The Canoe Is the People

Indigenous Navigation in the Pacific

WELCOME TO THIS CD-ROM

BEGINNINGS

United Nations
Educational, Scientific and
Cultural Organization

LiNKS
Local and Indigenous
Knowledge Systems

Welcome

Thousands of years ago, when most sailors were still hugging the coast, the island peoples of the Pacific held the knowledge and skills to explore the great ocean paths around and beyond their homes.

Modern instruments didn't exist – no compasses, no radio, no *radar*[*], no *GPS*. The Pacific peoples navigated their canoes with their own *sophisticated* techniques, using the seas, skies, and sea life to guide them. Their knowledge was built up through generations of experience.

It was handed down through careful teaching, stories, and songs.

An experienced Tongan navigator once said,
"The compass can go wrong, the stars never."
From David Lewis in Bader, H. and McCurdy, P., eds (1999).

And that is the beauty of Pacific navigation.
Voyage into this CD-ROM to find out more …

Video 1 - Cook Islands canoe builder and navigator Sir Tom Davis (Papa Tom)

The technology of building these ocean canoes that sailed from South East Asia to as far as South America and, in the other direction, as far as Africa and settled Madagascar, I think that's something to be very proud of. And it teaches us self-esteem. We were something. We did something. Therefore we can do something now, and therefore we can see a future for ourselves.

Video 2 - Satawalese master navigator Mau Piailug

Satawalese master navigator Mau Piailug shows the star compass to some children and names some stars as they are seen from Satawal.

From The Last Navigator © INCA 1989.
Directed by Andre Singer.

[*] NOTE: Definition of words in *italics* can be found in the Glossary in the CD-ROM Storehouse.

Video 3 - Cook Islands navigation student Kaiki Tarangi (Karl)

If my ancestors can sail the biggest ocean in the world, I can take on the whole world. Has it changed my journey in life? It's actually given me a kick up the butt. It says, "We can do this. Come on, boy. You got a gift. We gave it to you. You do everything you can with it." And it's not like smacking my bottom. It's more like the challenge has been set. We're all high achievers.

Video 4 - Hoturoa Barclay-Kerr of Te Toki Voyaging Trust

We're finding that all the things that children are taught at school, like about mathematics and science and astronomy and all those things, are things that our ancestors knew a lot about anyway and did before. So once we can get the message to people to understand that the knowledge of all our ancestors was as useful as any knowledge today, I think then people will be more interested in trying to look at learning about becoming, or following the pathway to become, a navigator.

Video 5 - Cook Islander Dorice Reid

To sail across the ocean in the days that they sailed the ocean, the European voyagers thought that the world was flat. Polynesians always knew that the world was not flat. They always knew it was round. And when our children find out how far more advanced the Polynesian voyagers were, I just know that it will give them such tremendous self-esteem and respect for their ancestors.

Video 6 - Maori master canoe builder, Hekenukumai Busby (New Zealand)

I hope that our youth recover the art of canoe building as the canoe is a mainstay of our culture. We must not forget that it was the canoe that brought our ancestors to this land. If we were to lose this part of our culture, we lose our heritage. I want to share this knowledge with youth today. My dream is for all the tribes of New Zealand to choose a suitable tree each and I could travel to each of these tribes to teach them how to build their own canoe.

About this CD-ROM

The Canoe Is the People honours and explores the knowledge and skills of traditional Pacific navigation. It is designed mostly for Pacific youth but will be of great interest to others as well.

The cultures of the Pacific are diverse. For this reason, the story of navigation has many faces and is told in many ways. This CD-ROM celebrates the similarities and the differences in these traditions. The main focus is on the island of Satawal in the Caroline Islands of the Federated States of Micronesia, where navigational knowledge is still very much alive. However, the CD-ROM also gives many examples from other parts of the Pacific.

Learning navigation is a life-long process. That process is rooted in a network of cultural, social, and spiritual factors. For this reason, the CD-ROM does not aim to teach navigation. Instead, it gives people a taste of the wealth of knowledge that still survives in the great Pacific Ocean. It encourages them to go into their communities to find out more – to rediscover their past and, by doing so, to take part in (and pride in) the voyage of revival.

The Canoe Is the People is the second in a series of CD-ROMs created as part of UNESCO's Local and Indigenous Knowledge Systems (LINKS) Programme (www.unesco.org/links). The series uses new information and communications technologies to attract the interest and imagination of indigenous young people about their own knowledge systems. It supports the transfer of indigenous knowledge from elders to youth. This CD-ROM builds on an earlier UNESCO programme called Vaka Moana, aimed at preserving and developing the Pacific culture and heritage, with an emphasis on canoes and voyaging.

Notes on Language

This CD-ROM uses English as a common language but gives indigenous words where possible. (Note that the spellings of these words vary from place to place in the Pacific.) The English has been kept as simple as possible. The meanings of some words are given in a pop-up glossary. The meanings relate to the ways the words are used in this CD-ROM. Some words may have different meanings when they are used in other places and ways.

Video 1 - Cook Islands navigator Tua Pittman

It's not just the canoe and the connection between the canoe and our ancestors, but it's the canoe and the connection with our future as well. And I think what we need to do over the next 12 months is what I really wanted to do right from the beginning, when the canoe first came out, and that is to take the canoe to the people. The canoe belongs to the people. The more people that touch the canoe, the more mana (prestige, power) that flows from within them to the canoe, and the more they feel they belong.

About Satawal

Island type: Low coral
Island group (geographical): Caroline Islands
Island group (political): Yap State
Country: Federated States of Micronesia
Area: 1.3 square km
Population: About 500
Religion: Catholic
Main foods: Taro, bananas, breadfruit, coconuts and reef and ocean fish

Like other Carolinians, Satawalese navigators know how to use the stars, winds, and sea patterns to travel to distant islands. Canoe houses (for building, storing, and caring for canoes) line the beach. Some people now have motor boats, but gasoline is expensive.

Satawalese women take care of the gardens, and the men mostly fish. Some people also have government jobs in Yap, the district centre. The government ship comes every few months, bringing rice, coffee, sugar, soap, fishing nets, concrete, and other things.

Kenneth Urumolug, a young man from Satawal, recently became a Catholic priest. About 1000 people from neighbouring islands came to the celebration. It included a shortened version of the pwo ceremony (initiation ceremony for navigators) adapted for the occasion and led by master navigator Mau Piailug. Some parts of the ceremony are shown on this CD-ROM.

Beginnings

How did the islands of the Pacific form? Where did the peoples of the Pacific come from? How did they live? When and why did they move? How did they learn to navigate?

Over the years, these questions have fascinated many people. They have been asked and answered in many ways. Each culture of the Pacific tells its own stories – some similar and some different – and modern researchers also have stories to tell. Every story has its own truths, and without them all, the picture would not be complete.

Video 1 - Satawalese navigator Mau Piailug talks about the story of the first navigators

Women were the first navigators, and Pulap was the first navigator island. It started with a kuling bird (sandpiper), which was a ghost and not just a bird. The kuling flew from the Marshall Islands to Pohnpei, Chuuk, and Pulap and ate everyone along the way … but not the people of Pulap.

The kuling said to the chief's daughter, "If you feed me enough, I won't eat the people here." The girl told her father this, and he said, "Take her a piece of wot (taro) and a coconut." The girl did, and the kuling ate until she was really full. Then she said, "Tell your father to build me a house so I can teach you to be a navigator."

Every evening, the girl learned from the kuling. She learned more and more. Then one day, the father said to the girl, "I know the story of the kuling … and do you know how we will kill her? Tell the kuling not to leave yet – we are going to give her something."

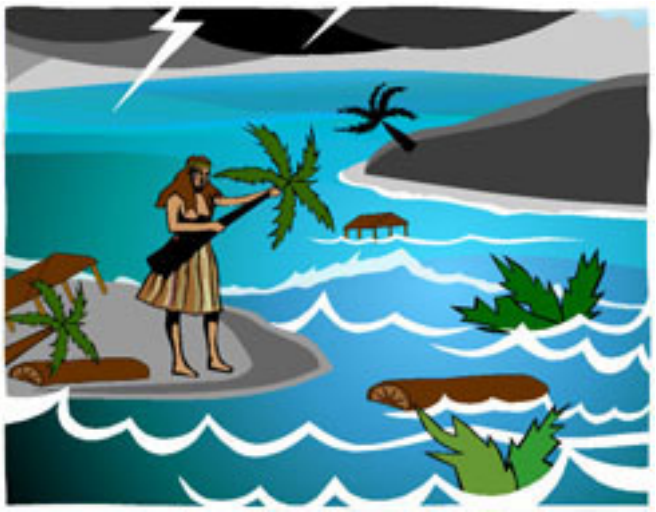
The chief told the women of Pulap to get many baskets of wot and the men to get many coconuts. They loaded everything onto the kuling bird. The kuling took off and flew between Chuuk and Pafang, but then she fell down and changed into an octopus. Every navigator always protects himself from this octopus by using pwanur (a mystical way that navigators use to protect themselves from danger).

1 Islander Accounts

Lots of stories tell about the beginning of places and people. Like the archaeological account, many stories talk about flooding or lost lands … or islands being fished up from the sea. Others talk about canoe voyages from faraway places. Still others tell about people using spiritual powers to create new lands.

In Aotearoa (New Zealand) alone, a range of stories are told. As in many Polynesian islands, there's the story of the boy Maui. From his canoe (Te Waka a Maui, the South Island), Maui fished up the North Island (Te Ika a Maui). There's the story of the navigator Kupe, who landed on the northwest shores. There are the stories of the canoes that navigated here from the island homeland of Hawaiki. And there's the story of Paikea, who arrived on the east coast of the North Island on the back of a whale.

Story 1 - Pohnpei, Micronesia



Langar Island in Pohnpei lagoon is like the main island. It sits on volcanic rock and has good soil and thick forests. A reef surrounds it. But once, Langar was completely flat.

Long ago, there was a huge rainfall, and Pohnpei was nearly washed away. The flood waters took trees, rocks, and houses into the sea. A woman from Langar called Li en Lan saw this. She climbed onto a large rock. As things from Pohnpei washed by her, she grabbed them and piled them on Langar. When the flood was over, she saw that she had created a lovely high islet that looked like Pohnpei.

Story 2 - Mwoakilloa, Micronesia

There were once three brothers named Ur (the oldest), Mwa, and Ka (the youngest). As they grew, their parents taught them many skills – to farm, build canoes, and fish. Ka was the best farmer but the worst fisherman. One day, Ka's hook got caught, and he couldn't free it. As usual, his brothers made fun of him. But Ka pulled hard, and finally he pulled an island to the surface. It had three islets.

Ka said he would only give his brothers some land if they showed him the secrets of fishing. They wanted land badly, so they agreed, and Ka learned to fish. Ka then gave them the islets with the best fishing areas – because they were the best fishermen. He kept the islet that had good land for farming. The brothers named their islands after themselves: Urak, Mwandohn, and Kahlap.

When their mother died, a coconut tree grew from her grave. The nuts had three corners, which they named Ur, Mwa, and Ka. They planted them on each islet, where they still grow today. Because of the names of the brothers, the word for young coconut became urmwaka.

In other versions of this story, Mwoakilloa is called Mokil.

Story 3 - Tonga, Polynesia

Tangaloa, the god of art and invention, looked down from his sky home of Bolotu. “I am hungry. Hungry for fish.” He let his great turtle hook go down, down, down. Soon, something heavy pulled on the line. Tangaloa pulled and pulled, but he couldn’t pull up the hook. He had caught a huge rock, not a fish! He laughed and said, “Today, I won’t eat. Today, I’ll have fun making islands.” He pulled up the very bottom of the sea. When the rocks reached the surface, the line broke. The land split into lots of little islands.

Then Tangaloa let pieces from the wood he was carving fall to the water. He told one of his sons to become a bird and fly down to see what happened. After some days, the pieces of wood became a beautiful island! He told his son to plant a seed on the island. The seed grew into a vine. His son pecked at the root until it broke in two and rotted. A big white worm formed there. He pecked at that, and it split as well. The three parts became the first men – Kohai, Kuau, and Momo.

Tangaloa named the island Eueiki, the first place of men. The three men became the first tui Tonga (rulers of Tonga). The first true man (not from a worm) was Ahoei. He was born later to Tangaloa and a beautiful woman called Ilaheva Veepopua.

Story 4 - Rapa Nui, Polynesia

Our homeland, Marae Renga, lies a long way to the west. Our king, Hotu Matua, was one of the chiefs there. Oroi was his enemy. There was a war between their tribes. Haumaka, the tattooer of Hotu Matua, had a dream: that six men went across the sea to a land covered in holes and white sandy beaches. So Hotu Matua sent six men to find that land. They travelled in their canoe Te Oraora Miro, taking yams, breadfruit, coconuts, and other things to plant.

And they found that land and arrived at Te Pu. There were no tall trees or streams. It was all rolling grasses. They climbed Rano Kao and saw the crater – the hole that Haumaka had dreamed about. They went along the coast and saw the white sands of Anakena. At Turtle Bay, one of the men was hurt when fighting a turtle. They carried him to Ihuarero cave so that he could heal. After three days, they left him. At the cave opening, they built five men of stone to care for him.

When they had come right around the island, they saw the double hull of Hotu Matua and another of Tuu Ko Ihu, the priest and navigator. Hotu Matua went along the south, and Tuu Ko Ihu went to the north. Hotu Matua's canoe was the first to land at Hiramoko. As it landed, his son Tuu Ma Heke was born. Then the canoe of Tuu Ko Ihu landed at Hanga Ohio. There, his daughter Avareipua was born. Tuu Ko Ihu cut their navel cords with his teeth and sent them to sea in a gourd. Then all the mahingo came to shore – all the people from the canoe of Hotu Matua, the king.

Story 5 - Ulithi, Micronesia

Long ago, the islands of Ulithi didn't exist. A woman called Felta lived on Yap with her two brothers, who treated her very badly. Because of this, she decided to leave. When she reached the sea, she could go no further. She filled a coconut shell with sand, said some enchanted words, and threw the sand in the sea. It formed a sand bar. She walked on it until she reached the end. She threw more sand and created more sand bars. She did this again and again until she came to where Ulithi is today.

She made Mogmog her home because it had lots of turtles. There, she had a son. She taught him many skills, like building canoes. She sent him to Yap to bring coconuts back since there were none on Mogmog at the time. Today, Ulithi is covered in coconut trees.

Story 6 - Palau, Micronesia

Long ago, Palau had only two islands – Peleliu and Angaur. One day, a woman named Latmikaik had a baby boy. She called him Chuab. The morning after, Chuab was already crawling. He learned to walk the next day. He grew very fast and ate huge meals. Sometimes, he ate pigs and even young children!

The village people were very worried and asked Latmikaik what to do. The mother sadly told them that they should kill Chuab. The people started to collect wood for a

fire. Latmikaik tearfully told Chuab that they were preparing special food for him. The people asked Chuab to stand on the wood so that they could pay respect to him. Without him noticing, they started a huge fire.

Chuab fell down and died. Because Chuab was so huge, parts of his body stayed out of the water. They became the many different islands of Palau. Chuab's mother asked the villagers to cover his body with mats. But there were not enough mats, so they had to use branches. This is why Palau is half forest and half plains. The people of Palau come from the worms that grew from Chuab's body.

In other versions of this story, Chuab is called Uab.

Story 7 - Majuro reefs, Marshall Islands, Micronesia

Letao, a man from Majuro in the Marshall Islands, was famous for his strength … and also for playing tricks on others. Letao really liked the King of Laura's canoe and made a plan to get it. He built a beautiful but useless canoe to trick the King. Letao used kone wood, which is strong but doesn't float!

Letao shined and decorated the canoe. At low tide, he piled large stones offshore and pulled the canoe on top of them. When the King arrived, Letao's beautiful canoe seemed to be floating on the lagoon. The King was very impressed. Without thinking, he traded his own good canoe for one he had never sailed. In the King's canoe, Letao raced towards the pass to the open sea, laughing and singing.

When the King tried to paddle his new canoe, it fell from the rocks and sank! The wet and angry King yelled for his people to catch Letao. Canoes raced after him, but Letao kicked up sand and coral from the bottom of the lagoon. This created reefs that blocked their way. Letao was last seen sailing into the sea beyond Majuro.

In other versions of this story, Letao is called Etao, Majuro is Mejuro, and the King is Koko the canoe builder.


Hawaiian Islands
North Pacific Ocean
MICRONESIA
POLYNESIA
MELANESIA
Line Islands
Kiribati
Phoenix Islands
Tokelau
Samoa
Wallis and Futuna
Tuvalu
Gilbert Islands
Marshall Islands
Northern Mariana Islands
Guam
Federated States of Micronesia
Yap
Palau
Bismarck Archipelago
Nauru
Solomon Islands
Reef and Santa Cruz Islands
Louisiade Archipelago
Papua New Guinea
Vanuatu
New Caledonia
Fiji
Tonga
American Samoa
Niue
Cook Islands
Society Islands
Rarotonga
Tahiti
French Polynesia
Marquesas Islands
Tuamotu Archipelago
Gambier Archipelago
Austral Archipelago
Pitcairn Islands
Easter Island
South Pacific Ocean
Kermadec Islands
Norfolk Island
Chatham Islands
New Zealand
Australia

2 Archaeological Account

Many thousands of years ago, the sea was much lower than today. A lot of the world's water was frozen in *glaciers* on the *continents*. As the earth's climate warmed up, the ice slowly melted. Water began to cover the lowlands. People had to move and begin a new way of life. Some went inland. The ancestors of today's Pacific Islanders became canoe people who travelled and traded between the newly created islands.

Through time, some islands rose and some fell due to underwater earthquakes and sea level adjustments. Today, people tell accounts of big floods and about islands being formed – sometimes fished up. These stories could be about what happened thousands of years ago.

Linguists and *archaeologists* are beginning to learn where and how people lived through the flooding and why they moved: to find new homes, to trade, to fish, to visit relatives, to find a wife or husband, and even to escape a fight or attack another island. To learn when people were in a place, archaeologists use *radiocarbon dating* on objects that they find there.

Peopling of the Pacific

4000–3000 years ago

The first islands reached in the tropical northwest Pacific were Palau, Yap, and the Marianas. The people who came to Palau and Yap to fish and garden may have been from nearby Halmahera (in Indonesia) and northwest New Guinea. The people who reached the Marianas from the Philippines sailed over 2500 km – the longest open sea crossing in the world until that time! The Marianas had bad droughts (long periods with little or no rain) and storms, but the reefs were full of fish, turtles, and shells that were valuable for trading.

South of the equator in the Bismarck Archipelago and the western and central Solomon Islands, the canoe people made decorative red pottery. Archaeologists (people who study ancient living places and artifacts (objects made by people)) call this pottery Lapita after the place in New Caledonia where it was first found. Over long distances, the people on these islands traded obsidian (hard volcanic rock that's good for cutting) and valuable shell ornaments. Like the people in the north, they probably also exchanged marriage partners.

3000–2000 years ago

The southern canoe people sailed east across 450 km of open sea to the Reef and Santa Cruz Islands (eastern Solomon Islands) and probably from there to Vanuatu, New Caledonia, Fiji, Tonga, and Samoa. The open sea crossing between Vanuatu and Fiji is 950 km! Lapita pottery has been found on all these islands.

By about 2000 years ago, the very low sea level had uncovered the Marshalls and Kiribati (Gilbert, Phoenix, and Line Islands). The people who settled (came to and occupied) these coral islands probably came from Vanuatu and the south-east Solomons. They grew many kinds of pandanus and coconuts, as well as giant swamp taro in holes fed by underground water. They also became some of the world's best sailors.

2000–700 years ago
Canoe people were settling (coming to and occupying) the small coral islands in Micronesia. At Lamotrek in the Carolines, turtle and fish bones have been dated to about 800 years ago. People also settled in the most remote (far away) islands of Hawaii, Rapa Nui (Easter Island), and Aotearoa (New Zealand). The similarities in the artifacts (objects made by people) and languages now spoken in these three places suggest that the settlers came from west and central Polynesia (Fiji, Tonga, Samoa, the Society Islands, and the Cook Islands). They probably used large, double-hulled canoes, which can safely carry many people and things. These canoes sail best in calm seas, not strong winds, and the navigators timed the trips for these conditions.

Great navigators guided the canoes to these islands thousands of kilometres away. The people needed to be strong and adaptable. The climates, land, animals, and plants were different. People developed new ways to fish and to farm (for example, to protect plants from the winds). They also started to plant a new crop – the sweet potato from the Andes Mountains of South America. The South Island of Aotearoa was often too cold to grow crops, so the people there fished, collected wild plants, and hunted animals.

So how did the people of the Pacific get the sweet potato? They may have sailed all the way to South America and brought it back. This apparently happened around the same time that people were settling Hawaii, Rapa Nui, and Aotearoa. Sweet potatoes were taken further west too. Bits of burned sweet potato have been found on Mangaia in the Cook Islands. These have been dated to about 900 years ago.


BP = before present
c. = circa (about)
c. 1300 BP
c. 1300 BP
c. 1300 BP
c. 1300 BP
c. 700 BP
c. 3500 BP
c. 3000 BP
c. 2000 BP
c. 3000 BP
c. 3000 BP
North Pacific Ocean
South Pacific Ocean
Hawaiian Islands
Line Islands
Marquesas Islands
French Polynesia
Tuamotu Archipelago
Pitcairn Islands
Easter Island
Gambier Archipelago
Tahiti
Austral Archipelago
Society Islands
Cook Islands
American Samoa
Niue
Rarotonga
Samoa
Tonga
Kermadec Islands
Chatham Islands
Tokelau
Kiribati
Phoenix Islands
Tuvalu
Wallis and Futuna
Fiji
Gilbert Islands
Marshall Islands
Reef and Santa Cruz Islands
Vanuatu
Norfolk Island
New Caledonia
New Zealand
Kosrae
Nauru
Solomon Islands
Louisiade Archipelago
Bismarck Archipelago
Papua New Guinea
Australia
Northern Mariana Islands
Guam
Chuuk
Pohnpei
Federated States of Micronesia
Yap
Palau
Halmahera
Philippines
Taiwan
Indonesia

The Canoe Is the People

Indigenous Navigation in the Pacific

CANOES AND SAILING

United Nations
Educational, Scientific and
Cultural Organization

LINKS
Local and Indigenous
Knowledge Systems

Canoes and Sailing

Ko te iwi te wairua o te waka, ko te waka te wairua o te iwi … the people are the spirit of the canoe, the canoe is the spirit of the people.
Maori saying

In Aotearoa (New Zealand), one of the last places to be *settled*[*] in the Pacific, every Maori iwi (tribe) is connected to the crew of one of the big canoes that first arrived there. This is the starting point of their whakapapa (family line, history). Waka, the word for canoe, can be used in many different ways – for example, to mean a project or voyage done together, both physical and spiritual.

Canoes were (and still are) of great importance to Pacific peoples. In the past, they were the way to travel, trade, and get food. They were part of stories and the work of everyday life. The whole community had huge respect for them. The Pacific peoples developed different types of canoes and ways of sailing for different purposes.

Video 1 - Cook Islands navigation students

Cook Islands navigation students Te Aru Rangi Reitu (Rangi, left) and Kaiki Tarangi (Karl, right): We're introduced to this vaka as if it's our mother. We treat it with respect. We pray as we board, and we don't leave the vaka until we say goodbye through prayer to the vaka and respect it right throughout because our mother will save our life. We need to love that vaka just like our mother. And another thing, whoever goes on the vaka adds to the mana or the prestige of the vaka, so that's another spiritual way. The people who have stood on that vaka – and as we stand on it, we stand with them.

Video 2 - Sir Tom Davis (Papa Tom)

Cook Islands canoe builder and navigator Sir Tom Davis (Papa Tom): I consider that the development of the big voyaging canoes, and the technology of navigation by people who became masters of it, is equivalent to the space programme for its time.

[*] NOTE: Definition of words in *italics* can be found in the Glossary in the CD-ROM Storehouse.

Video 3 - Satawalese senap (master canoe builder) Edward Remoi

If you want to learn how to be a navigator, then you also have to learn how to make a canoe. The two are related: navigation and canoe making. It is good to be both a navigator and a senap. Otherwise people may say, "You just know how to navigate, but you don't know how to make a canoe." Also, you will have to borrow a canoe. But if the people you ask don't lend it, then you will not be able to travel anywhere. If they don't want to lend their canoe, what are you going to do?

Video 4 - Maori carver Te Aturangi Nepia Clamp

On Te Au o Tonga, around the canoe there's a design called tikitiki tangata, which is a design that, when you look at it, it's people's hands linked, and that goes all the way around the canoe. Now, that's a design that was put on there to protect the canoe. That's a carving that represents our ancestors, that represents our genealogy, and that represents our kaitiaki, which are our guardians.

Story 1 - The First Canoes (Vanuatu, Melanesia)

Nobody lived on the island of Vao. The only way to get there from Mallikolo (Malekula) was to swim. One evening, the people of Mallikolo heard scary sounds coming from Vao. Then their food started disappearing overnight. One morning, a woman screamed that her toe had been eaten!

Many days and nights passed, and more food and toes were eaten! Then, one day, a guard saw a rat speeding away. He chased it, but it jumped onto a hollow stick and floated towards Vao. The chief ordered some men to swim to Vao and bring back the missing toes. The men were afraid of sharks in the sea, so they copied the rat and built a raft. They cut down strong pieces of bamboo and tied them together with coconut rope.

The men were away a whole night, and the villagers were worried. When they finally returned, they didn't come in their raft. They had carved a canoe like the rats' hollow piece of wood. Their canoe was big and strong because they had carved it from a tree. Later, they carved many more canoes. When they had a whole army, they attacked Vao. The rats tried to escape on the sea, but a storm drowned them all. Since then, the people of Mallikolo have used canoes to travel between islands … and they've kept all their food and toes!

1 Pacific Canoes

After *rafts*, Pacific *dugouts* were some of the first boats in the world … and a technological breakthrough that allowed people to explore the Pacific.

Thousands of years ago, when melting ice flooded South-east Asia and formed tiny islands in a large sea, the Pacific Islanders had to develop better canoes to carry people and link communities. By adding an *outrigger* to the single hull dugout, they stopped it from rolling over. By adding sails and more wood to the sides of the hull, they made the canoe fast and safe enough to explore the open sea to the east. By making the outrigger the same size as the main hull (a double hull), they made a canoe that could survive storms better and carry more things like crops and animals [See figure 1].

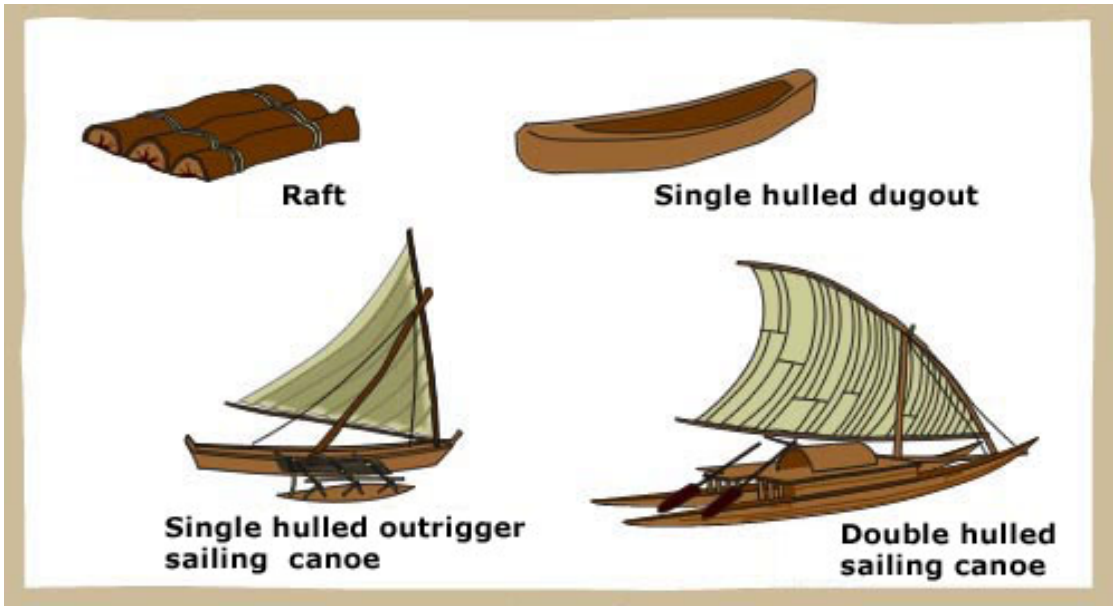
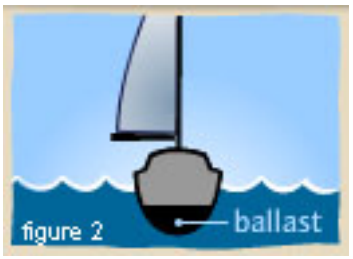


Figure 1

Outrigger canoes were good for fast trips to nearby islands and for chasing tuna. The stronger and more stable double hulls were ideal for *settling* new islands. Most sails were triangular. Their shape was good for sailing across and into the wind and for giving a lot of lift to the canoe. Some were quite small – made for safety, not racing. After all, a large sail increases the chance of a canoe *capsizing*.

By comparison, boats in other parts of the world (for example, Europe, Africa, and China) were mostly used to carry heavy goods like metal and cattle along the coasts. They had to be large and so needed many sails. The more sails they had, the more *ballast* they needed to stay upright in the wind [See figure 2]. As a result, they were slow. They didn't need to be as *seaworthy* as Pacific canoes because they could stop on land every night.



This stone carving (from the Borobudur Buddhist temple in Indonesia) is the oldest known image of a double outrigger (in this case a ship) and dates to about 1200 years ago. It is believed that ships of this type were sailed by Indonesians as far as Madagascar, off the coast of Africa.

This image is from the ArtServe website of The Australian National University, maintained by Dr Michael Greenhalgh (http://rubens.anu.edu.au/htdocs/bycountry/indonesia/borobudur/reliefs.small/0012/1200b.JPG).

Single-hulled paddling canoe with or without tacking sail

This canoe was used for travel, fishing, and war. Examples are known from the Solomon Islands and Aotearoa (New Zealand).

Outrigger paddling canoe with or without tacking sail

Used throughout the Pacific (at different times in history), this type of canoe was used daily for travel and fishing. Examples are known from Vanuatu and Aotearoa (New Zealand).

Double-hulled paddling canoe with or without tacking sail

People went to war in this canoe in the eastern Pacific. Examples are known from Tahiti, Aotearoa (New Zealand), and Hawaii.

Outrigger sailing canoe with tacking sail

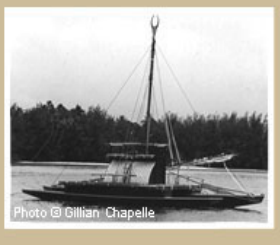
This canoe was used in the central Pacific for travel and fishing. Examples are known from Samoa and Tahiti.

Outrigger sailing canoe with shunting sail

This canoe was used for travel and fishing in the northern and western Pacific. Examples are known from the Marshall Islands and Fiji.

Double-hulled sailing canoe with tacking sail

In the central Pacific, this canoe was used for voyaging. Examples are known from Tonga and Tahiti.



Double-hulled sailing canoe with shunting sail

After the double-hulled sailing canoe with tacking sail, this canoe (with a different sail) was developed for voyaging in the central Pacific. Examples are known from Fiji and the Tuamotu Islands.

2 Building a Canoe

If you want to build a canoe, first plant a garden.
Ni-Vanuatu saying

Building a large sailing canoe can take more than a year. It can only begin if the right trees have been planted and are ready to use. A spiritual expert often performs a *ritual* to ask the spirits for permission to cut down a tree. The experts might be paid with valuables like weaving and food as well as shown great respect. Another expert guides the canoe builders. In Satawal, he's called a senap (master canoe builder). Young children watch, and older boys help out.

Before Europeans arrived in the Pacific, people used things from the world around them to build canoes – like stone or shell axes to cut the trees and shape the canoe parts. There were no steel tools and certainly no chainsaws like today! A canoe builder knows which trees are good for different canoe parts. The wood for hulls must be strong and long-lasting but not too heavy. Other canoe parts – like the outrigger and the sleeping platform on Satawalese canoes – are made from softer woods. Some of the wood used for the sleeping platform is brought by ocean currents from unknown places. If a community doesn't have building materials or a canoe builder, they may trade for canoes from other islands.

After the canoe is tested, there's a ceremony to celebrate. In Satawal, they throw food all over the canoe. When they're finished, they feast!

Video 1 - Cook Islander Dorice Reid

They learned how it was that our ancestors had this enormous respect for the environment. For instance, in the olden days, our ancestors would never cut a tree down to make a canoe without praying, without their karakia, praying for authority to take the life of that tree. Today, we just blatantly go and cut a tree down, and we don't think about the fact that it has a life.

Video 2 - Maori master canoe builder, Hekenukumai Busby (New Zealand)

There is a specific prayer that allows you entry into the forest. Things today are different from the past. I was committed to following as closely as possible the ancient rituals of my ancestors in entering the forest. One of these prayers is a prayer of preparation to make the first cuts on a tree after selection. Next comes a ritual that burns the first chips so that their energy can be released into the forest through the smoke generated by the fire.

Video 3 - Satawalese senap (master canoe builder) Edward Remoi

Satawalese senap (master canoe builder) Edward Remoi supervises the construction of a large voyaging canoe. Construction is a group effort involving many men – from boys to adults. Many different tools and techniques, both ancient and modern, are used. It is an exceptional opportunity to pass down knowledge and know-how to young boys who are eager to observe, participate, practice, and learn.

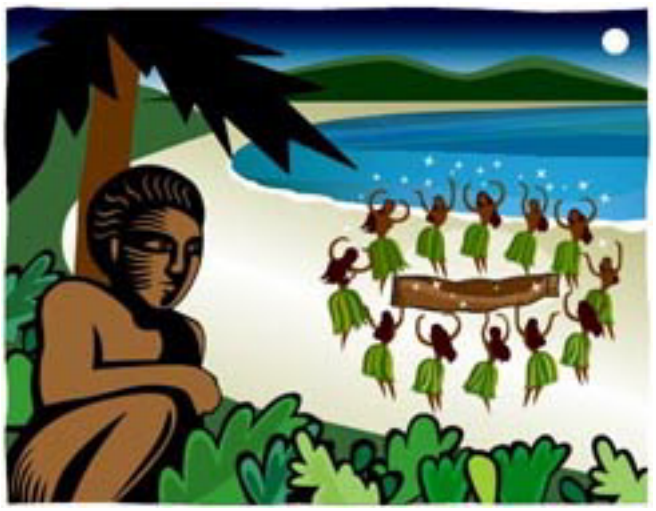
Video 4 - Satawalese senap (master canoe builder) Edward Remoi

They choose the old, old breadfruit to be the puun (hull of the canoe) – the one with the red skin and hard wood. It is very important to choose hard wood. The breadfruit for the tam (outrigger) is lighter. It is called mesaruuw. If they use the hard wood for the tam, the canoe will not be balanced. The tam will sink.

Video 5 - Maori master canoe builder, Hekenukumai Busby (New Zealand)

Voyaging canoes can be built from almost any tree, but the waka taua or waka tete requires trees that are heavier on one side than the other so the canoe doesn't capsize. In 1975 an elder taught me which trees were ideal for this. These trees were ones constantly exposed to the westerly winds. In these trees you will find the heart of the tree is closer to the western exposed surface. This is what you look for to build a waka taua or a waka tete.

Story 1 - The Story of Lata (Samoa, Polynesia)



Lata was the son of Fafieloa and Tula. When Fafieloa was killed by Matuutaotooto (from Savaii), Lata wanted revenge. Lata went to find Matuutaotooto, but he had already escaped in a fast canoe. So Lata decided to build a canoe too. He cut down good tamanu trees. He worked hard. When the sun set, his canoe was nearly finished.

The next day, Lata was shocked. The canoe was gone! The trees were standing as before! So Lata cut them down and built the canoe again. The next day, the same thing happened. Once again, Lata cut the trees and built the canoe. That evening, he hid to find out what was going on.

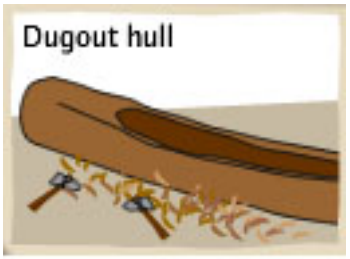
Soon, twelve female spirits appeared. They danced and sang, “Fly up and stick together, branches and leaves. Stand up, our children.” They asked Lata, “Why are you cutting down our children? Did you bring an offering to Tane, the god of the trees?” Lata cried out to be forgiven and promised to prepare an offering. When the spirits saw that Lata was truly sorry, they built the canoe for him!

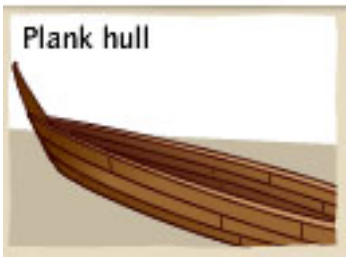
Lata was overjoyed. He asked the priest to bless the canoe. Then he sailed away, looking for Matuutaotooto. Finally, he found him in Tonga. He killed Matuutaotooto and ate his heart. Some say that before Matuutaotooto died, he put a curse on Lata's canoe and it broke. Others say that the Tongans took the boat apart to learn how it was made and that this is the origin of the first alia (double-hulled canoe) in Tonga.

This story is similar to other stories told in the Pacific Islands — for example, the Micronesian story of Rongerik and Rongelap and their canoes and the stories of Rata from Aotearoa/New Zealand, Tuamotu, Tahiti, and so on.

2.1 Hulls

The way a hull is built depends on the use of the canoe and available materials. You need big trees to build a *dugout*. On islands that have no big trees, such as those of Western Kiribati (Gilbert, Phoenix, and Line Islands), pieces of wood are shaped into planks and fitted together. Other planks are tied from the inside to give support. Before iron nails, Roman and Egyptian ships were made like this too.





These are the two oldest ways to build hulls. People refined them more in the Pacific than in other parts of the world, and this enabled them to travel far on the open ocean. By fitting and tying all the parts together, Pacific people made very solid canoes – but also *flexible* ones. When sailing, the canoes could absorb the force of the waves better than more *rigid* European boats.
If a canoe is used for fishing in lagoons, or if a place rarely has strong winds (like the Solomon Islands), it doesn't need side planks. But if it's used for voyaging between islands, where the seas are high, side planks are necessary. Balance is essential for these voyaging canoes. The hull shape, especially the distance between the two hulls (or hull and outrigger) has to be just right. Carvings on the hulls often have spiritual meaning and are there to protect the canoe.

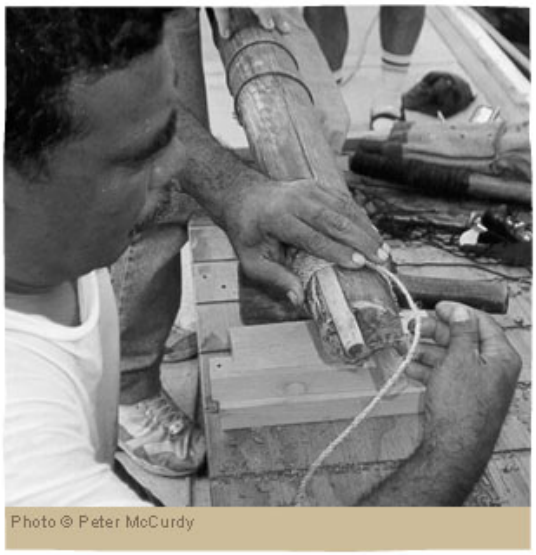


Photo © Peter McCurdy

Canoe Building

Aotearoa war canoe

In the past, the largest canoes were for wars or ceremonies, not voyaging. The dugout war canoes of Aotearoa (New Zealand) were usually made from three large pieces fitted tightly together – hull, bow (front), and stern (back). Planks were added to the sides of the dugout. Carvings in the styles of individual iwi (tribes) were put on top of the bow and stern.

Photo © Peter McCurdy

Photo © New Zealand Maritime Museum

The sharkskin surface on this Maori river canoe and other hulls in Aotearoa is difficult to explain in western terms. Pacific Islanders find that the sharkskin surface makes the hull faster than a smooth hull.

Walap

The Marshall Islands walap canoe also has three pieces, but not fixed together in the same way as the Maori war canoe. There are few large trees on the islands, so many planks make up the walap's sides. The outrigger is connected to the main hull in a flexible (loose, easy to bend) way. Like this, it can hit the waves first and ride over them separately from the main hull. This means less stress on the canoe and less drag (the friction of the water against the hull) in the water, so the canoe can go faster. Western designers have copied this clever feature.

Photos © Peter McCurdy

Satawalese canoe

Like the Aotearoa (New Zealand) war canoes, Satawalese canoes are built in three pieces, but they are much smaller because the trees are smaller. Therefore, more planks are added to build up the sides.

Photo © Karen Nero

2.2 Sails

Before modern sailcloth was available, women and girls used to weave sails from strong leaves like pandanus. (In some places, like Satawal, they still know how to do this.) They collected leaves that were long and *flexible* but not too young. They stored them in the women's house until they had enough to make a sail.

The women sat on the floor to weave the leaves – like weaving a mat. Then the sail was cut to the right size and shape. The edge of the sail was made especially strong to resist the pull of a big wind. Small girls learned first by watching and then by practising. Weaving was one of the many things that they learned at the women's house.

An original Maori sail from the British Museum, London.
Photo © Hans-Dieter Bader.

Video 1 - Satawalese Terese Lachielmwar and Teresa Nauweilug

When we pick the maang (leaves) of the far (pandanus), we remove the mwonanmaang (thorns). They hurt if you prick yourself. The good leaves are the ripe ones. These are the bad parts (the base and the end). We throw away these no-good parts. We divide the leaves. Then we roll the strips. This is called aoun. We use the knife to make them straight.

We do the weaving of the uuw (sails) in the women's house. We divide the leaves into narrow strips. We put one down and then another. If other women are weaving, we join the strips. We count the leaves. It's usually a hundred or longer. Then the men come to measure and cut it. They try the sail on the canoe and sew it into the final shape.

Video 2 – Testing a large sail

On the island of Satawal, a large sail is tested on a new mast in order to fine-tune its shape and size.

Story 1 - How the Sail Came to the Outrigger (Marshall Islands, Micronesia)

Ten brothers were to have a canoe race to decide who would become chief of the island of Jeh. Each boy carved a strong paddle. The bigger boys showed off their skills and made fun of the younger ones. The smallest boy, Jabro, was quiet.

When the race began, their mother, Liktanur, asked each son to take her and her heavy load on his canoe. They all said no except Jabro, even though he knew it would slow him down. For his kindness, his mother showed him how to use the sail, which she was carrying in her load.

Jabro beat all his brothers in the race and was called Jabro-Jeleilon, Iroij, the Wind Catcher. As the sons of Liktanur finished their lives on earth, their mother took them up to the night sky. Liktanur is now one of the brightest stars above the Marshall Islands. Each son can be seen in his correct position to guide ocean voyagers. The only star close to Liktanur is Jabro.

2.3 Ropes

A lot of rope is used to tie canoe parts together and to make the *rigging*. Very strong rope is made from plants like vines, hibiscus, and coconut. This is the process for coconuts.

Video 1 – Rope making

You put coconut *husks* in water for some weeks to remove the soft, weak parts.

Video 2 – Rope making

After, you dry the wet *fibres* in the sun and then join them together in small bunches.

Video 3 – Rope making

To start a length of rope, you pull a few fibres from the middle of the bunch and rub them together against your thigh.

Video 4 – Rope making

Then you rub the end of the first group of fibres together with the end of the next few fibres, and so on.

Video 5 – Rope making

To make thick rope, you weave several of these lengths together. Many people help make the rope.

From The Last Navigator © INCA 1989.
Directed by Andre Singer.

Video 6 – Rope making

Rope-making is a skill that children learn and practice from an early age.

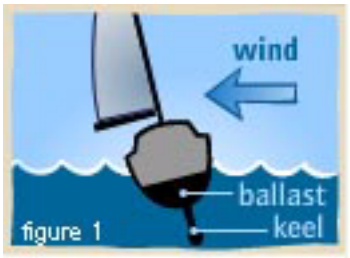
Satawalese navigator Anton Ratiloinug: Now I am preparing to make muuch (rope). We pick up nuu (coconuts), and we remove the husks. Then we put them in the nip (fresh water ponds in taro growing areas) for some months. We use this koor (wet coconut fibre) for many things. We use it for anon (coconut fibre rope). You can make a lot of types of rope.

3 Sailing

The wind on a sail can push a canoe right over. Therefore, most European boats have a deep, heavy *keel* that works against the force of the wind to keep the boat upright. They also have a heavy *ballast*. Both the keel and the ballast slow the boat down [See figure 1].

Pacific canoes are different. They sail by working with the natural forces of the wind and water. Because of this, they don't need extra weight to stay upright. Instead of having a deep keel in the water, the outrigger canoe puts the balancing weight (the outrigger itself) to the side – a clever solution because it doesn't slow the boat down [See figure 2]. The canoes don't crash through the water because their parts are *flexible* and move with the waves. This means less stress on the boat and less equipment failure, which is essential for long voyages. The canoes are built with very few materials. This is important on islands with few resources.

It's not surprising that the lightest and fastest boats in the world today are modern catamarans. Their designs are based on Pacific double-hulled canoes!



Video 1 - Satawalese kids play with model canoes

Maverick Eranginug and other Satawalese kids play with model canoes. They learn how a canoe behaves in the wind and water – first without a sail and later with one. A father makes several model canoes for his sons as they grow up. Sometimes the boys make the boats themselves. If the father is a navigator, he takes his sons on a canoe and teaches them more. When the boys are ready, he lets them sail a real canoe for practice.

From Becoming a Navigator, Becoming a Priest © UNESCO 2004. A film by J. Blumberg, R. Hunter-Anderson, R. Apusa, and B. Feinberg.

Video 2 - Maori master canoe builder, Hekenukumai Busby (New Zealand)

After we launched the canoe many things needed adjustment. In 1992 we wanted to sail to the festival in Rarotonga. Despite being a difficult time of year we decided to try. Te Aurere had one mast then. We had an international crew. One Hawaiian, Mau and a nephew, the remainder were our youth. The storms during that voyage severely tested us for seven days. Our two steering paddles were destroyed and we were assisted in to Rarotonga by our support vessel. Once we got back to New Zealand I made changes to improve her sailing performance.

Video 3 - Young men from Satawal practice sailing

Young men from Satawal practice sailing.

Video 4 - Hoturoa Barclay-Kerr of Te Toki Voyaging Trust

I encourage the kids to read and write and do all those kinds of things, but I also encourage them to be very experimental in the things that they do. So when we have the canoes out, especially if it's a good day, I'll say to them, OK, if we've rigged it up for sailing, so OK, what will happen if we do this, if we make this change to the canoe? What happens to the physics of the canoe if we tilt this mast forward a little bit? Or what happens if we move you all to the front of the canoe? How is that going to affect the performance of the canoe? How are we going to try to make the canoe go faster? How are we going to make it come up into the wind a bit better? All those little things.

3.1 Tacking and Shunting

A sailing boat can sail close to the wind, across the wind, and with the wind from behind. But it can't go directly into the wind because the sail can't catch any air. If its destination lies in the direction of the wind, the canoe has to sail in a *zigzag* pattern towards it.

The most common way to do this is to tack. The canoe sails on an angle to the wind. With enough speed, it turns its front through the wind. The sail flaps and then fills again on the other side. All European boats and many Pacific canoes tack like this. Tacking canoes are good for the changing winds around headlands, like those in Aotearoa.

Another way to sail into the wind is to shunt – to swap the front and back ends of the canoe. The outrigger of a shunting canoe is always on the side opposite the sail, so the canoe is well balanced. However, shunting is more difficult than tacking. It's good for places with steady winds, like Micronesia, where it was developed. The people in Fiji, Tonga, Samoa, and the Tuamotu Islands also shunted because this way of sailing suits long-distance canoes.

3.2 Balance

All Pacific canoes are designed to balance the forces of the wind and water. The shunting canoe is a good example of a balanced system based on advanced ideas. The hull, outrigger, and sail form a balanced triangle. The outrigger balances the pressure of the wind on the sail. It rides over the waves not through them, so it doesn't hold the canoe back. The crew moves in relation to where the forces of the wind and the water are acting on the canoe. Everything works together.

1. When the canoe travels with the wind from the side, the sail is nearly in line with the hull. The sail's centre of effort (the centre of the wind's force on the sail) is close to the middle of the hull. This way, the canoe is balanced, and so steering is easy. A small pull on the steering paddle or on the ropes that control the sail will guide the canoe [See figure 1].

2. When the canoe moves towards the wind, the force of the wind on the sail moves forward. The hull's centre of effort (the centre of the forces on it) also has to move forward to keep the canoe balanced. To achieve this, some of the crew move towards the front of the canoe [See figure 2].

3. When the canoe travels with the wind from behind, the opposite needs to happen. The hull's centre of effort has to move back to keep the canoe balanced, so some of the crew move back. The steering paddle can be put deeper into the water too. The deeper it is, the closer the hull's centre of effort is to the back [See figure 3].

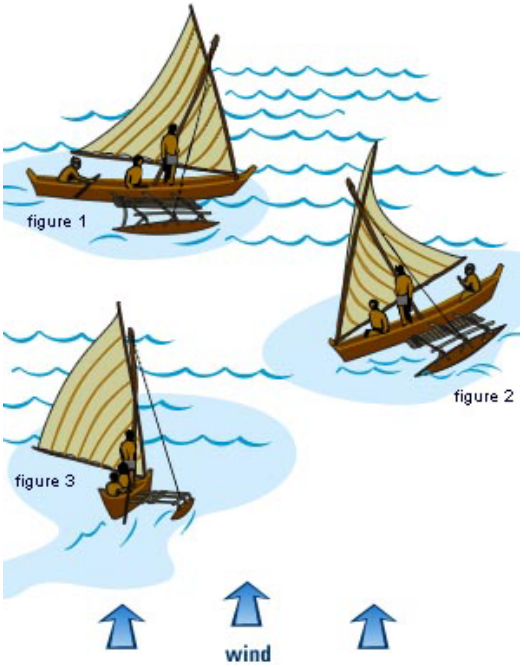


figure 1
figure 2
figure 3
wind


Hawaiian Islands
North Pacific Ocean
MICRONESIA
POLYNESIA
MELANESIA
Line Islands
Kiribati
Phoenix Islands
Tokelau
Samoa
American Samoa
Niue
Cook Islands
Society Islands
Rarotonga
Tonga
Tuvalu
Wallis and Futuna
Gilbert Islands
Marshall Islands
Nauru
Reef and Santa Cruz Islands
Vanuatu
Fiji
Solomon Islands
Louisiade Archipelago
New Caledonia
Norfolk Island
Kermadec Islands
Chatham Islands
New Zealand
Australia
Papua New Guinea
Bismarck Archipelago
Northern Mariana Islands
Guam
Federated States of Micronesia
Yap
Palau
Marquesas Islands
French Polynesia
Tuamotu Archipelago
Gambier Archipelago
Tahiti
Austral Archipelago
Pitcairn Islands
Easter Island
South Pacific Ocean

The Canoe Is the People

Indigenous Navigation in the Pacific

BECOMING A NAVIGATOR

United Nations
Educational, Scientific and
Cultural Organization

LiNKS
Local and Indigenous
Knowledge Systems

Becoming a Navigator

Becoming a navigator is a lifelong experience. Learning happens in many places (the home, the canoe house, the sea) and in many ways. On Satawal, everyone learns some things about canoes and sailing from a young age – for example, by playing with model canoes. Children, including girls, learn mostly from their father or uncles. If their mother is a navigator's daughter, she teaches them what she knows too.

But there is also a lot of secret knowledge. This includes knowledge about navigation, canoe building, the weather, and even knot *divination*[*]. The knowledge is like property. Secret navigational knowledge is passed on only through certain families. In the past, a tribal group without a navigator would sometimes pay to have a student trained. Some young men learn in the school of a reb (master navigator). They are initiated through a pwo (initiation ceremony for navigators). There were once many traditional schools in the central Carolines, but only two remain – Warieng and Faaluur.

In the Marshall Islands, navigational knowledge is considered a sacred gift from the ancestors. Only some families have access to it. Polynesian people say that knowledge is mana – the power to change. In Tonga, there were special navigator tribes like the Haa Fokololo oe Hau, who navigated the kalia (double hulls) of the tui Tonga (kings). A young boy from a high family was chosen to learn on board. Some boys were trained as ula lahi (navigators), and some as lomu lahi (canoe builders).

Video 1 - Cook Islands navigator Tua Pittman

In traditional navigation, you never know if you have enough knowledge. You never know. You never know what the elements will put up in front of you, so you are forever learning.

Video 2 - Satawalese navigator Jerome Rakilur

The first time I heard about navigators, I very much wanted to be one of them so that I could go to the far islands, like Pik or Pikelot. I first learned from one of my uncles from Pulusuk when he came to Satawal.

[*] NOTE: Definition of words in *italics* can be found in the Glossary in the CD-ROM Storehouse.

Video 3 - Satawalese Lourdes Lepanemai

My grandfather, Safwa, and my father, Fituu, were both navigators. They taught us that if we have kids, we should teach them too. That way, when my grandfather and father die and we go on a sailing canoe, we can still direct the canoe if we get mana (lost in the ocean). The crew can know where they are in the ocean.

Video 4 - Canoe builder and navigator Sir Tom Davis (Papa Tom)

Navigators were very secretive of their knowledge. I think they let friends know, and their apprentices and the passing on of the navigational methods they used were through family, preferably their own children or their nephews, this knowledge was passed on. Knowledge is mana, authority. If you have it, you have something better than anybody else has.

Story 1 - Father Teaching Son (Caroline Islands, Micronesia)

One of the greatest navigators was Anoun Foeng, from Lukunor Atoll in the Caroline Islands. His son, Sou, loved to practise navigation with his father. One day, Anoun decided to test Sou's navigation skills by voyaging to Moen Island in Truk Lagoon. As they sailed, Anoun taught Sou many secrets of navigation.

One morning, after some time on Moen, Anoun took his son to the beach. There, they checked the weather. At sunrise, they chose a day to return. Helped by his father, Sou set their course for home and led the voyage. They stopped first at Losap Atoll in the Upper Mortlock Islands, then at Piafo. Piafo was very beautiful, and they stayed for some days. Sou didn't want to leave. But the journey couldn't continue without his son, so Anoun promised that Sou could own the island when they got home to Lukunor.

Sou couldn't imagine how this could be true – he didn't know that Anoun had spiritual powers called Ngorongorin Faneu. Anoun whispered to the spirits, and Piafo moved from the reef on Losap to the reef on Lukunor. Sou was overjoyed when he got home to find Piafo waiting for him.

In modern spelling Moen is Weno and Truk is spelled Chuuk.

1 Ways of Learning and Remembering

Navigator Jacko Thatcher from Aotearoa (New Zealand): "It wasn't until I started learning the Maori names for the European stars … and I realised I've seen these before somewhere … I [went] through my old songbook from my school days, and there it was …" He had once learned a waiata (song) that named the same stars:

Takinga mai ra ko nga hui a Matariki,
Tuanga, Tautoru, Kangaroa-Atutahi,
mai Karewa, te tini o te whetu ariki.

Here above are the stars of Matariki,
Tuanga, Tautoru, Kangaroa-Atutahi,
and Karewa, the many chiefly stars.

From Bader, H. and McCurdy, P., eds (1999).

Until modern times, knowledge about navigation wasn't passed on through books … or CD-ROMs! It was passed on by careful watching, listening, repetition, and practice. Ways were developed to make the knowledge easier to remember and to preserve it over time. Everything had to be memorised because nothing was taken to sea — not like western compasses today. The sky and sea were often "mapped" using real objects (for example, stones or sticks to show stars or wave patterns) or mental images. Songs, chants, and stories helped navigators to remember the knowledge.

In Aotearoa, knowledge about the stars was recorded in some tukutuku (weavings), and in Samoa and other islands, it could be shown in tapa cloth (painted bark cloth) or in people's tattoos — for example, on women's legs.

Video 1 - Hoturoa Barclay-Kerr of Te Toki Voyaging Trust

So the next thing for us is to do what we do quite a lot with our young people. We take them out and show them. We take them somewhere, and then we say, "Look, you go and hold this, you touch this, you do this, and once you do it, you remember." And so I think that one of the biggest differences for us is that as soon as we can after talking about something, we take them to do it. Whereas often if they were at school, they would have to spend maybe three to four weeks learning about something before they might get a chance to have a little bit of a practical demonstration of something.

1.1 Satawal Ways

Nang (Star Compass)

To learn about stars, stones or pieces of coral are placed on a mat in the ut (canoe house). These represent the stars in the sky. Europeans call this a star compass, but it's really more like a map of the sky.

First, the student learns the names of the most important stars for navigation and where each rises and sets on the *horizon*. The stars are divided into groups for memorising. He learns to recall pairs of opposite stars. This helps him to remember the return course for any path. The most detailed step is learning the star paths to certain islands. He learns the positions of the stars in relation to parts of his canoe when he is sailing on different paths. He also learns about the stars that pass directly above particular islands – the *zenith star*. He practises on the beach at night to learn his own island's star paths.

Video 1 - Satawalese navigator Mau Piailug

Satawalese navigator Mau Piailug shows the star compass to some children and names some stars as they are seen from Satawal.

From The Last Navigator © INCA 1989. Directed by Andre Singer.

Ofanuw (Island Looking)

Ofanuw (or wofanu) is a way of remembering the star paths to certain islands. The student chooses an island. Using that island as the centre, he goes around the star compass and *chants* all the islands that lie in each direction: "I sit on Satawal. I go rising Mailap to Chuuk." This forms an island chart in his mind. He does this with all the islands: "I sit on Chuuk. I go setting Mailap to Satawal."

Later, he learns to include reefs and then living sea marks. In the evening in the ut, the older men test the younger men and each other. It's endless practice!

Video 1 - Maverick Eranginug

Maverick Eranginug points out the directions of the islands around Satawal.

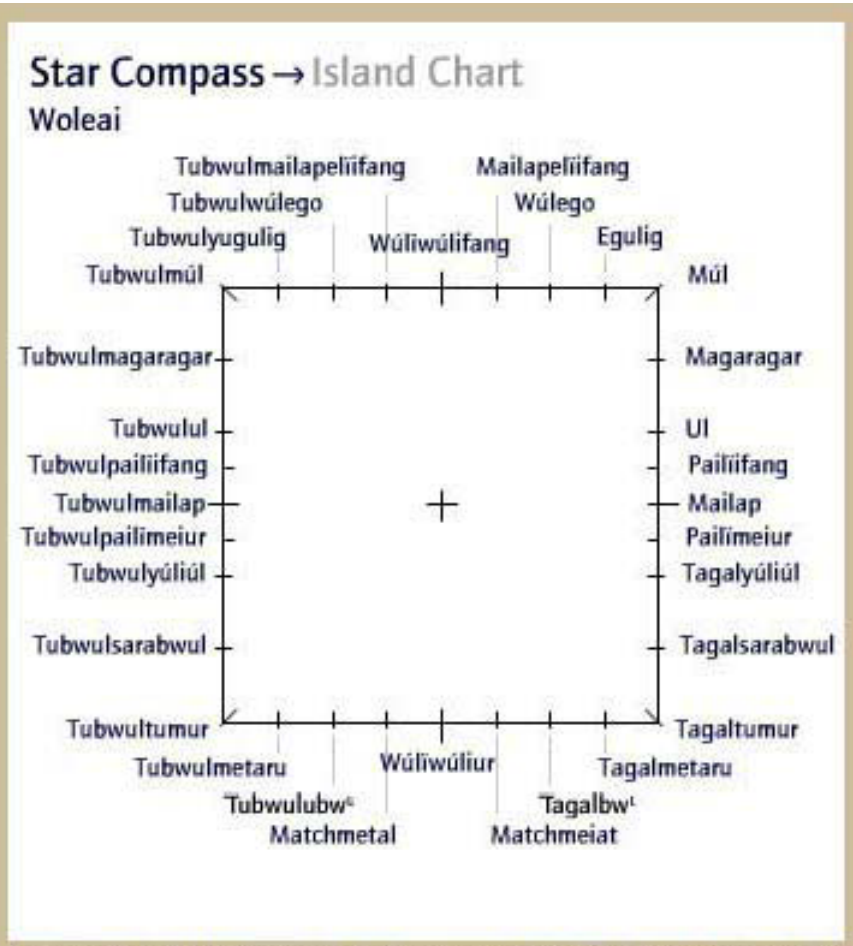


Diagram based on diagram which appears in "Systems of Measurement on Woleai Atoll, Caroline Islands" by W, Alkire, 1970, pg 42.

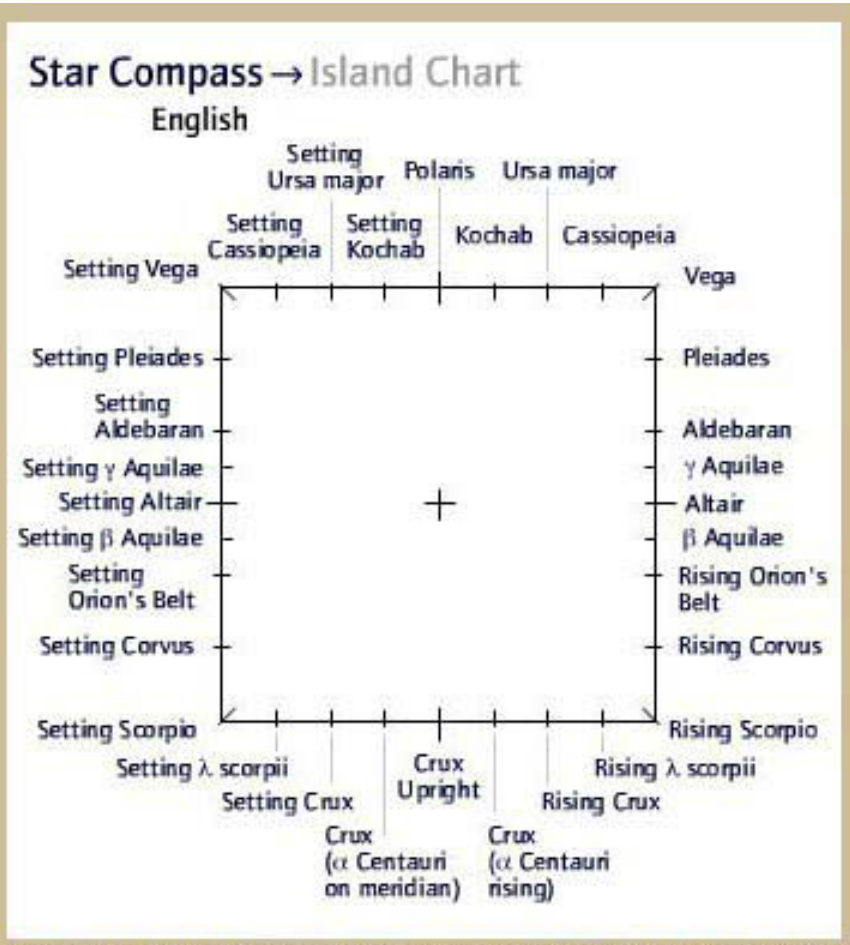


Diagram based on diagram which appears in "Systems of Measurement on Woleai Atoll, Caroline Islands" by W, Alkire, 1970, pg 42.

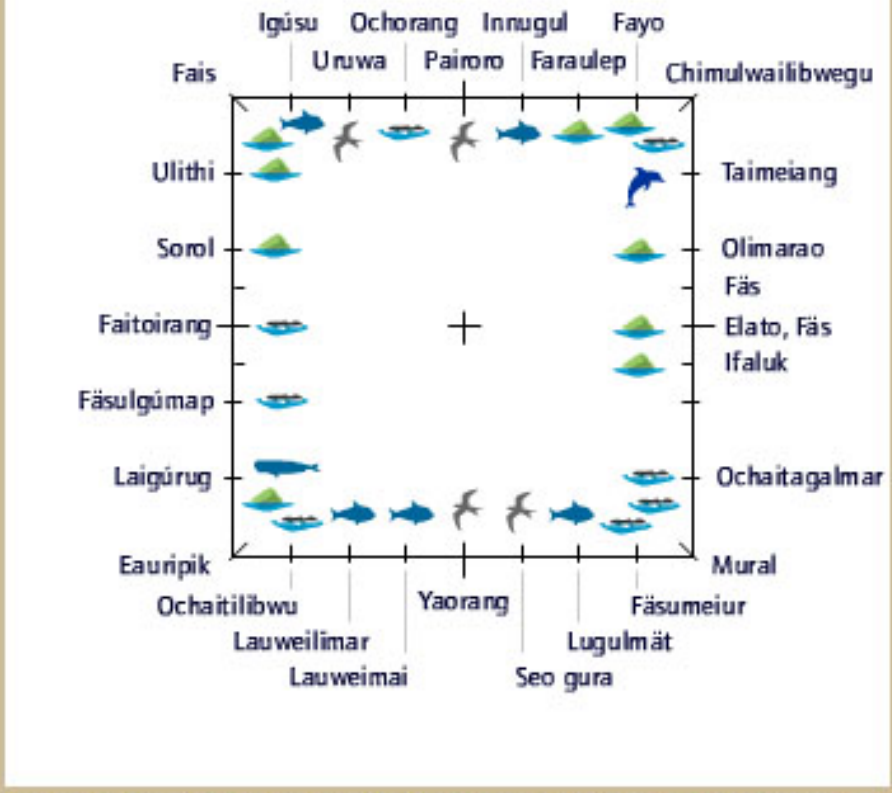
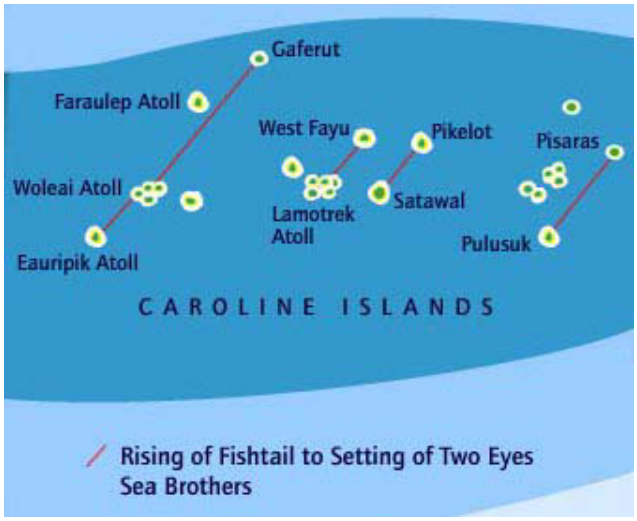


Diagram based on diagram which appears in "Systems of Measurement on Woleai Atoll, Caroline Islands" by W, Alkire, 1970, pg 42.

Arurwow (Parrot Fish)

Like ofanuw, arurwow is a way of remembering the star paths between islands. The navigator imagines an ura (parrot fish) hiding in the wow (reef channel) of an island. When the fisherman tries to catch the ura, it swims to the wow of the next island. Again the fisherman tries to catch the ura, and again it swims to the next island. Finally, it returns to the wow in Satawal. Because navigators never say the island names in arurwow, they can use it to talk about voyages in secret (the same as in sea brothers).

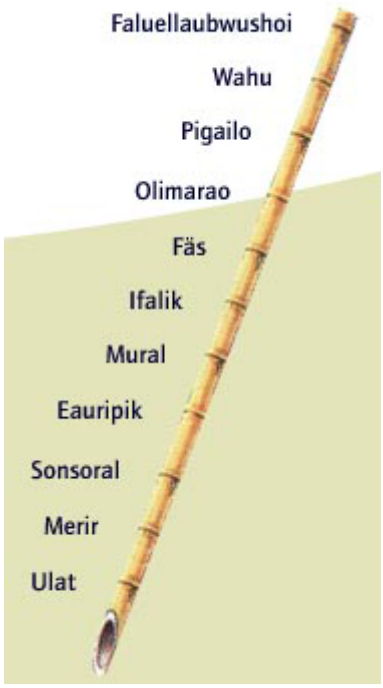
Sea Brothers



Navigators name all the sea roads between islands and reefs. For example, sailing on the Sea of Beads means sailing between Woleai and Eauripik on the star course from Rising of Fishtail (in Cassiopeia) to Setting of Two Eyes (Shaula in Scorpio). By using these names, they can say where they've been without other people understanding! With sea brothers, they group sea roads that use the same star compass points. For example, on the course from Rising of Fishtail to Setting of Two Eyes, there are several sea roads. These connect the islands of Pisaras and Pulusuk, Pikelot and Satawal, West Fayu and Lamotrek, Gaferut and Woleai, and (as mentioned above) Woleai and Eauripik. If a navigator forgets the directions from Woleai to Eauripik, he might remember that this sea road is brother to the West Fayu–Lamotrek sea road.

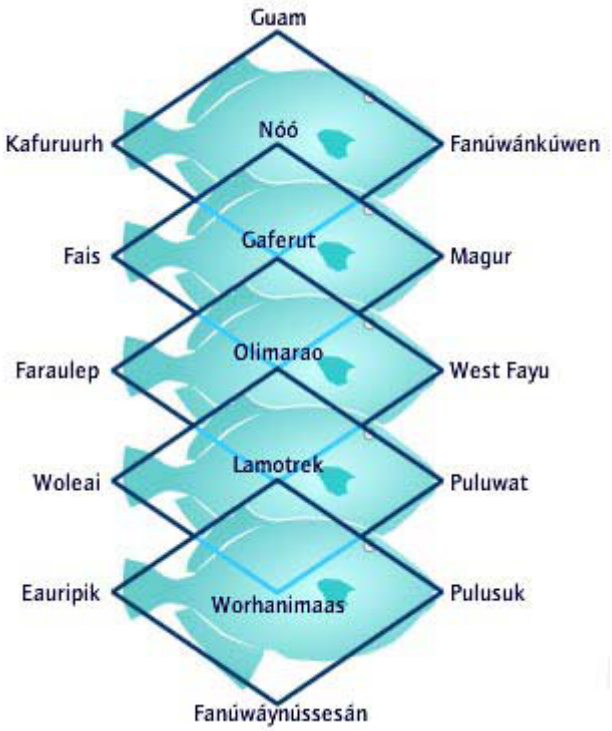
Yet (Pole Charts)

The navigator uses the image of a yaoiteyet, or long bamboo pole, to help remember what he will find when travelling from one island in a straight line to another under a particular star. The pole charts that he keeps in his mind list reefs, islands, and other reference points.



Pwuupw (Triggerfish Charts)

Pwuupw (or bwubw) is the Satawalese name for the diamond-shaped triggerfish as well as for the Southern Cross (also diamond-shaped). Both are important in navigation. The triggerfish image helps a navigator to map and remember the positions of islands in his mind. He imagines a triggerfish lying on the sea. He places himself in the middle of the fish and associates islands and other points (like reefs, *swells*, and sometimes mythical islands) with the five parts of the fish: the head, spine, tail, and two fins. A single triggerfish map overlaps others to provide a large triggerfish map of an area, called pwuupwunapanap.



1.2 Kiribati Ways

Uma Ni Borau (Roof of Voyaging: Star Compass)

Like the use of stones in Satawal, this is another way to learn the star compass. In Kiribati (Gilbert, Phoenix, and Line Islands), the roof of the maneaba (meeting house) represents the night sky. A young navigator sits by the central pole. He faces east and looks up. Various oka (rafters, poles) divide the sky into sections. The student first learns the stars in one section (where they are for each season) and then in the next sections. He might have to remember the names and positions of more than 100 stars! He also learns star paths – the order of stars to follow to reach an island. Stories about gods or heroes help him to remember.

Stone Canoe

In Kiribati, stones are arranged into a canoe shape to teach about the stars and ocean *swells*. To learn the star positions for his island, the student sits on a large rock – as if he is sitting in his canoe. When he learns about swells, the large stone represents his island. The smaller stones represent the wave patterns where the different swells meet.

Figure 1: Diagram based on the diagram which appears in We, the Navigators: The Ancient Art of Landfinding in the Pacific by D. Lewis, 1994, pg 229.

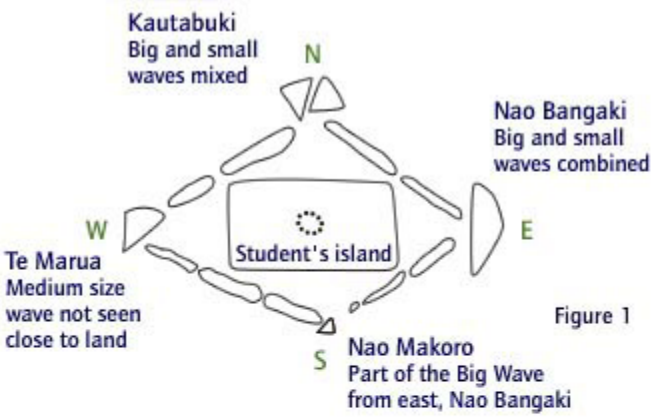


Figure 1

An instructional stone canoe, Beru, Gilbert Islands.

1.3 Marshall Islands Ways

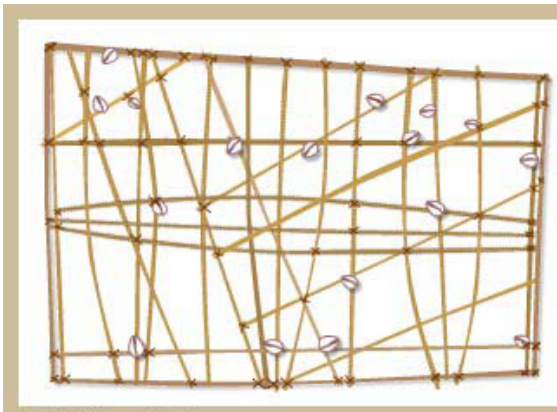
Stick Charts

The Marshall Islands chain stretches along the face of the predominant *swell*. This makes the swell very useful for navigation. Teachers make young navigators lie on their backs in the ocean to learn how to feel the swell. For teaching the main patterns, the Marshall Islanders tie sticks together. They attach shells to indicate islands.

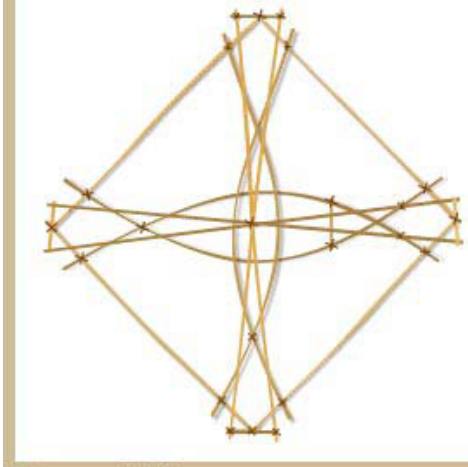
• The mattang is a *sophisticated* model used to teach students how swells bounce off islands and affect one another.
• The rebbellith and meddo are navigational charts that show how to get from one island to another by following the swell patterns. A return voyage has a different chart. The rebbellith covers the Radak or Ralik island chains or both. The meddo focuses on a smaller group of islands.

It would be embarrassing for a navigator to carry a chart with him on a voyage because he should already know what it shows. In the past, only a few people were taught how to make the stick charts.

Note: The above information is from research done over a hundred years ago by Captain Winkler of the German navy. It has yet to be confirmed by the few remaining people who know about stick charts. Other researchers talk of a wabebe chart (instead of a mattang), which they say shows the swells around a single island.



Rebbellith stick chart



Mattang stick chart

2 Initiation and Rank

On Satawal and other Carolinian islands in the past, boys went through a pwo (initiation ceremony for navigators) to become palu (initiated navigators). The Catholic Church stopped the pwo ceremony 50 years ago. This is now changing and some parts of the ceremony are once again being performed.

The pwo lasts about four days, but training goes on for many months afterwards. During the pwo, the boys stay in the canoe house and have no contact with women. They are taught secret knowledge about navigation and learn their role as navigators. After, there's a big ceremony with dancing and singing. The women prepare the food for the men separately. They oil the palu and paint him with yellow turmeric, which has spiritual properties. The families of the palu give tur (valuable weavings) to the teacher. The teacher then takes a student on his first voyage to a distant island. If the student succeeds, he can do longer voyages. He is no longer mesag (afraid).

Palu are the lowest *rank* of navigators. Reb (master navigators) are the most wise, skilled, and respected navigators. Only one man on an island is given the rank of most senior navigator. He has a special hand tattoo, sometimes showing star paths.

Video 1 – Kenneth Urumolug's pwo ceremony

In June 2002, a shortened version of the pwo ceremony to initiate navigators is performed on Satawal for the first time in over 50 years, as part of celebrations for Kenneth Urumolug's ordination as a Jesuit priest. Kenneth is prepared for the pwo by the women of his family, and Mau Piailug, master navigator, conducts the initiation. He confers spiritual power while attaching a coconut leaf bracelet to Kenneth's wrist.

From Becoming a Navigator, Becoming a Priest © UNESCO 2004. A film by J. Blumberg, R. Hunter-Anderson, R. Apusa, and B. Feinberg.

Video 2 - Satawalese navigator Lewis Repwanglug

I was 18 when I was initiated in the pwo.
Interviewer: 18? So he'd been sailing for 4 years before he did the pwo. And was it here in Satawal?
Translator: Yes.
Lewis: I'm like Roy Rogers, the straight-shooting cowboy in the movies. I could hit any island!
Translator: He says that's why he really, you know, like he really concentrates on where he's going to go. His first trip to Pikelot was only one time and he reached the island, so he's never scared to go to Puluwat, to anywhere.

Video 3 - Satawalese navigator Jerome Rakilur

The first time I sailed, I travelled to Pik on the canoe named White Horse that belonged to Weneito. Five men were on my canoe. When I was learning navigation, I still remember that they told me, "If you go on a canoe, you will not be afraid. You have to be strong, not afraid. If you are sailing for the first time, you will not be scared any more once you see the island." So the first time we went to Pik, I was very mesag (afraid) because I might die in the ocean. I was also afraid for my crew of five - that they will get angry with me. That was my first time sailing. After that I was not scared any more. I travelled many times ... going to Pikelot, going to Lamotrek. My uncles had told me that if I reached the nearest island, my fear would be gone. After that I wanted to sail to distant islands, because I felt that I could do it. I felt that I could sail to Woleai and Pulowat and could not be scared.

3 Role of the Navigator

Ua fili e le tai se agavaa … the sea tests the quality of a sailor.
Samoan saying

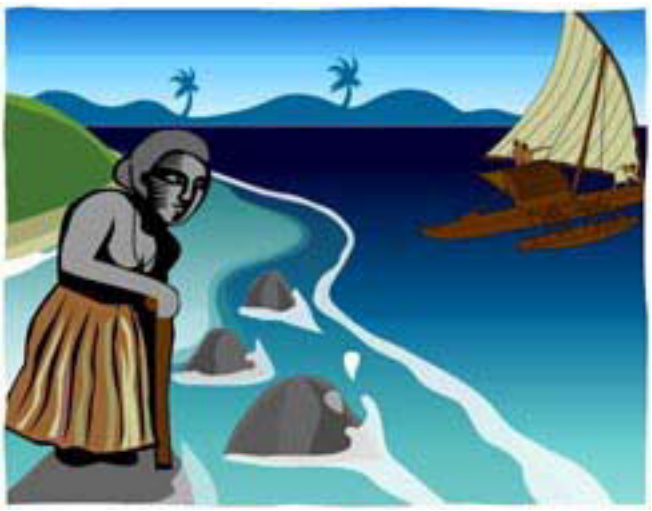
In Pacific communities, navigators are highly respected – not only for their practical skills but also for their wisdom. A navigator has to know huge amounts of information about the environment. Having access to navigational knowledge is an honour, and a navigator has a responsibility to use, protect, and pass on that knowledge in a way that best serves the community. He also has to live by the highest values — like modesty, respect, and patience. He is seen as the father of his crew and must protect them from danger. He is considered a wise leader, both on and off the canoe.

When navigators and their crews are away, the community sings to keep them safe and to be close to them.

Video 1 - Lourdes Lepanemai and Josefa Napiailug sing about Satawalese navigators at sea

The women of Peinripinong are sad and tired because we haven't seen them, those boys from our place. When they have a meeting at the mesan eraw (men's house), we get mad at our ancestors who taught them how to sail! They are not with us now. We wish the ancestors could see their sons now … surround them and smell the good smell of their mwarmwar (flower headdresses) … the men under the sun, under the rain. I don't want them to spend two weeks on the ocean!

Story 1 - The Wise Navigator (Yap, Micronesia)



A navigator from Yap taught navigation to his sons, Rongolap and Rongoschig. One day, Rongolap (the oldest) asked if he could journey to another island. His father agreed and gave Rongolap some advice. He said, "After you leave, you will see an old woman on the reef. You must stop and give her food. Then four rocks will appear. Your crew should sit at the first, stand up at the second, remove their hats at the third, and replace them at the fourth."

Rongolap chose young men for his crew. After they set sail, they saw the old woman on the reef. But they didn't stop! At the rocks, they mixed up all the instructions. After some time, they reached an island. The people there were really ghosts. They offered to clean the canoe. Then they took Rongolap and his men to two pools – one clean and one muddy. The men washed in the clean pool and then fell asleep. While they were sleeping, the ghosts ate them all!

When Rongolap didn't return, Rongoschig decided to look for him. Unlike Rongolap, Rongoschig chose older men for his crew and followed all his father's advice. When he arrived at the island, he didn't let the ghosts clean the canoe. The crew bathed in the muddy pool and felt strong again. The ghosts waited for them to fall asleep, but they stayed awake all night … and the next day, Rongoschig and his men sailed safely home.

Story 2 - The Rat Navigator (Vanuatu, Melanesia)

In the islands of Vanuatu, a group of seabirds decided to build a canoe. They chose a breadfruit tree and asked the spirits for permission to cut it down. But when the tree was on the ground, the birds couldn't move it. So, instead they chose a giant taro and hollowed it with their beaks. There – a beautiful canoe! But they still needed a navigator. A rat came along and said "Stop everything. I will be navigator of this canoe!" The birds thought him unfair – but when the rat starting biting at the canoe, they agreed.

The rat was a bad navigator and argued with the birds. "You stupid birds, you don't even have arms! I'm better without a crew!" He tried to bite one of them. At this, the kingfisher got angry and stuck his beak into the canoe. Water rushed in, and the canoe began to sink. The birds flew into the sky, but the rat fell into the sea. The birds didn't care. He deserved to drown!

The rat couldn't swim. An octopus came by, and he asked for a ride. The rat's claws hurt her skin, but she took him anyway. When they got to land, the rat began to laugh. "Thanks for the ride. Now get your ugly face back in the water where it belongs!" he said. The octopus was so angry that she picked up a stick and hit the rat as hard as she could. One end stuck in his back. The rat threw ashes on the octopus. And that is why the rat now has a long tail and the octopus has black marks on her head.

4 Role of Women

Old stories tell of the special role of women in navigation. A Micronesian story tells how the kuling bird (sandpiper) gave the knowledge of navigation to the people of Pulap by teaching the chief's daughter. A story from the Marshall Islands tells how Liktanur passed on the knowledge of sails to her sons.

In Satawal, girls used to be trained as navigators, but now it's mostly a male activity. However, girls whose fathers are navigators still learn many things. This way, they can help to guide a canoe if a navigator becomes confused. It's like a safety net.

Women prepare the food for navigation *rituals* and voyages. Another important *contribution* is their weaving. In the past, women wove not only pandanus canoe sails but also special tur (valuable weavings). Carolinians carried valuable tur to their relations in Yap on sawei voyages (a traditional ceremonial voyage in Micronesia).

In Carolinian pwo (initiation ceremony for navigators), hundreds of tur were given to the reb (master navigator) who taught young navigators. A community that didn't have a canoe builder could use tur to buy a canoe from another island.

Video 1 - Satawalese Lourdes Lepanemai talks about the story of her ancestor Ukura, who helped to navigate

Ukura went on a canoe trip with her father, Suk. Coming home from Saipan to Satawal, Suk lost his way. They were drifting until they saw the white-tailed seabird also called Suk.* The crew all wondered where the bird had come from. Ukura called out, "Father, why do you say you don't know where that bird is coming from? You told me that Suk lives north of Fais, under the star of Weno!" So they turned the canoe to where the bird came from and sailed until they saw Fais.

*Many Carolinians have names that relate to navigation, like in this story.

Video 2 - Satawalese Rosemary Lafilmal Apusa

I still remember when I was a little girl. Sometimes, I looked in the sky with my grandma, Lepalmai, and she said the names of the stars. I asked her to teach me because I wanted to learn. But I didn't really care to remember. So now, I want to learn again for when the old people leave us. We just go to school, but we don't care about our custom any more.

Video 3 - Carmen Piailug weaves on Satawal

Carmen Piailug (Mau Piailug's oldest daughter) weaves on Satawal. Modern tur are made from cotton. Traditional tur are made from banana and hibiscus fibres (strings). Weaving a tur takes a long time. This makes them very valuable. Girls start learning to weave before they finish primary school.

Video 4 - Mau Piailug removes each tur and calls out the star path

In June 2002, a shortened version of the pwo ceremony to initiate navigators is performed on Satawal for the first time in over fifty years, as part of celebrations for Kenneth Urumolug's ordination as a Jesuit priest. During the ceremony, Mau Piailug, master navigator, removes the tur one by one as he calls out star paths. It is the women who weave these tur on their looms for special occasions such as this. They use fibres from the bark of the banana tree, a very challenging material to work with. Below the stack of tur is a bowl filled with pounded breadfruit or taro, also prepared by the women.


Hawaiian Islands
North Pacific Ocean
MICRONESIA
Northern Mariana Islands
Guam
Federated States of Micronesia
Yap
Palau
Marshall Islands
Bismarck Archipelago
Papua New Guinea
Nauru
Solomon Islands
Louisiade Archipelago
Reef and Santa Cruz Islands
MELANESIA
Vanuatu
New Caledonia
Fiji
Gilbert Islands
Kiribati
Phoenix Islands
Tuvalu
Wallis and Futuna
Tokelau
Samoa
American Samoa
Niue
Tonga
Line Islands
POLYNESIA
Society Islands
Cook Islands
Rarotonga
Tahiti
French Polynesia
Marquesas Islands
Tuamotu Archipelago
Gambier Archipelago
Austral Archipelago
Pitcairn Islands
Easter Island
South Pacific Ocean
Kermadec Islands
Norfolk Island
Chatham Islands
New Zealand
Australia

The Canoe Is the People

Indigenous Navigation in the Pacific

NAVIGATING

United Nations
Educational, Scientific and
Cultural Organization

LiNKS
Local and Indigenous
Knowledge Systems

Navigating

Before setting out, a navigator and his community have to prepare well for a journey. Once at sea, the navigator has to bring together all his knowledge about the stars, sea, sun, and wind to keep the canoe on course and safely find land. At all times, he must know his canoe's position in relation to his home and destination and adjust his course if necessary. To do this, he must stay awake for long periods – sometimes all day and night. Otherwise, he might miss important information, like a star sighting or wind change.

But navigating isn't just practical – it's spiritual as well. It is said that you can tell a navigator because of his red eyes – a sign that he's spiritually blessed, not so much that he's had no sleep! In the Caroline Islands, a navigator carries a *charm*[*] made of wood and stingray spines to protect the voyage. In the Louisiade Archipelago, he places plants like coconut leaves on the canoe to show his authority and keep spirits away. In Kiribati (Gilbert, Phoenix, and Line Islands), he might perform a *chant* to keep away dangers like bad weather.

Ruberubei-te-nang, nkoe!
Me na baka, me na maototo i maiaki-ni wa-u ni boborau ikai!

Tremble-the-cloud, you!
So it falls, so it breaks to the south of my voyaging canoe!

Adapted from Grimble, A. (1972).

Video 1 - Cook Islands navigator Tua Pittman

A lot of things that we do on the canoe are things that we're not able to explain. There are things that are more spiritual than physical or mental, and they're a very big part of voyaging as well. You can be very physical, you can be the strongest guy on the canoe, but if you don't have that spiritual feeling as well, you don't have the whole package.

[*] NOTE: Definition of words in *italics* can be found in the Glossary in the CD-ROM Storehouse.

Video 2 - Satawalese navigator Mau Piailug

I use different things at different times. I use the wind and weather. I watch the shape and colour of the clouds. I look for yellow, red, or blue to know when it will storm or rain or blow.

From The Last Navigator © INCA 1989. Directed by Andre Singer.

Video 3 - Satawalese navigator Jerome Rakilur

The first time I returned from college, my uncle taught me "the key of sailing", what we call akurigiy. This means every aspect of sailing including all about the canoe, how it is built, how to handle it, the stars, winds, currents, and directions. Everything ... nothing is hidden. A navigator has to know where the wind is coming from, what is behind you when you leave the island, and he has to know to what destination he is travelling. When my uncle knew that I had learned everything that I needed to know, he then asked me to try sailing.

Video 4 - Maori master canoe builder, Hekenukumai Busby (New Zealand)

We went to the Marquesas. In Nuku Hiva we prepared for the BIG voyage, which was to be 2300 miles (3700 km). We had two trainee navigators who would get the canoe to Hawaii from Nuku Hiva. The University of Hawaii electronically recorded our course. Later, the data showed Te Aurere to be the closest canoe to the sail plan submitted before the voyage. I was proud of our trainee navigators.

1 Preparing and Starting Out

Throughout the Pacific, a canoe is thought of as the mother of the crew and the navigator as their father. Before leaving, the navigator must make sure that:

- the canoe is working well
- there is enough food and water
- the time to go is right.

Lots of people in the community help with these preparations.

The navigator knows many sea paths. In the days before a voyage, he goes over the one he will follow. He knows each star on the path, what weather he might find, and *alternative* routes to take if currents or winds push his canoe off course.

In many parts of the Pacific, like Satawal, the navigator has to follow *taboos* before trips, like avoiding sexual contact or only eating food made especially for him. He also performs certain *rituals* to protect the canoe from dangers. Some navigators are said to have spiritual powers to control natural forces like the weather.

Video 1 - Maori master canoe builder, Hekenukumai Busby (New Zealand)

While we were preparing for the 1995 Voyage of Rediscovery, Te Aurere was invited to sail to Raiatea to remove an ancient curse placed on a marae, centuries ago by one of our ancestors. Re-establishing connections is important and removing the curse of our ancestors would be a way forward leaving past deeds behind. Our elder Te Ao Peehi led the ceremony. I will never forget that day because it felt as if we were surrounded by all our ancestors.

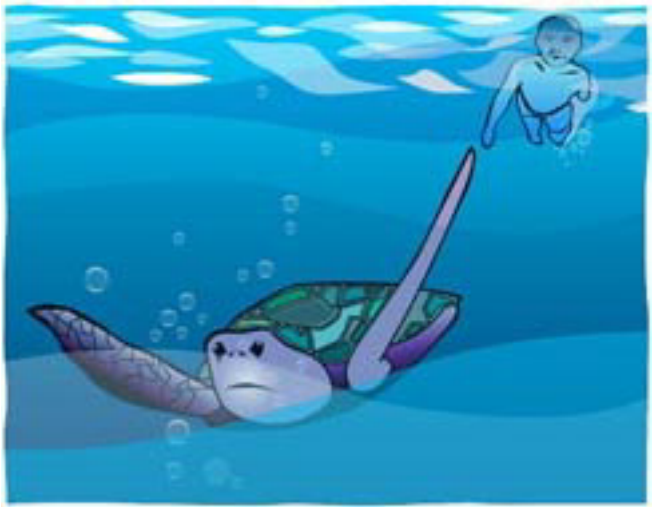
Video 2 - Satawalese navigator Mau Piailug prepares his crew and visits his father's grave before a voyage

I sit here because … What do you call this? Grave. Yeah, this grave is for my father. He taught me about navigation. That's why … when I sail from here to Saipan or anywhere. Because I learned from him.

From The Last Navigator © INCA 1989. Directed by Andre Singer.

Video 3 - A spiritual cleansing ceremony takes place in the Cook Islands

Story 1 - Turtle and Canoe: The Importance of Preparation (Palau, Micronesia)



Eledui from Ngerdemai wanted to be the best hunter of all. He wanted to catch the Great Turtle – the Old One. Then people would tell stories about his great strength! "The old men waste time waiting for a sign. Begin the hunt now, I say!"

On a night with no moon or stars, he started out. He forgot to look for storms or strong currents. But when a small tern cried out at him, he stopped paddling. He started to laugh, but then the bird disappeared. Did he just imagine it? Now he remembered – he had forgotten to greet the spirits, the providers of safety. These spirits often changed into birds with warnings. So Eledui gave thanks and asked to be forgiven for his hurry. He threw water on the front of the canoe and then paddled to the outer reef.

There, he saw the Old One! He threw his spear and hit him. Eledui dived in. He must stop the turtle from diving deeper. But he forgot to anchor his canoe. It was caught in a current and moving towards the ocean! He must swim now to save it … but he didn't want to lose the turtle. He decided to use the turtle to pull him to his canoe. Waves splashed, and Eledui's strength was nearly gone. The sea was red with the blood of both of them. Then the turtle dived down hard, and Eledui lost his hold. "No, no!" he screamed. But only the waves heard him.

1.1 Canoe

Before starting out, the canoe must be in good working order. It also needs extra equipment for emergencies – for example, wood (to replace broken masts), pandanus sails, ropes, and paddles, as well as breadfruit sap and burned lime to fill small leaks … not forgetting pandanus hats to protect from the sun and rain! Everything adds weight and slows the canoe down, so only necessary items are taken. The equipment is stored well to keep the canoe balanced. Extra parts are tied to the hull. If the canoe turns over in a storm, these parts won't be lost. Navigators and crew know how to fix the canoe with these parts when travelling.

Big canoes are needed for long voyages. On Satawalese outrigger canoes, there is an epep (lee platform) with a little aimweim (house) on top to keep passengers and things dry. In Hawaii and other Polynesian islands, double-hulled voyaging canoes have an even bigger platform between the hulls to carry people, animals, food, and extra parts.

Video 1 - Satawalese navigator Jerome Rakilur

After I learned about the stars, I also learned pwang – canoe repair at sea. This is important to know for when my canoe breaks. Then I can do the repairs and make it back to the island.

Video 2 - Satawalese navigator Lewis Repwanglug

He said they can work in the sea. Let's say the typhoon destroys their canoe, they have to go down and get the part if it's still there. They have to tie it. They take extra rope with them so they can use it … so they can swim around to fix the canoe. OK, this is the magic. He also mentioned that he can also do this magic or whatever to calm down the wind and the waves.

1.2 Food

Depending on what is found locally, food for a journey can include:

- breadfruit, taro, and pandanus (cooked, dried, grated, and so on)
- ripe coconuts for eating and young green ones for drinking
- fish (cooked or dried)
- sugar cane.

In the past, special foods were sometimes prepared as gifts for islands being visited – for example, coconut candy balls for the Yapese on the old sawei voyages (a traditional ceremonial voyage in Micronesia).

On Satawal, women keep the gardens and prepare all the food, not only for voyages but also other events, like canoe building and the pwo (initiation ceremony for navigators). They prepare taro year round. They cook in earth ovens or over open fires at home. They also prepare breadfruit when it's in season. Teenage boys climb the breadfruit trees owned by their relatives and throw the big fruits down. The women may preserve the breadfruit in the ground for use on later voyages. They wrap the food in leaves to keep it dry and clean.

At sea, the crew also collect rainwater and catch birds and fish. They sometimes cook on fires of coconut *husks* inside wooden bowls lined with sand and small stones.

Video 1 - Cook Islander Dorice Reid
They learned how to preserve breadfruit – how to put it into the ground so it was like being refrigerated underground, that when they were ready to voyage, they could take it. It was called mahi in those days, and the breadfruit would also be preserved and last such a long time.

Video 2 - Satawalese women collect and replant taro and prepare breadfruit in an earth oven.

Video 3 - Satawalese girls cook fish over a fire.

Video 4 - Young Satawalese boys collect fish for the women to cook.

1.3 When to Go

The navigator needs to choose the right season, weather, and time of day to depart. The success of a voyage often depends on these things. All Pacific societies had complex calendars based not only on astronomical observations, but also things like weather patterns and seasonal variations in the local flora.

In Woleai and other Carolinian Islands, the departure time may also be affected by bwe - knot *divination*. To tell the fortune of a canoe voyage, a trained diviner ties knots *randomly* in coconut frond leaves and then counts them. Different knot combinations represent the different spirits who ride the canoe of destiny. Readings tell things like whether the canoe and voyagers will travel safely and whether the community will be happy with their return. If the readings are bad, the voyage may be delayed [See figure 1].

Figure 1

Season

There are good and bad seasons for sailing. For example, in the Carolines and Kiribati, the voyaging skies are from March to September. Navigators know the seasons from the phases of the moon and the way certain stars rise and set at dawn and dusk. Stars rise and set at different times during the year, and sometimes they can't be seen at night. This means that the star path to an island changes with the seasons.

Weather

Navigators know the weather conditions of the sailing seasons in their region. In the South Pacific, trade winds blow from the south-east most of the year. But from December to March, distant storms sometimes make the wind blow from the west. Navigators use this wind to travel east. They know that the trade winds will soon return to blow them home [See figure 2].

A navigator might wait weeks for the right winds. He studies the natural signs carefully. The shape and colour of clouds can give clues about wind strength or direction, and animal behaviour can indicate bad weather. For example, when frigate birds suddenly return to the shores of Rarotonga, bad weather is on the way. If lots of ants come out in Kiribati, good weather is coming. Sometimes, the navigator or a weather expert performs *rituals* to bring good weather.

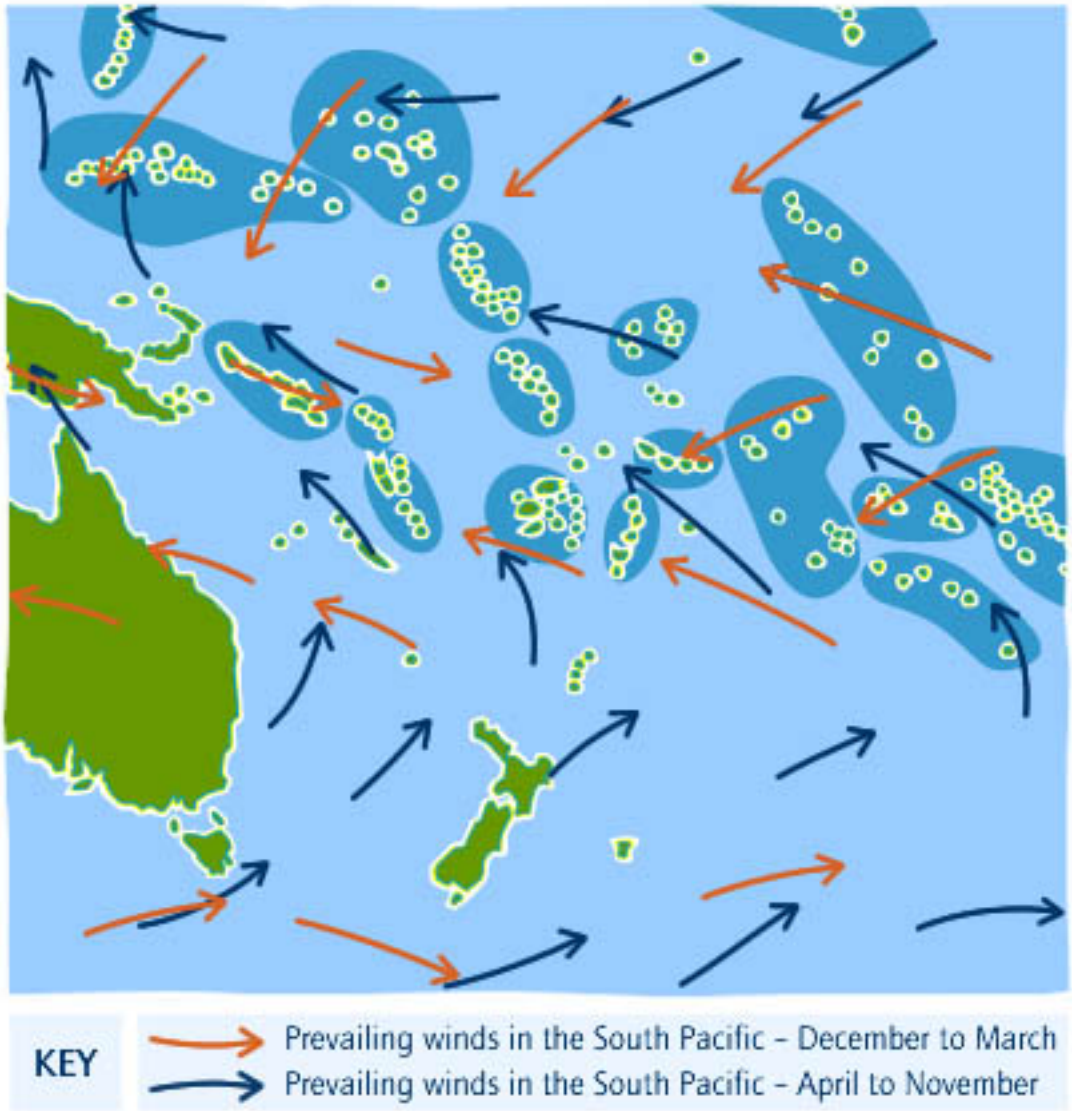


Figure 2

Time of Day

The time of day to leave depends on the journey:

• Voyages might be timed to arrive at an island at dawn or dusk. This is when birds fly to or from their homes. The birds are good signs of land.

• To allow for farewells and food preparation, long voyages don't depart too early.

• Leaving in the late afternoon allows navigators to take their position from stars as the land fades from view. At noon, the sun is high, which isn't good for navigating.

Video 1 - Piailug interprets the shape and colour of the clouds

We spend two days here [in West Fayu]. Piailug interprets the shape and colour of the clouds at sunrise and sunset to forecast the weather. The wind is blowing north-east – a bad direction for us. It will make for wet, rough sailing [to Saipan].

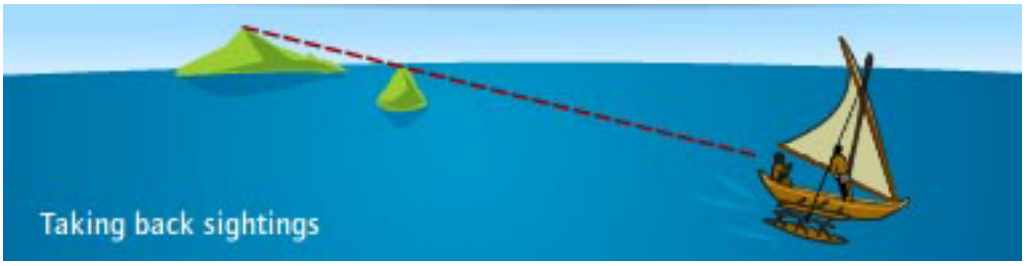
From The Last Navigator © INCA 1989. Directed by Andre Singer.

Video 2 - Satawalese navigator Lewis Repwanglug performs a weather chant

Calling spirits Uturenga, Rapwi, come down to drink all the rain water on Satawal so it will dry up. The rain stops. The land is totally dry.

1.4 Setting Out

For most important paths to other islands, there is a particular place to leave from. The navigator knows how his island should look as he starts out from this place. He lines up points on his canoe with points on the land, like mountains, rocks, or trees. If he starts out at night, fires are lit on land to guide him. Keeping the points in line sets the canoe on the right course. In English, this practice is called taking back sightings. It is especially useful if the stars or sun can't be seen. If the canoe moves sideways in relation to the points on land, the navigator knows that a *current* is affecting his canoe's position. He can then adjust his course.



When launching a canoe, navigators perform special *rituals* and *chants*, like the one below from the Tuamotu Islands. These are often about protecting the canoe on the voyage.

Ringiringi te horo o tena vaka!
Ko nei au hiri ka.
Ko tena ko te piu …

Bursting in spray sped that canoe!
I sat there amazed.
The sea swelled around me …

From Emory, K. P. (1969).

Video 1 - Satawalese navigator Mau Piailug and his crew celebrate before voyaging.

From The Last Navigator © INCA 1989. Directed by Andre Singer.

Video 2 - A Satawalese man chants before a voyage

I sit and I sit on the beach near my village. And I will set sail. We will sail down west. We will hold that course, and we will finish our voyage as men.

From The Last Navigator © INCA 1989. Directed by Andre Singer.

Video 3 - Canoe launch

A canoe is launched for a voyage from Satawal to Saipan, and Mau Piailug performs a chant.

From The Last Navigator © INCA 1989. Directed by Andre Singer.

2 Steering by the Stars

Nga tangata i wheturangitia … our ancestors, the people who have become stars.

Maori saying

The stars are usually a navigator's main guide. With learning and experience, he comes to know the night sky so well that he can steer accurately when only one or two stars can be seen. A navigator knows the exact positions and times that particular stars rise and set around the *horizon*. Westerners talk about the star compass to describe how navigators in different islands visualise star positions in this way. In Satawal, the rising and setting stars are called ururun mor.

A navigator also knows the star paths – the ururun mor to follow from one island to another. In Satawal, this knowledge is called ofanuw and is repeated in long *chants*. He also knows the zenith stars, which pass directly above particular islands.

Video 1 - Satawalese navigator Jerome Rakilur

The first thing I learned from my uncle was the names of the stars, paafu. The same person also taught me areuum and amaas. Amaas is knowing the star in front of the canoe and the star behind it. Areuum is knowing the stars in front and behind the tam (outrigger). Ofanuw is the knowledge about stars associated with an island destination. Then I started learning ururun mor – when each star rises and sets. If I just know how to sail but I don't know when each star will rise, I will die in the ocean.

2.1 Star Compass

Hawaiian navigator Keahi Omai (taught by Nainoa Thompson): “We use Papa Tom’s [Sir Tom Davis’] houses. Houses are divided into 32 portions in the sky where the stars live. I think of them as stars living in a house, just like people living in a house.”

From Bader, H. and McCurdy, P., eds (1999).

Stars move across the sky from east to west. Each night, they rise and set a few minutes earlier than the night before. Near the equator, each star rises from the same point on the *horizon* in the east and sets at the same point in the west.

The Carolinians divide the horizon into 32 points where specific stars rise and set. The Polynesian Te Ngapore o te Ao (Directions Around the World) also has 32 points. People from other places, like Indonesia, use similar models. Each star point, or paafu in Satawalese, has a name. It also has a pair. For example, the star x rising is paired with the star x setting. A navigator learns each pair as well as the pair of stars that rise and set at right angles to it. This way, he can steer by lining up rising and setting stars with the front, side, or back of his canoe.

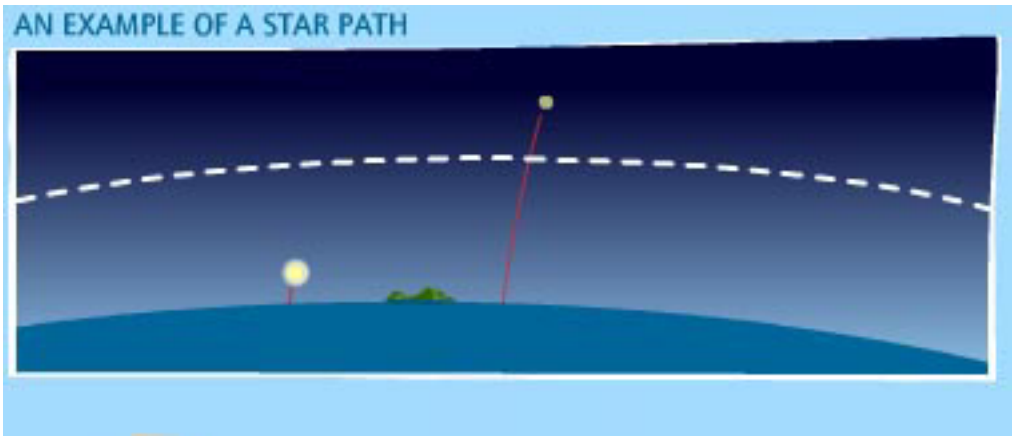
When no stars are visible (in the day or on a cloudy night), a navigator can still use the star compass to steer because he knows the direction of the *swell* and the wind in relation to it.

Figure 1. Diagram based on the diagram which appears in "Cartography in the Traditional African, American, Arctic, Australian and Pacific Societies." Edited by David Woodward and G. Malcolm Lewis, 1998, pg 462.

Carolinian Star Compass
Figure 1
Carolinian
Fuesemagut
Tana Mun
Tana Mailap
Tana Tumur
Wuliwulilup
Tubula Mun
Tubula Mailap
Tubula Tumur
The Carolinian navigators used pieces of coral to represent the 32 compass points, and bundles of coconut leaves to represent the 8 swell directions.
Carolinian Star Compass
Figure 1
English
Polaris
Rising Vega
Rising Altair
Rising Antares
Southern Cross Upright
Setting Antares
Setting Altair
Setting Vega
The Carolinian navigators used pieces of coral to represent the 32 compass points, and bundles of coconut leaves to represent the 8 swell directions.

2.2 Star Path

A star that is just rising or setting is a very good guide. A navigator steers towards the star that rises or sets in the direction of the destination island. A rising star, however, doesn't go straight up from the *horizon* (unless you are at the equator). It moves to the side of the island and soon is no longer a good guide. A navigator then uses the next star that rises in the same direction, and so on. There might be up to 10 stars in a star path for one night's sailing, but only one might have a name.



Often, songs or stories are used to remember the star paths. A journey between two islands can have more than one star path. Any star path can only be used in a particular season. Six months later, the same stars are only above the horizon in the day and so can't be seen. Different star paths are also used when there are strong currents or winds.

"When we sailed from Puluwat to Saipan [one of the Northern Mariana Islands] … with Hipour's sailing directions … there were three courses: … the direction in which the [island] lay, … the direction to allow for the west-going current, and the third … to allow for strong winds …"

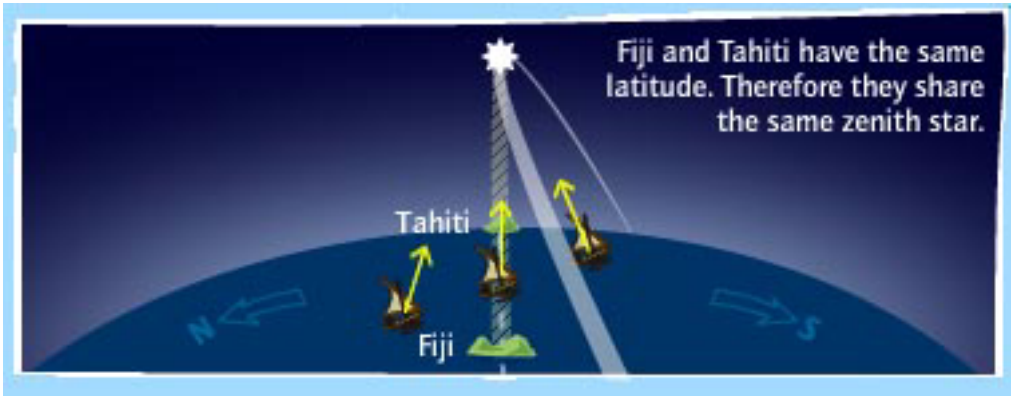
From David Lewis in Bader, H. and McCurdy, P., eds (1999).

Story 1 - Gaiuli and Gaisina (Samoa, Polynesia)

A story tells of the journey of Gaiuli and Gaisina from Tutuila in what is now American Samoa to Manua Islands. First, they headed towards the star Matatula. Then Tapuitea (the evening star) rose, and then Faipa and Tulalupe in the east. Then Toloa (the Southern Cross), Sumu, and Luatagata rose – all close together. Then Taelo rose, and they headed towards it. Then Tiotala, and they headed towards that. When morning approached, Amoga (Orion's Belt) and Lii (Pleiades) rose. They went towards Amoga. When it grew light, they faced Manua exactly.

2.3 Zenith Star

Stars cross the sky from east to west. They are at their zenith when they appear to reach their highest point. Certain stars are known to pass directly above specific islands when they are at their zenith. These stars are called zenith stars. Hokulea (Arcturus) is a zenith star for Hawaii Island. Aa (Sirius) is a zenith star for Tahiti and Fiji. When a navigator sights up his mast and sees Sirius directly overhead, he knows that he is at the same latitude as Fiji and Tahiti. The zenith star cannot tell him, however, how far he may be to the east or west of these islands.



Some people believe that in the past navigators memorised the zenith stars of different islands as well as the time distances between them. For example, on a voyage from Tahiti to Hawaii, a navigator knew that he was level with Nuku Hiva (Te Henua Enana (Marquesas Islands)) in the east when he was under the star Mataatau (Rigel).

Zenith stars can be useful for finding land. On north-south journeys, a navigator can sail upwind of the destination island until its zenith star is right above him. (That is, if the wind is coming from the east, he sails to the east side of the island.) He then turns *downwind*, keeping the zenith star above him. He sails along this east-west path until he finds land. Sometimes he *zigzags* to increase his finding range.

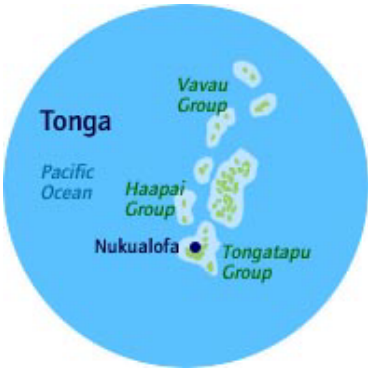
Anthropologist Ben Finney: "On the first voyage of Hokulea to Tahiti in 1976, David Lewis and I used Spica (the zenith star for Te Henua Enana (Marquesas Islands)) to tell when we were opposite that archipelago (group of islands). We sighted up the after mast until Spica was framed by the masthead. We couldn't use Aa (Sirius), the zenith star for Tahiti, because it wasn't visible at the time."

3 Steering by the Sea, Sun, and Wind

When sailing, a navigator notices every clue in the environment and doesn't take chances. When the stars can't be seen (in the day or on cloudy nights), he uses other signs to guide him – the sea *swells*, sea marks, the sun, and the wind. He visualises these signs in relation to the star positions.

He uses all of his knowledge in an *integrated* way. This is the great art of navigation.

Story 1 - Tuita's Finger (Tonga, Polynesia)



Once, the old Tongan navigator Tuita (from the Haa Fokololo oe Hau navigator tribe) was voyaging in his kalia (double hull) with the King's fleet (group of canoes). When the fleet got lost, the King wanted to know where they were. Tuita was old and blind, so he asked his son to tell him what he couldn't see. Then he put his finger in the sea and tasted the water. He told the King that the water tasted of Fiji … and soon after, the fleet arrived there! The matapule (talking chiefs) of the Tuita tribe are named after this story – fafa ki taha: to touch the sea.

3.1 Swells

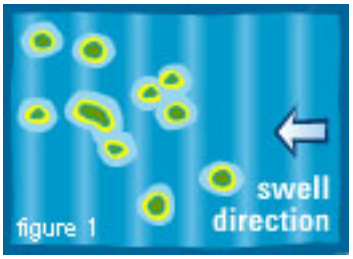
"I have heard from several sources that the most sensitive balance [to feel the swells] was a man's *testicles*…"

From Captain Ward in Lewis, D. (1972).

Unlike stars, which sometimes can't be seen, *swells* are always there and keep their direction for many days. This makes them very useful for navigation. A navigator relates their direction to the star positions. To learn about swells his teacher lies him on his back in the sea so he can feel them. He can't depend on sight at night or when visibility is bad.

The navigator knows how his canoe should move on the swell if it's heading in the right direction. For example, if its course is straight into a swell, the hull goes up when the swell meets it and down when the swell passes under it. If the canoe goes off course, it starts to roll. The point where the swell meets the hull changes too, and the navigator can see and feel this. He notices the shape of the swell to tell the direction and strength of the *current* underneath. Currents can affect his canoe's course and speed.

In the Marshall Islands, swells, currents, and winds are used more than stars for navigation. There, the two parallel chains of the Marshall Islands stretch across the face of the main swell, making it very reliable [See figure 1].



"With Tevake, in Santa Cruz … we had three wave patterns running … it started to rain, and the wind started to shift. Tevake stood … feeling this very faint lift of the swell coming … from the north-east, and he steered by that for 8 hours, standing sopping wet in his lavalava … So this is navigating by the swells, by feel …"

From David Lewis in Bader, H. and McCurdy, P., eds (1999).

What Causes Swells?

Swells are caused by big winds many kilometres away. They feel different from local waves, which are caused by local winds. Usually, local waves are shorter and *steeper*, and they break at the top. Swells are wider apart and have a rolling motion. Even when two or three swells are mixed with local waves, a navigator can separate them and use them to steer. He also knows which swells are most reliable.

Marshall Islands Navigation

Marshallese navigators have studied how waves *diffract* around and *reflect* off islands and then interfere with one another. They show how this happens in mattang stick charts, and they represent the wave patterns around specific islands in rebbellith and meddo stick charts. These charts are used for teaching. The Marshallese have many words to describe the currents too – for example, jukae (first area of currents – nearest an island), dibukae (second area of currents), and jejelatae (third area of currents – furthest from the island).

Interrupted swells are especially useful for finding land. Marshallese navigators have a highly developed system of knowledge about this.

Video 1 - Satawalese navigator Mau Piailug talks to his crew about the swells

Piailug first learned them as part of his grandfather's crew. The old man showed Mau how to read the swells. There are eight distinct swells. Each one is connected to a specific position of a star on the star compass. But swells tell more than what course you're on. If you can read their shapes, you can know the strength and direction of the current running beneath them. If you don't know what the current's doing, you can steer a perfect course and still become lost.

From The Last Navigator © INCA 1989. Directed by Andre Singer.

Video 2 - Satawalese Lourdes Lepanemai

The first time I sailed on a canoe, I was very sick – mumus. I didn't want to eat anything. I almost died of vomiting! I was sick every day!

3.2 Sea Marks

A navigator also relies on sea marks located in specific places to find his way. He might not take the shortest path to an island if this means that he can check his course from such sea marks. He learns the marks through experience as well as through stories and songs about them.

Reefs may act as sea marks, even those up to 50 m below the surface. The water above a reef has a different colour (light green) from the sea around it (blue). Short, steep waves sometimes form above a reef too. They are caused by a current meeting the reef. If the sea is flat, a navigator can see these waves from some kilometres away. At night, he can feel the canoe move differently over them [See figure 1].

Sea life (like sharks, whales, and dolphins) also act as sea marks for a navigator. Extraordinary animals are often found at the same place along a path, even over centuries. Some are well known to navigators and have been given their own names. They can be as helpful as reefs in guiding the navigator. Some sea life can also be helpful to find land.

Knowledge about sea marks is closely protected. Student navigators *chant* lists of marks that they can look for between an island and each star point. A navigator's wife may sing or tell a story about these sea marks while he is at sea.

Video 1 - Cook Islands navigation student Kaiki Tarangi (Karl)

You say, "Whoever you are, and I know you – that's the other thing, I know you, I trust you – can you hold me in the palm of your hand until I get back from this voyage and help us to get there safely?" And you'd be amazed, mate. So many navigators talk about when they're lost and they're getting nervous, and they just look down to the water and there's a shark, a white shark just swimming right in front, and they go, "That's the direction!"

Video 2 - Cook Islander Dorice Reid, crew member of Te Au o Tonga

Cook Islander Dorice Reid, crew member of Te Au o Tonga on the voyage to Taputapuatea Marae in 1995: We saw the birds, and we saw a whale. And we saw her go down and put her tail up, and she waved her tail just enough to allow us to know that she was there. And I say she because I'm sure the whale was a she. She waved her tail and disappeared. When we got to the mouth of the sacred harbour, the dolphins were there at the entrance. That meant we had permission to sail through that harbour. The priest of the marae said, "If you see the dolphins, that is your permission to go through the harbour." Well, they were there.

Video 3 - Satawalese Lourdes Lepanemai sings the song of Tutu ne Naipa (Shower of Naipa)

Satawalese Lourdes Lepanemai sings the song of Tutu ne Naipa (Shower of Naipa), which names a lot of sea life: The lady called Naipa goes to shower in Powrow on the reef. A wind comes down to her from the south. The men are shouting that a canoe is coming. It is Gamomumonu, who is getting away from his father. He is sailing to the south, under the stars. He sees the shark in its place. The leaf of the nat tree floats out from the beach. Now you are going to drink your nuu (coconut). The asaf (frigate bird) called Tinimwar – one of his hands in the west by Eurpiik and his neck and head by Metau Sarik (the ocean path between Satawal and Pik) … You are going to Pik to get the suum (giant clam) on the reef … for Naosow because she is thirsty and hungry.

3.3 Sun

Steering by day is less accurate than steering by night, when exact points of light can guide the navigator. Also, unlike stars, the sun rises and sets in different places during the year. The sun is really only useful for navigation when it is low in the sky – in the early morning and late afternoon.

Each dawn, a navigator lines up the sun's position with the star positions. During the day, he might also note the sun's angle over parts of the canoe to work out his course. Before the sun sets, he notes where it is. He knows his chosen star path in relation to this position.

3.4 Wind

A navigator can know the wind direction by how it feels on his face. On the canoe, he sits where the wind hits his face directly and where he can see the ocean and *horizon* ahead. Sometimes, he also watches the movement of feathers or pieces of *bark* attached to the sail or ropes. He can sense a change in wind direction by how the boat feels on the waves.

The navigator relates the wind direction to the star positions. However, because the wind often changes, it is not as accurate as the stars. Europeans talk about this technique as the wind compass. In 1876, missionary William Wyatt Gill described the Cook Islands wind compass, which divided the horizon into 32 points. The winds were taught by using a gourd with holes in it.

"At the edge of the horizon are a series of holes, some large and some small, through which Raka, the god of winds, and his children love to blow …"

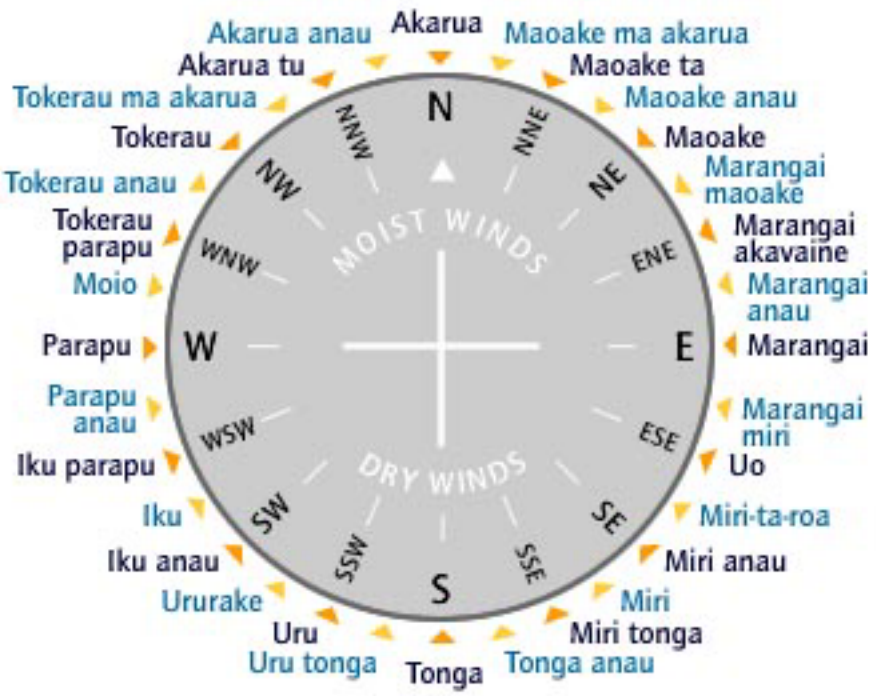
From Lewis, D. (1994).

There are also descriptions of wind compasses (divided into different numbers of points) from other islands, like the Carolines, Fiji, Tonga, Tokelau, and Tahiti. The great navigator and chief Kruso Kaveia once described one from the Santa Cruz (eastern Solomon Islands) outer islands.

"… for two hours, he stood there … and he named each wind. He pointed the direction … whether it was a cold wind, warm wind … and when he would expect them at different times of the year."

From David Lewis in Bader, H. and McCurdy, P., eds (1999).

Wind Compass



Based on the diagram which appears in We, the Navigators: The Ancient Art of Landfinding in the Pacific by D. Lewis, 1994, pg 113.

4 Knowing and Adjusting Position

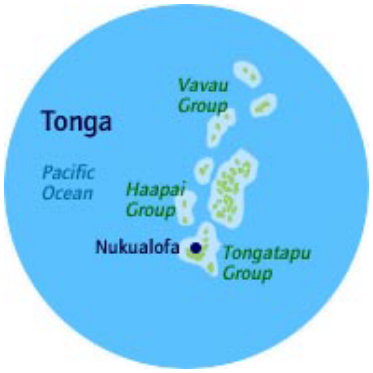
Over many kilometres of ocean, a navigator needs to keep track of his canoe's position in relation to his home and destination so that he can change his course if necessary. To do this, he needs to carefully observe his *heading* and speed. He also needs to know how the *leeway* and *currents* can push him off course and affect his speed.

He puts all this information together to *estimate* his position at any time. There are different ways of doing this.

- Before modern equipment like the *GPS*, western navigators used a way called dead reckoning.
- Pacific navigators use dead reckoning, but they have also developed a very different way to track their position. The best known way is the etak system used in Satawal and other Carolinian islands.

The real test is when a storm blows a navigator's canoe off course for days. When this happens, he must use *intuition* as much as skill and experience to keep track of his position. For emergencies like bad weather, a navigator must always know where other islands are and the paths to them.

Story 1 - The Voyage of Moala Lahi (Tonga, Polynesia)



This story tells how a navigator had to change his path because of bad winds. Akauola was the head navigator from the Haa Fokololo oe Hau tribe in Tonga. Once, one of his kau moala (team of navigators and sailors) called Moala Lahi was sailing home to Vavau from Fiji with a group of kalia (double hulls). The journey was in a north-east direction. The winds became bad, and the canoes were separated, so Moala Lahi turned for Samoa in a north north-east direction. But the winds changed again, so he turned to Uvea (Wallis and Futuna) in a north-west direction, and he arrived there. The Uvean people helped him with his canoe. In return, he gave them what he was carrying. When the winds improved, he sailed back to Fiji for more supplies. Finally, he went on and arrived safely in Vavau.

4.1 Estimating Position

Judging Speed

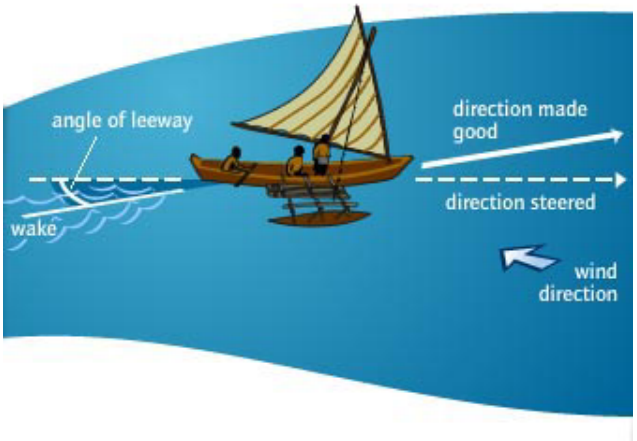
The wind's speed changes all the time, so the canoe's speed changes too. To judge speed, a Pacific navigator watches the spray from the water on the canoe's sides. He also feels the wind on his face and watches how it affects the sails or things hanging from them.

Hawaiian navigator Keahi Omai: "… We measure the bubbles from our front iako [bow] to our rear iako [stern] … if the bubbles travel between the two points within 5 seconds, we are going about 5 knots."

From Bader, H. and McCurdy, P., eds (1999). Note: The way that Keahi talks of knots and seconds shows that this method of measuring speed is influenced by the European system. Today, a lot of practices combine western with traditional ways.

Judging Leeway

When a canoe sails into the wind, the wind pushes it sideways, not just forwards. This is leeway. Because of leeway, there is a difference between the course that the navigator steers and the *course made good*. To judge leeway, Pacific navigators study the angle between the centre of the canoe and the *wake*.



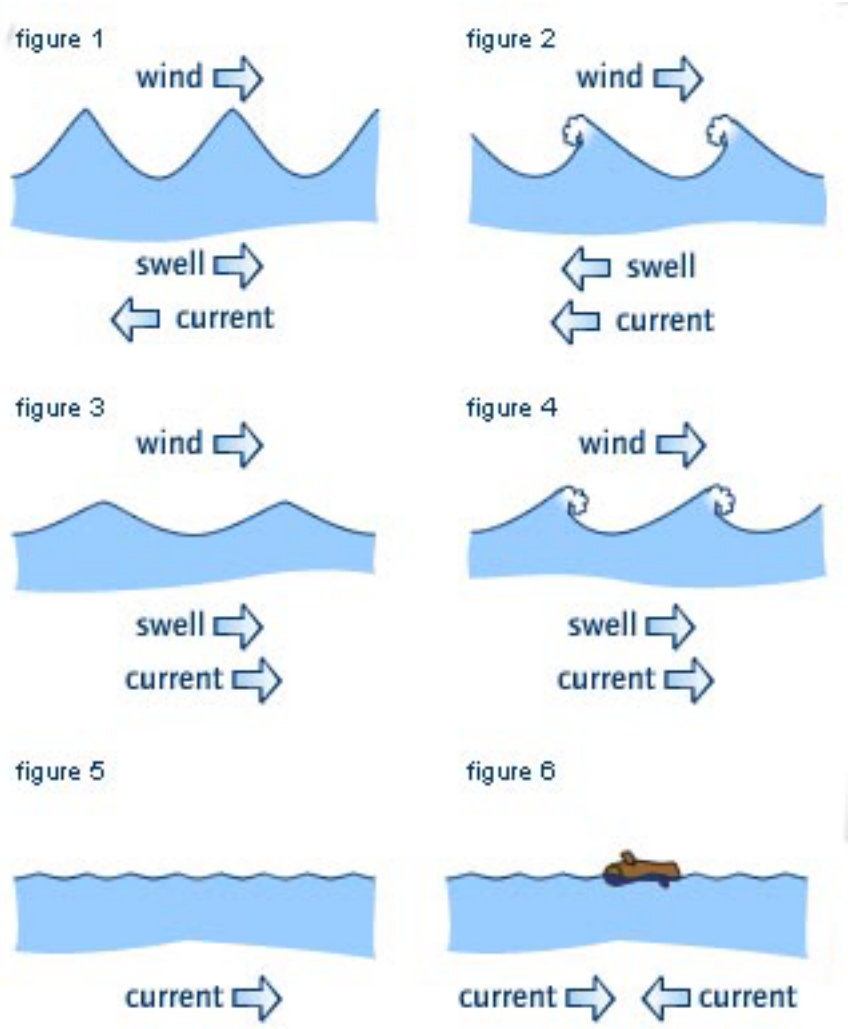
Reading Currents

Currents out at sea can push a canoe off course and affect its speed. If a canoe is sailing against the current, its speed is lower. If it's sailing with the current, its speed is higher. A navigator needs to know how to read the currents and adjust his course if necessary. A destination island can have different star paths for currents of different directions and strengths.

When he starts out, a navigator watches to see if his canoe moves sideways in relation to points on the land. Away from land, he looks for other clues about currents. For

example, he can read the direction and strength of a current by noting how the water moves in relation to the wind direction.

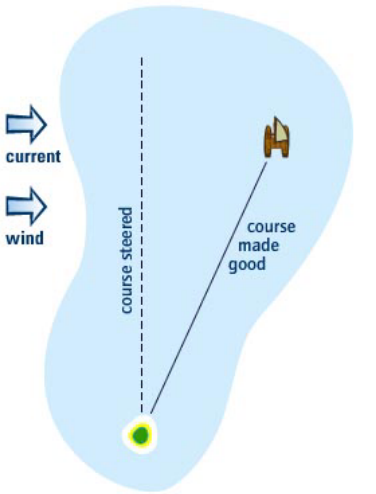
• If the waves stand up more than usual when they are moving with the wind, the current is moving against them [See figure 1].
• If white caps fall backwards into the wind, the current is moving against the wind [See figure 2].
• If the waves are smaller and flatter than usual, they are moving with the wind and the current [See figure 3].
• If white caps fall smoothly and their foam moves in a long line with the wind, the current is moving with the wind [See figure 4].
• When the sea is calm, *ripples* on the water's surface can show the direction and strength of a current [See figure 5].
• Lines of drifting wood and other objects can sometimes form where two currents meet [See figure 6].



4.2 Dead Reckoning

This way of tracking a boat's position is quite different from the etak system that Carolinian navigators use.

1. In the past, western navigators used to keep track of their *heading* with a magnetic compass. They worked out the distance they had sailed by throwing an object overboard and measuring how far and how fast it was left behind.
2. They estimated how the *leeway* and *currents* were affecting their heading and speed.
3. With this information, they *reckoned* how far and in what direction their boat had sailed over a certain time period – for example, 200 km at 90 degrees (straight east) over the last 24 hours.
4. They then marked the boat's position on a navigation chart and made any necessary course changes.



Today, the Global Positioning System (GPS) makes life even easier! A GPS is a hand-held computer that automatically tells sailors their position by communicating with *satellites*.

4.3 Etak System

As in dead reckoning, a Carolinian navigator keeps track of his canoe's *heading* and speed and the effects on his position of *leeway* and *currents*. But he doesn't use any instruments and he doesn't write anything down! Also, he doesn't talk of his position in terms of compass points (north, south, west, east), kilometres, or hours and minutes.

Instead, he imagines his canoe and the stars as unmoving. The sea and the land move backwards – like a mat pulled out from under the canoe. As the home island moves away, the destination island moves closer on this mat of sea. To both sides of the canoe, unseen islands beyond the horizon also move back.

1. He chooses the star compass point that is closest to the destination island. In his mind, he draws a course line to it.

2. He also chooses an unseen island to one side of the course line as a reference (positioning) island. He draws imaginary direction lines between it and each star compass point back to the course line.

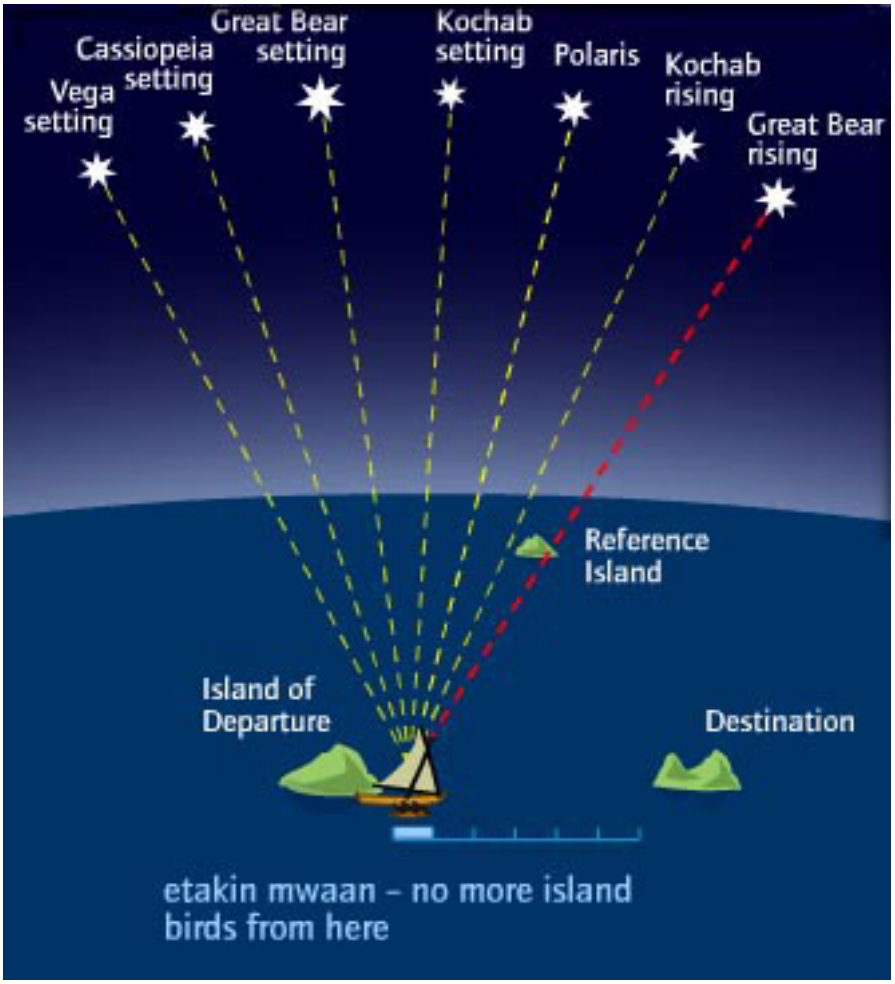
3. When he is sailing, the reference island moves from under one star point to under another. (Remember, the stars are unmoving in this system, like the canoe.) In this way, he cuts the course line into etaks (stages). He understands his canoe's position in terms of sailing from one etak to another. One etak is the movement of the reference island back by one star point as the canoe sails towards its destination.

Satawal Etaks

Journeys of all distances from Satawal to other islands are broken into six etaks:

- etakin mwaan – no more island birds from here
- palsapou – we're far away from it
- alugaan metaw – middle of the sea
- sapalongon alugaan ponsapilong – we're getting closer to the island
- etakin mwaan – the birds of the destination island can be seen
- etakin kena – looking for the island, it's about to be seen.

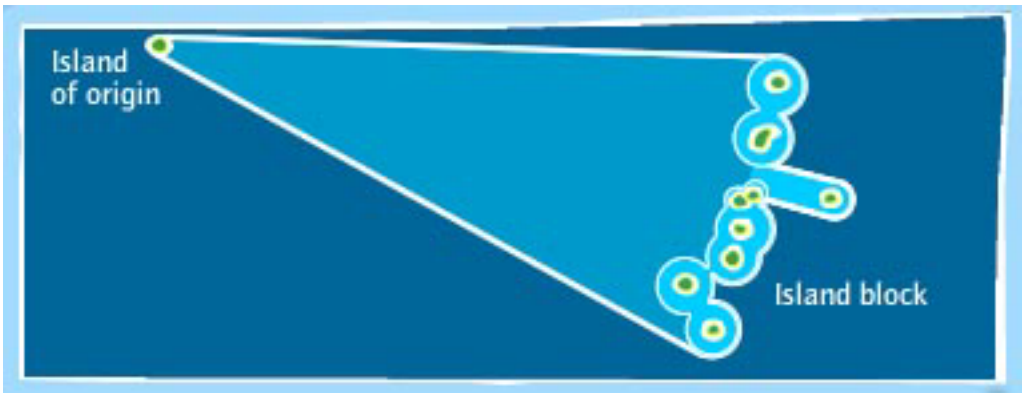
The two last etaks are the etaks of birds – the range of the flight of homing birds from land (about 30 km).



5 Finding Land

On a clear day, low islands can be seen from about 15 km away and high islands from even further away. Signs of land can normally be seen or felt from 30 km away or more. The signs include sea life, interrupted *swells*, clouds, and deep phosphorescence.

A navigator uses these signs to increase the size of his destination island. He can head for an area about 60 km in *diameter* instead of just the small island. He can then read the signs to find land. The enlarged islands join together to form island blocks, which can be hundreds of kilometres wide.



For each island, the signs differ, and the navigator reads them differently. At night, if the navigator doesn't know the area well, he may drop the sail and wait till morning before heading for land. When landing he may often have to sail into the wind and the current.

After a long voyage or fishing trip, there is usually a big welcome to celebrate a canoe's safe return as well as the supplies and food that it may bring.

Video 1 - Cook Islands canoe builder and navigator Sir Tom Davis (Papa Tom)

The great aspect of this ancient navigation is that the Polynesians were able to find very small atolls, isolated in the middle of the sea, with nothing around except perhaps the birds to help you, and of course always, during the hot day, in the day time and in the morning especially, there is the cloud that always sits, the thermal cloud that sits over every island in the Pacific and the world.

Video 2 - Cook Islander Dorice Reid, crew member of Te Au o Tonga

Cook Islander Dorice Reid, crew member of Te Au o Tonga on the voyage to Nuku Hiva, Te Henua Enana (Marquesas Islands) in 1995: The sky was full of birds. They were flying up and down as if they were celebrating. And at the same time as we sailed into this harbour, the water of the harbour was absolutely awash with fish. Hundreds of dolphins were swimming and leaping in the harbour entrance. So, here we had three phases of living things celebrating. We had man on the beach with drums and dancing, and we had birds in the sky flying up and down in huge celebration, and we had the fish. We had the fish in the harbour.

Video 3 - Local people in Saipan welcome Mau Piailug and his crew from Satawal.

From The Last Navigator © INCA 1989. Directed by Andre Singer.

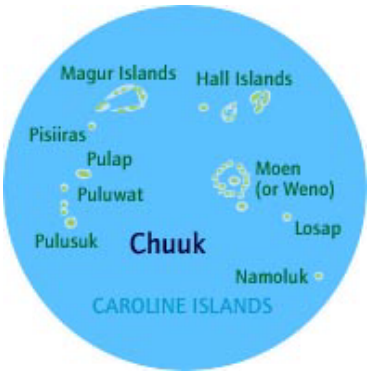
5.1 Sea Life

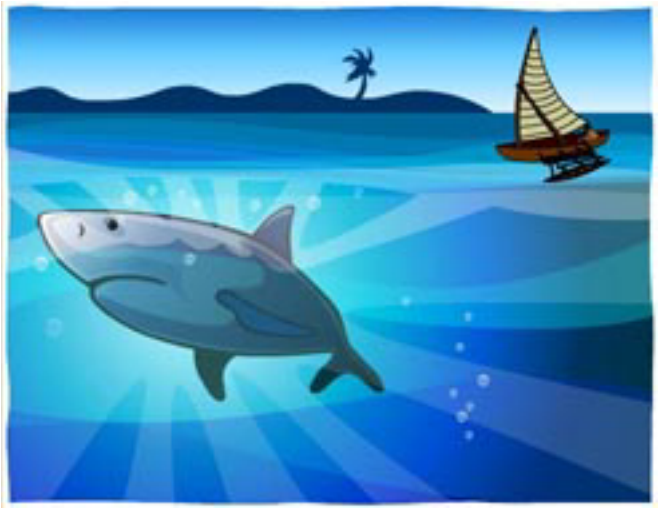
Sea life – like fish, birds, and seaweed – is more common near land and can help to guide navigators in. For example, lines of seaweed can reach up to 200 km east of Aotearoa (New Zealand).

Homing birds are especially useful for finding land. These are birds that feed at sea during the day and return to land in the evening – for example, boobies, terns, and noddies. They fly in a direct line of up to 30 km to and from land. A large group of birds shows that land is 15 to 30 km away. To find out the direction of land, the navigator waits till evening when the birds fly home. Boobies may even circle a canoe before going home.

It is possible that *migrating* animals gave early navigators clues about where other islands were – for example, the kuaka (godwit) and the koekoea (long-tailed cuckoo), which fly across the Pacific and arrive in Aotearoa in spring each year. Whales also migrate to and from the Pacific, often using the same route from year to year.

Story 1 - How Pisiiras Was Found (Chuuk, Micronesia)





This story about land finding involves a shark and a bird. Five brothers lived on Moen Island. Their father told them about a lost island near Moen. When he died, the brothers sailed to find it. In four days, they found nothing. Only the youngest brother still believed in his father's story and kept looking. Soon, he saw a huge shark. It was guiding his canoe. The boy thought it must be the ghost of his father. The shark swam with the canoe until they reached the area of the lost island.

The boy dived down and found the island! The next day, he took his brothers there. The oldest tied a rope to it and pulled. The other brothers tried too, but they all failed. When the youngest tried, it came up! At that moment, a black bird flew by and told them to call the island Pisiiras.

Moen is now spelled Weno.

Story 2 - Paikea and the Whale (Aotearoa, Polynesia)

The Ngaati Porou iwi (tribe) of Aotearoa talks of how Kahutia Te Rangi (or Paikea) came to this land on a whale. Paikea lived in the homeland of Hawaiki. His father was Uenuku, and his older brother was Ruatapu. One day, Ruatapu climbed on the roof of Uenuku's house. This was a great insult to his father. Uenuku was very angry. He reminded Ruatapu that he was illegitimate (born of parents not married to each other) and that the younger Paikea was really the leading son.

So Ruatapu decided to kill all the leading sons of the chiefs of Hawaiki. He took them out on a waka (canoe) and drowned them by letting water into it. But Paikea escaped. A whale rescued him and brought him to Aotearoa. He arrived at Whangara on the East Coast of the North Island.

Ko wai te tekoteko kei runga?
Ko Paikea! Ko Paikea!
Whakakau Paikea hei!
Whakakau he tipua hei!
Whakakau he taniwha hei!
Ka u Paikea ki Ahuahu ...

Who is the carved figure on the roof?
It's Paikea! It's Paikea!
Paikea is swimming!
Paikea with his magical powers is swimming!
Paikea the great is swimming!
Paikea lands at Ahuahu ...

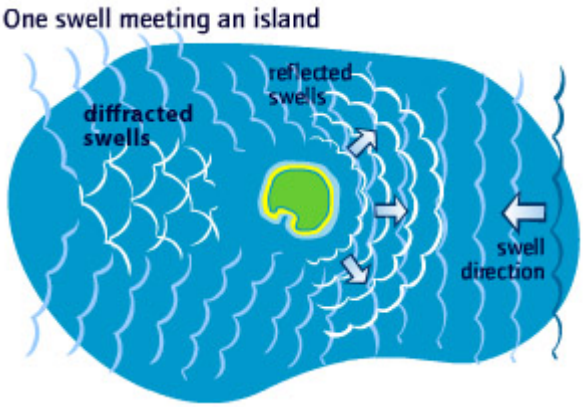
Adapted from the website of John Archer (www.folksong.org.nz/pataka.html).

5.2 Interrupted Swells

As well as using *swells* to set his course, a navigator uses *interrupted* swells to find land. He knows that they mean land within 50 km. Marshallese navigators have very *sophisticated* knowledge about the behaviour of swells and currents, which can be their main guide. They use stick charts to represent and memorise the interrupted swells and currents for many important islands. Here are two examples of the knowledge that a stick chart might show.

1. One swell meeting an island

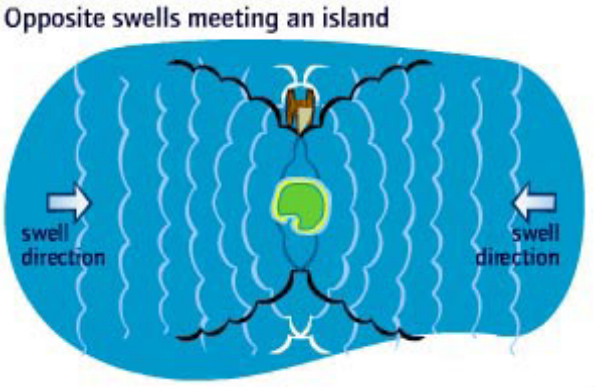
When a swell meets an island, some swell *reflects* off it, and the rest *diffracts* around it and joins on the other side. Where the two parts join, the sea is limaajnono (choppy, broken up, rough). Closer to the island, there is a calm area where the swell doesn't reach.

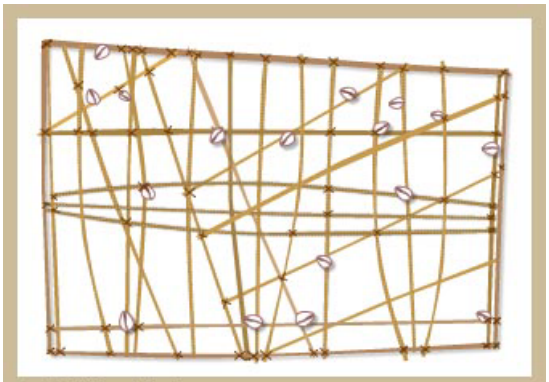


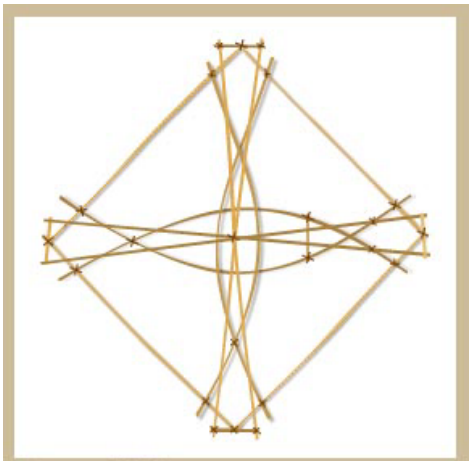
• If a navigator is sailing against the swell, he feels the pattern change when he meets the choppy water. When he reaches the calm water, he stays in it to find land.
• If he is sailing with the swell, he can feel his canoe pause slightly when it meets the reflected swell. The reflected swell is shorter than the main swell and at a different angle. The navigator can steer directly into it to find land.

2. Opposite swells meeting an island

Two swells coming from east and west (that is, from opposite directions) will curve around an island and meet north and south of it. The meeting swells create an okar (line of swell peaks) that points to the island. When a navigator meets an okar, he knows that he is to one side of an island, even when he can't see it. He can then sail down the okar to find land.




Rebbellith stick chart


Mattang stick chart

5.3 Clouds

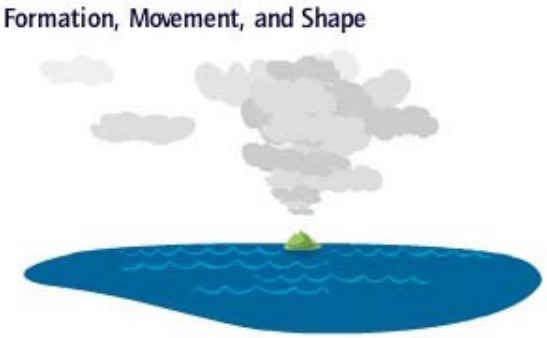
Aotearoa, the Maori name for New Zealand, means long white cloud … for a very good reason. Some Maori traditions tell how, on the voyage of discovery to Aotearoa, the navigator Kupe's wife said, "He ao, he ao, he ao tea, he ao tea roa!" … "A cloud, a cloud, a white cloud, a long white cloud!"

Clouds give many clues about land beyond the *horizon*. Navigators study their formation, shape, and colour for hours.

Formation and Movement

Clouds that keep forming in one place indicate land below.

- In cloudy, calm weather, the clouds tend to be thicker over land.
- In cloudy, windy weather, one cloud might sit above an island while others move fast.
- Clouds often move freely as they move towards an island. They slow as they near it, then break up and speed off on the other side.



Shape

V-shaped clouds often form over islands, especially in calm weather when few clouds are in the sky. The centre of the unmoving cloud stays above the land.

Colour

Clouds over land can reflect the land's colour – white for coral reefs and sand, pink for exposed coral reefs, and dark for plants.

Even a cloudless sky shows signs of land. White sand and lagoons reflect the sun as a pale, shining beam over an island. A lagoon reflects the stars more than the ocean does.

5.4 Deep Phosphorescence

"To the east of Whangaroa, there is … Te Au-kanapana, or flashing current … it is here that Kupe is said to have made land on his voyage from Hawaiki."

From Evans, J. (1998).

Navigators use flashes of light occurring in the deep ocean to know the distance and direction of land. This light is known as te lapa in the Santa Cruz Islands (eastern Solomon Islands), te mata in Western Kiribati, and ulo aetahi in Tonga. The flashes occur as far out to sea as 150 km, darting to and fro in the direction of the land. The closer land is, the shorter and quicker the flashes are. Once land is close enough to be seen, the flashes disappear.

This 'underwater lightning' as the navigator Tevake described it to David Lewis, appears a metre or more below the surface. Navigators often use it to steer by on dark and cloudy nights. It is different from phosphorescence, or more correctly, *bioluminescence*, which is commonly seen on the surface, in the wake of boats, and close to reefs and land. The exact nature of deep phosphorescence remains a mystery.


Hawaiian Islands
North Pacific Ocean
MICRONESIA
Northern Mariana Islands
Guam
Federated States of Micronesia
Yap
Palau
Marshall Islands
Bismarck Archipelago
Papua New Guinea
Nauru
Solomon Islands
Louisiade Archipelago
Reef and Santa Cruz Islands
Vanuatu
MELANESIA
New Caledonia
Gilbert Islands
Kiribati
Phoenix Islands
Tuvalu
Wallis and Futuna
Tokelau
Samoa
Line Islands
POLYNESIA
Society Islands
Cook Islands
American Samoa
Niue
Tonga
Fiji
Rarotonga
Marquesas Islands
French Polynesia
Tuamotu Archipelago
Tahiti
Gambier Archipelago
Austral Archipelago
Pitcairn Islands
Easter Island
South Pacific Ocean
Kermadec Islands
Norfolk Island
Chatham Islands
New Zealand
Australia

The Canoe Is the People

Indigenous Navigation in the Pacific

VOYAGES AND REVIVAL

United Nations
Educational, Scientific and
Cultural Organization

LiNKS
Local and Indigenous
Knowledge Systems

Voyages and Revival

In parts of the Pacific, especially Micronesia, much navigational knowledge has been kept alive. In others, it has been lost.

Now, all over the Pacific, there is a growing revival. There are now many voyaging societies, including those in Hawaii, Tahiti, the Cook Islands, Aotearoa (New Zealand), and the Marshall Islands. People are making more and more voyages in traditional canoes – rediscovering the past and carving the way to the future. New schools are being started to teach navigation to young people.

Sometimes, European ways are used – like teaching with books, building canoes with modern tools, navigating with the help of western maps and compasses, and using inboard motors and *escort boats*[*] for support. People have different opinions about these things, but everyone has the same aim – to keep the traditional knowledge alive and hand it down to the young navigators of the future.

Video 1 - A young man from Satawal

See, there are some young people from these islands who went out to school in the United States or somewhere outside, and when they came back, they lost all these … they lost all these things. And, you know, I'm kind of ashamed. If I'm those people, I'll be ashamed for losing our, you know, way of life. That's why I want to learn this.

From The Last Navigator © INCA 1989. Directed by Andre Singer.

Video 2 - Maori master canoe builder, Hekenukumai Busby (New Zealand)

Since my first time in Hawaii, my friends know I build these canoes because I felt … I feel a great debt for the things they have shown us. I believe without the Hawaiians and Mau Piailug sharing their navigational knowledge we would be in a state of ignorance today. But today this knowledge is strong and will never be lost again. The outcome is that we are now teaching young people things like navigation and sailing.

[*] NOTE: Definition of words in *italics* can be found in the Glossary in the CD-ROM Storehouse.

Video 3 - Hoturoa Barclay-Kerr of Te Toki Voyaging Trust

One of the things that we've been very interested in is learning the kinds of ways of navigation that Mau Piailug has been teaching everybody. So a few of us have been lucky enough to spend a little bit of time to listen to him and the things that he has to tell us about navigation and all those things. We're starting to find that there are some young people here in New Zealand who are interested in listening to those kinds of stories and doing those kinds of things too. So, something like the programme that we have here with these young children is we sit down and we spend time and look at the old traditions about canoes and the people who sailed – not just to Aotearoa but other stories from all around the Pacific Ocean.

Video 4 - Cook Islands navigation student Te Aru Rangi Reitu (Rangi)

I had a vision many, many years ago, with me sitting out here on the water in a canoe. I've never told anyone this. This is the first time I'm relaying this to anyone. And in my dream I was saying, "What am I doing here?" I was frightened, and then I realised what I was here for. This is where I'm meant to be, not in New Zealand. This is where I'm meant to be. I'm meant to be part of this voyaging society.

Video 5 - Maori master canoe builder, Hekenukumai Busby (New Zealand)

In 1985 a Tuhoe elder, John Rangihau was overseas. In Hawaii he met some Hawaiians thinking about sailing a canoe from Hawaii to Tahiti onto Rarotonga, but they were unsure about a journey between Rarotonga and Aotearoa. Then Nainoa Thompson one of Mau Piailug's first students came to New Zealand. He had to decide whether or not to sail to NZ. I accepted responsibility for their care and he agreed to sail here and made me a very happy man. That is when they prepared themselves for their Voyage of Rediscovery.

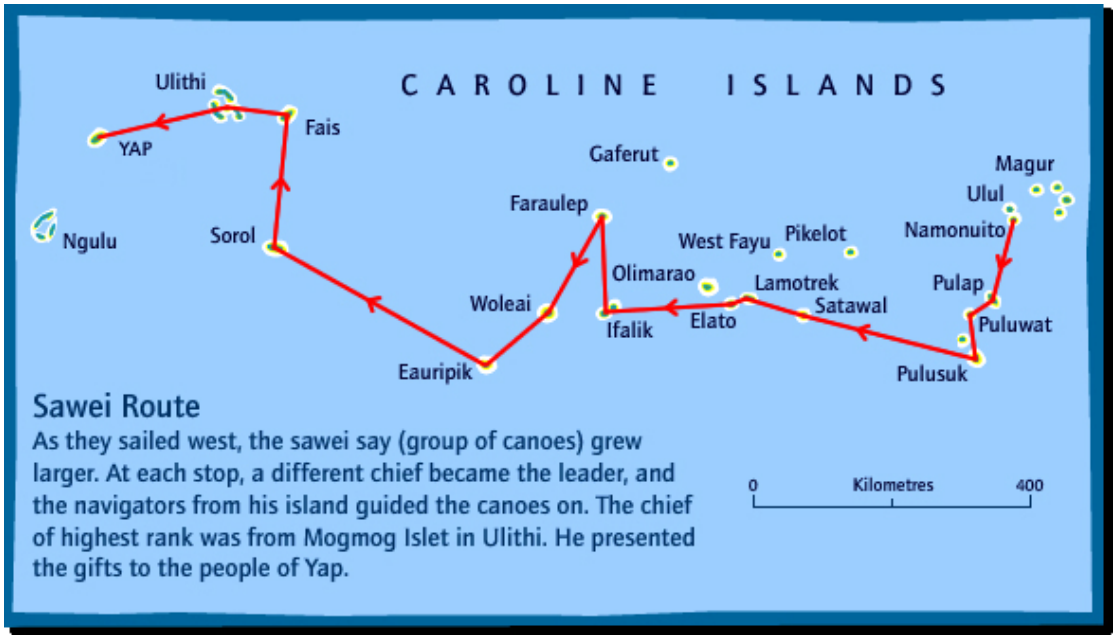
1 Traditional Voyages

In the Pacific, special trading and religious voyages between islands used to be made. The sawei voyages are an example. Every few years, people from the *atolls* of the Carolines travelled to Yap (a larger volcanic island) with gifts. Some were kept in sawei baskets (woven baskets made of coconut fibres). The coral islanders believed that the Yapese controlled the weather. If they didn't bring sawei gifts to them, they could be hit by very bad storms.

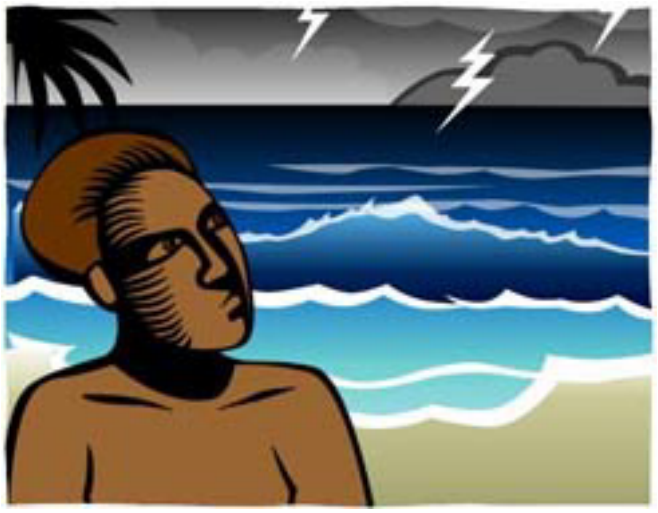
The Yapese gave gifts in return. The gifts were often valuables that were not available on the other island and religious offerings. They recognised the *kinship* between the two cultures. The families in Yap treated the visitors as if they were their children.

The German administration stopped the sawei voyages in the early 1900s, but many people still know their sawei connections – and how to make the sawei basket.

Sawei basket photo © Rosalind Hunter-Anderson. This image is from the Ethnology Museum at the Academia Sinica in Taipei.



Story 1 - Why Fasu Disappeared from Ifalik (Yap, Micronesia)



This story tells of another voyage involving people from Yap and the atolls. One day, a sailing canoe from Yap came to Ifalik. The people of Ifalik welcomed the navigator and his crew and gave them many gifts. They invited them to stay as long as they wanted. However, the chief asked them not to leave the area of the canoe house. He knew that the Yapese had spiritual powers and didn't want this danger around Ifalik.

One morning, the Yapese navigator broke the chief's rule. He left the canoe house and went to the other side of Ifalik to swim. Suddenly, he saw something strange on the horizon. Even though the sun made it hard to see, he thought it was a big storm. So he collected some special leaves, said some enchanted words, and made the thing disappear.

He went to tell the chief that he'd just stopped a storm from hitting Ifalik. The chief was shocked. He told the navigator that it wasn't a big storm but Fasu, an island with a large mountain. The navigator was terribly sorry for what he'd done. The chief accepted his apology but told him to leave Ifalik. Today, Fasu lies just below the sea north-east of Ifalik. Boats avoid the area, but men fish there when the winds from the east make it easy to return to Ifalik.

1.1 Sawei Gifts

The coral islanders gave many special gifts to the Yapese through the sawei voyages. They included foods; mats and sails; dance belts; coconut oil, rope, and sweets; tobacco; and special shells. They also made religious offerings to the spirit Yangolap, like tur (valuable weavings).

The Yapese gave gifts in return – for example, turmeric powder for ceremonies; Tahitian chestnuts and other foods; red soil used for colour; clay pots; and giant clam shells. They also gave large trees for making voyaging canoes or even finished canoes. They promised to help the coral islanders after storms too.

The women made many of the gifts that were exchanged in the sawei system – for example, the tur, mats, sails, clay pots, and foods. Men were responsible for the soil, clam shells, trees, and finished canoes – and for navigating. They also performed the religious *rituals*.

pandanus mat

Photo © Rosalind Hunter-Anderson

two bundles of reng

© Rosalind Hunter-Anderson

canoe

Photo © Rosalind Hunter-Anderson

2 Modern Voyages

The story of revival is the story of people weaving into each other's lives like the strands of a mat. The whole mat would not be complete without all their experiences and thoughts.

1936-37 Kaimiloa (double hull): Hawaii > France

When he built the Kaimiloa, Eric de Bisschop was inspired by Pacific voyaging canoes and guided by the indigenous people of Hawaii. However, he used modern building materials and methods. For example, he joined the two hulls together with old car springs instead of tying them to wooden beams (long pieces of strong wood). After many adventures, he succeeded in sailing west across the Pacific and Indian Oceans and then around Africa to France.

1947 Kon-Tiki (raft): Peru > Tuamotu Islands

Thor Heyerdahl didn't believe that canoe voyages from South-east Asia could have sailed east to Polynesia against the trade winds (winds that blow steadily towards the equator for half the year – from the south-east south of the equator and from the north-east north of the equator) and currents. He thought that raft voyages from South America were the first people to reach Polynesia. To support his idea, he built the raft Kon-Tiki from light balsa wood. He sailed it from Peru to the Tuamotu Islands of Polynesia. However, after studies of languages, cultures, and artifacts (objects created by people) from the area, modern researchers believe that Heyerdahl's theory is incorrect.

Note: After landing in the Tuamotus, Kon-Tiki was shipped to Tahiti and then to Oslo in Norway, where it is now in a museum.

1956-58 Tahiti-Nui (raft)

Tahiti-Nui (raft): Tahiti > off Chile
Tahiti-Nui (raft): Peru > northern Cook Islands

After Kon-Tiki's voyage, Eric de Bisschop wanted to prove that Polynesians could have sailed by raft to South America. He built Tahiti-Nui (a bamboo raft) and sailed south from Tahiti to catch the west winds east. Tahitian navigator Francis Cowan went with him. However, he and his crew had to abandon (leave) the broken raft near Chile. They were rescued by the Chilean navy. Later, they sailed back to Polynesia on Tahiti-Nui II, a raft made from Cyprus wood. As they neared Polynesia, it began to fall apart and sink. It finally crashed onto the coral reef of Rakahanga in the northern Cook Islands, killing De Bisschop.

1964 Rehu Moana (catamaran): Tahiti > Aotearoa

New Zealander David Lewis sailed a modern catamaran from Tahiti to Aotearoa (New Zealand), navigating by the stars in the old Polynesian way. He made one mistake in the Cook Islands, but his voyage still showed that it is possible to navigate without instruments over long distances. He learned from the traditional navigators

like Hipour (of Puluwat atoll in Micronesia) and Tevake (of Taumako Island of the easter end of the Solomon Islands). His book *We, the Navigators* is still the most complete book about Pacific navigation.

1964 Tangaroa (catamaran): Atlantic Crossing

Englishman James Wharram wanted to make yachting something for everyone, not just the rich. He mixed the design of the double-hulled voyaging canoe with European building materials. First, he crossed the Atlantic in a basic catamaran (double-hulled sailing boat based on the Polynesian double-hulled canoe). In the Caribbean, he made a better catamaran and sailed back to England. Since then, many sailors worldwide have successfully built and sailed boats that Wharram has designed.

1965-66 Nalehia (double hull): Hawaiian Islands

In the mid-1960s, a New Zealand historian named Andrew Sharp claimed that the Polynesians did not explore and settle the Pacific on purpose. He said that their canoes and ways of navigation weren't good enough. He argued that they'd been blown to the islands by storms and bad winds. To show that Sharp was wrong, anthropologist (person who studies human cultures) Ben Finney started a project to build double-hulled canoes. He wanted to test these canoes on long voyages and recover the old ways of navigating. The first tests were made with Nalehia, a copy of a Hawaiian double hull. The tests showed how well double hulls could sail on the open ocean. They provided the information needed to build the big voyaging canoe Hokulea and sail it to Tahiti.

1970 Maiisukul (single outrigger): Satawal > Pikelot > Saipan

The name Maiisukul means "his first teaching canoe of breadfruit wood", referring to Rasemai, who used it when he began to teach navigation. Rasemai and the canoe belonged to Asuukwow canoe house in southern Satawal, where Rasemai had married. For the trip to Saipan, Repwanglug borrowed the canoe from Rasemai/Asuukwow.

The voyage of Repwanglug and his crew re-opened the sea lanes from the Carolines to the Marianas. In the next decades many other voyages within the Carolines were made, although they were not officially recorded.

1976 Hokulea (double hull): Hawaii > Tahiti > Hawaii

Hawaiian artist Herb Kane designed Hokulea, a 19-metre-long voyaging canoe. Hokulea was built mostly with modern materials (plywood hulls and cloth sails). However, it sailed like a traditional canoe. At the launch in March 1975, Kane blessed it: Eia ka waa I kalai ia; e kapaia hainoa o Hokulea. Ke ui aku nei na alakai o ka po, na alakai o ke ao, na alakai o luna, na alakai o lalo. (This is the canoe that has been built; its name is to be Hokulea. As our gods of po and of ao, from above, from below to bless it.)

From a piece by Kenneth Emory on
http://leahi.kcc.hawaii.edu/org/pvs/launching.html

No old Polynesian navigators were available to guide Hokulea from Hawaii to Tahiti, so Ben Finney brought a master navigator from Satawal, Micronesia. His name was Mau Piali. Hokulea arrived in Tahiti to a great welcome and then voyaged home. Mau has since played a huge part in the rebirth of traditional navigation. Hokulea continues to sail around the Pacific. It has become a symbol of indigenous revival, inspiring other Pacific Islanders to reconnect to their voyaging past.

1976-77 Taratai I and II

Taratai I (single outrigger): Kiribati > Fiji
Taratai II (single outrigger): Fiji > Tonga

Taratai is a small island in Kiribati (Gilbert Islands) with few large trees. New Zealand photographer James Siers wanted to give the people of Taratai the chance to build a large voyaging canoe. He sent them wood for it. The largest piece was for the keel (structure on the bottom of a boat that works against the force of the wind to keep it upright). The master canoe builder had never seen such a big piece of wood. He didn't want to cut it smaller and so made a 21-metre canoe! It had two sails, which made sailing difficult. Finding wood light enough for the outrigger was also a problem.

In 1976, Siers and a crew from Taratai sailed for Tahiti but only got as far as Fiji. In 1977, they tried to complete the trip in a new plywood canoe (Taratai II), but it broke after leaving Tonga.

1980 Hokulea (double hull): Hawaii > Tahiti > Hawaii

After the 1976 voyage, the Hawaiins sailed Hokulea back to Tahiti in 1980. Nainoa Thompson, a young Hawaiian trained by Micronesian master navigator Mau Pialug, guided the canoe. This was the first time in hundreds of years that a Polynesian had navigated a canoe so far. The voyage marked the rebirth of long-distance voyaging in Polynesia.

1985 Hawaiki-Nui (double hull): Tahiti > Aotearoa

The building of Hawaiki-Nui was a joint project between Tahitian and Maori canoe builders, led by navigator Francis Cowan and carver Matahi Avauli Brightwell. Matahi had a dream that his grandmother wanted him to rediscover the path to Hawaiki, the mythical homeland of all Maori. He went to Tahiti with his dream and two hulls that he had carved. There, Francis helped him to complete the canoe and sail it from Tahiti to Rarotonga and then on to Aotearoa (New Zealand). Unlike some other canoes, Hawaiki-Nui sailed without the support of any escort boats (modern boats that follow a canoe) or an inboard motor. The canoe was shipped back to Tahiti and displayed in the museum there.

1985-87 Hokulea (double hull): Hawaii > Aotearoa > Hawaii

The Hawaiians sailed Hokulea to Aotearoa (New Zealand) and back. They stopped at the Tuamotu Islands, Tahiti, the Cook Islands, Tonga, and Samoa. They wanted to develop Hawaiian knowledge of the rest of Polynesia and encourage other Polynesians to join in the voyaging revival. The voyage took two years because they waited for the right winds for each stage. This is the traditional way of voyaging. For example, they waited for west winds before sailing east from Samoa to Tahiti instead of going against the trade winds (winds that blow steadily towards the equator for half the year – from the south-east south of the equator and from the north-east north of the equator).

1992 Takitumu, Te Aurere, Hokulea, Waan Aelon Kein

Festival of Pacific Arts, Rarotonga, Cook Islands

These big Pacific canoes and many smaller ones met in Rarotonga to celebrate the canoe voyaging tradition.

Takitumu (double hull): Cook Islands

Takitumu had just been built on Rarotonga by former Cook Islands Prime Minister Sir Tom Davis (Papa Tom). Takitumu is a shunting kalia. It shows the tie between the Cook Islands and the western Pacific, Tonga, and Samoa. It's one of the fastest of the long-distance voyaging canoes. Its two plywood hulls are of different sizes. The smaller one is like the float of an outrigger. It uses a triangular sail thought to have been copied from Micronesian canoes. Like those canoes, Takitumu is shunted not tacked.

Te Aurere (double hull): Aotearoa > Cook Islands
Hokulea (double hull): Hawaii > Cook Islands

Te Aurere sailed from Aotearoa (New Zealand) for the festival. Hekenukumaingaiwi (Hec) Busby built the canoe in 1991. Stanley Conrad was the captain. Jacko Thatcher was the navigator. After Hokulea's visit to Aotearoa in 1976, Hec wanted to build a Maori voyaging canoe with traditional materials. He feared that the knowledge could disappear, and so he wanted to rediscover canoe culture completely – from the prayer before cutting a tree down to the rituals (ceremonies) on the building site.

Waan Aelon Kein (outrigger): Cook Islands

Waan Aelon Kein is a long outrigger canoe from Eniwetok atoll of the Marshall Islands. It was built in 1991 by master canoe makers who had built and sailed big canoes when they were young. Walap isn't a long-distance canoe, so it was shipped by yacht to Aitutake atoll in the southern Cooks. From there, it sailed to Rarotonga using the Marshallese way of navigating by the ocean swells.

1995 (Feb-Mar) Sailing to Taputapuatea Marae on Raiatea

Hokulea (double hull) and Hawaiiloa (double hull): Hawaii Raiatea
Takitumu (double hull) and Te Au o Tonga (double hull): Cook Islands > Raiatea
Tahiti-Nui (double hull): Tahiti > Raiatea
Te Aurere (double hull): Aotearoa > Raiatea

Pacific stories say that canoes from across Polynesia used to sail to Taputapuatea Marae on Raiatea (near Tahiti) to take part in rituals (ceremonies) of the faatau aroha (friendly group). Then the group was broken when people from its eastern and western sides began fighting. In 1995, canoes once again voyaged to Raiatea to celebrate the rebirth of Polynesian voyaging and the rebirth of the group.
A ceremony of forgiveness and renewal was held on the marae.

Some of the canoes were built just for the voyage. Hawaiiloa was made in Hawaii using dugout logs from Alaska. Te Au o Tonga was built from plywood in Rarotonga using a Tahitian design. Tahiti-Nui was made from the old hulls of Hawaiki-Nui.

1995 (Apr-Jun) Sailing to Te Henua Enana (Marquesas Islands)

Hokulea (double hull), Hawaiiloa (double hull),
Makalii (double hull), Takitumu (double hull),
Te Au o Tonga (double hull), Te Aurere (double hull): Raiatea > Te Henua Enana > Hawaii > home islands

Five of the canoes that were at Taputapuatea Marae in Raiatea plus Makalii (a new one with fiberglass hulls from Hawaii) sailed to Te Henua Enana (Marquesas Islands). This island is thought to be the homeland of the Hawaiians. From there, the canoes sailed together to Hawaii to remember and celebrate the discovery of these most northern islands of Polynesia. Then they all sailed home. After Te Au o Tonga returned to Rarotonga, the Cook Islanders sailed her to French Polynesia's Tuamotu Islands to protest the testing of nuclear bombs on the atoll of Mururoa.

1996 Te Au o Tonga (double hull): Rarotonga > Samoa > Aotearoa > Rarotonga

Te Au o Tonga sailed on a long voyage to Aotearoa (New Zealand), visiting events like the 7th Pacific Arts Festival in Samoa and the 1996 Waka Moana Symposium in Auckland, Aotearoa.

1999 Makalii (double hull): Hawaii > Satawal > Hawaii

The crew of Makalii (Hawaii's newest voyaging canoe) wanted to honour the master navigator Mau Pialug for all he'd done to help Hawaiians to revive voyaging. They sailed Mau from Hawaii back to his home island of Satawal in the Federated States of Micronesia.

1999-2000 Hokulea (double hull): Hawaii > Rapa Nui > Hawaii

Hokulea, still strong after 25 years, succeeded in reaching Rapa Nui (Easter Island), the most eastern island of Polynesia. It stopped at Te Henua Enana (Marquesas Islands), Mangareva, and Pitcairn Island on the way. Finding Rapa Nui with traditional navigation methods was a great success. The island is very small. There are no islands around it to make a larger target. On top of that, nearly all the seabirds that once fished around the island are now gone.

2000 (Jan) Mileniume (outrigger): Tonga

This 33-metre kalia (Tongan double hull) was built by Tuione Pulotu and his men in Nukualofa, Tonga, to celebrate the year 2000. They also built two smaller 12-metre kalia as training canoes. Tuione: "We need four men just to handle the steering paddle. In the old days, if they didn't steer right, the king or chief would knock them on the head…and they would be replaced. We obviously can't do that sort of thing nowadays."

From www.tongahighschool.com/king_1.html (Originally from John Hamilton, Melbourne Herald Sun, July 1999.).

2000 (Feb-Apr) Te Aurere (double hull): Circumnavigation of North Island, Aotearoa

This journey right around the North Island of Aotearoa (New Zealand) was more difficult than an open ocean voyage (for which traditional double hulls are really designed). Te Aurere visited many marae (Maori communities) on the way.

2000 (Sep-Nov) Te Au o Tonga (double hull)

Te Au o Tonga (double hull):
Rarotonga > Aotearoa > New Caledonia > Rarotonga
Te Aurere (double hull):
Aotearoa > New Caledonia > Aotearoa
Te Au o Tonga sailed to Aotearoa (New Zealand) for the Millennium celebrations. It met up with Te Aurere in New Caledonia for the 8th Pacific Arts Festival.

2004 Hawaiki-Nui II (double hull) – proposed voyage: Tahiti > Chile > Cook Islands > Aotearoa

At the time that this CD-ROM was being created, Matahi Avauli Brightwell and Francis Cowan were building Hawaiki-Nui II, with the help of Tarepa Wharepapa and Ole Maiava. The 25-metre double hull follows the Maori Horouta tradition of canoe building. The sections of the hull are tied together.


Hawaiian Islands
North Pacific Ocean
MICRONESIA
Northern Mariana Islands
Guam
Federated States of Micronesia
Yap
Palau
Marshall Islands
Bismarck Archipelago
Papua New Guinea
Nauru
Solomon Islands
Louisiade Archipelago
Reef and Santa Cruz Islands
Vanuatu
MELANESIA
New Caledonia
Gilbert Islands
Kiribati
Line Islands
Phoenix Islands
Tuvalu
Wallis and Futuna
Tokelau
Samoa
POLYNESIA
American Samoa
Niue
Cook Islands
Society Islands
Tonga
Fiji
Rarotonga
Tahiti
French Polynesia
Marquesas Islands
Tuamotu Archipelago
Gambier Archipelago
Austral Archipelago
Pitcairn Islands
Easter Island
South Pacific Ocean
Kermadec Islands
Norfolk Island
Chatham Islands
New Zealand
Australia