

# AMAL أمل

*Aquaponics as a social art project... and how it works....*

*The word Aquaponics is a combination of two words: aquaculture and hydroponics. It refers to any system that combines conventional aquaculture (raising aquatic animals such as snails, fish, crayfish or prawns in tanks) with hydroponics (cultivating plants in water) in a symbiotic environment. In normal aquaculture, excretions from the animals being raised can accumulate in the water, increasing toxicity. In an aquaponic system, water from an aquaculture system is fed to a hydroponic system where the by-products are broken down by nitrifying bacteria initially into nitrites and subsequently into nitrates that are utilized by the plants as nutrients. The water is then recirculated back to the aquaculture system.*

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*As existing hydroponic and aquaculture farming techniques form the basis for all aquaponic systems, the size, complexity, and types of foods grown in an aquaponic system can vary as much as any system found in either distinct farming discipline.*

*In 2014 we expanded the project of the artist residence CASAdelDRAGON and we bought a first plot close to the village of Cervera del Maestre. We started the color garden project, by combining ancient and contemporary methods of horticulture with modern technologies (solar power, internet of things).*

*As part of this project we founded the free University of informal education (UNIIIE) and we started to offer workshops and classes in various fields.*

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One embedded project is aquaponics. We want to discover and learn, how to implement this agriculture technique in the lower Maestrazgo under our specific circumstances (light, access to water, quality of soil). We invited also the University of Halle in Germany (MLU) to join this project and to give new generations of biology students the chance to develop contemporary agriculture systems from the beginning.

According to our philosophy of “donation without expectation” we do not charge money for our workshops. Also we are not farming and selling products on local markets.

The reason for both is easy to understand. If you charge money for sharing knowledge you end up in classical education systems. We prefer informal education, driven by the needs of the people who

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want to learn something. According to a UNESCO study about the effect of education, we know that 20% of daily used knowledge came out of classical education, and 80% of informal learning.

Selling a product to a market involves you in a lot of regulations and restrictions. If you want to enter the market you have to deal with this. Selling products ends by optimizing the benefits and you come to very specific solutions.

So we donate what is left over and we come to very different “products”.

Our main aim to study aquaponics is, to understand and handle running systems of different sizes. We want to collect knowledge about fish farming and we offer this knowledge in our UNIIIE workshops.

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The gourami fish is native to Pakistan, India and Bangladesh. However, it has also been widely distributed outside of its native range. It inhabits slow-moving waters in rivulets, streams and lakes, occurring in areas with plentiful vegetation.

The fish likes water temperature between 20 and 28 degree and is used as food fish.

The male builds a floating bubble nest in which the eggs are laid. Unlike other bubble nest builders, males will incorporate bits of plants, twigs, and other debris, which hold the nest together better.

The water level should be reduced to 7-10 cm (3-4 in) during spawning, and the temperature should be approximately 28-30 °C (86 °F). Vegetation is essential, as males build their bubble nest using plant material, which they bind together with bubbles. Nests are very elaborate and sturdy, reaching several inches across and an inch deep.

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*Limnophila aquatica*, *Riccia fluitans*, *Ceratopteris thalictroides*, and *Vesicularia dubyana*, are good choices for the breeding tank. Peat fiber may also be offered as building material. Once the nest has been built the male will begin courting the female, usually in the afternoon or evening. He signals his intentions by swimming around the female with flared fins, attempting to draw her to the nest where he will continue his courting display. If the female accepts the male she will begin swimming in circles with the male beneath the bubble nest. When she is ready to spawn she touches the male on either the back or the tail with her mouth. Upon this signal the male will embrace the female, turning her first on her side and finally on her back. At this point the female will release approximately five dozen clear eggs, which are immediately fertilized by the male. Most of the eggs will float up into the bubble nest. Eggs that stray are collected by the male and

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placed in the nest. Once all the eggs are secured in the nest, the pair will spawn again. If more than one female is present in the breeding tank, the male may spawn with all of them. The spawning sessions will continue for two to four hours, and produce between 300 and 800 eggs. Gouramis have a fecundity of about 600 eggs. Upon completion, the male will place a fine layer of bubbles beneath the eggs, assuring that they remain in the bubble nest. The male will protect the eggs and fry. In 12 to 24 hours the fry will hatch, and continue developing within the protection of the bubble nest. After three days they are sufficiently developed to be free swimming and leave the nest.

We have 4 males and 4 females of two Gourami types in this aquarium. Later we will move them to larger aquaponics systems in our color garden.

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The social aspect is, to be able to teach complexity and dynamic systems to new generations. The challenge to understand, that we as humans are more or less able to regulate dynamic systems, but we can not control them.

This will end up in the 21 century with a big paradigm shift in science at all: control versus regulate.

As an contemporary artist my capacity to “paint” is much larger than it was for artists in the past. I can expand my “pigments” to every technology and every new knowledge and I enjoy this a lot.

Aquaponics give me the chance to use programming and handcraft skills to set up little and middle size systems.

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In a process of co-evolution I invite groups of children, students and teachers and everybody with interest in this alternative fish farming idea to join the project. We can imagine a small size system on every little balcony occupying less than 1 square meter as well as middle size systems between 1 and 12 square meter.

If you have access to pipes, tubes, water installation parts, wood, pallets or other useful stuff you are welcome to donate this to our project.

In spring 2019 we will offer more workshops on the campus of our free University of informal education (UNIIE), just here in Cervera del Maestre. You are welcome to join this project and contribute to a future for all of us, with tasty fish, vegetables and salads.