeast Asian countries such as China and Cambodia (Alcina 1668; Legarda 1999; Javellana 2015; Amano et al. 2021). Animal husbandry practices and incorporation of the introduced taxa into the local diet were present in the archival records as well (Alcina 1668; Javellana 2015; Doeppers 2016). However, formal archaeological studies on these topics are limited.

The historical archaeology of the Spanish occupation of the Philippines has tended to focus on buildings (e.g., churches and stone-based houses), shipyards, and tradeware (Barretto-Tesoro 2015; 2021; Jagon and Orillana 2019). In contrast, there are limited zooarchaeological studies covering this period, including the Manila-Acapulco Galleon Trade (Amano et al. 2021). The information provided by archival records only offers glimpses of the past, sometimes with conflicting accounts from different historical documents (Morga 1609; Dizon 1993; Goddio 1996a). Direct analysis of archaeological materials, especially animal remains, will not only complement and contrast archival records but may also provide new insights not explicitly indicated in historical documents (Amano et al. 2021).

Zooarchaeological studies in general can offer inferences on the interaction of humans with their environment (Reitz and Wing 2008). Incorporating zooarchaeology within an historical framework will add to our current understanding of the historical archaeology of the Manila Galleon Trade and its legacy in the maritime trade networks in Asia during the Spanish occupation of the Philippines. Formal zooarchaeological analysis of faunal remains also serves as preparation for future in-depth analysis of animal remains using biomolecular approaches such as stable isotope analysis and ancient DNA (e.g., Guiry et al. 2015; Díaz-Lameiro et al. 2022), which can contribute to improving the resolution of our inferences regarding animal translocation, husbandry practices, and land use during the Spanish colonial period.

SELECTED HISTORICAL ACCOUNTS OF ANIMAL TRANSLOCATION TO THE PHILIPPINES

Several historical accounts of the early Spanish colonial period have mentioned various animals that were translocated to the Philippines. Antonio de Morga noted large scale cattle farms reared in several parts of the archipelago, with breeds coming from China and New Spain. In addition, he mentioned other animals and their introduction to the Philippines: *‘There are no ewes or rams, for though frequently brought from New Spain, they never increase because so far the climate and pasturage seem unsuitable. There were neither horses, mares nor asses in these islands until the Spaniards had them brought over from China and New Spain’* (Morga 1609, 255). However, there may have been horses already present in the Philippines before the colonial introductions, especially in Mindanao (Bankoff 2004; Amano et al. 2021). Morga also mentioned that *‘tame buffaloes, geese like swans in appearance; horses, mules, and donkeys, even caged birds some of which talk, while other sing, and make them play lots of tricks’* (Morga 1609, 306) were brought to the Philippines from China before loading them into the galleons bound for Acapulco.

Similarly, Fr. Ignacio Francisco Alcina (or Alzina), a Jesuit friar who recorded a detailed natural history of the Visayas in the seventeenth century (Arcilla 1996), recorded that several animals were brought to the Philippines during the early Spanish colonial period, likely via the Galleon Trade. Some of the animals include cattle, goats, donkeys, and horses. He also mentioned how some of these animals were not readily accepted by the people in the islands and how some did not survive in their new environment. Alcina also mentioned that the cattle from New Spain interbred with those from China (Alcina 1668).

Doeppers (2016, 137) mentioned that the “*local breed of horse evolved in the archipelago in the sixteenth and seventeenth centuries from larger imported stock and, though small, was well adapted to the available forage supply*”. The resulting breed was described as medium-sized, strong, vigorous, and hard workers (Bankoff 2004). This is in comparison to those from China, which Morga described as “*small, strong, long steppers, but treacherous, vicious and ill conditioned*” (Morga 1609, 255).

RESEARCH FRAMEWORK

The initial objective of this study was to identify the animal taxa present in colonial sites and infer from the faunal assemblages the taxa that could have been translocated to the Philippines, based on available historical data and chronological information. With this goal in mind, faunal remains from the 2020 Archaeological Impact Assessment (AIA) of the *Intendencia* Ruins, Intramuros, Manila (Paz et al. 2020) and some bones from the 1992 and 1993 excavations of the San Diego wreck (Desroches, Casal, and Goddio 1996) were examined. Skeletal elements with diagnostic features were identified to the highest taxonomic level using the available comparative reference collection at the University of the Philippines School of Archaeology (UPSA) Zooarchaeology Laboratory, atlases, and online databases (e.g., “Anthro - Dynamic Imaging Engine” n.d.; “Digital Resource Platform for Archaeozoology” n.d.; Cornwall 1956; Gilbert, Martin, and Savage 1985; O’Connor 2000; Reitz and Wing 2008).

To improve the resolution of the taxonomic identification, measurements of diagnostic features (Driesch 1976; Gilbert, Martin, and Savage 1985) were also taken using a digital calliper, and the summarised values were compared with those in the literature. In cases of limited features that can be used to identify a specimen, taxonomic identification was performed to the genus, or at least the family, level. The faunal remains were also subject to in-depth taphonomic examination to identify the presence of anthropogenic modifications (e.g., cut marks, chop marks, and burning). The specific taphonomic features were compared with those from the collection in the UPSA Zooarchaeology Laboratory as well as those available in atlases and other literature (e.g., Behrensmeier 1978; Fernández-Jalvo and Andrews 2016).

CASE STUDIES

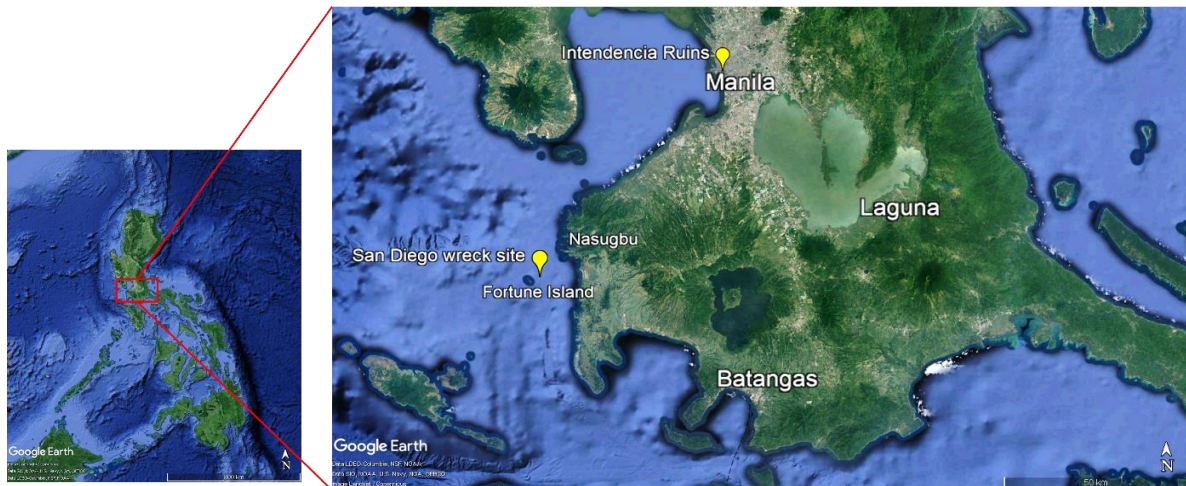


Figure 1. Map of the sites and other relevant locations. (Left) Map of the Philippines. (Inset) The San Diego wreck and Intendencia ruins are marked with a yellow pin.

San Diego Wreck (Nasugbu, Batangas, Philippines)

The San Diego wreck site is located northeast of Fortune Island, off the coast of Nasugbu, Batangas (Figure 1). San Diego was initially a merchant ship that was retrofitted into a warship during the battle against the Dutch led by Oliver van Noort in December 1600. The San Diego was commanded by Antonio de Morga, whose accounts of the event were scrutinized for their inaccuracy and exaggeration (Dizon 1993; Goddio 1996a; 1996b).

An initial survey and exploration were conducted in 1991 to determine the site of the wreck, as there were contradicting historical accounts as to the approximate location where the vessel sunk (Dizon 1993; Goddio 1996a). The first phase of the excavation was undertaken in 1991 followed by the recording of the ship hull in 1993. The diving activities were headed by Franck Goddio with the supervision of the National Museum of the Philippines, who did the accessioning, cataloguing, inventory, and recording of the archaeological materials recovered. Hundreds of ceramics (in the form of dishes, plates, bottles, pots, and jars), some cannons and muskets, navigational instruments, silver coins, two anchors, and many bone fragments were recovered from this site (Ronquillo 1993; Cuevas 1996).

For this study, a fraction of the animal remains from the San Diego wreck were accessed from the repository of the National Museum of Anthropology. Of the reported 2,727 skeletal remains (combined number of animal and human bones), only 44 were accessed and confirmed as animal bones; some of the animal bones were fragmented and commingled with human bones, which made it difficult to sort them, while some of the bones may have been stored elsewhere.

Among the bones analysed, 14 were pig bone fragments (Figure 2A), likely from the species *Sus scrofa*. The third lower molar (Figure 2A, topmost) is a good anatomical feature for identifying this species (Ingicco et al. 2017). The bovines in the assemblage were entirely represented by rib fragments (Figure 2B). Interestingly, anthropogenic modifications in the form of cut and chop marks (Figure 2B, arrows) were mostly observed on these bones, suggesting that bovines may have been butchered before they were loaded onto the galleon. The meat from the butchered animals was usually preserved in either brine or salt and then stored in barrels or jars (Guiry et al. 2015; Migaud 2011). Aside from pig and bovine bones, chicken (*Gallus gallus*) bones were also present in the faunal assemblage of the San Diego. Complete long bones of these birds were recovered from the site, with abrasions of the epiphyseal ends being observed due to the preservation underwater.

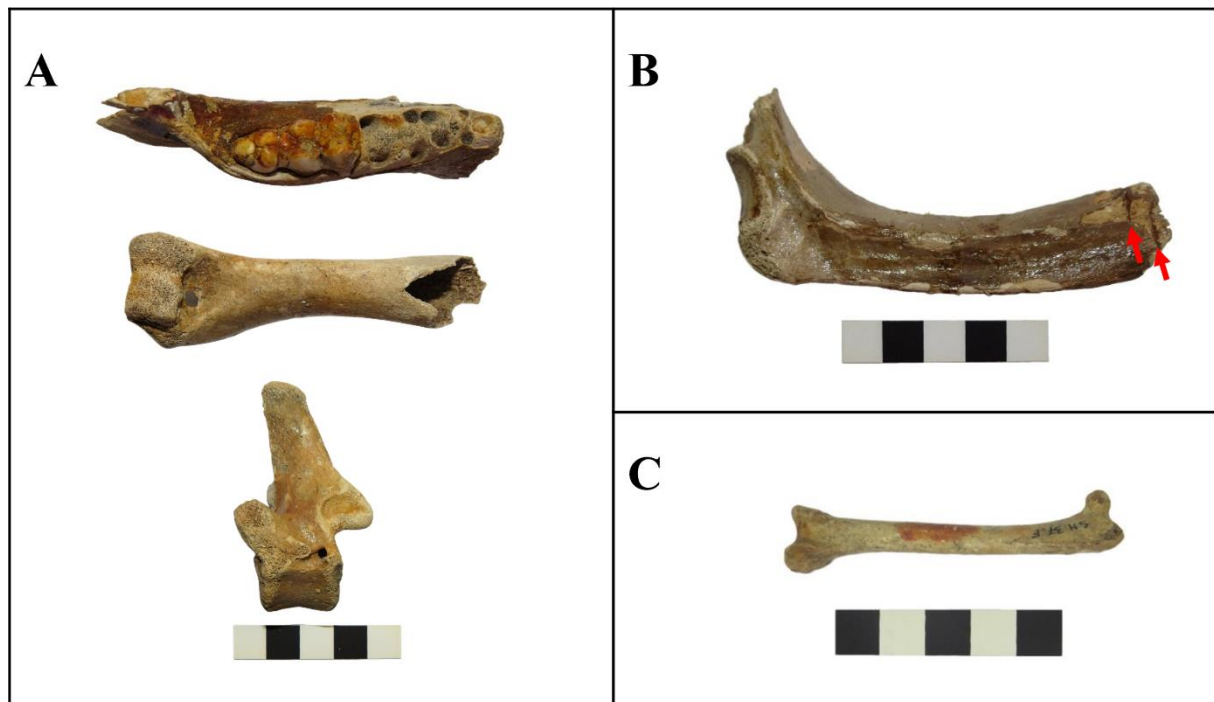


Figure 2. Faunal remains from the San Diego wreck. (A) Pig skeletal remains, likely *Sus scrofa* (not necessarily from the same individual): (from top to bottom of panel A) a left mandible fragment with an intact third lower molar (m3), a humerus distal end, and a thoracic vertebra. (B) A bovine rib fragment with chop marks (arrows) at the sternal end. (C) A complete chicken (*Gallus gallus*) femur.

Given the limited number of bones available from the original collection, it is difficult to make further inferences regarding the site. In the reports from the San Diego wreck survey and excavation, Secuya (1993) and Migaud and Pérez (in Veyrat 1996) provided insights into life on board the San Diego based on historical records and the initial analysis of the faunal remains from the site. According to the list of provisions for the San Diego, which consisted of live chickens and preserved pork and beef, there was a “*certain predilection for pork hams, sides of beef, and chicken drumstick*” (Veyrat 1996, 174). The presence of live chickens, specifically laying hens, was demonstrated by the presence of remains of a chick and eggshells, the major cortical ossification of certain long bones, as well as the accounts of the battle (Veyrat 1996). However, the initial zooarchaeological analyses focused only on the life on board the ship and did not provide possible explanations on the source of these animals (i.e., whether they were raised in the vicinity of the port, or transported from nearby provinces) and any clues on animal husbandry practices of that time (Migaud 2011; Veyrat 1996). More information regarding the origin of these animals may be generated using biomolecular approaches such as ancient DNA and stable isotope analyses.

Intendencia Ruins (Intramuros, City of Manila)

Not all shipwrecks will yield faunal remains for systematic zooarchaeological analysis. Aside from the San Diego wreck, other underwater excavations in the Philippines recovered mostly ceramics and metals, with almost no mention of faunal remains (Jago-on and Orillaneda 2019). Aside from the difficulty in recovering and collecting animal bones underwater, they may not always be preserved because they can be significantly eroded by tides and sea currents and are often used as substrate by certain aquatic organisms (Migaud 2011). In addition, faunal remains from shipwrecks may not necessarily represent the animals meant as livestock, but food rations and supplies of the passengers of the galleon. Thus, it is also necessary to investigate inland and coastal sites to expand our understanding of animal translocations and integration of introduced taxa to Philippine landscapes.

In December 2020, an AIA was done on the *Intendencia* building inside Intramuros (Figure 1) to guide the reconstruction and development plan of the National Archives of the Philippines. *Intendencia*, or a building for offices, is a structure inside the *Intramuros* of Manila initially built as an *aduana* (customs house) in the nineteenth century. The excavation revealed some artefacts from the nineteenth century such as ceramic sherds, tiles, metal implements, coins, and faunal remains (Paz et al. 2020).

The *Intendencia* Ruins faunal assemblage consists of several animal taxa including pig, cattle, buffalo, dog, and chicken. Furthermore, bones recovered from this site include a right tibiotarsus belonging to a wild turkey (*Meleagris gallopavo*) (Figure 3A). Currently, there is only limited evidence of an early introduction of turkey in the Philippines prior to the American period. Several turkey bone fragments were excavated from an AIA in Sta. Ana, Manila, although these were likely modern based on the associated materials in the sediment layer (Barretto-Tesoro et al. 2018). The discovery of a much older turkey bone from a nineteenth century site suggests an earlier introduction of this animal to the Philippines, possibly from the Americas which is considered the center of domestication for this bird taxa (Manin et al. 2018). The presence of cut marks (not shown in the figure) suggests consumption of this animal as early as the nineteenth century (Doeppers 2016).



Figure 3. Faunal remains from the Intendencia Ruins. (A) Right tibiotarsus of a turkey (*Meleagris gallopavo*). (B) A bovine tibia with chop marks (arrows).

The abundance of bovine bones, either from cattle (*Bos taurus*) or water buffaloes (*Bubalus bubalis*), was also observed in the faunal assemblage of the *Intendencia* Ruins. Evidence of butchery such as cut and chop marks (Figure 3B, arrows) on the bovine bones was also recorded. However, it is yet to be elucidated whether these animals were reared within or in the vicinity of *Intramuros*, or were supplied from nearby provinces such as Batangas and Laguna (Doeppers 2016). It will be important to explore archaeologically whether the practice of importing cattle and buffaloes from nearby provinces was in place since the early Spanish colonial period, if not before, and if this network of inland trade had supplied the food provisions of the Manila Galleons.

Summary, Recommendations, and Future Analyses

Historical accounts record the introduction of certain animal taxa, such as cattle and horses, to the Philippines during the Manila-Acapulco Galleon Trade. Currently, there is limited direct archaeological evidence for these introductions, as this aspect of Philippine history is yet to be explored and examined from the perspective of zooarchaeology. This academic paper presents two pilot studies of zooarchaeological assemblages of potential relevance to the Manila Galleon Trade; however, it is imperative to do further analyses of colonial sites, especially those of the early Spanish colonial period, regardless of whether the archaeological materials come from underwater/coastal sites or from inland sites. In addition, archaeological sites of the later Spanish colonial period should also be explored because they may provide archaeological records of the adoption/rejection of certain animal taxa. Such studies will provide a bigger picture of the extent of animal translocations and will improve the resolution of our inferences about the integration of introduced taxa to local environments and human lifestyles in the Philippines (Amano et al. 2021). Genetic studies will also help in tracing the ancestry of the domestic animals from colonial sites, given the historical accounts of interbreeding of animals, whereas isotopic data can provide insights to animal husbandry practices and how these contributes to changing landscapes (e.g., Manin et al. 2018; Thornton, Emery, and Speller 2016; Conrad 2022; Morandi et al. 2021; Freiwald and Pugh 2018; Guiry et al. 2015).

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