

“AQUAETREAT”

Farming out waste to help the environment

It is widely known that eating fish is good for one's health, and fish consumption is increasing worldwide. Fish farming however still poses some risks on the environment, and currently produces effluents – containing fish faeces, excretions, uneaten feed, etc. – that may, if not properly handled, contribute to the pollution of water bodies.

As the world population and economy continue to grow, water will become an increasingly scarce commodity. The European Union is therefore committed to promoting and encouraging the sustainable use and efficient management of water resources across the continent.



AQUAETREAT, “Improvement and innovation of aquaculture effluent treatment technology”, is a 3-year SME collective research project, funded under the Sixth Framework Programme, looking at the need for fish farms to **improve the management of wastewater and solids, to minimise pollution and optimise the recovery, disposal and re-use of solid waste.**

It has started in May 2004 and since then developed **effluent treatment systems, applicable to all types of land-based fish farms** – open and closed systems, fresh water and marine operations, regardless of species – , which have been tested at three sites in Italy, France and Denmark. Research institutes in Italy, France and the United Kingdom act as the project's RTD performers and are supported by an Italian engineering SME that is expert in treating effluents.

The systems designed have proven to be **cost-effective** and allow **efficient effluent removal and sludge thickening**. The first step is a mechanical filtration, in which all large settleable or suspended particles, both organic and inorganic, are removed; this step produces a high flow of filtered water (1), where the reduction of solid concentration varies between 30 and 70 %, and

a very low flow of concentrated waste water (2) containing 1 to 3 g of solids per litre. The latter flow (2), also called the pre-concentrated effluent, needs further treatment with additional concentration systems (settling and flocculation-coagulation) to obtain on one hand a concentrated sludge (10-30% of dry matter content) (3) and on the other hand an effluent (4) containing high concentrations of mineral and organic soluble substances (in particular nitrogen and phosphorus). The final sludge (3) dewatering and thickening process occurs through the employment of different devices, as settling tanks, geotubes and belt filters, while further soluble substances removal from the filtered (1) and the nutrient enriched waste water (4) occurs through packed biofilters, wetlands, both natural or constructed, and algal ponds.



THE AQUAETREAT SYSTEM. SOURCE: MARIBRIN.

Project acronym:

AQUAETREAT

Full title of Project:

Improvement and innovation of aquaculture effluent treatment technology

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The composition of all flows has been characterised and protocols and methods have been set up for the re-use and/or disposal of waste and by-products. The quality of the recycled water has been tested by rearing sea bream larvae in it; preliminary results have shown higher growth rates and less mortality, as well as a comparable quality of the flesh, which has been certified by a panel of experts. Parameters of welfare are still being checked. An agriculture test whereby tomatoes were grown using marine stabilised sludge, has also shown promising results.



AGRICULTURE TEST WITH STABILISED
 SLUDGE. SOURCE: MARIBRIN.

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It has to be noted here that to avoid high transport costs, it is advisable to find a way to reuse sludge inside or in the area of the fish farm. As to the sludge composition, nitrogen and phosphate might be limiting factors, but preliminary studies also have excluded the presence of potential pollutants such as heavy metals, poly-aromatic hydrocarbons and PCBs.

At the moment, although filters are currently employed to clean water in the farms, there are no means of reusing waste products, and fish farmers must bear the cost of disposing of their waste. The effluent treatment systems developed in this project will enable fish farmers not only to reduce the amount of waste they produce, thereby **lowering disposal costs**, but also to **create commercial products** as the waste might be used as soil amender or compost for agriculture, or find uses in other sectors. Moreover, they will also be able to produce cleaned water that can be safely discharged in the environment or be recycled inside the process units, thereby lowering the amount of water extracted from the environment, which is needed to maintain optimal growth conditions in the fish tanks and the health of the cultivated species.

Within this project, an **extensive dissemination and training plan** has been foreseen, which includes four regional workshops and four training courses and is focused on the formation of updated and skilled managers and technical staff of the European aquaculture SMEs. More information about this can be found on the project's web site.