

THE PHUKET PROJECT REVISITED: THE ETHNO-ARCHAEOLOGY THROUGH TIME OF MARITIME ADAPTED COMMUNITIES IN SOUTHEAST ASIA

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Abstract

The Phuket Project aims to model all aspects of the Chaw Lay maritime adaptive strategy in order to understand how various activities, and their evolutionary sequence, can be identified in the archaeological record. This paper describes the previous work of the project, focusing on the palimpsest of sites representing four levels of socio-economic organization, from temporary base camp, through base settlement, to sites in distress and in a state of collapse. New research at the same, and additional sites, in Phuket is described and analyzed for the ways in which it adds to our understanding of the various levels of complexity. The paper ends with a discussion of the networks formed by these sites and how they act as safety nets to maintain the adaptation regardless of the pressures which change, stress and time might impose on them. The value of this research is the opportunity it has given to add a temporal dimension to ethno-archaeological work.

Background to the Phuket Project and review of previous research

The Phuket Project was initiated in the late 1970s and early 1980s as a means to investigate the ways in which adaptive strategies based on the specialisation in marine resources have evolved in the tropical island environment of Southeast Asia. These strategies have resulted in a widespread distribution of archaeological deposits throughout the archipelago which has been widely remarked upon but not explained. To investigate this phenomenon a multi-disciplinary team with a commitment to long-term ethno-archaeological research was constituted. Over the seventeen years which the project has been on-going, specialists from the disciplines of geology, oceanogra-

phy, marine biology, anthropology, demography, mathematical topology and, of course, archaeology have all contributed to the work of the project.

The Phuket Island group lying off the west coast of southern Thailand is one of many such places in the South China Sea where most, if not all, beach sites yield evidence of past human exploitation. This area is also the present-day home to three of the still-thriving groups of transhumant sea peoples known collectively in the Thai vernacular as *Chaw Lay* – Sea Gypsies, or People of the Sea. Twenty years ago, the Phuket Group, now well-known as an international tourist destination, was already poised for rapid economic development and thus inevitable social change for the indigenous inhabitants of the area. Because of the widespread distribution of archaeological remains, the existence of an ethnographically analogous indigenous population, and im-

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pending social change, the area was chosen as the laboratory in which to investigate the issues concerning specialisation in maritime resources – issues which have wide relevance throughout insular Southeast Asia. The initial phase of ethnographic documentation and archaeological research continued for a period of three full years from 1978 through 1981, during which a series of nine living communities of Chaw Lay were studied and fifteen sites were excavated.

Recognising that much ethno-archaeological research lacks a time dimension and thus is open to a critique of speculation, our research has been updated by periodic return visits culminating in a formal project extension in the spring of 1996 in which eight sites were re-excavated and one newly-discovered site investigated. The ethnographic data pertaining to the populations of four Chaw Lay communities were updated and the demographic connections of these populations re-mapped in order to determine what, if any, changes in the pattern of movements had taken place over the course of a generation.

This was a unique opportunity to return and observe how events which were first encountered as living behaviour more than fifteen years ago have now been converted into archaeological deposits – thus adding a temporal dimension to our ethno-archaeological model.

As predicted, certain sites have reached the limits of their carrying capacity and are changing function while others have been abandoned entirely. However, the social links binding together the network of sites have enabled the populations of these 'dead' sites to move elsewhere and continue their lifestyle substantially unaltered.

While confirming the previous interpretations of site use and distribution, the new data have given insight into the patterns of horizontal redistribution of material remains within a given occupation site over time. The insights gained concerning impermanence of structural evidence and the recycling of discarded midden material

can have important implications for the interpretation of maritime gatherer-hunter campsites throughout the tropical South China Sea.

In previous papers we have extensively reported on the ethnography of the Chaw Lay (Engelhardt 1980, 1989; Rogers 1992), the nature of coastal archaeological deposits in the study area (Engelhardt and Rogers 1995, In Press), and the explanatory models which we have developed to interpret these deposits and explain their distribution (Engelhardt and Rogers 1997, In Press). In this paper, we report the results and insights obtained during the recent field season when we returned to and re-excavated both old and new sites since it is useful to make a brief review of the deposits and archaeological transforms so that the new data can be understood in the context of our previous findings.

The ecological niche to which maritime people have adapted themselves to exploit is characterised by long stretches of sandy beach broken by estuarine areas of mangrove and mud flat, rocky outcrops and offshore island groups.

The climate is warm with a monsoon pattern of mild, sunny winters and rainy summers with strong winds. The sea is shallow, warm and low in salinity resulting in plentiful marine fauna. In general, coastal areas tend to have a larger number of ecological niches crowded into the same area than do non-coastal areas. As a result, coastal areas exhibit higher species diversity and longer food chains. The more species exploited, the more stable is the entire resource pattern and more suitable for supporting human population densities over a sustained period of time. There is evidence suggesting occupation of the area since at least the end of the Pleistocene by people who for the past several millennia have increasingly specialised in exploiting the marine resources of this ecologically diverse area.

As already noted, an autochthonous population of strand-loopers cum fishermen, known in some anthropological lit-

erature (Sopher 1977) by the linguistic designations as Moken, Moklen or Uruk Lawoi, but commonly referred to collectively as the Chaw Lay, exists to this day moving constantly through a biologically rich island environment. At any one time the area actively exploited by a Chaw Lay group will be comprised of many 'vertical transects' containing most if not all of the available ecological mini-zones found at

spread and sparse, but even, spacing of Chaw Lay groups throughout the archipelago, and puts limits to the human population which a given area can support from fish alone.

Although fish are the preferred resource exploited by the Chaw Lay, shellfish form the baseline of their subsistence. If the biomass of the preferred resource – fish – is low for one reason or another, the ecological

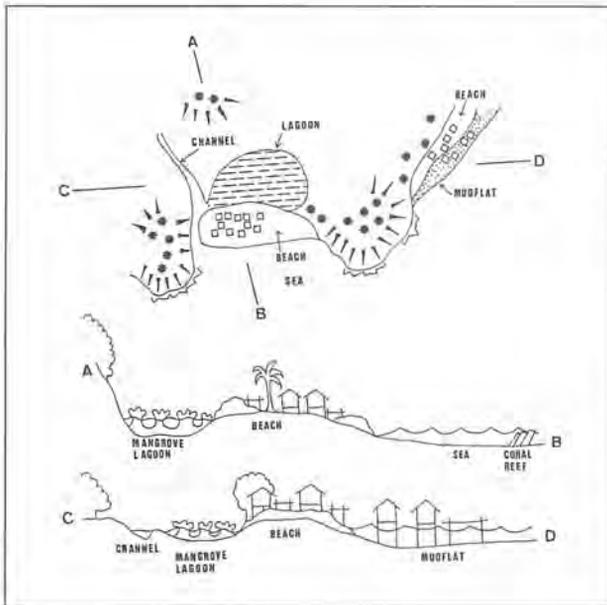


Figure 1. The environmental ecotone occupied by the Chaw Lay consists of raised sandy beaches backed by mangrove-filled lagoons. Nearby typically are rocky tidal flats rich in oyster beds which provide the basic subsistence resource of these maritime-adapted people.

every coastal site. Where certain zones do not exist at a site, it is not uncommon to find that the Chaw Lay have purposely altered the site in an attempt to create, extend or enhance the zone. [Figure 1]

Throughout the region, the Chaw Lay have adopted a subsistence strategy devoted exclusively to the exploitation of the resources of the sea and the shoreline. The Chaw Lay, by strategic preference, pursue the larger species of fish. These tend to be solitary wanderers in the sea and therefore too great a concentration of fishermen in any one area reduces the economic validity of the expedition. This encourages wide-

diversity of the coastal niche assures that alternatives are available to buffer the population.

The buffering effect of easily-available shellfish is therefore the most important consideration of the Chaw Lay subsistence strategy. Access to and harvesting of shellfish is the essential feature of their economic adaptation. As a result, bulky and highly visible shell debris is the main archaeological marker of their use of a site. The presence and density – or lack thereof – of deposits of shellfish debris are the essential archaeological features which therefore must be examined and explained if we are

to understand the evolution and workings of a subsistence strategy based on maritime resources.

The objective of the Phuket Project has been to model all identifiable aspects of this maritime adaptive strategy in order to understand how the various activities and their evolutionary sequence can be identified in the archaeological record. The ecology of these strategies has been studied in depth as has the material culture developed to exploit the marine environment. Models have been built to explain the nature and evolution of sites as well as the relationships between these sites and the role of community and individual mobility in maintaining the networks linking them. Special attention has also been paid to the archaeological transforms characteristic of this environment which directly affect the nature and retrievability of the archaeological record.

The research strategy formulated to achieve these aims consisted of several main lines of investigation.

Firstly, a series of environmental studies was undertaken to clarify the geology, geography and resource base of the region. Much of this work was original field research because of the paucity of available data relevant to the coastal econiche under study.

Secondly, a programme of demographic studies was designed to supply data on the sea-based population of the area, their distribution and movements. During the course of research more than 1600 individuals were tracked, which accounts for more than one-third of all known Chaw Lay inhabiting Thai waters.

Thirdly, aerial, boat and ground surveys identified a series of sites, ranging from long-abandoned locations to those still in use. At the latter, detailed mapping was done of all the material, spatial and demographic components of living sites.

Special studies were undertaken of material culture and its role in site-based activities. These studies focused on the ethno-archaeological journey of artifacts and ma-

terials through use in an activity, reuse, storage, recycling and finally discarding.

Next, micro-excavation, or 'dermatabrasion' using razor blades and calligraphy brushes of both activity areas and depositions was carried out to evaluate the visibility of artifacts and activities in the archaeological record and the effectiveness of various methods of retrieval.

These studies at environmental, community, site, activity area and subsoil levels were developed into a number of predictive models of site use and formation.

Fundamental to these models have been such concepts as 'catastrophe theory' (Postle 1980) and theories borrowed from biogeography such as 'carrying capacity,' 'nearest neighbour analysis' and the 'founder effect' (MacArthur and Wilson 1967). Such theories are useful tools for explaining the ways in which multiple, small niches are selected and developed, linked, abandoned and then re-used.

A final line of investigation was the critical evaluation of these models. Archaeological methodology was employed at several abandoned Chaw Lay sites in an attempt to reconstruct a map of their living form. This reconstruction was then evaluated for the degree to which it fits expectations based on the ethnoarchaeologically-derived models.

As a result of our most recent phase of field work, the models we have developed have been re-tested, refined and given a greater degree of time depth, as we shall shortly describe below.

Network of sites form an archaeological palimpsest

Although the water is both the physical and the psychological link and limit between social communities of maritime adapted communities, the physical manifestation of their use of the catchment area is to be retrieved at each coastal site, be it a shellfish gathering site in the mangrove, a temporary fishing camp on a small beach, or a more permanent base camp along the coast.

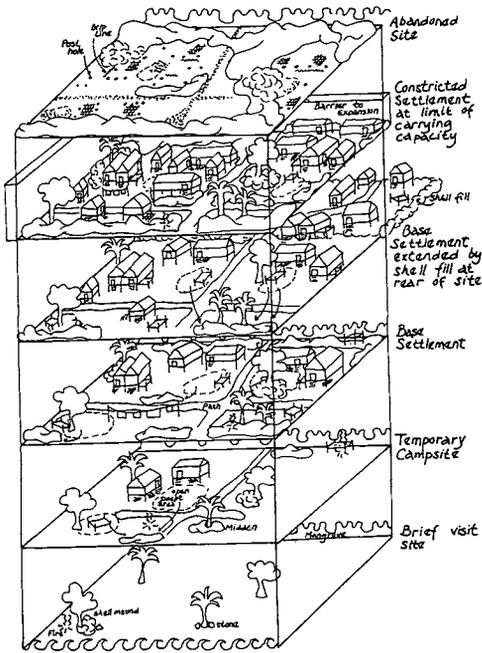


Figure 2. Evolutionary typology and palimpsest of coastal sites of maritime-adapted communities.

Throughout our study of the evolution of maritime adaptation in Southeast Asia, the interchangeability of the coastal econiche coupled with the specialisation of certain communities in the exploitation of this econiche is the basic phenomenon which we have attempted to understand and explain. As we examined a wide range of beach and strand camp sites and travelled by boat between these sites with our Chaw Lay informants, it became clear that the catchment area exploited by each Chaw Lay group includes a much larger area than their immediate habitation sites. It is the limit of the extended catchment area that determines the spacing of Chaw Lay throughout the potential econiches at any given time. This has created the pattern of archaeological deposits to be found on so very many of the islands of the archipelago.

Each site in the network has the potential to be used in a continuous but intermittent fashion in both a regular and erratic manner. This seemingly contradictory situation is a

result of the varied patterns of econiche use. A site, or a portion of a site, may be used as a base camp by one Chaw Lay group, while several small and transient groups may use portions of the site for temporary occupation. At the same time-space, a boat group may use the econiche for water and vegetable collection, but not for residence, as they stay on their boats and move on. The pattern is further complicated by aspects of seasonality and the occasional need for a site to be temporarily, but regularly under-utilized while its resources regenerate.

In the attempt to conceptualize and understand this diversity a typology – or more precisely phrased, a palimpsest – of archaeological sites and their interlinkages or network throughout the catchment area has been developed. [Figure 2]

To develop our palimpsest we originally identified the ethnographic and archaeological patterning at four levels of socio-economic organization.

- (i) Temporary seasonal camp sites, forming the basic unit of Chaw Lay colonization of a site.
- (ii) Base settlements of longer-term occupancy, functioning in a sustained-manner well within a site's carrying capacity.
- (iii) Communities at the point of collapse from over-exploitation of the environmental resources of a site's catchment area.
- (iv) Abandoned occupation areas, past the point of collapse, now in a state of environmental regeneration and used only for intermittent scavenging.

The Chaw Lay's conceptual organization and use of space for social and economic subsistence activities is what determines the spatial patterning of archaeological remains at ground and below-ground levels. The complex patterning creates on the sandy matrix of the beach sites a multiple overlay of partly visible lines of archaeological 'text', each one imperfectly erased but remaining

in partial form. The concept of palimpsest seems particularly applicable for intermittently occupied coastal sites, where the phenomena such as the annual monsoon and action of the inhabitants through regular maintenance of activity areas and scavenging of abandoned sites partially erases the evidence on the ground.

At each site the Chaw Lay subsistence strategy implies a range of activities for extraction, processing and consumption of the resources from their environment. Those activities which occur on-site have potential impact on the archaeological record of a site in the form of the tools and materials used, associated discards, deposition and impact on the activity loci. These are the elements which make up each layer of the palimpsest.

**Activity areas:
the importance of negative space**

From this analysis we have found that, for peoples who rely on maritime resources for their subsistence, the remains of individual events of extraction and processing activities are not reliably retrievable directly or proportionally in the spot where they took place. This is because of post-depositional factors – particularly the cleaning and maintenance of the activity areas which resulted in the removal of most debris associated with specific activities.

Of course, it is obvious to all archaeologists that many post-depositional forces will transform activity areas. Other contemporaneous activities, some unrelated to subsistence, take place on top of shell middens; animals scavenge and children play in the middens; traffic tramples the midden; shell from the midden is recycled; structures are built on and removed from middens; tidal action both along the strand and along the lagoon alter the deposit.

But the important point to note is that primary in-situ depositions are almost without exception swept up and cleared away leaving the activity area clean and usable for other activities. What remains in-situ is only

the soil transforms of repeated maintenance of the site together with fragments of artifacts so small as to be incorporated with the soil itself and, typically, mixed by subsequent scavenging by animals at the site.

This continual maintenance of activity areas is related to the use of communal areas for a wide variety of social activities including boat and fish trap repair, shellfish processing, cooking, daily domestic traffic and children's play and semi-annual communal feasts and festivals, all of which are community-wide activities participated in, at one time or another, by all members of a Chaw Lay group.

This overlap of activities also obscures traditional archaeological retrieval techniques, as does the repeated mixing of the resulting by-products of activities which do remain in-situ.

That this is a complicated process often repeated over and over again on the same depositional materials has been shown by our recent field work which will be described below.

In other papers we have examined these archaeological transforms at coastal sites of maritime-adapted communities and can conclude that artifacts and material by-products of activities should not be expected to be retrieved in-situ except in situations of very temporary use of a site at the entry level of the palimpsest or when a site is on the verge of abandonment and may soon drop from the network altogether.

What does remain and is retrievable through careful excavation is a record of archaeological impact of repeated site use, modification and maintenance consisting of a pattern of open, communal areas; depositional midden frames; and surfaces differentially compacted by repeated mechanical action such as walking and water erosion from roof run-off. This is the archaeological pattern of the Chaw Lay past as a maritime-adapted community.

Depositions: debris and potential artifacts

Let us now turn to debris depositions which are, along with activity areas, the two main components of coastal archaeological sites of the Chaw Lay and other transhumant maritime strand-loopers. Debris depositions are also the places where the by-products of the activities which took place in the open communal spaces are to be found, if at all.

As noted above, the accumulation and patterning of the remains of extensively-available and intensively predated shellfish species found in the intertidal (such as oysters and mussels) is the definitive characteristic, or trait, of sites occupied by maritime-adapted gatherer-hunters of Southeast Asia.

Shells which comprise the 'trait' depositions are collected, processed and deposited in bulk. As such they are evidence for the economic basis of the subsistence strategy of the inhabitants of a site. The important point, archaeologically, is that they are not in primary deposition. Redeposition of trait processing remains is necessary to keep sites from being overwhelmed with refuse. Thus redeposited shell debris frames a site and defines the spatial limits of the site.

At any one location, the space available for both productive and social activities becomes, over time, increasingly constricted by accumulating shell refuse. Eventually the carrying capacity of a site is reached and a way must be found to extend the site to increase, or to reduce, the number of persons relying on the site for their subsistence. If not, the group must abandon the site, splintering and moving on to one or more of the many other similar and available econiches within their catchment area. Therefore, from the position of secondary depositions we can reconstruct the limits of a site and the degree to which the site has reached its carrying capacity.

Concepts of activity area maintenance, and redeposition also affect the meaning of 'artifacts'. Few (if any) can be assumed to be in-situ objects found where they were used. As discussed elsewhere (Engelhardt and

Rogers 1995, In Press), due to the intensive re-use of objects by maritime-based communities, objects can be expected to be found in terminal deposition only if they are considered un-recyclable, i.e. without potential for future reuse, by their users. An 'artifact' – that is to say any object utilized by humans – if found in archaeological context has meaning only as discarded rubbish (i.e., part of a terminal deposition) or as potential tool. This explains why stones are frequently found cached at sites. In addition to being inconvenient to transport from site to site, they are multifunctional, so even after one use, they have the potential to be used for other things. But it is important to understand that in their cached context, they have yet no specific function. They are undifferentiated artifacts.

The archaeological record of the Chaw Lay can be understood as a more or less continuous distribution of depositions, surfaces and open spaces within a specific and limited environmental niche. It is, above all, not a collection of artifacts waiting to be found. This concept of the archaeological reality of transhumant maritime communities means that variability in density of these three factors as well as that of cached artifacts is potentially explanatory. In such situations as Dunnell (1992: 34) has pointed out, the analytical task of archaeology is to explain the density and character of the more or less continuous distribution of these features throughout a 'cultural landscape'.

It is important to understand that these patterns created are regular, predictable and indicative of both the carrying capacity of a site and of the place a site has in the evolutionary palimpsest of maritime communities. These patterns are therefore both meaningful and retrievable from the archaeological record.

They are also quite different from what archaeologists usually expect to study: shellfish depositions must be assumed not to be in-situ; artifacts, in particular stone, are significant only for their 'potential'; the absence or presence of open or negative spaces is a diagnostic of human social interaction; the

segregation of these elements is correlated to the extent to which the carrying capacity of a site is stressed. These are the defining elements of the archaeological remains of a maritime-adapted community.

Type sites revisited

These included three temporary campsites:

Haad Hin Khaw

We have described the minimal level of spatial patterning which is recognisable at a site as characteristic of a temporary campsite – the basic unit on a palimpsest of site complexity. Typical of such sites is Haad Hin Khaw on Ko Lon. During our initial investigation seventeen years ago we identified a single compacted surface, some small amount of debris redeposited at the back of the site and a peripheral activity area consisting of charred stones and shell remains on a flattened surface associated with a shade tree. Through ethnographic analogy we know that this type of site represents the basic unit of Chaw Lay occupation – a single boat group on a short-term visit to the site resulting in minimal impact, but one which nevertheless leaves characteristic alterations in the ground.

On returning to Haad Hin Khaw we re-identified all of the site features originally found. The compacted surface and the peripheral activity area were overgrown and showed no evidence of use since our last investigation. However, new evidence for continued use of the site was found in the form of several individual in-situ deposits of shell on the raised beach, the results of short stops to collect and consume shellfish. Note that these in-situ depositions are characteristic of, and found primarily at, temporary campsites or at sites which have been abandoned for permanent settlement and are experiencing re-use at another level of the palimpsest.

The explanation for this new and even more transient use of this small campsite is that in the intervening fifteen years the Chaw Lay of this area have acquired motors for

their boats. This has altered the physical as well as the mental map of the Chaw Lay, shortening the distances between sites within their catchment area. Recalling that the Chaw Lay do not, if it can in any way be avoided, spend overnight on the open sea, the distance between Haad Hin Khaw and the nearest base camp previously necessitated an overnight stay. Now that the Chaw Lay have acquired motors for their boats it is possible to visit and use the site on a day-trip basis. This has altered the nature and degree of archaeological impact by making it even more ephemeral. Consequently, we have refined and added another level to our palimpsest reflecting the most temporary and transitory of minimal archaeological impact.

Ao Wai Daeng

The site of Ao Wai Daeng, also on Ko Lon, is a larger beach with more spatial potential for this minimal stage to expand into a more long-term and complex occupation. Previously, three or four activity surfaces, a path along the front of the site and several secondary midden deposits were recorded. On returning after more than fifteen years all these features were re-identified although not all showed signs of continued use during the interval. There was also evidence of increased recent use at the west end of the beach, with remains of several shell cracking stones and shell debris on an activity surface. The status of this site also appears to have been affected by the technological change in the Chaw Lay mode of transport with an increase in day-use over short-term stay. This is reflected in the increased number of activity surfaces, cached artifacts and primary debris scatter which one would have expected to have been redeposited in secondary midden if the site were still occupied over a longer or seasonal time-period as had been the case only fifteen years ago.

Haad Yao

When the econiche is larger still, with denser and more diverse resources, we see a movement beyond a temporary campsite towards the minimal requirements for a more or less

permanent base site habitation. This level was characterised by Haad Yao on the island of Ko Bon. Here we recorded nine or ten activity/habitation surfaces at the north end of the beach, extensive secondary deposits of shell refuse and a central open area under large shade trees. At the opposite end of the site were a turtle butchering area and a spirit house area. Informants had told us that until seventy years prior to our initial study this site had been a base camp supporting a substantial population of up to thirty households or, more precisely, residential boat groups. The site had been abandoned due to continuing erosion of the beach front by monsoon action exacerbated by the changes in the ecology of the sea bed caused by widespread tin-dredging carried out in the vicinity in the early part of this century. Subsequently, the site had reverted to a camp site used for short stays similar to Haad Hin Khaw and Ao Wai Daeng.

On our return we found that the entire site at Haad Yao had been developed into a tourist beach facility, thus closed to further use by the Chaw Lay. The beach was entirely covered with bungalows, a restaurant and various other structures. Survey of the site however revealed the remains of all the surfaces and shell deposits previously identified underlying the recent effort to landscape the site. One of the compacted surfaces recorded fifteen years ago was re-used as the foundation for a resort bungalow structure. Material and artifact debris could be seen eroding out of the foundation, being swept up as part of contemporary site maintenance and being redeposited, again at the rear of the site. This site provides an interesting opportunity to see what must surely be a common phenomenon confronting the archaeologist in these areas: that of the ongoing creation of archaeological deposits of different cultures and different uses being superimposed and integrated – from base camp to temporary campsite to tourist resort – and evidence of all levels of use still discernible in and on the ground. We shall return to this interesting issue of cultural replacement and overlay later in this paper.

Ko Raya

During the 1996 field season, an additional site was added to our typology of site development. The island of Ko Raya Yai lies many nautical miles to the south of Phuket and is barely visible from Phuket in clear weather. Although the trip to Ko Raya now takes only three to four hours by modern speedboat, by traditional means of transportation the trip took more than one day and necessitated a night at sea.

The island has two beaches, Raya on the northeast and another deep bay on the northwest. The beach at Raya is long and shallow with rich oyster beds; the beach to the west is apparently not utilised by the Chaw Lay because it is exposed to the open ocean, has little shellfish and even at low tide the water is too high and the shoreline too rocky to be easily accessible by boat. Behind the beach at Raya is an area of mangrove-filled brackish-water lagoon with drainage channels inhabited by crocodiles. The Chaw Lay say that, although rich in shellfish resources, the site itself has never been the site of long-term habitation because the island is short of fresh water and too isolated from other sites to serve as a base camp and hub of a network of sites. Nonetheless, because of its very rich shellfish resources, the site is frequently visited, especially by boat groups of intrepid young men. Visitors sleep on the open beach and focus their activity at the rocky eastern end of the beach.

Investigations at the east end of the beach did indeed reveal evidence of both past and recent use. A stone built cistern was found terraced into the rocky hill slope, just above the high tide line. The date of this structure is unknown, although informants have known of its presence for at least three generations and there is evidence of continuing and very recent maintenance of the cistern. The cistern is placed to collect run-off from the hill slope, as the water from the channel is too saline to be used for drinking purposes. Associated with this cistern was found evidence of continuing use in the form of plastic, net, a charred coconut bowl, and burnt stones and driftwood from fire re-

mains. These remains represented periodic use of the site as a temporary campsite. The purpose-built and continuously maintained cistern can be understood as a site modification designed to increase the carrying capacity of the site as well as of the catchment area as a whole by making the potential exploitation of this isolated site a realistic possibility known by the wider Chaw Lay community and used communally by all members of the group. This is an example of the extension of the potential carrying capacity of a site for the benefit of future users. Such a communal approach to a site manifests itself also in other ways, such as the planting of coconut trees on potential sites. Chaw Lay informants told us that these plantings are indicators visible from afar that a site would be potentially inhabitable and resource rich.

In addition, some eighteen metres to the northeast along the rocky shoreline was found a processing site under the shade of a large tree. The remains consisted of a shell cracking platform, two hammer stones, remains of a fire, a matchbox and shell debris on and between the rocks. The evidence was arranged in such a way as to reflect the presence of at least two working individuals – i.e. a basic boat group – each with their own hammer stone and resulting shell debris, centred around a shared cooking fire.

The data from Ko Raya have added to our picture of temporary campsites and their importance within the network of sea-linked econiches. This site has also added to our understanding of the diagnostic nature of in-situ shellfish remains at temporary fishing campsites, remains which are distinctly anomalous at other types of sites. The environmental limitations of Ko Raya and its position as an outlier in the network prevented it from ever evolving into a base site. At the same time, its value as an exploitable econiche, albeit limited to a tiny portion of the overall site, justified modification of the site's environment to increase its viability and thus link it into the catchment area network.

Mature base settlements: Tukay and Rawai

Tukay: an expanding site

The next major evolutionary type site in our palimpsest is the mature base camp, typified by Tukay, a site which we returned to and re-investigated during our most recent field work season.

In the fifteen years since our initial study the overall space at Tukay has been encroached upon by Thai-Chinese shop expansion in the central area. To compensate, a deliberate attempt has been made to expand the available site space by modification of the site itself.

On our map of 1981 we recorded numerous large mounds of shell in the central areas of the village. To create additional space many of these have in the interval been removed leaving only shallow and shadowy evidence of their locations.

Along the rear of the site more space has been created by expanding into the low area lagoon. This has been achieved by the leveling of what was the rear, framing deposition and the moving of its bulk outward into the low area and filling it with secondary midden material. The frame of deposition along the rear of the site is therefore in re-deposition, a concept with implications beyond the meaning, as it is normally understood, of secondary deposition resulting from the maintenance of activity areas. It is obvious that this process has been repeated more than once and that the same garbage could travel outwards, being mushed and mixed, until finally it reached its 'terminal' position. [Figure 3.]

As the garbage travels outward some is left behind both intentionally to create a level surface and unintentionally as a kind of archaeological smear of debris on the site surface.

At Tukay, the new space has been filled in an orderly fashion by rows of new structures. However, no significant rearrangement of previous structures or spaces could be seen. In other words, a straightforward expansion took place to redefine the limits

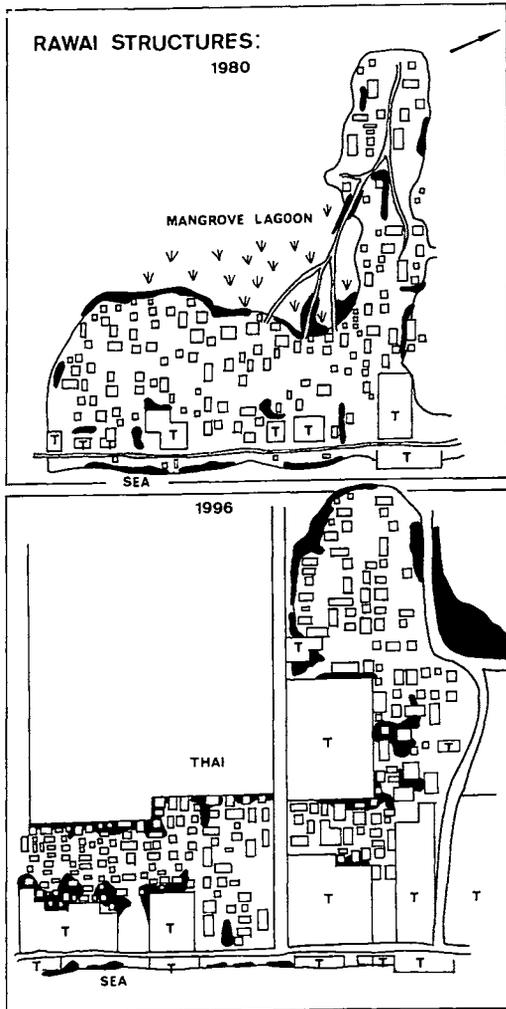


Figure 3. Tukay: a base camp site comparing the location of shell deposits in 1980 with that in 1996 after the many small shell deposits within the site had been redeposited at the back of the site, thus expanding the total inhabitable area of the site.

of the site by repositioning the frame of secondary midden material to create enough space to accommodate the evacuated population of Laem Thong, a collapsed and abandoned site which we will return to later.

Rawai: a constricted site under stress

A further evolution in the palimpsest is found at Rawai, another base camp where in the past fifteen years site space has been

seriously encroached upon along the sea front and along the rear lagoon by alien buildings and associated land fill. A frontage road limits one side of the site and a new perpendicular road now literally cuts the settlement in half and gives access to the lagoon behind the site which has been filled in by developers. Here, unlike at Tukay, there is no option for expansion by moving the frame outwards. Fifteen years ago Rawai was in a state of incipient stress. Now this has become serious. Markers of stress include; increased density of structures; increase in percentage of total surface area of the site which is hard-compacted; shrinkage of open communal areas; increase in area occupied by debris deposition and loss of segregation between depositions and habitation space. [Figure 4]

These are all indications that the econiche has been overpopulated and over-exploited with the result that we are beginning to see the blurring or loss of the characteristic Chaw Lay sense of space and grouping.

As population pressure intensifies on limited environmental resources at Rawai, more and more time and effort is being expended to maintain the environment by resorting to such means as the shifting of structures, filling, raising and consolidating of surfaces and the construction of drainage arrangements. It is clear that in times of stress much more energy is devoted to environmental alteration than would be the case in a site in equilibrium. When sites are in a state of equilibrium, with adequate space to maintain patterning and segregation of activity areas, open spaces and debris deposition, maintenance input is equal to replacement and a stable site structure results. This is what we have seen at Tukay. However, when a site is approaching the limits of its carrying such as it now is at Rawai, dramatically increased input in site alteration is necessary.

Perhaps the most important marker of site stress is a dramatic amount of structural movement. At Tukay eighty-seven percent of structures are still in the same position they were fifteen years ago, although the

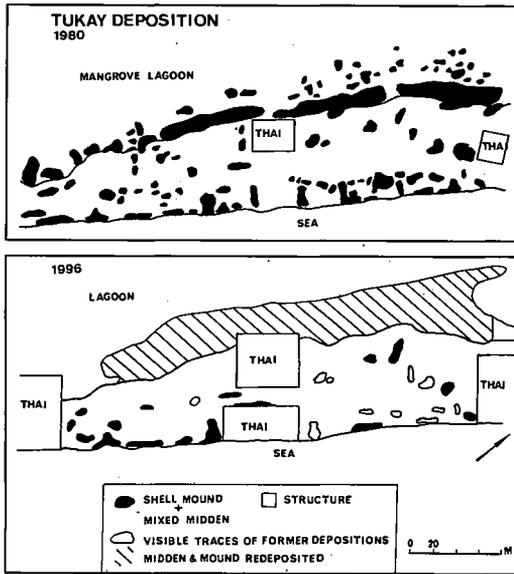


Figure 4. Rawai: a base camp where between 1980 and 1996 alien elements have encroached upon the site. The stress on the carrying capacity of the site is shown by the increased density of structures and the loss of open, communal space.

structure itself may have been altered or added to in some way. At Rawai in contrast only twenty-four percent of structures are in their positions of fifteen years ago. What we are seeing as the community gets dangerously close to exceeding its carrying capacity is a frenetic shifting and packing of structures in an attempt to maximise the use of the available space.

This will be reflected in the archaeological record by a dense and erratic arrangement of postholes superimposed, cutting and intruding on each other with varieties of fill and little if any discernible patterning as one reconstruction replaces another. Orientation of structures towards open communal spaces is also lost. In such circumstances, because structures and depositions are constantly moved and rearranged, their micro-patterning is of limited interpretative value archaeologically. A more important diagnostic characteristic is the degree of feature density in relation to the amount of open communal space at the site.

Open space is also a dependent variable

of another marker of stress which is the reliance on buffering resources for subsistence. At Rawai there is a dramatic increase in the reliance on shellfish. Fifteen years ago, there was very little shellfish debris at Rawai, as the community relied heavily on fishing for its subsistence. In fact, at that time only seven percent of the population reported that collecting shellfish was the primary subsistence activity in which they were engaged. This seven percent correlated closely with the elderly population of the site. Today, sixty-eight percent of the population of Rawai reports that shellfish collecting is of primary importance, whereas the figure at Tukay still remains below the ten percent level. This increased reliance on shellfish is evident in the debris depositions at the site.

Collapsed Sites: Laem Thong and Sapam

Finally, we will examine the terminal case of our palimpsests – a collapsed and abandoned base camp archaeologically represented by Phap Pha, La Eo and recently, Laem Thong which has been abandoned only some six years ago; and by ethnographic analogy at the site of Sapam.

When first studied fifteen years ago, Sapam was a maritime settlement already in crisis, much as Rawai is today. It served as the type site for the next to last stage of the palimpsest: an overpopulated and overexploited econiche at the limits of its carrying capacity. The density of structures had increased to the point where virtually all available space was filled, with a post count of forty-nine in a ten metre square in site centre in contrast to zero to two posts at other sites. The quantities of secondarily-deposited refuse had increased until discrete mounds had merged to cover the entire surface of the site. No attempt was being made to maintain the area, nor were there any discernible open, communal spaces or activity areas which were not themselves on top of terminal depositions of shell middens.

This stress was also reflected in the greater amount of time expended at Sapam than at

other sites on the basic acquisition of food which during our initial research was at sixty-five percent of the time, as compared to thirty-five percent of time at a mature and flourishing base camp. This meant that virtually all daylight hours were spent in subsistence activities. Furthermore in terms of fish versus shellfish, all Sapam residents reported that shellfish was the primary resource on which they relied.

Catastrophe theory suggested a predictive model of what would happen at Sapam; when such a system becomes unsustainable in the long term a radical or catastrophic change is to be expected. The 'catastrophic jump' we predicted was what we called the 'removal response'. In this problem-solving strategy, when the carrying capacity of a site is reached, it can be expected that out migration either of individuals or of small splinter groups in an attempt to establish a new equilibrium will precede any final abandonment of the site, in the attempt to re-establish equilibrium. However, if the pressure has already resulted in the decline of the essential shellfish resource base, removal of the group to another site is inevitable and the abandoned site reverts in status to a temporary camp, allowing the site time for the very slow process of regeneration.

We have described such a turn of events at the site of Laem Thong, on Ko Phi Phi, where acquisition of the land by outsiders and subsequent development resulted in the displacement of a Chaw Lay group.

At Laem Thong the residents removed first to a peripheral side beach and attempted to re-establish themselves there but this proved impossible as the site was too small, had few buffering shellfish resources and no place to beach boats. A process of evacuation began and most inhabitants of Laem Thong shifted their base camp of residence to Tukay. This process is now complete and Laem Thong is no longer a part of the complex network of the Chaw Lay world [Figure 5].

The events which have overtaken Sapam since our original study have created a complicated state of affairs which tests our model

and has helped us to understand the precise limits to a site's viability in the system – limits which attest to the tenacity of a site and help explain the phenomenon of widespread site distribution and the presence of remains over an extended time period.

Originally Sapam consisted of a relatively small settlement on the north edge of a river channel mouth. Structures built on posts over the intertidal mudflats expanded the site area into the sea. As density increased, several households moved across the channel to its southern mouth.

Recently developers have levelled all of the southern settlement and all but the seaward edge of the northern settlement and covered it with a soil deposit some one and one-half metres thick. On top of this have been built a complex of houses for Thai fishermen. Similarly soil has been deposited on the sea edge to reclaim land, extending the shore line some sixty meters and isolating the former Chaw Lay settlement behind the landfill.

Only two patches of Sapam have been left exposed: the spirit area in south Sapam which continues to be used and a thin strip of north Sapam now no longer on the sea but fronting a road.

Thirty-two structures from both north and south Sapam have relocated to a makeshift stilted community over the intertidal along the edge of the reclamation.

One group still remains of the original houses; all are recognisable on our map of 1980, but now they are in new positions. Of these dozen houses only one continues to be occupied by a Chaw Lay family. The rest are either abandoned or squatted in by Thai fishermen.

Like at Laem Thong, at Sapam displacement has similarly resulted in removal to the fringe of the site and to the splintering and out-migration of population. Only two of the original thirty-two resident boat groups present fifteen years ago at Sapam are still intact. However, Sapam continues to be exploited even under these very adverse conditions. The question this poses is what has enabled Sapam to be retained in

the Chaw Lay network of sites, whereas Laem Thong has been dropped entirely.

Networks as safety nets

Clues to this can be found in a) continued existence of abundant shellfish resources in the nearby mangrove; and b) the relative position of Sapam and Laem Thong within the Chaw Lay network of fishing and migratory links. Laem Thong is isolated at the outer edge of the network. If the population of such a distant node falls below a certain threshold it ceases to be a viably sustainable community and the predicted catastrophic jump takes place in the form of removal. Sapam is sufficiently close to the centre of the same network that it remains viable even when its population is depleted by individual out-migration. There will be enough traffic of neighbouring Chaw Lay in and out as part of the normal functioning of the network to maintain its viability as a site. Sapam provides us with a good example of the tenacity of the survival mechanisms of the maritime adaptation. Their elasticity allows them to absorb a great deal of stress without the necessity for abandonment of the basic adaptation. It also points out that the network itself is constantly in flux with the relative position, function and importance of sites within the network constantly changing.

In the past fifteen years, Sapam has changed its position in the palimpsest. It has jumped to near the bottom of the chain. Relative positioning within the network is a key to understanding the system. We have seen how in the seventeen years since our project began, the centre of the network has switched from Rawai to Tukay. The central position of Tukay has been reinforced by the in-migration six years ago of the Laem Thong population. The shift of the centre to Tukay has also given Sapam an extended lease on life as it has brought Sapam closer to the centre and makes it a viable site for base settlement exploitation on a more casual or temporary basis with Tukay fulfilling the base camp social and support functions for

the Sapam population.

Returning to our earlier discussion on the concepts borrowed from the biogeographic model – carrying capacity; spacing; splintering; colonialisation; and filtering – we can understand how and why certain sites change their relative importance and drop in and out of the network, depending upon factors such as, (i) their position and relative isolation along dendritic networks linking satellites with base camps; (ii) the absolute size of the satellite site; (iii) the critical level of population which the buffering resources of the site can support; and, (iv) the degree to which the site's carrying capacity has been overreached and its resources exhausted.

The removal response is a maritime-adapted solution to the problem of how to sustain human population densities and conserve resources over an extended period of time in an environment where the resources themselves are mobile and widely scattered. Because of the population's mobility and the availability of interchangeable niches, a complex pattern of movement, social splintering and regrouping has evolved. The advantage of this strategy is that it does not entail a change in the means, forces or in the relations of production.

The insights which have been the result of our long-term study and repeated re-examination of these phenomena both archaeologically and ethnographically have been essential in testing and clarifying our previous models of maritime adaptation of the sea peoples of the Southeast Asian archipelago.

Infiltration, displacement, expansion and replacement

The situation of invasion by intruders at Laem Thong, Haad Yao, Tukay, Rawai and Sapam – as we knew was happening when we first initiated the Phuket Project – also has made it possible to investigate the issue of relations between maritime adapted and non-maritime adapted groups as shown archaeologically in their material culture

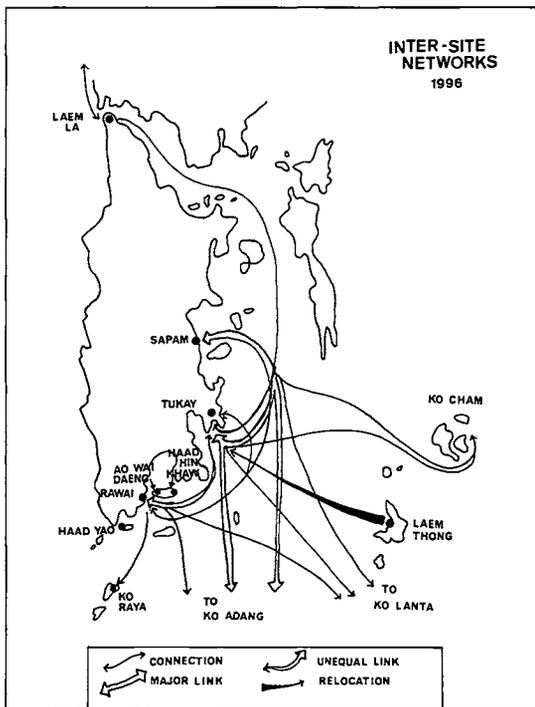
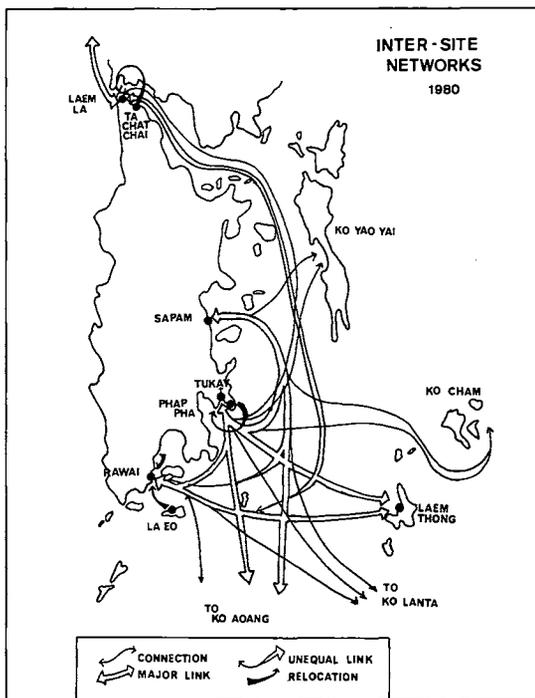


Figure 5. The networks and hierarchical linkages between Chaw Lay sites is constantly in flux as shown in these comparisons between 1980 and 1996, after the abandonment of the Laem Thong base camp on Ko Phi Phi.

and in the use-patterning of sites. At Sapam the Chaw Lay had been co-existing with the Thai fishermen for some time before the outsiders expanded into Chaw Lay space. Laem Thong is a different case of invasion by total outsiders, in this case overseas developers, and commensurably violent displacement. This difference may have played a part in the decision of the Laem Thong residents to evacuate and those of Sapam to continue to co-exist a bit longer with their encroaching Thai neighbours.

At Rawai we have a situation where there is gradual infiltration by outsiders as evidenced by both space and demographic statistics which reveal that unique among Chaw Lay villages, marriage with non-Chaw Lay is not just a social possibility; it is on the increase especially among the children of the traditional village leaders.

Such episodes of infiltration, displacement, expansion and replacement of one cultural group by another are frequently presumed to be the cause of complex stratified deposits which archaeology attempts to unravel. Sapam supplies us with a stunning example of just how easily the most mystifying stratigraphy can be created. If we were to look at a schematic presentation of what archaeology might reveal at this site we would see a complex interweaving of Chaw Lay presence in a matrix of midden and mud coexisting beside Thai presence in soil, then in artificial fill over Chaw Lay midden and in landfill over mud. Complicating this picture we have a spirit area outliving its related settlement, two distinct stages of Chaw Lay habitation of both sides of the channel, a Thai shop in a Chaw Lay matrix and evidence of the displaced Chaw Lay confusingly present at the site's new periphery. In contrast, at Laem Thong a long sequence of strata of Chaw Lay culture in a matrix of sand will be juxtaposed with patches of remains of the Thai Muslims with whom they shared the site. Dramatically overlaying this will be a destruction layer of bulldozed debris, a layer of levelling soil all topped with a tourist resort.

This use of and competition for a coastal

site is not surprising given the biotic richness and strategic location of such sites. Nor is it new, for the coasts of the South China seas have been contested for millennia.

The processes by which different cultures coexist, often economically linked, and then replace or displace one another is, however, a subject which we will not be able to go into here. We will examine this phenomenon in a future paper in which we will show how the insights gained during the Phuket Project can help to interpret the archaeological data of many of the sites which have been reported, for example, along the coast of South China, along the west and south coasts of the Philippine Islands and in the Mekong Delta.

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KEYWORDS – SEA PEOPLE, MARITIME HUNTER-GATHERERS, NOMADISM, THAILAND, SOUTHEAST ASIA, FISHING

