Salt Making and Pottery Production: Community Craft Specialization in Alburquerque, Bohol, Philippines

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Salt Making and Pottery Production: Community Craft Specialization in Alburquerque, Bohol, Philippines

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ABSTRACT
This ethnoarchaeological study examines contemporary salt and earthenware pottery production in Alburquerque, Bohol, Central Philippines. It highlights the intersection of these two craft industries through the use of locally made earthenware pots for salt making, serving both as brine boiling containers, as well as standard units of measurement for trade. It examines the spatial distribution of production activities and related material culture, from the procurement of resources through the stages of production, to distribution, and the resulting archaeological correlates to serve as a framework for interpreting prehistoric salt sites with pottery remains. Moreover, this research contributes to research on household-based production activities, demonstrating that households can be active and integral participants in inter-community and regional markets and long-distance exchange.

KEYWORDS
Ethnoarchaeology; pottery production; salt production; organization of production; craft specialization; household production; Philippines; salt archaeology

Introduction
Pottery was commonly used for salt production in premodern times. Dense accumulations of pottery sherds are common features at salt sites of diverse temporal, geographical and cultural contexts demonstrating the widespread and enduring, practical utility of using fired clay objects (briquetage) for salt making. In Europe, archaeological salt sites with pottery remains date to as early as the middle 5th millennium BC (Weller 2015) and by the Iron Age, they are widespread throughout the continent (Harding 2013, 56). In most other areas of the world, much less is known about early salt sites because the discipline of salt archaeology is much younger, but over the last 20 years the scope and depth of research has expanded substantially. Many more salt sites with pottery have been excavated and studied in Asia, the Americas and elsewhere, demonstrating the cross-cultural practice of using pottery for salt making in premodern times (Burley et al. 2011; Cardale Schrimpff 2015; Cassen, de Labriffe, and Mémanteau 2008; Chen 2004; Connah 1996; De Brisy 1975; Early 1993; Eubanks 2014; Eubanks and Brown 2015; Flad 2004; Flad et al. 2009; Harding 2013; Hopkinson 1975; Huerta 2016; Kawashima 2015; Kondo 1975; McKillop 2005; McKillop 2019; Millhauser 2012; Nitta 1997; Parsons 2001; Potts 1984; Pryzybyla 2015; Riddiford et al. 2016; Rivett and Higham 2007; Weller 2004; Weller 2015; Williams 1999).
While the use of pottery in salt making has been well documented archaeologically, detailed studies on how pottery is used in the salt-making process are still rare, and as a result, we often lack comparative information needed to reconstruct the complete technological process of salt making at archaeological sites with pottery remains. Pottery recovered at prehistoric salt sites provides a unique opportunity to study the early technology and organization of salt making and the associated pottery industry. Pottery is versatile and can be used for many purposes, including making, storing and transporting salt and the type of pottery used can often be correlated to its function. For example, porous vessels are commonly used for draining and molding salt forms known as “salt cakes.” This is when wet salt is placed in ceramic forms, to drain and mold, sometimes with the help of indirect heat. Pottery vessels are also used to boil brine to induce evaporation of water and crystallization of salt. Non-porous vessels are generally favored for boiling brine, with similar properties to a cooking pot, and sometimes smoothed, polished, slipped or cured on the interior surface to make them non-permeable and less prone to salt entering the pores, which could cause cracks (Cardale Schrimpff 2015, 36–37; Kawashima 2015, 128; Weller 2015, 72). The identification of these different vessel characteristics and types is meaningful for interpreting their functional use.

Using ethnoarchaeological research, this study examines a contemporary example of a traditional method of making salt in earthenware pottery vessels as a comparative model for interpreting prehistoric salt sites. It documents the salt-making process, and the archaeological correlates, including the types of materials culture used and the spatial layout of production activities. It also examines the local salt-pottery industry as these two craft activities are socially and economically linked and interdependent.

The research also provides a case study on household craft specialization. Craft specialization is often defined as the manufacture of goods in excess of personal or household needs (Costin 2000; Flad and Hruby 2007; Hirth 2009; Rice 1981), and has traditionally been framed around an evolutionary model, whereby societies progress through stages of economic intensification, classified by the scale and intensity of production, starting from household-based production for personal use, and evolving to workshop based production, and eventually large-scale industry (Costin 1991; Peacock 1982; Van der Leeuw 1977). More recent research has challenged these limiting definitions, noting that households often produce goods for beyond their own household needs (Peacock 1982; Stark 1991), or even engage in “high intensity” production for long-distance trade (Bayman 1999, 275; Feinman 1999; Masson et al. 2016). This study provides an ethnographic example of a community where production is organized at the household level, but where resources and activity areas are shared, and goods are sold and traded long distances. It also highlights the interdependent nature of these two industries and can potentially serve as a model for interpreting and understanding the organization of complementary, craft industries.

Lastly, this study sheds light on the potential role and impact of households in regional economies, even when work is on a part-time or seasonal basis. Working collaboratively, the salt-makers and potters in Alburquerque produce a specialized product that serves a specific economic need and is sold in regional markets and bartered and traded via well-established and widespread trade networks. This trade is facilitated by the fabrication and use of pots made to a standard size and form, allowing the salt-makers to produce a product with set trade and cash equivalents. Archaeological studies often attempt to
address the relationship between craft standardization, specialization, and centralization of production, suggesting that the former two traits are indicators of the latter (Rice 1981; Sinopoli 1988); but, increasingly it is being recognized that there isn’t a one-to-one correlation. Product standardization can be adopted by households in response to locally specific market conditions, and in societies of various sizes and complexity. A good archaeological example of this from the Philippines is Niziolek’s (2011) pottery sourcing study at the early pre-state polity of Tanjay in the Central Philippines which noted that as pottery became more morphologically similar and standardized, it also became more compositionally diverse, suggesting local, dispersed pottery production, “likely individual households or neighborhoods of potters”, rather than centralization of production (Niziolek 2011 xxiii–xxiv). This ethnoarchaeological study in Bohol, as well as other recent archaeological research (Hirth 2009; Masson et al. 2016) supports this less restrictive interpretation of the archaeological significance of production standardization and demonstrates the potential importance of households as independent production units in regional economies, challenging traditional ideas that minimize their economic role.

The Study Area

Bohol is the 10th largest island in the Philippines, with a land area of approximately 4117 square kilometers. It is located in the Central Philippines, in a group of islands commonly referred to as the Visayan Islands, with the island of Cebu to the northwest, Leyte to the northeast and Mindanao to the south (see Figure 1). The island is primarily rural and the economy is heavily dependent on agriculture and fishing. The primary crops grown are

![Figure 1. Map showing the location of the research area, the Municipality of Alburquerque, Bohol, Philippines.](image)
irrigated and rainfed rice and corn in the northern and central highlands. Fishing and aquaculture are important economic activities in coastal areas and there is a rapidly growing tourism industry concentrated around the island’s beaches and coral reefs.

Alburquerque is a small municipality located on the southwestern coast of Bohol twelve kilometers east of Tagbilaran City, the capital of Bohol. Per 2015 census records, the population was 10,540 persons. The town’s upland topography includes steep terrain with elevations up to 153 meters above sea level and alluvial valleys that slope sharply down to the sea. The coastal topography has rolling to level terrain with grasslands, mangroves and coral reefs. Geological maps indicate a predominance of Maribojoc Limestone (92%) and some Quaternary Alluvium (8%). Common economic activities include fishing, farming, copra drying, and small cottage industries such as loom weaving, basket and broom making, salt making and pottery making.

The data for this study was collected over numerous research field seasons in Bohol commencing in 2000 and with subsequent visits in 2006, 2011, 2013 and 2017. The data collection methods included direct observations, informant interviews, and foot surveys of salt sites. A local guide and translator assisted with the logistics and ethnographic interviews. Both the salt making and pottery making process was documented using a combination of photography, videography, sketches and manual field notes. Due to the infrequent and fluctuating schedules of salt production today, and the seasonality of some tasks, observations of certain aspects of the salt-making process were only collected during a single research trip. Locational data on current and former salt-making sites was provided by informants and confirmed by ground-truthing for the physical features and material remains of salt-making, as are described in detail below.

**Salt Production**

There is a long history of indigenous salt making in the Philippines. More archaeological research is needed to substantiate the time depth, but sixteenth century Spanish colonial records described salt making as a pre-colonial industry, with regional variations in methods used throughout the islands (Alcina 2004 [1668]:445–459). In the Central Philippines, an “ash” method was used, resembling the process still used in Bohol today. This method, further described in detail below, was referred to by the Spanish as “Sal de Bisayas” and was said to be unique to the region. This was in contrast to other salt-making methods, such as solar evaporation ponds, which were and are still common elsewhere in the islands (Yankowski 2010, 161–165).

Historically, salt was widely traded in the islands, typically between upland and lowland communities. Miguel de Loarca’s 1582–1583 chronicles described the trade between the coastal and mountain populations, noting that economically, “the inhabitants of the mountains cannot live without the fish, salt and other articles of food, and the jars and dishes, of other districts; nor, on the other hand, can those of the coast live without the rice and cotton of the mountaineers” (Loarca 1911 [1582–1583]:121). Long-distance trade of goods among upland and lowlands areas has been well documented archaeologically, historically and ethnographically throughout Southeast Asia (Bronson 1977; Hutterer 1977; Junker 1993, 2002). In Bohol, the upland-lowland trade of salt for rice still occurs. Salt has also been historically traded by viajadores inter-island on family-owned trading boats. For example, maritime traders from the island of Maripipi in the
northeastern Visayas were known to trade their locally made pottery along with secondary goods purchased during their voyages, including salt, throughout the Visayan Islands (Ushijima and de la Peña 1996). And, up until recently, salt from Bohol was transported to and sold on the neighboring island of Mindanao along with other native goods such as brooms, mats, dried fish, fish and shrimp paste, and earthenware pots (Cembrano 1998; Yankowski 2007).

Throughout most of the twentieth century, salt making was a widespread economic activity in southwestern Bohol. Ethnoarchaeological studies by this author in 2000 documented evidence of salt-making activities across 49 coastal kilometers of southwestern Bohol including an active industry in the town of Alburquerque concentrated in the villages of Santa Filomena and Eastern Poblacion (Yankowski 2007) (see Figures 2 and 3 and Table 1). Today, this is the only area where salt is still actively being made in Bohol.

Salt-makers are commonly families of fishermen, or coconut farmers, who supplement their income making salt seasonally. Throughout most of the twentieth century, salt was typically made two times per year, just prior to the rice harvests, so that it could be traded to the inland areas for unmilled rice (humay). But by the year 2000, the demand for salt had decreased substantially and once a year was more common. More recently, as local demand has continued to decline, there has been a shift to marketing salt as a specialty product to retailers, hotels and restaurants, as well as to overseas customers. This has led to change in the production schedules to fulfill bulk order requests on demand rather than follow traditional agricultural schedules.

The salt producers typically own a small plot of land in the coastal areas where they construct and maintain a hut that functions as a kitchen for making salt. These are

Figure 2. Map of traditional salt-making areas in Bohol with inset map of the Municipality of Alburquerque.
**Figure 3.** Map of salt-making areas in the Municipality of Alburquerque.

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**Table 1.** Locations and counts of salt-concentration ponds in Alburquerque, Bohol (2000).

<table>
<thead>
<tr>
<th>Barangay (village)</th>
<th>Sitio (hamlet)</th>
<th>Count of Parils (salt ponds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahi</td>
<td>–</td>
<td>7 salt ponds/7 families</td>
</tr>
<tr>
<td>San Agustin</td>
<td>–</td>
<td>10 salt ponds/7 families</td>
</tr>
<tr>
<td>W. Poblacion</td>
<td>–</td>
<td>6 salt ponds</td>
</tr>
<tr>
<td>E. Poblacion</td>
<td>–</td>
<td>17 salt ponds</td>
</tr>
<tr>
<td>Santa Filomena</td>
<td>Kaintskian</td>
<td>7 salt ponds</td>
</tr>
<tr>
<td>Santa Filomena</td>
<td>Lublub</td>
<td>15 salt ponds</td>
</tr>
<tr>
<td>Santa Filomena</td>
<td>Puntod</td>
<td>40 salt ponds</td>
</tr>
<tr>
<td>Santa Filomena</td>
<td>W. Puntod</td>
<td>3 salt ponds</td>
</tr>
<tr>
<td>Santa Filomena</td>
<td>Kanipaan</td>
<td>8 salt ponds</td>
</tr>
<tr>
<td>Tagbuane</td>
<td>–</td>
<td>3 salt ponds</td>
</tr>
</tbody>
</table>
open-air structures with the equipment they need to make and boil the brine. Next to the hut is at least one coral-enclosed pond for soaking coconut husks used in the salt-making process (see Figure 4). The work huts and ponds are constructed in coastal areas that are dedicated activity areas for salt making. A generation ago these areas would have been active with many families working side-by-side one another during the salt-making season. This would include husbands, wives, kids and able-bodied grandparents sharing in the labor. Families would often eat there and sleep there, making it an extension of their homes. The work embodied the Filipino custom of bayanihan, which is a spirit of communal labor and cooperation. Neighbors and friends would help one another and the salt-making areas would be lively with activity. During the off-season, it was less busy, but other activities ensued, such as collecting and transporting of wood and husks to the huts and ponds and taking care of the maintenance and repairs of the equipment. Today, most of these areas are abandoned or only a single salt-hut remains standing.

In Alburquerque, an “ash” method is used to make salt. Coconut husks (bunot) are collected and soaked in seawater to absorb the sea’s minerals and then dried and burned with available plant/wood materials to make salt-enriched ash (gasang). Seawater is then poured over the ashes through a filter (sagsag) to leach the salts into a brine solution (tinulo). Lastly, this is boiled in earthenware pots (kon) to induce evaporation of the water and crystallization of the salt (see Figure 5). The ash method of salt making is not unique to Bohol, but it is the only known example of using coconut husks to prepare the ashes, versus other organic materials, such as driftwoods (Table 2).

Most of the salt-making activities take place over a one to two month period prior to the rice-harvesting season, but preparations start far in advance as time allows around other economic activities. For example, coconut husks are collected either locally, or from up the

Figure 4. Salt-making kitchens and coral-lined enclosure ponds for soaking coconut husk, Alburquerque, Bohol.
nearby Tagbuane River where trees are plentiful, and from where they are transported by bamboo rafts (gakit) to the salt-working areas. This often involves the trade of labor for goods, i.e. the salt-makers will de-husk the coconuts for farmers who earn their living on the copra (dried coconut meat), in exchange for the husks. Once collected and transported to the salt-making areas, the husks are soaked (humol) for three to six months in ponds (paril) situated next to the salt-making huts (kamalig). Wood for burning the husks is also collected in advance. Traditionally, it was common to do this during the typhoon season when driftwood would get washed up on the beaches and in the mangrove areas. From there, it would get bundled with rope and transported to the salt huts via waterways. Additionally, the huts, production tools and materials often need seasonal repairs. This can include new thatching for the roof of the huts, cleaning and repairing of the filters, which are used to make the brine, and repairs to the stove (laga-an), made of hardened ash, where the brine is boiled. Almost all of the materials are made from local resources. This includes bamboo wood (kawayan), palm fronds (dahon sa buli), and a local vine.

Figure 5. Salt-making steps: (1) collect and soak coconut husks in seawater. (2) Dry, chop and burn the coconut husks. (3) Using seawater, leach the salt from the ash through the large filter to make brine. (4) Arrange earthenware pots on a stove. (5) Boil brine in the earthenware pots. (6) Bundle pots together for transport.
Table 2. Ethnographic examples of traditional salt-making locations and methods in the Philippines (Funtecha 2006; Jenks 1904; Lyons 1922; Postma 1977; Yankowski 2007; Yano 1994; Zayas and Hernandez 1996).

<table>
<thead>
<tr>
<th>Location</th>
<th>Salt source</th>
<th>Method of making brine</th>
<th>Method of crystallization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alburquerque, Bohol</td>
<td>Seawater</td>
<td>(1) Coconut husks are soaked in seawater, then dried and burned to make a salt-rich ash. (2) Seawater is poured over the ash through a filter made of dried buri palm leaves to leach out the salt and make brine.</td>
<td>Brine is boiled in earthenware pots.</td>
</tr>
<tr>
<td>Candon, Luzon</td>
<td>Seawater</td>
<td>(1) Seawater is sprinkled on plots of raked and cleaned sand for seven days. (2) The sand is collected and seawater is poured over it to leach out the salt and make brine.</td>
<td>Brine is boiled.</td>
</tr>
<tr>
<td>Ilo-Ilo, Panay</td>
<td>Seawater</td>
<td>(1) Seawater is sprinkled on sand for seven days. (2) The sand is collected and seawater is poured over it to leach out the salt and make brine.</td>
<td>Brine is placed in bamboo poles, which are cut in length vertically, and salt is left to crystallize by solar evaporation. Local name for salt is budbud.</td>
</tr>
<tr>
<td>Guimaras, Panay</td>
<td>Seawater</td>
<td>(1) Sea-soaked driftwoods are collected and burned to make salt-rich ash. (2) Seawater is poured over the ash through a woven bamboo filter to leach out the salt and make brine.</td>
<td>Brine is boiled in shallow metal pans until solidified into a hard block. Local name for salt blocks is tultul.</td>
</tr>
<tr>
<td>Mindoro</td>
<td>Seawater</td>
<td>(1) Seawater is slowly poured over a fire to make salt-rich ash. (2) Seawater is poured over the collected ash in a woven basket made of dried buri palm leaves to leach out the salt and make brine.</td>
<td>Brine is boiled in tree-bark containers.</td>
</tr>
<tr>
<td>Cavite, Luzon</td>
<td>Seawater</td>
<td>Seawater is collected in a series of retaining ponds and left to crystallize via solar evaporation.</td>
<td>Natural solar evaporation.</td>
</tr>
<tr>
<td>Pangasinan, Luzon</td>
<td>Seawater</td>
<td>Seawater is collected in a series of retaining ponds and left to concentrate into brine via solar evaporation. The final crystallization is done in clay-tiled harvesting ponds.</td>
<td>Natural solar evaporation.</td>
</tr>
<tr>
<td>Bontoc, Luzon</td>
<td>Salt Springs</td>
<td>Brine spring water flows via streams through salt-huts that are paved in cobblestones. The salt collects in the crevices of the stones and is periodically rinsed with water to make brine.</td>
<td>Brine is boiled in shallow metal pans and when a consistency of thick paste, is laid out on a banana leaf near a fire to dry/harden. Local names for salt blocks is luk'sa.</td>
</tr>
</tbody>
</table>

(sig-id) for the filters; molave hardwood (tugas), bamboo wood and nipa palm fronds (dahon sa nipa) for the huts; bamboo wood for the rafts; coconut hardwood (bahian) for the brine containers (pasong); and coconut wood and dried coconut palm fronds (lukay) for the fire. Coconut trees (lubi) in particular are important as they provide many of the needed resource materials (see Figure 6).

Earthenware pots (kon) must also be acquired. The pots are all locally made in Alburquerque and purchased or obtained by trade. A typical batch of salt will require 100–124 pots, which are preordered. This complementary relationship between the salt-makers and potters has a long history and has been noted in other salt making towns in Bohol (Yankowski 2007). This economic arrangement provides the potters with a consistent source of business based on the seasonal schedule of salt production, and vice-versa, the salt-makers receive a steady supply of pots. As far back as the elder salt-makers remember, salt and pot
making have been independent but complementary craft activities in Alburquerque, sustained through the maintenance of familial and social ties.

After all the preparations have been made, the salt-makers can begin making and boiling the brine. This work is time and labor intensive. The first step is to collect the coconut husks that have been soaking in the seawater, cut them into pieces and place them out to sun-dry for several days. Once dried, they are placed in a mound on the hut floor and slowly burned as embers. Typically, the burning of the husks will start early in the morning and last throughout the night into the next day, requiring someone to attend to them the whole time. The resulting salt-enriched ashes are then placed in a large funnel and seawater is poured over them to leach the salt from the ashes and make a brine solution.

The next step is to boil the brine to induce evaporation and crystalize the salt into a solid form. Prior to this, the empty earthenware pots must be carefully arranged on the stove to sit directly above the fire. This is done by wedging small stones between the pots so they are balanced one next to the other. Careful attention is given to this step to ensure the pots are secure and will not become unstable or broken during the boiling process. A flat metal pan (buwayanan) is also placed at the end of the stove, which is used to pre-heat the brine that is added to the pots.

Once all the pots are all in place on the stove, a fire is ignited beneath them and small scoopfuls (approximately 100 ml) of brine are added to each of the pots. Using high heat, the liquid is quickly brought to a boil and the salt begins to crystallize rapidly, whereupon small amounts of additional brine are continually added. Large quantities of fuel are required to maintain the fire for up to six hours. Throughout this process, the heat of the fire must be constantly maintained until the pot is full of hardened salt (ingle) and the bottom of the pots begin to show signs of cracking, indicating the salt is done. This whole process usually starts early in the morning and lasts into the afternoon.

Figure 6. Illustration of the many uses of the coconut tree for salt-making (by J. Alipala).
Lastly, the pots are left on the stove to cool overnight before they are removed. After removal, the pots are cleaned and the bottoms are broken open, as it is the local tradition to use the hardest salt, broken off in large pieces from the bottom of the pots first. Typically, four pots are bundled and tied together with palm fronds for ease of transport, and to be bartered or sold. In 2017, one pot of salt (approx. 450 ml) was traded for 4 gantang (approximately 10.4 kilos) of unmilled rice or a cash price of 300 pesos (approximately US $6.00).

A number of taboos and traditions are adhered to in order to ensure a successful batch of salt. Common taboos prohibit coins, jewelry or other metal objects and/or foods containing pig fat within the vicinity of the hut while making salt. Pregnant and menstruating women are also prohibited in the vicinity or it is said the salt may turn red and/or the baby may be stillborn. A prayer (pangaliya or pag-ampo) is typically said prior to boiling the brine, followed by the sprinkling of a small amount of fresh coconut milk into the metal pan and empty earthenware pots, to help ensure the salt will be white and solid. These are common taboos and traditions in Alburquerque but were not universal. For example in the former salt-making village of Tayong, Loay, only five kilometers east of Alburquerque, the presence of pregnant women was considered to be lucky to help ensure a quickly bulging pot of salt, “like the woman’s belly” (A. Columna and F. Banwag, personal communication, October 17, 2000).

Traditionally, one of the most popular ways to use the salt was as lumps of rock salt stirred into rice porridge (lugaw). It was also commonly used to salt dry and ferment fish. But people weren’t the only ones to consume the salt. It was fed to farmers’ draft animals, i.e. water buffalo and cattle, to encourage them to drink water and to provide them needed minerals to keep them healthy and protect against parasites.

Over the last 15 years, traditional salt-making activities have diminished substantially and it is now only bartered or sold in limited quantities. The local history of salt making as well as the knowledge about the traditional materials, technologies, and the craft-specific lexicon is in danger of being lost. There is an effort to revive this traditional product and market it to tourists and specialty restaurants and retailers as well as overseas. One strategy has been to reduce the size of the pots to make it more affordable and marketable but ultimately, due the prevalence of cheaply available factory salt, it will take a concerted effort and commitment by the local community and the salt-makers to preserve this unique tradition.

Salt-Pottery Production

Until recently, Alburquerque had active pottery industry. Pottery production in Bohol likely dates back to the Neolithic. Archaeological surveys and excavations by the National Museum of the Philippines in the 1980s recovered Neolithic pottery from numerous habitation and burial sites along the eastern coast, much of which was believed to have been locally manufactured (Santiago 2003). By the Metal Age to early Protohistoric Period (500 BC – AD 500), archaeological sites with pottery remains are much more numerous and diverse (Solheim and Wilhelm 2002). For example, analysis of pottery recovered from a Metal Age burial site in District Ubujuan, Tagbilaran City, Bohol revealed a wide range of forms and styles, with diverse clay and temper types, suggesting a wide-spread pottery industry and/or trade in pottery during the early to mid-first millennium AD (Yankowski 2005).
A handful of ethnographic surveys spanning a period of forty plus years provides some valuable insights into modern pottery production locations, clay sources, and technological aspects of pottery production in Bohol over the last century (Calderon and Roales 1987; Roales 1983; Scheans 1977; Yankowski 2008). Particularly relevant here is a study in the 1970s by Daniel Scheans (1977, 48–53) in which he interviewed potters in the towns of Alburquerque, and he noted there were 25–30 potters making fifteen different pot types, including a pot form known as “lutoan sa asin” (salt pot) which he described as a small round-bodied, flared rim pot for salt storage. This description suggests it was the same pot form that is still made and used for salt today.

In 2000 this author visited many of these same pottery-producing villages in Bohol, including Alburquerque, to collect updated data. In Alburquerque, this included information on salt pots. Salt pottery production is a specialized craft activity among potters in the coastal areas of Alburquerque, most notably in the village of Eastern Poblacion. Potters typically make a wide variety of earthenware products, such as cooking pots, stoves, flowerpots, water jars, and steamers, but only a few specialize in salt pots. These products, including the salt pots, are still made using traditional methods of hand forming and open-air firing ceramics (see Figure 7). Two different forming methods have been used to make salt pots. The first is a type of hand-modeling (nilugbot), which starts with a cylindrical form of clay that is formed into a preliminary pot form by pinching and molding the clay, allowed to air dry, and then shaped it into the final form with a wooden paddle (palo palo) and stone anvil (bato). Potters also used a coiling method (nilikit), whereby the vessel form is built up from coils of clay and again made into its final form with a paddle and anvil. Typically, potters use different forming methods for different types and sizes of pots, often preferring hand-modeling for cooking pots and coiling for other forms such as stoves, water pots, flower pots. However, salt pots have been made using both these methods demonstrating that forming methods are flexible based on the individual potters preferences.

Clay (janang) is readily available, in both the elevated and in low-lying coastal areas of Alburquerque. Selection of clay is based on a number of factors including access to resources and familiarity with the quality and malleability of the materials. Local sands (bonbon) are used as temper, commonly mixed in a ratio of 3 bags of clay to ½ bag of sand; however, some clays are naturally sandy (lunlonan) and do not require additional temper. Preliminary petrographic and ICP-MS studies on clays from Alburquerque and neighboring areas have noted differences in the clay composition that can potentially be used to differentiate clay sources (Peterson et al. 2012; Yankowski 2008). These preliminary studies suggest that both the form and technological aspects of pottery can be used to distinguish the community where pottery and potentially the salt is from, assuming it can be determined that the two were made in the same community.

Pottery production in Alburquerque is a household activity, with women typically the primary potters, but men are also known to make pots and/or assist with specific activities such as collecting the clay or firing the pots. Work typically takes place under a traditional raised platform house or a covered porch or work area. The basic steps for making pots are as follows. (1) Clay is collected and prepared for cleaning by sun drying (ebuwad) so that unwanted impurities can be easily removed. (2) Once cleaned of impurities, water is added to rehydrate the clay, and temper is added, and they are kneaded together by hand (bunbonon) until well mixed. In Alburquerque, sand is typically used as temper, although the
amount will vary based on the composition of the raw clay. (3) The pot is formed starting with either a coiled or hand-modeled form as described above and shaped by manually turning the pot. (4) The pots are allowed to air dry (*paughon sa landong*) for at least one day, often longer, depending on the weather. (5) The vessel is formed into its final shape using a paddle and anvil (*pik pik*). (6) The pots are allowed to dry for another three days to a week before being fired (*pag-ba*). (7) The pots are open-air fired. A
wooden structure (**kamada**) is built and the pots are placed inside with dried coconut palm fronds (**lukay**), husks (**bunot**), and spathes (**butay**), and sometimes, if available, dried cogon grasses are layered underneath and on top. Potters will typically fire as many as 100 pieces at a time, with it taking from one to three hours depending on the number and size of pots.

In the year 2000, there were four potters actively making salt pots in Alburquerque, all in the village of Eastern Poblacion. According to one of these elder potters, Fortunata “Totang” Saluague who was 77 years old at that time, when she was a child the salt-makers would purchase 600 pots per season from her family. By the year 2000 when she was interviewed, the quantities declined to only 100–200 per season (F. Saluague, personal communication, May 2000).

In 2013, there was only one potter actively making salt pots, also residing in Eastern Poblacion. At the time she was making a smaller-sized salt pot, upon request from a local businessman who is marketing “**asin tibouk**” (native salt) through a distributor to restaurants and hotels, and for overseas sales. Today, two different sized pots are made and used, and other potters have helped with the increase in demand, demonstrating the flexibility and adaptability of both the potters and salt-makers (see Figure 8).

It is also significant to note that within the last 20 years, salt and consequently salt pots were still being made in other coastal towns in Bohol. For example, potters in the coastal town of Valencia, to the east of Alburquerque, supplied salt pots to salt-makers in several neighboring towns. These salt pots were larger in size, resembling a globular cooking pot. The salt-makers would break them in half vertically and place them on the stoves on their sides as shallow, open vessels. The origins and age of these differences is unknown but it does suggest that there have been some regional variations in salt-making traditions and the pot form could have allowed buyers to distinguish the area where the salt was from.

Lastly, there is a traditional belief adhered to that female potters should not make salt pots while pregnant or menstruating or it is believed it can cause the salt to turn red. The

![Figure 8. Illustration of salt pots (by A. Yankowski).](image-url)
same is true in Alburquerque when cooking salt. These beliefs must have greatly shaped the work schedules of the women involved with these crafts.

Today, household pottery production continues to decline in Albuquerque as fewer individuals embrace this craft activity that was traditionally passed on from one generation to the next. There are only a handful of potters who continue to make pots using traditional methods, and currently, only one actively making salt pots. For the most part, the younger generation has not shown an interest in this craft or profession.

**Archaeological Implications**

This ethnoarchaeological study explores the long-established and symbiotic relationship between salt and pottery production in the municipality of Alburquerque, Bohol and provides an archaeological model for investigations of salt sites with pottery remains. It focuses on technological aspects of salt production, the relationship between the spatial distribution of production activities to the organization of production, and the inter-relation between these two traditional industries within the community as well as their role in the broader economy.

Pottery is an important artifact for reconstructing the technology of salt production at prehistoric salt sites because of its many diverse uses in salt making. This includes its use for production activities such as boiling brine, and molding and drying salt cakes, as well as for post-production tasks such as storage and transport, and for transactional uses, such as to serve as a standard unit of measurement for trade. The type of pottery can inform us about its potential uses. For example, in Alburquerque, a well-made and fired vessel is used that can withstand the long intense heat required by the boiling process, with similar properties to a cooking pot. The same pot also serves as a transport and storage vessel. Conversely, pots used for draining salt tend to be porous ceramics, which by nature are more fragile. As a result, the salt cake is typically removed from the vessel for transport and trade. To summarize, the type of pottery recovered from archaeological sites can be a good indicator of its potential technological and/or functional use for salt making.

Secondly, the quantity and types of discarded sherds recovered at salt sites can be important indicators of the functional use of pots in salt production. For example, if pottery is used exclusively as a production vessel, with the finished salt transferred into another container for transport, we would expect to recover large quantities of pottery waste at production sites from the broken vessels. Conversely, when salt is traded in the pots, sherd counts would likely be minimal. In the Bohol case study, the salt is transported in the pots but beforehand, the bottom of the pot is broken open, which results in the accumulation of base sherds and an absence of rim sherds in and around work areas. Many of these sherds end up mixed into waste ash that gets recycled for building the stoves. The resulting micro-patterns of sherd counts, types and locations can be significant to the analysis of salt production sites, as well as critical for estimating the scale of production based on sherd counts.

This study also highlights the importance of the spatial layout of production areas and features to gain insights into the social organization of production and in this case, multi-household or village-based craft specialization. In Bohol, both salt and pottery production is organized at the household level but tied into a broader community-based economy.
with shared resources and production areas. Access to resources is one of the key factors influencing the spatial organization of production, with activity areas situated close to raw resources. With salt making, the salt-huts and salt-ponds are individually owned and worked by households but located in shared work areas strategically situated along the mangrove coastlines where coconut husks and seawater are readily available. Archaeologically, this results in dense accumulations of artifacts and features within these work areas as was noted in my surveys of abandoned salt-making areas. Conversely, pottery making takes place at individual households, but again, generally within close proximity to clay resources or within easy transportation distance. The forming and drying of the clay happens at the potter’s house and the firing nearby, often in shared, firing areas. This demonstrates that domestic production can be organized around both residential and non-residential localities, offering two different models for the spatial patterning of household-based craft activities. This same organization of salt and pottery production is not unique to Alburquerque, but has been noted in other salt and pottery-producing areas of Bohol and the Philippines. [Smith 1921; Spoehr 1973; Ushijima and de la Peña 1996; Yankowski 2007; Yano 1994; Zayas 1996].

Furthermore, this study demonstrates that households are not relegated to production solely for personal or household needs. They can be informally integrated into communities of craft specialists and regional market economies. In this case study, this is facilitated by using a standard vessel size and form so that the salt has a standard trade equivalency, facilitating trade transactions at markets and over established trade networks. To identify this archaeologically, one needs to adopt a multi-scale approach to data collection and interpretation, i.e. examining household production within the local economy as well as the distribution of these goods with the broader economic region.

Lastly, this research aims to emphasize the potential symbiotic relationship between various community-based production activities, in this case, salt and pottery making. Many archaeological studies on material culture and craft specialization tend to focus on a singular type of product specialization (Costin 1991, 2000), potentially missing out on the broader picture of the communities being studied. This study demonstrates how craft activities can be interdependent, with “intersecting technologies” (Hagstrum 2001, 50), shared seasonally-based production schedules, and socially linked economic interests. There is great potential for more archaeological studies to integrate the analysis of various craft activities and consider the complementary relationship between production activities (Costin 2005, 1039–1040; Hagstrum 2001, 49). In the case of salt making, I would suggest this could include pottery production (De León 2009; Halliwell, Yankowski, and Chang 2016), tanning and dying (Delrue 2011; Parsons 2001, 241), fish and meat salting and fermentation (Flad 2013; Yankowski, Kerdsap, and Chang 2015), to name a few.

Notes on contributors

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Disclosure statement

No potential conflict of interest was reported by the author.

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