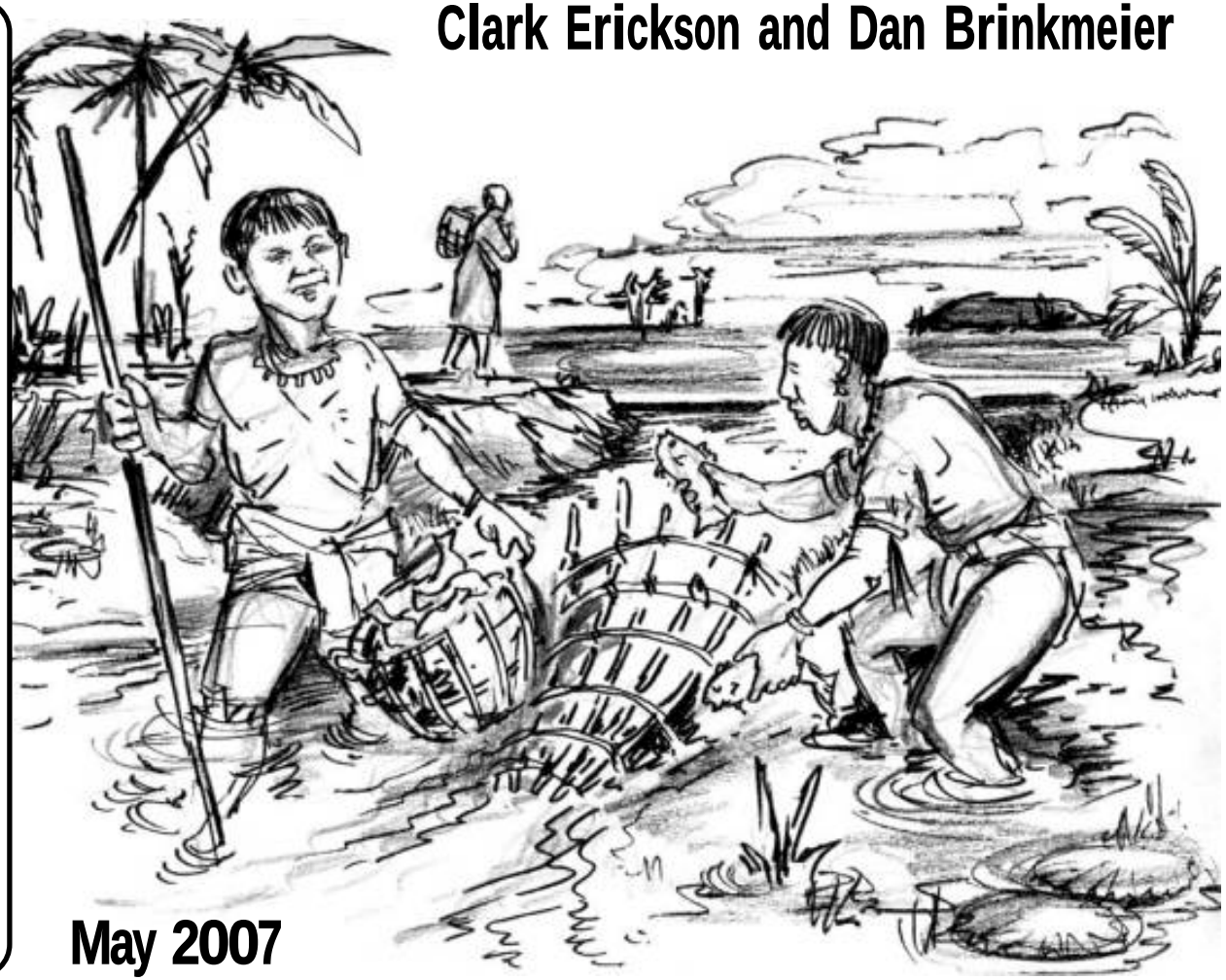
PreColumbian Fishermen of the Bolivian Amazon

Indigenous Technology and the Transformation of the South American Landscape

Clark Erickson and Dan Brinkmeier

Learn how—

- Indigenous cultures built amazing cities in the savannas and rainforests of the Amazon
- PreColumbian cultures managed aquatic resources so that they could support large populations
- How archaeologists help us to interpret and learn about the past
- Examples of fishing techniques used by contemporary people living in South American rain forests



May 2007

The Beni Agro-Archaeology Project—University of Pennsylvania and The Field Museum with the Foundation for Science and Sustainable Development of The Beni

Harris Loan Program—The Field Museum

The Field Museum

1 In this booklet, you can learn—

—about more than 500 square-kilometers of artificial earthworks used by preColumbian cultures in Bolivia to fish, enhance, and manage their wetland resources long before the Spanish Conquest. Discovered by American and Bolivian archaeologists, the earthworks covered an area equal in size of the City of Chicago.

Where did this happen?
The eastern tropical lowlands of Bolivia, South America.
The region, known as the ***Llanos de Moxo***s, is characterized by savannas or ***pampa***, wetlands, and tropical forest.

Who did this?
The Native people, the Baure, built a vast network of fish weirs, ponds, canals, and causeways to harvest fish and other aquatic resources. This was a *preColumbian culture*, a term applied to native people living in The Americas before the Spanish Conquest.

When did this happen?
The earthwork complex was probably built and used in late prehistory and during the early colonial period (around AD 1300-1700).

Why is this imporant?
The availability of protein is considered by some scholars to be a "limiting factor" in settlement and cultural development in the Amazon, in that early cultures supposedly could not obtain enough food to develop large villages and support huge populations. People living in Bolivia more than a thousand years ago transformed their landscape into a large artificial fishery so that they could efficiently harvest and manage aquatic resources and support a large populations.

The Baure fish weirs are a remarkable example of indigenous knowledge and technology. We can learn about sustainable land use from this past culture, and help us to better-use resources in the Amazon today.

This story takes place in the Amazon, in an area known as the Llanos de Moxos in central Bolivia—

People have lived in the Amazon for at least 11,000 years. Prior to European contact, between three and five million people thrived in the Amazon region, an ecologically diverse land of 2.5 million square miles, home to lush rainforests, savannas, wetlands, and an incredible diversity of plants and wildlife.

Today, fewer than 100,000 Amazonian Native people survive. Their cultures threatened by uncontrolled development, illegal logging and deforestation, abuses by colonists, and mining and petroleum companies. In effect, Native cultures are fighting for their cultures, their land, and lives.

The Amazon River

The Amazon River drains nearly 3 million square miles of the South American continent. The Amazon Basin is equal in size to the lower 48 states in the U.S.

The Amazon Basin

3 The area in Bolivia known as the LLanos de Moxos, and its wetlands and savannas, was once the home to hundreds of thousands of people, who built elaborate systems of earthworks, mounds, causeways, and systems for raising food and using aquatic resources.

The wetland savannas of Bolivia were our home!

Indigenous cultures in the Bolivian Amazon began building textensive systems fo earthworks nearly 3,000 years ago. As their populations grew, how did they provide enough food?

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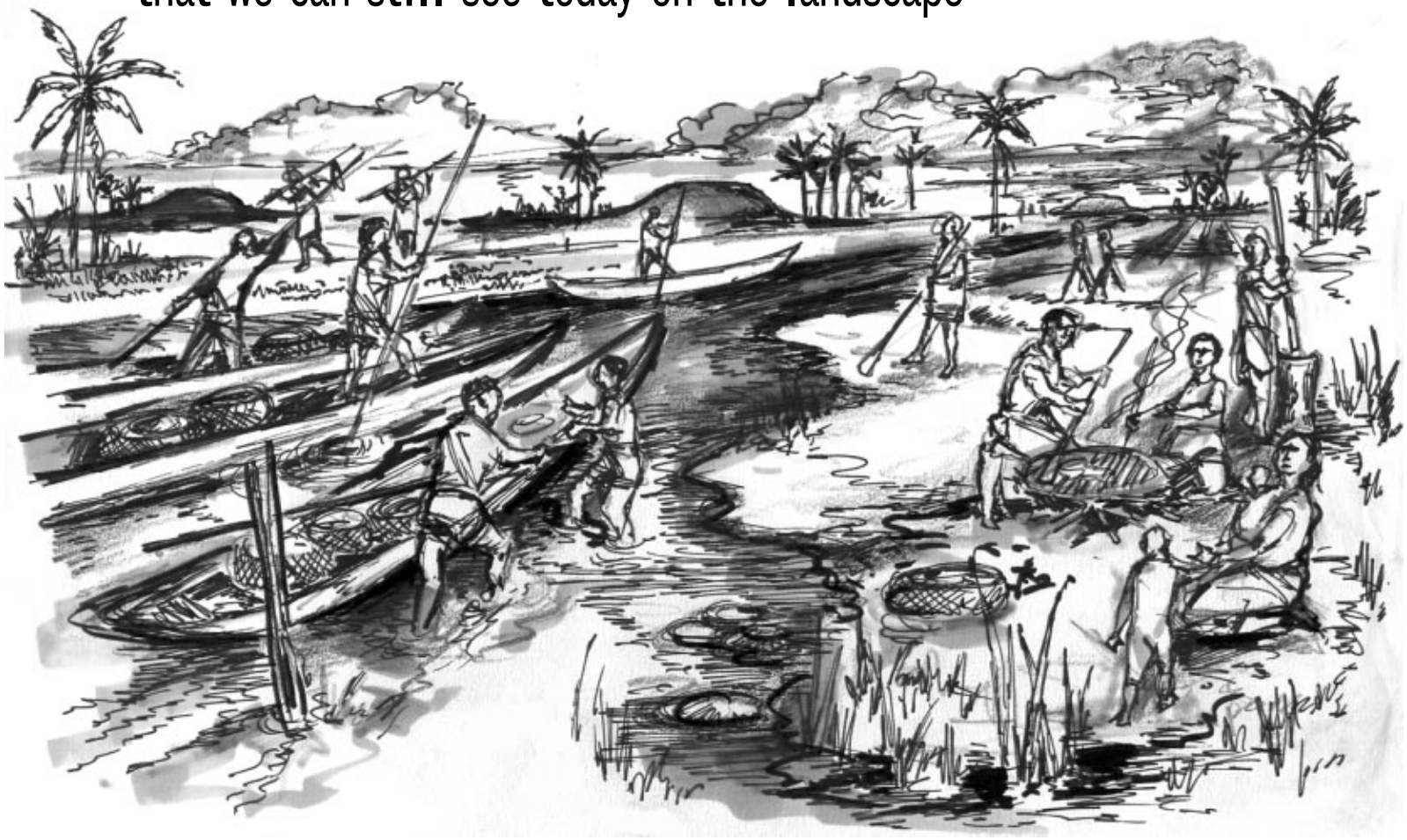
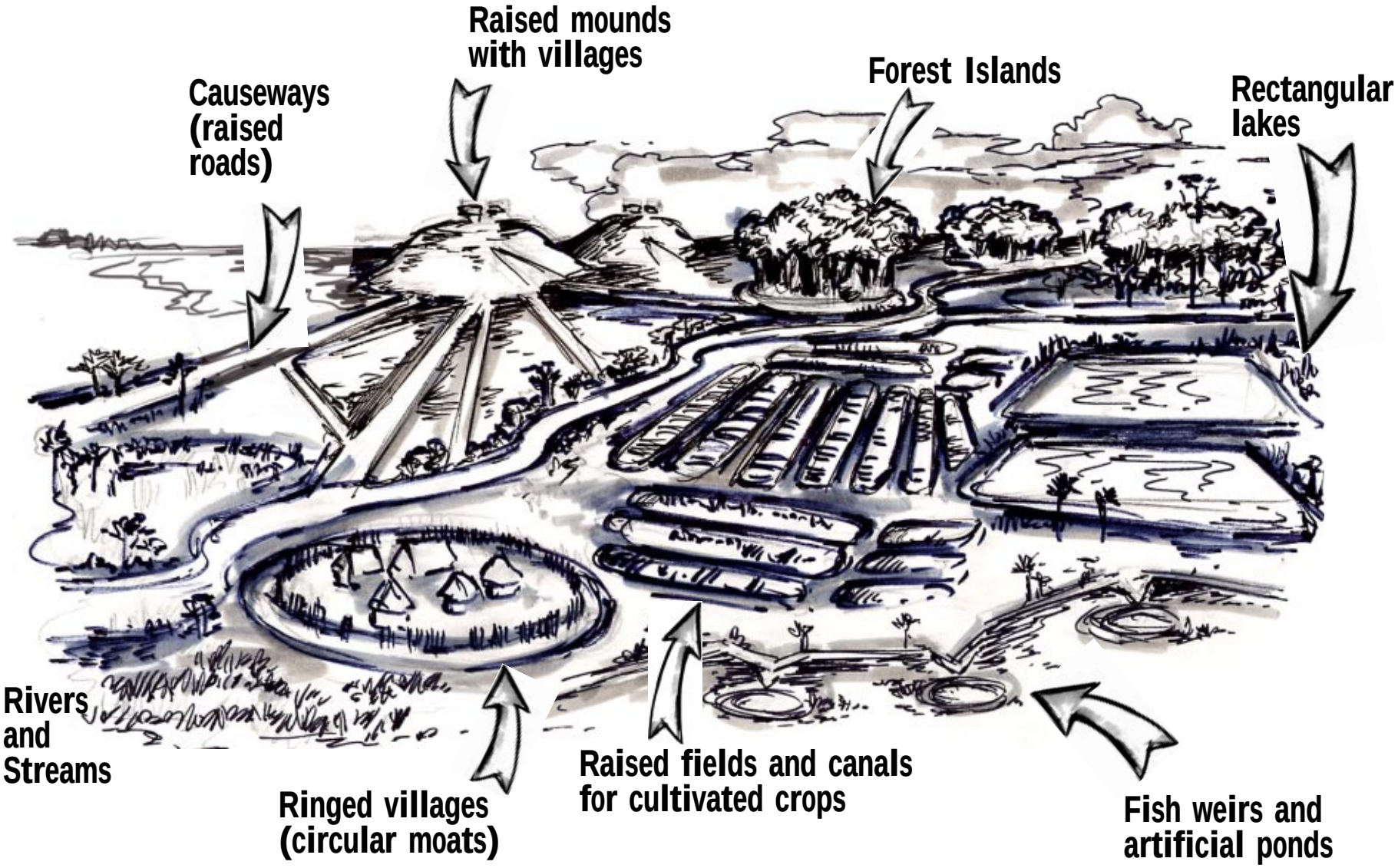
- They raised crops on elaborate systems of “rasied fields”
- They hunted in managed forests and forest islands
- They fished extensively, and later developed the system of fish weirs that we can still see today on the landscape



PreColumbian Fishermen of the Bolivian Amazon— The Harris Loan Program, The Field Museum, Chicago 2007

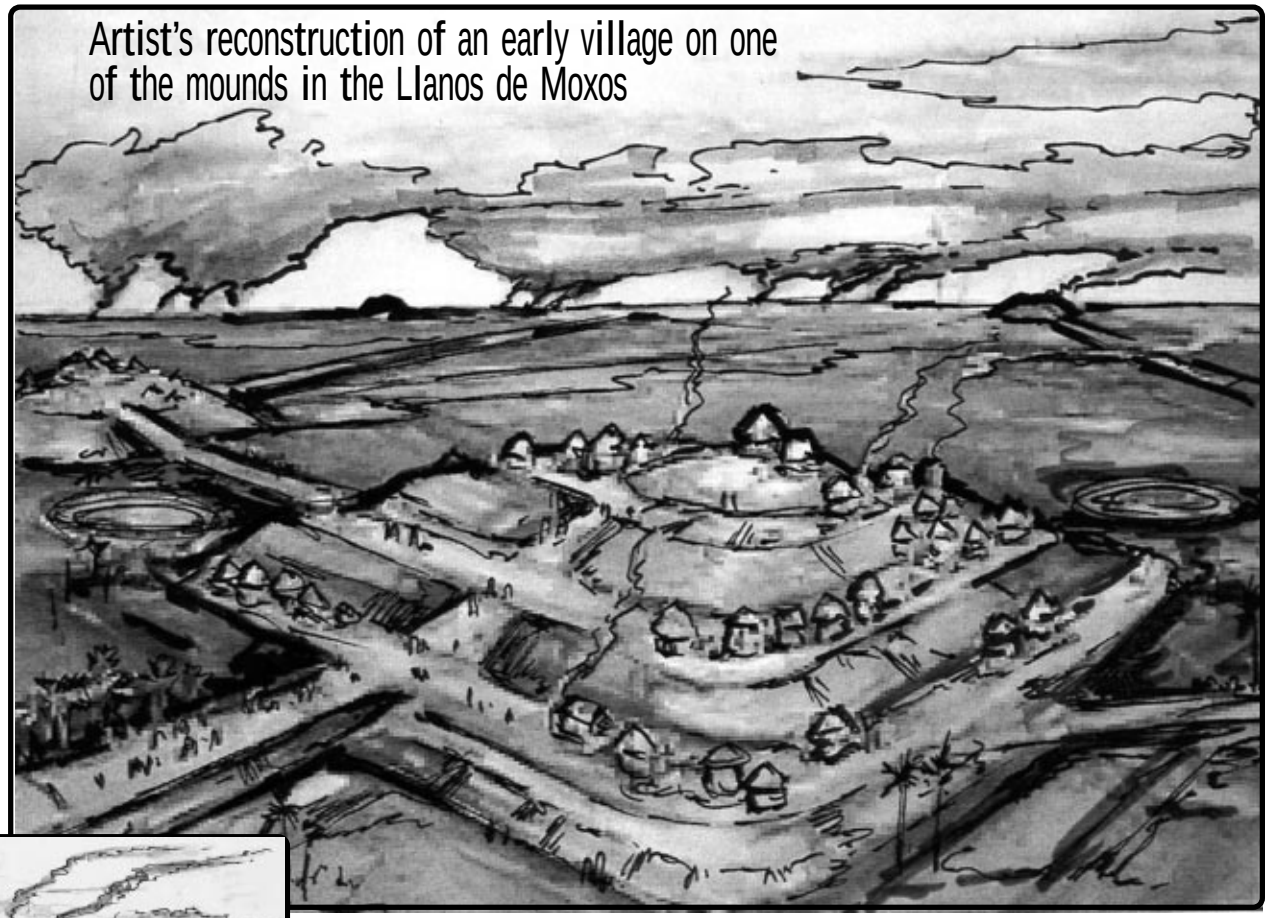
5 Today, the transformed landscape of Bolivia can best be seen from above. The remains fo their earthworks show us how preColumbian cultures changed and managed their environment on a grand scale!



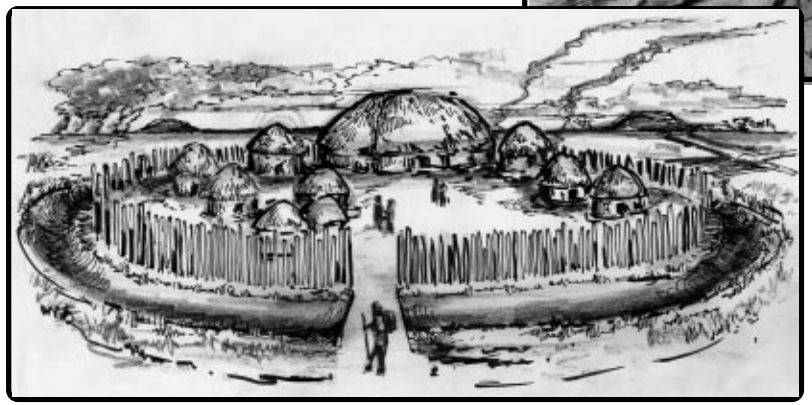
PreColumbian Fishermen of the Bolivian Amazon— The Harris Loan Program, The Field Museum, Chicago 2007

As early as 2,000 years ago, the Llanos de Moxos of South America had a huge population, living in organized societies on large mounds

At one time, people lived on mounds that were connected by causeways. People were able to live in the wetland environment throughout the long rainy season, when the surface of the land was flooded for six months of the year. Within these mounds, archaeologists can find the remains of many years of life— pottery, bones,and ceremonial objects— the remains of everyday life. Some mounds were probably also used for sacred ceremonies and burials.

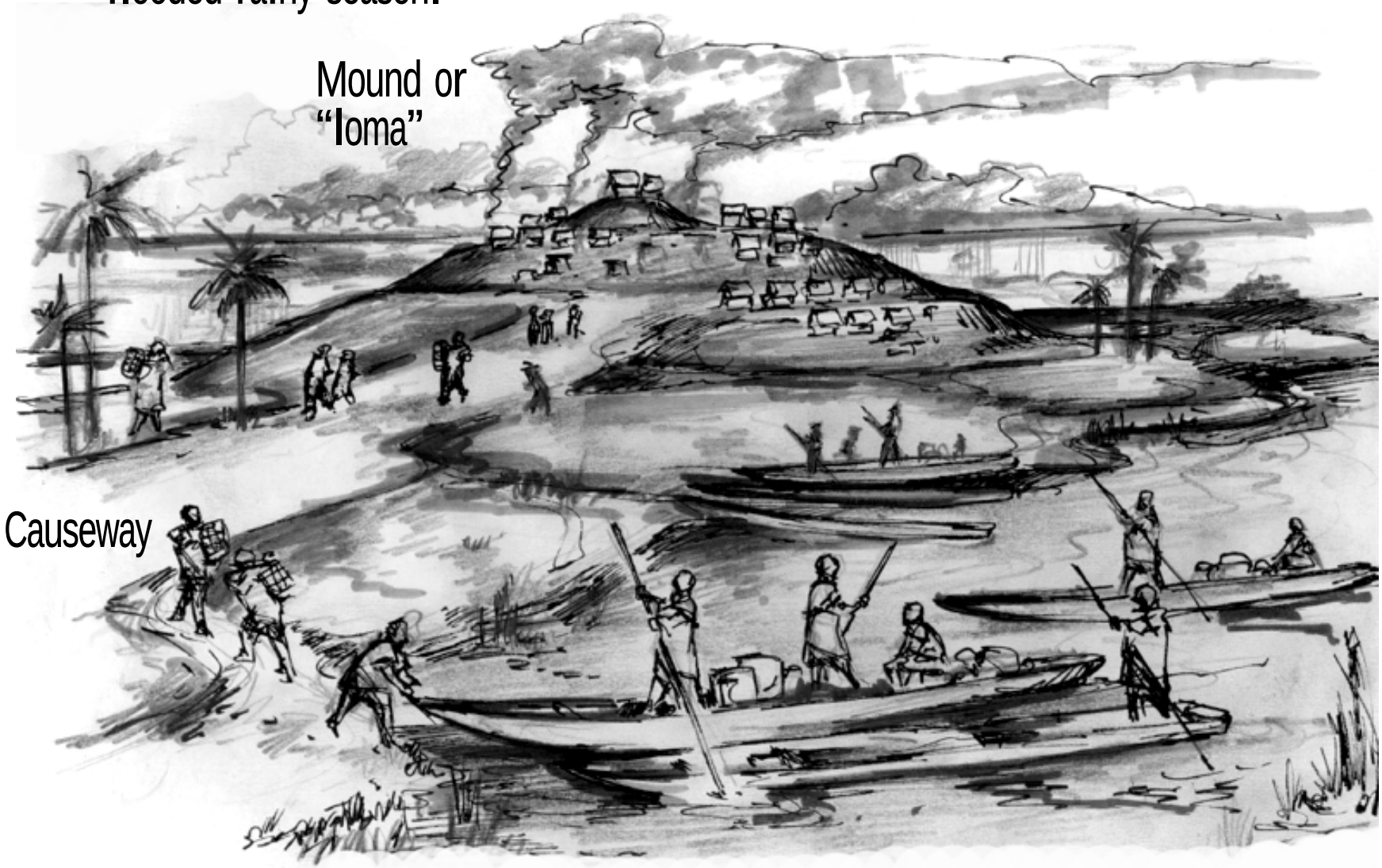


Artist's reconstruction of an early village on one of the mounds in the Llanos de Moxos



Early people in the LLanos de Moxos also lived in villages surrounded by moats, or deep ditches that encircled their houses. The remains of these large circles can still be seen today. Archaeologists believe that these earthworks may have been for defense (combined with a protective wall of tree trunks) or to mark sacred sites.

7 The communities living on the large mounds or "lomas" in the Llanos de Moxos were connected by long, straight causeways (raised roads) and canals during the flooded rainy season.



Canoes were used for travel and transport of goods in the canals that were alongside the causeways

How do we know about preColombian cultures?

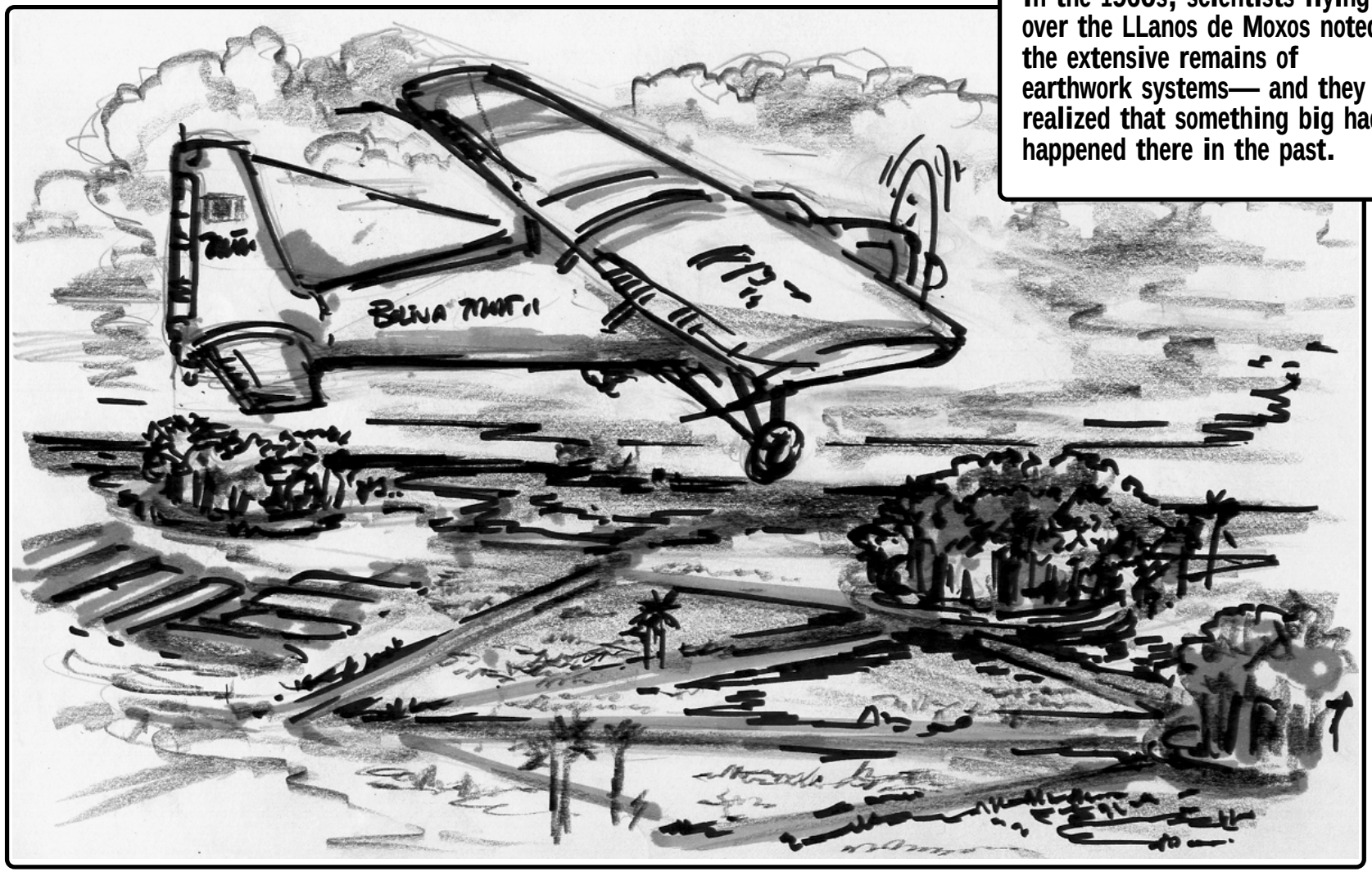
8

Native peoples in the South American Amazon permanently transformed their environment through the construction of large earthworks. Today, archaeologists can study these physical remains of mounds, raised fields, cuaseways, canals, reservoirs and fish traps so that we can better interpret the past and understand the everyday life of early cultures in Bolivia.

Ditch surrounding a fort or ritual site in Llanos de Moxos, Bolivia

9 Large earthworks in South America are often visible from above—

One of the best ways to appreciate and study early people and their cultures is from above. Archaeologists can learn much about the interaction between communities, villages and towns by looking at the patterns in the landscape left by agricultural earthworks, networks of causeways and roads, and systems of canals.



In the 1960s, scientists flying over the LLanos de Moxos noted the extensive remains of earthwork systems— and they realized that something big had happened there in the past.

How do we know what life was like in ancient Bolivia?

Scientists called archaeologists search for, and investigate the remains of past cultures. In the Beni of Bolivia, the large mound sites where people once lived can show us many things when we explore beneath the ground.

Things we can find in an archaeological site:

Bones, fish scales, and remains of ancient meals

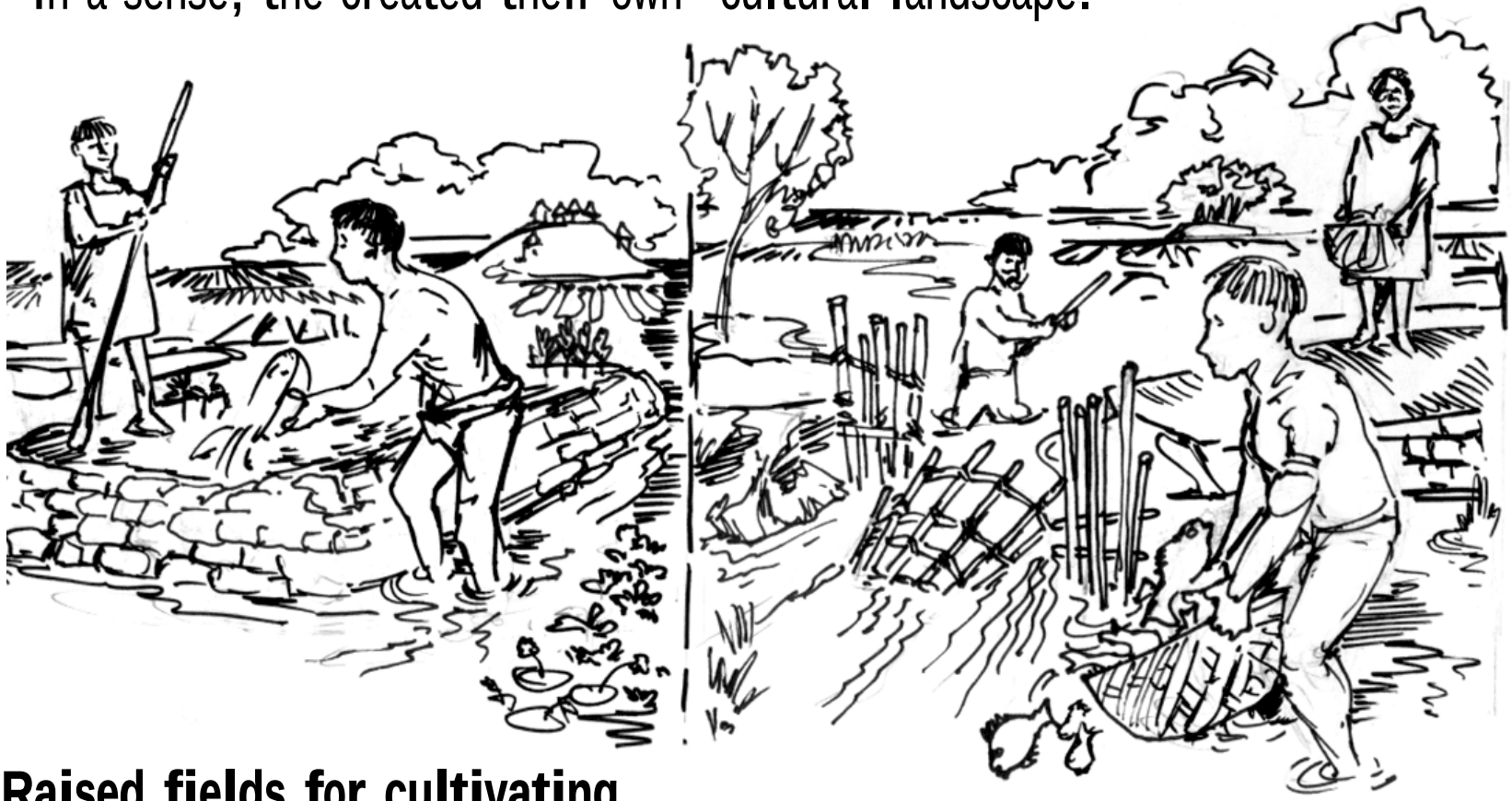
Human remains from burials

Stone tools such as axes for clearing forests and hoes for agriculture

Pottery fragments and objects used in daily life— pots, bowls, cups and griddles for cooking

11 How did early people use resources in the savanna— a flooded environment for six months of the year?

They created and shaped the land around them so that they could live— in a sense, the created their own "cultural landscape."

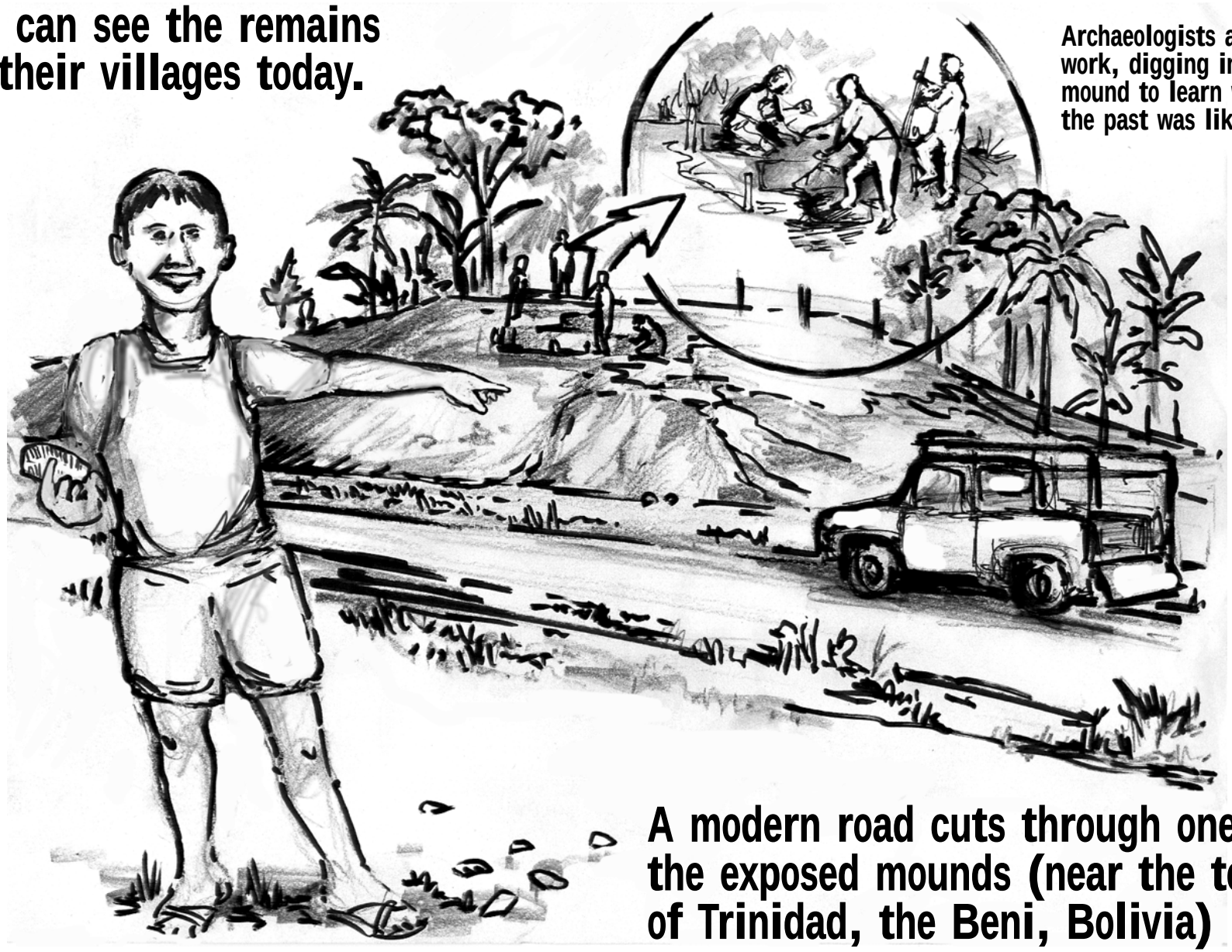


Raised fields for cultivating crops when the floods arrive

An intensive system of fish traps and weirs for easily catching fish

How do we know how preColumbian people lived?

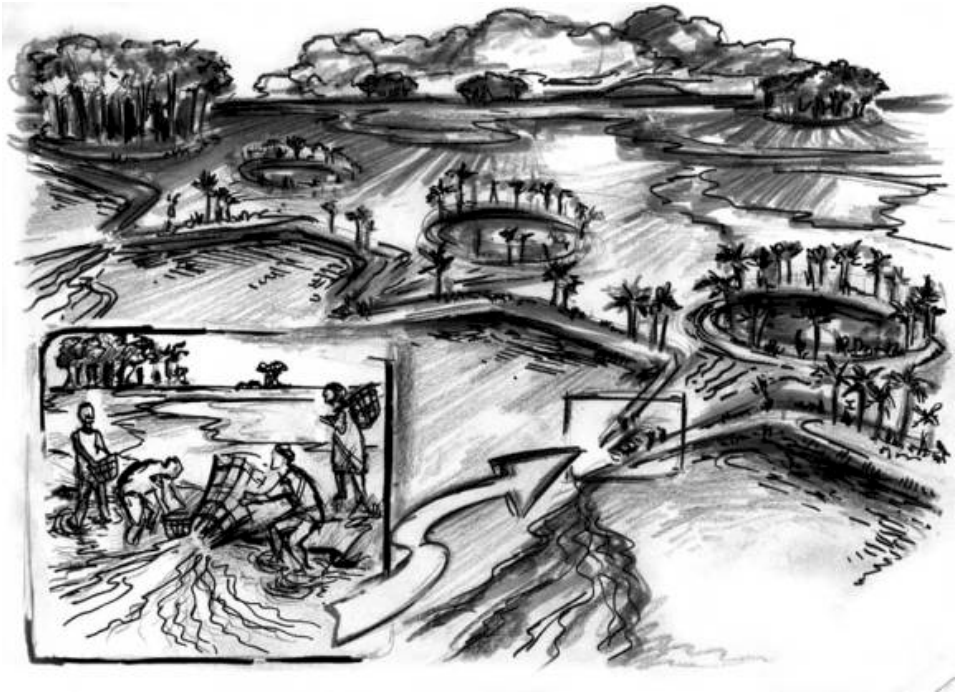
We can see the remains of their villages today.



Archaeologists are at work, digging into the mound to learn what the past was like.

A modern road cuts through one of the exposed mounds (near the town of Trinidad, the Beni, Bolivia)

13 The fish weirs and artificial ponds used by preColumbian people on the savannas of Bolivia.



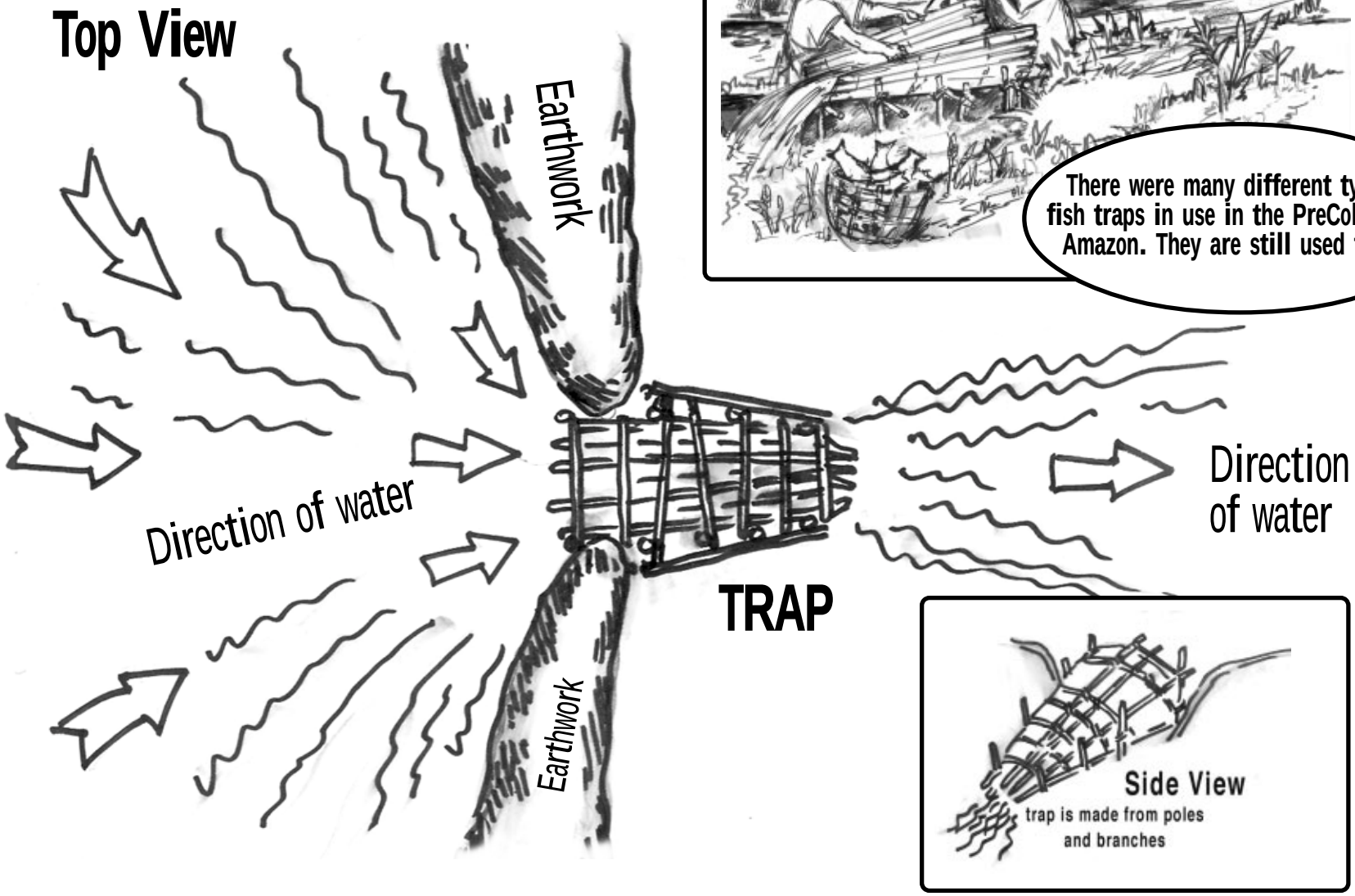
So far, this is the only example of this type of early fishing technology found in the Americas—

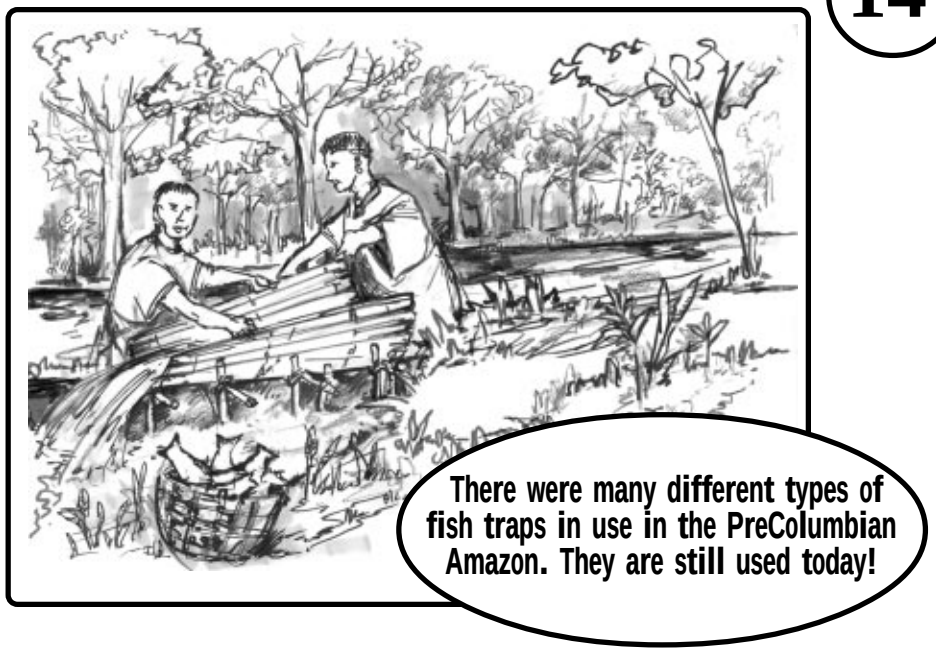
fish weir: the "zig-zag" earthworks crossing from upper left to lower right. The fish weir is a low ridge of earth used to channel fish through small funnel like opening where they can easily be caught using basket or net traps (see insert in the drawing).

Artificial ponds: the circular features in the drawing are ponds that were excavated by the fishermen to store live fish during the dry season— like a natural refrigerator! Fish are trapped here as the waters recede and the savanna dries out (during the dry season, June through December). These ponds are surrounded by rings of royal palms (*Mauritia flexuosa*). This palm is one of the most useful trees for Native peoples (fronds for thatching roofs, trunks for house beams, wood for bows, heart of palm and palm fruits for food, etc.; in addition, game animals eat the fruits). The palms shade the ponds (reducing evaporation) and provide food (fruits) for the fish in the ponds.

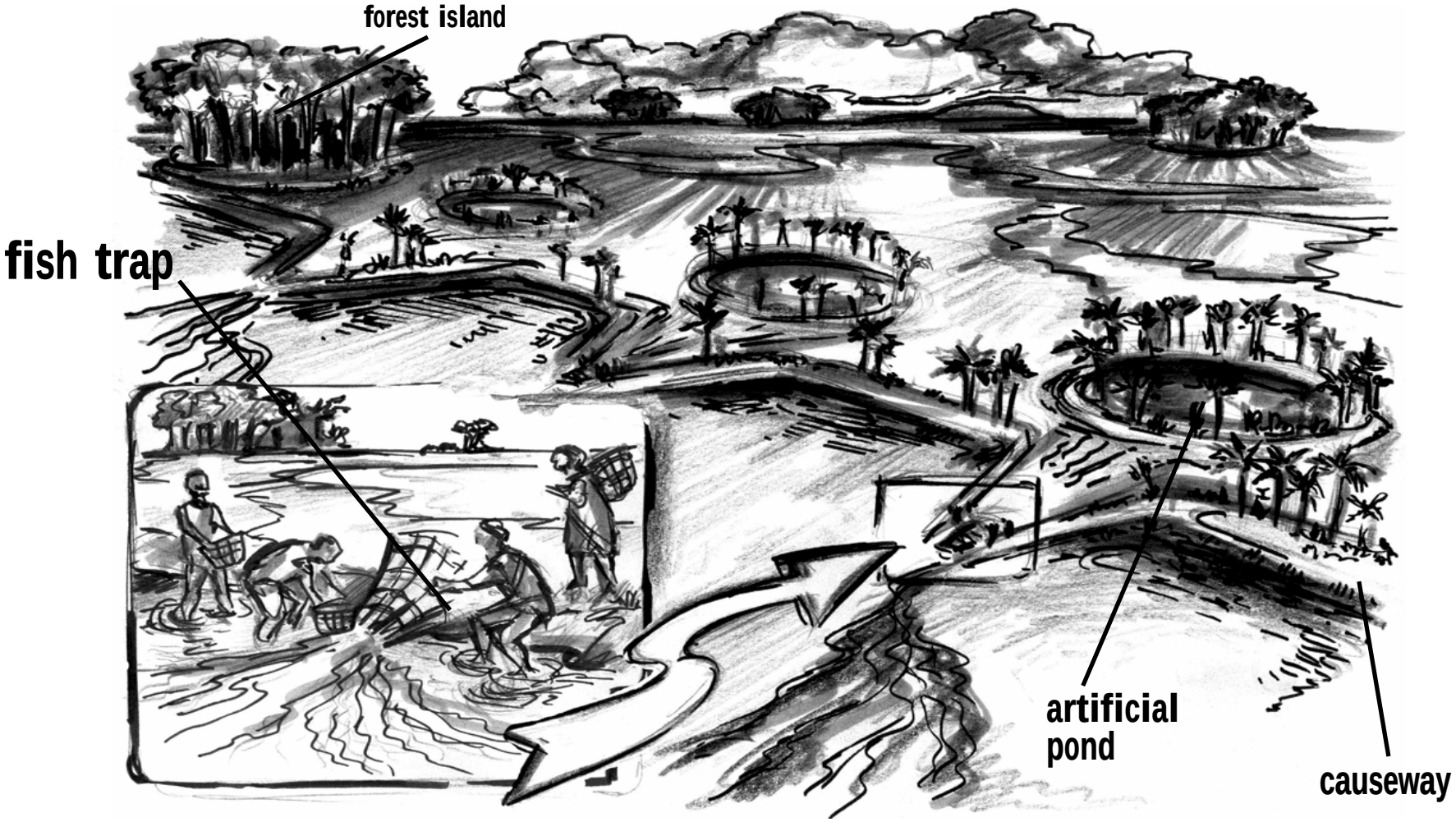
How a fish weir works—

As the water drained during the dry season, fish are channeled into the weirs and trapped for food.



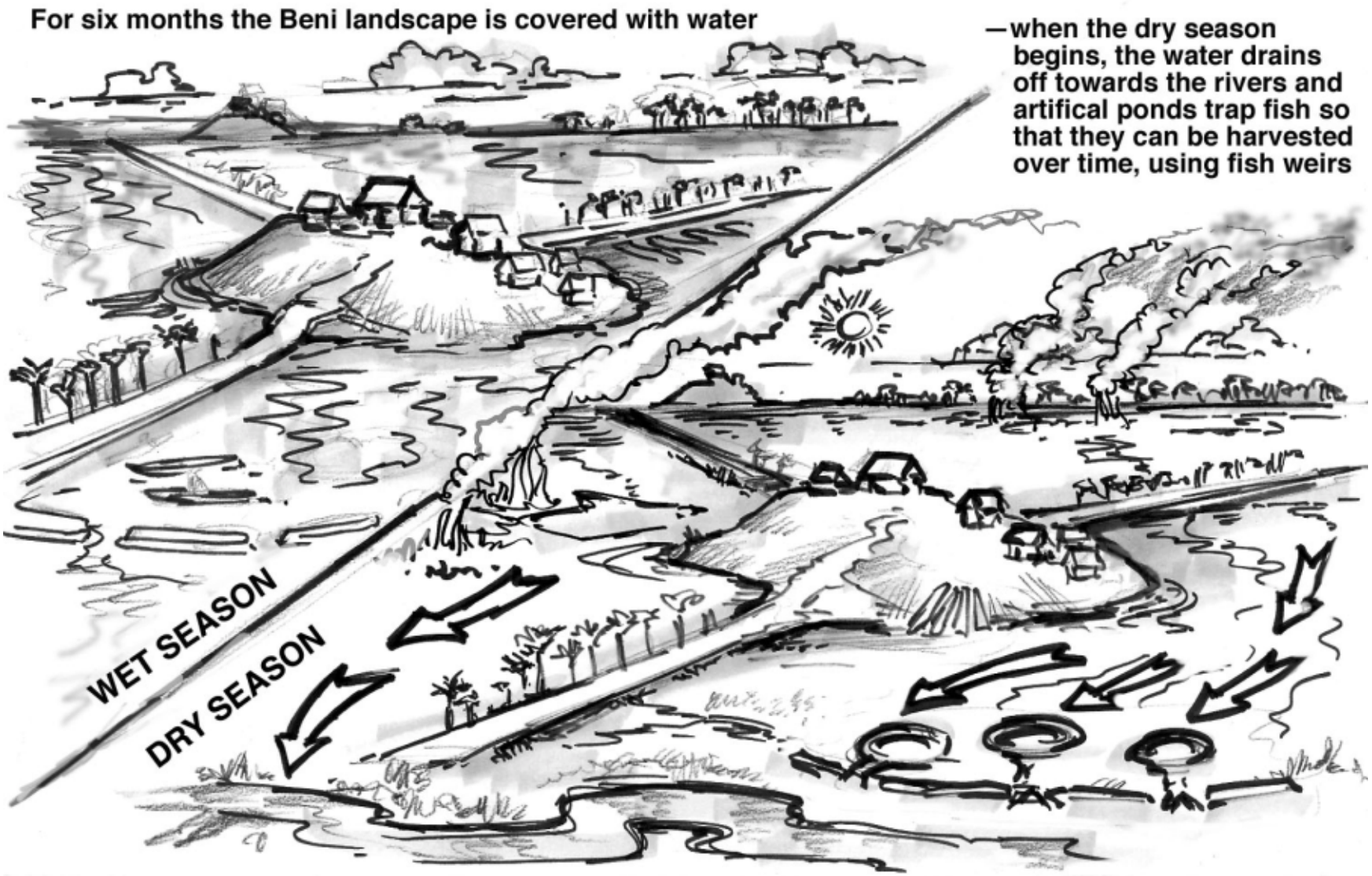


15 The remains of the fish weirs can be seen on the Bolivian landscape today as zig-zagging earthworks that cross the savanna for miles.



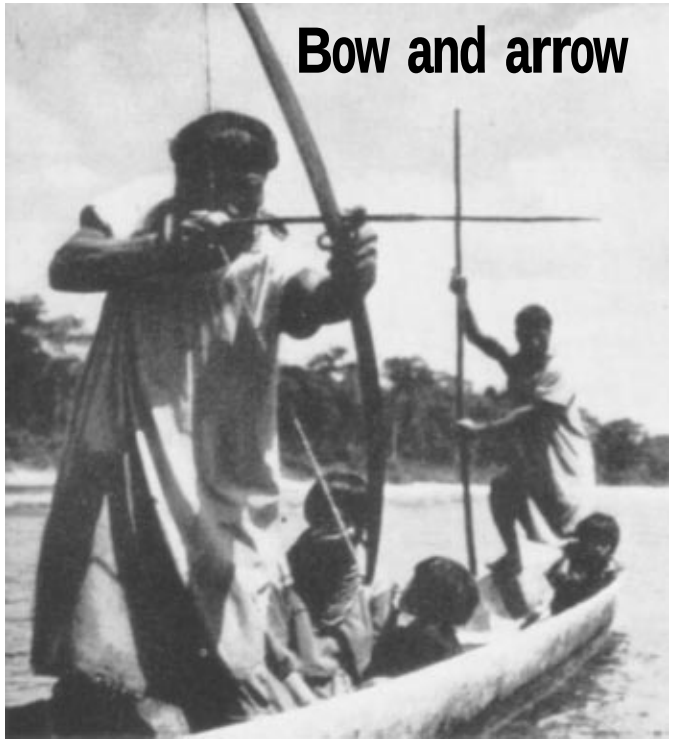
As the water from flooded pampa drains away and the dry season begins, fish are collected in the ponds and then later caught in the fish traps

The savannas of the Beni were flooded for six months of wet season, followed by six months of dry season when water was scarce.



17 Continuing fishing traditions in the Amazon of South America

These image are from the 1940s, and show members of the Cofán people, who live in the Amazon of Ecuador.



In the Amazon today, people continue to use the traditional fishing methods practiced by their ancestors for hundreds of years. Although bows and arrows are used much less today, people still have them. Nets are much more common, and are still used all over the Amazon.

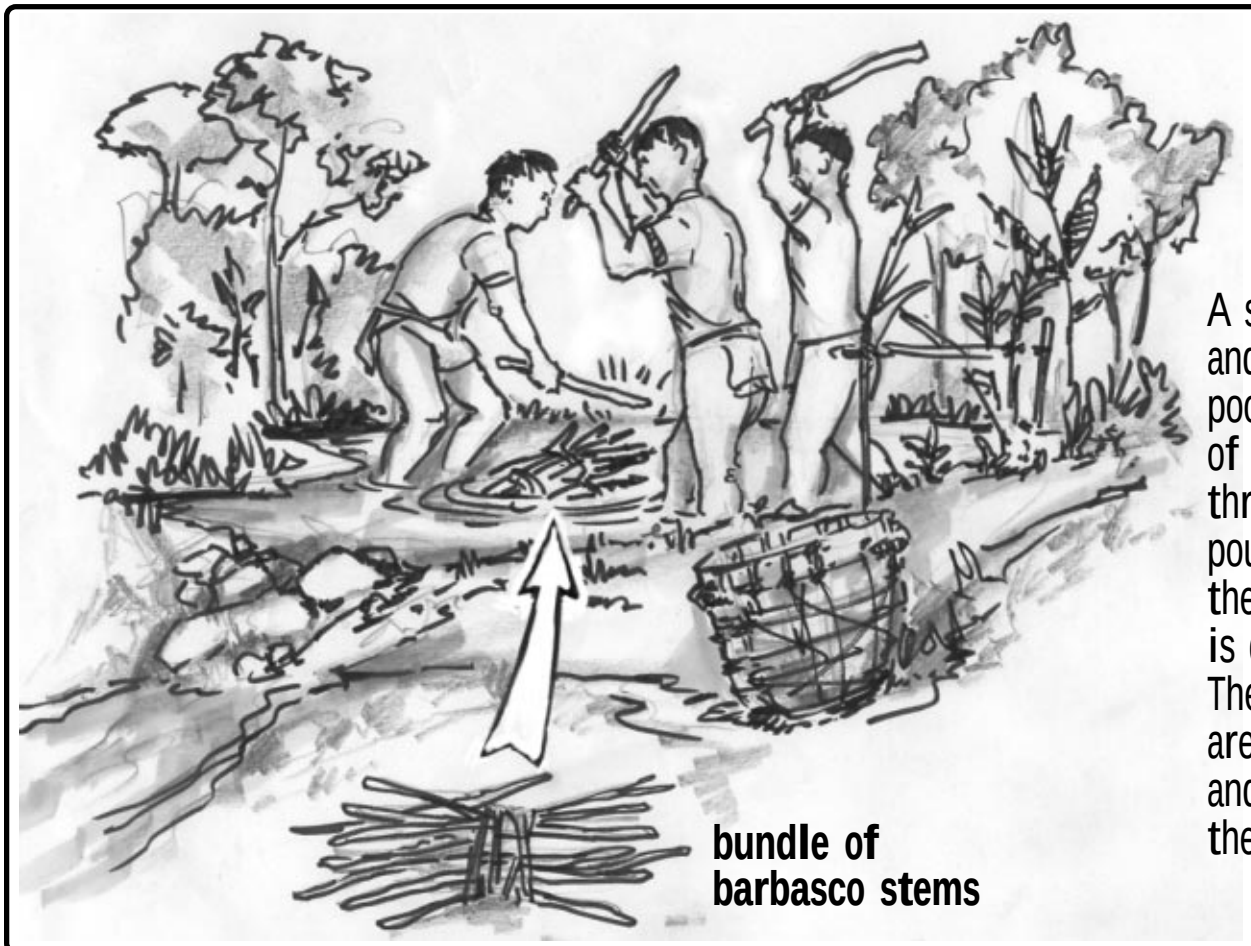
Photos on this page are from the book "Buried Gold and Anacondas," by Rolf Blomberg, 1959 (Swedish expedition to the Cofán community of Santa Rosa de Sucumbío (Río San Miguel) and Rumi Yacu in Colombia.

To Kill a fish:

a traditinal way to kill a fish after it is caught is to bite it on the back of the head. A club is often used to kill the fish if it is caught while fishing from a canoe.

The use of *barbasco* for fishing in the rainforests of the Amazon.

For thousands of years, past and present people living in the rainforests have fished by using natural poisons or barbasco made from plants. This type of fishing was done by people working together in groups during periods of low water in small streams, or ponds created by making temporary dams. The streams were blocked with temporary dams of brush, rocks, or earth. When a stream was at a low point, fish in isolated pools couldn't easily escape. A fairly small, still pool of water was also necessary as for a fish poison to be effective, it must be concentrated in the water—using the poisons in large, rapidly flowing bodies of water would not work and the poison is diltuted quickly in the water. But by the use of fish poisons such as this, large numbers of fish could be captured by people living in the humid, tropical forests of the Americas through this method, using *barbasco.*



Beating a bundle of barbasco stems to release the poison

A stream is blocked with mud and rocks to form a shallow pool. A bundle of the stems of a barbasco plant is then thrown into the water and pounded with sticks so that the plant's sap (and poison) is diffused into the water. The fish in the shallow pool are affected by the poison, and can be easily captured by the gathered fishermen.

19 The use of *barbasco* for fishing in the rainforests of the Amazon.

The term *barbasco* is a very general term used in South America for any plant used to poison fish. The term is probably *NOT* indigenous in origin, but probably has origins in the Spanish language. The kinds of plants used to make the *barbasco* poison are many. Most fish poisons, also called icthyotoxins or piscicides, occur in several plant groups, most from the genera *Lonchecarpus* or *Pollinia.* The chemicals found in these plants will stun fish when it passes through the gills or in some cases is ingested, and the fish poisons usually function by blocking the gills so that the fish suffocates. The fish then floats to the surface, belly up, for easy capture. The fish killed in this way are safe to eat by humans after they are cooked.

To use the plant poisons in fishing, the roots, stems or leaves of certain plants were pounded into a mash or a powder and thrown into the water of a pond or stream, or, a group of fishermen would stand around a bundle of the plant stems in waist-deep water and beat the stems with heavy sticks so that the poison would filter into the stream of pond. Sometimes large batches of stems or roots were bundled together and thrown into the water. When *barbasco* is used, fish are not always killed outright, but are temporarily stunned or made lethargic by the poison, and they rise to the surface to gulp air. On the surface, the fish are shot with arrows, scooped up with baskets or by hand, and clubbed with a stick by members of the fishing party.

Some very deadly plant poisons could be used, poisons that kill the fish instantly, along with every other animal in the water such as turtles, frogs and caiman. Fish poisons had probably been used by early people in the Amazon for thousands of years. However, in most cases the Native peoples of the past (prior to the Spanish Conquest) managed their fishing resources and were probably careful NOT to kill all of the fish. In today's Amazon, there are often serious environmental problems caused by people using fish poisons (and even using dynamite or even commercial insecticides!) to kill all of the fish and animals, both young and adult, in the waterways of the Amazon. People using these destructive methods today can quickly deplete all the aquatic resources in a stream, river or pond.

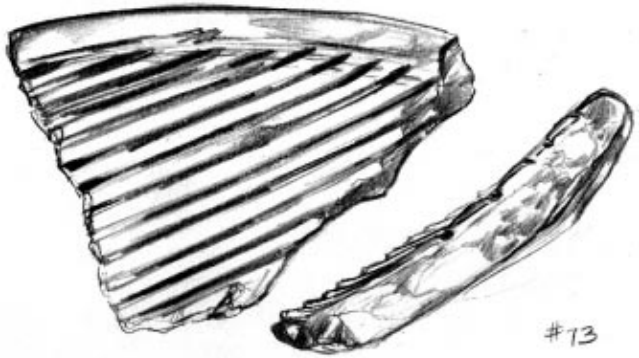
Plants used for making barbasco were often grown in house gardens, small plots of useful plants maintained by the household, which also would have included other medicinal, sacred, and food plants. It must also be noted that fish poisons are used by forest dwelling societies all over the world— in the tropical areas of Asia and Africa as well— and like in the Amazon, probably have been for thousands of years.

Plant used for fish poison by The Cofán Indigenous group, eastern Ecuador
(Photo by Robin Foster, The Field Museum)

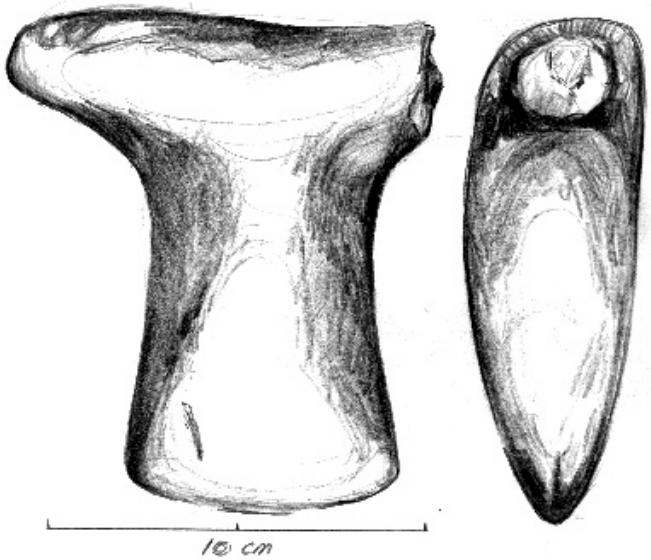
To see this plant, and other plants like it that are used by Amazonian people, go to the Field Museum website at:

http://fm2.fieldmuseum.org/plantguides/rcg_intro.asp

Today, we can still see evidence of past cultures of the Amazon— especially in the large earthworks such as fish weir systems and causeways such as those found in the Beni of Bolivia. We also find artifacts related to past life. Because organic material decays rapidly, archaeologists working in the Amazon rarely find artifacts other than stone tools, bone, and pottery objects and charcoal from cooking fires.



Remains of ceramic objects and pottery (called sherds)



Remains of stone tools, such as axes.

Amazonian people reflected their lives and spirituality in their art and the objects they made. Even fish had a spirtual significance.

Muiraquitãs are small amulets made from transluscent gemstones. They were charms for good fortune, presented as gifts on special occasions. Some of the creatures portrayed by these charms, such as fish, turtles and especially frogs, stand for women's fertility and power in Amazonian culture. In one legend a powerful tribe of women warriors presented these small treasures to men who gave them daughters, but nothing to men who gave them sons. Other legends say that young boys would catch small fish and frogs at their coming of age ceremonies, and these creatures were turned into rocks.

PreColumbian pottery figurines of women from the Santarém region of Brazil are shown wearing such charms, suggesting that they were meant to help them have children. The charms passed along the Amazon waterways, probably as gifts exchanged between communities. They were highly valued as powerful and attractive ornaments.

Adapted from "The Unknown Amazon," a 2002 exhibit at The British Museum

(learn more at http://www.thebritishmuseum.ac.uk/) or search the British Museum collections compass collections online.

Stone amulet (*muiraquitã*) in the form of a fish
From the Lower Amazon, AD 900-1600
Museu de Arqueologia e Etnologia da Universidade de São Paulo, Brazil, inv. no. X641.

Important terms to know:

Myth of the Pristine Environment: the idea that human history is separate from the history of the environment; that nature can exist independent of human activities, and that the environment can be in a state of equilibrium. **Dispelling the myth**: scholars show that native peoples, past and present, have transformed the face of the earth for tens of thousands of years.

Myth of the Noble Savage: the idea that Native peoples live in harmony with nature (low impact on the environment)or Native peoples as natural stewards of the environment. **Dispelling the myth:** scholars point to cases of over-hunting, cutting and burning of forests, soil erosion, and degradation of the environment by native peoples past and present. It is difficult to measure changes in biodiversity, "degradation," and "deforestation." Whether human activity is good or bad for the environment is often a subjective value judgment.

Anthropogenic landscape: ("human made") environments that show evidence of having been transformed by and/or created through human activities (both intentional and unintentional). Few, if any, of the landsurfaces of the Americas can be considered "natural" because of 12,000 or more years of continuous and intense human impact (burning, clearing, agriculture, building, etc.). Historical ecologists view the Amazonian environment as a human "garden" created and maintained by Native peoples.

Historical Ecology: A long-term view of ecology that considers human activities (past and present) as major factors in creating nature and environmental biodiversity. **The major ideas are** (1, Much, if not all, of the non-human biosphere has been affected by human activity; (2), Human activity does not necessarily lead to environmental degradation and can actually increase biodiversity, (3), the specific history of local and regional landscapes must be taken into consideration (historical contingency), and (4), Change rather than stability creates a healthy environment.

Llanos de Mojos (Llanos de Moxos) (Bolivia): large region of pampas, lowland savannas, wetlands and gallery forests in NE Bolivia (the Bolivian Amazon).

Raised fields: elevated platforms of earth used to grow crops in seasonally flooded wetlands and savannas.

Causeways and canals: two types of earthworks found in the Llanos de Mojos, Bolivia; used for transportation and communication across the pampas; may have been used to control water levels for agriculture, aquaculture, and canoe traffic during the rainy season.

Fish Weirs: a barrier or enclosure of wood, basketry, nets, stone, or earth used to capture fish; structures used to trap migrating fish in lakes, streams, rivers, or savannas (in the case of the LLanos de Moxos in the Bolivian Amazon).

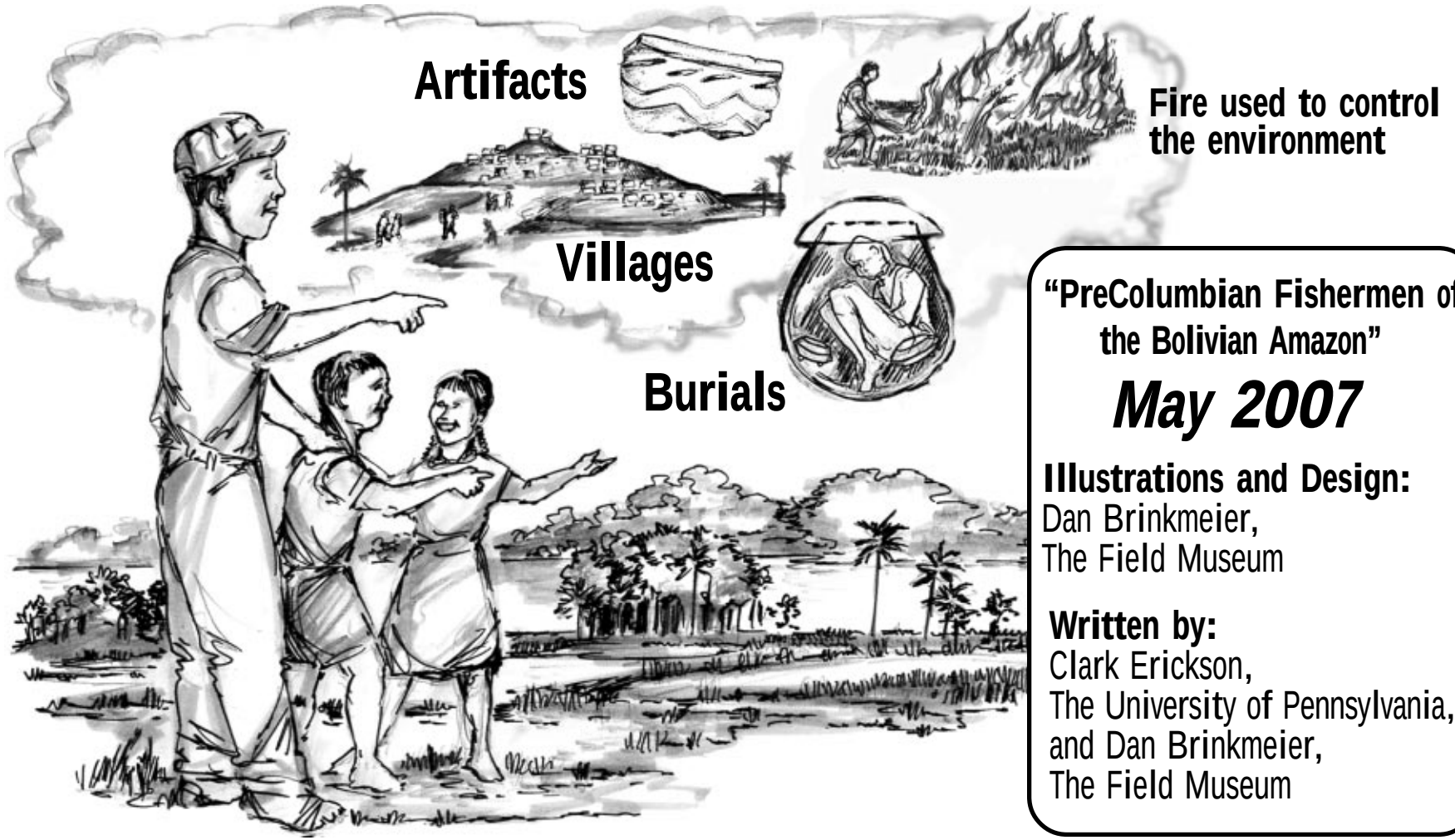
Fishery: a place for catching fish and other aquatic species; improved wetland habitat for the capture, storage, and management of fish and other aquatic species (in the case of Baures in the Bolivian Amazon; fish weirs, artificial ponds, canals, and causeways).

Pampa: a lowland wetland or savanna that is often flooded for a freat part of the year. Pampas are found in central Boliv ia, Venezuela, Brazil, and Argentina.

Want to know more about archaeology and preColumbian earthworks in the Bolivian Amazon?

Go on-line at: http://www.sas.upenn.edu/%7Ecerickso/applied.html

(this is the website of Clark Erickson at the University of Pennsylvania)



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Dan Brinkmeier,
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Written by:
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and Dan Brinkmeier,
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