

Aquaculture L1 (Introduction)

Dr. Majid Makky Taher

Aquaculture

Anyone who attempts to learn of aquaculture soon realizes how much science is involved

1- demands a reasonable understanding of chemistry to deal with water quality

2- A species cannot be cultured until its biology is known

3- Being able to produce significant numbers of an aquatic species for culture requires a thorough understanding of reproductive life cycles

4- To recognize healthy animals and prevent diseases, an understanding of anatomy and physiology is necessary

5- Feed costs represent a significant share of the cost of production, so an understanding of the science of nutrition is essential

6- Economical and marketing science of cultivated species

Aquaculture is a relatively new word used to describe the art, science, and business of Aquatic animals and plants useful to humans

Aquaculture is a type of agriculture, and it means fundamentally farming in water instead of on land

Often, agriculture and aquaculture include all of the activities involved in producing plants and animals, the supplies and services needed, the **processing** and marketing, and other steps that deliver products to the consumer in the desired form

Characteristics of cultivated species

1- Climate resistance

2- Rapid growth rate

3- Ability to reproduce and grow depending on cheap food

4- Tolerate for handling and high cultivation densities

5- High resistance for parasites and diseases

6- Marketing considerations

The Food and Agriculture Organization (FAO) of the United Nations defines aquaculture as “the farming of aquatic organisms, including fish, mollusks, crustaceans, and aquatic plants



COMPARISON OF TRADITIONAL FARMING TO AQUACULTURE

Farming	Aquaculture
Occurs on land	Occurs in water
Limited by water supply	Limited by oxygen dissolved in water
Many plant and animal crops	Many plant and animal crops
Domesticated plants and animals	Wild and/or domesticated plants and animals

Fisheries involve hunting and general public access to the crop—fish—being hunted. Aquaculture enhances fisheries by providing fish to restock streams, lakes, and oceans, and also by reducing the pressure on stocks

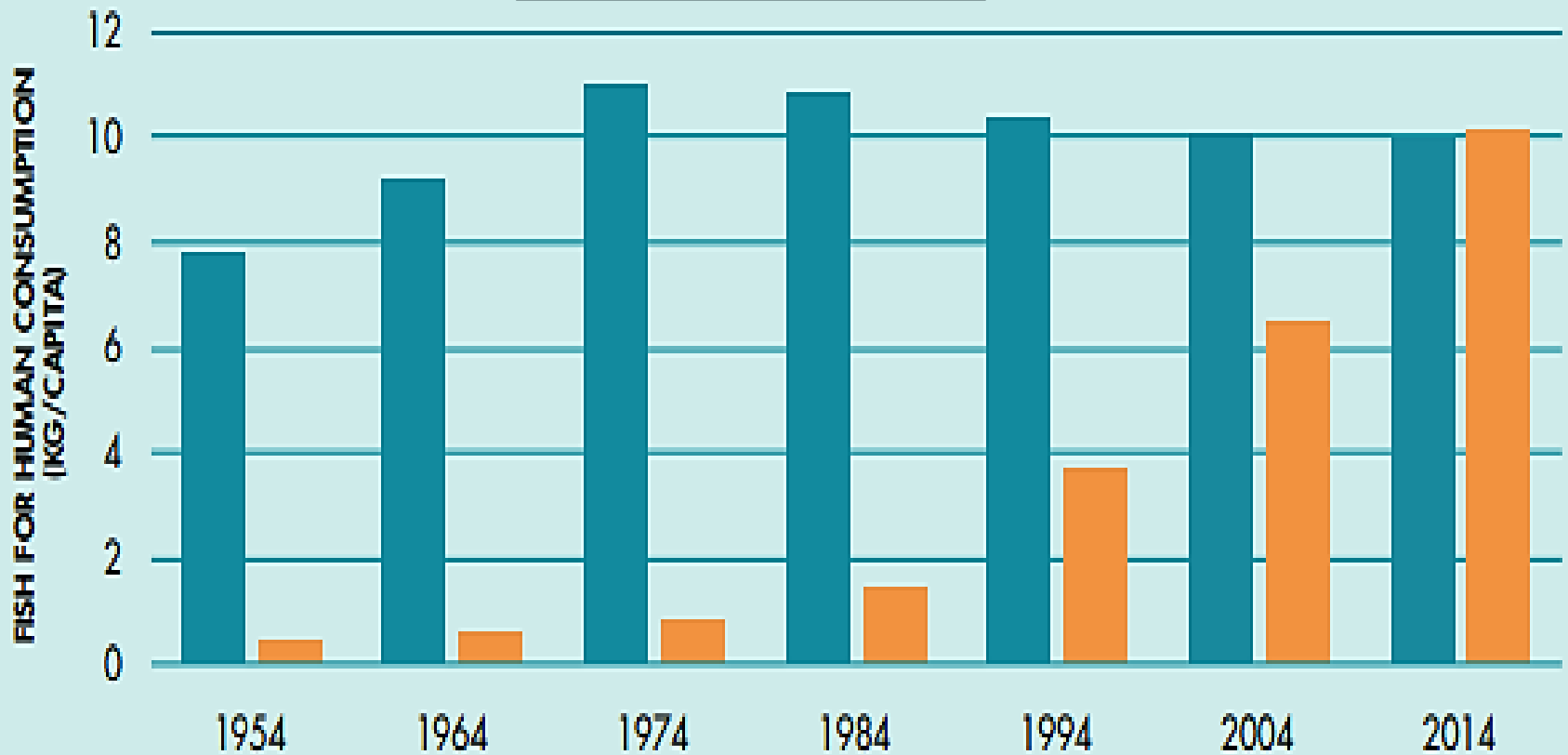
	2009	2010	2011	2012	2013	2014
	<i>(Million tonnes)</i>					
PRODUCTION						
Capture						
Inland	10.5	11.3	11.1	11.6	11.7	11.9
Marine	79.7	77.9	82.6	79.7	81.0	81.5
Total capture	90.2	89.1	93.7	91.3	92.7	93.4
Aquaculture						
Inland	34.3	36.9	38.6	42.0	44.8	47.1
Marine	21.4	22.1	23.2	24.4	25.5	26.7
Total aquaculture	55.7	59.0	61.8	66.5	70.3	73.8
TOTAL	145.9	148.1	155.5	157.8	162.9	167.2
UTILIZATION¹						
Human consumption	123.8	128.1	130.8	136.9	141.5	146.3
Non-food uses	22.0	20.0	24.7	20.9	21.4	20.9
Population (<i>billions</i>)	6.8	6.9	7.0	7.1	7.2	7.3
Per capita food fish supply (<i>kg</i>)	18.1	18.5	18.6	19.3	19.7	20.1

Note: Excluding aquatic plants. Totals may not match due to rounding.

¹ Data in this section for 2014 are provisional estimates.

Relative Contribution of Aquaculture and Capture Fisheries to Fish for Human Consumption

Capture fisheries
Aquaculture



Historical events that made aquaculture a viable, growing, and profitable enterprise are not always easy to identify

Aquaculture probably evolved through a combination of human observation and serendipity in several areas of the world at different times

Perhaps aquaculture developed from fishing practices that involved trapping fish and holding them for freshness, which led to trapping, holding, and feeding to maintain a food supply for a longer time

Once people saw that fish could be fed and held, they refined techniques to ensure a more constant supply of fish

Possibly, cage culture developed when fishers realized that their surplus catch could be held in baskets in the water

Pond culture likely developed when some fishers observed fish trapped in pools of water formed by a flood

Some aquaculture likely developed in conjunction with farming and irrigation, since irrigation provided structures and a source of water

**Family fishing —father, daughter,
and son enjoy an afternoon of fishing**



Chinese Aquaculture

Aquaculture in China began around 3500 B.C. with the culture of the common carp

These carp were grown in ponds on silkworm farms. The silkworm pupae and feces provided supplemental food for fish. Carp are hardy and easy to raise in freshwater ponds, and, because fish were an important part of life in ancient China, their culture developed very early

In 475 B.C., Fan-Li, a politician and administrator, wrote the oldest document on fish culture. Fan-Li was renowned for his self-taught expertise in carp culture. His document described methods for pond construction, **broodstock** selection, stocking, and managing ponds.

Polyculture

growing more than one species in the same water. Realizing that water is a three-dimensional habitat, all of the productive portions of a pond will not be used by just one species. Different species occupy different locations in the pond and feed on different food. Using polyculture, the Chinese cultured four species of carp

Species	Location	Feed
Grass carp	Topwater	Large vegetation near shore
Bighead carp	Midwater	Minute animals known as zooplankton
Silver carp	Midwater	Minute plants or algae known as phytoplankton
Mud carp	Bottom	Wide variety of plants and animals

Egyptian Aquaculture

For the ancient Egyptians, aquaculture seems to have evolved in tandem with the development of irrigation systems

Aquaculture in Egypt focused on tilapia, and developments seem consistent with those of carp in China

No written documents from early Egyptian aquaculture exist, but drawings in tombs, dated about 2000 B.C., show tilapia

Roman Aquaculture

During the Roman Empire, fish were kept in ponds called “stews” next to the manors of the wealthy and lay people, providing a source of fresh fish

Roman aquaculture focused on mullet and trout
Pliny the Elder recorded that saltwater and freshwater fish culture was practiced in Rome in the first century B.C.

During the Middle Ages, stew ponds became important for both monks and lay people, providing a source of fresh fish.

English and European Aquaculture

In central Europe, the history of pond-fish culture began at the close of the eleventh century and the beginning of the twelfth

Pond management in Bohemia, a part of the Czech Republic, peaked in the fourteenth century

Bohemia had about 185,000 acres of ponds for carp. From spawning to marketing required four to six years

Dom Pinchon, a fourteenth-century French monk, possibly was the first person to artificially fertilize trout eggs. At the very least, he was the first person to collect natural spawn and incubate them in a hatching box

In 1600, John Taverner of England presented the first known comprehensive paper on the management of carp, bream, trench, and perch in ponds