ARCHAEOLOGICAL AND PALAEOENVIRONMENTAL RESEARCH IN BATANES AND ILOCOS NORTE PROVINCES, NORTHERN PHILIPPINES

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ABSTRACT

Commencing between 5000 and 4000 years ago, agricultural populations in Taiwan, speakers of early Austronesian languages, began a process of cultural and linguistic expansion that culminated in the widest distribution of any ethnolinguistic population in pre-AD 1500 world history. Austronesian speaking populations ultimately came to settle all of Island Southeast Asia, parts of Mainland Southeast Asia, the Pacific (except for Australia and much of New Guinea), and Madagascar. The project reported on here is concerned with teasing out the archaeological and palaeoenvironmental backgrounds for the early centuries of Austronesian dispersal in the northern Philippines, specifically in the Batanes Islands, and northern Luzon. A three-phase archaeological sequence covering the past 3500 years for the island of Batan has been established, extending from the Neolithic to the final phase of prehistory (late 17th century). This paper focuses mainly on the Sunget Phase of Batan prehistory c.1500 to 700 BC), which reveals strong relationships with Taiwan to the north and the Cagayan valley of northern Luzon to the south. Also reported are the preliminary results of palaeoenvironmental research at Paoay Lake, Ilocos Norte (NW Luzon), that document the local development of a deforested landscape since about 3000 BC.

The Asian Fore-Arc Programme (AFAP), that provides the infrastructure for the research to be described, was established in 2001 as a research initiative of the Centre for Archaeological Research (CAR) at The Australian National University in Canberra. It is concerned with the prehistoric archaeology and relevant palaeoenvironments of the arc of large islands, including the Ryukyus, Taiwan, the Philippines and eastern Indonesia, that forms the boundary of the subtropical to tropical western Pacific. It is within this region that island lifeways worldwide have their greatest antiquity, and through it that all the ancient populations of Australia and Oceania migrated. The general intention of the AFAP is to understand, more profoundly than at present, when, by whom, in what manner and why this region became a corridor for successive movements of people. Accordingly, the prehistory of Austronesian dispersal is a major theme for AFAP research.

The research described here has been undertaken in three field seasons. Archaeological and palaeoenvironmental reconnaissance and excavation was undertaken in the Batanes Islands in February-March 2002; palaeoenvironmental coring then took place at Paoay Lake in Ilocos Norte (northwestern Luzon) in October 2002; and further archaeological excavation and reconnaissance occurred in Batanes in February-March 2003. The field research will be continued in 2004.

THE BATANES ISLANDS

The Batanes Islands lie on the northern edge of the tropics, 150 km from the southern tip of Taiwan and 200 km from the north coast of Luzon (Figure 1). They are separated from Luzon by the Balintang Channel and the Babuyan Islands, and from Taiwan by the open sea of the Bashi Channel. The group consists of three inhabited islands; dumb-bell shaped Batan, 18 km long and the most densely populated island of the group; 10 km long Sabtang; and 18 km long Itbayat, the largest island in land area. In terms of the human environment, Batan is by far the most fertile island in the group, particularly its central "neck" between the Iraya and Matarem volcanoes. Here, a remarkable patchwork of small hedged pastures and fields stretches right across the island from coast to coast (Figure 2). Most Batan archaeological sites occur in this area (Figure 3).

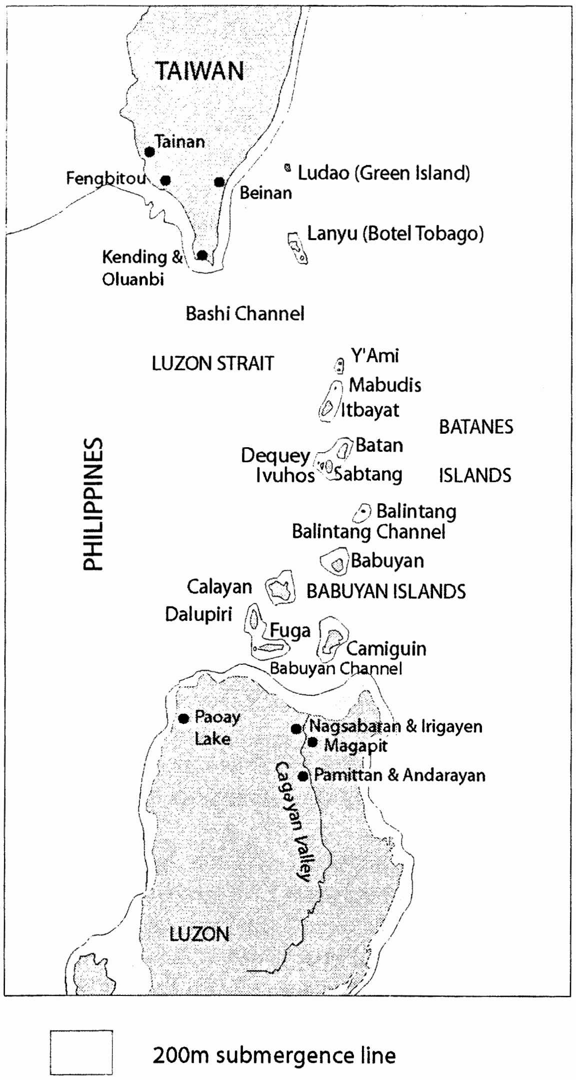


Figure 1: The Batanes Islands, and their location between southern Taiwan and northern Luzon.

Because the Batanes are situated in the ocean strait between Taiwan and Luzon they tend to have rough seas and windy weather for much of the year, with prevailing winds from the northeast in the northern hemisphere winter and from the southwest in the summer. Typhoons occur in late summer; William Dampier's ship (see below) was forced from its Ivuhos anchorage in early October 1687 by a violent storm and blown out to sea. He was not able to return to the island for 6 days. Rainfall in this region is relatively unreliable, a circumstance that, with the rugged topography, might have led to a virtual disappearance of rice from the Batanes crop roster by ethnographic times (Dewar 2003).

Unfortunately, natural history data on the Batanes Islands are scarce. The islands would have been forested before human arrival (Valerio 1995), but we are unable to locate any systematic reconstructions of either flora or fauna for them in prehuman times. Despite a great deal of "received wisdom" in the older literature that the Batanes and Babuyan Islands were part of a Pleistocene land bridge from Taiwan to Luzon, there is absolutely no geological or faunal evidence to demonstrate that this was ever the case (Heaney 1985; Bellwood 1997). Sea bed depths in the Bashi channel attain at least 1000 m – clearly far too deep to be affected by Pleistocene sea level fluctuations. As in many of the similarly-isolated small islands of eastern Indonesia, we would expect the Batanes terrestrial mammal fauna to have been restricted to rodents and bats before human occupation – the distances from Taiwan and Luzon would have been too great even for wild pigs to swim across (Meijaard 2001). However, recovery of pre-human floral assemblages from pollen cores and bone assemblages from caves are important topics for future Batanes research. Pigs were certainly present in Batanes in prehistory, and ethnographic accounts refer to deer (Hidalgo 1996:64), but we assume these animals were introduced by humans unless proven otherwise.

Unlike Lanyu (Botel Tobago) off southeastern Taiwan, and Mountain Province in Northern Luzon, the Batanes Islands have always been in a kind of ethnographic "rain shadow" behind the cultural "peaks" to north and south. As a result, we have few detailed records of traditional native life that can aid archaeological understanding. Most information is anecdotal or derived from vague missionary observations. A rather glaring example of this can be found in the huge compilation of historical documents on the Philippines by Blair and Robertson, in which it is stated (1903-9, Vol. 39, page 97, footnote) that "the present population of the Batanes is composed very largely of Ibanag from the Cagayan Valley (Luzon), introduced there as colonists by the Dominican Friars". In actuality, the Ivatan and Itbayaten populations, like the Yami of Lanyu, have their own quite independent languages and customs and would perhaps be disappointed to read such an offhand dismissal of their cultural background.

There does exist one absolutely invaluable eye-witness ethnographic document, penned by the English navigator and "privateer" William Dampier, who visited the Batanes in August-September 1687 (Blair and Robertson 1903-9, Vol. 39, pp. 95). Dampier arrived first off Batan, which he called Duke of Grafton's Isle, and recorded the presence of "abundance of inhabitants" in at least four "large Towns". At that time, both Batan and Sabtang were thick with terraced and defended settlements on hill tops and ridges, some apparently inland and some coastal, protected wherever possible by "precipices". These defended sites are today termed *ijang*, and several have been investigated archaeologically, although they are not discussed further in this

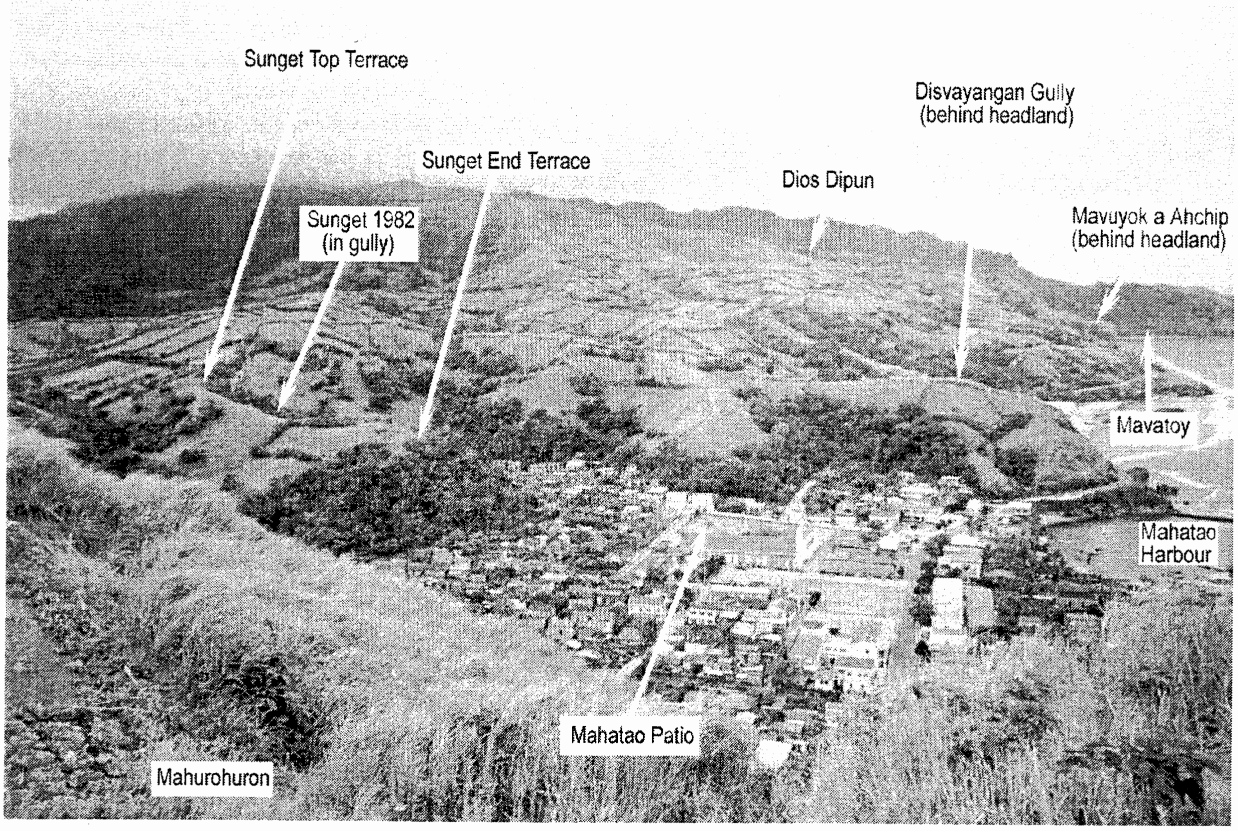


Figure 2: Mahatao and surroundings taken from Mahurohuron, showing the locations of the Sunget sites. The other sites marked - Mahatao Patio, Disvayangan, and Mavuyok a Ahchip, belong to the Rakwaydi Phase and are not discussed in this paper. The summit of Mt Matarem is under the cloud in the left background.

paper. In 1687, Batanes people grew bananas, pineapples, pumpkins, sugar cane, yams, cotton, and "Potatoes", a term which surely referred to the sweet potato, or *camote*, already introduced from South America to the Philippines by the Spanish. Rice was not seen growing, and no cattle or water buffalo were mentioned, even though they are universal as livestock today.

PREVIOUS ARCHAEOLOGICAL RESEARCH IN THE BATANES ISLANDS

Apart from early observations of Babuyan and Batanes jar burials by Solheim (1960), the first major archaeological research project in Batanes was carried out by researchers from the University of Kumamoto in 1982 (Koomoto 1983). The Japanese team surveyed the central neck of Batan Island, between the Iraya and Matarem volcanic complexes, finding many assemblages of burial jars, sherds and other artefacts exposed on the present ground surface and in the walls of road cuttings. They apparently did not realise that many of the assemblages, especially those with red-slipped pottery, were also buried under one or more layers of volcanic ash from a past eruption of Mt Iraya. Several of these buried sites have been investigated in the recent research and are discussed below. One of them, the Sunget Neolithic site near Mahatao, was the main attraction in bringing the AFAP team to Batanes in 2002 (Koomoto 1983:55; Bellwood 1997:221).

Since 1982, there have been a number of other archaeological projects in Batanes, particularly on Ivuhos, Itbayat and Batan Islands, organised by the National Museum of the Philippines and the Archaeological Studies Program at the University of the Philippines. Most of these have involved survey and test excavation of late prehistoric *ijangs*, of burials covered by boat-shaped cairns of stones, and of jar burials (Dizon and Santiago 1994; Dizon *et al.* 1995; Dizon 2000; Mijares and Jago-on 2001; Faylona 2003; Mijares *et al.* 2003; Paz 2003).

BATAN ISLAND: VULCANICITY AND ARCHAEOLOGY

Before describing the archaeology of Batan, it is necessary to examine the recent volcanic history of the island. The southern volcanic complex, Mt Matarem, is no longer active, but many sites are buried under volcanic ash from the

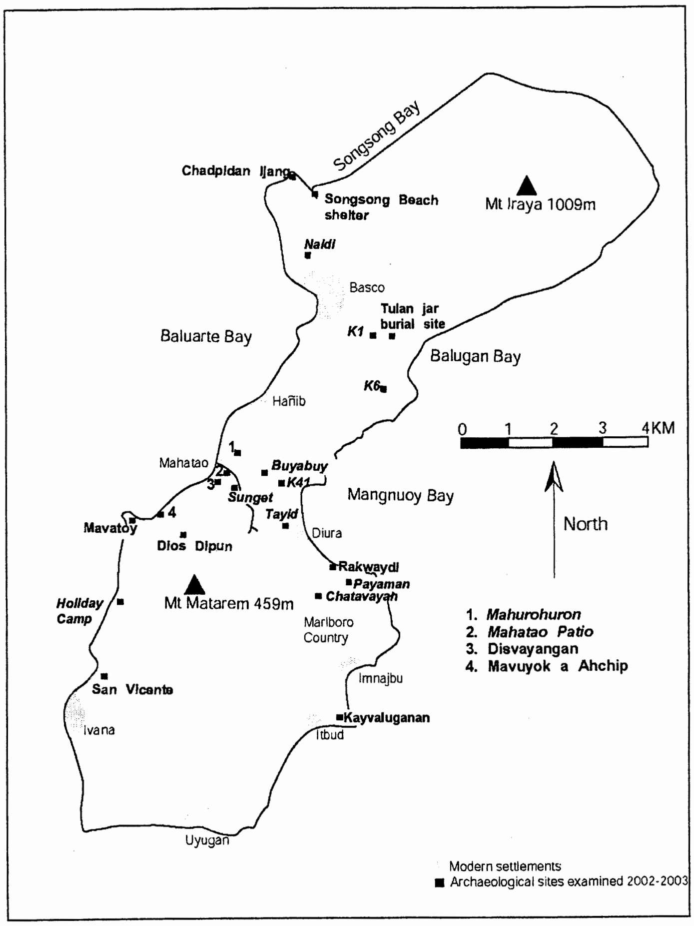


Figure 3: Sites investigated on Batan Island by the AFAP team in 2002 and 2003. Names of archaeological sites are in bold. Those in italics have pottery stratified beneath ash deposits, and thus probably predate 1500 years ago. Sites labelled K1, K6 etc are from Koomoto 1983, with original numbering system.

northern volcano, Mt Iraya. This ash blanket provides a very useful minimum age in central Batan for the buried archaeological assemblages in protected hill and ridge top sites, these being situations where secondary alluvial and colluvial deposition can be ruled out.

The geological survey of Richard *et al.* (1986) established that this last phase of volcanic activity took place between 760 BC and AD 650 and was associated with widespread falls of volcanic ash and lapilli. The last eruptive event was the collapse of the cone on the western side of Mount Iraya between AD 450 and 650 with restricted local deposition. Richard *et al.* (1986) determined the chronology of these events from three C14 dates on charcoal collected from beneath volcanic deposits at Naidi and Songsong Bay (Figure 3; Table 1). Our own results, from the archaeological sites of Naidi, Sunget, Tayid and Payaman (Figure 3) confirm these earlier findings, with the youngest reliable date from beneath the ash coming from Payaman (110 BC to AD 130). Although we also have a date of 1590±210 bp from Naidi, this date is not considered a good estimate of the ash fall event given the low carbon content of the sample (ca. 25%) and as a consequence the large standard deviation. From our own survey work we also know that the major ash deposit is thickest in the west at Sunget, thinning towards the east at Tayid and Payaman. This is possibly not that surprising given that the predominant wind direction in Batan is from the northeast.

For the purposes of this paper the following preliminary conclusions on the volcanic history of Batan can be made:

1. The last phase of volcanic activity from Mount Iraya began with major ash falls in the first half of the first millennium AD.
2. Volcanic activity ceased at around AD 500.

This information on the recent volcanic history of Batan is important because it allows us to apportion the archaeology into two separate chronological periods – before and after first half of the first millennium AD. The archaeological assemblages from these two chronological periods have some obvious differences, although no site actually spans the period of eruption itself with continuous occupation below and above the ash.

THE BATAN ARCHAEOLOGICAL SITES

In February-March 2002, the AFAP team excavated and augered the following stratified and significant sites on Batan (minor sites are not discussed, but were listed in the unpublished preliminary report distributed as AFAP 2002):

Sunget Top Terrace, Mahatao
Naidi (termed Basco-Songsong Road in AFAP 2002)
Mavuyok a Ahchip, a volcanic rock shelter
Dios Dipun, a limestone rock shelter inland from Mavuyok a Ahchip.

In February-March 2003, a different AFAP team returned to Batan to conduct further reconnaissance and excavation at:

Sunget Top Terrace, Mahatao (second phase)
Mahatao Town – augering
Mavatoy rock shelter
Payaman
Tayid.

These sites are all shown in Figure 3. This paper focuses on Sunget and Mahatao, with briefer comments on Naidi, Payaman and Tayid. All these sites predate the last eruptive phase of Mount Iraya. The younger sites, that include the

Table 1: Radiocarbon dates from Batan and Sabtang Islands, 2002 and 2003 fieldwork, and for red-slipped pottery excavated in northern Luzon related to that of the Sunget Phase. All dates are on charcoal, except for WK13090. Calibrations use Oxcal version 3.8

Site	Context	Date bp	Lab no.	Oxcal, 2 sigma
BATANES	SUNGET PHASE			
Sunget Top Terrace	Layer 5 charcoal concentration	2630±30	ANU 11693	840-760 BC
Sunget Top Terrace	Squares A/D, layer 5, 20-30 cm within layer	2000±140	ANU 11707	400 BC – AD 350
Sunget Top Terrace	Layer 5, food residue in pottery (AMS)	2910±190	ANU 11817	1700-500 BC
BATANES	NAIDI PHASE			
Naidi	A2, 0-10 cm within layer	2240±140	ANU 11708	800 BC – AD 50
Naidi	South sample in road section	1590±210	ANU 11694	50 BC – AD 900
Naidi	North sample with pottery	2620±30	ANU 11695	835-760 BC
Naidi	A1, 0-10 cm within layer	200±360	ANU 11709	Error too large
Mahatao Septic Tank	Cultural paleosol at 2.5 m below surface (AMS)	2090±60	ANU 11710	500 BC – AD 350
Payaman (Batan)	North square, layer 3, 10-25 cm within layer	1988±47	WK 13092	110 BC – AD 130
BATANES	RAKWAYDI PHASE			
Mavatoy	Square A, 25-30 cm below surface (*Turbo* shell)	682±49	WK 13090	(marine shell)
Dios Dipun shelter	Test Pit 2 at 175 cm below surface	500±260	ANU 11696	Error too large
Dios Dipun shelter	Extension S. end 120 cm	590±110	ANU 11736	AD 1210-1530
Mavuyok a Ahchip	Square C, layer 2, 5-10 cm within layer	Modern	ANU 11711	Modern
Mavuyok a Ahchip	Square C, layer 3, 0-5 cm within layer	550±70	ANU 11712	AD 1290-1470
Mavuyok a Ahchip	Square B, layer 3, 25-30 cm within layer	750±80	ANU 11697	AD 1040-1400
Mavuyok a Ahchip	Square C, layer 3, 30-35 cm within layer	900±60	ANU 11713	AD 1020-1260
Pamayan (Sabtang)	Square A, 100-105 cm below surface (AMS)	418±41	WK 13091	AD 1420-1630
Savidug (Sabtang)	Below *ijang*, square C, 100-110 cm	760±190	ANU 12070	AD 850-1650
CAGAYAN VALLEY, LUZON	RED-SLIPPED POTTERY PHASE			
(NB: Nagsabaran and Magapit have dentate stamping)				
Pamittan	Layer II (Tanaka & Orogo 2000:132; Spriggs 2003:67)	3390±100	Gak 17967	1940-1440 BC
Pamittan	Layer III	3810±200	Gak 17968	2900-1700 BC
Andarayan	AMS date on rice husk (Snow et al. 1986)	3400±125	Unknown	2050-1400 BC
Andarayan	(Snow et al. 1986:3)	3240±160	SFU 86	1950-1050 BC
Nagsabaran	Level 16 (Hung Hsaio-chun, pers comm)	3050±70	GX 28379	1450-1050 BC
Nagsabaran	Level 19	3390±130	GX 28381	2050-1400 BC
Irigayen	Layer 3 (Ogawa 2002:95)	3025±20	NUTA2-914	1380-1130 BC
Irigayen	Layer 3	2925±20	NUTA2-912	1260-1020 BC
Irigayen	Layer 3	3165±25	NUTA2-913	1520-1390 BC
Irigayen	Layer 3	3185±25	NUTA2-917	1520-1410 BC
Magapit midden	Spit 9 (Aoyagi et al. 1991:50; Spriggs 1996:35)	2720±135	N5396	1300-400 BC
Magapit midden	Spit 20	2680±120	N5397	1200-400 BC

three rock shelters listed above, will be reported elsewhere. However, one reason why these rock shelters were targeted for excavation was the prospect of finding preceramic deposits. Such were never found, and the three rock shelters listed only contained deposits dating from the past millennium. The implications that the Batanes did not have a preceramic hunter-gatherer population are intriguing, but require further confirmation.

Sunget Top Terrace

The importance of the Sunget site (Site 56 in Koomoto 1983: 55), on the limestone ridge that rises immediately behind the central part of Mahatao township, was first indicated by the Japanese survey in 1982. Undoubtedly the most important Neolithic site found so far in Batanes, Sunget was found during construction of the road (now concrete, but at that time dirt) that runs from Mahatao harbour, along the southern side of Mahatao Patio (Beateria Street in Figure 5), and inland towards Mt Matarem up a narrow valley. Informants told us that soon after this road was cut, artefacts appeared in the bulldozer cut made into the south flank of the limestone ridge, about 600 m inland from the sea.

The original Sunget find place was located well below the top of the ridge in a situation suggestive of a movement of material downslope from a higher settlement area. Augering in 2002 found no trace of any undisturbed deposit

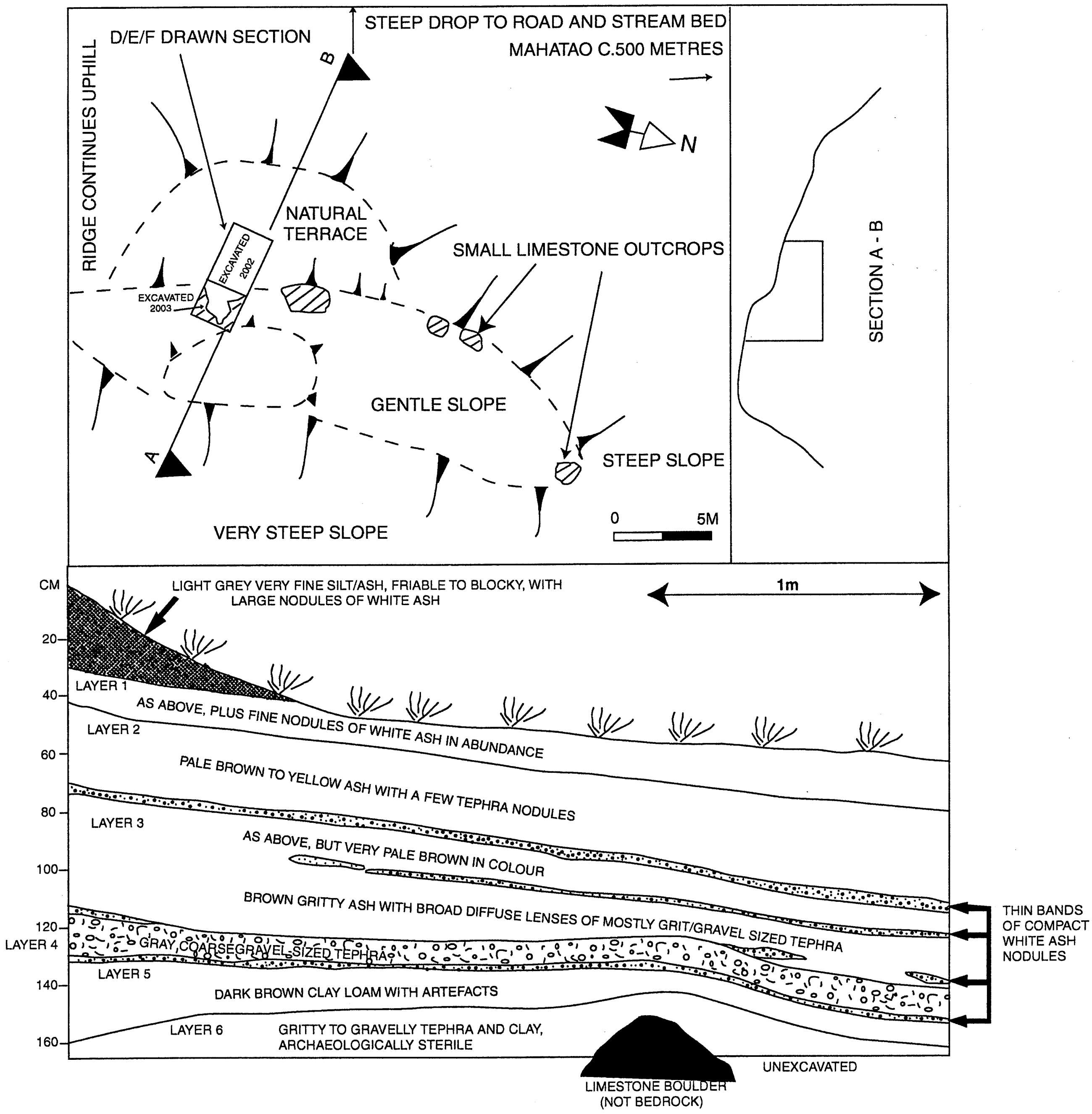


Figure 4: Upper: Plan of the Sunget Top Terrace excavation, 2002 and 2003. Lower: Section through the Sunget Top terrace excavation, based on the southeastern wall of the 2002 trench. The archaeological deposit is layer 5.

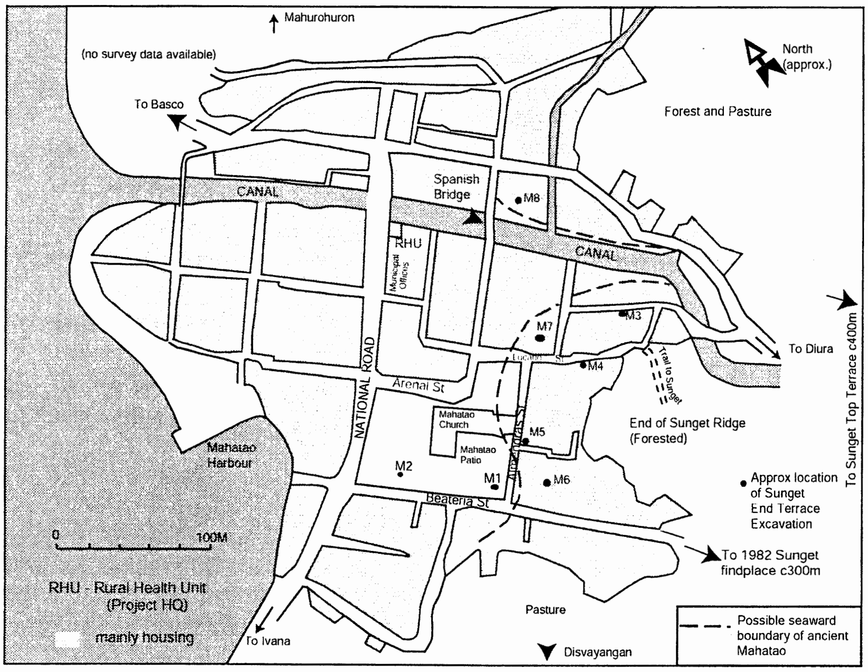


Figure 5: Plan of Mahatao showing auger hole locations (M1, M2, M5, M6, M7), Mahatao Septic Tank site (M3), another find-place of pottery beneath volcanic ash (M4), and the find place (M8) of an untanged and polished basalt adze 19 cm long with a reversed triangular cross-section, in the possession of Irwin Castillo, Mahatao High School. A C14 date from M5, at a depth of 5 mm below surface, is awaited (January 2004). Base map courtesy Municipal Government, Mahatao.

in the vicinity of the Kumamoto 1982 find place, perhaps because the road construction, the Kumamoto investigations and subsequent ploughing of the land had disturbed or removed most of the material. The Kumamoto report does not refer to any excavation undertaken in 1982, but it states that a "pit dwelling" was observed in the road section and notes that the Neolithic materials were recovered from a 30 m-long section at a depth of 120-240 cm below the surface, sealed below "silt" (i.e. volcanic ash).

Because of our lack of success at the original Sunget site, we moved upslope in 2002 to take cores along the top of Sunget Ridge, especially in the location that we called Sunget Top Terrace (the terrace being a natural slump feature in the ash rather than an archaeological feature). This terrace lies just below the top of the ridge, from which protrude several blocks of limestone indicating the existence of a buried outcrop. Luckily, we hit dense pottery sherds in 2002 at about 1 m below the terrace surface, beneath a deposit of archaeologically-sterile volcanic ash. As a result, we opened a 3 by 2 m excavation in 2002, expanded by an additional 2 by 2 m excavated into the ridge top in 2003 that exposed the side of the limestone outcrop that once protruded about 2 m high above the ground, prior to its burial under the volcanic ash (Figure 4).

The 3 m-long stratigraphy of the southeastern wall of the 2002 trench is also shown in Figure 4. The topsoil (layer 1) contained no artefacts apart from one stray ceramic sherd. Layers 2 to 4 below are *in situ* volcanic ashes, deposited as a continuous series with no topsoil horizons between them. Thus, this hilltop location was subjected to a dumping amongst limestone boulders of *at least* 1 m of tephra, mostly volcanic ash, and possibly more than 1 m if we allow for later erosion.

The only cultural deposit in the site is layer 5, a rather heavy and sticky clay loam that formed the pre-eruption topsoil on the ridge, over a basal and culturally sterile clay that lies in turn over the limestone bedrock. The disposition of the sherds and other artefacts in layer 5 became clear during the 2003 season, when we excavated back right up against the limestone outcrop. A dense deposit of sherds had been deposited around and against the base of the limestone, reaching about 45 cm in thickness against the rock, where solution had led to the formation of a natural channel about 20 cm deep and about 25 cm wide into which many of the sherds had sunk. Away from the rock the density of sherds fell away quite sharply and the cultural layer shrank to about 25 cm thick within a metre of the rock, with the outer (westerly) 2 m^2 of the 2002 trench being virtually sterile. Hard against the rock the sherds were quite large, but moving away from it the average sherd weights dropped sharply, presumably owing to trampling or later cultivation activities (Table 2). Thus, deliberate dumping or placing of pottery against the base of the limestone and to about 2 m away from it had taken place.

The possibility that this could reflect ritual activity should perhaps be borne in mind. The situation reminds Bellwood of the contemporary red-slipped pottery site of Bukit Tengkorak in Sabah (Bellwood 1989), where sherds had been deliberately placed on the bare rock summit of the volcanic crater rim, just near the location of the excavated archaeological rockshelter. These sherds had presumably been placed there for some purpose unrelated to normal daily life, unless the rock was being used as a look-out point (but then, why take up finely decorated pottery?). In the case of Sunget, also an excellent look-out point, the pots might originally have been placed on top of the rock, but we cannot know this without total excavation of the

Table 2: Sunget Top Terrace: Distribution of sherds by number and weight within layer 5. Away from the limestone, the sherds in the top 10 cm tend to be smaller than those in the bottom 20 cm, perhaps due to post-occupational trampling or cultivation. Next to the limestone, the sherds in the top 10 cm are more numerous and larger than those below, suggesting they were deliberately piled/dumped against the rock, and thus subsequently protected from trampling.

STT Layer 5: 2003 excavation, against limestone (1.3 m²)	No. Sherds	Average Sherd Weight (g)	STT Layer 5: 2002 excavation (away from limestone – 6 m²)	No. Sherds	Average Sherd Weight (g)	Small finds 2003
0-5	2750	12	0-5	400	3.4	
5-10	850	10.9	5-10	374	6.4	3 notched pebbles
10-15	1350	9.6	10-15	445	7.7	2 notched pebbles
15-20	1880	10.3	15-20	398	10.3	3 notched pebbles
20-25	1400	9.9	(20-30) (excavated as one 10 cm spit)	940	8.4	3 notched pebbles
25-35	1060	6.2				3 notched pebbles 1 spindle whorl

area since the rock is now buried. Further surmise seems unwarranted, since "ritual" interpretations of this type can only be upheld if paralleled by a large number of similar situations in other sites.

There are three C14 dates from Sunget layer 5, all on samples taken in 2002. The most significant is an AMS date on food residue inside a potsherd, at 2910±190 bp (ANU 11817). Two conventional dates from layer 5 are 2630±30 bp (ANU 11693) from a charcoal concentration, perhaps a hearth and 2000±140 bp (ANU 11707) on loose pieces of charcoal collected through the layer. The latter date perhaps reflects post-occupation activity. The first two dates seem to be the most reliable and indicate occupation between outer limits of 1700 and 500 BC. Several of the sets of matching rims that belong to individual vessels were found right through the archaeological deposit, suggesting that it represented one phase of activity, lasting perhaps only a few years, during which time the sherds were exposed on the ground surface and subjected to casual disturbance and reassortment. The pottery style is quite unified in terms of rim forms and vessel shapes, so the 1200 year occupation span contained within the ultimate C14 calibration ranges is, of course, most unlikely. In addition the pottery is found well within the palaeosol (layer 5), suggesting that when the ash fell at Sunget, it had been long abandoned.

The cultural materials excavated from Sunget Top Terrace are described in detail later, but three concentrations of rounded volcanic rocks were found, not native to this location. No evidence was found for any *in situ* cooking pits. Apart from the possibility of ritual activity mentioned above, another interpretation is that this material represents domestic refuse from a nearby living establishment, perhaps of one or more field huts placed among the large limestone boulders (to give wind protection?), since this is one of the closest areas of arable land to Mahatao. It is unlikely that the Mahatao settlement itself stretched right to the top of Sunget since deposits of this period were absent in the separate Sunget End Terrace excavation undertaken in 2002 (located on Figure 5), just above Mahatao, where a mixed and obviously disturbed deposit 40 cm deep, with iron fragments and imported ceramics, was excavated sitting directly on the limestone bedrock.

Investigations in Mahatao Town

When Mahatao was visited by Dizon and Bellwood in 2001, the Patio (an open grassy area, now used for playing football) next to the church was found to be covered in pottery, much of it red-slipped like that reported from Sunget by the Kumamoto team. Unfortunately, two small excavations in 2002, near the locations of auger holes M1 and M2 in Figure 5, showed that the whole area had been disturbed by grading and well-digging; the results of these excavations are not detailed here (see AFAP 2002).

In 2003, one of the team members, Shawna Yang, discovered a quantity of circle-stamped Sunget type pottery, along with lots of large marine shells, alongside one of the Mahatao basketball courts near the church (Figure 5). As we knew this material had to come from a limestone soil that preserved shell in good condition, and given that Sunget Ridge is limestone, we decided to auger in gardens close to the base of Sunget Ridge at the back of Mahatao. None of these auger holes, however, has yet produced a likely source.

Despite this, the auger holes do give interesting information about the disposition of the pre-eruption coastline beneath Mahatao, summarised in Figs 5 and 6. Locations M3, M5, M6 and M7 have sherds and charcoal stratified in humic dark soil layers (palaeosols) beneath redeposited volcanic ash, presumably washed down from

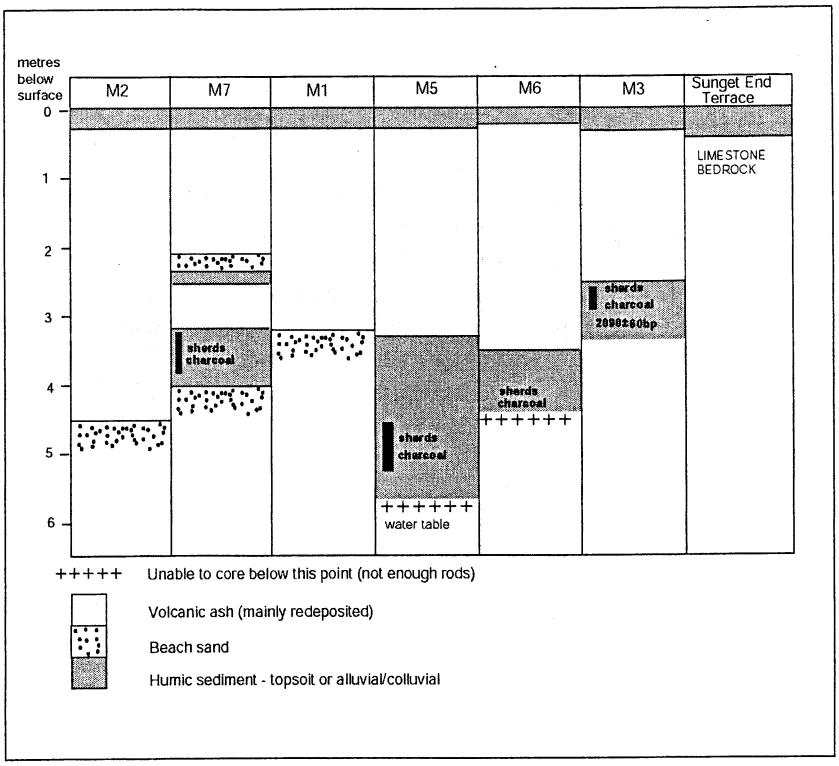


Figure 6: Layers revealed in the Mahatao auger holes indicated in Figure 5.

Sunget Ridge. The M3 (Mahatao Septic Tank) pottery was recovered in 2002 and is dated to 2090±60 bp (ANU 11710). Locations M5, M6 and M7 also have palaeosols with sherds and charcoal beneath the ash. Unfortunately, augering in M6 and M7 had to stop before we could get below the artefact-bearing layer since we only had 4 x 1 m auger rods with us in 2003 (M5 was augered to 6 m since we were able to climb down 2 m into an abandoned septic tank pit). However, we were able to establish that locations M1 and M2 (both augered in 2002) and M7 (augered in 2003) finished in clean beach sand.

These data indicate that, during the Sunget and Naidi Phases (to be defined below at *c.* 1500 BC to AD 500), the flat embayment upon which modern Mahatao stands did not exist, except for a narrow strip of coastal soil around the head of the bay, just above the sandy beach, delineated partly by guesswork in Figure 5. The eruption itself presumably helped to fill in the bay, not just by direct ash deposition but also by the subsequent in-washing of huge amounts of ash from hinterland valleys and slopes. Before the eruption, the main river of Mahatao must have debouched into the harbour between locations M3 and M8. It still flowed through the centre of the village, apparently running just north of the church, into the modern harbour until the 1940s, when it was re-routed within its present concrete channel (William Agsunod, Mayor of Mahatao, pers. comm.).

Given this reconstruction of ancient Mahatao it is no surprise that so many archaeological materials should have been found on Sunget Ridge, where no houses exist today. In the pre-ash fall period, the population would have been quite constricted along the narrow coastline and people must have moved up to satellite hamlets on Sunget Ridge itself, into areas used today only for pasture and cropping. Our next project, scheduled for 2004, is to excavate an area behind M5 at the base of Sunget Ridge to try to find the source of the basketball court pottery, the shell midden, and possibly the first settlement constructed in Mahatao.

Naidi *(termed "Basco-Songsong Road" in AFAP 2002)*

Richard *et al.* (1986) identified a road cutting that exposed a buried palaeosol containing pottery and sealed beneath over 2 m of tephra. We investigated this location, which lies between Basco and Songsong Beach at around 63 m above sea level, and found a single continuous archaeological layer about 20 cm thick (Figure 7). The main exposure is on the west (upper) side, where the cutting is about 150 m long. The stratigraphy is very consistent along the section and there is no sign of any cultural material in layers beneath or above the cultural layer itself, with the exception of some unslipped sherds in the modern topsoil. The volcanic ash deposits here extend to a depth of 2.4 m, with intervening thin topsoil formation at about 2.1 m. Two small excavations into the side of the road cutting in 2002 yielded quite abundant pottery within the surface of the buried palaeosol. As detailed in Table 1, four C14 dates from different locations within the upper 10cm of the site (and thus not in a stratified series) are now available for this deposit. Excluding the presumably out of context ANU 11709, the remaining dates give a calibrated age range of between 835 BC to AD 900 – in actuality a much wider range that can be accommodated by such a shallow archaeological deposit. The main concentration of dates points to the late first millennium BC for the Naidi assemblage.

Payaman

The Payaman site was discovered by chance in our search for the source of the Mahatao basketball court pottery. A number of Mahatao municipal labourers believed the source to be from near the Mahatao municipal garbage dump. Located high inland on the edge of Marlboro Country, an archaeological layer had been disturbed by grading for the dump and red-slipped sherds were strewn thickly around. Augering quickly located an undisturbed area near the perimeter fence of the dump, and a 2 by 1 m square was dug in 2003. The stratigraphy is very simple (Figure 8), with culturally sterile topsoil and subsoil (layers 1 and 2), over primary volcanic ash (layer 3), here much thinner than at Sunget, in turn over palaeosol (layer 4) containing cultural material. Within layer 4, sherds are numerous and concentrated heavily between 10 and 25 cms below the surface of the palaesol. The cultural layer has a C14 date of 1988±47 bp (WK 13092). As at Sunget, Payaman had long been deserted when the major ash fall occurred. Being quite shallow, flat, and located close to grading equipment, this site would be an excellent prospect for a future area excavation to recover evidence for houses and settlement features.

Tayid

The Tayid site was originally reported by Koomoto (1983, Site 49), who noted the presence of two archaeological layers separated by "silt" layers, presumably volcanic ash. The site is another that has been exposed by a road cutting, and two small "windows" were dug into the cutting face in 2003 to describe the stratigraphy. This consisted of 6 layers, as follows:

Layer 1: topsoil and redeposited volcanic ash, 50 cm thick;
Layer 2: Primary volcanic ash, 60 cm thick;
Layer 3: Palaeosol, 10 cm thick, with a small number of featureless plain body sherds;
Layer 4: Primary volcanic ash, 7 cm thick;
Layer 5: Palaeosol, 20 cm thick, containing the bulk of the archaeological materials (pottery sherds) and with a posthole visible in section;
Layer 6: Culturally sterile red brown clay.

About 50 m away from the two test pits, also visible in the road cutting, lies part of a volcanic stone pavement about 2.5 m long that underlies the ash layer 4. This suggests that the site may contain domestic architecture. Koomoto (1983: 49) also noted the finding somewhere on the site of a broken baked clay casting mould for a cupreous spearhead. In the Taiwan and Philippine context such an item would be unlikely to date older than 250 BC, and could be as recent as AD 1000. Without further information we cannot know if this unique artefact (in the Batanes context) came from layer 3 or layer 5, or if it was a surface find. At any rate, Tayid had a far lower density of sherds than either Naidi or Payaman, and further research there is not planned.

THE BATAN CULTURAL SEQUENCE

As a result of the research so far, the pottery-based prehistory of Batan can be divided into three phases. So far we have found no evidence for preceramic settlement (despite excavating in three rock shelters), and no sites have yet been found that were occupied continuously throughout the three pottery phases, or even two of them, a circumstance

Figure 7: Excavation in the exposed road-cut face at Naidi: Katherine Szabó and Gay Lacsina are both trowelling in the cultural layer, that is sealed by the volcanic deposits above. Atholl Anderson is recording at the right.

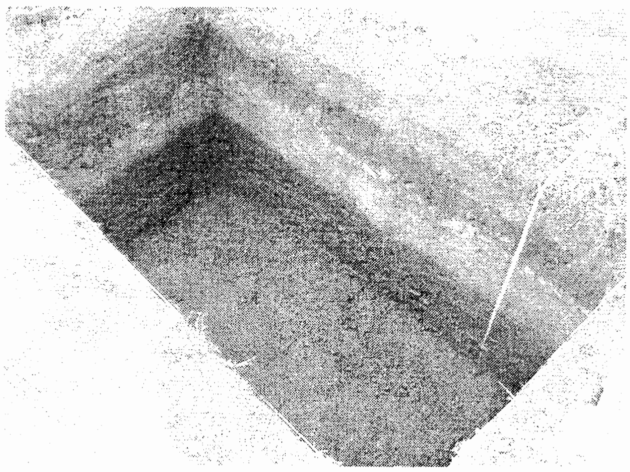


Figure 8: The stratigraphy of the Payaman site, Batan Island. The archaeological layer 4, with sherds protruding from the section wall, lies beneath the 30 cm thick pale coloured layer of sterile primary volcanic ash (layer 3). Trench depth 1m.

that may reflect the rather unstable nature of the Batanes environment. The three archaeological phases are as follows:

1. An early phase characterised by the red-slipped pottery found at Sunget Top Terrace, dating to between perhaps 3500 and 2700 years ago. This will henceforth be called the Sunget Phase.
2. An intermediate phase, represented by the pottery assemblages at Naidi, Mahatao Septic Tank, Payaman and Tayid, dating to between 2700 BP and the first half of the first millennium AD. This will henceforth be called the Naidi Phase.
3. A period of catastrophic volcanic eruption within the first half of the first millennium AD.
4. A post-eruption phase, represented by the stratified assemblages from the rock shelters of Dios Dipun, Mavuyok a Ahchip and Mavatoy; the open sites of Rakwaydi and Disvayangan on Batan; and Pamayan and Savidug *ijang* on Sabtang. This will henceforth be called the Rakwaydi Phase. All C14 dates for it fall between AD 1000 and "modern".

The Sunget Phase

Interest in the Sunget assemblage was sparked originally when Bellwood was writing the first edition of his *Prehistory of the Indo-Malaysian Archipelago* in the early 1980s (Bellwood 1985). The Sunget material found in 1982 was Neolithic, related to assemblages of Neolithic date in Taiwan (especially Yuanshan and Beinan), and (as we now know) also to assemblages of stamped and red-slipped pottery in the Cagayan Valley and other areas of Northern Luzon (e.g. Magapit, Nagsabaran and Irigayen in the lower Cagayan valley, Dimolit in coastal Isabela). All of these linkages fall generally into the period 1500-500 BC, as discussed in Bellwood 1997:221. The possible correlations with early Austronesian dispersal from Taiwan southwards formed the most exciting aspect of these links.

The Sunget material found by the Kumamoto team (Koomoto 1983) and by the AFAP team in 2002-3 is quite prolific in quantity and variety. The pottery is mainly red-slipped and includes:

Globular restricted vessels with everted tall and unthickened rims (Figure 9 a-d, f-h), some being internally quite convex in profile, perhaps to take lids. Some lips have thin shallow external grooves, and some of these vessels were probably placed on tall ring feet. Parallels for this pottery can be seen in the Irigayen assemblage from the lower Cagayan Valley (1520 to 1020 BC – see Table 1; Ogawa 2002:91), especially the concave rim profile and the external lip groove (although some of the Irigayen sherds also resemble the Naidi Phase materials from Batan). Similar high and concave rims occur at Magapit, also in the Cagayan Valley and dated to about 1000 BC (Aoyagi *et al.* 1991). Radiocarbon dates for these Cagayan sites are listed in Table 1.

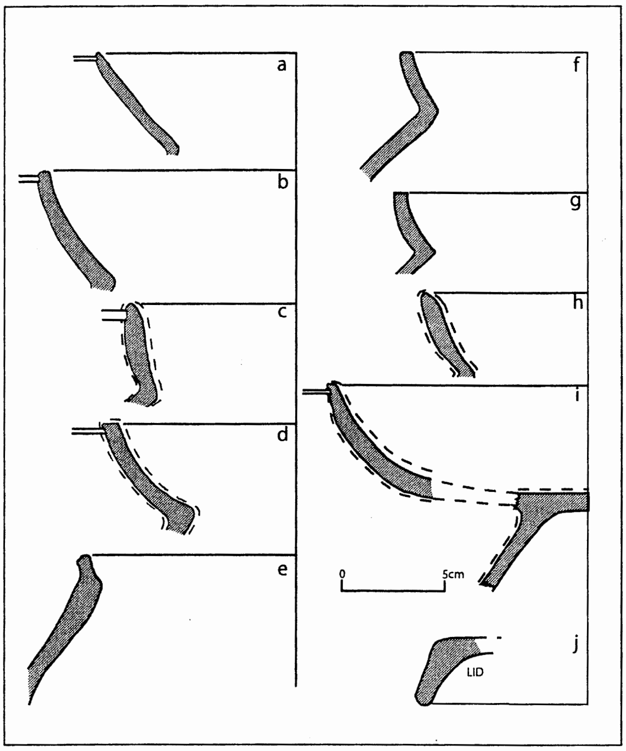
Open bowls with direct rims stated by Koomoto to have been placed on pedestals or ring feet (Figure 9 i, 10), the latter often perforated. Some bowls were externally decorated with zones of close-set stamped circles (Figure 11) forming what appear to have been rectangular meanders. Interestingly, in two circle-stamped sherds found in 2002 the decorated zones occur against thick and massive carinations, a shape category not represented in any of the drawings published by the Kumamoto team.

Circular-sectioned lugs or handles, attached either horizontally or vertically to the sides of vessels. These resemble the handles on Yuanshan and Beinan pottery in Taiwan, dating from the second and first millennia BC (Figs 12, 13). There are also small knobs that clearly belong to lids (Figure 12).

Completely flat sherds with impressions of large ribbed leaves (Figure 10m). These are rare, but at least one example was found in 1982, and we found three in 2003. They could be from evaporating pans used for precipitating salt from sea water, but this is only a guess (albeit one already proposed for similar flat and leaf-impressed sherds from Level 2 at Sigatoka in Fiji: Birks 1973:45).

An important absence in Sunget, and for that matter in all Batan sites, is cord-marking or any kind of paddle-impression on pottery. In this regard it should be noted that the Neolithic pottery of western Taiwan is heavily cord-marked, whereas such decoration is absent in eastern Taiwan after 2000 BC and subsequent to the Dapenkeng (oldest Neolithic, henceforth TPK, 3500 to 2000 BC). Sunget has also yielded no dentate stamping of the type common in Magapit and Irigayen in the Cagayan Valley, although it does of course have the circle stamping.

One unique (for Batanes) pottery finding in 2003 was the biconical spindle whorl found in the channel at the base of the limestone outcrop (Figure 14). The attributes of this whorl are recorded in Table 3, prepared by Judith Cameron, who has also contributed the following notes on the item. The central perforation is perfectly straight, although slightly off-centre, and the whorl would have functioned efficiently. As it is relatively heavy it is likely that it was used to spin strong fibres, perhaps the comparatively stiff elongated strands from leaves and hard leaf stems of *Musa textilis* (*abaca*, Manila hemp) or ramie (*Boehmeria nivea*). The biconical morphology links the whorl to Tanshishan sites in mainland China (3rd millennium BC), and to certain 2nd to 1st millennium BC Neolithic sites in Taiwan, particularly Yuanshan sites around Taipei, and Beinan in



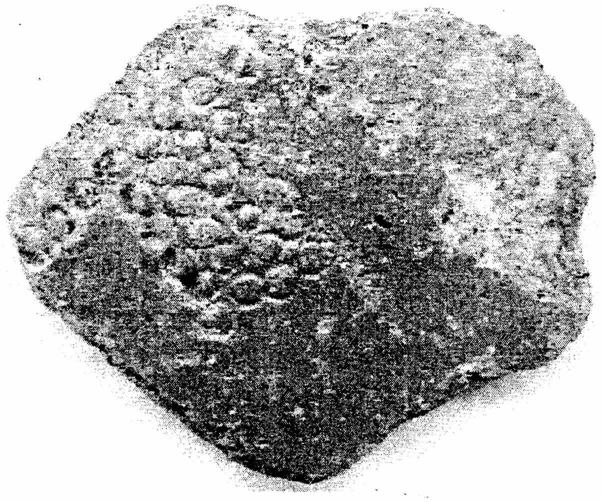


Figure 11: Stamped circle decoration on a red-slipped carinated sherd from Sunget, 5 cm maximum dimension. The stamping was done after application of the slip.

Figure 9: Profiles of Sunget pottery excavated in 2002 and 2003. Dotted lines indicate red slip.

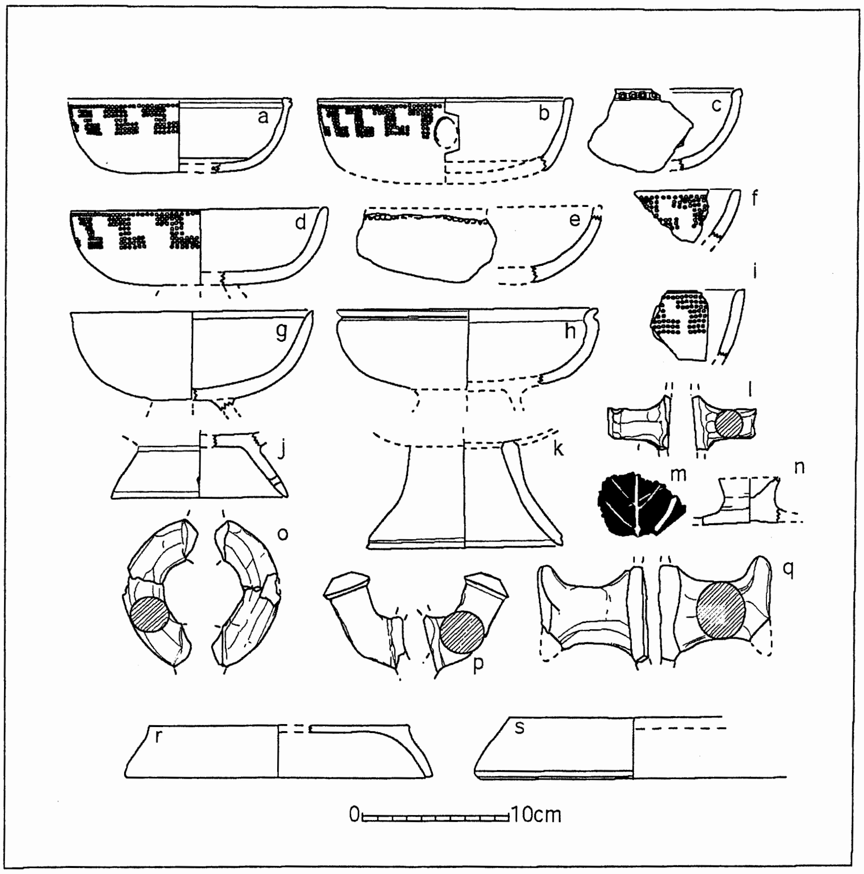


Figure 10: Pottery excavated at Sunget (site 56) by the Kumamoto team in 1982; (m) is a flat sherd with leaf impressions. Reproduced with permission from the University of Kumamoto.

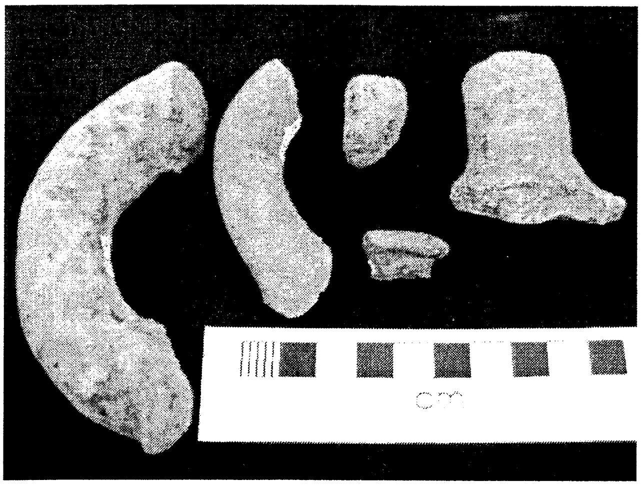


Figure 12: Four fragments of pottery handles and a lid knob (on right just above scale) from Sunget, 2002-3.

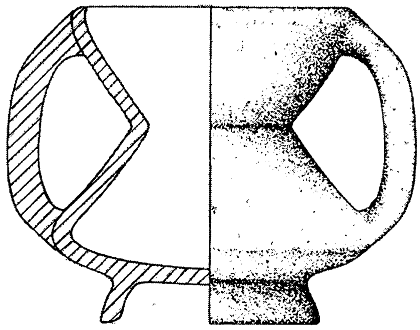


Figure 13: A footed vessel with two handles from Beinan, southeastern Taiwan (1000 BC?). Redrawn from Sung and Lien (1987).

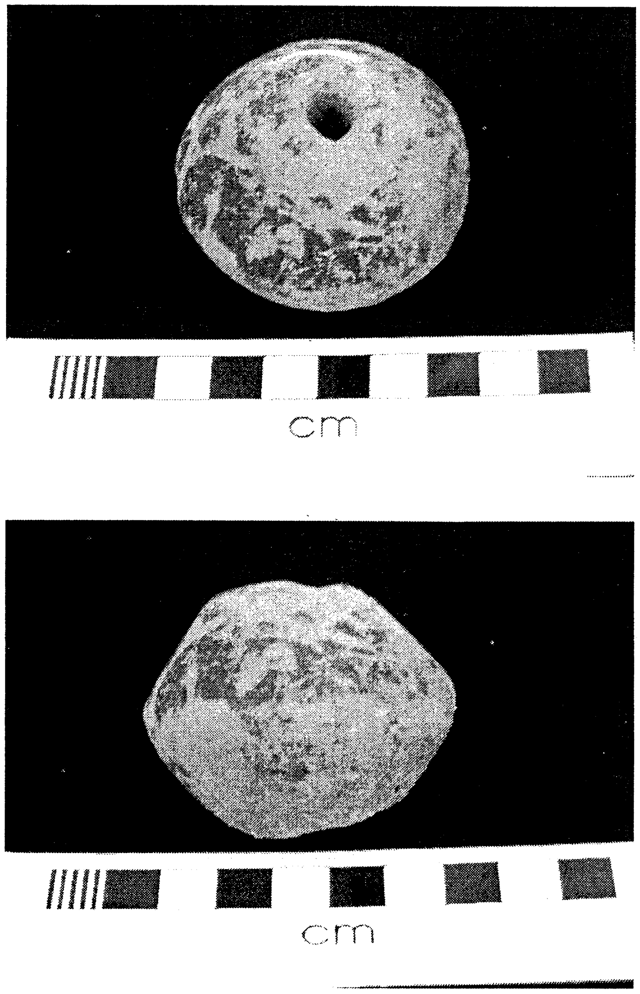


Figure 14: Baked clay biconical spindle whorl from Sunget, 2003. See Table 3 for measurements.

southeastern Taiwan. Similar biconical whorls also occur in 2nd millennium BC Cagayan Valley sites such as Andarayan, and possibly Arku Cave and Magapit (Cameron 2002).

Other Sunget Phase items include large numbers of notched and flat ovate pebble "net sinkers" of a type also common all over Taiwan from TPK times onwards (Figure 15); pitted anvil stones; and a very intriguing array of stone adzes of shouldered and stepped quadrangular types (found in 1982), both typical of the Yuanshan and Beinan cultural horizons (1500 to 500 BC) in Taiwan (Koomoto 1983: Figure 25). There are also perforated stone pendants and part of a perforated polished slate projectile point, again of a type very common in Taiwan from TPK times onwards (and indeed possibly imported from Taiwan, where slate occurs commonly). One remarkable absence from Sunget is any evidence for flaked stone tools – presumably chert-like materials were so scarce that the community depended entirely on polished stone. We found no more stone adzes or projectile points in 2002 or 2003.

The Naidi Phase

The Naidi Phase assemblages are more restricted in artefact variety than Sunget, and none contain any notched pebble "net sinkers", stone adzes or projectile points. Payaman, however, does contain a few tiny chert flakes, which is interesting given the complete absence of flaked stone tools in all other sites investigated, including Sunget. The Naidi Phase pottery is heavily red-slipped but has no other form of decoration such as stamping or incision. Quite sharp carinations are now present, and vessel rims are generally much shorter vertically than at Sunget, with lips that are quite often rolled or thickened externally, as shown in several examples in Figure 16. External lip grooving continues, as in Sunget and Irigayen, and the Irigayen rim forms for open bowls actually overlap quite closely with those of the Naidi Phase – compare those shown by Ogawa 2002, Figs 5 and 6, with the red-slipped bowl rim from Mahatao Septic Tank shown here in Figure 16 (fifth from top, right hand side). Payaman has a number of small perforated pottery lugs that clearly belong to a separate and presumably later tradition than the large handles from Sunget.

So far, pottery of the Naidi Phase seems to be very widespread, occurring certainly beneath the major AD 500 ash fall in sites all over central Batan, both coastal and inland, such as Disvayangan (unstratified), Mahatao Septic Tank (M3 in Figure 5), Buyabuy (surface finds), Mahurohuron, Mahatao Patio, Payaman, Chatavayan, Tayid, San Vicente Holiday Camp, and possibly in three other sites (K1, K6 and K41 on Figure 3) recorded by Koomoto (1983). This suggests that a large population was already in occupation on Batan by 500 BC, although if first settlement occurred before 1000 BC, as seems highly likely, this would come as no surprise.

The Rakwaydi Phase

Materials from this phase will be published elsewhere, but it should be noted that there is considerable regional variation in pottery style, more so than in the Naidi Phase. Southern Batan and eastern Sabtang appear to have formed one style zone in this period, with the Mahatao region forming another.

PALAEOENVIRONMENTAL RESEARCH

We now describe current palaeoenvironmental research in Batanes, and at Paoay Lake in Ilocos Norte (northwestern Luzon). The aim of this research is to provide an environmental context for the archaeological sequences and to investigate possible agricultural plant use. The introduction and intensification of agriculture would have led to large-scale changes in the landscape, and so an objective of our research is to determine if the Neolithic in the northern Philippines was associated with significant environmental change.

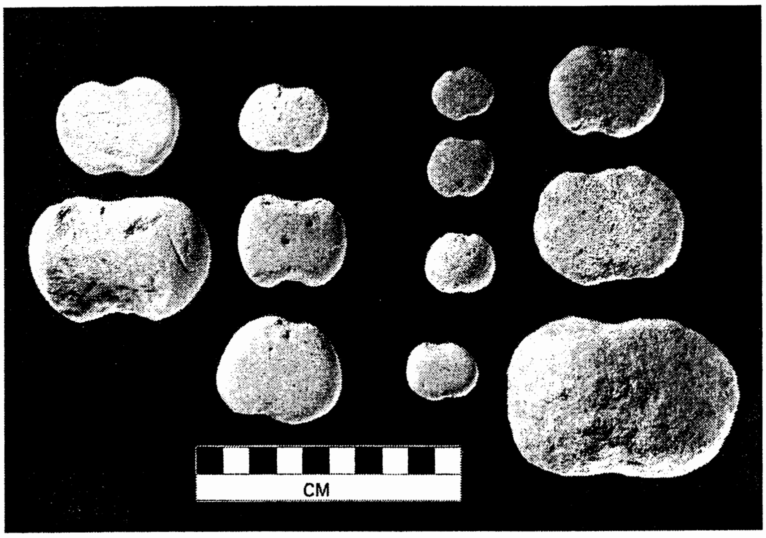


Figure 15: Left: notched pebbles from various sites in Taiwan; Suogang, Penghu, c.2500 BC (two at left and middle right), Kending, c.2000 BC (top right), and Guishan (bottom right). Right: seven notched pebbles from Sunget Top Terrace layer 5.

The palaeoenvironmental records are primarily being constructed from the pollen, spores and charcoal found in lake and swamp sediments. In locations where such waterlogged situations are not found, phytolith analyses of soil profiles are being carried out. Phytoliths have the advantage of being able to survive in situations that lead to pollen degradation and are an important tool for assessing agricultural activity. They are most abundant in grasses and are therefore produced by a number of agricultural plants. As an example, the phytoliths produced by rice are diagnostic, and one of the research areas we wish to explore is the history of rice farming in Batanes and northern Luzon. By contrast, the pollen of rice is difficult to identify, being morphologically similar to many other grass pollen types.

Batanes

In February and March 2002 we carried out reconnaissance for suitable palaeoenvironmental sites in Batan, Sabtang and Ivuhos. All three islands lack permanent, natural and undisturbed bodies of water, and there are no permanent swampy areas. Therefore, sediments from several unincised valley fills in Batan, and from a low-lying point behind a sand dune in the north of Ivuhos, were collected for phytolith analysis. The sediments were augered and samples collected every 5 cm. Trial processing has revealed that the sediments contain abundant phytoliths and have great potential for a study of landscape change. Further analyses are to be carried out in 2004.

During the 2003 archaeological field season several lakes were identified on the island of Itbayat. These hold some potential for palaeoenvironmental reconstruction using pollen and charcoal. A lake coring expedition is planned for early 2004.

Luzon

In October 2002, sediment coring was undertaken at Paoay Lake in northwestern Luzon (18° 07' N, 120° 32' E) (Figures 1 and 17). Coastal progradation and the subsequent development of a sand dune barrier during the late Quaternary are believed to have led to the formation of the lake (Siringan and Pataray 1997). This sand dune complex is approximately 2.3 km wide with an average elevation of

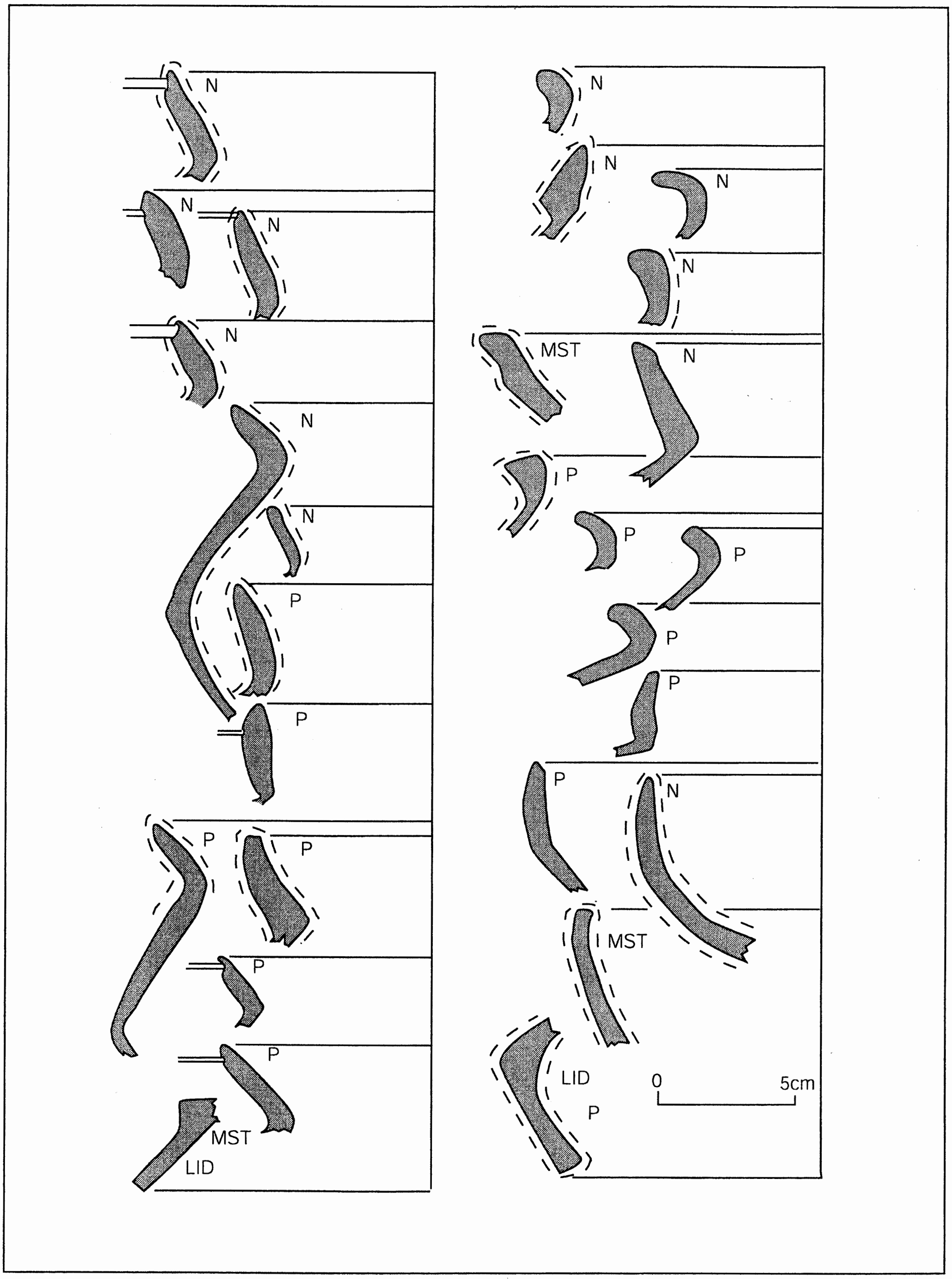


Figure 16: Pottery of the Naidi Phase. N = Naidi, P = Payaman, MST = Mahatao Septic Tank. Dotted lines indicate red slip.

40 m. A recent OSL date from within the sand dune system returned an age of approximately 55,000 years (Fernando Siringan, pers. comm. 2003).

The region experiences a tropical climate, with a wet season from May to October and a dry season from November to April. Rainfall shortages can occur during the wet season, associated with the El Niño phenomenon. Average annual rainfall is around 2000 mm, with the bulk falling during July, while the average annual temperature is 28° C. During the rainy season the lake surface constitutes just over half of the 7 km^2 watershed. The surface of the lake at this time is around 20 m above mean sea level, but falls by around 2 m during the dry season through the combined effects of evaporation and extraction of water for irrigation. Most of the surrounding landscape is a mosaic of secondary forest and rice fields, and during the dry season the exposed shoreline is heavily utilised for growing a variety of crops, including rice. Fish farming is carried out within the lake itself.

Three sites were explored as potential coring sites, but material was collected from only two of these, Core 2 and Core 3 (Figure 17). These two cores are from separate embayments on the eastern shoreline. Land surrounding the embayment of core site 3 is under rice cultivation, while the landscape near core site 2 has been re-forested during the last decade. Sediments at both locations were recovered using a Livingston corer, with water depth in each instance being around 3 m. Over 6 m of sediment was collected at each core location, with stiff clays and sand lenses halting the coring process. Unfortunately the upper 68 cm of sediment at core site 3 is unconsolidated and could not be retrieved with a Livingston corer. These upper sediments will be recovered during fieldwork in early 2004 with a specially designed interface sampler. Mineral magnetic measurements on the sediments have allowed the two cores to be correlated, revealing how many of the erosion and sedimentation processes affecting the lake have been regional and not confined to local catchments (Figure 18). Mount Pinatubo went through a significant eruptive phase from 3900 to 2300 BP (Newhall and Punongbayan 1996) and examination of the cores for volcanic glass is being undertaken to determine if any tephra from this period was deposited at the site.

Pollen and charcoal and analyses have begun on core 3 and a summary of the preliminary findings is shown in Figure 19. A chronology for the core has been established with 7 AMS age determinations, and ages referred to in the text are calibrated years before present (BP). Pollen samples have been processed at 10 cm intervals from 68 to 700 cm, but only half of these have been analysed so far.

Given the difficulties associated with identifying rice from the pollen record, an analysis of the phytolith assemblage is being undertaken as well as an analysis of the macro plant remains. Already, some interesting plant remains have appeared, such as the charred grass husks from around 2200 BP (Figure 20). These husks resemble the husks of rice, but taxonomic work has not yet to been carried out to determine this with any certainty.

While the pollen and charcoal record from Core 3 is still in the early stages of analysis, the preliminary results can be summarised as follows (refer to Figure 19).

The sediments recovered span the last 6000 years.

There have been no abrupt changes in sedimentation rate.

The landscape from 5500 to 5000 BP had a coniferous forest cover, overwhelmingly dominated by *Pinus*.

At 5000 BP the *Pinus*-dominated forest declined and the landscape was converted largely to grassland.

Charcoal is found in large quantities throughout the record but is most abundant in sediments before 5000 BP.

The finding that *Pinus* once dominated the landscape around Paoay Lake is significant. Today, *Pinus* in Luzon is only found in the Central Cordillera above 600 m above sea level, which is considered to be the altitudinal limit of the genus (Zamora and Co 1986; Domingo Madulid, pers. comm. 2003). Given that people have heavily modified most of the landscape below 600 m, these findings raise the question of whether the restriction of *Pinus* to above 600 m can be attributed to human activity.

Pines worldwide have a long evolutionary history intertwined with fire, resulting in a variety of adaptations to natural fire regimes (Agee 1998). In fact, fire is an important component of pine forest ecology and because pines are shade intolerant and require regular disturbance for successful regeneration, fire suppression can lead to pines being replaced by hardwood species (Agee 1998). Tropical pine forests are typically found in environments with a seasonal climate on nutrient poor or sandy soils and most commonly have a grass understorey that is highly flammable during the dry season (Richardson and Rundel 1998). In many of the tropical regions where pines occur naturally, fires have become more common as population pressures have increased. Observations from these regions, where the natural fire regime has changed during historical times, indicate that pines are initially favoured over hardwood species, but as the fire return interval shortens, pine forests become degraded and are replaced by grasslands (Goldammer and Peñafiel 1990).

This could well be the scenario recorded in the sediments of Paoay Lake 5000 years ago. Although not all the slides below 5000 BP have been counted, inspection of the processed slides reveals the predominance of pine pollen over grass pollen in association with fire back 6000 to 5000 BP. After 5000 BP, however, some aspect of the environment changes and grassland dominates over pine forest in the

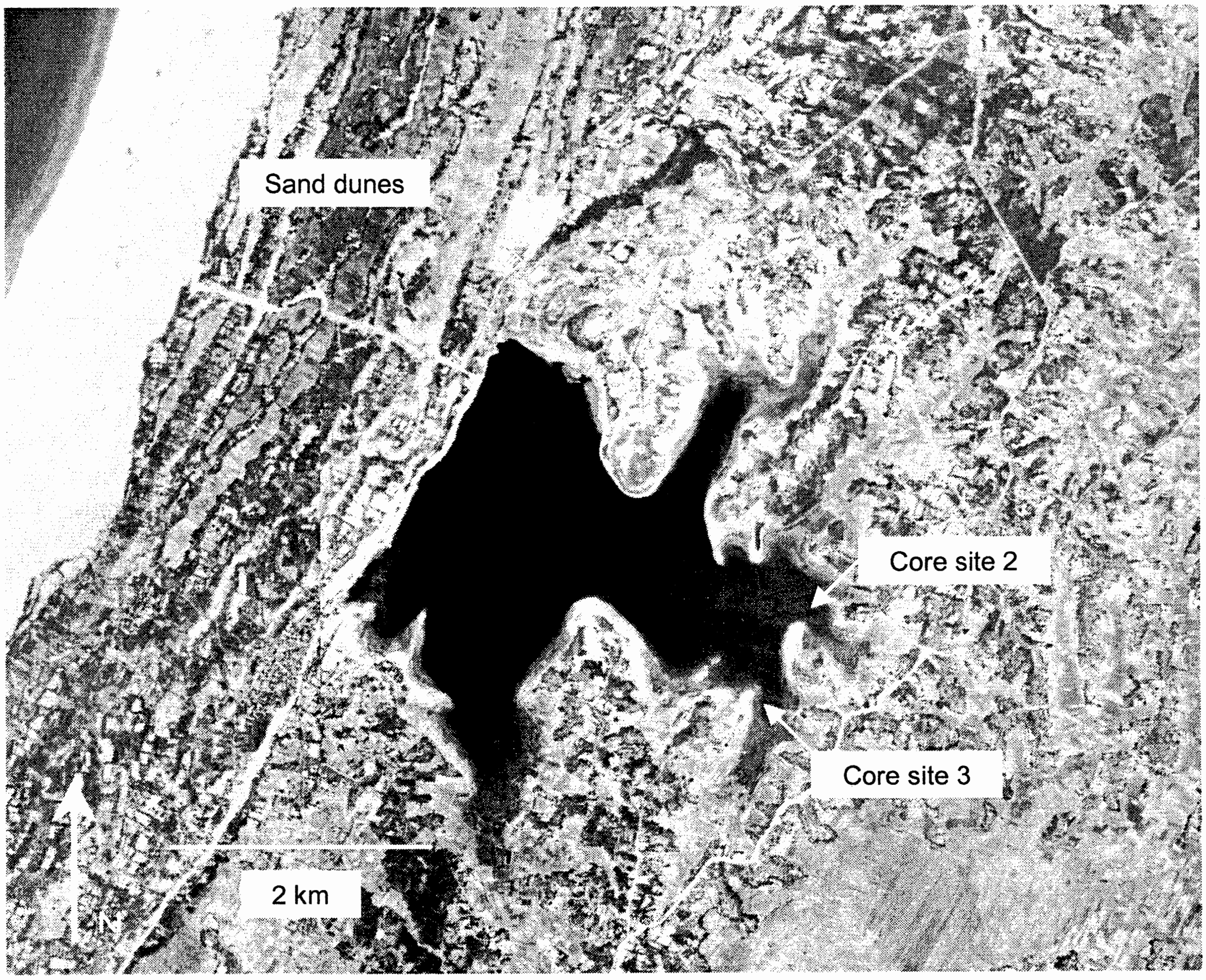


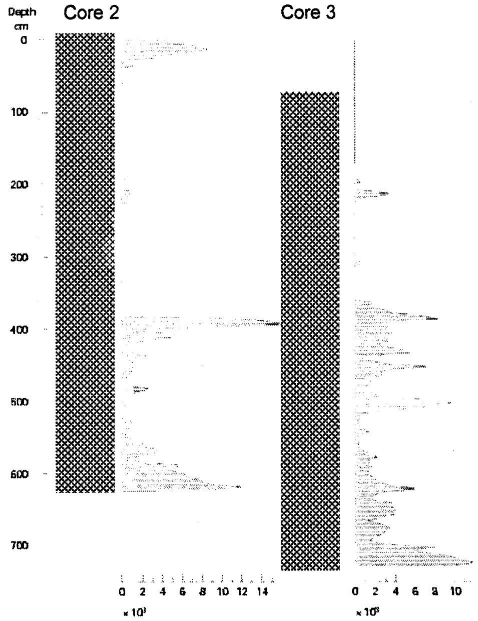
Figure 17: Airphoto of Paoay Lake showing coring locations. Courtesy of Fernando Siringan.

surrounding landscape. One possibility is that the fire return interval changed around this time, either through human activity or climate change.

There is only one other pollen record from the Philippines, Laguna de Bay in southern Luzon (Ward and Bulalacao 1999). This 10 m sediment core also covers the last 6000 years and a summary of the record is shown alongside the Paoay Lake record in Figure 19. These dates have also been calibrated and although the forest composition at the two sites differs, there is an interesting parallel in forest decline at around 5000 BP. The two records also differ however, in that there is a much stronger relationship between charcoal and grass after 2500 BP in the Laguna de Bay sediments.

Ward and Bulalacao (1999) concluded that the forest decline in the Laguna de Bay record is probably best attributed to the regional climate becoming drier, and that the contribution of human activities to this process would require studies of fire regimes from pre-human horizons. Similar conclusions must also be drawn from this early stage of analysis at Paoay Lake. While the decline in coniferous forest appears to be quite abrupt in the pollen diagram, the time interval between analysed samples is actually around 100 years. High-resolution analysis around this boundary will be an important component of determining the likelihood of human activity as the driving force behind this change, but will also require independent high-resolution climatic research from the region. Such climatic work is also in a pioneering phase of development and is being carried out by colleagues from the ANU and the University of the Philippines. We also plan to collect a third core from a more central position within the lake during the dry season, when lake levels are lower, in an attempt to obtain older sediments and thus extend the time frame being analysed.

While we cannot be more definitive at this stage about whether people and agriculture in northern Luzon were associated with the significant environmental changes at Paoay Lake 5000 years ago, these preliminary results are tantalizing. So far however, all the evidence from northern



Luzon places the arrival or development of the Neolithic in the Philippines in a period that post-dates by a millennium or so the major landscape changes found in the Paoay Lake record (refer to Table 1). The immediate focus of our ongoing research will therefore endeavour to resolve whether the fire return interval significantly changed around 5000 years ago, and if so why, and to look for evidence of rice cultivation within the palaeoenvironmental record.

CONCLUSIONS

The research undertaken in 2002 and 2003 has established a 3500-year archaeological sequence for the Batanes, with three phases identified so far for Batan Island: Sunget Phase 3500 to 2700 BP, Naidi Phase 2700 BP to 1500/1000 BP, catastrophic volcanic eruption and landscape burial at 1500/1000 BP, then Rakwaydi Phase from at least 1000 BP to ethnographic times. The Sunget Phase has strong relationships in its red slipped pottery, notched "net sinkers", shouldered and stepped adzes, slate projectile point, and biconical spindle whorl, with contemporary assemblages in northern and eastern Taiwan, especially those associated with the sites of Yuanshan, Changkuang and Beinan. Similar relationships exist with contemporary sites of the second millennium BC in the Cagayan valley of northern Luzon, especially in terms of pottery typology, these sites including Irigayen, Magapit and Nagsabaran (see Table 1). Since this research is still fairly preliminary it is unlikely that our dates for Sunget Top Terrace are tracking the very first settlers in Batanes, and a commencement date for the Sunget phase back towards 2000 BC is likely. We hope to test this possibility further in Mahatao in 2004.

Unlike the Sunget Phase pottery, so far found at only one site, the Naidi Phase assemblage is particularly widespread on Batan, suggesting that a large population was in residence by at least 2500 BP. Naidi Phase assemblages have some affinity with Cagayan Valley assemblages from Luzon, but fewer direct links with Taiwan (for instance, no notched sinkers were found in any Naidi Phase sites). This lessening of contact with Taiwan is interesting, and could suggest that the development of the Austronesian long distance ocean crossing technology, that eventually allowed the settlement of Polynesia, occurred well to the south of the northern Philippines. Szabó *et al.* also discuss this issue in the following paper in this volume.

Palaeoenvironmental research has established a 6000-year pollen sequence for Paoay Lake, with a major disruption to the local pine forest, possibly though an altered fire regime, at around 5000 years ago. This could circumstantially be associated with human impact. Research is also underway to identify phytoliths in soils, in order to detect the presence of significant plant foods in the prehistory of Batanes and northern Luzon.

In February-March 2004 we will continue the research in Mahatao and on Sunget Ridge, in Torungan Cave on Itbayat, and with palaeoenvironmental coring in the small lakes on Itbayat. Our most important aims now are to determine whether or not there was a Preceramic Phase in Batanes; to define the source and date of appearance of the Sunget Phase assemblage and any immediate antecedents in Batanes; and to refine our understanding of vegetation history and economic developments in Batanes and northern Luzon during the past five millennia.

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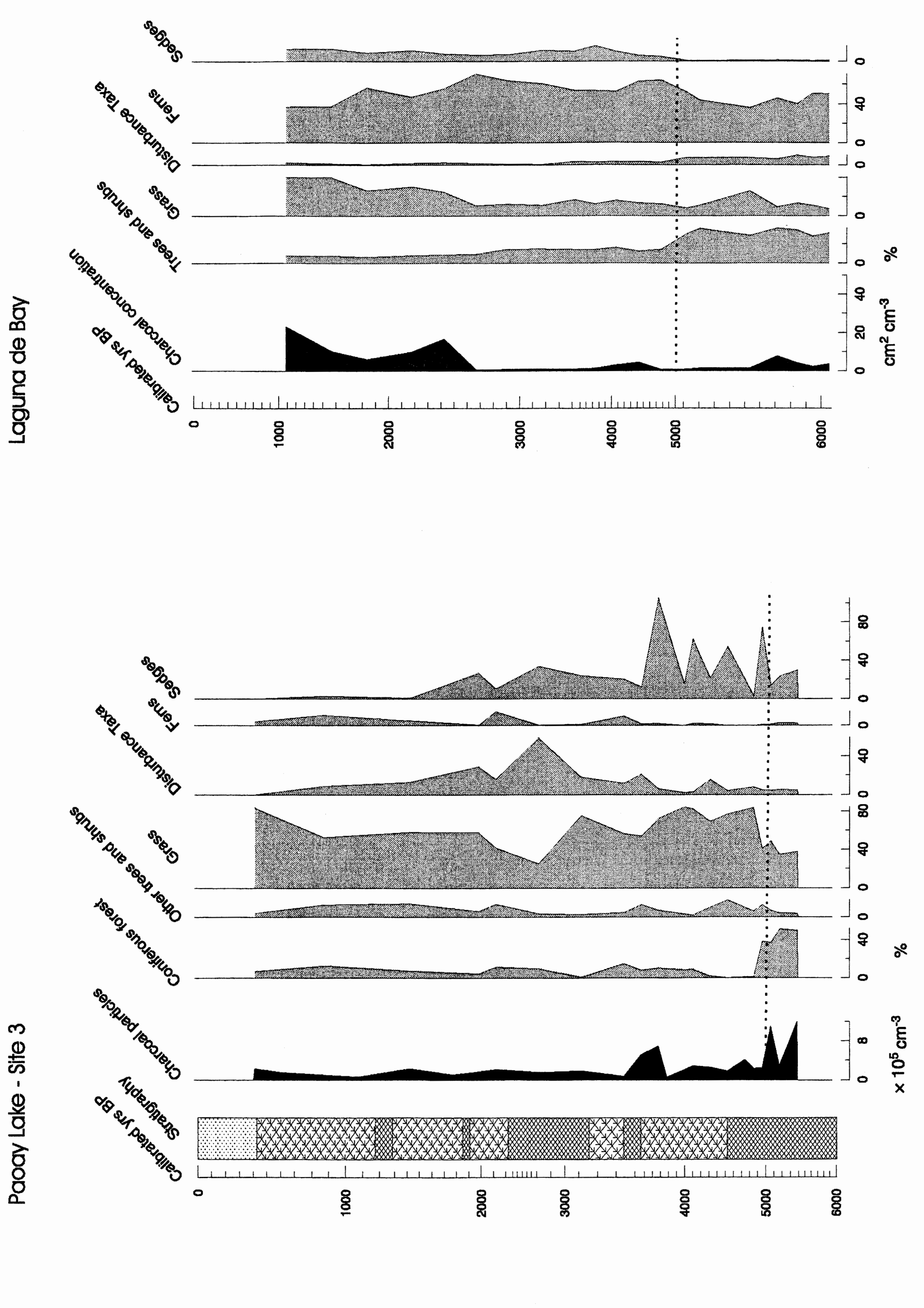

Figure 19: Summary percentage pollen diagrams from Paoay Lake and Laguna de Bay. Data for Laguna de Bay compiled from Ward and Bulalacao 1999.

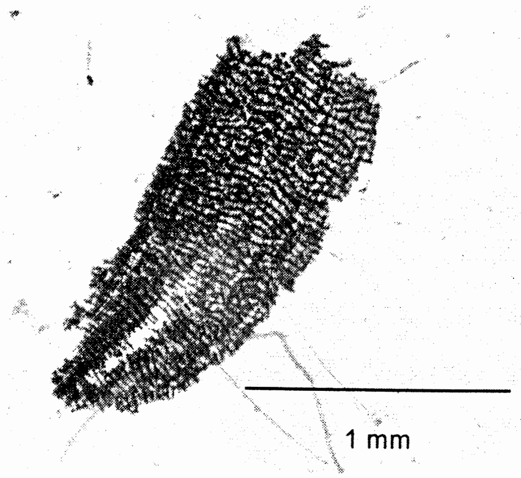

Figure 20: Charred grass husk from Core 3, Paoay Lake. Sample depth is 361 cm, which is approximately 2200 BP in age.

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