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PRELIMINARY OBSERVATIONS ON FISH PEN CULTURE IN A LAGOON AT MANDAPAM*

Introduction

Fish pens of various designs are in operation in countries like Philippines, Taiwan, Hongkong and Indonesia. Small fish enclosures were tried experimentally in Pulicat lake, Killai backwaters, Tuticorin Bay and Palk Bay. In the present study large fish pens of area 0.25 ha (50 × 50 m), 0.5 ha (100 × 50 m) and 1 ha (100 × 100 m) respectively were fabricated in the Pillaimadam lagoon near Mandapam Camp adjacent to the Palk Bay for culturing fishes. (Fig.1).

Location of culture area

The Pillaimadam lagoon is situated along the Mandapam coast (09° 17'N and 79° 06'E) adjacent to the Palk Bay. The maximum water spread of the lagoon during November-December is about 400 ha extending for about 5.2 km in length and 500 to 800 m in width. The lagoon was earlier reported to have two bar mouths opening into the Palk Bay. But now the opening at the western end has got closed and that has affected the topographical and the Physiochemical characteristics of the lagoon to a great extent. Though water is found throughout the year in the deeper parts of the lagoon, it dries up exposing the major part during September-October when the south west wind is strong. During the north east monsoon from November-December, the lagoon receives rain water mainly through the Pillaimadam creek, the main fresh water inlet of the lagoon

Based on the topography of the lagoon, it can be divided into 3 zones, the shallow eastern zone upto the bar mouth with 5-15 cm of mud, the middle zone between the bar mouth and the fresh water inlet with 10-40 cm of mud and the western shallow part beyond the fresh water inlet with 5-20 cm of mud. The deeper parts are restricted to the middle zone where the water is locked up through out the year (Fig.1). This area is suitable for culture of fishes through out the year in net enclosures or fish pens. Other areas can be utilised for culture for only about 6-8 months when there is water.

The bottom sediment consists of 48% of fine sand, (300-600 micron), 35% of coarse sand (600-1200 micron) and 11% of very fine sand (150-300 micron) and 2% silt (75-150 micron) in this middle zone. The mud contains 48 ppm/100 g nitrogen, 33 to 44 ppm/100 g phosphorus (P) and 253-385 ppm/100g Potassium (K). The pH of the mud ranges between 8.5 and 9.0 indicating alkaline condition and the electric conductivity from 7.0 to 7.2 mhos/cm.

The hydrological condition of the lagoon varies greatly. The salinity ranges between 22 and 180 ppm. The high saline condition is observed during September to October when the bar mouth is closed and the evaporation at the maximum. The dissolved oxygen of

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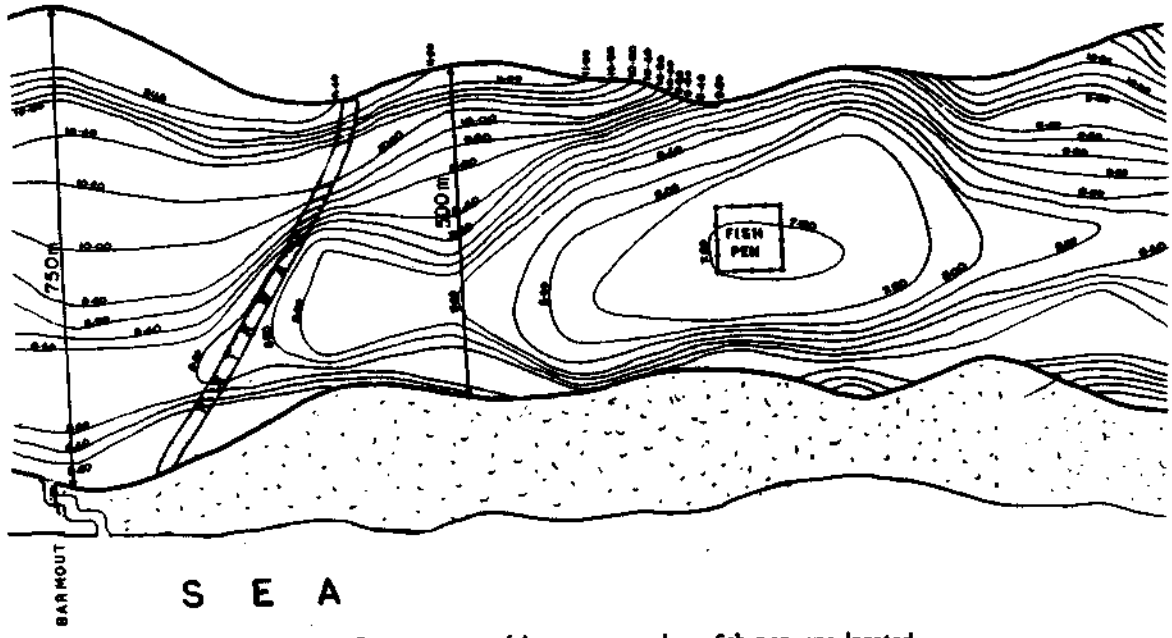

Fig.1. Contour map of lagoon area where fish pen was located

the lagoon varies between 2.1 and 6.0 ml/l and water temperature between 26° to 34°C. The productivity is almost nil during October when the salinity is very high (106.5 ppm), but increases to 951.9 mg C/m2/day as the salinity decreases (44.5 ppm) in January.

Potentiality of large scale fish culture in the Pillaimadam lagoon has been stressed by earlier workers. One of the advantages of the area is the availability of large number of milk fish seed in the lagoon during April-May.

Fish pens

Large fish pens covering an area of 0.25 ha (3 numbers), 0.5 ha and 1 ha were designed and fabricated (Fig.2, 3) in the lagoon taking into consideration various topographical features of the lagoon such as depth and soil condition. The fish pens were made of Palmyra poles and nylon webbing. The palmyra poles, 3.5 m long, 10 cm wide and 5 cm thick were used. The poles were planted 75 cm deep at an interval of 1.5 m with the help of a crow bar. An iron nail at the top of each pole served for attaching the head rope, a 3 mm nylon rope inserted through the upper meshes of the webbing. The webbing was made of 0.75 mm nylon twine with 20 mm mesh. The width of the webbing used was 3.5 m. The foot rope was inserted through alternate meshes of bottom free end. Laterite stones of about 500 g tied to the foot rope at an interval of 1.5 m served as sinkers. The webbing was securely placed on the nails at the top of the poles with the aid of the head rope. After allowing enough slackness tc the webbing i.e. 1 m slackness to 10 m of webbing, the sinkers were buried at a depth of 50 cm in between the poles. The lower end of the webbing was buried at a depth of 50 cm. The webbing was tied to the poles at an interval of about 1 m so that it was held tightly to the poles. An opening was provided at one of the corners. It could be closed by tying the free ends of the net to the poles after overlapping the webbing. A table made of palmyra poles measuring 2 × 1.5 × 1.5 m was provided near the gate for field observations (Fig.2, 3).

A scare line was provided inside the enclosure. The tender palmyra leaves of length 50 cm was tied to a nylon rope of 3 mm tickness at an interval of 1 m. The bright yellow colour of the palmyra leaves would

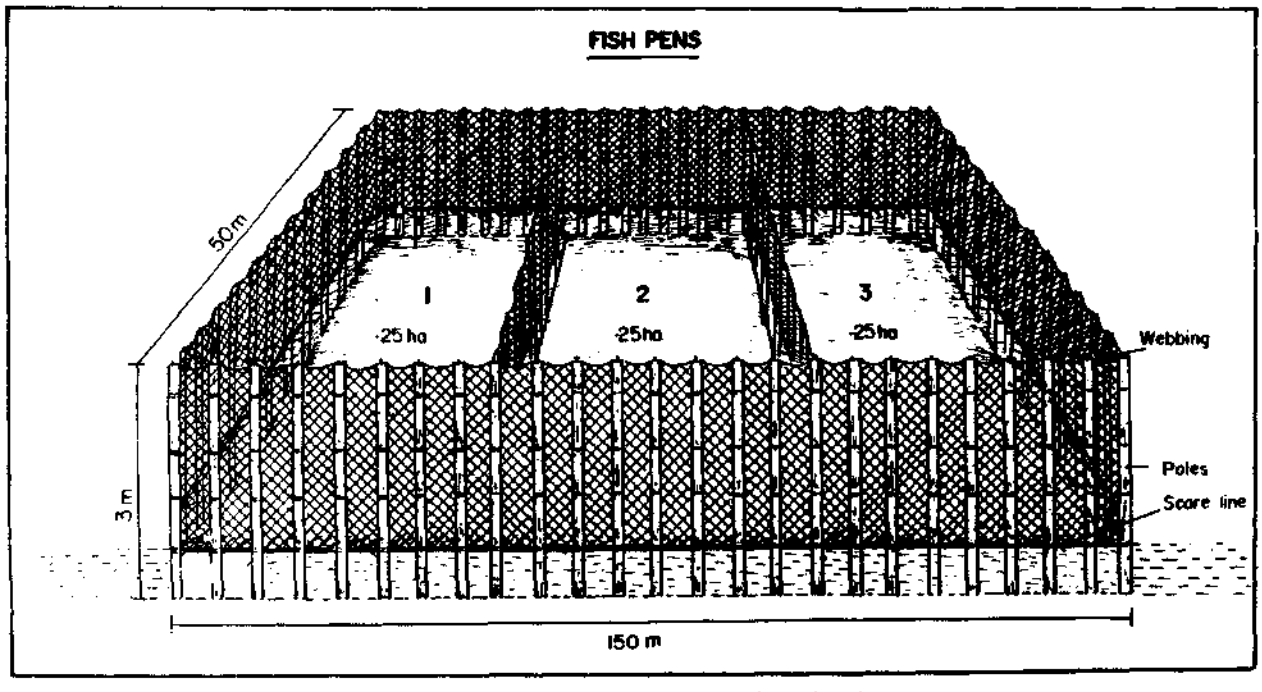

Fig.2. Three fish pens constructed in Pillaimadam lagoon

a

b

c

d

e

f

Figs. (a–f) Views of lagoon at Pillaimadam and preparations for pen culture in the lagoon.

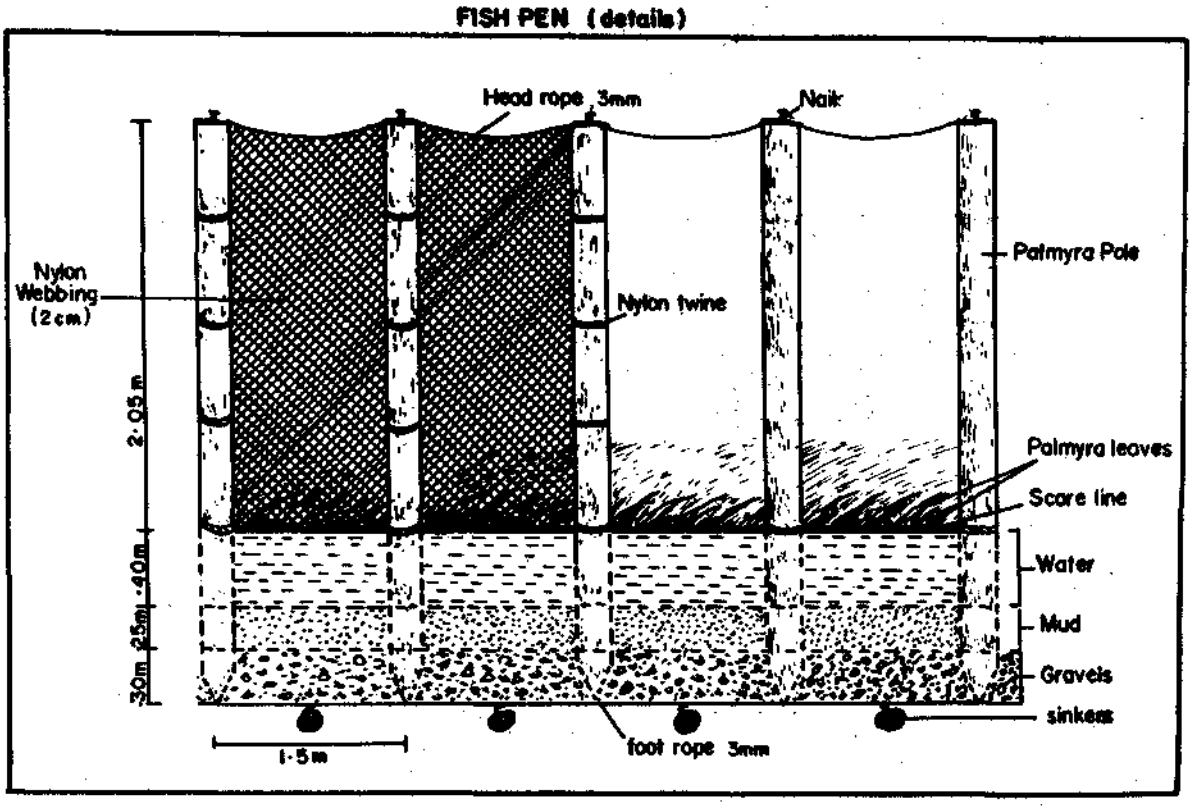

Fig.3. Details of construction of fish pens

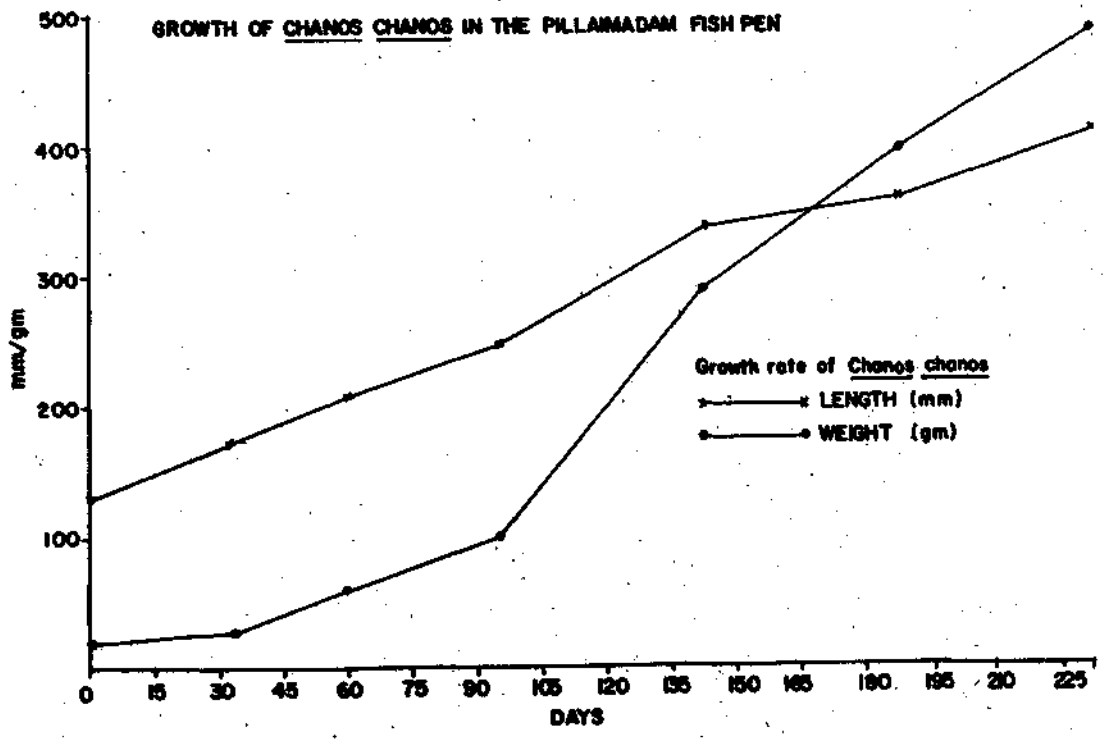

Fig.4. Growth of *Chanos chanos* in the fish pen

scare away the chanos fingerlings from coming near the webbing in their attempt to escape from the enclosure.

Stocking

Chanos fingerlings measuring 90–150 mm were collected mainly from the lagoon using a rectangular bag net measuring 12 m length, which was dragged behind a scare line made of tender palmyra leaves attached to a coir rope. The scared chanos fingerlings leap and fall into the net. The fingerlings were then transferred to plastic containers of 40 capacity and covered with nylon net. About 50 fingerlings were kept in a container and immediately transferred to the fish pen.

The 3 fish pens of 0.25 ha area each were stocked with 1000, 1500 and 2000 chanos fingerlings at the rate of 4000, 6000 and 8000 number/ha respectively.

Growth

The chanos fingerlings attained a length of 200 mm, weighing 63 g in 30 days in a 0.25 ha pen with the stocking rate of 4000/ha. The stocking size was an average of 140 mm weighing 25 g. In another pen it attained a length of 195 mm weighing 61.6 g in the first 30 days, 245 mm weighing 103 g in the next 36 days. The average growth was 1.5 mm/day. The growth rate was more or less same in the pen with the stocking of 8000/ha.

During the period of the experiment the salinity of the fish pens fluctuated from 60 to 169 ppm. The oxygen ranged from 3.8 to 4.5 ml/l.

In another experiment with a stocking rate of 6000/ha the fingerlings of length 74 mm in a 0.06 pen attained length of 405 mm weighing 400 g in 234 days (Fig.4). When salinity was about 32 ppm, a daily increment of 2.1 mm and weight 2.3 g was observed but the growth was very poor when the salinity was higher in the range of 65–70 ppm, indicating the influence of salinity on growth of the milkfish fingerlings.

These culture experiments are only preliminary. However, the possibility of making use of pens fabricated in these lagoon areas for culturing valuable fishes like milkfish and mullets is indicated. Thus large areas of water spread in this lagoon could be utilised for production of valuable protein food.