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# Inland shrimp farming and the environment

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## Farmers should adopt practices to prevent soil and water salinization

The inland shrimp farm to the left above is located adjacent to rice fields in Thailand.

Inland shrimp farming has been a common practice in some areas of Thailand for nearly a decade and interest in this activity is spreading. Several inland shrimp-culture operations have been initiated in Ecuador and other Latin American countries. In the United States, shrimp are being produced in inland ponds in Alabama, Arizona and Texas.

This method of shrimp production is attractive because it allows better control over the spread of disease organisms than often can be achieved in coastal areas. Also, it has the advantage of moving shrimp culture from highly sensitive coastal ecosystems, which often have multiple and conflicting uses, to inland areas with more resilient ecosystems, where conflicts with other resource users are less likely.

## Inland water use

A few inland producers are trying to raise shrimp in freshwater, but in most cases, water with 2 to 5 ppt or greater salinity is provided in culture ponds. Some areas have saline underground water that can be obtained from wells and used directly, or diluted with freshwater for shrimp culture. Brine solution from coastal evaporation ponds used for salt making can be brought in and mixed with freshwater. Salt also can be dissolved in freshwater to increase salinity.



Environmental groups have objected to inland shrimp farming on the grounds it will cause soil and water salinization. While there is potential for such salinization, steps can be taken to minimize the impact of inland shrimp farming on water resources and vegetation.

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## Preventing salinization

During a recent trip to Thailand, I visited several inland shrimp farms located adjacent to rice fields, orchards and natural freshwater wetlands. Based on the appearance of the crops and vegetation, I found no evidence of salinization. These farms had initiated practices to reduce the loss of water from ponds and employed water-reuse techniques for shrimp culture.

In west-central Alabama, USA, farmers have cultured channel catfish for more than 25 years in ponds filled with well water of 2 to 6 ppt salinity. This water is highly prized by catfish farmers, because it has therapeutic value to fish, and fewer disease problems develop with its use than in normal freshwater

water.

An environmental impact assessment of channel catfish farming in Alabama revealed no negative impacts of catfish culture in saline water. However, it should be noted that all catfish culture in saline water has been conducted in embankment ponds that only overflow after heavy rainfall, ponds are constructed in heavy clay soils where seepage is low, sediment is not removed from ponds and ponds are not drained more than two times in 15 years for fish harvest because harvest is done by seining.

# Good practices

If standards for the location, design, construction and operation of inland shrimp farms are developed and enforced, inland shrimp farming can be conducted in a profitable, sustainable and environmentally responsible manner. The major practices that should be adopted to prevent salinization are straightforward and relatively simple.

## *Pond design*

Production should be done in embankment ponds, because watershed ponds have large amounts of overflow that could cause salinization of surface water. During high rainfall periods, overflow can occur even from embankment ponds. Thus, ponds and reservoirs on farms should have adequate free board to store direct rainfall and avoid overflow. A shallow ditch with a low embankment on its outside should be constructed around the farm to prevent runoff onto adjacent land.

## *Site selection*

Sites for inland shrimp farms should have soils of adequate particle size distribution to resist seepage. Control of seepage will conserve the saline water used in culture ponds, as well. Where soils have a moderate to high potential for seepage, a clay liner or plastic membrane can be installed in ponds to reduce water loss.

## *Water reuse*

Inland shrimp farms should reuse water. This practice will prevent effluents from entering natural waters and conserve saline water for shrimp culture. Reuse systems should contain water treatment reservoirs and possibly wetlands for enhancing water quality.

Moreover, sediment should not be removed from ponds and discarded outside the farm area. Such sediments contain salt that can leach out following rains, and possibly contaminate surface and underground water and soil.

## *Buffer zones*

A buffer zone of vegetation should be provided around farms. The continued health of the buffer-zone vegetation will provide evidence that salinization of surface soil is not occurring. Piezometer tubes can be installed at critical points and monitored to assure that salinization of the shallow aquifer does not develop.

# Conclusion

Inland shrimp farmers should adopt practices to prevent soil and water salinization. Shrimp farmers can work with governmental agencies to develop formal regulations for inland shrimp culture based on best management practices. The Global Aquaculture Alliance may also develop suggested practices for

inland shrimp farming.

In Ecuador, the National Aquaculture Chamber (Cámara Nacional de Acuacultura) cooperated with the Deputy Secretariat for Fishing Resources (Subsecretaría de Recursos Pesqueros) to develop experimental standards for inland shrimp farming. These standards, which other nations would do well to emulate, are an important step toward assuring that inland shrimp farming will grow in a responsible manner.

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