Land and Sea

The Significance of Named Places in Digitally Mapping Historic Ocean Voyages

Claire Brennan
James Cook University
http://orcid.org/0000-0002-7593-7522

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Articles

Introduction

The late eighteenth and early nineteenth centuries saw a burst of interest by European powers in the scientific exploration of the Pacific. Well-equipped expeditions were sent to the far side of the world, although the technology of the time limited navigators' ability to record their routes accurately. The journals and other publications produced by European expeditions to the Pacific are storehouses of observations of places and people, and the self-consciously scientific expeditions of this period provide particularly rich descriptions of the physical world they had set out to document. In addition, scientific expeditions brought back to Europe a vast array of physical specimens used to define species, as well as descriptions and drawings of people, landscapes, cultural objects, plants, and animals. However, the value of these records is diminished through uncertainty about where specimens were collected, and about the locations in which observations were made. The Coral Discovery project seeks to map scientific voyages to the Pacific completed by 1834 in order to clarify issues of coral taxonomy. Land provides the project with a way to map these voyages and trace the provenance of their specimens. Places named within navigators' journals provide a more accurate way of mapping the locations visited by vessels than the multitude of calculated coordinates laboriously produced during the voyages.

Land and Oceanic Travel

Shipboard explorers used land to navigate. In 1697, English Astronomer Royal John Flamsteed wrote to Samuel Pepys, retired from administration of the navy, "'tis in vain to talk of observing the Longitude at Sea, except you know the true Longitude and Latitude of the Port for which you are designed" (qtd. in Kershaw 134). While that expert observation identifies the impossibility of reliably calculating longitude at sea, it omits to mention the difficulty of calculating the correct longitude of places on land. However, Flamsteed's observation points to a means of mapping voyages undertaken before longitude could be effectively recorded. Land provided stable markers for mariners, and the accounts of voyages to the Pacific are linked to land through their inclusion of profiles of coasts, descriptions of approaches to harbours and surrounding regions, evocative names for landmarks, and records of Indigenous place names.

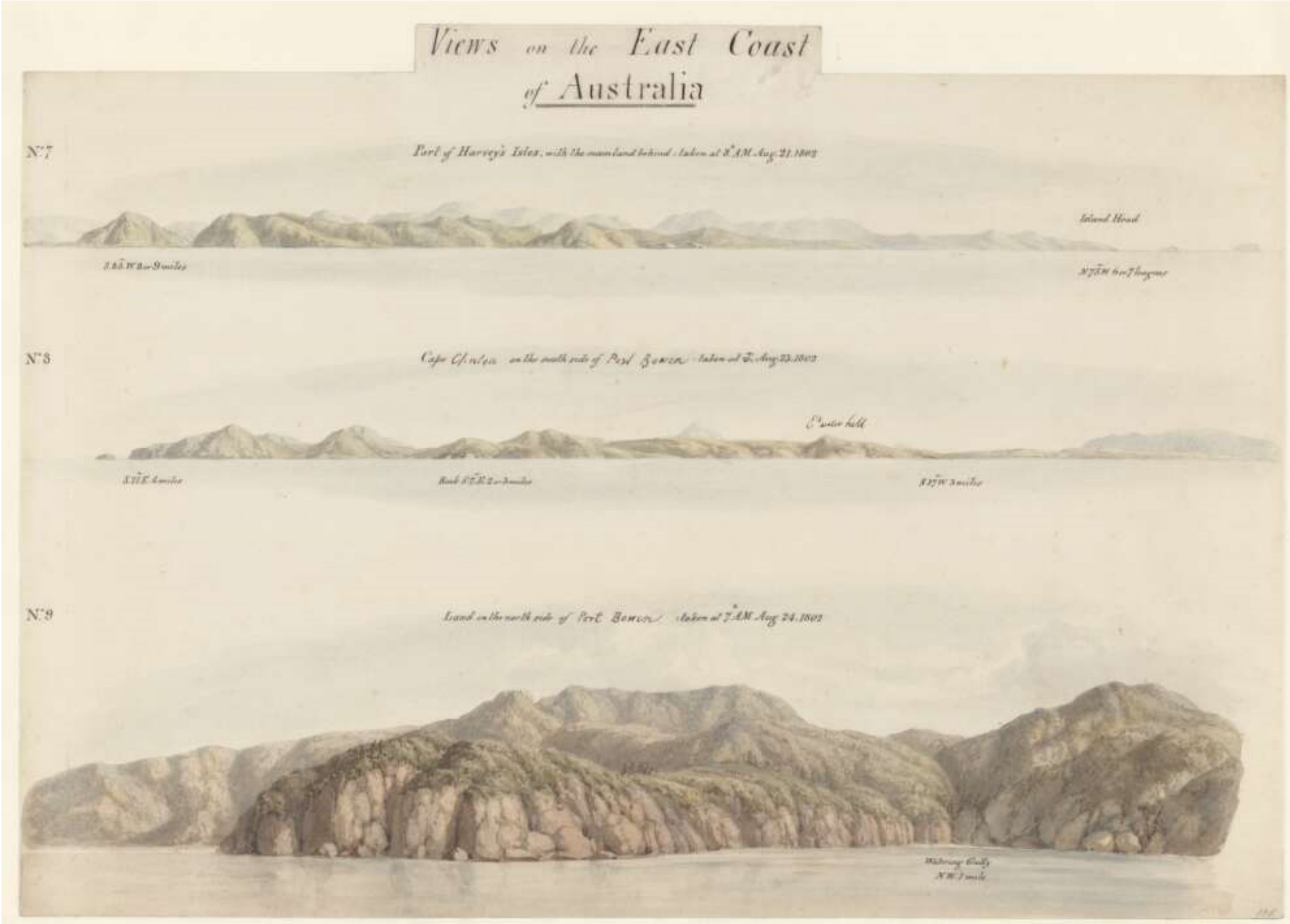

Fig. 1: Westall's images are remarkable in their detail, and form part of a long tradition of coastal profiles.

Coastal profiles formed an important part of records of expeditions—drawing had been part of the curriculum of the Portsmouth Naval Academy since 1733—and in concert with written descriptions, depictions of coasts enabled subsequent visitors to identify previously visited regions (Smith 9). Naming was also a means of making landmarks. James Cook named topographical features of land seen during his voyages. While many of the names he used were fanciful, or influenced by matters of patronage and power, or reflective of Cook's personal history, or of events during his voyage, some were descriptive (Carter 3-33). Such opportunities to name visibly distinctive topographical features allowed navigators to offer guidance to subsequent visitors. Like Cook, later European visitors might see mountains that "very much resemble glass houses" and confidently identify them as the "Glasshouse Mountains" marked on their maps (17 May 1770).

In addition to imposing their own names on the places they observed, European navigators also marked Indigenous names on their maps and charts, as evidenced by the plethora of Indigenous names on the map of the Society Islands that resulted from Cook's *Endeavour* voyage. Such records made it possible for later visitors to establish their location by asking the people who lived there where they were (Gapps). European navigators recorded names in unfamiliar languages, writing without an established spelling system, working from a range of European languages, and while the names they recorded often differ from modern versions in their spelling they are still generally recognisable, and can be found on modern maps. Such detailed mapping demonstrates the significance of land to mariners. Records of coastlines, ports, and names allowed navigators to determine their whereabouts with an accuracy and precision impossible while at sea.

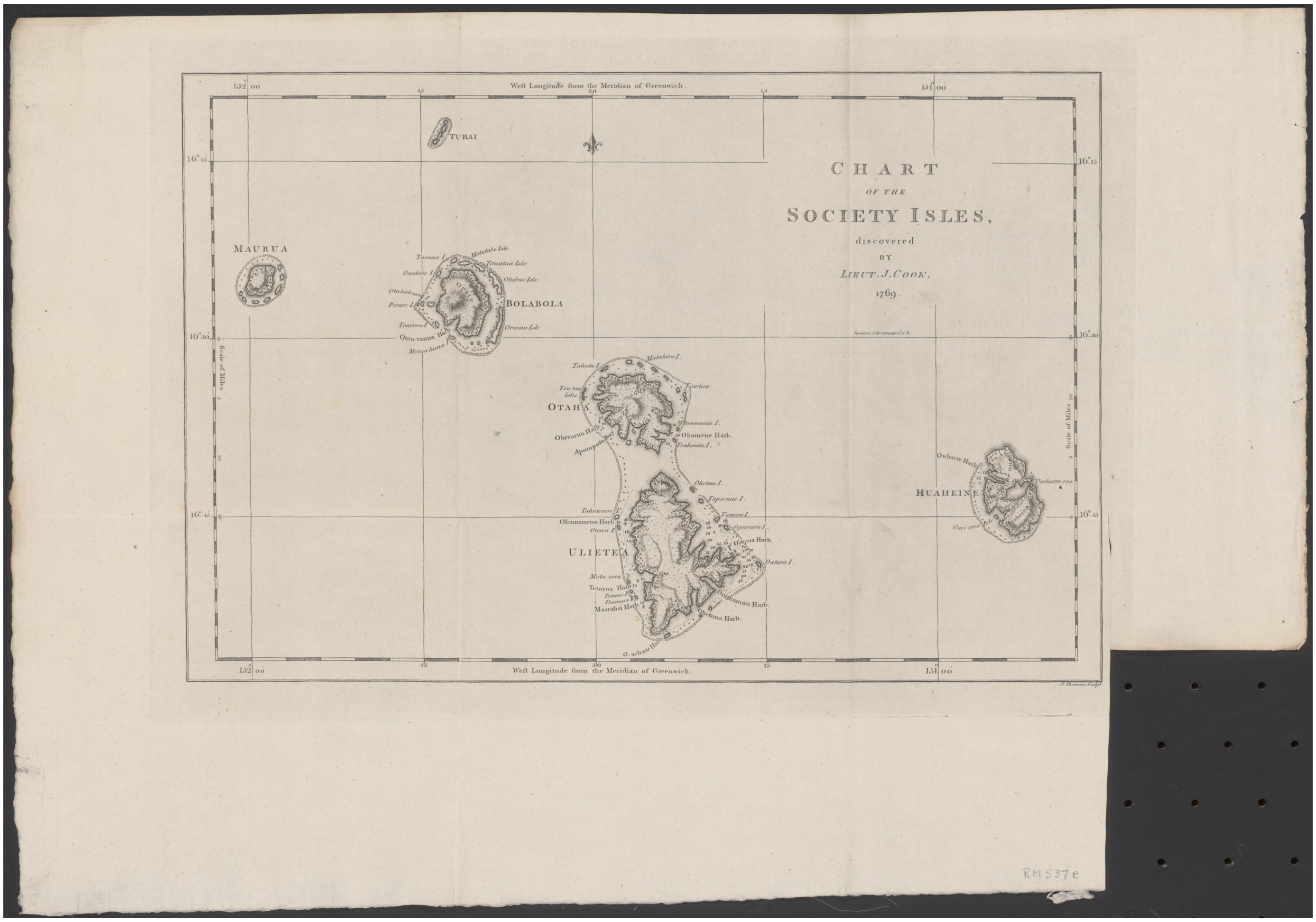

Fig. 2: Cheevers's 1773 map of the Society Islands with Indigenous names for islands, regions, and geographical features including harbours.

Dava Sobel's well-known examination of John Harrison's production of a marine chronometer and claiming of the longitude prize in 1773 suggests that the problem of longitude was solved between Cook's first and second Pacific voyages (148-150). However, marine chronometers retained a significant margin of error throughout the nineteenth century (Miller 223). In 1855, the United States Coastal Survey sought to establish a baseline longitudinal measurement for the geodesic survey of North America by repeatedly shipping chronometers between Boston and Liverpool. Between 42 and 51 chronometers at a time were sent on five voyages across the Atlantic, and astronomical observations were made to repeatedly recalibrate the instruments while in port. However, even as late as 1855 such a concerted effort to establish the exact longitude of the continent of North America using chronometers failed. While an estimate of longitude was reached, the margin of error of the result was larger than that of the longitude calculated using astronomical methods alone (Stachurski 139-140). Advancements in certainty about the location of North America in relation to Greenwich came later and involved the use of telegraph technology in combination with the trans-Atlantic cable, and then, after 1963, satellites (Stachurski 207-8; NOAA). In the nineteenth century, even in ideal circumstances, the exact location of continents could not be determined. At sea in the late eighteenth and early nineteenth centuries, recorded locations were only ever estimates.

The uncertainty even of land-based longitude was evident to the scientific voyagers of the eighteenth and early nineteenth centuries. Even when on land, scientific expeditions were aware of vagaries in their location and undertook extended astronomical observations with their attendant calculations, while also attempting to establish the accuracy and precision of their chronometers. During his 1793 observations at Cattle Point in Sydney Cove, Alejandro Malaspina, leading a well-equipped Spanish scientific expedition, found that clouds and a lack of suitable astronomical events hampered his efforts to establish longitude. He produced a range of estimates, based on the limited observations his astronomers could make, and on his chronometers. Those estimates varied by nearly 16 minutes of longitude (approximately 24 km; Malaspina 78). Similarly, during his 1802 visit to Sydney Cove, Matthew Flinders's astronomical efforts were hindered by clouds, though he took what observations he could (Flinders 237). His average result for longitude was close to that obtained by Malaspina's expedition, and to the result achieved by averaging that expedition's results from all methods. Chronometers were useful for rough reckoning, but determining longitude accurately remained difficult and continued to use a range of methods throughout the nineteenth century (Higgitt and Dunn 3). While navigators regularly estimated their longitudes, even those skilled in astronomy and armed with chronometers were aware that there was considerable room for error.

Such room for error means that named sites on land are the best indications of the waters visited by navigators in the late eighteenth and early nineteenth centuries. While navigators diligently recorded their calculated latitudes and longitudes, mapping those reckonings would misrepresent their voyages. Their chronometers were inconsistently unreliable, making the error in their readings impossible to correct. Calculations using astronomical observations are also imperfect due to observer error and reliance on imperfect astronomical predictions. Further confusion creeps in from navigators recording their positions with reference to places already visited, compounding error. Conversion from minutes and seconds of arc to modern digital format, and recalibration of estimates to account for the variety of reference meridians in use before the International Meridian Conference selected Greenwich as the 'prime meridian' in 1884, introduces potential for further error (Pimentel 13). This compounded confusion is most easily overcome by accepting Flamsteed's observation, and mapping ocean voyages using the certainty of named places on dry land.

Land Seen from Sea

However, land also has its uncertainties, making interpreting navigators' accounts of their locations challenging. While navigators sought to recognise priority and respect the names given to landforms by other Europeans, news of "discoveries" did not always travel quickly enough to reach expeditions before their departures from Europe. It is to the credit of navigators and their editors that many such issues were resolved before publication, although some remained to cause confusion. Frederick Beechey, in his account of the voyage of the HMS *Blossom*, demonstrated both the care navigators took to recognise priority of naming, and the difficult in doing so, in one case noting:

> This island, which on our charts bears the name of Elizabeth, ought properly to be called Henderson's Island, as it was first named by Captain Henderson of the Hercules of Calcutta. Both these vessels visited it, and each supposing it was a new discovery, claimed the merit of it on her arrival the next day at Pitcairn Island, these two places lying close together. But the Hercules preceded the former several months. To neither of these vessels, however, is the discovery of the land in question to be attributed, as it was first seen by the crew of the Essex, an American whaler, who accidentally fell in with it after the loss of their vessel. (50)

Despite such diligence in recording priority of naming, errors such as those on Beechey's map meant that some places have different names accorded to them by different navigators.

Places named in journals can be difficult to locate if they have been deliberately renamed, or if the names given to them by navigators have fallen into disuse. Some names selected by European navigators are offensive, making their inclusion on modern maps problematic. Cook gave the region of his first landfall in Aotearoa—a land mass at times known as Staten Land, Nieuw Zeeland, and New Zealand (Breen et al.)—the name Poverty Bay because "it afforded us no one thing we wanted" (11 Oct. 1769). In 2019 the region around that bay was officially renamed Tūranganui-a-Kiwa/Poverty Bay to reflect its Māori history and recognise its prior naming (*Gisborne Herald*). While Cook's disgust has not been entirely banished, the local Māori name and its quite different implications has been given precedence in official nomenclature. The process of recognising the priority of Māori names in Aotearoa is well advanced, and such processes are widespread in postcolonial nations, including Australia (Sta Maria). Grace Karsken's "Real Secret River Dyarubbin" project retrieved traditional names for places on the Hawkesbury River and demonstrated the potential to restore names, using documentation left by navigators and settlers (Karskens 14-17). Maps are frequently redrawn, and the names used by navigators are not always present on modern maps.

And land itself is not always stable. In places, shorelines recorded and named in journals are no longer present. In Hawai'i, coastal erosion has changed coastlines, leaving beaches sighted by navigators underwater (Fletcher et al. 49). In other places, new land has emerged as the result of human efforts. Many European voyages of the nineteenth century anchored at the Typa River. That river has been reclaimed by the island of Macao, and the anchorage once used by expeditions is now underland. Similarly, on the east coast of Australia, what was named Coal Island by James Grant in 1801 had, by 1846, been reduced to Nobby's Head by a causeway built using stone quarried from the island itself (Grant 152, Umwelt 14-15). The instability of coastal regions can make navigators' landfalls difficult to locate.

Beyond the problems of recognising real places, the journals of even scientific expeditions include sightings of places misperceived. Studying a shoreline from a ship at sea is difficult, and maps produced by European navigators include peninsulas depicted as islands and islands as peninsulas. The dangers of land at times led to the omission of significant river mouths and other features as ships sought safety out to sea (Brennan, Physical 146). In addition, some navigational accounts and maps include sightings of land that did not exist, and phantom islands could persist on maps for many decades (Brooke-Hitching 9). The second ship of Malaspina's well-equipped expedition surveyed the sub-Antarctic Aurora Islands, approaching to within about a mile of the shore (Malaspina, 307-308). Despite being sighted both before and after that 'visit', the Aurora islands do not exist and the expedition's co-commander José de Bustamante y Guerra most likely observed "ice-islands, incorporated with earth" (Weddell, quoted in Stommel 92). As well as being deceived by icebergs masquerading as mountainous and substantial islands, navigators could be misled by mirages and report land where there was none (Young).

Mapping Coral Discovery Using Land

The Coral Discovery project is in the process of digitally mapping European scientific voyages visiting the Indian and Pacific Oceans before 1834. Scientific voyaging began with the expedition of Bougainville 1766-9 and is distinguished by the inclusion of scientific workers among ships' companies. The project limits itself to voyages completed by 1834 because of its interests in coral: 1834 marked the publication of C.G. Ehrenberg's foundational work on coral taxonomy. While English speakers refer to Ehrenberg's work as *Corals of the Red Sea,* the work includes descriptions of corals collected further afield including those from the Indian and Pacific Oceans (Ehrenberg). Within the long history of voyages of exploration, the late eighteenth century saw European empires use science to legitimise their imperial enterprises, and the project has identified 49 expeditions which meet its criteria (Gascoigne 230-234; Brennan, Expeditions). While real commitment to science varied between expeditions—the journal of one Russian expedition mentions the voyage's naturalist only once, as he left the ship for the last time (Golovnin 293)—French, British, Russian, Spanish, United States, and Dutch expeditions all at times claimed scientific credentials. Generally, that claim to science influenced the records kept by the expeditions, as captains and other journal-keepers sought to make good on their promise to observe the natural world, collect specimens, and establish their priority through publication.

Maps of expeditions' routes already exist, ranging from global maps to detailed studies of individual bays and coastlines drawn from the hydrographic work of the expeditions themselves. However, digital maps offer the ability to move between these scales, and to compare the paths of expeditions in a way paper maps do not allow. The TLC Map project makes digital mapping infrastructure available to humanities scholars and allows the inclusion of temporal elements in mapping projects (TLC Map). Coral Discovery is making use of this infrastructure to produce voyage maps that can be put to many uses, including the comparison of accounts of visits to a site by different voyages (Brennan, Expeditions). Digital tools make it easy to layer voyages and compare their landfalls and observations. They also facilitate inclusion of all European scientific voyages, rather than the voyages of a single empire. This layering facility has underpinned a study of failures of acclimatisation attempts in Tahiti in the eighteenth century and promises to support the establishment of environmental baselines of a wide range of marine and terrestrial ecosystems observed in detail by expeditions (Brennan, Ecological). The project's publicly accessible datasets can support other mapping projects and have been used in the creation of a map contrasting sites of Cook memorialisation with Cook's landing sites in Australia and Aotearoa

(Brennan and Stevenson).

Such land-focussed projects are a by-product of the project's marine interests. Coral Discovery is a cooperative enterprise between coral taxonomists and humanities scholars sparked by a peculiar marine organism. Since the late twentieth century, scientific study of species and their distributions has been greatly enhanced by the use of molecular analysis, but the coral specimens in museums are limestone skeletons that do not contain genetic material. Collecting duplicate specimens from the same sites as the original, species-defining specimens makes molecular analysis possible and improves clarity around coral phylogenetics (Bridge et al. 2-3). However, species descriptions dating from the nineteenth century are often imprecise regarding the origins of specimens. In 1817 French biologist Jean Baptiste Pièrre Antoine de Monet de Lamarck published seven volumes describing and naming invertebrate animal species, including corals. Within those seven volumes the description "Habite l'Océan des Grandes-Indes ou Austral" occurs numerous times, indicating that a specimen originated from somewhere within the Indian and southern Pacific Oceans. However, de Lamarck's descriptions often include the names of the naturalists who collected the specimen, allowing identification of the relevant voyage and the possibility of identifying a more exact collection site. This is the case with the species *Acropora pocillifera* (named *Madrepora pocillifera* in de Lamarck's work), which was collected by "Péron et le Sueur", naturalists who sailed with the 1800-1804 Baudin expedition (de Lamarck 280). Consulting a published account of the voyage narrows the origin of the specimens from two oceans to two sites on the west coast of Australia (Baird; Peron). With other specimens, the date of publication of a description and knowledge of collecting networks may be enough to identify the voyage on which they were collected and narrow down their origins using Coral Discovery maps.

Fig. 3: Brué's 1816 map shows the extent of the Oceans mentioned in de Lamarck's species description. The map's prime meridian runs through Paris.

Conclusion

The records created by European expeditions to the Pacific have long been treasure houses of information about Pacific societies in the eighteenth and nineteenth centuries. Those of scientific expeditions contain detailed observations of environments, as well as of the people who lived in them. The emergence of digital mapping infrastructure facilitates comparison and promises to uncover new information both about Pacific environments and about the provenance of items within museum collections. Land has a part to play in the mapping of voyages across the trackless ocean in a period before the possibility of precisely establishing one's location relative to known locations in Europe (and so placing oneself accurately on the globe). Triggered by interest in the taxonomy of a marine species, the Coral Discovery project is producing a new tool to understand European scientific voyages across the Indian and Pacific Oceans as they set about the task of cataloguing the natural history of the planet.

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Author Biography

Claire Brennan, James Cook University

Claire Brennan is a history lecturer at James Cook University, Townsville. She researches the history of animals, particularly the history of recreational hunting. She is also interested in the development and distribution of cattle breeds. Further information, including recent publications, can be found at https://research.jcu.edu.au/portfolio/claire.brennan/

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