

DUCKWEED

Potential Feed for Fish and Livestock

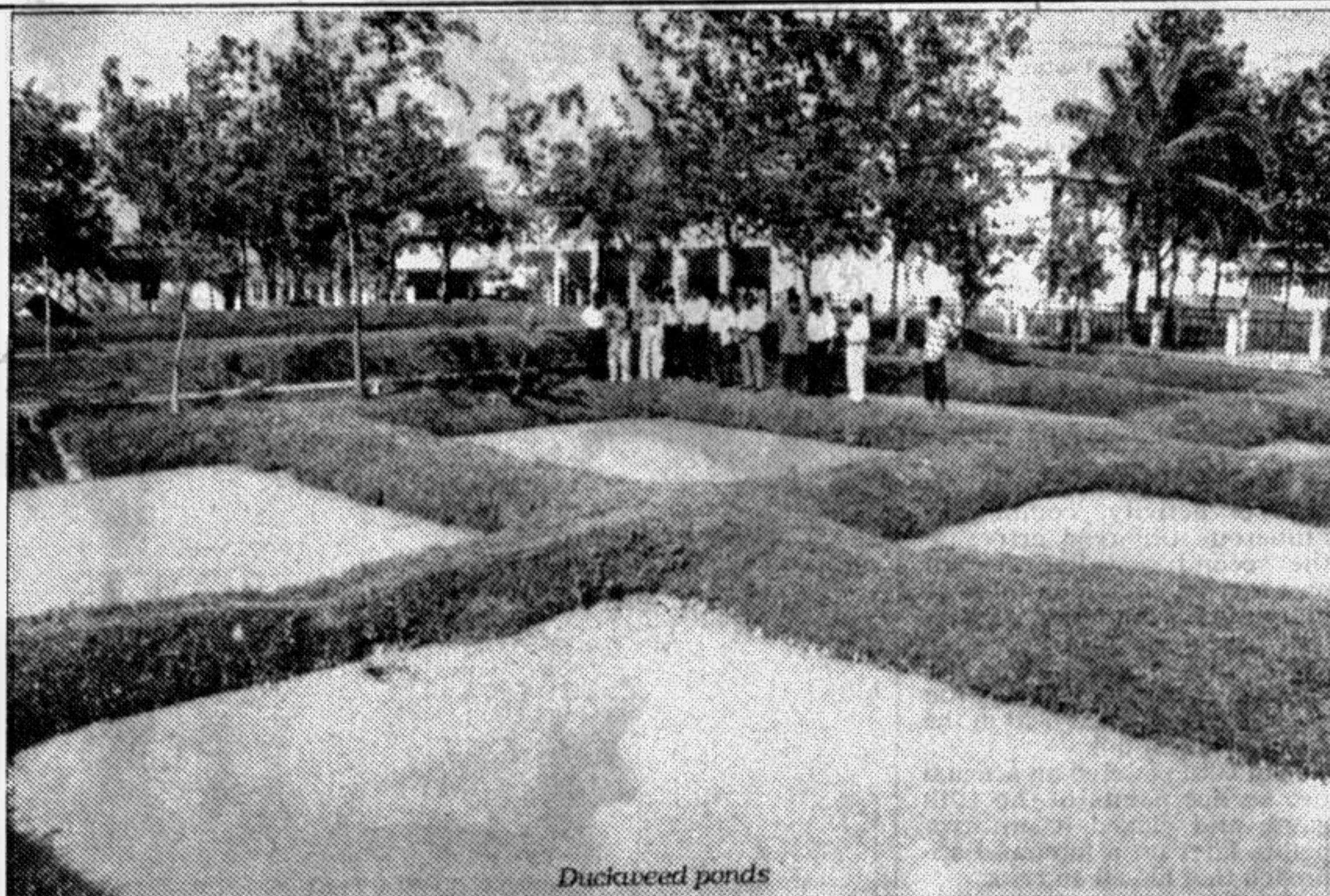
by Md Azizul Karim

With little effort and initiative duckweed production in every nook and corner (on water bodies) of the country would be economically feasible and socially acceptable.

DUCKWEED is a tiny floating aquatic plant having 36 varieties of which three are (wolffia, lemna, Spirodela) leading, produced in sizeable quantity. Over the past 20 years limited research has been done in several places. Countries like India, Thailand, Vietnam, China, South Africa have successfully experimented with this plant in various climatic conditions and in varying setups. The most interesting findings of this plant (duckweed) is the high production potential upto 300 tons per hectre per year combined with high level protein upto 40 per cent. The production cost is negligible and warrants only simple management technology.

It is well-known that Bangladesh faces massive shortage of feed for fish and livestock. There is enormous demand for quality feed fodder. The acute dearth of feed in fishery and livestock sector created near starvation situation in the country. The feed crisis is so deep and so drastic that it calls for an all out effort for mobilizing indigenous low-cost technology in the production of quality feed. Country's overall development, poverty alleviation, meeting wide-scale demand for nutrition (both for humans and livestock), large scale deficiency in the production of animal protein and chronic shortage of feed (for fish and livestock) are all linked together.

In order to hit the rural poverty line of the ways would be to grow more low cost fodder crop having high protein content to facilitate large production of fish and livestock so that supply and consumption of animal protein by the rural poor is possible. This will contribute to meeting their nutritional requirements if distribution and marketing is not hindered by any external factor.



Duckweed ponds

Duckweed as a fodder crop is extremely attractive for Bangladesh with its innumerable waterbodies spread all over the country. Besides fodder, duckweed can be used to treat waste water, sewage water to purify and reduce pollution. Duckweed grows fast in waste-water, in sewage sites and it is effective in absorbing pollutants. The research in duckweed has greatly advanced and one could be proud of the fact that Bangladesh is leading in this activity. Efforts by PRISM (an NGO) is noteworthy, besides

PROSHIKA and other NGOs have been working in this field. Government agencies like Bangladesh Livestock Research Institute (BLRI) and Fishery Research Institute (FRI) have also taken pilot project in Duckweed research and field application and by now they have obtained interesting findings. GOB-Dutch-PRISM-UNCDF collaboration in Duckweed research was very encouraging.

Considering the nature of the duckweed, its cultivation is suitable on surface water of limited size. Small ponds reasonably protected from strong wind would be ideal and that nutrient for faster growth of duckweed may flow from wastes

(household and non-industrial wastes). Duckweed growth is hampered only in extreme temperatures (hot or cold). Duckweed can also be dried in a natural process or applying indigenous technology and stored with minimum loss of protein. Dried duckweed mixed with the wastes of molasses and urea in little quantity is an ideal feed for cattle. BLRI has already developed a few options with duckweed as feed for livestock.

One of the major policy thrusts of the government is poverty alleviation through increased production and creation of employment opportunity. In pursuing this objective, it is

possible that vast number of rural poor can increase their earning and improve their standard of living based on duckweed production since it requires low input, easy management and simple technology. Household effluents can be used as fertilizer for duckweed production. Existing ponds, roadside ditches/canals, many of which not used for any purpose, can be utilized for duckweed cultivation. Simple application models for using duckweed as feed for fish, ducks and other livestock make it possible to reach protein large number of rural poor. Rural poor can with little effort participate in duckweed production and use it as feed. PRISM has shown that fish production can be more than doubled using duckweed as supplementary feed... PRISM's experience in Mirzapur, Tangail is highly encouraging.

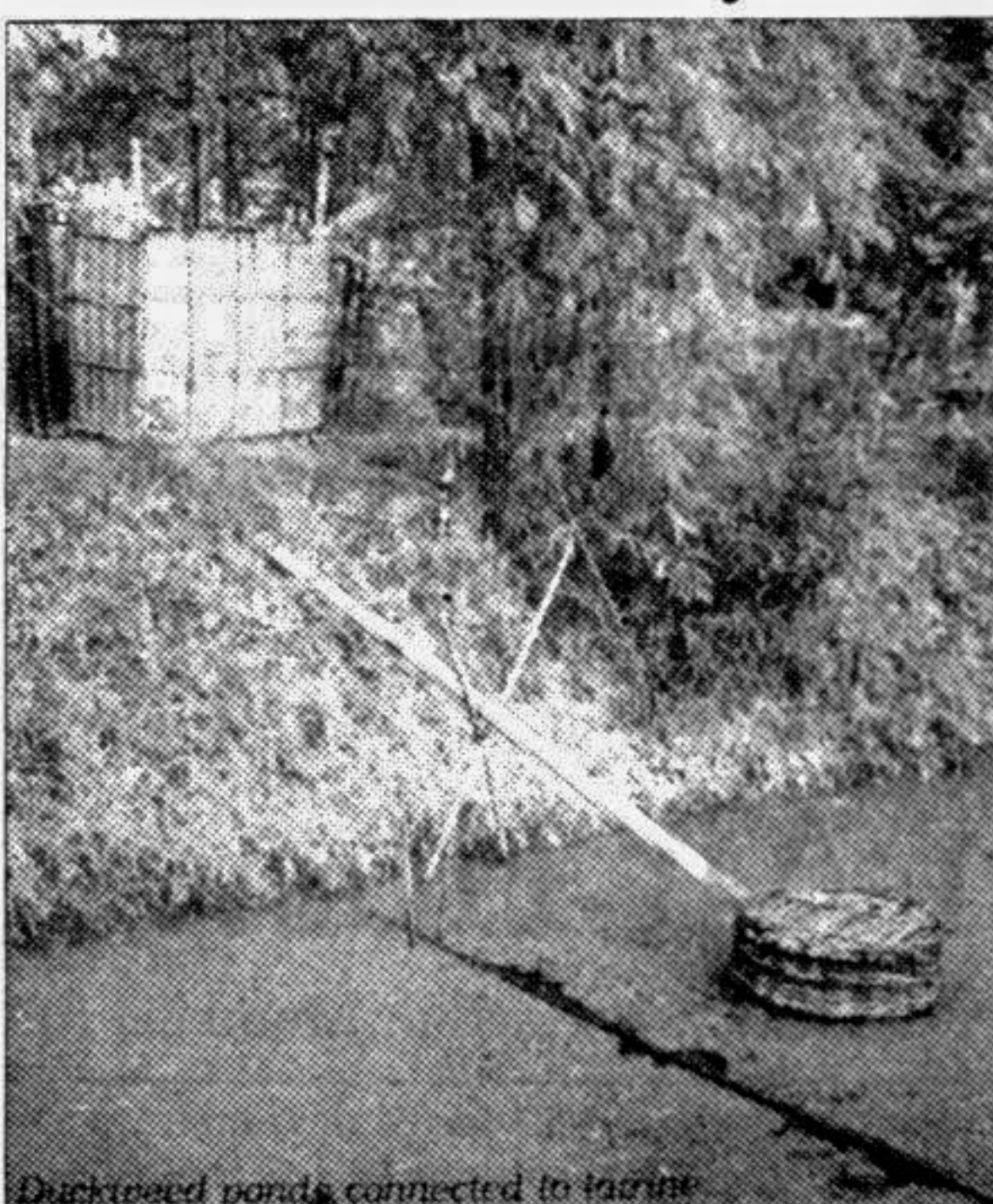
There is one thing more worth mentioning. The surface water while covered by duckweed is shaded and the temperature is substantially reduced, even mosquito breeding on duckweed covered water is severely reduced. With little effort and initiative duckweed production in every nook and corner (on water bodies) of the country would be economically feasible and socially acceptable. It may open up new avenues of income generation for the poor and bring fortune for the small entrepreneurs.

Bangladesh has at its disposal so many known and unknown, hidden and exposed resources unexploited or under utilized which with proper initiative and hard work can usher in wealth of health for the nation.

The writer is Joint Chief and Project Director, Ministry of Fisheries and Livestock.

Providing Protein for Millions Through a Miraculous Plant

by Nico den Tuinder



Duckweed ponds connected to farm

Collecting duckweed

Duckweed is more than this:

- It purges waste water as it feeds on human faeces. In this way it improves the hygiene and health of a village;
- It prevents the breeding of mosquitoes and flies by covering the surface of the water body;
- It slows down evaporation for the same reason;
- It can be used as a manure as it fixes atmospheric nitrogen to the soil.

Duckweed Research Project

The Duckweed Research Project formed part of the nation's efforts to develop this alternative source of fish. It investigated the best ways of using duckweed as fish food.

It seems a bizarre idea to use this plant to feed fish. It is just very small; it consists of an oval leaf with a diameter of a few millimetres and a short root usually less than 1 cm long. It is furthermore an aquatic plant; it floats on the surface of fresh and brackish waters. Why would this Lilliputian plant have such a tremendous potential that a multi-million dollar research project has been dedicated to it? The answer to this question is simple: it produces six to seven tons of protein per hectare per year, which is more than many other plants. How is this possible? Duckweed is supported by the water it floats in and therefore does not need much fibre to support itself. This allows for a very high protein content, in some varieties as high as 45 per cent. Provided there is good sunshine and enough plant food, duckweed may double its mass in one to two days.

ponds fed with the former source of fertilizer increased from about 5.6 tons in 1993 to 12.6 tons in two years. Whereas it was more stable in ponds fed on the latter, with volumes ranging from 8.47 to 15.08 tons per hectare per year.

These increases had been achieved by improvements in the management and operation of the fish ponds. The water levels in the duckweed ponds, for example, were maintained by regularly adding water from a deep well. The researchers also enthusiastically experimented with the composition of the fish stock until the best combination of duckweed-eaters, fish feeding on the former's droppings and fish eating other food was found. The area under duckweed was too small, and for this reason PRISM added oil cake and wheat bran to feed fish.

Extension Work

By 1993 time was considered ripe for allowing farmers to benefit from the research findings. An extension project supported by UNCDF (United Nations Capital Development Fund) earmarked a total sum of nearly two million US dollar to train 1,000 pond operators in improved fish and duckweed culture. Poor and landless farmers in Mirzapur and Manikganj districts were organized into groups of joint stock companies. Each group was to consist on average of ten

members holding 1.75 hectare of ponds in total, of which 50 per cent would be fish ponds. Each operator would get Tk. 28,000 credit, disbursed through PRISM, for the necessary investments in earthworks, latrines and wells.

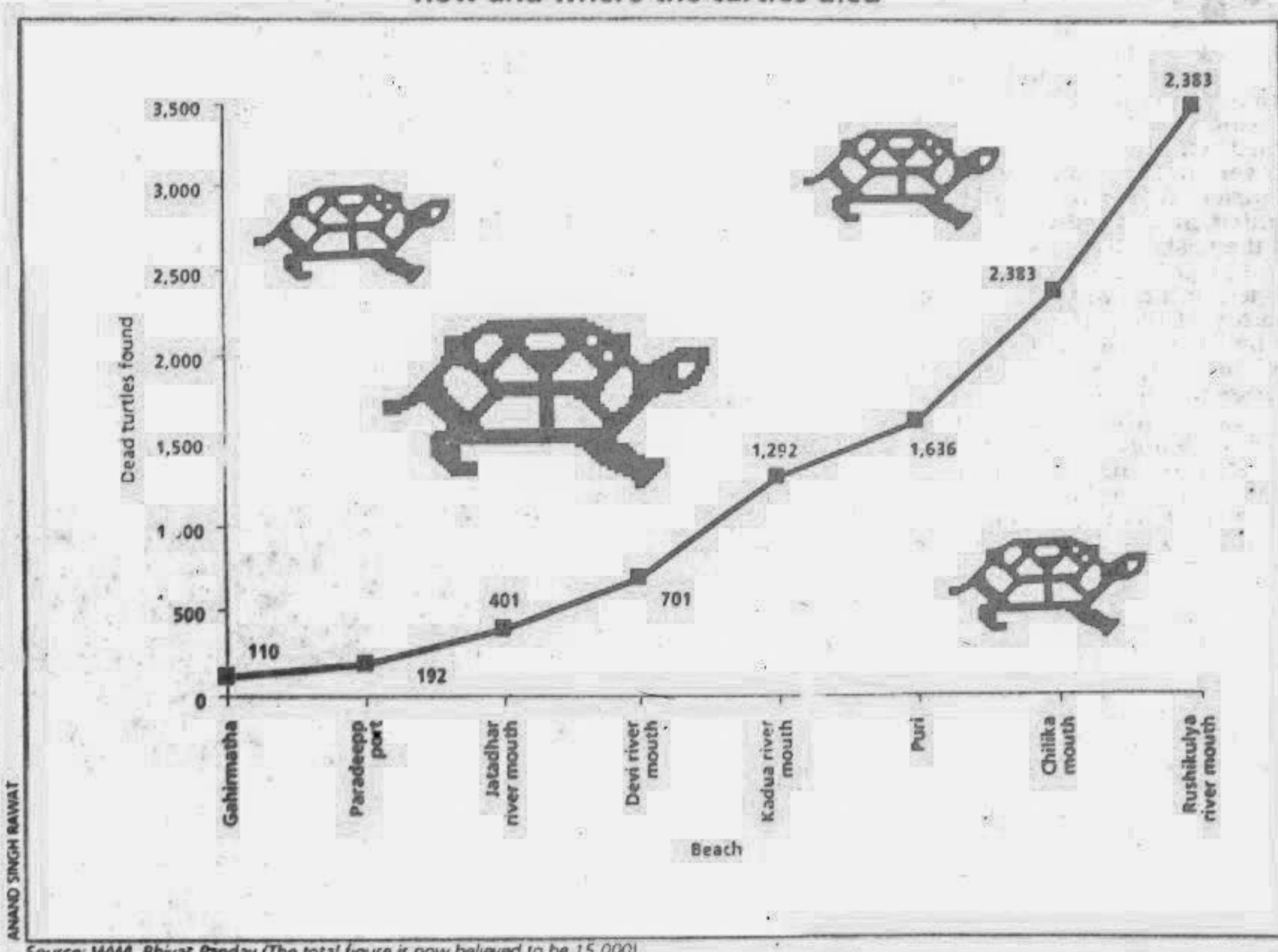
Mixed Results

Within three year a total number of 533 pond operators had been organized into 28 groups in Mirzapur and 20 groups in Manikganj. All of these companies achieved the aim of producing at least 5 tons of fish per ha. per year. Not with duckweed alone, though; the companies had to purchase many inputs such as oil cake, wheat and rice bran, and chemical fertilisers. An irrigated area had been demarcated by duckweed ponds and duckweed yields were lower than expected. Hardly any money had been invested in the duckweed ponds, with the result that some of them stood dry part of the year, producing no duckweed.

The Review Mission studied the profitability of 15 companies. Only six were making a profit, while the remaining nine made no profit at all. It feared that if a company would fail, the landless, marginal and small farmers would lose all their assets. It also pointed out that 60 to 80 per cent of the company shares were owned by 30-40 per cent of the shareholders. When the project would end, the higher income members would buy the shares of the poor.

Turning Turtle

The Toll  
How and where the turtles died



ROUGHLY half the "two to three million" Olive Ridley's existing in the world have regularly been turning up at Gahirmatha coast, in Orissa, for mass nesting. They have been turning up as usual for the last two years but this year only 50 turtles managed to nest because the remaining have been swept up dead on the coast.

As one drives along the Paradeep and Konark coast, thousands of dead turtles litter the shoreline, the shells bearing the initials J, F or M, put there by diligent Wildlife Institute of India (WII) researchers to indicate the month in which they were washed ashore.

The government has taken no more than inadequate steps to help the situation, and betrays no sign at all of trying to understand the overall phenomenon, let alone grasping the implications for the world's most famous nesting ground for Olive Ridley's.

WII experts estimate that at least 15,000 turtles, primarily females, have so far been killed. The male of the species are said to desert the females after mating and go for deeper marine waters. So, they do not come into contact with trawler nets or other human artefacts.

Gahirmatha may be repeating history. Before it the Mexican coast used to be the favourite nesting ground of the Olive Ridley's. Intensified fishing and trawling activity in the area is blamed for having pushed them out of the region. Now only 300 to 400 turtles visit the Mexican coast for nesting.

Mass nesting is unique to this species. The creatures mate in the sea, congregate near the shoreline, as though in conference, and then emerge from the sea for nesting at night. By the morning their eggs are gone, leaving their eggs behind, protected under the sand. When evening comes again, a fresh batch of a few thousand arrive. And so it goes on for up to eight to 10 consecutive days through January-February and April-May each year.

Gahirmatha was declared a marine sanctuary last year as a measure to protect the turtles. This seems to have had no impact on the situation, and mass nesting has not taken place.

Illegal fishing activity near the shoreline is taking a major toll. In 1975, when she was prime minister, Indira Gandhi had suggested deploying Coast Guards to check illegal trawling with a view to leave the Olive Ridley's unmolested in the Orissa area.

Brought in only last October, the Coast Guard has managed to apprehend 200 trawlers this year alone. Yet everyday 60-70 trawlers set out to sea along the Orissa Coast, and there is only one Coast Guard vessel to patrol the entire Orissa coastline. This is grievously inadequate.

A trawler net must have a special device, known as the turtle excluder device (TED), if it is not to trap turtles. The TED costs about Rs 10,000 (roughly \$264). However, using it reduces ordinary fish catch by 10 to 15 per cent, a figure suggested by the National Marine Fisheries service in the US.

This is why trawlers, operating legitimately or illegally, avoid using the TED. This causes large-scale turtle death. Unfortunately, trawlers cannot be forced to use the TED as there is no binding legislation in India.

And in Orissa in the last five years, the coast has seen mushroom growth of large fishing jetties promoted by the state government. Two fishing harbours which have come up at Dhamra and Paradeep, to the north and south of the Bhitarkanika wildlife sanctuary, under which the Gahirmatha rookery comes, are hardly a few kilometres away from the route the turtles take.

Even inside the sanctuary a massive fish landing has been constructed at Talchua which, according to the coast guards attracts at least 150 illegal trawlers from Orissa and Andhra Pradesh. This violates

the provision that no fishing activity should take place within 25 km from the shore of the sanctuary.

Animal husbandry minister of the state, Prakash Chandra Debta, blames "marine pollution and fatigue from long distance travel" for the Olive Ridley's deaths. Expert find this baffling. The Orissa coast is relatively free of pollution. And even if it were polluted, it is the fish population that should succumb first.

Turtle experts also find it difficult to accept the "travel fatigue" argument. "Fatigue can't be a reason as turtles are migratory in nature and can withstand thousands of miles of journey. Also, the dead turtles found were healthy. Indeed, many were pregnant", says Bivash.

Trawlers are not the only menace to Olive Ridley's. The turtles also get caught in gill nets used by traditional fishfolk. To disentangle them from the nets fishfolk either hack their heads off or plunge iron rods into their eyes.

The changing land use patterns are making matters worse. Bright lights in the prawn fields are disorienting the nesting turtles as well as the hatchlings. The hatchlings are attracted by the lights and instead of heading for the sea, they go in the opposite direction. They end up being found on private lawns, badminton courts and football fields.

The Orissa beach is also fragile and is affecting mass nesting in a big way. It has been noticed that the area available for mass nesting has eroded considerably in Gahirmatha since the rookery was first discovered.

Largescale plantations of Casuarina since 1971 as a check against annual floods has also disrupted nesting. With their nesting patterns disrupted, the Olive Ridley sea turtles are clearly in danger. But will help come in time?

CSE/Down To Earth Features

Obscure Pages of History Shed Light on Goa's Past

by Frederick Noronha

WORDS from Zanzibar, maps from Lisbon and intriguing little tidbits from far-flung regions of the once-vast Portuguese empire crowd the shelves of an obscure library in the tiny western Indian state of Goa.

The Xavier Centre of Historical Research (XCHR) located five km from Panaji has a library that documents not only Goa down the centuries but also the history of places like Macau near China or Ormuz in present-day Oman.

Some interesting records of villages in Goa, which was once the eastern headquarters of the Portuguese empire, are also showcased here. Goa, captured by Afonso de Albuquerque in 1510, was ultimately liberated from Portuguese rule in 1961, years after India's independence. It was granted statehood only in 1987.

In the year 1877, for instance, there were as many as 8,988 people living in Aldona and 9,604 in Sliolim. Now, the population of both of these villages along the coastal tract of Goa has diminished as, in recent decades, there has been large-scale emigration of people to the Gulf countries.

One can gingerly flip through brittle pages of the

original copies of the first newspaper published from Goa, the 'Gazeta de Goa', which was brought out in 1821.

In this seldom visited XCHR library at Alto-Porvorim, one comes across a wealth of historical sidelights about past life in Goa, like the details about how migration affected this small state or how valued goldsmiths from here who were sent to Portugal in the early 16th century.

"Indian goldsmithery was considered to be of a very high order. The Portuguese were fascinated by it," points out librarian Lilia Maria D'Souza, referring to a book written by the son of Goa's last Portuguese Governor-General.

The book, 'The Heritage of Raulu Chatim', was recently published in Portugal. Raulu Chatim was a goldsmith who went to Lisbon to display his skills in the early 16th century. Apart from goldsmiths, Goa was also famous for its tailors in regions as far as Calcutta in the east.

For decades, Goans have been migrating to many parts of India and abroad. Despite being a small community, they have spread out to many parts of the globe.

The dusty pages on the well-maintained shelves of the library reveal a treasure of forgotten facts. In the late 19th century, for example, there were a number of clubs and other bodies set up by people from Goa across the country, including in Mumbai, Calcutta, Karachi and Pune. These included dramatic groups, cricket clubs, schools and institutes.

Besides its many books, XCHR has rare atlases, maps, dissertations and bibliographies, newspapers clippings and some cyclostyled volumes of government reports and seminar papers.

XCHR also houses around 200,000 documents of the Mhamai Kamat business house of Old Goa, who in the 18th century were tobacco farmers. They ran an agency for the French and also conducted international trade from Goa.

Scholars have undertaken interesting studies — on the relations between colonial Brazil and colonial Goa for instance — through this centre.

Besides, XCHR has received many quaint gifts such as three swords from the family of a doctor who was the personal physician to the Sultan of Zanzibar.

— India Abroad News Service

Garfield®

by Jim Davis

