MORTARS AND THEIR POSSIBLE PAST USE IN PROCESSING TRADITIONAL FOODS IN THE HUNJARA AREA, ORO PROVINCE, PAPUA NEW GUINEA

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INTRODUCTION

Oro Province is located on the northern side of Papua New Guinea and to the northeast of the central cordillera which separates the southern part of the country from the north. The high central ranges are located in the west of the Province and are the source of the stones and boulders from which mortars were made.

This paper reports previously undescribed finds of stone mortars in the Hunjara area of Oro Province and speculates about their use in the processing of traditional plants. Discussion makes reference to the discovery of traditional tree crops in the archaeological record of the Dongan site of the lower Ramu, reported by Swadling, Araho and Ivuyo in the previous paper in this volume, and to a possible similarity of geomorphic history between the lower Mambare, north of the Hunjara area, and the lower Sepik-Ramu situation described by Swadling, Araho and Ivuyo. An archaeological find in the lower Mambare area is described in this connection.

THE MORTARS AND PESTLES OF PAPUA NEW GUINEA

Mortars and pestles have been found on the mainland and islands of Papua New Guinea and their greatest concentration on the mainland is in the high-altitude areas, as depicted in Pretty's (1965) map. There is a greater population density and more evidence of human impact leading to vegetational change in the main Eastern and Western Highlands of Papua New Guinea, as compared to the Central Papuan mountain chain southeast of them.

Over the years large numbers of mortars and pestles have been found in Oro. Many of these were found in the goldfields near Kokoda and other finds have been made at the nearby Morobe goldfield and elsewhere in the general region (Figure 1). Unfortunately most of these finds were illegally exported. Today the National Museum holds few examples of these artefacts from Oro Province, but published and unpublished reports

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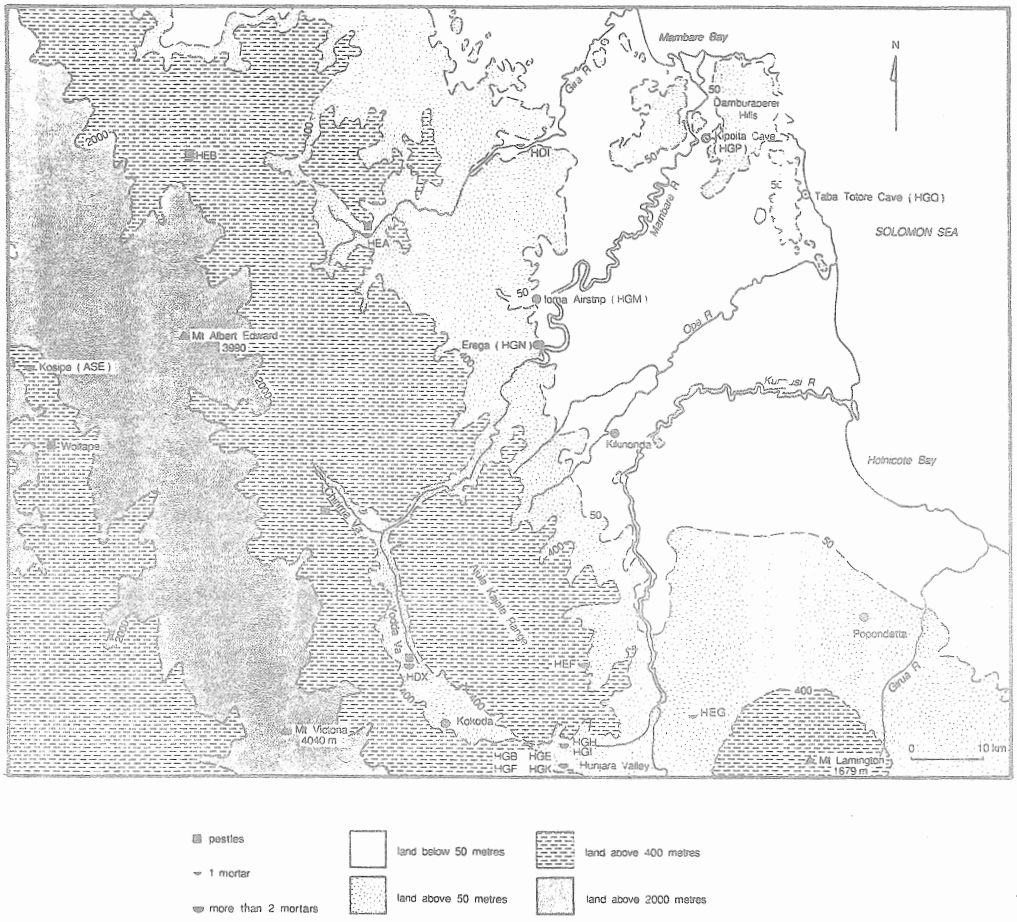

FIGURE 1: GENERAL LOCALITY MAP

indicate that many have been found. Little archaeological work has been done in Oro Province and it is anticipated that many more discoveries will be forthcoming.

In the following discussion of the mortar finds in the Hunjara area I would like to consider two points. The first is that we do not know what stone mortars and pestles were used for. There is a lack of direct archaeological evidence on the matter, but ethnographic observations made on the use of their wooden counterparts give an indication as to what function the stone examples might have had. Other direct observations, such as Gorecki's (1989:78-79) in the lower Jimi Valley, where he observed people using stone mortars to process *Pangium* nuts, are hard to emulate in the Hunjara area but are very useful in considering why mortars are found in the landscape in the Hunjara area. Having said this, perhaps the best way to begin is to compile a list of some of the traditional foods - seeds, nuts, tubers - in the area and to review the methods used

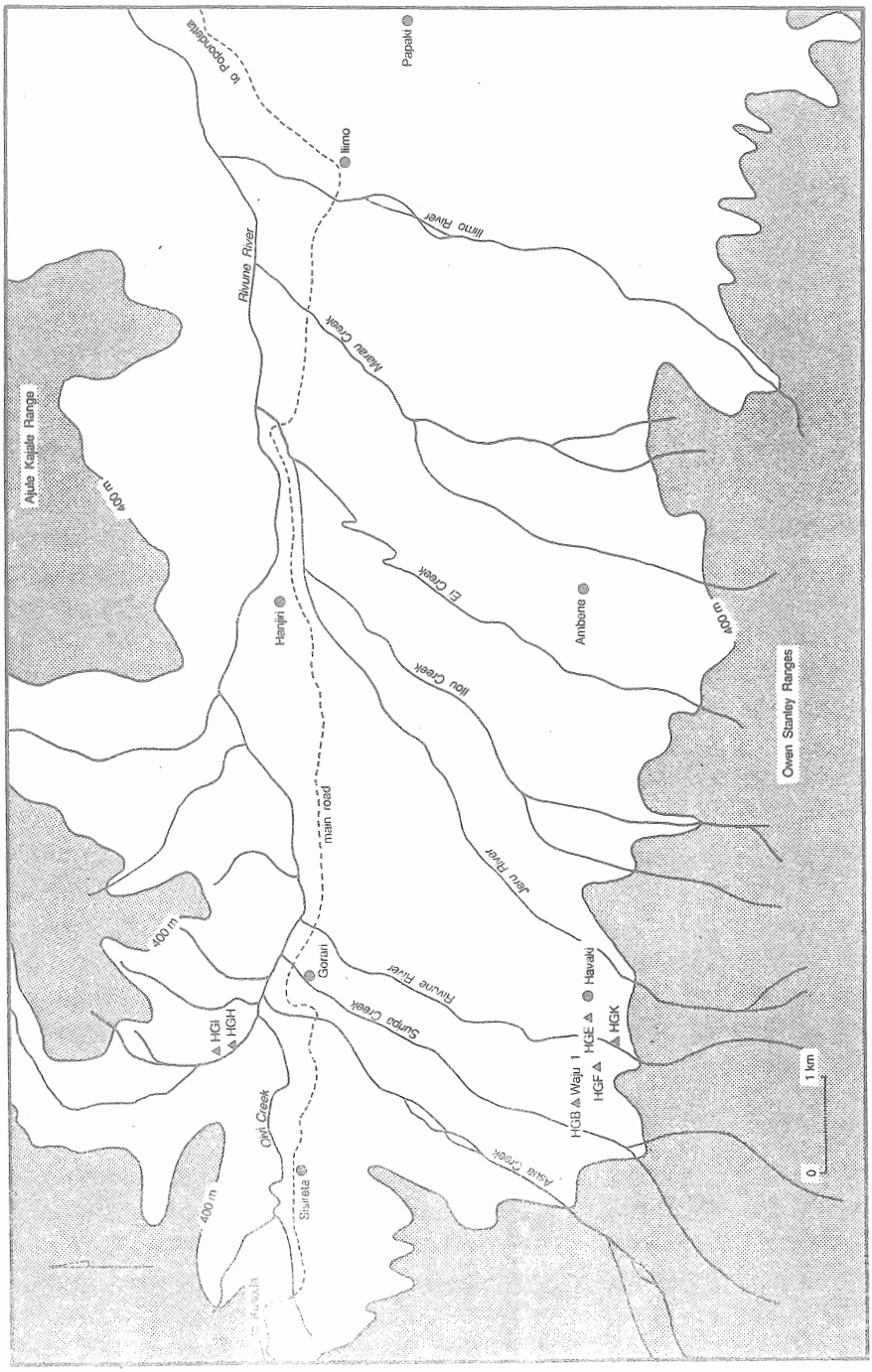

FIGURE 2: THE IUNJARA VALLEY

to process them, which may have implications for the way mortars and pestles were used in the past.

The second point is that the use of mortars is now redundant, yet their distribution suggests that they were once widespread. What led to the decline in, and what finally put a stop to, the use of mortars and pestles? As Gorecki (1989:78) suggests, mortars may have been multipurpose implements, utilitarian more than ceremonial, and perhaps the mortars now found in the Hunjara area were, among other purposes, once used to process nuts and fruits of traditional tree crops. Their use may have declined with time until they were no longer required. From the standpoint of plant usage, could the decline in the use of certain plants for food have led to the decline in the use of mortars and pestles? Certainly there is no shortage of plants with potential for use as famine food in the Hunjara area and the lists provided later in the paper (Tables 1 and 2) are not exhaustive. Thus it is not hard to envisage that in the past they might have been regularly used until replaced by crops with higher yields.

MORTAR FINDS IN THE HUNJARA AREA

Broken potsherds, stone axe/adze heads, stone clubs and stone barkcloth beaters can be often collected in newly cleared garden areas, but stone mortars have never been reported frequently in the Hunjara region. Thus the seven mortars described in the Appendix are the biggest number reported at any one time. They were found as a result of an archaeological impact study carried out by the author at the site of the Divune Hydro Scheme near Waju and Havaki villages (Araho 1990) and their findspots are shown in Figure 2. They were observed in the landscape within an area of about 10 km^2, located at an altitude of around 400 m above sea level on the floor of the Hunjara Valley. When asked, the people said that the only use for mortars in the recent past was as mirrors when they were filled with water, but the general antiquity of these artefacts is considerably older.

WHAT WERE THE MORTARS USED FOR?

While mortars may have been used as utilitarian implements there is no direct archaeological evidence to relate them to processing food, but when the presence of the mortars in the landscape is seen in the light of the tubers, nuts and seeds traditionally used for food in the Hunjara area, it raises interesting prospects for their role in food processing. However, rather than trying to establish a direct relationship between particular plants and the use of mortars in their processing, I will review some of these plants used as food. Tables 1 and 2 are respectively lists of undomesticated tubers and bananas and of some of the common nuts and seeds with potential for use as famine foods.

Depending on what part of the plant was to be used, different methods might have been employed to process them.

Tubers and Bananas

The types are listed in Table 1.

TYPE	PROCESSING	REMOVAL OF TOXICITY	REMOVAL OF SEED
Wild banana	Mashing		X
Wild taro	Mashing/soaking	X	
Wild yam	Mashing/soaking	X	

TABLE 1: UNDOMESTICATED TUBERS AND BANANAS IN THE HUNJARA AREA

In addition to the domesticated taro (*Colocasia esculenta*), two varieties of wild taro are known but not considered economical and therefore not planted by the Hunjara. They are also toxic. Both varieties are called *ba maroro* in the Hunjara language, but one grows on well-drained soil, while the other grows in low-lying and less well-drained areas. The single term used to denote the two wild varieties is meant to differentiate between domesticated and wild.

Araka ange is the term used for wild yams which are not cultivated in the gardens. Two commonly encountered varieties are a poisonous type called *kausa* and another which is recognised as a wild yam but no specific name is given to it and it is referred to under the general rubric of *araka ange* (or wild yam). The first type often bears one or two large ball-shaped tubers about 40 cm across. The exterior is frequently brown in colour and covered in numerous fine hairs. Despite its seemingly interesting prospect as a potential food due to its large-sized tuber, it is said to have no flavour and is therefore usually regarded as a minor food. The stem of the other type is more woody and has a few sharp thorns towards its base. The tubers are long and take a long time to develop.

The toxic properties of the wild taro and the *kausa* variety of wild yam might have required a pretreatment combining some form of mashing and washing or soaking in running water to get rid of the poison.

Wild bananas, which usually have a lot of seeds rendering them unfit for consumption, can be used as famine food and might also have needed mashing in order to separate the seeds from the flesh.

Fruits, Seeds and Nuts

The range of fruits, nuts and seeds tabulated in Table 2 would have required a range of processing strategies prior to consumption.

Puwa (Pangium edule), for example, can be eaten either after the raw flesh is processed to remove the highly toxic juices or after the nut has been dried in its shell, rendering the dried nut safe for immediate consumption. The present-day method to

LOCAL NAME	DESCRIPTION	SCIENTIFIC NAME	PREPARATION
Puwa	Nut from tree	*Pangium edule*	Shell removed
Hauwa	Nut from tree	*Terminalia kaernbachii*	Shell removed
Kenda	Seed from tree	*Gnetum gnemon*	Shell removed
Borowa	Seed from breadfruit tree	*Artocarpus altilis*	Shell removed
Humbare	Fruit from vine	?	Seed and pulp eaten
Laulau (wild)	Fruit from tree	?	Flesh eaten
Akena ivivi	Nut from tree	?	Shell removed
Sagona be	Seed of bean from large vine	?	Shell removed

TABLE 2: COMMON FRUITS, NUTS AND SEEDS IN THE HUNJARA AREA

remove the poison from the raw flesh of the nut involves cutting the nuts into smaller pieces and soaking overnight for the poison to be washed away by running water. In the past stone flakes or bamboo, readily available in the environment, would have been used to cut the nuts into pieces, but the most efficient way to treat the nut would have been to smash or crush it before wrapping it up and soaking it in running water. Smashing or crushing provides a large surface area for the efficient removal of poison.

Hauwa (Terminalia kaernbachii), on the other hand, is quite safe to eat either dried or raw after the shell is cracked open with a hammerstone. It can also be dried and stored for a long time. A handful of these nuts crushed produces a lot of oil. *Kenda (Gnetum gnemon)* seeds are often gathered and roasted over the fire before eating, but they could also have been crushed and soaked to get rid of irritants (French 1986:57). *Borowa* seeds from the breadfruit tree, *Artocarpus altilis*, are commonly eaten after being roasted over the fire and the shells removed. *Humbare* is a fruit belonging to a certain vine. The fruit is boiled and the pulp eaten with the seed. Compared to *hauwa* and *puwa*, *humbare* does not guarantee a seasonal harvest.

One variety of wild *laulau* is a small fruit which is light green when unripe, turning red when ripe. It is about 7 cm long and has a large seed case in proportion to the flesh. The flesh is sour to the taste, even when ripe, which makes it unpleasant for eating, but children use it as a snack occasionally.

Akene ivivi is a nut with a small kernel inside a hard round stone. The corrugated surface requires considerable force to crack using a stone mallet in the same fashion that

the *hauwa* nut is cracked open. The kernel is very small in proportion to the stone. As the nut is a minor component of the diet, very little attention is paid to it and mainly when it is deposited on the river banks by flood.

Sagona be is the fruit of a large vine. The actual fruit is a large bean which can grow up to 40 cm long and 10 cm wide. Upon reaching maturity, the seed case turns dry and in it are found several seeds, roughly square or circular in shape and about 6 cm across, with a hard dark shell and a white kernel. There is no economic use for the seed in the Hunjara area. It is similar to *kiekie* found on Tagula Island in Milne Bay Province. Beran and Meyer (1990) report that *kiekie* was cracked open using a conical stone tool called *biko*. They describe it as a nut, but I suspect that it is the seed of a large bean because it resembles *sagona be* in shape and size, as described above. While *sagona* be has no economic use in the Hunjara area, *kiekie* is used on Tagula as food. It is not known whether *sagona* be was used in the past as food in the Hunjara area and its use forgotten or people there never used it as food. It is interesting to note that one of the steps in the processing stage of *kiekie* involves pretreatment to rid the kernel of its poison. This process is similar to that involved in removing the poison from *puwa*.

Sagona be and *puwa* are commonly found growing at an altitude of around 400 m above sea level in the Hunjara area. The fact that the former is neglected while the latter is consumed suggests that there may be many more plants whose economic potential is ignored. Some of these plants could have been used in the past, but their economic use may have diminished so that they are now forgotten. The seeds and nuts treated above are not a complete listing of all that are available in the Hunjara area and an effort should be made to improve the catalogue. Seeds and nuts of the type described above would have had a good chance of being crushed or pounded in a stone mortar, but out of those listed as food, all except *humbare* usually have the shell removed prior to consumption.

Williams (1930:44) mentions the *okari* nut, *Terminalia kaernbachii* (*hauwa* in Hunjara), which is strung together and dried over a fire. He describes part of the processing technique for the nuts of *Pangium edule* (*puwa* in Hunjara), but does not say that they can also be dried. He also mentions that dry coconuts were stored, as were yams, for a period, in a yam house.

Hauwa and *puwa* bear at different times but they can be dried and stored for a long time, so the consumption of the dried nuts can coincide with that of the major root crops like taro and yams, which are harvested seasonally. Seasonal harvests and storage of the nuts would ensure that large quantities were on hand for feasts or to make available a steady and reliable supply for everyday consumption. Both the nuts might have been heavily used for oil in the preparation of yam porridge. Coconut cream is also used in the preparation of porridge made from yam and sago.

Taro, yams, bananas and coconuts feature strongly in some of the traditional ceremonies that were performed in the past, like brideprice payments, initiation ceremonies, death and burial feasts, and yet the only information available about their method of preparation in the past is boiling in clay pots and roasting with hot stones. Ethnographically recorded examples from the north coast of Papua New Guinea, the

Bismarck Archipelago and the Solomon Islands (Swadling 1981:50-53) show the use of either stone or wooden mortars and pestles, but similar information relating to the use of stone mortars and pestles has never been recorded in the Hunjara. According to the Government Anthropologist F.E. Williams (1930:37), the only explanation given for mortars was their use as mirrors after being filled with water. A similar story was also related to me at Waju village in the Kokoda District of Oro Province, as already noted.

THE WIDER CONTEXT

I have mentioned the concentration of mortars and pestles in the Western and Eastern Highlands of Papua New Guinea and now wish to draw attention to the existence, at the northern foot of these, of the Sepik-Ramu basin. In this volume Swadling, Araho and Ivuyo refer to an inland sea which occupied the lower parts of this basin during the Pleistocene and early to mid Holocene (cf. Swadling *et al.* 1989). They describe work at the Dongan site, on the Bosmun Plateau west of the lower Ramu, which would have been an island at the time of the inland sea. A rich collection of plant remains was recovered at the Dongan site, showing that tree crops important at the present time were being exploited about 6000 years ago. These include *Areca catechu* (betelnut), *Aleurites* sp. (candlenut), *Canarium* spp. (canarium almonds), *Cocos* sp. (coconut), *Cordia* sp., *Pandanus* spp., *Pangium* sp., *Parinarium* sp., *Pometia pinnata* (Oceanic lichee) and *Sterculia* sp..

The upland Hunjara area, for which I have described finds of stone mortars, with a possible use in processing nuts and seeds, of which some are no longer generally used, is similarly bordered to the north by an area of low topography. This is the lower Mambare River area, where no large boulders like those used for mortars in the Hunjara area to the south are available, but the suite of nuts and seeds listed in Table 2 is present, as well as traditional foods, like tubers.

Though no geomorphological studies have been made, there is some evidence to suggest that the coastline in the Mambare River area could have been much further inland than today. This consists of a surface collection of marine shells scattered on a newly graded road surface adjacent to the Ioma airstrip (site HGM), which is 50 km inland from the coast (Figure 1). The road is located on the north side of the airstrip and connects Iaudari No. 1 village to the Ioma Government Station. It also serves as the access road to a small-scale gold-prospecting venture at the headwaters of the Tamata Creek by City Resources Pty Ltd. It is possible that more substantial shell deposits may have been destroyed by the grading of the surface of the airstrip. Most of the shells collected were fragments of *Polymesoda (Geloina) coaxans*, which were found scattered within a 10 m long strip of the graded road surface and on the heaps of spoil dumped by the bulldozer on the roadside. Only a single *Telescopium telescopium* shell was found *in situ* in the soil. A section of the road was inspected for about 500 m towards Iaudari No. 1 village, but nothing else was found. All the shell samples collected were forwarded to the ANU Radiocarbon Laboratory for dating and the results are awaited.

Inspection of the 50 m contour on Figure 1 shows that the predicted submergence of the lower Mambare during the late Pleistocene to middle Holocene rise in sea level would have brought the coast closer to the foothills of the Ajule Kajale and the central cordillera. Any such environmental change might have led to the settlement of the fertile plains further inland towards the headwaters of the Mambare and also to the southeast around the foothills of Mt Lamington.

At the same time there could have been the formation of a large bay and numerous offshore islands, on which it is proposed that sites of the mid to late Holocene should be found, paralleling the Dongan case in the lower Sepik-Ramu basin. These coastal communities would have been linked with the inland by way of three interconnecting valleys located at about 400 m above sea level (Figure 1). One of these, the Chirima Valley, leads towards the Kosipe basin on the other side of the central divide; a traditional trail connects the two. It is likely that in the past this would have formed part of a route for the exchange of trade items between the coastal and inland communities. For this reason future archaeological investigations in the lower Mambare area will incorporate the high-altitude region from the Hunjara Valley to the Kosipe basin.

CONCLUSION

It is tempting to suggest after considering the possible use of mortars and pestles that there is some relationship between the reported finds in the Central Papuan Highlands and the Eastern and the Western Highlands, but all that can be pointed out is the relative location of these areas to the basins of the Sepik - Ramu in the latter case and the Mambare in the former. It is not know whether the marine shells found scattered at Ioma are of Holocene age, but while we await the shell dates, they can be considered as the only form of evidence to suggest the inundation of the lower Mambare region.

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APPENDIX: DESCRIPTION OF MORTARS AND THEIR FINDSPOTS IN THE HUNJARA AREA

All grid references are to the Kokoda 1:100,000 map. The findspots are shown on Figure 2.

1 Site: Waju A Code: HGB.1 Grid reference: EL946084. A plain mortar now located at the back of Wilford Pe'embo's house, recently moved from a spot about 200 m away, but the original findspot is unknown. It is 47 cm long and 37 cm wide and its weight is estimated as between 40 and 50 kg.

2 Site: Waju A Code: HGB.2 Grid reference: EL946084. This is a roughout now at the bottom of the steps at the front of Howard Sambijo's house, but the original findspot is unknown. The dimensions of the boulder are: length 85 cm, width 58 cm. There is a slight depression 20 cm long on the surface.

3 Site: Karani Code: HGE Grid reference: EL956083. Karani is the traditional name of the area where the mortar is located, 500 m west of Havaki village. The mortar, 80 cm long and 25 cm deep, was made in the centre of the surface of a large sandstone boulder, 8 m long, 1.5 m high and at its widest 2 m across. The smoothness of the inside suggests that a natural depression in the rock surface was widened for use as a mortar. The boulder is a permanent feature of the landscape and cannot be moved.

4 Site: Korotumo Code: HGF Grid reference: EL951081. This is the traditional name of the area in which a mortar is located on the surface of a large boulder. The shallow basin is 1.1 m long, 60 cm wide and 10 cm deep. The boulder in which it is formed is 6 m long and 2 m wide. The irregular shape and the smoothness of the inside suggest that a natural depression in the boulder was enlarged to serve as a mortar, as at Karani (3 above).

5 Site: Haroro Code: HGH Grid reference: EL953117. Part of a broken mortar was seen at Handari hamlet at Geminiel Sivi's residence. It had been found by Grace Sivi at a place traditionally called Haroro, which is located near an old village site called Kirona.

6 Site: Kirona Code: HGI Grid reference: EL953119. This plain mortar was found in the Akuru Creek where it passes through the old village site called Kirona, north of

Haroro. It is 42 cm wide and 16 cm high and the shallow basin in the centre is 9 cm deep. Its estimated weight is 70-80 kg.

7 Site: Samburape Code: HGK Grid reference: EL954078. This is the location of a large boulder called *Samburape koro hamo*, a traditional landmark on the east bank of the Divune River about 100 m downstream of the weir site for the Divune Hydro Scheme, with a hydrological station and helipad close by. About 10 m high, the boulder has a natural dip on its surface, which oral traditional says was used as a mirror after being filled with water.