REPORT ON ARCHAEOLOGICAL RESEARCH

ON GARUA ISLAND, WEST NEW BRITAIN PROVINCE, PNG

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PREPARED BY:

Dr. Robin Torrence
Division of Anthropology
Australian Museum
P. O. Box A285
Sydney South, N.S.W. 2000
Australia

Dr. J. Webb
Department of Geology
La Trobe University
Bundoora, Victoria 3083
Australia

COPIES TO:

Institute of Papua New Guinea Studies, Boroko, NCD

National Museum and Art Gallery, Waigani, NCD

Department of Anthropology and Sociology, University of Papua New Guinea, Waigani, NCD

The Manager, Provincial Cultural Centre, Kimbe, West New Britain Province

NOTE: This report summarizes PRELIMINARY results compiled immediately following fieldwork. For confirmed and accurate data, please consult publications.

SUMMARY

Between July 7 and August 12, 1992 a team of 10 archaeologists and one geologist carried out a programme of excavation and fieldwork on Garua Island, near Talasea, in West New Britain Province. The team was comprised of members from three Australian and two PNG institutions. The aims of the two year project are to learn about how obsidian tools were made and used in the past and to examine the effect of obsidian trade on the lives of the island's prehistoric residents.

Four objectives were achieved by the fieldwork in 1991. Firstly, the archaeological excavations conducted at four sites (FAO, FAQ, FQY, and FSZ) revealed a clear sequence of three prehistoric settlements which are separated by two tephras from dated volcanic eruptions. The work also produced important assemblages of pottery and stone tools from the three periods. Secondly, a detailed study of the stratigraphy present in the Malaiol stream cutting has provided a geological history for the island, established the framework for dating the major period of obsidian quarrying on Garua, and led to the discovery of several new archaeological sites. Thirdly, the dating of raised coral reefs identified during the fieldwork will provide the basis for understanding recent sea level change in the Talasea harbour. Fourthly, a study of prehistoric landscape use was initiated.

TEAM MEMBERS

Dr. R. Torrence	Australian Museum
Dr. P. White	University of Sydney
Ms. K. Victor	University of Sydney
Dr. J. Webb	La Trobe University
Mr. G. Summerhayes	La Trobe University
Mr. N. Baker	Contract Archaeologist, Sydney
Mr. J. Mangi	University of Papua New Guinea
Mr. H. Mandui	University of Papua New Guinea
Ms. N. Tati	University of Papua New Guinea
Mr. B. Ivuyo	National Museum and Art Gallery
Mr. R. Mundol	National Museum and Art Gallery

AFFILIATIONS

The project is affiliated with the National Museum and Art Gallery and the Department of Anthropology and Sociology, University of Papua New Guinea.

RESULTS OF THE FIELDWORK

The fieldwork on Garua Island can be summarized in terms of the following major components:

1. Excavations at four prehistoric sites;
2. Analysis of the stratigraphy exposed along the Malaiol stream;
3. Study of Holocene sea level changes;
4. Reconstruction of prehistoric landuse patterns.

Archaeological Excavations

As a result of the excavations carried out by Specht et al. in 1988 and 1989 at various sites in the Talasea area (notably FRL, FRI, FAO) and the stratigraphic analyses of the tephras at these sites by Machida, it has been possible to divide the prehistory of the region into 3 periods which are defined on the basis of a shared stratigraphic sequence:

Period 1: roughly 6,000 - 3,500 years BP (before the present);
Period 2: 3500 - 1100 years BP (partially contemporary with Lapita pott
Period 3: 1100 years BP up to the present.

Period 1 was sealed by the WK-2 eruption of Mt. Witori, whereas Period 2 was terminated by the fall of a tephra derived from Mt. Dakatau. These divisions form the framework for interpreting the prehistory of Garua Island.

The aims of the excavations on Garua in 1992 were (1) to obtain a good sample of cultural material from each of the three periods and (2) to investigate the nature of spatial patterning within settlements from Periods 2 and 3. (Period 1 deposits are so deep that extensive sampling is not feasible.) In order to achieve the first aim, deep soundings were required. Although FAQ and FAO were chosen, lack of time prevented extensive sampling at FAO. To satisfy the second aim, a relatively large area (16 m^2) was excavated at FSZ and extensive surface sampling complimented with test pits was conducted at FAQ. A small excavation was also carried out at FQY in order to determine the nature of the stratigraphy at a low-lying locality. A brief sumary of the preliminary results of each excavation are presented in the following sections. Analyses of the finds to be carried out in Sydney and Melbourne during 1992-3 should greatly expand the interpretations based solely on field observations which are presented here. The location of the sites investigated in 1992 is shown in Figure 1.

FSZ

The FSZ site is located 30 metres above sea level on top of a small, discrete hill formed by a volcanic scoria cone. The location of the site is extremely important. Since it offers views around 270° which take in both the Garua Harbour and the mainland coast to the east, it provides an excellent, defensible position. It is also significant that the best source of

fresh water on the island at present is located near the base of the hill, within easy access. The site was first identified by Summerhayes, Fullagar, and Ivuyo in 1990 because bulldozing in conjunction with the mining of scoria had exposed large quantities of Lapita pottery and obsidian artifacts. The aims of the 1992 excavations were to (1) investigate the stratigraphy of the site, (2) open up a large area to aide the study of spatial patterning, (3) recover a large sample of artifacts for analysis, and (4) determine the spatial limits of the site.

The excavation was supervised by Glen Summerhayes and lasted three and one half weeks. Work began at the top of the hill adjacent to the area where Lapita pottery had been uncovered by the bulldozer, but in a location where the Dakatau tephra had been left intact. One trench measuring 16 m^2 and one test pit (1 x 1 m) were excavated to the base of the Lapita deposit. Firstly, the DK tephra was removed in quadrants (2 x 2 m). Immediately below the tephra ceramics and pottery were found in a hard, compacted, red-brown clay unit. Secondly, the Lapita deposit was excavated in three spits, each 10 cm thick, within 1 m^2 units. All the soil was put through 5 mm sieves, mostly by water sieving in the sea.

The depth of the excavation was determined in advance on the basis of a 1.85 m sounding in square E15N92 on the grid established over the site. At this locality three tephras with soil development on top of them and the possible remants of a fourth were identified below the DK tephra, but the layers were very difficult to discriminate because of the extent of diagenesis. The WK-2 tephra was not recognizeable among the tephras revealed in the test pit. We were therefore unable to correlate these tephras with those revealed in the sections on the edge of the hill or with units 3-5 in the Malaiol stream (see below). Geochemical and thin section analyses would be required to cross-correlate the early tephras on Garua. Fortunately, this task is not essential to the interpretation of FSZ, because no pottery was found more than 30 cm below the Dakatau tephra and the extremely rare obsidian artifacts found below 30 cm were very small, suggesting worm action rather than intentional deposition by humans.

Pottery and obsidian comprise the bulk of the finds at FSZ. Due to the high acidity of soils formed on tephra, organic remains are unlikely to be preserved in prehistoric deposits on Garua Island. Consequently, it is not surprising that only a few charred nutshells were found at FSZ. All the pottery and obsidian was counted and weighed before leaving the island. This analysis revealed that the spatial distribution of finds was relatively homogeneous across the site. In addition, Summerhayes' preliminary study of the pottery shows that approximately 5 per cent of the total assemblage is decorated and that 1.6 per cent is comprised of vessel rims. Dentate stamping is very rare. The decoration is mainly comprised of incision by sticks, shells, and fingernail impressions. A small number of sherds bear relief decoration. All these lines of evidence combined with similarities to sites in the Arawe Islands suggest that FSZ belongs very late in the Lapita sequence and may have continued into the post-Lapita period.

A sample of over 1000 plain sherds was futher examined by Summerhayes at the National Museum and Art Gallery in Port Moresby using a 10X binocular microscope. The results show that the paste is highly

uniform: the dominant mineral is plagioclase feldspar with varying amounts of pyroxene and small quantities of quartz. The composition is similar to the pottery collected in 1989 by Specht et al. from Boduna Island (FEA) and to sherds from FCR/FCS at Lagenda Plantation near Talasea. The preliminary results suggest that all the FSZ pottery, like the other Lapita sites in the vicinity, was made locally in the Talasea area. Further analyses by Summerhayes using SEM probe on the fabrics and PIXE on the small pieces of obsidian incorporated in some sherds will be carried out in an attempt to identify the location of manufacture.

In other areas of the world the analysis of differences in the phosphate content of soils is beginning to yield results that can be used to reconstruct how people patterned their activities in space. Since the potential of phosphate analysis of soils formed on tephras has not been thoroughly investigated, a pilot study has been inititated at FSZ. Eighty samples of soil from Period 2 contexts were collected at one metre intervals along three transects and within the excavated area. Augering was employed in the area outside the trench. The laboratory analyses are scheduled to take place at Sydney University later in the year. If the technique produces good results, a major programme of sampling will be implemented in 1993.

Finally, in order to test whether the site extends beyond the well-defined hilltop, Mandui excavated four test pits (1 x .5 m) on relatively level ground forming a saddle to the adjacent hill. The extremely low recovery rate of artifacts in the pits gives considerable weight to the view that the hill was the focus of activity. In contrast, the presence of well-preserved WK-2 tephra in all the test pits makes its absence on the top of the hill puzzling. Could the intense activites of humans at FSZ cause a much faster rate of diagenesis or was the tephra removed by erosion before the deposition of Lapita pottery? Further geomorphological work is demanded.

Clearly, FSZ is a very important site that demands as much detailed investigation as possible, within the financial constraints of current funding. In 1993 emphasis will be placed on extending the areal extent of excavation to cover a wider area of the deposits which remain intact.

FAO

Like FSZ, the FAO site is situated on top of a prominent hill overlooking a narrow beach. Although there are good views in two directions, unlike FSZ the inside of Garua harbour is not visible from FAO. Reasonable sources of obsidian can be found outcropping all around the base of the hill as well as on the beach below. The site was first discovered by Fullagar and Torrence in 1989 and subsequently Specht, Baker and Wadra excavated a test pit ($1m^2$) along a recent road-cutting where a sequence of tephras had been exposed. They found the now classic stratigraphy defined by the presence of the DK and WK-2 tephras. Obsidian was recovered from all three periods, but pottery bearing Lapita decoration only occurred within the soil between the two tephras. Specht and his team had previously excavated site FEL on the beach below FAO and had found that most of the cultural material was not in situ. It was

therefore suggested that a possible source for the Lapita pottery and the obsidian deposited at FEL was the hilltop FAO site.

The 1992 excavation, supervised by Laurie Victor comprised only a single test pit (100E100N) measuring $1m^2$. The pit was placed on the apex of the hill directly above the 1989 sounding. Seven strata were identified, exactly comparable to the previously defined Talasea sequence:

Layer 1, modern topsoil, is comprised of a dark brown, unconsolidated, silty/sandy loam. Obsidian artifacts are present.
Layer 2 is a transition layer between the soil and underlying Dakatau ash. It is more orange in color than Layer 1, is less consolidated, and contains scattered pieces of tephra. Rare obsidian artifacts occur.
Layer 3 is the very orange, coarse Dakatau tephra. No artifacts.
Layer 4 is comprised of an upper unit which is redder in color than the lower unit. It is dark brown in color becoming darker with increasing depth. The soil is relatively loose and fine-grained. Obsidian and Lapita pottery are fairly common throughout the layer.
Layer 5 is the WK-2 tephra which is very coarse and nearly white in color.
Layer 6 is represented by a red brown, very sticky clay. Obsidian artifacts were concentrated in the top 10 cm.

Four possible post holes were recognized as intrusive into the Layer 3 Dakatau tephra. The regular shape in plan and profile as well as their placement suggests that some sort of a structure had existed here during Period 3. Hopefully, additional excavation at FAO in 1993 will reveal more information concerning the layout of structures at the Period 3 settlement.

The Lapita pottery recovered from Period 2, like that from FSZ, appears to date quite late in the sequence: dentate stamping is absent, the decoration is dominated by incision, and relief decoration is present. A few pieces collected from the road contain small pieces of obsidian as temper. It is hoped that later this year an analysis can be made of their chemical composition in order to determine whether the pottery was made on Garua or elsewhere.

In addition to the test pit, augering was carried out at 3 locations located on a transect running downhill from E100N100 and two profiles of the hill were surveyed with a theodolite. Augering confirmed that the Dakatau tephra blankets the entire hill, but that as observed along the road cutting, the WK-2 tephra is preserved only in patches. Layers can often be distinguished, however, on the basis of the darker brown color of the soil formed on the WK-2 tephra versus the redder shade of the palaeosoil underlying it.

These results imply that although the Lapita pottery-bearing layer is well-preserved, the occurrence of cultural material dating to Period 1 may be sporadic. Despite this reservation, the 1992 excavation confirms that FAO is an very important site which demands further exploration in 1993. For this reason it would be most efficient if the future shovel testing programme at FAO concentrated on Periods 2 and 3 and seek to recover a

smaller sample of the deeper deposits of Period 1 by limiting exploration to those areas where the Wk-2 tephra has been preserved.

FAQ

The FAQ site is unique among those investigated in 1992 because it is not located near the coast (Figure 1). Discovered in 1989 by Baker, Namuno, and Torrence, the site is a dense surface scatter of cultural material comprised of obsidian and other stone atifacts as well as abundant shell refuse. Given the good preservation of shell, it can be estimated that the Period 3 material is unlikely to be very old. Augering in 1989 demonstrated that both the DK and WK-2 tephras were present. Furthermore, obsidian artifacts were recovered from each soil horizon and to a depth of two metres.

The objectives of the 1992 fieldwork, supervised by Neville Baker, were firstly, to investigate the spatial distribution of the Period 3 surface scatter and, secondly, to obtain samples of cultural material from Period 1 and 2 deposits. Although both aims were satisfied, the more detailed investigation of the site has raised questions which require further research.

FAQ is located on the lower of two natural terraces which form distinctive shoulders on the slopes of Mt. Hamilton and which are probably the result of uplift (see Webb's report below). The closest sources of fresh water are at the foot of the terrace: depending on one's exact location, either in Malaiol stream or from springs along the beach to the north. The area of the site identified in 1989 is comprised of an old grove of shade trees planted under coconuts. Since it has been heavily grazed and trodden over by cows, the ground is completely bare, except for artifacts and piles of coconut shells. Surface survey outside the shade trees revealed that the Period 3 scatter identified in 1989 extends along the terrace for at least another kilometre. Some material was also noticed on the slopes above the shade trees. Although visibility in this larger area is obscured by undergrowth, shell and obsidian were seen eroding from the sides of recent gullies and were observed when the grass was deliberately cleared away. Baker's impression is that the density of material increases as one moves away from the edge of the slope toward the inside edge of the shoulder, where there would be more shelter from the southeasterly winds of the dry season. Given the large size of the area with Period 3 material, the question of how the site was formed becomes significant: e.g. could it have been permanent occupation or was it just a series of gardens?

A detailed study of spatial patterning within such a large area is beyond the bounds of the current project. Nevertheless, a pragmatic approach has been adopted, based on the belief that a great deal about the structure of the deposits could be learned if judicious sampling were employed. In 1992 emphasis was placed on the area originally discovered in 1989 because the exposed material is currently under threat from erosion and trampling by people and cattle.

In order to collect a large sample of Period 3 material for analysis, a surface collection was made using a transect (5 x 180 m) oriented on a north-south axis along the terrace. All the shell and artifacts were collected

in 5 m^2 units. Subsequently, a second transect (25 x 5 m), running east-west, was collected in the same manner.

In conjunction with the surface sampling, Victor investigated a small feature comprised of a cluster of burned stones and hypothesized to be either a mumu pit or the rubbish from one. Unfortunately, when the feature was sectioned, it became clear that the surface of this portion of the site has been seriously deflated. The topsoil has washed away leaving the heavier artifacts lying on the top of the harder and more compact Dakatau tephra. A more thorough investigation found that the entire area under the shade trees had been subject to the same processes so that that the absence of artifacts in some places is not due to differential erosion. It was concluded that although the artifacts were no longer in their original stratigraphic context, the spatial integrity of the site was probably relatively intact.

Counts and weights of the surface material, which was analysed on Garua, demonstate that the material was distributed in small patches separated by nearly empty gaps. At this stage a number of models can be put forward to explain how the spatial pattern was created, but they cannot be evaluated without further research. These small dumps probably represent the activities of individual households, but did they belong to a relatively permanent village with dispersed houses, a small hamlet that shifted back and forth along the terrace, or merely a series of gardens where people ate and slept occasionally?

In addition to surface sampling, a series of 5 test pits (4 at 1 x 1 m and 1 at 1 x 0.5 m) were excavated in order to recover Period 1 and 2 material. These were all placed outside the area of the shade trees. Both marker tephras were recognized in four of the pits. Period 3 material was surprisingly rare in all pits and Period 2 was virtually nonexistant: only one undiagnostic sherd was recovered.

In contrast, large quantities of waste by-products resulting from the manufacture of obsidian tools were uncovered within Period 1 contexts in two test pits. The existance of so much obsidian debitage at a reasonable distance away from an obsidian source is surprising. A comparison of the obsidian from FAQ with the assemblages from sites FAP and FRL, which are adjacent to obsidian outcrops, will be extremely interesting. Another important result is that the clustered distribution of obsidian waste during Period 1 at FAQ contrasts with the more dispersed spread of obsidian in the Period 3 sample. It appears that the very different nature of tool use in Periods 1 and 3 is being expressed as much in the spatial patterning of the finds as in the types of artifacts.

In summary, sampling of deposits at FAQ has revealed interesting and important differences in the spatial patterning of refuse disposal at various times in the past. Furthermore, these patterns relate to changes in the nature of obsidian tool production and in settlement pattern during the prehistory of Garua Island. It is hoped that further sampling of FAQ in 1993 will heighten these differences.

In 1988 Specht and Fullagar noticed pottery and obsidian eroding from the sides of a drainage ditch alongside the modern road near the church, but they were unable to determine the stratigraphic integrity of the material. Following the discovery in 1992 of a potsherd with Lapita decoration from the same location, Summerhayes cleaned off a small section on one side of the ditch but again had little success in locating the marker tephras because of disturbance associated with the construction of the ditch.

Mangi cleared a section on both sides of the ditch over 2 metres long in order to further investigate a stone feature protruding from one wall. Although restrictions of time and modern disturbances prevented the successful completion of his original goal, Mangi found that the basic stratigraphic sequence was intact outside the boundaries of the modern ditch. Furthermore, potsherds with Lapita decoration and abundant charcoal were recovered from a dark soil underneath the Dakatau tephra. The presence of one sherd with dentate stamping from well down in Layer 3 suggests that this low-lying location may have been occupied before the settlement system shifted to the hilltops at FSZ and FAO. Additionally, the presence of crab holes filled with Dakatau tephra gives weight to the possibility that the local environment of the site at the time of the Lapita pottery was quite different from that of the modern day. Further excavation in 1993 should help answer these questions.

Malaiol Stream

The second major contribution of the 1992 fieldwork was a reanalysis of the stratigraphy exposed within the gully cut by Malaiol stream. In 1989 abundant evidence for the quarrying and manufacture of obsidian was discovered at site FAP but it has not been possible to date these important deposits. Dr. John Webb carried out a stratigraphic study aimed at establishing a relative chronological framework for the archaeological sites eroded by the activities of the stream. Webb's geological reconstruction is extremely significant because it has led to important new interpretations for the role of obsidian-working in the prehistory of Garua Island.

A summary of the stratigraphy from Malaiol stream is presented in Figure 2. The stratigraphy can be subdivided into 2 broad phases.

(a) The earlier phase comprises volcanic activity (both lava and pyroc
(b) The obsidian-working phase consists of a major phase of obsidian quarrying follo

The basal units (1a-e) record the history of the island before human occupation. To begin with, Baki and Hamilton volcanoes both erupted viscous rhyolitic flows. These are not visible in the gully but can be observed at numerous locations elsewhere on the island. On top of these flows coral reefs (1a) grew up. These first reefs were buried by a pumice fall (lb), but the coral soon established itself (1c) on top of the pumice. Subsequently, the reefs were almost completely buried by one or more pyroclastic flows, one of which bears small pieces of obsidian (1d). In deeper, quieter water offshore of the reef (upstream in the gully), ash derived from onshore was redeposited as turbiditic flows (1f), some of which were covered by a pyroclastic flow (possibly 1d). In shallower water, or

perhaps onshore, a blocky obsidian lava flow (1e) was erupted. Unit1e formed one of the major sources of obsidian on Garua. It is best exposed near the FAP site at source locality G002.

Next, relative sea level fell so that the entire sequence was exposed to the atmosphere. Uplift is suggested as the cause of the sea level change since the thin bedded unit of the turbidites has been faulted and folded as well as brecciated by intrusive dykes. When uplifted, the buildup of coral and volcanic sediments around the flanks of the two islands of Baki and Hamilton gave rise to the prominent flat 'shoulders' which occur today at the same height around both these volcanoes.

The upper units (2-8) were deposited during and after the first evidence of human occupation on Garua. Directly overlying the basal units is a distinct stone line usually containing artifacts (unit 2a). Near the obsidian flow (1e), unit 2a is represented by a thick deposit of densely packed artifacts, as at the site of FAP. At the time it was quarried, the outcrop was exposed as a small cliff and the waste by-products from extraction and production of obsidian tools were discarded directly on top of the source or just below this cliff. Just across the streambed from the 1989 excavation at FAP a small pit has been exposed, demonstrating that in some cases obsidian was obtained by digging into the outcrop. In several places, including FAP, there is no soil development at all under the artifact layer, suggesting that human use of the source began as soon as the obsidian was exposed to the surface. At other localities there appears to be a red-brown soil beneath the artifacts. It seems that exploitation of obsidian during the time of unit 2 was both intermittent and patchy across the outcrop.

Overlying the artifact-rich unit (2a) is a red-brown soil with variable thickness and containing scattered blocks of rhyolite and occasional artifacts which are sometimes present as clear stone lines (2b). This material is probably slope wash. The sudden appearance of up to 3 metres of slope wash immediately after the first appearance of artifacts might suggest that human interference was responsible; however, the slope wash might also have been caused by uplift.

The succeeding unit 3 is a bedded tephra. In 1989 it was mistakenly identified as tephra from the WK-2 eruption from Mt. Witori. The basal portion of unit 3 is sometimes quite coarse. Quite close to the obsidian flow where the bulk of artefacts had been laid down previously, it occasionally incorporates artefactual material. Overall, unit 3 shows planar bedding, but some beds are clearly trough cross-bedded and give palaeocurrent directions from 315° to 090°. This bed was deposited by a stream flowing generally northward, in approximately the same direction as the current Malaiol stream. Presumably the unit was formed as a result of erosion and redeposition of an airfall tephra which erupted during the wet season. The process must have occurred quite quickly after the eruption, before vegetation had time to re-establish itself and stabilize the tephra. Given the thickness of unit 3 (up to 1.5 metres), the eruption must have deposited a considerable amount of tephra over the area. The origin for unit 3 as well as for the subsequent tephras in units 4 and 5 is currently unknown.

The top of unit 3 shows a small amount of soil development and in some locations incorporates a stone line containing artifacts. Succeeding unit 3 are up to 3 additional airfall tephras (labelled units 4 and 5). All are very coarse at the base with a dark brown soil at the top. Where the soils are well developed, it is difficult to discriminate between the various tephras. At several localities the top of the lowermost tephra is marked by a stone line with artifacts.

Unit 6 which overlies the tephras is comprised of lapilli and blocks of rhyolite and obsidian in a white matrix. This unit is almost identical to unit 1d of the basal sequence and probably represents a pyroclastic flow. The eruption of unit 6 would certainly have been drastic enough to have eradicated all plant and animal life on the slopes of Mt. Baki. The final unit in the Malaiol sequence is the Wk-2 tephra known widely from other parts of the island. The Dakatau tephra is not preserved at this locality but is present on nearby hillsides.

This reconstruction of the geological history of this part of Garua Island has important implications for understanding the prehistory of the area. Firstly, it seems likely that only a small amount of quarrying took place during the time of unit 2a, that quarrying was sporadic rather than continuous, and that it was quite limited in spatial terms. After unit 2a only small stone lines with artifacts are present in the deposits exposed by the stream, suggesting that the quarrying and manufacture of tools was conducted on a very small scale. Secondly, since the obsidian source was buried by the slopewash of unit 2b as well as the tephras of units 3-5, it may have gone out of use at a very early date. Thirdly, the frequent occurrence of volcanic activity on Garua prior to the WK-2 event of 3500 years bp may help explain why obsidian from the Baki source group has been found to be extremely rare on archaeological sites outside the island itself.

During the course of geological fieldwork a number of new localities containing artefactual material were recorded and photographed and a representative sample of artifacts was collected for further study. At locality 7, just across the stream from site FAP a pit dug into the obsidian source during the time of unit 2a contained a stemmed tool and a hammerstone. Collections of artifacts were also made from stone lines in unit 2b at localities 6 and 11. Further upstream at locality 14 three superimposed stone lines in unit 2b each contained a stemmed tool. Finally, at Locality 17b three samples of charcoal were obtained from units 2b, 3, and 4/5, samples of artifacts were collected from unit 2b, and a solitary blade was retrieved from unit 4/5.

Hopefully, the charcoal will provide radiocarbon dates for these units. In the future it is hoped that obsidan hydration dating could also be used to help clarify the relative stratigraphy of the scattered stone lines along Malaiol stream as well in the gully below site FAR, where stemmed blades were also collected this year. In this way it may be possible to establish a relative chronology for the different types of stemmed tool using the isolated examples found in situ this year.

Recommendations for further work on the geological history of Malaiol stream include the following:

1. Detailed characterization of all the units using thin sections;

2. Further characterization of units 3-5 by using refractive index and an SEM microprobe in order to improve the correlation throughout the stream cutting and to relate the Malaiol tephras to the layers exposed at the scoria pit.
3. Dating of the coral units and associated sediments using both forams and U/TH dating of clam shells (if possible).

Holocene Sea Level Changes

Dr. John Webb also undertook a preliminary study of the raised coral reefs in the Talasea harbour in order to reconstruct the recent history of sea level changes. There is abundant evidence along the coast from Walindi Plantation to Garua Island that there has been a drop in sea level in the relatively recent past. Firstly, there are a number of coral reefs which are exposed during current low tides. Since normally coral will only grow up to the level of the low water mark, these reefs must have grown when the sea level was higher. Secondly, at Mondu Point (near the Talasea police station) dead oysters adherring to rocks were observed to form a consistent line some distance above the high water mark. These also indicate a higher sea level since oysters usually occur up to the high water mark and not above it.

A transit survey of levels by Webb showed that the high water mark determined by the level of oyster shells is about 1.1 metres above the present high water mark. Levelling near the new jetty at the scoria pit on Garua Island showed the the surface of the raised reef is 0.75 metres above present low tide mark so that these are covered by current high tides. This reef, however, has been extensively reduced in height by erosion and the activities of boring animals. Reefs closer to the mainland near Bamba and Bitokara are better preserved, as evidenced by the presence of vegetation growing on them. They appear to be about 30 centimetres higher than those on Garua (i.e. approximately 1.1 metres above current high tide).

The data from the reefs and the oysters, therefore, both point to a fall in sea level of around 1 metre. This is consistent with the drop in sea level of 1 to 2 metres observed elsewhere in the western Pacific region for the period between 6000 years ago and the present. Alternately, the evidence could indicate recent uplift of the coast in this vicinity due to volcanic activity. In order to help differentiate between these two possibilities, samples of oysters and coral were collected for radiocarbon dating.

Prehistoric Land Use

The final aspect of the 1992 fieldwork was the initiation of a study of prehistoric landuse. In order to investigate when gardening began on Garua Island and to determine how intensively the land was used at different times in the past, Dr. Tony Koppi (University of Syndey) will undertake a study of the micromorphology of buried soils from each period.

Although he was unable to join us on the island this year, we nevertheless collected a series of soil samples from both modern and ancient contexts. Since this technique has not been used by archaeologists before, the modern samples are needed to provide an essential reference against which to measure differences expressed in the ancient soils. The analyses of thin-sections prepared from the samples will be carried out before the next field season in order to determine the next stage of sampling.

SUMMARY OF RESULTS

When all the new data are taken together, it is clear that our understanding of the prehistory of Garua Island has increased significantly as a result of this year's fieldwork. At the same time, the preliminary data have raised a number of important questions to guide future research, both on Garua and for archaeologists working in other regions. To begin with, the stratigraphic analysis of Malaiol stream has increased the time-scale and complexity of Period 1. Future fieldwork on Garua must make a distinction between deposits dating before and after the bedded tephra (unit 3). Secondly, although the frequent occurrence of volcanic activity witnessed in units 3-5 may help explain the lack of obsidian from Garua in assemblages outside the island, vulcanism is not sufficient on its own since local obsidian was extensively used before the WK-2 event (at FAO and especially FAQ). Furthermore, why was obsidian not distributed from Garua during the time of Lapita pottery, when clearly people were living on the island and exploiting local sources?

Another major new source of information has been differences in the presence or absence of archaeological material at sites as well as in the way artifacts were distributed in space. These data are extremely important because they indicate that shifts in settlement pattern (which may also reflect changes in social organization and subsistence) have taken place on Garua during at least the past 6,000 years. For example, it is significant that of the sites investigated in 1992 Period 2 deposits only occur near the coast. In contrast, cultural material from both Period I and Period 3 is abundant at the coastal and inland hilltops at FAO and FAQ, but both appear to be absent near the coast at FSZ. In contrast, Periods 1 and 3 differ in terms of the way obsidian manufacturing waste was discarded, with high density, special purpose deposits of manufacturing waste present in Period 1, whereas Period 3 obsidian assemblages are more generalized in their composition. Finally, comparing FSZ with FAQ, the widespread, although patchy, distribution of Period 3 material contrasts markedly with the discrete, localized discard of pottery and obsidian in Period 2.

One plausible explanation for these data is that the settlements of Period 2 are more clustered and sedentary than those of both previous and later times. Another possibility is that the overall picture is biased by the distribution of one particular artifact, pottery, and that may have been associated with a very specialized activity which was restricted to Period 2.

Possibly the most significant result of the fieldwork is the confirmation that the two sites FSZ and FAO, which are situated on top of well-defined and easily defended hilltops, contain pottery which probably dates to very late in the Lapita sequence and may even represent a post-Lapita

occupation. Elsewhere in West New Britain, earlier sites with Lapita pottery are generally located on reefs or beaches, as in the case of FQY. If the location of sites FSZ and FAO signals a shift in settlement to defended locations, the most likely explanation is that a major change in social relations took place. The regional social and economic networks inferred by archaeologists for the period associated with Lapita dentate stamped decoration may have begun to break down. Regionalization of local pottery traditions during the post-Lapita period has also been observed for other areas such as Buka, New Caledonia, Vanuatu, Fiji. Gaura Island presents a rather different picture since the production of ceramics did not continue. Furthermore, the suggestion raised by the location of FSZ and FAO that conflict was a factor raises many new questions about the nature of social change.

Finally, in addition to the initial field data, the project has recovered excellent samples of cultural material dating from before 5500 years ago and ranging up to the present. The analysis of these assemblages will also provide important data for studying the impact of obsidian on the lives of the people who inhabited Garua Island in the past.

FUTURE DIRECTIONS

Fortunately, funds are available to support another season of fieldwork on Garua Island and plans are underway for a team to return in July/August 1993. The goals of the 1993 fieldwork will be as follows:

1. Recover a larger sample of cultural material from each of the three designated periods so that changes in technology, exchange, and subsistence can be better understood. Deep stratigraphic soundings will therefore be conducted at FAO, FAQ, FQY to ensure the widest coverage for each period.

2. Improve the knowledge of spatial patterning on sites in Periods 2 and 3 by conducting large aerial excavations at FSZ, FAO, FAQ and by an extensive programme of shovel pits at these sites.

3. Continue the study of prehistoric landuse by collecting additional soil samples, by carrying out a programme of sampling phytoliths, and by incorporating field studies on soils and geomorphology by Dr. A. Koppi and Dr. W. Boyd.

In the interval between field seasons, the data from 1992 will be subjected to a wide range of analyses. A series of samples from FSZ, FAO, FAQ, Malaiol Stream, and Point Mondu have already been submitted for conventional and AMS radiocarbon dating. A small number of samples from FAP have been send to Christopher Stevenson for obsidian hydration dating, but his results cannot be interpreted until relevant climatic data has been collected from Garua Island and a source specific rate obtained for the Baki source. During 1992-3 grant applications will be made to obtain funds for complete hydration analysis of artifacts from Garua.

In addition to chronological studies the following laboratory projects have been initiated: soil microporphology (A. Koppi), phosphate analyses of soils, characterisation of pottery (Summerhayes) and obsidian (Summerhayes and Victor), stylistic analysis of pottery (Summerhayes), obsidian technology (Torrence and Victor), sorting and identification of shell. The results of most of these will be obtained before the next field season and will be invaluable in the determination of specific field sampling strategies for 1993.

COMMUNICATION OF RESULTS

After the fieldwork was completed, Torrence, Summerhayes, and Victor visited the Department of Anthropology and Sociology at the University of Papua New Guinea to discuss their work with students and staff; Torrence also presented a seminar. In addition, Torrence and Summerhayes both presented seminars at the National Museum and Art Gallery. Summerhayes spent one week in the Department of Anthropology and Sociology at the University of Papua New Guinea teaching techniques for ceramic analysis to an advanced student. He also provided tuition in ceramics for members of staff in the Department of Prehistory at the National Museum and Art Gallery. Torrence was able to brief officials from the West New Britain Provincial Government about our work: in particular, meetings were held with the Acting Premier, Mr. Gabriel Bakani; Acting First Assistant Secretary for Social Sciences, Mr. Poliap Kisokau; Acting Assistant Secretary for Home Affairs, Youth, and Culture, Mrs. Ester Papaea; and the staff of the Provincial Cultural Centre, Mr. John Namuno (Manager) and Mr. John Normu (Curator). Unfortunately, a planned trip to Garua Island by officials was not able to be carried out. Torrence and Summerhayes also visited the International Primary School in Kimbe where they showed Lapita pottery to a group of teachers and discussed the research.

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1a Coral reef-lower
1b Blocky pumice
1c Coral reer-upper
1d Rhyolite, obsidian blocks in white matrix: ?pyroclastic flow
1e Blocky lava flow with obsidian
1f Thin bedded turbidites: faulted, folded, brecciated, intruded by dykes
2a Concentration of obsidian artifacts and stone lines
2b Red brown soil with scattered obsidian blocks and artifacts
3 Plane-bedded and trough cross-bedded tephra
4 Air fall tephras and stone lines
5 Air fall tephras and stone lines
6 ?Pyroclastic flow: white matrix, unworked obsidian pieces
7 Wk-2 tephra
8 Dakatau tephra

Figure 2 Summary of the Stratigraphy in Malaiol Stream

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