A New Low-Cost Method of Sealing Fish Pond Bottoms

In no part of the world is aquaculture less developed than in Latin America, despite its great potential there and the shortage of protein foods in much of the region. One of the constraints on the development of Latin American aquaculture has been the porosity of many of the soils – a problem which is by no means limited to Latin America. Such was the case with a 200 m^2 pond constructed in 1973 at Finca El Uno, located at Tirimbina, Provincia de Heredia, Costa Rica. Compaction of the soil alone was not enough to enable the pond to hold water. The soil at the pond site appears to contain quite a high percentage of clay, but there is a porous, sandy layer at a depth of 2-3 feet. Rainfall in the area is about 120 inches annually.

Similar problems have been solved in a variety of ways in the United States and other affluent countries. Bentonite clay is the most common sealing agent; when mixed with the pond bottom soil in the proper proportions it forms a colloidal seal. A similar effect may be achieved through the application of certain chemical salts. Many American fish farmers have lined their ponds with sheets of polyethylene, butyl rubber, and other synthetics, which are then buried. In extreme cases, small ponds may be cemented.

All the sealing methods mentioned so far share the characteristic of being expensive. This is a disadvantage anywhere, but in situations where capital is a major limiting factor, the expense can be prohibitive. We were able to circumvent this problem by applying a virtually cost-free method of sealing at Finca El Uno. The technique does not originate with us, but is of Russian origin and has not been well publicized. We became aware of it when Marsha Zilles of Santa Barbara, California, sent us a copy of an abstract from an architectural design journal briefly describing how Soviet scientists had sealed ponds by artificially inducing the formation of a "gley" or "biological plastic", as occurs naturally in bogs.[1] The process, as adapted for use in Costa Rica, proceeded as follows:

1. The pond bottom was completely cleared of debris, rocks, etc.

2. The bottom and sides were covered completely with wastes from nearby hog pens. Care was taken to apply the material to the vertical sides of the pond as well as to the bottom. This layer and each subsequent layer of material was added in quantities sufficient to just cover the previous layer.

3. The hog pen waste was completely covered with freshly cut grass and banana leaves, plus a few discarded cardboard cartons.

4. A third layer, of soil taken from near the pond site, was added and tamped down firmly.

5. After between 2 and 3 weeks, the pond was flooded.

The pond retained water immediately upon filling, with no leakage whatsoever. The cost of sealing was limited to labor costs; the materials used were all "wastes" which would have been discarded in the course of normal farm operations.

The process involved in forming the seal is a bacterial one, which requires anaerobic conditions. It is possible that plastic and rubber pond liners actually act in the same way. While great care is taken to prevent punctures in the installation of such liners, it may be that their long-term effectiveness is, in fact, a result of the creation of anaerobic conditions underneath the liner. The suggestion is that a variety of waste materials, if properly applied, would seal porous soils, thus enabling the Russian method to be adapted for use practically anywhere.

So far as we know, the experience reported here is the first test of the gley formation method of pond sealing in the tropics, or anywhere outside the U. S. S. R. If its application turns out to be universal, as appears likely, the implication is that many areas of the world which, up to now, have been closed to aquaculture (except perhaps by large corporations or government agencies) can now be opened to this method of food production. We would very much like to hear about any experiences our readers may have with pond sealing.

– William O. McLarney
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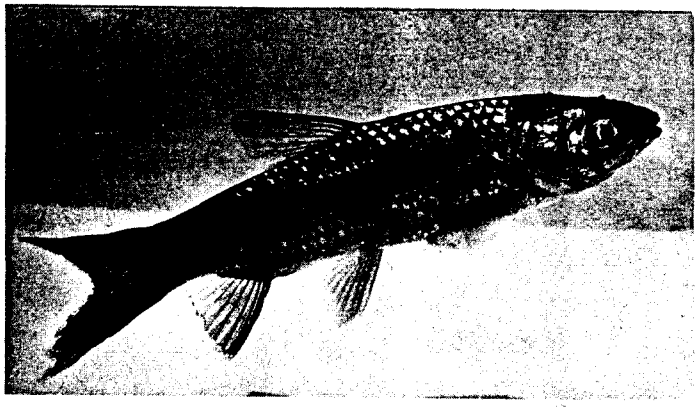

Photo by Fritz Goro

1. *The Journal of the New Alchemists (1) p. 35.*