KALINGA CERAMICS AND NEW TECHNOLOGIES:
SOCIAL AND CULTURAL CONTEXTS OF CERAMIC CHANGE

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Innovations in ceramic technology and style have occurred among two Kalinga pottery-making villages in the northern Philippines. Generationally-based shifts are evident in the designs of Dangtalan potters as each new cohort modifies its predecessor's style. In the neighboring village of Dalupa, even more profound changes have occurred since the late 1970s. Dalupa potters have modified traditional vessel shapes and have also introduced an extensive repertoire of nontraditional forms. The sale of these forms supplements the production and exchange of traditional, utilitarian pottery. This ethnoarchaeological study describes social and cultural contexts that have contributed to particular ceramic innovations among Kalinga potters. In doing so, the study places the Kalinga case within a broader theoretical framework that focuses on the forces behind and processes of ceramic change.

Cultural change lies at the very heart of archaeological research. Vestiges of cultural change are often reflected in shifts in ceramic technology and style in prehistoric societies worldwide. As traces of political and economic upheaval, ceramic indicators provide valuable information on past events.

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Despite the wealth of research on ceramic change (e.g., Kramer 1985; Rice 1984, 1987), basic issues regarding the causes (Nicklin 1971; Schiffer and Skibo 1987) and the rates (Graves 1984; Montgomery and Reid 1990) of ceramic change require further examination.

The research discussed in this study is ethnoarchaeological in nature. Ethnoarchaeology, as used here, consists of the study of material culture systems among living people by archaeologists. Social and historical processes, so critical in understanding change, can best be examined within a living society. For this reason, ethnoarchaeology provides an ideal strategy for investigating ceramic change. Ethnoarchaeological research in northern Luzon, Philippines, provides a detailed case study of ceramic change. Stylistic, morphological and technological changes reflect both the impact of innovative potters within two Kalinga villages, as well as the consequences of specific social and cultural contexts. Our Kalinga case study informs on studies of ceramic change by examining the social and technical repercussions of particular changes in a pottery-making society.

We first, briefly, discuss three theoretical issues in the study of ceramic change: incentives for change, relative priorities of internal vs. external factors in the processes of change, and directionality in the process of innovation. Traditionally viewed as conservative in nature (e.g., Foster 1965), pottery systems appear to change slowly and with great resistance (Rice 1984). Whether the producers or the products are conservative remains open to debate. It is possible that the ceramic production process is conservative, rather than simply its practitioners (Gill 1981:113). Potters worldwide place a high premium on replication, instead of innovation, in order to avoid economic disaster (e.g., Handler 1963; Papousek 1981).

If conservatism is rooted in risk reduction, then what induces potters to tamper with their productive strategies? External factors are routinely cited as causal forces behind instances of ceramic change in the archaeological and ethnographic records (e.g., Nicklin 1971). Ethnographically, external factors include various aspects of international economic integration, including the imposition of a cash economy, improved communication and transport facilities, an increase in national and international tourism, fuel shortages and deforestation and emigration from rural areas to cities (Rice 1987:450). Market demand (Diaz 1966; Foster 1965; Rice 1978) and the development of a tourist market (e.g., Annis 1985; Arnold 1987; Graburn 1976; Lackey 1988; Lathrap 1976; Stolmaker 1976) are two related important influences on ceramic systems.

Implicit in these ceramic studies is the assumption that change occurs only in response to external factors. However, several recent studies suggest that change results from a dialectic between external forces and internal conditions that render systems amenable to change (see Bargatzky 1989 and Papousek 1981). Internal factors certainly influence ceramic change. For example, population growth serves as a powerful economic incentive. Equally important are innovative individuals who may, for example, tap social relations defined by patron-client relationships (e.g., Papousek 1984). More research is clearly needed on the dynamics that produce innovation-receptive environments.

Having touched on incentives and sources of change, we are now turn to processes of innovation and reasons why certain groups within a particular society may choose to innovate. Our approach to viewing innovation within artisan communities uses two perspectives: from the top down, and from the bottom up. Silver's (1981) analysis of Ashanti wood carvers illustrates these two perspectives. Top-down innovation occurs when master artisans, who are affluent, or at least well-established in their trade, engage in innovation; they have little to lose. High-status individuals tend to innovate under conditions of risk, since they have surplus goods and prestige. On the other hand, low-status groups innovate under conditions of economic uncertainty since they have nothing to lose (Silver 1981:1:0). Bottom-up innovation involves new, exogenous forms that occupy a new, previously untapped economic niche.

These innovation processes have applications to archaeological data, given the appropriate conditions. In an analysis of Andean assemblages, Costin and others (1989) have broadened the range of top-down innovation processes to include state-control as a top-down mechanism that leads to innovation. In this model, top-down innovation is equated with impositions by the Inca administration. The Inca study focuses on changes in particular production strategies, made possible by political centralization endemic to the Inca state (Costin et al. 1989:107). In their model, bottom-up innovation derives from sources outside of state control. Evidence of bottom-up innovation is instead visible in 'commoner' assemblages, and involved changes that enhanced their economic security.

The foregoing examples are two divergent, yet not entirely dissonant attempts to grapple with directionality of innovation processes. Different forces of change are examined within each approach, and the importance of each of these stimuli varies across societies. Within an acephalous organization, such as that of Silver's wood carvers, catalysts for change lie in market demand and, to a lesser extent, in the force of personal creativity. In this sense, the direction of innovation is related to a combination of economics and prestige. Within a state-controlled structure such as the Inca empire, directionality refers to political demand (supported by economic power) that stimulates and dictates the types of innovations that develop. The applicabili-
ty of these concepts requires further study, using assemblages from a variety of societies. In this ethnoarchaeological case study, we explore both sets of concepts of top-down and bottom-up innovation processes to understand Kalinga ceramic change.

The three issues discussed in this section are relevant to our Kalinga study of change, as will be clear in the sections that follow. Conservatism in pottery technology, rather than in the potters themselves, characterizes Kalinga ceramic changes that we describe. Both external and internal sources are responsible for the types of ceramic innovation that we observed. Finally, both "top-down" and "bottom-up" processes of change have occurred within the Kalinga system.

The Kalinga Ethnoarchaeological project

The Kalinga Ethnoarchaeological Project has been conducted for nearly two decades under the direction of William Longacre. The research area is located in the northern Philippines within the Kalinga-Apayao province. The "Kalinga area," as it is used in this study, refers to a municipality in the southern portion of the Kalinga subprovince, depicted in Figure 1.

Fig. 1 The study area within the northern Philippines.

Figure 2 demarcates the boundaries of the Kalinga project study area. Eleven of thirteen Pasil Municipality communities are identified in this figure, along with satellite (sito) settlements that are associated with Dangtalan (Puapo, Lonong) and Magsilay (Bulap). The Kalinga Ethnoarchaeological Project has focused its research on five Pasil communities, each of which is nested in the steep mountain slopes that flank either side of the Pasil River. The Pasil Municipality is the site of previous research (e.g., Lawless 1975, 1977) that provides some background to the economics and ecology of the area. Two communities, the villages of Dangtalan and Dalupa, were initially selected for ethnoarchaeological study because pottery-making represented a traditional, small-scale industry in which pots were produced and used primarily for the potters' own households.

Fig. 2 The Pasil Municipality, Kalinga-Apayao, Philippines.

The initial, year-long study was carried out during 1975-1976 by William Longacre (1974, 1981). This research examined learning frameworks among potters to test hypotheses developed during seminal research in the New Archaeology era of the 1960s. This research focused on social organization in late prehistoric pueblos in the American Southwest (Longacre 1970). Kalinga potters tended to work in informal work groups based upon
Kalinga potters tended to work in informal work groups based upon neighborhoods, so data and pots made by work groups were collected to measure the impact of potting together and to test hypotheses for the transmission of design traditions from one generation to the next (Graves 1981, 1985). Unstable political conditions precluded the project's return to the area until 1987, although Kalinga assistants collected a series of data sets during the eleven year interim that enabled project members to explore pottery use-life (Longacre 1985) and, in a preliminary fashion, pottery exchange (Graves 1991).

The Technology of Kalinga Pottery Making

Kalinga pottery making is a combination of coil-and-scape manufacture that yields the initial shape of the vessel, and paddle-and-anvil techniques that produce the final shape of even, globular vessel bodies. Although the initial vessel-forming sequence lasts just 15-25 minutes, the entire pottery making process involves clay preparation, vessel forming, drying, and firing over the course of approximately five days. An active Kalinga potter can finish between 10-15 vessels in a week. This number varies seasonally, according to weather and household demands such as childcare and cooking. Labor requirements related to rice farming activities (e.g., transplanting, weeding, or harvesting) also vary seasonally. It is during the drier months, in periods of low agricultural demands, that the majority of Kalinga potters are most active. Kalinga pottery vessels are used for a variety of daily activities, including rice, meat and vegetable cooking, water storage, coffee roasting and sugar cane wine production. Plastic and metal substitutes, while nominally available, are costly. Only metal rice cooking pots (calderos) have entered the Kalinga cooking technology to any extent.

Pottery, Reciprocity and Kalinga Society

As is true of most traditional societies, the fabric of Kalinga social life is held together by an ethic of reciprocity. Pottery is one class of objects that moves between individuals and groups in various communities. Gift-giving is an essential form of reciprocity in Kalinga daily life. As Sahlin (1972:186) notes, "If friends make gifts, gifts make friends." Pots often serve as gifts during visits by potters to other communities. These visits often occur within the context of ceremonial occasions, including weddings, visits to celebrate the a married woman's first pregnancy (legading), visits to sick relatives (ila), funerals, and events related to the establishment or renewal of peace-pacts (bodong) between two communities. Informal visits by friends and relatives to a pottery-making community may also involve the exchange of gifts, and pots serve as a convenient medium of exchange.

Kalinga pots are also intimately involved in a second important form of reciprocity, in what Takaki (1977) has called balanced exchange (galas). The term "balanced exchange" emphasizes the symmetry of such transactions: goods of equivalent value, be they livestock or cooking pots, are exchanged nearly simultaneously between individuals. Rice fields, houses and livestock are exchanged using the water buffalo (or carabao) as the unit of exchange. Foodstuffs and utilitarian crafts such as baskets and pottery are regularly exchanged for pounded dry rice (palay). The customary rice measure is called the chupa (one cup), a pan-Philippine volumetric measurement. Among the Pasil Kalinga, the chupa is measured using a 14 ounce Alaska brand condensed milk can (Lawless 1977:123) with an approximate volume of 353 cubic centimeters (Takaki 1977:692). By weight, the chupa is approximately 200 grams (Embrey 1923:365). The chupa measure sets the standard for equivalences in other foodstuffs, primarily in grains (e.g., corn) and legumes (e.g., mung beans, white beans). For example, thirteen chupas of beans may be worth fifteen chupas of rice. A water storage jar valued at fifteen chupas of rice may therefore be exchanged for thirteen chupas of beans.

Traditionally, Kalinga potters produce utilitarian vessels for their own households' use. Potters engage in limited exchange with other households in their own community, and even less so with individuals from other communities. Such pottery trade supplements potters' households' supply of rice, beans, greens and other foodstuffs. Data on pottery exchange were collected for the period between 1971 and 1980 in Dangtalan. Data consisted of inventories of each household's vessels and records of pottery exchange transactions between 1977 and 1980. The analysis of these data produced three important findings: 1) a far greater number of pots are distributed through balanced exchange than through gift-giving; 2) Dangtalan potters traded a limited number of pots within their communities and beyond them, to neighboring (non-pottery-making) communities; and 3) pottery exchange was on the rise, doubling in scale from the early to the late 1970s (Graves 1991). For a few Dangtalan women, pottery exchange within their own village was becoming an increasingly common strategy for meeting their households' subsistence needs.

Changes in the Kalinga Ceramic Tradition

Fieldwork by the Kalinga Ethnoarchaeological Project, last conducted in the mid-1970s prior to political turmoil in the area, finally resumed in 1987. It quickly became clear that trends identified in the pre-1980 had intensified in Dangtalan and Dalupa pottery making. The once thriving pottery industry in Dangtalan is now sporadic at best, as only a handful of potters remain active. Meanwhile, Dalupa pottery production has soared since the mid-
1970s. In 1987 and 1988, Dalupa potters actively made and traded pottery within and beyond the confines of their community. The current pottery exchange network involves several river valleys, reached by motor and foot transport. Pottery production has become a community specialization (Stark 1991, n.d.). It is the archaeologist's most fervent hope that changes in a prehistoric society's cultural and economic conditions will leave material reflections that can be excavated and identified. This Kalinga case study of ceramic change is therefore ideal from an archaeological viewpoint, since changes in the ceramic tradition coincided with changes in economic reorganization. With an increase in the scale of production has been an array of changes in types of incised decoration, surface decoration and shape. How and why these changes took place is the subject of this study. The nature of these changes will be described first, followed by an analysis of how these ceramic changes reflect changing social and cultural contexts of Kalinga society.

Changes in the Incised (Gili) Decoration

We begin by describing stylistic changes in the incised decoration. Decoration on Kalinga cooking pots consists of incised and stamped decoration around the vessel's neck (gili). Found on virtually all Kalinga vessels (Longacre 1981), the decoration is traditionally applied using a bamboo stylus (Figure 3). During the 1987-88 field season, potters were also observed using the rounded ends of ballpoint pens to incise decorations onto vessel surfaces. The number of gili bands on a particular vessel ranges from a single band to four or more, and these bands may be combined in a variety of patterns.

Analysis of the gili decorations from the 1975-1976 field season suggested that the complexity of Dangtalan ceramic designs has decreased with time and with each new potter cohort. Older potters tend to make far more elaborate decorations than do their younger counterparts.

Understanding the relationship between intensified ceramic production and decorative strategies is important for explaining this trend toward decreased design complexity among Dangtalan potters. Archaeologists have suggested that as ceramic production intensifies, the number of manufacturing steps required decreases, and products become more standardized (e.g., Rice 1991). The overall labor input required in ceramic production can be gauged by the use of a "production step measure" (Feinman et al. 1981). This "production step measure" has been applied to prehistoric ceramic assemblages to assess the relative complexity of manufacture.

Ethnoarchaeological ceramic assemblages provide optimal conditions in which to test the utility of the "production step measure" concept. In the

Fig. 3 Dangtalan potter applying incised decoration (gili) to vessel's surface with bamboo stylus.

Dangtalan case, gili patterns from the mid-1970s were produced by household potters, who largely made vessels for their own household's use. The overall reduction in design complexity noted by Graves (1981, 1985) is likely related to a trend toward more specialized ceramic production, an ongoing process that, by 1987, left very few active Dangtalan potters who supplied most of the households in the community with utilitarian vessels. Gili data from the 1988 field season include products by household potters (i.e., those in Dangtalan) and products made by more intensive producers in Dalupa, where pottery production has become a village-level specialization (Stark 1991). Stylistic analysis of this new data set, now underway, will assess the importance of changes in the organization of production on changes in the amount of labor invested in ceramic decoration.

Changes in the Water Jar (Immosso)

Morphological and stylistic changes have occurred in the water jar, or immosso. Traditionally, the globular-bodied immosso differs from Kalinga cooking vessels only in its uniform coating of resin and ocher across its
exterior surface. Interviews with Dalupa potters suggested that technological and stylistic changes occurred in the *immosso* around 1978-1980. These changes consist of: 1) simplification, as the amount of resin used has been reduced, 2) stylistic elaboration, with the introduction of ocher decoration, and 3) morphological innovation, with the appearance of a pronounced Binontoc shoulder.

Reduction in the use of resin. Like many earthenware vessels across the Philippines (e.g., Scheans 1977), daily-use Kalinga cooking vessels are routinely coated with resin on their interior. Resin is applied immediately after firing, while the vessels are extremely hot. It is likely that the low-fired vessels have a high rate of water permeability that requires the organic sealant to attain boiling temperatures (Schiffer 1990). Traditional Kalinga water jars (*immosso*) were coated on the interior and exterior surfaces (Figure 4).

![Image](image1.png)

Fig. 4 Dangtalan potter applying resin to exterior of newly-fired cooking vessel. The vessel's interior surface has also been fully coated with resin.

Kalinga pottery technology for producing water jars has now simplified, as potters no longer invest as much effort in their post-firing application of resin, locally called *lebu*, from the Almaciga tree (*genus Agathis*). Traditionally, potters coat the complete exterior of the water jar with resin. Now many Dalupa potters restrict the resin treatment to the vessel's interior surface and to the vessel's exterior as far as the shoulder. The resultant jars are more permeable, since they lack a full resin coating. Consumers who like the new style remark on the improved cooling effectiveness of the vessels. Consumers who dislike the change complain of excess water leakage that destroys woven pot stands.

Development of ocher designs. Most consumers seem to like the second area of change: the elaboration of ocher decoration on water jar exteriors (Figure 5). On traditional Kalinga water jars, a uniform ocher (or hematite) coating was applied to the exterior surface. Ocher is now used to create elaborate and unique designs across the outside of the *immosso*. Geometric and floral ocher designs are common motifs on water jars, and anthropomorphic designs are occasionally added to the surfaces as well.

![Image](image2.png)

Fig. 5 Examples of ocher decoration on Dalupa *immosso* (water jars).
Development of Binontoc shoulder. Morphological change constitutes the third type of ceramic change observed in the Kalinga water jar. Some aspects of traditional imnosso morphology are free to vary, such as neck height, degree of neck constriction, and height:diameter ratio of the vessel. However, all traditional water jars are characterized by a distinctly globular body. Figure 6 illustrates a miniature traditional imnosso with a slightly elongated neck and a rounded body.

Fig. 6 Traditional morphology of Kalinga water jar (imnosso).

Many water jars observed in Dalupa during the 1988 season did not conform to this prototypical shape. Instead, these water jars exhibited low, sharply angled shoulders that contrasted with the traditional globular water jar. The Kalinga term for the style is Binontoc, since they claim that this stylized shoulder derives from a ceramic tradition in the neighboring province of Bontoc. Potters explain that the Binontoc style was initiated after two expert Dalupa potters encountered the style in Lubuagan, the former capital of Kalinga, in the late 1960s. Most of these shouldered water jars are also decorated with ochre designa and lack an exterior resin coating. The Binontoc style water jar is illustrated in Figure 7.

Fig. 7 Example of Binontoc shoulder on miniature Dalupa water jar. Most regular-sized water jars produced in Dalupa during 1987-1988 had Binontoc shoulders.

Initiated in Dalupa, the Binontoc style was not adopted by neighboring Dangtalans potters, despite its widespread popularity among pottery consumers (Aronson et al. 1991, n.d.). Dangtalans report that the Binontoc style shoulder is difficult to make. Since Dalupa now is the predominant pottery-making village in the Pasil River Valley, most water jars found in Pasil villages are Dalupa-made. An ever-larger proportion of these vessels are of the Binontoc style. Consumers who like this innovation comment that the new shoulder is easier to grip than a globular body, as jars are carried, full of water, atop women’s heads.

The Introduction of Nontraditional Forms (Ay-ayam)

Equally important in the process of change has been the development of nontraditional forms in Dalupa, called ay-ayam by the potters. Today the Kalinga term “ay-ayam” translates as “toys.” Earlier research by Barton (1949) also defines the term ay-ayam (in Barton, aiyaiyam) as property in animals or pets (1949:91). The development of nontraditional forms has followed a shorter path of innovation than has the Binontoc water jars. The production of nontraditional forms began in earnest during the late 1970s. Dalupa potters currently manufacture a broad range of nontraditional forms. At least
50 different types of "souvenirs" were recorded during our 1987-1988 research season, ranging from ashtrays, plaques and flower vases to money banks and imitation teapots. Not all potters make nontraditional forms, and those who do tend to concentrate on a few types, such as flower vases or decorative plaques (Figure 8). These nontraditional forms are called ay-ayam or toys because Kalinga potters have always produced some miniature pottery for their children, but these are traditionally restricted to miniature water jars or im-immosso.

Fig. 8 This "God Bless" plaque is one variety in a wide range of decorative plaques that Dalupa potters now manufacture. Younger, less experienced Dalupa potters tend to make these plaques because they have more formal education than the senior expert potters.

Production Technology of Nontraditional Forms. The production technology required for manufacturing nontraditional forms is essentially derived from that used in making cooking pots. The same array of clays are used to make traditional vessels and nontraditional forms, and variations in particular clay sources used are minor (Aronson et. al. 1991, n.d.). The transfer of cooking pot technology to the nontraditional forms has been, for the most part, unsuccessful. The manufacturing technology that produces a heat-resistant, thin-walled lightweight product is not well-suited to many nontraditional forms, which are not intended for use over an open fire. Some ay-ayam are even based on globular, pot-like shapes while other forms, such as sculptures, are not. In general, nontraditional forms are heavy and thick-walled. Standard firing procedures that produce resilient cooking pots, are also used in firing ay-ayam (Figure 9).

Fig. 9 One of the most prolific ay-ayam potters preparing to fire a variety of forms, including flower vases and coffee cups.
However, insufficient fuel and firing duration, geared toward firing cooking vessels, produce underfired, frail ay-ayam. Each piece requires an extensive coating of resin, which is difficult to spread smoothly as the piece cools and the resin begins to lump. Poorly fired and elaborately modeled, ay-ayam are easily broken during transit. These forms require complicated packing strategies for transport on barter trips. In addition, many forms, such as the clay teapot, mock coconut bowls and the coffee cups, cannot be used for in a practical fashion. Hot liquids would melt the thickly resined interior surfaces upon contact, contaminating the vessel's contents. Products by Nigerian potters also suffer this technological defect: "European" style soup-plates and coffee pots are too porous and weak for regular use (Cardew 1952:197).

Dalupa nontraditional forms are distinctive from utilitarian pots not only in their appearance, but in the manner and geographic extent of their distribution. Unlike the cooking and water storage pots, which are exchanged for rice and other foodstuffs, the nontraditional forms are sold for Philippine currency (pesos). The ay-ayam are costly to make in relation to utility ware with the diminishing availability of resin. To the Kalinga potter and consumer, an aesthetically pleasing ay-ayam is one that is glossy with an ample covering of resin. Though more costly to produce, the worth of a single ay-ayam is triple or quadruple that of a rice or meat/vegetable cooking pot. Moreover, nontraditional forms are more commonly sold for cash than bartered for foodstuffs. Nontraditional forms are widely traded to consumers outside the Pasil Municipality to an eager market. An ever-growing demand for these "souvenirs" beyond the Pasil boundaries ensures that the range of varieties produced will grow as well.

Social and Cultural Contexts of Kalinga Technological Change

What are the social and cultural contexts of Kalinga ceramic change? These innovations are best understood in the broader framework of sociopolitical, environmental and ecological changes that have occurred since the 1970s. Sociopolitical events, environmental processes and policy decisions by the Philippine government encouraged changes in the Dalupa ceramic tradition. These changes include intensified stylistic variation in extant vessels, the expansion of the range of ceramic types and the expansion of network of customers involved in Dalupa potters' production systems.

One of the most significant agents of change lay in efforts associated with the Chico River dam. Plans were drawn for the Chico River Basin Development Project in 1973. The project was to include the construction of five dams that would triple the country's electrical energy resources and especially help the capital city of Manila. The Kalinga-Apayao province was not slated as a recipient of the dams' output. A small diversion dam associated with the project was also intended to irrigate over 50,000 acres of downstream agricultural land (Drucker 1988). Plans for dam construction included the resettlement away from the Chico River of families in Kalinga and Bontoc provinces, respectively. It was estimated that one of the four dams (Chico III) would require the relocation, minimally, of 15,000 Kalinga and Bontoc families, or about 100,000 individuals (Aranal-Sereno and Liberios 1983:451). Indigenous resistance to the project motivated the incursion of Philippine military and federal employees into the area (cf. Carino et al. 1979). In response, the New People's Army or NPA (the military arm of the Communist Party of the Philippines) entered the area and bolstered the anti-government battle (cf. Rocamora 1979; Winnacker 1979). After more than twelve years of struggle, the Aquino government announced the demise of the project shortly after assuming power of the nation. Although the threat of the dam is gone, NPA and military forces remained in the area during the field season and clashed frequently.

The Chico River development era, despite the project's ultimate failure, effected profound changes in the Kalinga area. Non-Kalinga values and commodities were introduced, municipal facilities were constructed, road networks were improved and motor transport systems were encouraged. Road networks linked formerly isolated Kalinga villages. Dam-related developments, such as improved road systems and more accessible truck transport, enabled the Dalupa pottery system to expand in scale.

Sporadic income from wage labor associated with the dam efforts (e.g., road construction, cultural commissions) and the reactivated gold mines trickled into the Kalinga economy throughout the late 1970s and the early 1980s. Relentless population growth (Lawless 1977) strained the available subsistence alternatives of swidden (uma) cultivation and coffee cash-cropping. Dangtalan residents had access to a wider range of employment opportunities than did their Dalupa neighbors. Close social ties between Dangtalan residents and individuals already involved in mining or dam construction enabled many Dangtalan men to take jobs, and their wives to quit making pottery. Many Dalupa households, faced with the same pressures and far fewer jobs, turned to pottery production as an alternative economic strategy.

External forces have also altered the environmental and ecological contexts of Kalinga life in the last two decades. Kalinga natural resources, traditionally a boon for indigenous populations, have become a burden in their appeal to outsiders. Modern mining interest was most recently renewed in the 1970s, effectively destroying riverine resources that provided important supplements in the Kalinga subsistence system (Dozier 1966:134-135). Population increase has pressed available swidden land to its limits, and forest
recession plagues the Pasil Municipality (Lawless 1975). Once-lush montane tropical forests are also now disappearing under the demand of lumber companies, which log vast forest tracts throughout the Kalinga sub-province. These companies have restricted access to logging areas by Kalinga residents in neighboring areas, thereby reducing the amount of land available for (uma) swidden agriculture and prohibiting access to ocher and resin, forest resources used in pottery production.

Ceramic Reflections of Social and Cultural Processes of Change

Social and cultural processes of change are reflected in changes made to the water jar, or immosso. Resin for cooking and water jars was traditionally obtained from itinerant resin traders. These traders, often residents of communities near the forested resin areas, visited Dalupa and Dangtalan with their goods. Most resin traders have now abandoned their former occupation. Some former traders in the Batong Buhay mining area (near Balatoc at the western end of the municipality, not pictured in Figure 2) have turned to mining as a more lucrative profession. Others have abandoned their occupation because of restrictions imposed on forest use from the Philippine government, which has declared a large proportion of ancestral Kalinga land as 'forest reserve' (Aranal-Sereno and Libarios 1983:445). Leases and concessions granted by the government to logging companies since the mid-1970s have constricted the area of forest land in which Kalingas can hunt and harvest resin. One of the primary resin harvesting areas lies to the north, near the boundary of the Balbalan and Pasil municipalities. Unfortunately, this forest area is contained within a concession granted to the Cellophil Resources Corporation, covering 197,000 hectares (Aranal-Sereno and Libarios 1983:445; Dorral 1980). Stiff fines are meted out to those attempting to harvest forest resources in lease and concession areas. For those traders who continue to venture into resin-rich areas, increasingly frequent highway robbery makes travel hazardous between the Pasil municipality and resin sources. An operating gold mine in the Balbalan municipality north of Pasil, and the availability of firearms following the Chico River Dam era, have facilitated the development of highway robbery. Mine employees and civilians are routine victims of hold-ups along the route from Pasil northward to Balbalan.

These recent developments in resin resource areas have diminished the availability of resin. Dalupa potters, forging ever wider markets, were faced with a rising demand for their products. It was only through decreasing the amount of resin needed per vessel that potters could continue to produce pottery. Eliminating the exterior coating of water jars proved economical with respect to available resources. Today, most Dalupa potters produce some non-resined water jar exteriors. Many of the most active Dalupa potters produce predominantly new forms, rather than the traditional, resined water jars.

The development of ocher decorations on water jars also reflect political changes during the 1970s and 1980s. Efforts by the Philippine government to curry favor with the Kalingas during the Chico River project included the founding of cooperatives that encouraged traditional crafts such as backstrap loom weaving. Cooperatives aggregated Kalinga artisans from surrounding tributary valleys into the center of Lubuagan. Dalupa potters who travelled to Lubuangan interacted with weavers who suggested modifications for exterior surface decorations of Kalinga water jars based on designs from woven blankets and skirts.

Water jars, like large rice or vegetable cooking pots, pose a greater manufacturing challenge than do standard cooking vessels. For this reason, water jars—and innovations in these jars—are made by older, experienced potters (N=34 or 87% of the active potters). In one sense, then, water jar innovation has been from the "top down", according to Silver's (1981) scheme. Experienced potters, as part-time or full-time specialists, actively engage in pottery exchange beyond the municipality's boundaries (Stark, n.d.). Contact with outsiders in Lubuangan has encouraged successful innovations, and these expert potters are "opinion leaders" that Bargatzky, in his analysis of innovation, (1989:19) describes. Moreover, water jar changes occurred in an amenable environment, as external factors listed previously and internal factors (e.g., population increase, decreasing availability of farmland) encouraged these particular innovations.

Nontraditional forms also reflect the impact of the Chico River dam project since the forms emerged in the context of the dam era. Newcomers to the area imbued the region with non-Kalinga values and a desire for "souvenirs" beginning in the late 1970s. The first water buffalo bank, for example, was crafted for an employee of a gold mining company whose operations drew workers from different parts of the Philippines into the Kalinga area. Ideas for new ay-ayam designs are found in elementary school textbooks, the rare Manila magazine that sends its way into the remote Kalinga highlands, and in orders placed by customers. Although the range in forms produced is highly diverse, several commonalities unite them: they lack an adequate manufacturing technology to produce reliable products, they are almost always bought rather than bartered (while pots are bartered), and they are non-utilitarian in every sense of the word. We describe a few forms as examples.

The money bank (arcanda) is a commonly made nontraditional form, manufactured primarily for decoration rather than for actual use. Figure 10
illustrates one variant of a chicken (*manok*) money bank that is produced by several Dalupa potters.

Fig. 10  Chicken (*manok*) bank manufactured by one of most versatile *ay-ayam* producers in Dalupa.

Dalupa money banks come in over a dozen different zoomorphic and miscellaneous forms. Goat banks and squash banks find company with fish banks and horse-and-rider banks. Money banks are also made that resemble traditional forms, such as pect-shaped banks and *gusi* banks; the latter form is discussed in a following section. Since Kalinga residents participate in a predominantly barter economy (Takaki 1977), cash is a scarce commodity that is rarely curated in money banks. The money banks are interesting not only for the scarcity of cash in the Kalinga area, but for the tremendous popularity that they enjoy as gifts and their high diversity of form. Producing for a market, potters have copied calendar illustrations, ceramics seen in the former capital of Lubuangan, and illustrations from elementary school science books.

Flower vases are also made by most active Dalupa potters (Figure 11).

Although ceramic flower: vases were occasionally made in class projects during the 1960s, full-scale production of vases by Dalupa potters began in the late 1970s and early 1980s in response to external influences. Like money banks, flower vases come in a wide variety of forms, from hanging shell vases that imitate a common variety of snail that inhabits Kalinga rice paddies, to

Fig. 11  One type of flower vase produced by Dalupa potters. At least one dozen different varieties of flower vases are produced, some of which incorporate design styles from Mindanao potters.

imitations of Muslim flower vases whose magazine illustrations occasionally reach the Pasil villages. As is the case with money banks, Dalupa-made flower vases are decorative rather than utilitarian in function. The tradition of cut-flower arrangements is distinctly non-Kalinga, and Kalinga households do not cultivate flower gardens for decorative purposes.

Another nontraditional form, the *gusi*, is the "poor man's porcelain," shown in Figure 12.

The *gusi* form replicates in earthenware the Chinese porcelain jars that have been valued Kalinga heirlooms for decades or even centuries. Chinese porcelain, in the form of jars (*gusi*) and plates (*tapak, panay*) is one of several traditional forms of Kalinga wealth, in addition to Chinese brass gongs,
Fig. 12 Elaborately decorated gusi produced by one of Dalupa’s expert potters. Unlike the incised (gil) decoration on cooking vessels, gusi vessels often have complicated designs on the upper half of the vessel.

carabaos and rice fields (Dzouer 1966:150). Mountain groups such as the Kalinga originally obtained this Ming Dynasty (10th-15th centuries A.D.) porcelain from Ilocano lowlanders during the early part of the Spanish era in the Philippines. At that time, mountain reserves of gold and rice served as the most common media of exchange (Lawless 1977:93). In recent years, the growing international demand for Ming dynasty ceramics has driven traders from Manila and Baguio into the Cordillera Central to purchase porcelain from indigenous populations such as the Kalinga, the Ifugao and the Bontoc. With each passing year, the porcelain stores of Kalinga households are depleted, and only a single gusi was recorded in 76 Dalupa households in 1988.

Chinese porcelain has consequently become an ever rarer, valuable commodity in Kalinga life. This may be one reason why Dalupa potters began to manufacture gusi replicas in the later 1970s. Responding to orders from prospective customers in Lubuagan, potters experimented with gusi forms whose sizes ranged from miniatures (ca. 20 cm high) to full-sized vessels that are 80-90 cm in height (Figure 13).

Fig. 13 Large, amuto-sized gusi vessel made by one of Dalupa’s most experienced potters. Gusi vessels are more commonly produced in miniature forms, since larger vessels are costly and require abundant resin.

The earthenware gusi mimics its porcelain prototype, but is affordable for less affluent Kalinga households. The success of the gusi innovation may also be related to the declining production of traditional Kalinga wine jars (amuto). Since the Kalinga Ethnoarchaeological Project’s inception in 1973, the production of amuto has been on the wane. In former times, expert women potters would enlist the assistance of men in forming the large amuto, which stands nearly a meter high. Two factors discouraged the production of Kalinga amuto wine jars as early as the mid-1970s: 1) declining resin supplies; and 2) the increased availability of Ilocano stoneware jars. The introduction of gusi vessels, whose construction partly parallels the amuto construction, has also begun to fill the gap left by the cessation of amuto manufacture. Many
of the "expert" Dalupa potters manufacture large gusi vessels on order. The elaborately decorated gusi form has now become a popular item in the Dalupa ceramic repertoire, both as jars (replete with lids) and as gusi-shaped money banks.

Extensive interviews with Dalupa potters enables us to comment on the processes of innovation with respect to nontraditional forms. The development of nontraditional forms involves "top-down" and "bottom-up" processes of innovation. From the "top-down" perspective, high-status, wealthy (non-potter) individuals pioneered new forms in the late 1970s. One influence is exogenous: around 1977, Manuel Elizalde (then director of PANAMIN Foundation) ordered a flower vase from one Dalupa potter. Another influence is indigenous: around 1981, a Dalupa schoolteacher (a non-potter) began experimenting with vase shapes she had seen in markets in Tuguegarao, the provincial capital of Cagayan Province (refer to Figure 1). Tuguegarao lies approximately 60 kilometers northeast of the Pasil Municipality, a 3-4 hour truck ride from Dalupa's neighboring village, Ableg.

From the "bottom-up" perspective, inexperienced potters carved out a new economic niche for themselves through ay-ayam production. Almost one-third of Dalupa potters who make nontraditional forms do not make shouldered water jars. These potters are considered beginners by local standards, and have not yet mastered the skills required for manufacturing the more technically complex water jars. Several of these "beginners" initiated pottery-making in the early to mid-1980s, when differential employment opportunities and prolonged dry periods severely affected the Dalupa economy. Beginners who lack proficiency in making traditional vessels, can make and sell nontraditional forms as an important source of household revenue.

Discussion and Conclusions

The key to the different degrees of adoption is more likely to lie ... in the active social component. Social and political strategies may prove to be a necessary component in models of innovation (Wade 1989:241).

This case study has explored social and cultural contexts of new ceramic technologies among Kalinga potters. In this particular example, social and political events have left their mark on the Dalupa ceramic tradition. Whether social and political change coincide with ceramic change is an issue that must be explored across a wide range of contemporary and prehistoric societies. Equally important is examining the forms that ceramic change assumes. In the Dalupa case, change has occurred at the levels of design, Philippine society, especially along economic lines. Despite the partial political sovereignty that Kalingas and their Cordilleran neighbors (e.g., the Ifugao, Bontocs) exercise, national policy affects Kalinga lives now more than ever. The imposition of policy from the top-down, in the form of development projects and commercial interests, has affected the Dalupa ceramic tradition as well. It is clear in the Dalupa example that social factors have guided the nature and directions of the observed ceramic change (cf. Kingery 1984). The presence of a continued, indigenous demand for the new products suggests that these changes may become regular components of the Kalinga ceramic repertoire. Judging from the history of Dalupa's ceramic tradition, as yet unforeseen political situations may also shape its future.

Conclusions

One reason why innovation has occupied a back seat in archaeological research lies in our exclusive focus on "successful" innovations (Torrence and van der Leeuw 1989:4). This is understandable, since the archaeological record primarily contains evidence of changes that succeeded. To understand ceramic innovation, however, we must focus on the entire process of innovation. Longitudinal ethnoarchaeological research, such as the study that we have described in this study, is well-suited for this endeavor.

Ethnoarchaeological research, like sound ethnographic research, requires a long-term commitment to understanding the dynamics of change. In this paper, we have described the nature of changes, sources of influence, and directions of change. However, we recognize that our research remains unfinished. In a single year's field season, we cannot chronicle the entire process of innovation that begins at the conception of ideas and culminates in the incorporation of these forms into the ceramic assemblage, often at the community level. We know from the innovation literature that rates of a given adoption are affected by perceived advantages as well as its complexity (Rogers 1962:312). Our continued research in Dalupa and Dangtalan in the coming decades will further illuminate our understanding of Kalinga ceramic change. Chronicling the success of particular innovations and the failure of others will enable us to refine extant models of innovators and adopters within potter communities.

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Torrence, R. and S. E. van der Leeuw
Look at the Process of Innovation, edited by S. E. van der Leeuw and R.
In exploring innovation in ceramic technology, we have numerous areas of parallel discourse to draw upon. Unfortunately, the material seems to be localized into distinct fields, the result being that different fields have taken approaches appropriate to the central issues particular to that field. It is the manner of presentation that is the issue, not the particular field.

An ethnoarchaeological perspective will be used in examining short-term technological change over three generations of pottery production in the agriculturally marginal community of Pino Suárez, Hidalgo, Mexico. The relationship between traditional and more recent technological development of wheel production and glazing will be examined. The relationship between environmental, socio-political, and individual factors will be investigated in deriving a trajectory for technological innovation.
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