

Growing seafood without the ocean

Warren Page and Geoff Wilson report on a possible benefit from salty soils



PHOTO: STEWART FIELDER



Easing the pressure on natural ocean fish stocks: Fish being harvested from a community pond in Rohtak Village, left; and saltwater aquaculture ponds in Australia. Credit Stewart Fielder.

Salt and soils do not mix. This has been known from ancient times; conquering armies would sometimes spread salt on an enemy's farmland to destroy its agriculture.

Modern farmers have as their enemy naturally occurring salt, rather than that dispersed by marauding armies. It is rising water tables that are on the march, mobilising ancient salt deposits in countries like India and Australia, both having large areas once covered by seawater.

As this salt approaches the surface it is being 'sown' into soils, all but crippling productivity.

Many management approaches have been tried over the years and research continues. One of the more recent and novel ideas is to use 'interceptor banks' to intercept saline water as it rises through the soil and direct it into holding ponds (or farm dams), and use these for raising saltwater fish species.

Short-season crops, or pastures, have shallow root systems that do not soak up rising water in the same way as deep-rooted trees and some perennial species. So rising groundwater is not absorbed in large quantities until it reaches surface subsoils, where it prevents healthy plant growth. This, combined with over-irrigation, increases salinity.

Channelling this saline water into collection ponds before it reaches the root has the potential to keep farmland arable, and provide a resource for inland aquaculture that could help to ease the growing pressure on natural ocean fish stocks.

To this end, Australian and Indian scientists are collaborating in a three-year ACIAR project to support the use of saline holding ponds in cropping and grazing lands for profitable aquaculture.

Several barriers have to be overcome. Inland salt water is not always like seawater, even if it is from ancient oceans. The concentration of chemical salts can vary greatly and can have adverse effects on fish, crustaceans, shellfish or the water-borne micro-organisms upon which juvenile fish feed.

The same applies to the extremely variable salty waters from land degradation or faulty irrigation. Lightly salted waters can be suitable for some fish and crustaceans, while the heavily salted waters may have commercial uses only after chemical treatment.

Nonetheless, the salty water resource in both countries is huge – and is growing – and everyone agrees long-term economic answers are needed.

In Australia, it is forecast that 12 million hectares of farmland will be salt-affected by 2050, affecting the livelihoods of about 74 rural and metropolitan towns and cities.

In India, about 8.57 million hectares are predicted to succumb to salinity over the next few decades. In addition to this, some 41 to 84 per cent of groundwaters in north-western India are naturally saline.

Researchers believe that using collected saline water for commercial enterprises such as saltwater aquaculture will provide the commercial incentives

needed to sustain long-term management options.

They are looking at the potential to grow fish, crustaceans, shellfish, edible seaweeds and other halophytic (salt-tolerant) plants that can create food and farm incomes at village, regional and national levels.

In India the proposal has the potential to increase food production and create an alternative income source for farmers in salt-affected lands. Dr Stewart Fielder, scientific officer, marine fish breeding, with NSW Fisheries at Port Stephens, says that in both India and Australia, basic husbandry used to culture target species elsewhere (on the coast) is being used in experiments. The intention is to evaluate coastal technology in an inland environment.

"Feeds are obtained from either coastal feed mills or made locally using the same ingredients and formulations as on the coast," he says.

Dr Fielder says the objective of this ACIAR-funded program is to identify opportunities and develop technology for integrating aquaculture with agriculture in degraded areas.

Such integration is moving towards fish feed proteins produced from farmer-grown cereal grains, rather than from a declining (and more expensive) wild-catch of anchovies and other aquaculture feed fish.

It is hoped that successful integration of aquaculture into traditional farming lands could finally overturn the age-old rule that soils and salt cannot mix. ◀