

Anthropology of Aquaculture

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A decorative graphic consisting of several parallel white lines of varying lengths, slanted diagonally from the bottom right towards the top right, set against a blue gradient background.

The Economist

AUGUST 9TH-15TH 2003

www.economist.com

Schwarzenegger to run

PAGES 11 AND 27

The gay-marriage debate heats up

PAGE 23

Terror in Jakarta

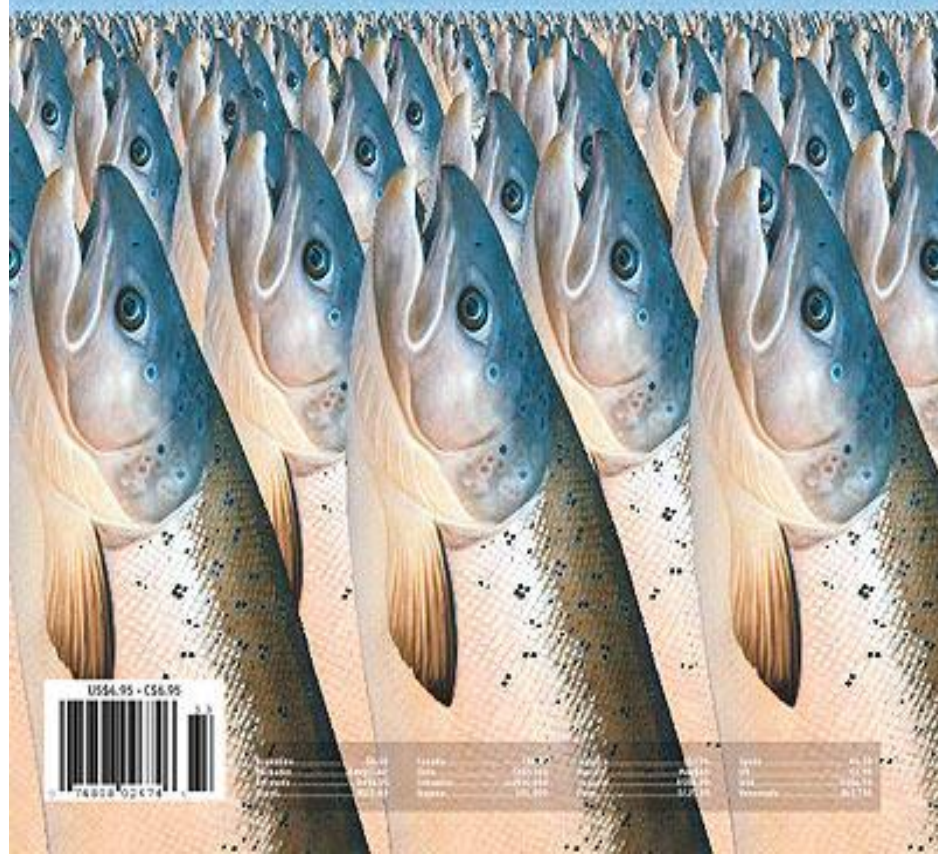
PAGE 32

How immigration is changing London

PAGES 10 AND 46

Blue revolution

The promise of fish farming



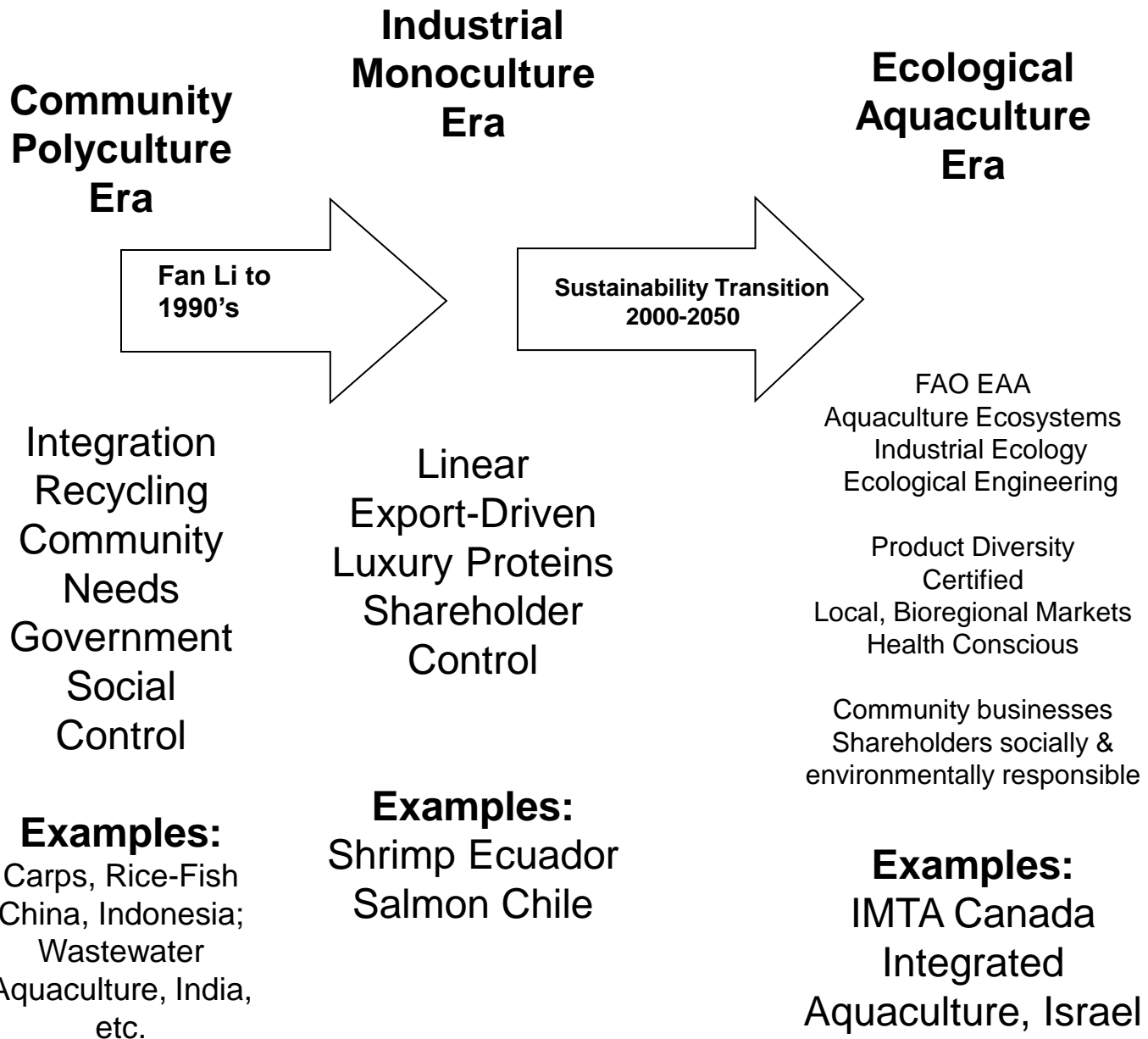
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It's *NOT* the "new"
Blue Revolution



China, Egypt, Australia ~ 8,000 to 4,000 y ago

Canada, NW USA ~ 2,000 y ago

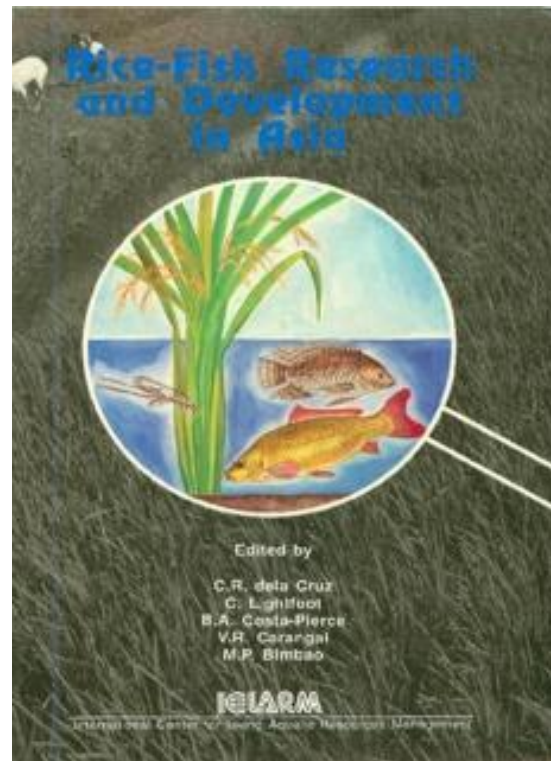
Bolivia, Mexico ~ 1,000-2,000 y ago

Cambodia, Indonesia ~ 1,000 - 1,500 y ago

Hawaii ~ 700 y ago

China (over 8,000 years ago)

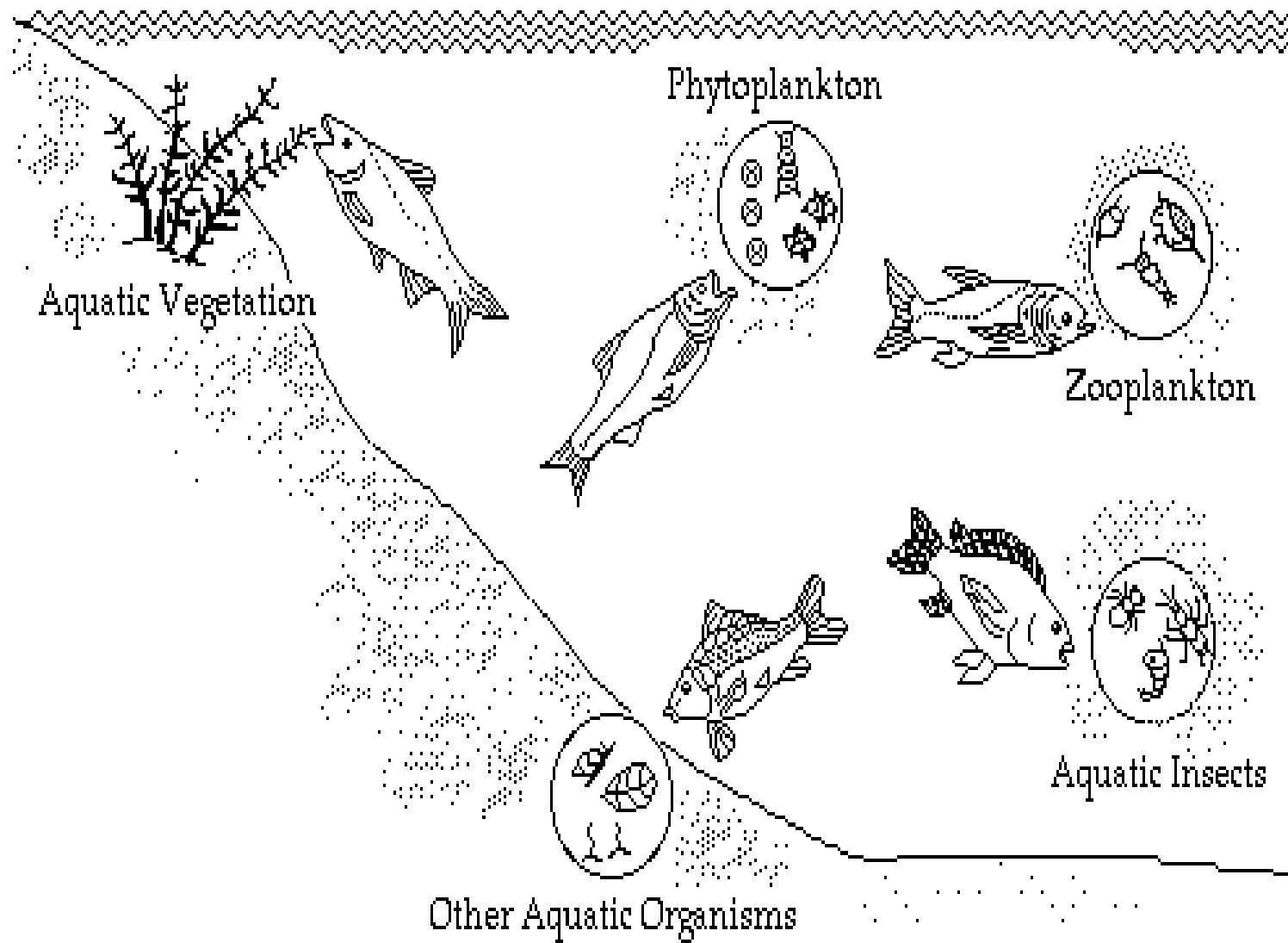
Tang Dynasty
evidence of the integration of fish and rice

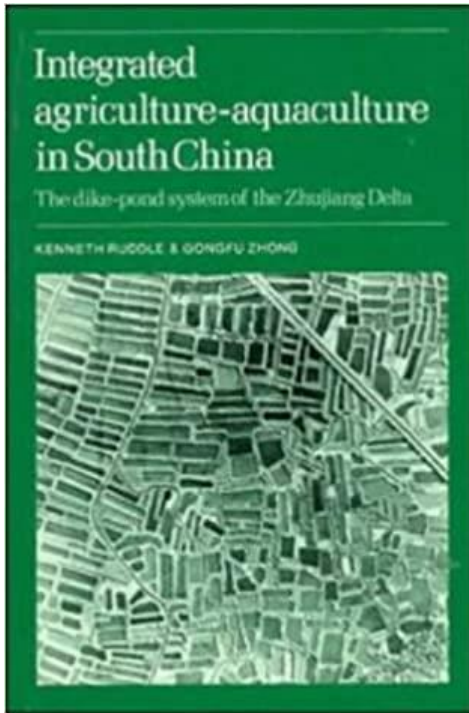


<https://books.google.com/books?id=5Fj15aiKlv8C&printsec=frontcover>

Fan Li, 470 B.C.

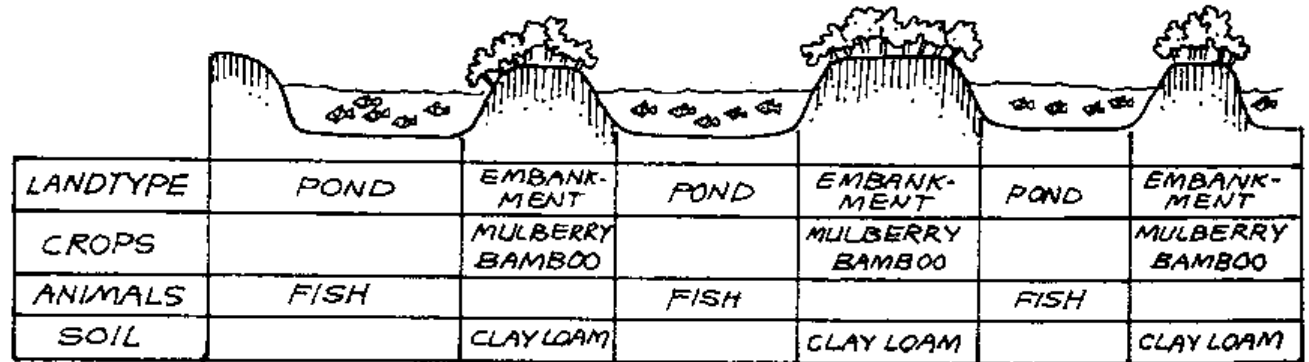






Ken Ruddle. 1988. *Integrated Agriculture-Aquaculture in South China: The Dike-Pond System of the Zhujiang Delta*

Mulberry-dike systems. Mulberries – silkworms – silk – pupa – rich muds – mulberry trees

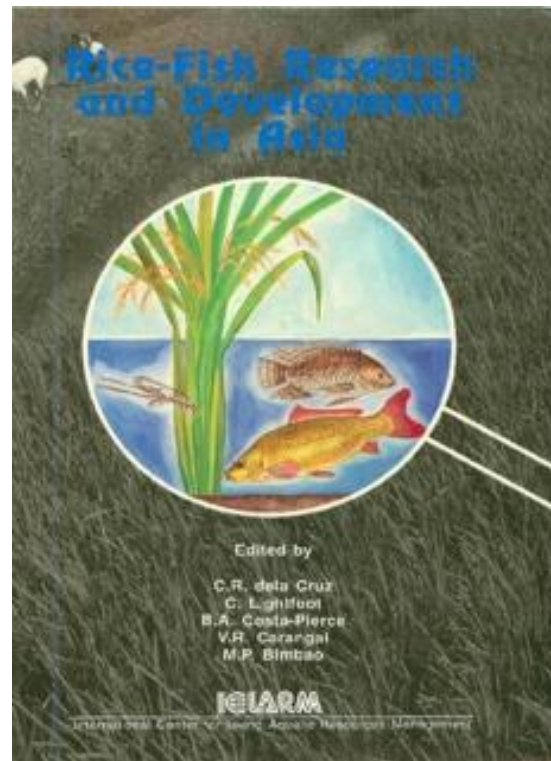


FAO “Globally Important Agricultural Heritage System”



China (over 8,000 years ago)

Tang Dynasty
evidence of the integration of fish and rice



<https://books.google.com/books?id=5Fj15aiKlv8C&printsec=frontcover>





Australia (over 8,000 years ago)

Gunditjmara people around Lake Condah farmed eels in an artificial system of ponds connected by canals which covered over 75 km²



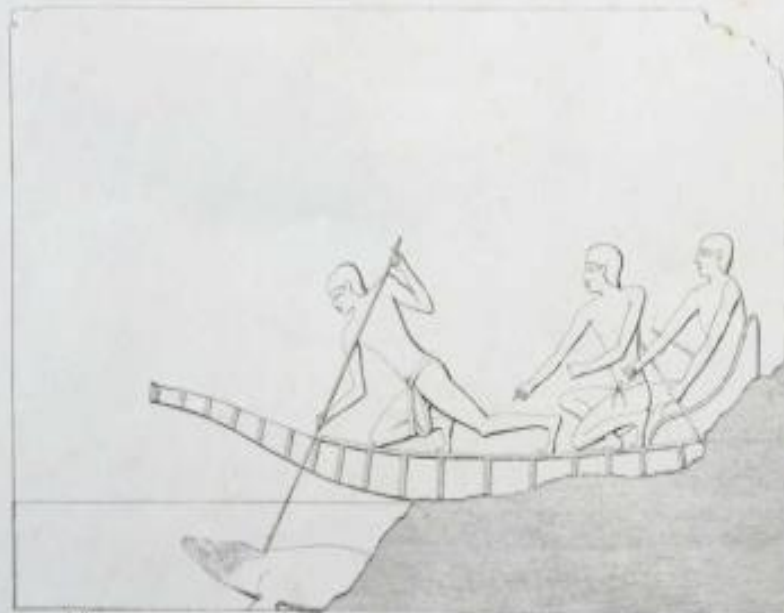






Budj Bim Cultural Landscape UNESCO World Heritage Site

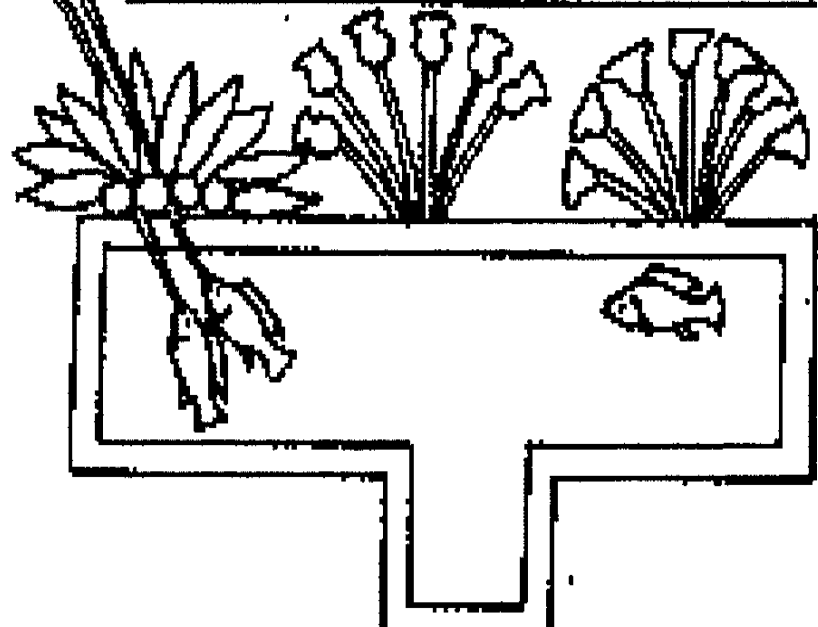
Egypt, ~ 4,000 y ago?



Sisma-Ventura, G. 2018. Tooth oxygen isotopes reveal Late Bronze Age origin of Mediterranean fish aquaculture and trade. *Nature Scientific Reports* 8: 14086.

Decorative frieze with hieroglyphs and symbols.

Vertical columns of hieroglyphs.

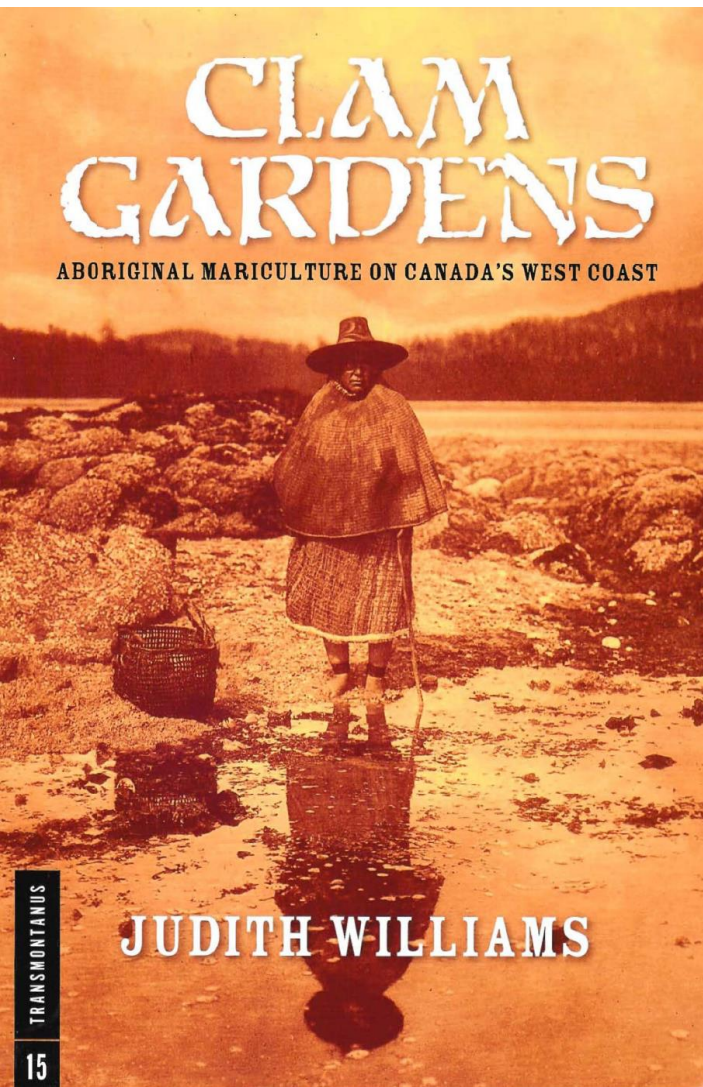




Canada 2,000 y ago?

Canada 2000 y ago?

*B. Reid
"Raven and First Men"*



**Ancient First Nation clam gardens in the
Broughton Archipelago cultivating butter clams**

Central/South America

Mexico

Bolivia

Venezuela

Columbia

Mexico

2,000 y ago?

Before it became the New World, the Western Hemisphere was vastly more populous and sophisticated than has been thought—an altogether more salubrious place to live at the time than, say, Europe.

C. Mann (2005) “1491: New Revelations of the Americas Before Columbus”



Llanos Region



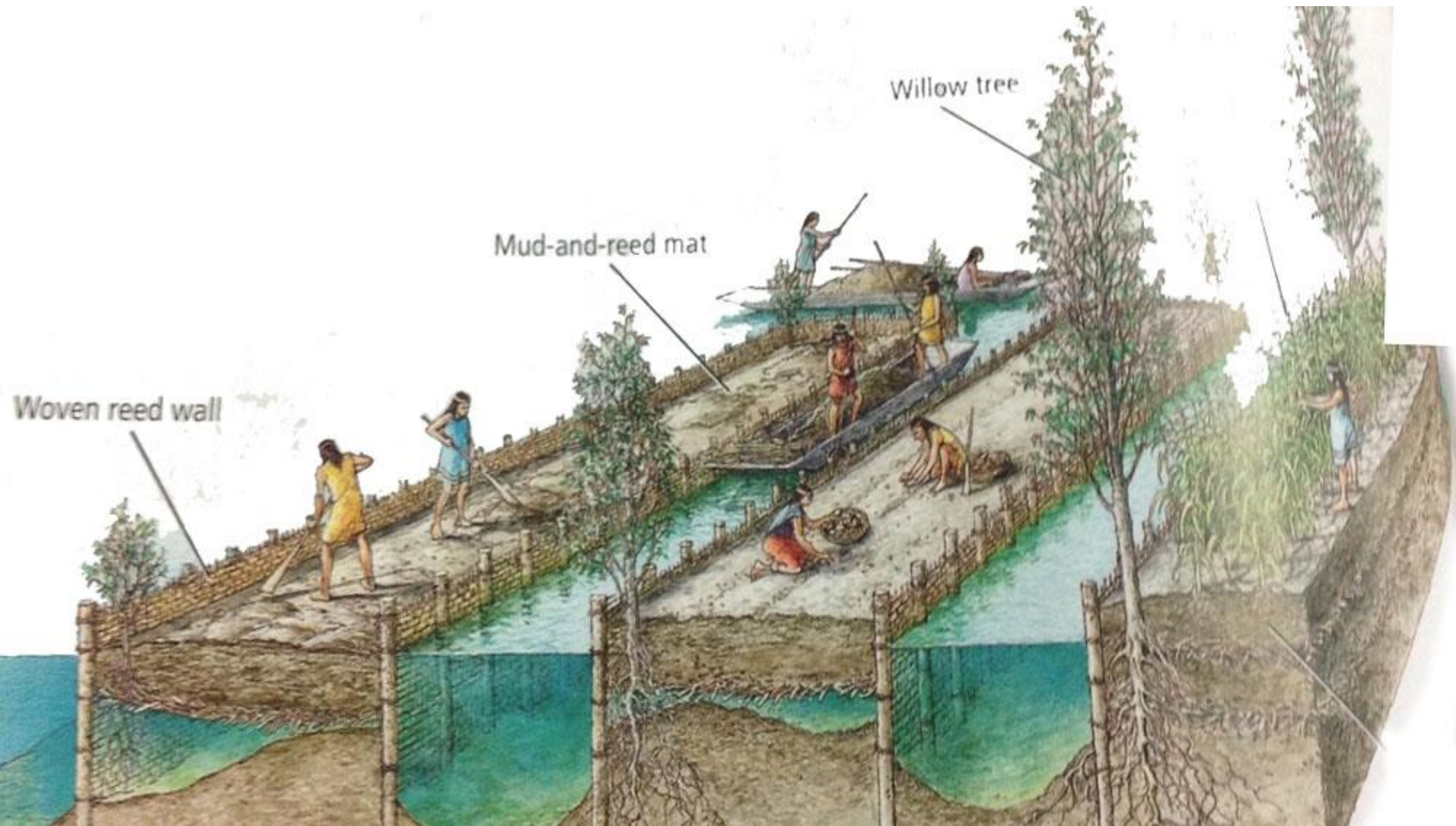
The Beni is ~30,000 square miles of raised agricultural fields integrated with fish/irrigation canals



Life in the Llanos. An artist's conception of a settlement in the Llanos de Mojos, some 2 millennia ago. (painting by Dan Brinkmeier)

Mann, C.C. 2008. Ancient earthmovers of the Amazon. Science 321: 1148 – 1152.

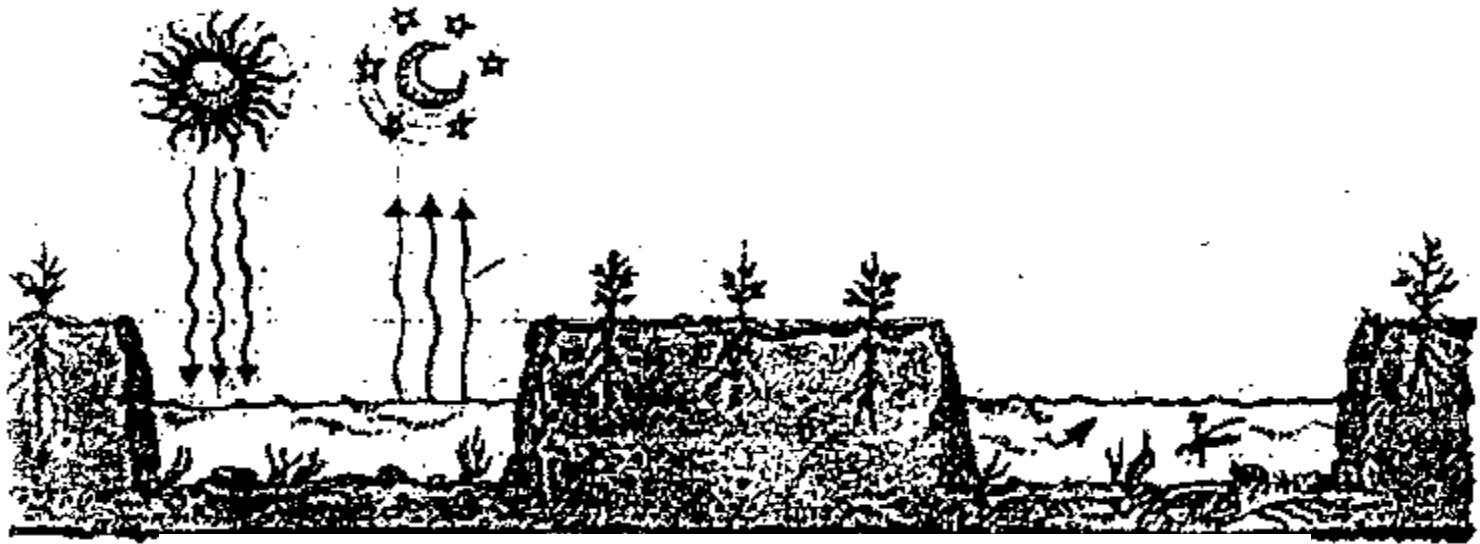




Willow tree

Mud-and-reed mat

Woven reed wall

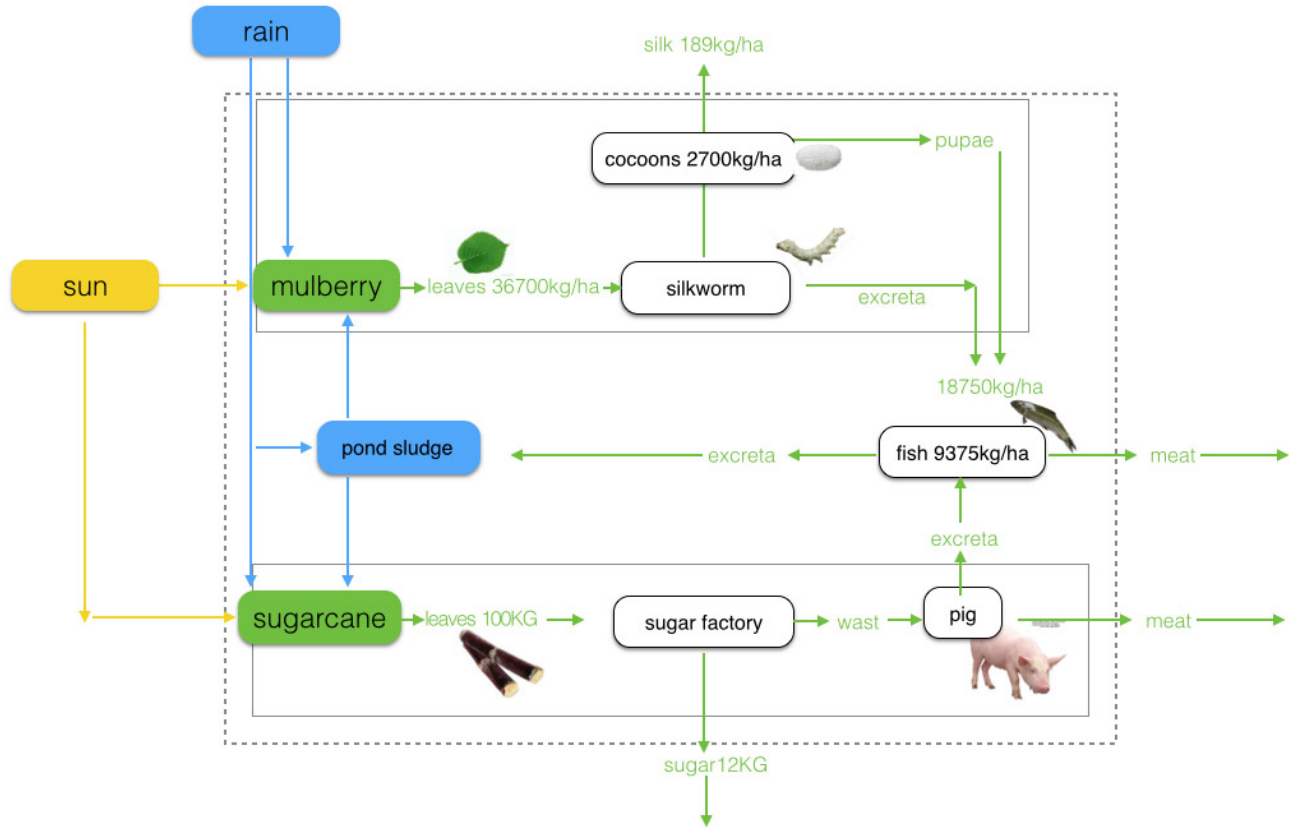


Re-Creating Prehistory: A patchwork of ancient raised fields (above). Clark Erickson's team and local farmers studied how such fields work by erecting their own (below) (Photographs by C. Erickson)



Cambodia, Indonesia ~ 1,000 - 1,500 y ago?

The Mulberry Dyke Fish Pond Complex



RESOURCE

<http://pub.iges.or.jp/contents/APEIS/RISPO/inventory/db/pdf/0152.pdf>

<http://collections.infocollections.org/ukedu/en/d/Jii23we/5.2.html>

by JILLIAN CHEN





Tonle Sap Lake Cambodia







Europe

(Etruscans and Romans 2100-2200 y ago?)



Europe

(Etruscans and Romans 2100-2200 y ago?)

Start of “vallicoltura” coastal aquaculture by the Etruscans
on Adriatic and Tyrrhenian coasts
Roman literature describes that fish in ponds was
commonplace



Sluice gates let the water go back to the river but equipped with mesh so carp won't escape.

Fishing Ground

Deep part of the pond where carp stay when the fishermen empty the pond (also called the fishing pan).

Pond causeway

Barrier of land made around the lowest part of the pond to retain the water.

Silt ground

Part of the pond full of silt where carp love to feed and linger.

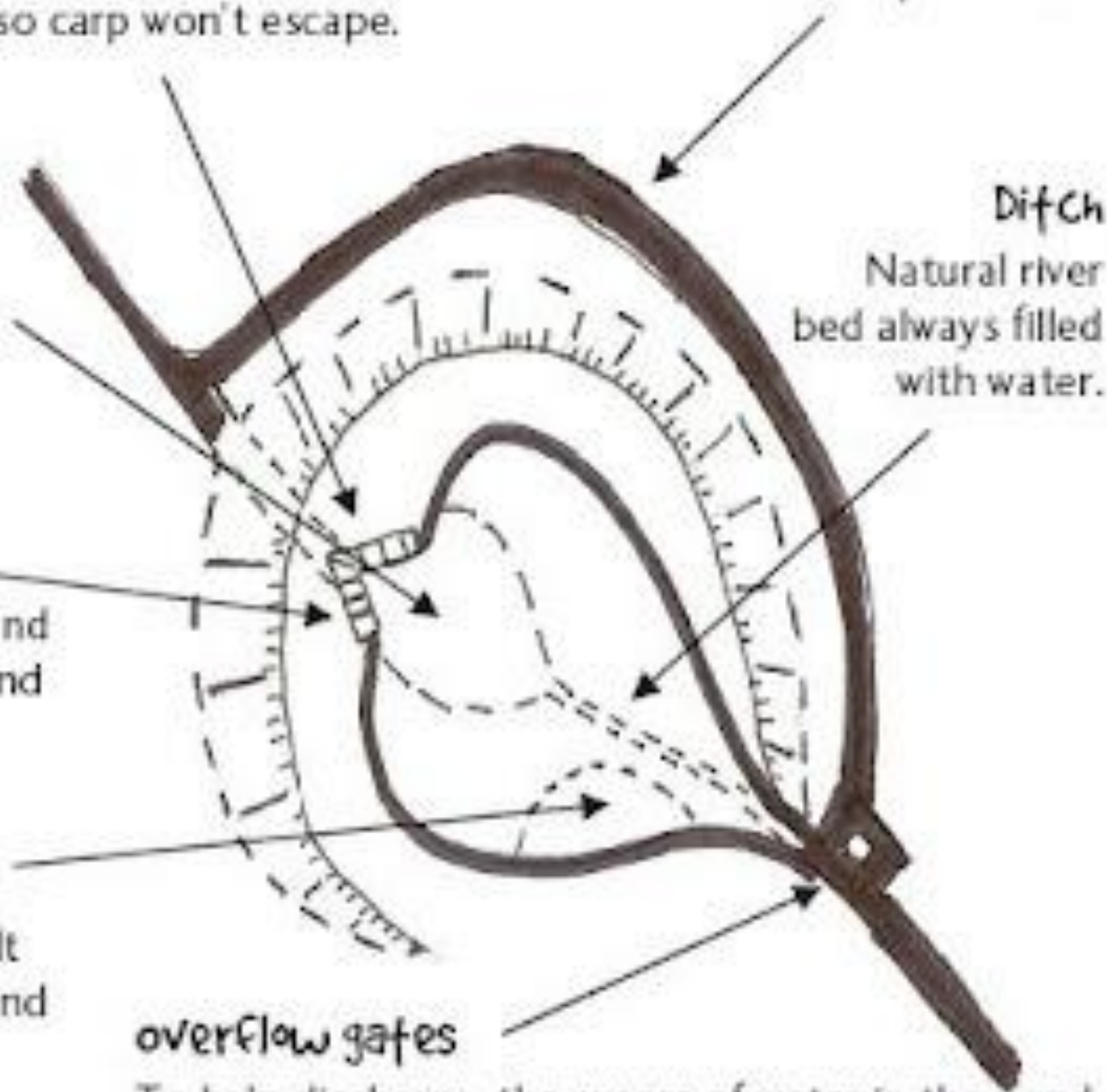
Diverfed River

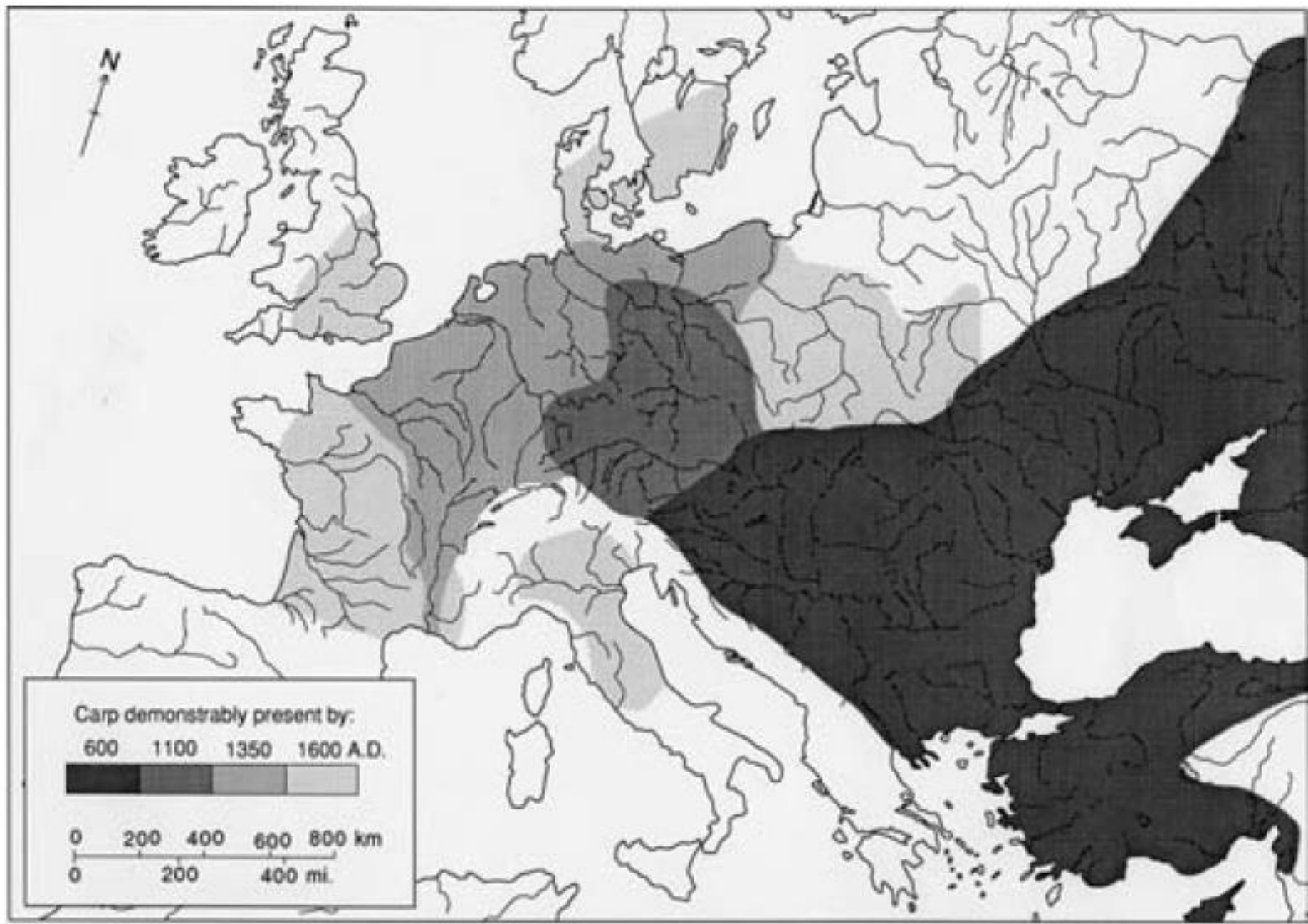
Ditch

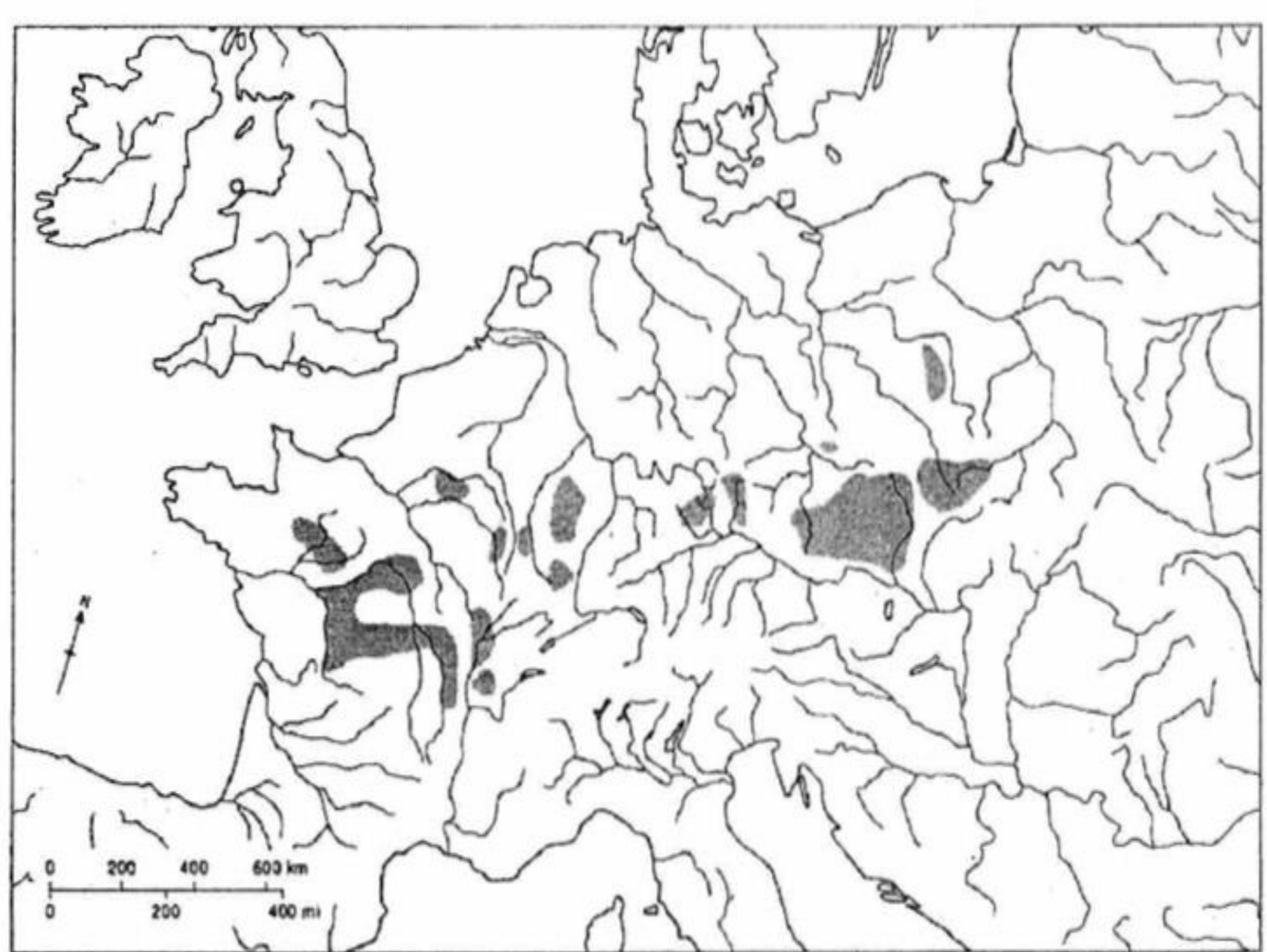
Natural river bed always filled with water.

overflow gates

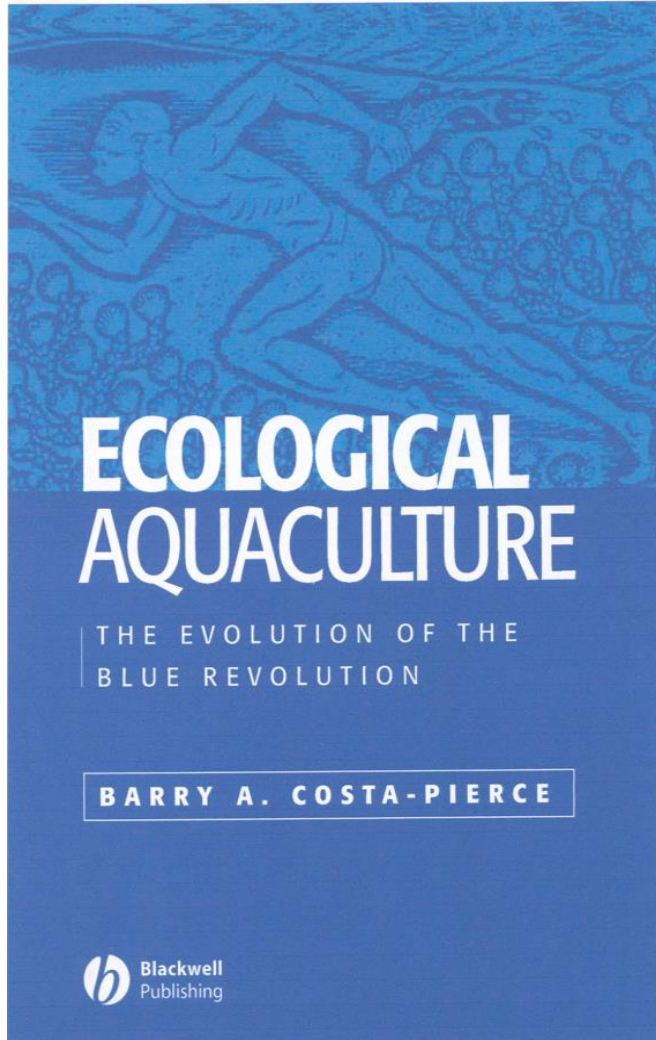
To help discharge the excess of water in the pond







Hawai'i ~ 700 - 1,000 y ago?

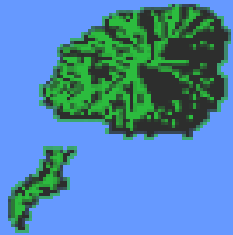


Costa-Pierce, B. 1987. Aquaculture in ancient Hawaii. BioScience 37: 320-331.

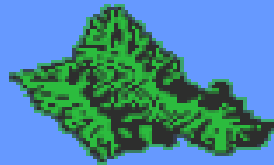
Costa-Pierce, B. 2002. The ahupua'a aquaculture ecosystems in Hawaii, p. 30-43. Blackwell Science, Oxford, UK.

HAWAIIAN ISLANDS

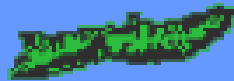
Kauai



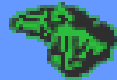
Oahu



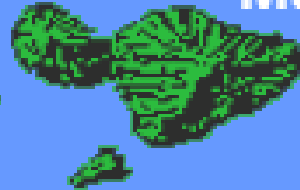
Molokai



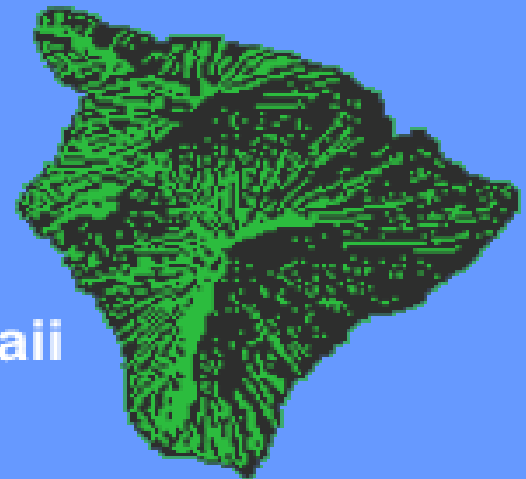
Lanai

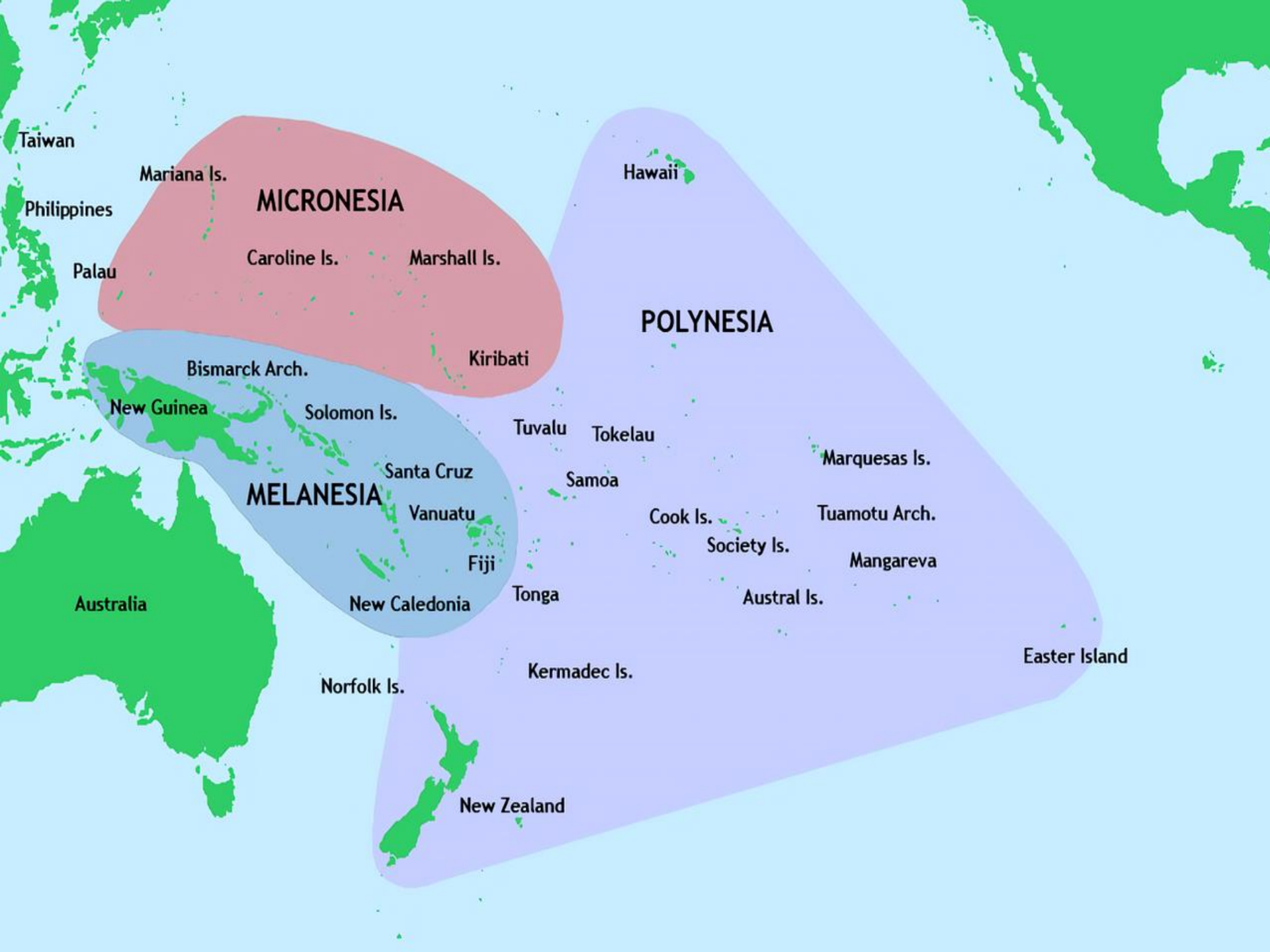


Maui



Hawaii





MICRONESIA

Mariana Is.

Caroline Is.

Marshall Is.

Palau

Kiribati

Hawaii

Bismarck Arch.

New Guinea

Solomon Is.

Tuvalu

Tokelau

Marquesas Is.

MELANESIA

Santa Cruz

Samoa

Vanuatu

Cook Is.

Tuamotu Arch.

Fiji

Society Is.

Mangareva

New Caledonia

Tonga

Austral Is.

Australia

Norfolk Is.

Kermadec Is.

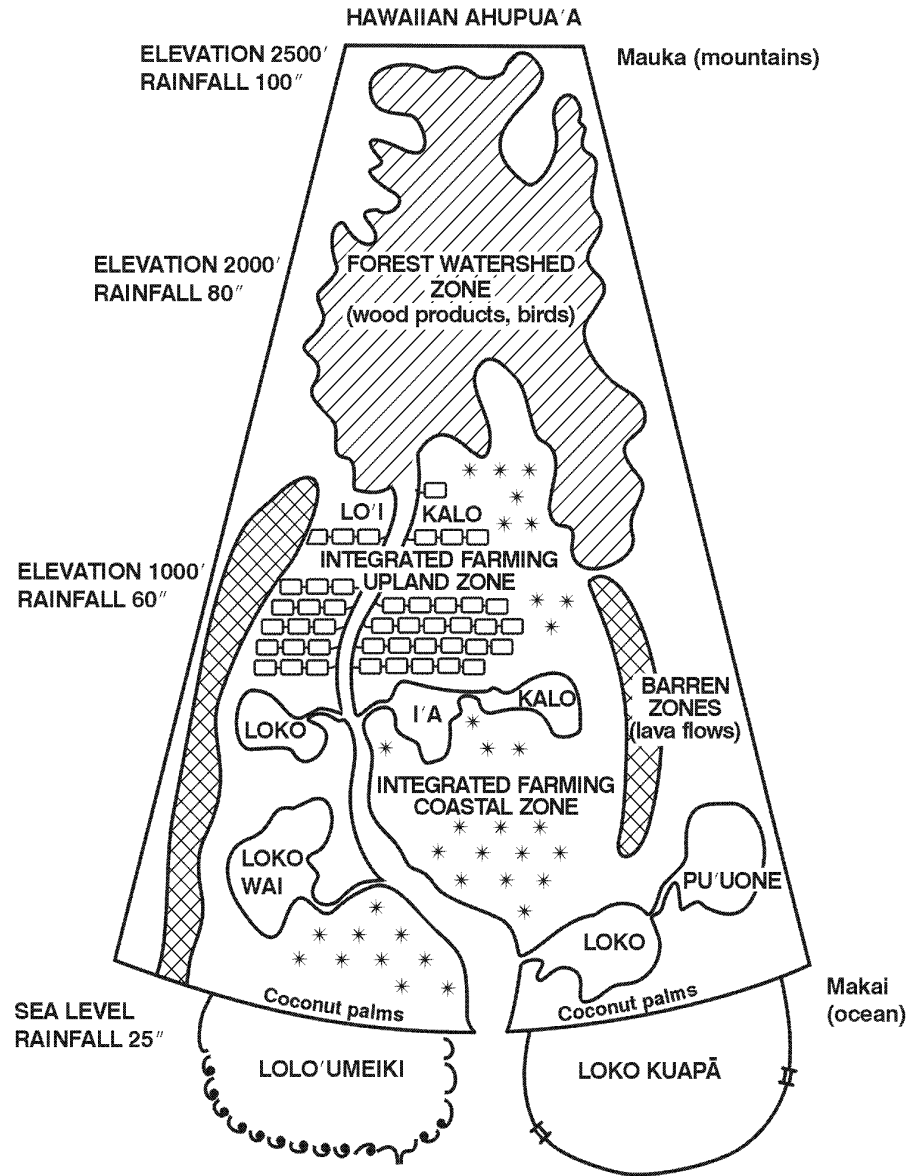
Easter Island

New Zealand



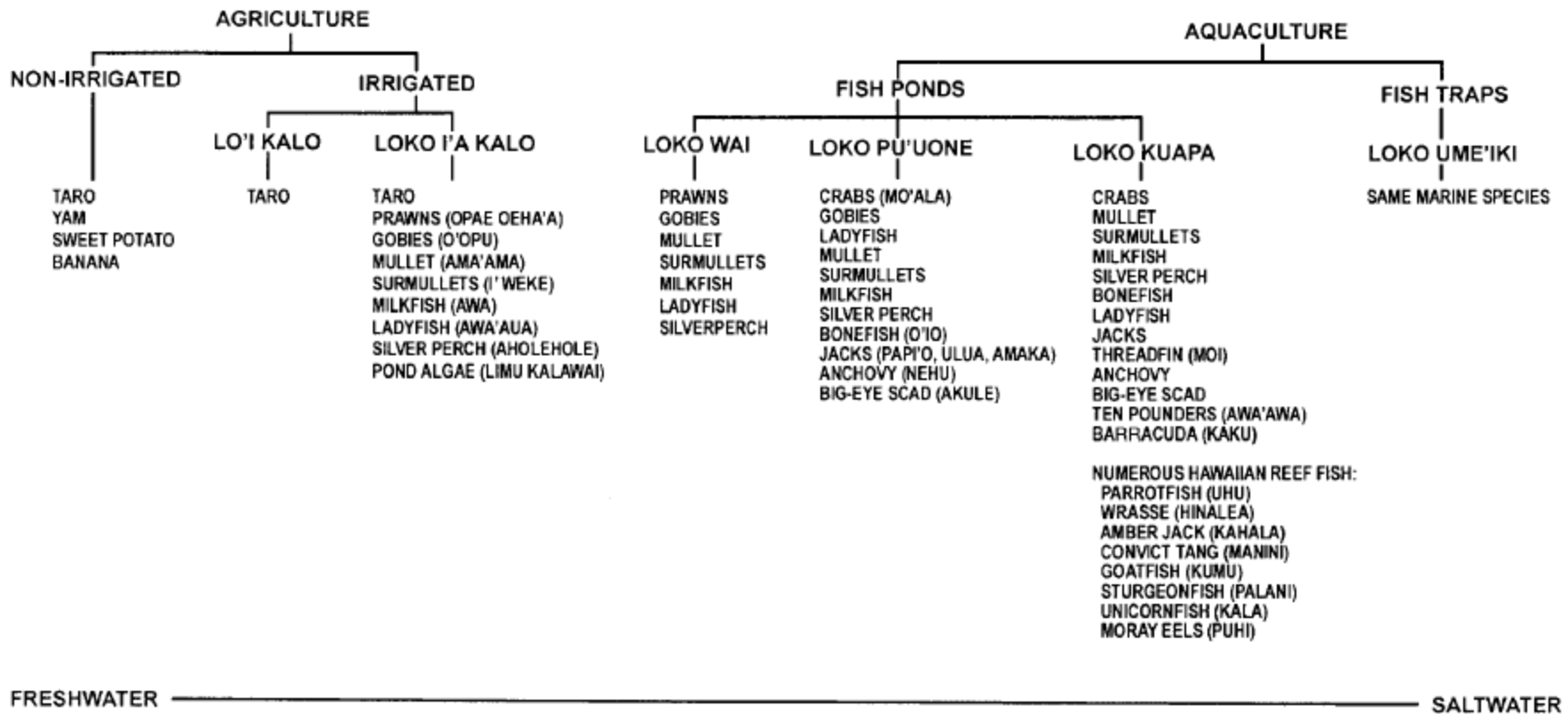


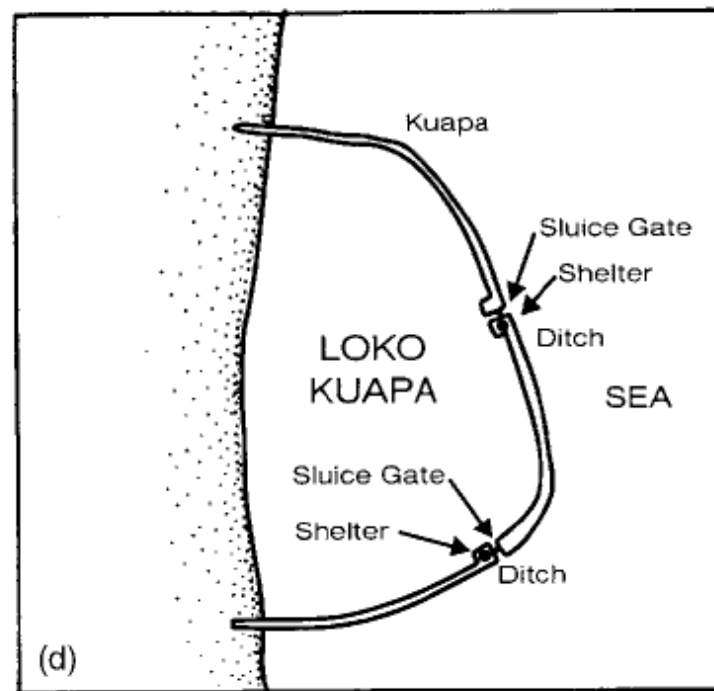
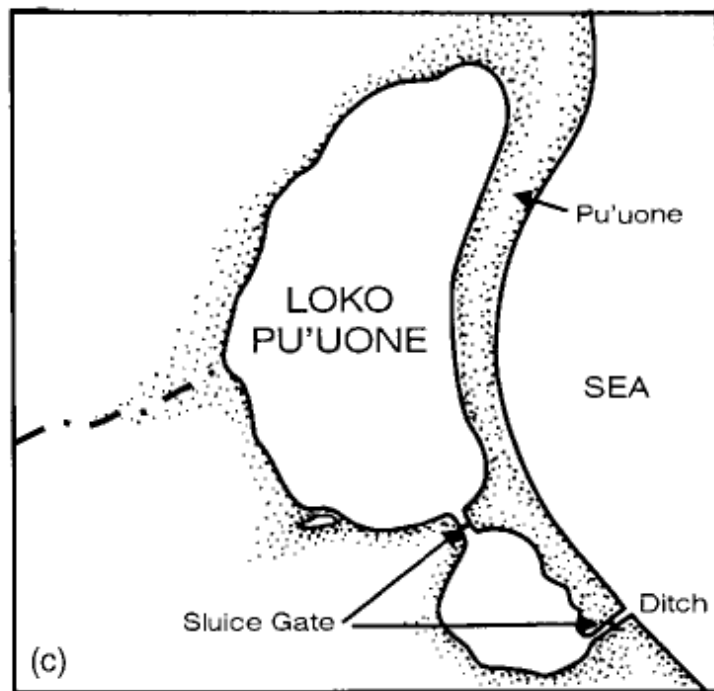
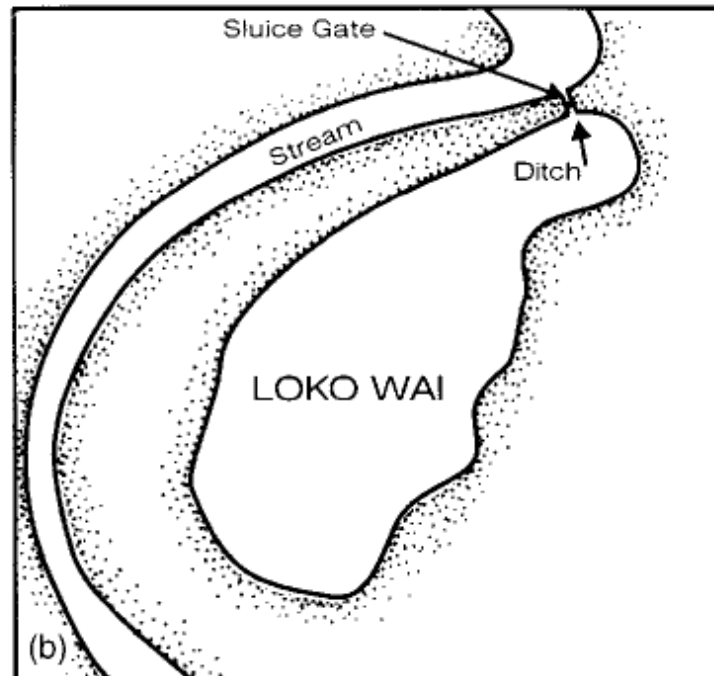
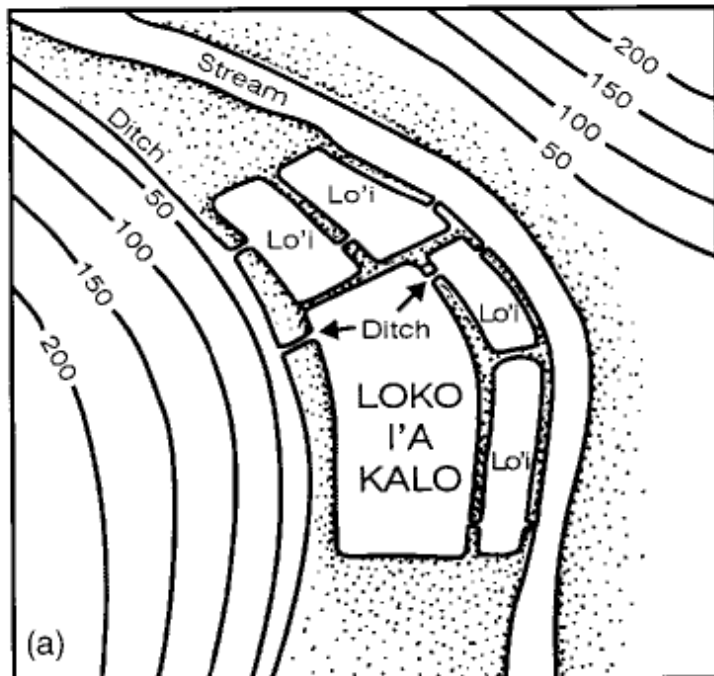
Photograph courtesy of Bruce Lum, Kamehameha Schools



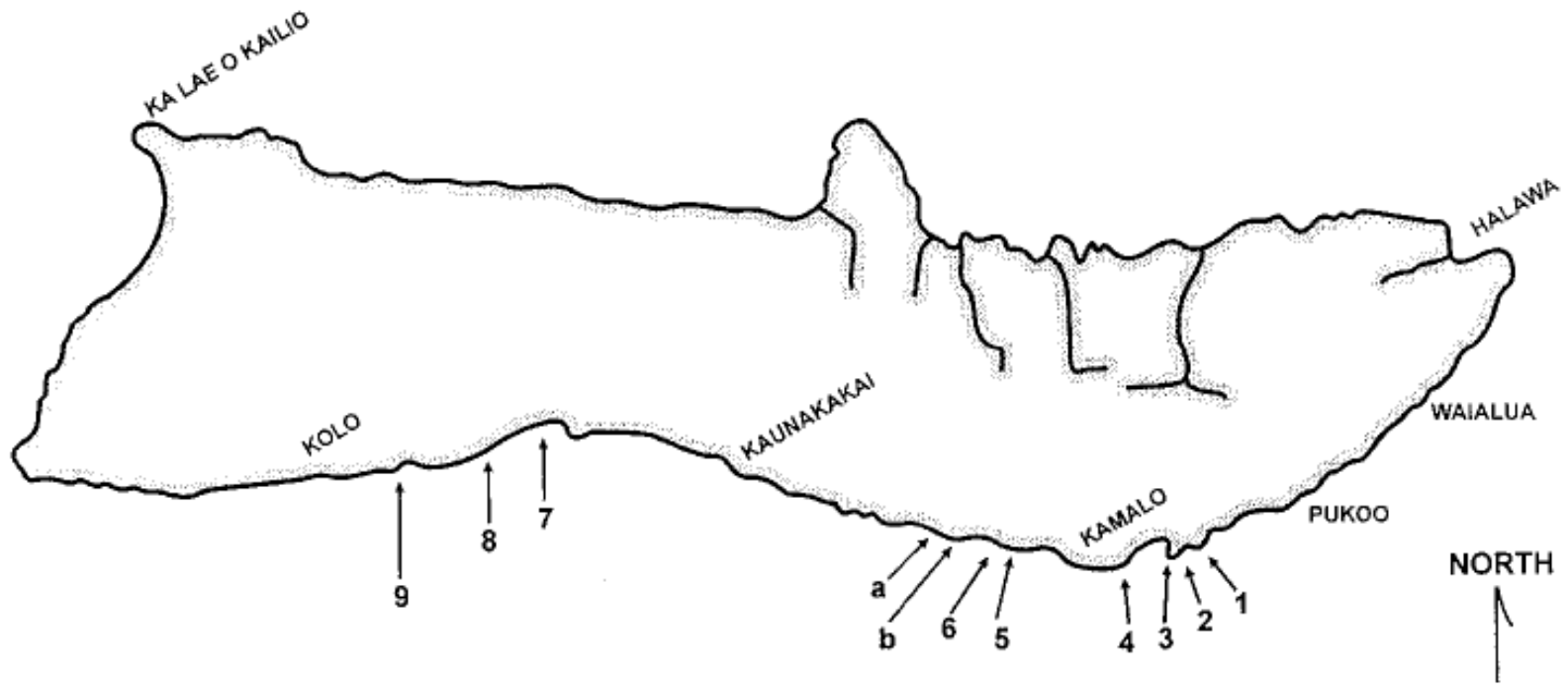
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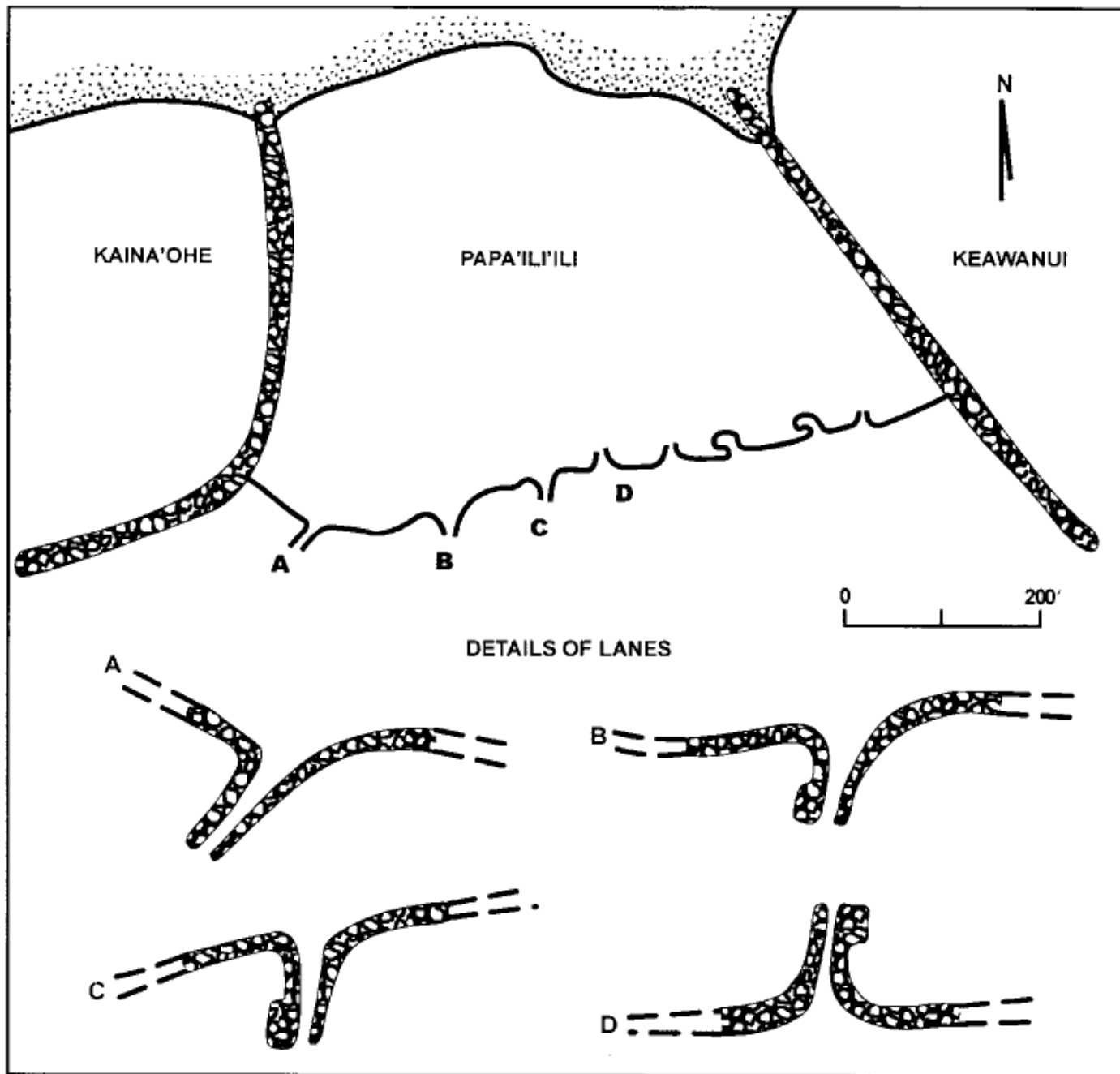
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‘Such was the case of Mikiawa Pond at Ka’amola, Molokai. When the tide was coming in, the people of Keawanui could use the lanes. When the sea ebbed, the fish belong to Ka’amola.’

Timoteo Keaweïwi, 1853,
Foreign Native Testimony Book 16, State of Hawaii Archives,
Honolulu, Hawaii (Summers, 1964)

The Island of
O'ahu
 The Heart of Hawai'i.



‘The whole distance to the village of Whyeete is taken up with innumerable artificial fishponds extending a mile inland from shore, in these the fish taken by nets in the sea are put, and though most of the ponds are fresh water, yet the fish seem to thrive and fatten. . . . The ponds are several hundred in number and are the resort of ducks and other waterfowl’

T. Bloxam, British naturalist on *H.M.S. Blonde* describing Waikiki in 1825 (Handy & Handy, 1972).

The top half of the book cover features a blue-toned illustration of a swimmer in motion, with a background of circular patterns resembling bubbles or water ripples.

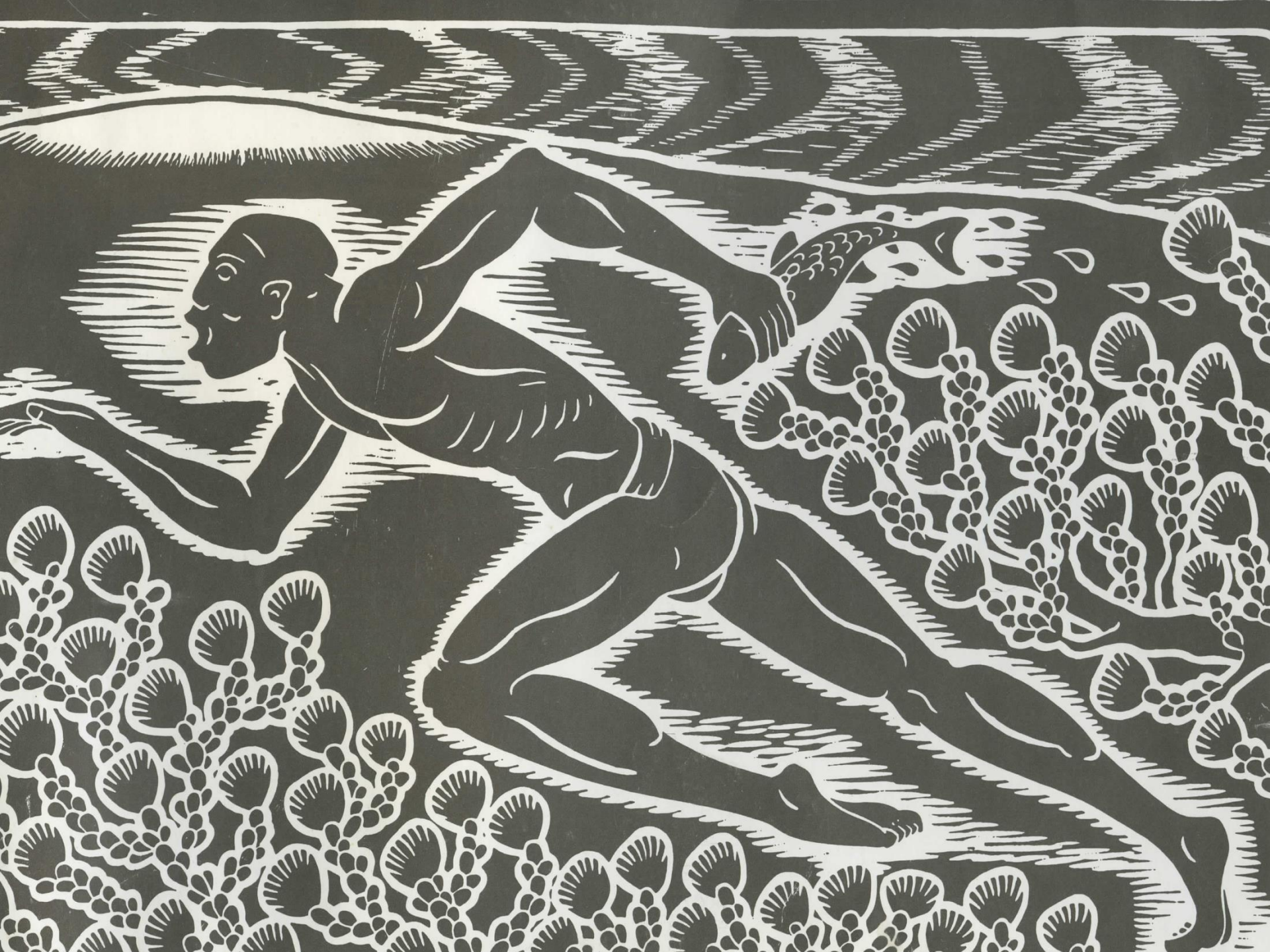
ECOLOGICAL AQUACULTURE

THE EVOLUTION OF THE
BLUE REVOLUTION

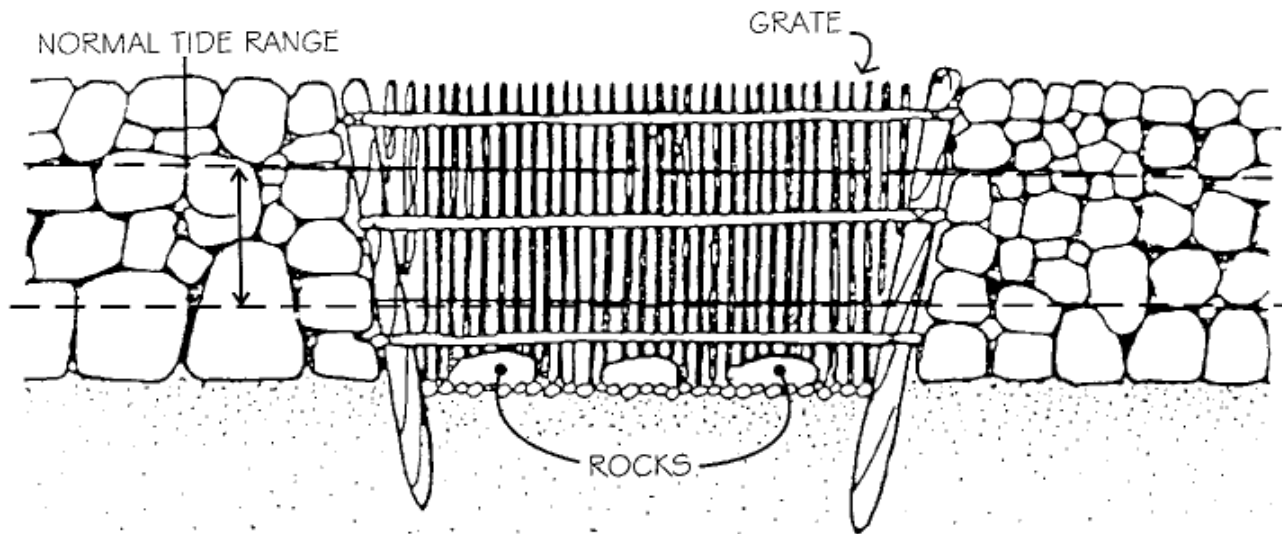
BARRY A. COSTA-PIERCE

 Blackwell
Publishing

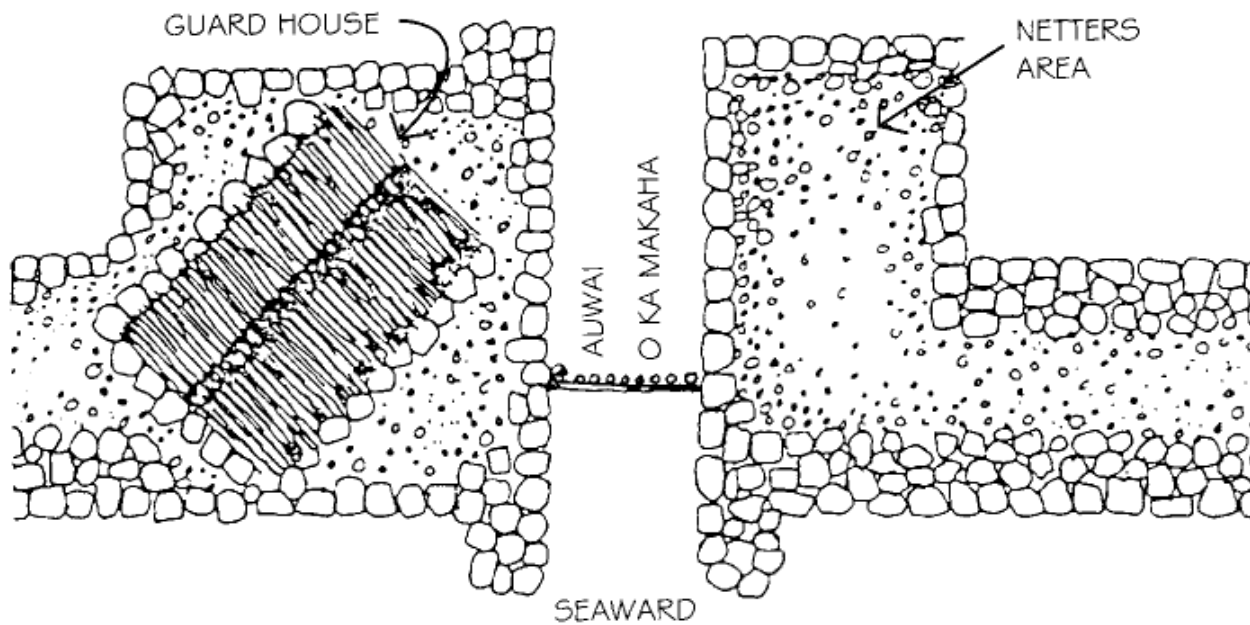
MAKO A







VIEW OF MAKAHA FROM SEAWARD

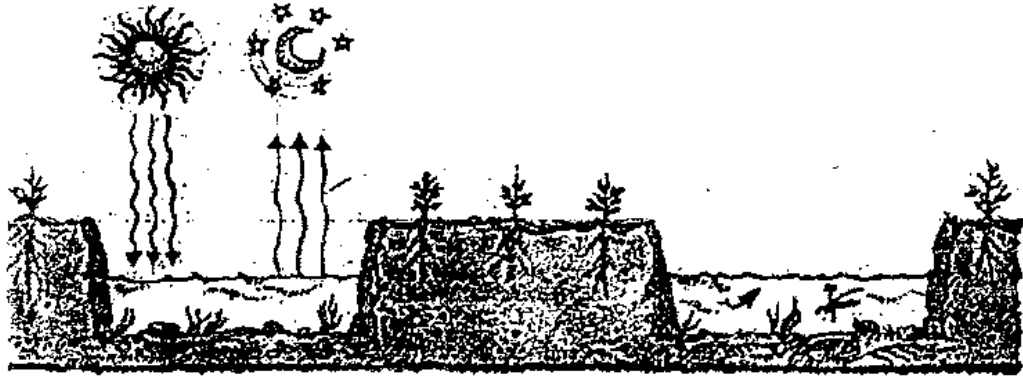


‘When the keeper of the pond wished to remove some fish, he would go to the *makaha* (grate) while the tide was coming . . . the keeper would dip his foot into the water at the *makaha* . . . and if the sea pressed in like a stream and felt warm, then he knew that the sluice would be full of fish. The fish would scent the fresh sea and long for it! I have seen them become like wild things. At a sluice where the fish had been treated like pet pigs, they would crowd to the *makaha* where the keepers felt of them with their hands and took whatever of them they wanted.’

S.M. Kamakau, 9 December 1869.

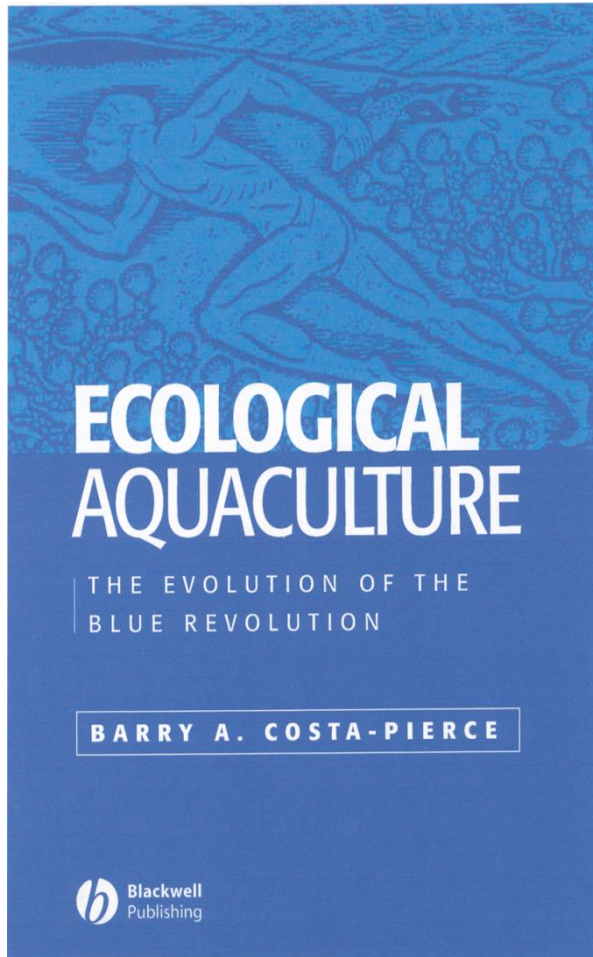
Translated from a Hawaiian Newspaper, *Ke Au 'Oko'a* (Kamakau, 1976)

An Ancient Wisdom...



Aquaculture revolutions are not new.

*Aquaculture is an integral part of our
planetary wisdom
and cultural heritage...
an essential part
of our past...
and a vital part of our future...*



夢

Roberts, S.E. (2008). Esteeme a Little of Fish: Fish, Fishponds, and Farming in Eighteenth-Century New England and the Mid-Atlantic. *Agricultural History* 82(2): 143-163 <https://www.jstor.org/stable/20454815>

The late pioneering anthropologist, Claude Levi-Strauss, brought the idea of “structuralism” to anthropology (Levi-Strauss, 1958)

The concept is that societies throughout history follow **universal patterns of behavior.**

My theory on the evolutionary, “social ecology” of aquaculture that —

whenever the demands of seafood-eating peoples exceed the abilities of their indigenous aquatic ecosystems to provide adequate aquatic resources for them, these cultures, throughout the world, develop aquaculture.