Feeding Hawaii

The Hawaiian Islands before European contact were the manifestation of paradise. Warm, lush and filled with wildlife, the Hawaiian Islands would have been a lovely place to live. However, the islands were missing one thing: a reliable source of protein. Few large mammals are endemic to Hawaii; due to space restrictions and the geography of the archipelago there were no plains for grazing. The Hawaiians turned to the sea for sustenance. The sea would yield its bounty of fish, but only if the Hawaiians built the correct boat for the task. The Hawaiian fishing boat was made of a single dugout tree, with sewn planks attached above to increase the height of the ship. The other notable feature of the boat is the single large outrigger, called an “ama” in Hawaiian. In addition, the ship was equipped with both a mast and paddles. Sewn plank technology was the first form of ship fastening used throughout the world. A fiber braid called “sennit” was used to lash and sew the entire boat together. The finished boat was capable of fishing trips around the Hawaiian Islands but could never travel to a different island chain due to its small size and inability to carry provisions. Thousands of fishing boats, similar to the boat depicted in this model, were responsible for providing most of the protein to the Hawaiian Islanders.

The construction of the canoe started with the selection of the tree that would be dug out to form the base of the canoe. Hawaiians generally preferred to use the koa tree for this, although occasionally massive pine trees from Oregon would drift to Hawaii and be used (Dodd 1973). The koa tree has some properties that make shipbuilding difficult, as its density varies greatly,
both from tree to tree and even across the length of a single tree. Lighter density tree (30 to 45 pounds per cubic foot) was desirable in order to achieve the optimal balance of strength and buoyancy. Once the tree was selected and harvested, craftsman would use stone adzes (a tool similar to a pick) to hollow out the tree. The outrigger was made out of different type of tree. The wiliwili tree was desirable because of its low density (Holmes 1981). This enabled the outrigger to provide more flotation on the open seas. The float was generally fashioned into a slight convex curve in order to improve hydrodynamics, as is visible on the model. It is attached on the port side of the ship by the outrigger booms. In a fishing boat all of these components were built as lightly as possible. Speed allowed for net trolling fishing techniques to be used; slow boats cannot net troll because there is not enough force to keep the fish in the net.

The most crucial step in the construction of the canoe was to lash the ship together. Hawaiians used sennit braid for this task. Sennit cords were made from coconut fiber. Several of these cords were braided together to make the final lashing material (McCarthy 2005). The lashing had to withstand huge forces when the main hull and the float were torqued by the big waves of the Hawaiian waters. In this respect, sennit has a distinct advantage over iron fastenings. Sennit is able to stretch, thus allowing the hull to flex and bend. If an outrigger canoe were built rigidly it would quickly be dismembered. Sennit was used to fasten everything on the boat together. The planks had holes drilled in them, the sennit was led through the holes in a crisscross pattern and then tightened. The actual fishing boats would likely have used more sennit cord than was used on the model, especially at the critical linkage between the dugout tree and the planks. The disadvantage of this technique was that all the holes leaked slightly, even after they were caulked with gum or resin. The leakage was not a major problem due to the short
length of the voyage. Because the water leaked in relatively slowly it could be bailed out without incident.

A fishing boat would have used much less cordage than a voyaging boat. Sennit is an organic material that is not very durable – it had to be replaced about every two months, which is why it has been replaced by fishing line in modern times (Feinberg 1988). The Hawaiian fishing canoe did not have to be very durable, due to its short trips and proximity to shore, so it was lightly bound together. The cordage of the ship was so important that it took on a religious component. Hawaiians sometimes would leave sennit out to dry when their relatives left on a voyage. A priest would later uncover it, if the sennit was straight then the voyage had been made without incident. If the was crooked then a disaster had occurred at sea (D’Arcy 2006).

Both wind and muscle power were used to propel the fishing canoe. Hawaii has consistent trade winds, but occasionally they fail, this meant that ships were often paddled. One paddle, called a “hoe,” is found on the model. The mast stood next to the forward outrigger boot in the main hull. It was stepped on the hull bottom, but was also lashed to the outrigger boom for addition support. The rig on the boat is called a “crab claw” because of its distinctive shape, see Figure 1 below (Holmes 1981). The mast is vertical while the boom curves sharply upward, making the sail very deep. This type of rig maximized the space available on the canoe for people. The sails were made out of many sheets of leaves sewn together. Even though the sail on the canoe appears quite small, it would have been enough to provide adequate speed because of light design of the rest of the canoe.
Fig 1) Although the canoe is a modern fiberglass reproduction, the mast and sail are very realistic

Canoes very similar to the one depicted in this model enabled the development of complex Hawaiian cultures. Without them, there would not have been enough food to sustain a substantial population. The fishing canoe was tailored over the centuries to provide exactly what the Hawaiians required: speed and space to work. Space for provisions and the durability of the ship were sacrificed to achieve these ends.

Figure 2.) The model studied


Figure 1 from Wikimedia Commons

Figure 2 Photo by Author