

## 2. History

Both botanical and linguistic evidence point to the early origin of cultivated rice in an arc along continental Asia extending from eastern India through Myanmar, Thailand, the Lao PDR, northern Vietnam, and into southern China. Although the oldest evidence of cultivated rice comes from Myanmar and Thailand, wet rice cultivation<sup>3</sup> involving the puddling and transplanting of rice seedlings is thought to have been refined in China. In contrast to other areas, the history of rice in river valleys and low-lying areas in China is longer than its history as an upland crop.

It can be assumed that once rice farming progressed beyond shifting cultivation in forest clearings to one involving puddled fields with standing water, fish must have been an additional product. Fish and other aquatic organisms would have come in with the flood water, made the rice field their temporary habitat, and grew and reproduced within the duration of the rice farming cycle to become a welcome additional rice field product for the farmers.

It may never be known exactly when or where the practice of deliberately stocking fish in rice fields first started. However, since it is widely acknowledged that aquaculture started early in China, where pond culture of common carp (*Cyprinus carpio*) began at the end of the Shang Dynasty (1401-1154 BC) (Li 1992), it is assumed that rice-fish farming with stocked fish also started in China. Archaeological and written records trace rice-fish culture in China over 1 700 years ago and the practice may have started when fish farmers with excess fry released them in their rice fields (Li 1992; Cai and Wang 1995).

Clay models of rice fields with figurines of common carp, crucian carp (*Carassius carassius*), grass carp (*Ctenopharyngodon idella*), and other aquatic animals date back to the later Han Dynasty (25-220 AD) (Bray 1986, cited in FAO 2000). The earliest written record dates from the Wei Dynasty (220-265 AD) that mentions “a small fish with yellow scales and a red tail, grown

in the rice fields of Pi County northeast of Chendu, Sichuan Province, can be used for making sauce.” The fish referred to is thought to be common carp.

Rice-fish culture was first described by Liu Xun (circa 889-904 AD) (Cai et al. 1995) who wrote: “In Xin Long, and other prefectures, land on the hillside is wasted but the flat areas near the houses are hoed into fields. When spring rains come, water collects in the fields around the houses. Grass carp fingerlings are then released into the flooded fields. One or two years later, when the fish are grown, the grass roots in the plots are all eaten. This method not only fertilizes the fields, but produces fish as well. Then, rice can be planted without weeds. This is the best way to farm.”

It is possible that the practice of rice-fish culture developed independently in India and other parts of the “Asian arc” of wet rice farming, but was not documented or circulated. Apart from being described as “an age-old practice” there are few estimates of how long rice-fish farming with deliberate stocking of fish has been practiced outside China, although some authors suggest that rice-fish culture was introduced to Southeast Asia from India 1 500 years ago (Tamura 1961; Coche 1967; Ali 1992).

Integrated rice-fish farming is thought to have been practiced in Thailand more than 200 years ago (Fedoruk and Leelapatra 1992). In Japan and Indonesia, rice-fish farming was developed in the mid-1800s (Kuronoma 1980; Ardiwinata 1957). An early review on rice-fish culture showed that by the mid-1900s it was practiced in 28 countries on six continents: Africa, Asia, Australia, Europe, North America and South America (FAO 1957). Common carp was then the most popular species, followed by the Mozambique tilapia (*Oreochromis mossambicus*). In Malaysia the snakeskin gouramy (*Trichogaster pectoralis*) was favored, and Nile tilapia (*Oreochromis niloticus*) was used in Egypt. Other species mentioned include buffalo fish (*Ictiobus cyprinellus*), the *Carassius*<sup>4</sup> (*Carassius*

<sup>3</sup> Wet rice cultivation includes the IRRI rice ecosystems of rainfed lowland, flood-prone and irrigated rice that together make up 87% of the world's rice area and 96% of the rice production (IRRI 2001).

<sup>4</sup> Note that older reports mention the term “goldfish” only and Ardiwinata (1957) suggests that both *Cyprinus carpio* as well as *Carassius auratus* were included.

*auratus*), milkfish (*Chanos chanos*), mullets (*Mugil* spp.), gobies (family Gobiidae), eels, murrels or snakeheads (*Channa* spp.), catfish (*Clarias batrachus*), gouramy (*Trichogaster pectoralis*) as well as penaeid shrimps (*Penaeus* spp.).

Coche (1967) pointed out that in most countries rice-fish farming did not involve deliberate or

selective stocking of fish and that the species cultured and the stocking density depended on what came in with the flood waters. Thus the species cultured usually reflected what was living in the waters used to flood or irrigate the rice fields. It appears that rice-fish farming did not spread out from one focal point but may have developed independently.