

Excerpt from the National Geographic feature story “Forests of the Tide,” February 2007

On the east coast of Africa, a very different kind of mangrove experimentation is going on. In Hirgigo, Eritrea, a few miles down the coast from the port of Massawa, two men sit on planks on the hot desert sand. With a knife for a chisel and a rock for a hammer, they knock the bottoms out of empty tomato sauce cans - discards from the Eritrean Navy. Nearby, on the shores of the Red Sea, a group of women push the hollow cans into the soft sediment, forming long alleys on the mudflats. Into each can, the women press mangrove propagules.

This is the planting of the Red Sea, the brainchild of cell biologist, cancer-drug pioneer, and humanitarian Gordon Sato. In the early 1980s, Sato's laboratory at the University of California at San Diego developed Erbitux, a breakthrough drug for colorectal cancer. These days 79-year-old Sato works to cure a different disease - poverty - attacking the problem not by culturing cells but by cultivating mangroves.

Eritrea was reeling from war and famine when Sato first traveled there in the mid-1980s. Since water is such a scarce resource in the arid country, Sato wondered if he could develop some form of salt water-based agriculture on Eritrea's long coastline, to help provide food for the hungry. Mangroves seemed a logical, if unconventional choice. They occurred naturally, though patchily, along the Red Sea shore, they flourished in salt water, and camels were known to eat the leaves. If camels ate them, why not feed the foliage to sheep and goats? Grow enough mangroves, Sato reasoned, and you could provide food security for thousands.

So, like a maritime Johnny Appleseed, he began planting - and failed. All the saplings, died. Undaunted, Sato looked closely at places on the Eritrean coast where mangroves were growing naturally, and he noticed they occurred only where fresh water was channeled during the brief rains that fall on this desert coast. Sato reasoned it was not fresh water the trees needed but minerals the water was bringing from inland - specifically nitrogen, phosphorus, and iron, elements in which sea water is deficient.

By conducting a few simple trials, Sato and small team of helpers from the Eritrean Ministry of Fisheries assessed how much of the three elements mangrove seedlings needed and devised a low-tech method of supplying them. When the propagules are planted, a small piece of iron is buried alongside. So, too, is a small plastic bag with holes punched in it containing a fertilizer rich in nitrogen and phosphorus.

Now, six years on, 700,000 mangroves are growing on the formerly treeless shore of Hirgigo. Sato calls the project Manzanar after the World War II internment camp in the California desert where, during his teens, he and his family were relocated, along with thousands of other Japanese Americans. It was the memory of older internees there coaxing crops from the arid soil that inspired him all these years later.

At Sato's Manzanar many of the mangrove trees are now well above head height, and the yellow-green coats of ripe propagules are beginning to split open, showing the plump green leaves within. The mangrove mud is sprouting pneumatophores, as if

someone had sown a crop of pencils. Barnacles and oysters have started to settle on them, and crab and winkle trails crisscross the sediment. Plant a few trees, and you usher in an ecosystem. Build nature a house, and she makes it her home.

The home extends its influence out to sea. At the end of a long rock jetty, Ibrahim Mohammed Ibrahim peels off his shirt, winds it around his head, then steps into the water to check his net. He wades chest deep along it, feeling the mesh for fish and turning up a nice barracuda and a jack. He cleans them on the rocks, plunging them repeatedly, almost reverently, in the water.

Since planting began, Hirgigo's fishermen have started to catch small species such as mullet. Ibrahim put the equation simply: "No mangroves, no mullet." And the little fish that make the mangroves their home attract bigger, predatory fish - the kind that snag in Ibrahim's net and sell for good prices in the Massawa market.

On a pen on the outskirts of the village, a flock of sheep crunches mangrove propagules as if they were apples. Sato is using these animals to fine-tune the livestock-rearing side of the project. He has found that mangrove leaves and propagules, though highly nutritious, are not a complete stock food. Fish meal, which Sato is having made locally from fish processing, seems to provide the missing nutrients.

Outside the pen, donkeys nibble in the dust. The stubble of grass is so miserable and sparse it doesn't provide even the faintest green tinge to the parched earth. The nearby houses are nothing more than dusty improvisations of flattened iron, bits of cloth, and scraps of wood. Sato dreams of seeing a livestock pen beside every house. "In this country, a few goats can be the beginning of an empire," he says. "I want to give everyone his chance." Who would have imagined it: The mangrove, foundation of empires.

The town of Massawa recently celebrated the 15th anniversary of its liberation from Ethiopian forces - a David-and-Goliath struggle (as Eritreans tell it) in which the pride of the Ethiopian Navy was bested by a ragtag band of Eritreans in speedboats. A sign on a cafe shows a soldier in heroic pose and the slogan "Able to do what can't be done."

Out on the mudflats another old soldier is attempting the impossible: turning the tide of poverty by growing mangroves. The gardeners of Manzanar would be proud.