

## Kfar Ruppin, Israel

### *A Case Study*

Case Study: Fish Farm

Client: Kibbutz Kfar Ruppin

Start Up: 2004

Capacity: 120 m<sup>3</sup>/h circulation



#### Overview

Kfar Ruppin is one of the leading fish farming coops in Israel. Recent restrictions on water consumption and discharge have led the coop to consider semi intensive closed loop fish ponds. The main objectives in closed loop fish farming applications are prevention of Ammonia and Nitrite accumulation, and removal of suspended solids. Usually, the investment in a closed water cycle system can only be justified by intensification of the pond yeild (fish density).

#### Requirement

The closed loop water system was required to maintain a free Ammonia concentration of less than 0.02 mg/l, along the entire cycle. This corresponds to 2-2.5 mg/l total Ammonia Nitrogen (depending on pH and temperature). In addition, pond TSS was to be kept below 80 mg/l, and preferably below 50 mg/l. Fresh water consumption had to be reduced by at least 90%.

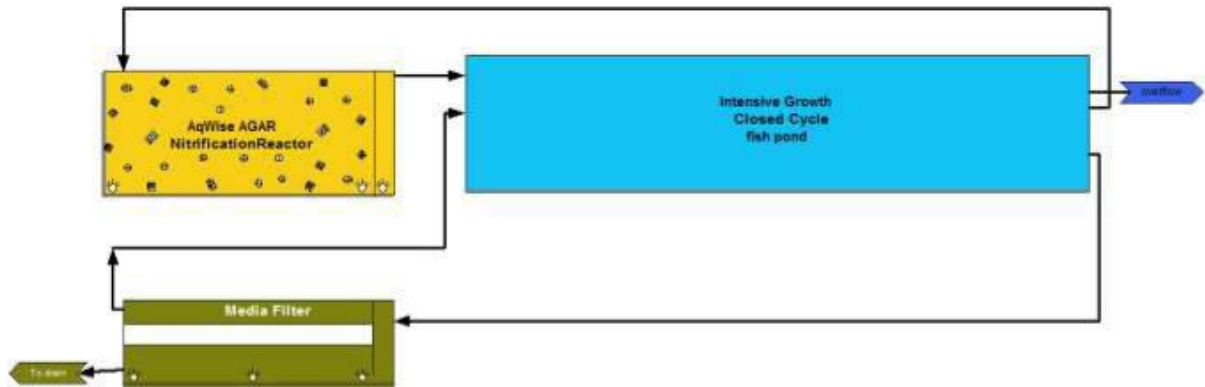
#### Solution

An AGAR nitrifying Roughing Filter was installed to comply with the required removal load at all stages of the growth cycle. Biomass develops on the carriers according to the applied load. The reactor, including the aeration system, are designed to handle the maximum load. In addition, a plastic media coarse gravity filter was installed on a separate circulation loop, to maintain low TSS in the pond.

#### Design

A one stage nitrifying AGAR Roughing Filter system, filled up with 43% of biomass carriers and aerated by fine bubble diffusers was installed. Controllable circulation between the pond and the reactor is done by an airlift pump.

An up-flow coarse plastic media filter operates on a separate circulation loop, in order to control pond TSS. The filter was sized according to required solids removal load, with a removal efficiency of about 60%. The max. quantity of fish treatable by the system is about 12 tons. This would allow a single pond to operate at a fish density of up to 54 kg/m<sup>3</sup>. However, pond aeration limitations to fish densities of less than 40 kg/m<sup>3</sup>, are now handled by connection of two ponds to the water treatment system.



## Results

The system has completed 3 successful growth cycles, with all concentrations maintained according to specifications. In addition, fish mortality has been observed to be lower than adjacent reference ponds.

|          | Total Ammonia | NH <sub>3</sub> -N |
|----------|---------------|--------------------|
| Required | 2.0-2.5 mg/l  | < 0.02 mg/l        |
| Achieved | < 1 mg/l      | << 0.02 mg/l       |

