THE ARCHAEOLOGY OF OCEANIA

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Summary

The Pacific Ocean is the largest ocean in the world, with a water area of 165 million sq km and a land area of 1.3 million sq km spread among at least 25 000 islands. There were at least 1 200 000 people, speaking more than 1200 language, living on the 789 habitable islands known as Oceania. Oceania is historically divided into the three geographic areas of Melanesia (black islands), Micronesia (small islands), and Polynesia (many islands). People began colonizing the western Pacific between 40 000 and 60 000years ago and with the colonization of eastern Oceania around 3000 years ago, people had occupied all major ecoregions on the planet. People caused a relatively rapid and massive change in the ecosystems of islands that were colonized. The Lapita culture, found throughout Oceania between about 3500 and about 2500 years ago, is

demonstratively ancestral to the ethnographic cultures in Oceania. Prior to the appearance of the Lapita culture, people were confined to the largely intervisible islands of western Oceania. During Lapita times, people rapidly spread throughout Oceania and colonized virtually all islands in the Southwestern Pacific. Melanesia contains the oldest known sites in Oceania and because of this antiquity has more cultural and linguistic diversity that the rest of Oceania. People attempting to adapt to harsh and limited atoll ecosystems dominate Micronesian culture history. The region is most famous for long distance voyaging and pinpoint navigation. Micronesia also contains large-scale monumental architecture complexes that are difficult to explain by simple evolutionary models. Polynesia is best known for stratified and ranked societies led by powerful chiefs. Beginning about 1000 years BP evidence of complex hierarchical political systems and long-range trade networks suggests that ethnographic Polynesian culture was established, and monumental mounds, fortifications, and nucleated villages dominate sites.

1. Introduction

1.1 Environment

The Pacific Ocean is the largest ocean in the world. It is roughly circular with a water area of 165 million sq km and a land area of 1.3 million sq km spread among at least 25 000 islands. The Pacific straddles the equator where it is 16 640 km wide and stretches 14 720 km from the Bering Strait to the Antarctic circle. It is roughly bounded on three sides by Australia, Asia, and the Americas. It is open to the south toward Antarctica and is in contact with the Indian Ocean toward the south and west and with the Atlantic Ocean toward the southeast.

The Pacific is a relatively simple hydrographic system. In the northern hemisphere it is dominated by the clockwise circulating North Pacific gyre driven by the northeast trade winds. In the southern hemisphere the Pacific is dominated by the counterclockwise circulating South Pacific gyre driven by the southeast trade winds. In between, lie the he North equatorial current, the equatorial Countercurrent, and doldrum winds.

Most Island areas in the Pacific Ocean and located within 20 degrees of the equator in a setting dominated by warm currents and tropical climates. Hawai'i and New Zealand lie between 20 and 30 degrees north and south respectively. Humidity and temperature are high year round while seasons fluctuate from relatively wet to dry throughout the year.

Plate tectonics has been a major factor in creating the island geography of the Pacific. Most of the Pacific Basin in underlain by the Pacific Crustal Plate which is in contact with the American Plate toward the east the Antarctic Plate to the south, the Indo-Australian Plate to the south west, and the Eurasian Plate to the west and north. Sea floor is being created where plates are moving away from each other and being destroyed where plates are moving together. This mean that there is significant volcanic activity along plate boundaries around the Pacific "rim-of-fire" and along mid-ocean ridges. Volcanos create the Islands in the Pacific Ocean in a continuum of island types from large continental islands through high volcanic islands to low atolls.

1.2 Oceania

The 789 habitable islands of the Pacific Ocean are also known as Oceania. The island of Oceania range in size from New Guinea at 800 000 sq km to tiny coral atolls comprising a few acres. There were at least 1 200 000 people living in Oceania when Europeans entered the Pacific. Oceania is historically divided into the three geographic areas of Melanesia (black islands), Micronesia (small islands), and Polynesia (many islands).

These historic groupings make some sense geographically, however, many now consider them to have racist and colonial implications that render then less meaningful as linguistic or cultural groupings. Archaeologists in Oceania now consider the distinction between Near Oceania and Far Oceania to be more useful in understanding the archaeology and prehistory of what is historically known as Melanesia and Polynesia.

All the islands in Near Oceania are found on the fringe of the Indo-Australian Plate. Islands in Near Oceania are separated by relatively narrow water gaps, and as one moves eastward each successive island is usually visible from the island to its west. This geography greatly simplifies navigation and colonization. The islands in Near Oceania share the same volcanic and sedimentary rock types as found in Asia and Australia. These island have also been subjected to comparable processes of folding and faulting as well as high risk of catastrophic earthquakes and explosive volcanism. Andesite is the most significant raw material for stone tool making.

The islands in Far Oceania (except Tonga and New Zealand) are the tops of basaltic volcanos on the Pacific Plate. The islands of Far Oceania are dominated by extruded basaltic rock types and lack sedimentary rock types. In contrast to Near Oceania, island groups is Far Oceania are not within sight of each other, Instead they are separated by water gaps greater than 350 km and sometimes of much greater distances. The Hawaiian Islands are 3000 km from their nearest inhabited neighbor and Easter Island is1600 km from its nearest neighbor. People living in Far Oceania, face a high risk of catastrophic hurricanes and atoll dwellers can be plagued by water shortages. Basalt is the most important raw material for stone tool making

1.3 Island biogeography

Island biogeography largely determines how land plants and animals occupy and propagate in Oceania and it is crucial in understanding the archaeology of the region. Oceanic land biota is determined in large part by the islands distance from Continental source regions and patterns of stepping-stone islands between the continental source and the target island. Since Asia and New Guinea are the dominant source areas, the biota of Oceania is generally more clustered and diverse in west than in east. The size and elevation of the islands being colonized also structure ecosystems. Large Islands have more diversity than small ones and high islands have more diversify than low ones. Within these parameters - source geography, size, and elevation, Islands biogeography is also determined by the boundedness and limited size of any Oceanic land mass compared to any continental land mass. Thus, adaptive radiation and founder effect are

always significant in determining the structure and composition of island land ecosystems.

Within these parameters islands can be divided into four types: (1)Continental or Island arc Islands; (2) High islands; (3) makatea islands, and (4) atolls. Continental or Island arc Islands are clustered in the western pacific along the borders of crustal plates. This type includes New Guinea, New Britain, New Ireland, the Solomons, Vanuatu, New Caledonia, Fiji, and New Zealand. Island arc islands are generally large and high with high biodiversity and complex geological histories. Lithic sources include rhyolite, andesites, dacites, cherts, and obsidians. Many of these islands are large enough to sustain inland human populations who have no direct experience with the ocean.

High islands are young islands formed over mid-ocean hot spots. As crustal plates move over a hot spot new islands are created by volcanic activity and older islands are being eroded beneath the ocean surface to become atolls or seamounts. This type of island varies greatly depending on age and the extent of erosion. Young high islands lack coral reefs and as the island age fringe and then barrier reefs are formed as the island continues to subside with age. Most high islands are composed of basalt and have limited lithic sources and soil development. In Oceania, high islands range in size from Hawai'i (10,458 sq km) to Anuta (0.8 sq km) in the Solomons.

Atolls are formed when high island erode down or subside to the point the central island is submerged and all the remains are its fringe or barrier reefs. Most atolls are no more than 2 to 3 m above sea level, making them vulnerable to innundation by waves and storm surges. Fresh water is limited to rainfall and thin buried lenses floating on salt water. Saline soils and high saltwater tables severely limit available plant resources. Atoll lack lithic resources.

On the other hand, atolls are rich in marine resources. People visiting and slowly developing plant resources generally created habitable environments on atolls. Makatea Islands are formed by tectonic uplift that raises an atoll or old high island above sea level. Habitable areas and safe harbors are limited because of the exposes reef limestone cliff around the shore of makatea islands.

Vegetation complexity varies with island size and elevation. Salt tolerant trees like Pandanus, Barringtonia, or coconut Palm dominate tropical Pacific coastal/strand vegetation. In the western Pacific, especially in Melanesia, shores are lined with extensive coastal mangrove swamps and sago palm swamps. After human colonization, repeated firing to clear land for agriculture created extensive fire tolerant grasslands, fernlands, and savannahs where forests once stood.

Native land faunas are limited throughout Oceania with Near Oceania more diverse that Far Oceania. Native land animals in Near Oceania include marsupials, rats, lizards, frogs, snakes, geckos, land crabs, and fruit bats. Far Oceania limited to fruit bats and land crabs. Land birds include megapodes, pigeons, fruit doves, rails, and parrots. Sea birds include frigates, shearwaters, petrels, noddies, albatrosses, and boobies. When human colonize an island bird population decline steeply, and pigs, dogs, chickens, and rats are introduced to compete with native land fauna.

Bottom living and inshore marine populations include parrotfish, wrasses, tangs, squirrelfish, jacks, and groupers. These fish were taken with hooks, nets, spears, traps, poison. Important pelagic fishes include tuna, wahoo, mackerel, skipjack, albacore, bluefin, bonito, yellowfin, bigeye, mahi-mahi, marlin, sailfish, spearfish, barracuda, and swordfish. Pelagic fish were taken by trolling lures from open boats. Bivalves and molluscs were taken from reefs and lagoons as were sea urchins, octopus, crabs, lobster, sea weed, and marine turtles..

2. History of Research

Explorers from Europe began visiting Oceania in the Sixteenth Century. Ferdinand Magellan led a Spanish expedition around the tip of South America and into the Pacific in 1521 and remarkably sailed for four months northwest across the entire Pacific without making the first contact with people living in Oceania until he reached Guam. He was followed by numerous Spanish, Dutch, English and French expeditions in Seventeenth and Eighteenth centuries. As they traveled around the Pacific, these explorers recorded their impressions of the people living in Oceania. These descriptions are the most direct accounts lifeways in Oceania. Missionary and whaling activities began the Euro-American colonization of Oceania in the late Eighteenth Century and formal European and American colonies were created in the mid to late Nineteenth Century. Anthropologists did not arrive in Oceania until the late Nineteenth and early Twentieth Centuries, well after indigenous cultures had been significantly altered by colonization and most island populations had been significantly reduced by disease.

There are no written records bearing on Oceania from before the sixteenth century. Everything we know about the prehistory of Oceania is based on archaeological investigations of the physical remains of past Oceanic societies and inferences from theoretical models derived from ethnohistoric accounts of the people living in Oceania at or immediately after contact with Europeans.

In what was probably the first excavation in Oceania, Julius Von Haast, in 1872, excavated a rockshelter in which prehistoric artifacts were associated with the bones of extinct Moas on New Zealand. Anthropology and archaeology become formal academic specialties in Europe and America in the late Nineteenth Century. Formal anthropological and archaeological work in Oceania begin with the founding of the Bernice Pahuahi Bishop Museum of Polynesian Ethnology and Natural History in Honolulu in 1889 and the Polynesian Society in New Zealand in 1892. The Journal of the Polynesian Society was founded at the same time and it has been in continuous publication ever since.

In 1902, the Bishop Museum's first director William T Brigham, published Stone Implements and Stone works of the Ancient Hawaiians, and in 1913 John F.G. Stokes of Bishop Museum excavated a stratified rockshelter on Kaho'olawe in Hawaiian Islands and initiated stratigraphic excavation in Hawai'i. Archaeological pioneer, Katherine Scoresby Routledge funded and led expeditions to Easter Island between 1913 and1916. Ethnographic surveys, which included descriptions of archaeological sites and monumental architectural complexes, began in Melanesia with the Torres Straits Expedition led by A.C. Haddon in1898-1899. The Torres Straits Expedition was

followed by Seligman's Ethnographic Survey of Papua in 1910 and the Sladen Trust Expedition led by W.H.R Rivers 1914. During World War I, Bronislaw Malinowski worked among the Trobriand Islanders. Between World Wars I and II, anthropological interest shifted to Polynesia with the most famous and influential work being done by Margaret Mead in 1924 in American Samoa. Beginning in 1920, anthropological and archaeological interest focused on basic surveys of island groups. With funds from Yale University, the Bishop Museum sent four field teams of anthropology and archaeology graduate students from American universities to the Marquesas, Tonga, Hawai'i, and the Austral Islands. These teams did basic ethnographic data gathering, physical anthropology, and archaeological survey and excavations to investigate Polynesian origins. In the process, they founded systematic anthropology in Oceania.

2.1 Anthropology in Oceania

Oceania had at least 1200 indigenous languages of which 450 belong to the Austronesian family and 750 are included in the Non-Austronesian Papuan language group. All of the languages spoken in Polynesia and Micronesia belong to the Oceanic subgroup of the Austronesian family. In Melanesia, the people of Fiji, New Caledonia, the Solomon Islands, and Vanuatu also spoke Oceanic languages. On New Guinea, and in the majority of the Bismark Archipelago, people spoke Papuan languages. Generally, there is high variability among Papuan languages and very low variability among Oceanic languages. There is a corresponding relationship in biological variation, with higher diversity in New Guinea and Near Oceania compared to Far Oceania. Cultural variability follows a similar pattern, that is, relatively higher in Near Oceania compared to Far Oceania. Within Far Oceania, there is generally more linguistic, biological and cultural variability in Micronesia compared to Polynesia. All of these relationships suggest that New guinea and Near Oceania were colonized first, followed by Micronesia and finally Polynesia.

With a few exceptions, plants and animals in Oceania came from tropical East and Southeast Asia. Biodiversity decreases from west to east across the region. Throughout Oceania, people lived by cultivating plants, animal husbandry, reef gathering, and fishing. They also gathered food and raw materials. Major cultivars, not all of which were used on all islands, include taro, pulaka, elephant ear, bread fruit, coconut, pandanus, banana, arrowroot, and yams. The sweet potato came to Oceania from South America. In a context of local variation in crop composition, scheduling and cultivation practices, Oceanic agricultural systems developed around a combination of intensive and extensive gardening. Domesticated animals were limited to pigs, chickens, and dogs. Daily protein was supplied by reef collecting and ocean fishing and atoll dwellers relied more heavily on marine resources than did people on other island types.

2.2 Archaeology in the Pacific Islands

Between World Wars I and II, anthropologists working in Pacific concentrated on ethnographic investigations to understand Oceania and most scholars did not think the there was a significant archaeological record in the region. This changed after World War II when it became clear that the problem of Oceanic origins could not be solved by ethnographic investigations alone. Solving the problem required an understanding of the

culture history of Oceania and this required archaeologists to develop cultural sequences throughout the region.

In 1947, Thor Heyerdahl sailed Kon Tiki, a balsa raft from South America to Oceania and claimed that the region could have been colonized from there rather than from the west. Archaeologists responded to this with a sustained research program that culminated in the Lapita Homeland Project in the 1980s and 1990s. The Lapita Homeland Project firmly established the Lapita Complex as ancestral to Oceania and in the process pushed the record of human occupation in the region back more that 30 000 years.

2.3 Themes in the Study of Pacific Island Archaeology

2.3.1 Migration/Colonization/Voyaging

There is no fossil or other evidence suggesting that humans evolved on Oceania from some pre-human ancestor. Instead it is clear that people sailed or rafted into Oceania from somewhere else in the world. Some time between 40 000 and 60 000 years **BP** (Before Present) people migrated into Australia and New Guinea and into Near Oceania around 30 000 years BP. People migrated into the Americas around 15 000 to 20 000 years BP. With the human migration into Far Oceania from the west around 3000 to 2500 years BP, people had occupied all major ecoregions on the planet.

There is now overwhelming archaeological, ecological, biological, and linguistic evidence that Oceania was populated by a series of migration from insular Southeastern Asia to Near Oceania and then Far Oceania. Historically, The only competing alternative to western migration throughout Oceania has been an assumed migration from South America. This alternative is based largely on South American plants (sweet potatoes and a matting reed) found in archaeological and ethnographic contexts throughout Oceania and on voyages by Thor Heyerdahl. In drift voyages, Heyerdahl demonstrated that people could have migrated from South American to Oceania on large balsa rafts. The plant data are more easily explained by postulating voyages from Oceania to South America and back and Heyerdahl's raft voyage demonstrate the technological feasibility of the trip, not its historic actuality

2.3.2 Evolution of Chiefdoms

Based on worldwide ethnographic analogies, prehistoric human cultures can be scaled in terms of the relative degrees of egalitarianism and hierarchy in their political systems. Archaeologists interested in understanding political evolution can build process models to explain movement along the egalitarian/hierarchical scale. The presumption is that relatively egalitarian societies (age/gender status differentiation only and achieved situational political power) evolve into highly stratified hereditary religious/political hierarchies.

Except for the Pleistocene migration into Near Oceania, most islands were occupied relatively late in time during the rapid Lapita expansion around 3000 years BP .

Because of this, Oceania offers archaeologists and anthropologists a unique setting for building and testing models of political evolution.

2.3.3 Easter Island

Rapa Nui is located in the extreme eastern corner of the Polynesia triangle. It is 3200 km west of South America and 2000 km southeast of Pitcairn Island, its nearest inhabitable Oceanic neighbor. This extreme isolation and limited size (160 sq km) make it unlikely that people living on Rapa Nui maintained contact with the outside world after first settlement.

The first European visitors to Rapa Nui landed there on Easter Sunday in 1722 and renamed it Easter Island. The people of Easter Island declined after European contact and, aided in large part by the Peruvian slave raids in 1862-1863 and subsequent rapid missionization of the survivors, the indigenous population was reduced to 110 people in 1877 and most traditional cultural knowledge had been lost.

The lack of comprehensive ethnography on Easter Island and the ecological limitations imposed by its extreme isolation made the prehistory of Easter Island one of the most famous and enduring puzzles in archaeology and world culture. The study of Easter Island prehistory has been dominated by attempts to explain (1) hundreds on large monolithic stone statues (moai); (2) megalithic structures (ahu) associated with moai; (3) the development and use of a written script (rongorongo); and (4) ecological collapse.

2.3.4 Ecological Change

Since, in most places, the effects of the first human migration into an area are lost in the mists of antiquity, it is very difficult for archaeologists and ecologists to evaluate the effects of human migration into an area. Oceania is one place in which human migration is relatively recent and ecological conditions before and after human colonization can be studied.

People in Oceania voyaged with domesticated animals such as pigs, dogs, and chickens; and useful plants such as coconut, breadfruit, taro. They also accidentally transported less useful plants and animals, such as rats, snails, geckos, skinks, and weeds. The result was a relatively rapid and massive change in the ecosystems of islands that were colonized. On high and makatea islands, biodiversity decreased as land and sea bird populations were devastated by human or rat predation and plant communities were changed to accommodate agriculture. As fertility decreased after forest clearing for shifting agriculture, inland forest cover was replaced by fern and grass savanna. Dense root systems on these savannas precluded further cultivation. This necessitated more forest clearing and ultimately more savanna. This process was at its most extreme on Easter Island where people exterminated all woody plants on the island. On many atolls, people slowly built up soils and imported useful plants. Over time floral diversity probably increased on atolls while at the same bird populations decreased. People had similar impacts on lagoon and reef marine ecosystems, especially after human populations were fully established and population densities increased.

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Biographical Sketch

James P. Barker is the State Archaeologists for the bureau of Land Management in Nevada and adjunct professor of anthropology at the University of Nevada, Reno. He has done ethnographic fieldwork in Western Samoa and Southern California and archaeological fieldwork in the Great Basin in the western United States. In addition to an ongoing interest in historic preservation, his topical interests include archaic settlement and subsistence systems, political evolution, and indigenous land use policy and environmental manipulation.