Recirculation Aquaculture Systems (RAS): An Opportunity for the SE Asian Aquaculture Industry

AquaBioTech Group

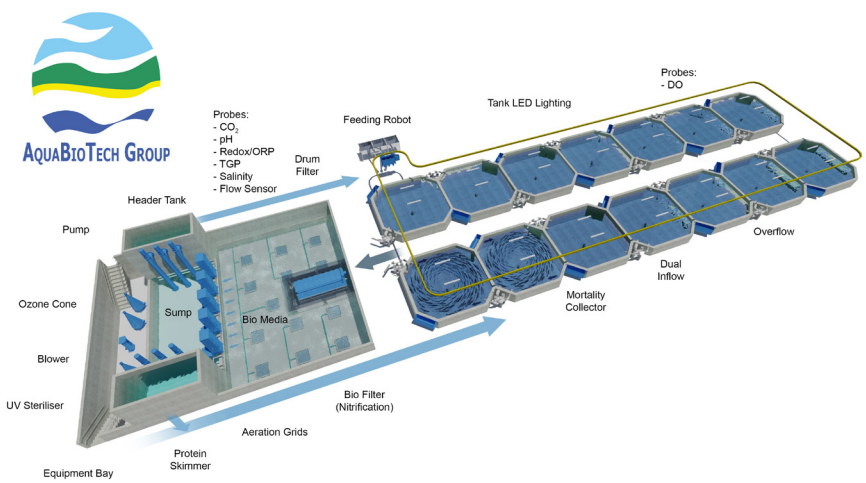
A recent study by the World Bank stated that aquaculture is a major sector that is still expanding and receiving considerable attention as a way to fill the growing seafood supply gap which is estimated to have increased to 30 million tonnes by 2030. However, aquaculture cannot be practised everywhere; it requires a unique set of natural, social and economic resources, which must be utilised wisely for the development of the sector to be sustainable. Around the globe, the availability of areas suitable for aquaculture is becoming a major problem for the development and expansion of the sector. Appropriate environmental characteristics, good water quality, well-understood consequences of social interactions and the appropriation of marine, coastal and inland resources are essential when setting up new production sites and maintaining existing aquaculture facilities.

Marine biotechnology, often called blue biotechnology, is also recognised as one of the most promising biotech industries with an endless growth potential. Aquaculture is one of the main contributors of blue biotech, providing marine bio-sourced compounds which are obtained from a variety of organisms and utilised in high value products.

A combination of a number of limitations, including direct environmental interactions, dependency on and availability of sustainable fish meal sources and the deterioration of the quality of water bodies suitable for aquaculture have been the driving forces behind the development of new technologies that allow aquaculture production in a more sustainable manner. Aquaculture is more efficient than other forms of animal production in terms of freshwater usage and feed resource, and overfished and decreasing wild fish stocks can no longer be relied upon to provide for an increasing population globally. The development of technology in aquaculture has allowed for environmentally sustainable alternatives. One of these is the Recirculating Aquaculture Systems (RAS) technology such as AquaCirc™ that has been developed by the AquaBioTech Group and will be showcased at the EU Business Avenues Pavilion during the Singapore International Water Week from 10–14th July 2016, as well as in Vietnam as part of the EU Business Avenues in South East Asia programme's Environment and Water Technologies Business Mission.

Recirculating Aquaculture Systems (RAS) are semi-closed loop facilities that retain and treat the water within the system, rather than flow through fish farms. The water in RAS flows from a fish tank through a treatment process and is then returned to the tank, hence the term; Recirculating Aquaculture Systems. RAS technology can be designed to be extremely environmentally sustainable, using 90-99 per cent less water than traditional aquaculture systems and thus enabling clients to reduce their environmental impact.

RAS technology reduces the discharge of waste, the need for antibiotics or chemicals through biosecurity, and minimises the risk of fish escapees. It has been under development for over 30 years - refining techniques and methods to increase production, profitability and environmental sustainability. Traditional fish farming is dependent on external environmental conditions such as water quality, temperature, oxygen levels, etc. In RAS, these external factors are eliminated either completely or partially, depending on the degree of recirculation and the construction of the facility. RAS allows producers to control all of the factors that might affect the environment and provides complete control over factors affecting the growth and health of the fish such as temperature and oxygen levels, while external threats such as predators, pollution and harmful algal blooms (HABs) are eliminated.



In a recently published study by the Food and Agriculture Organisation (FAO) of the United Nations about RAS, this

technology is considered the most environmentally sustainable way of producing fish at a commercially viable level. The small percentage of water used in RAS is seen as beneficial, as water has become a scarce resource in many regions. Also, this low volume means that the removal of nutrients from the effluent, which are harmful to the environment, is highly effective and any residual suspended solids or nutrients is much lower than that discharged from a traditional fish farm. Also, this reduced need for water enhances the production potential of the farm as internal environmental parameters which affect the fish can be stabilised and controlled at optimal conditions promoting extremely fast fish growth and high survival rates, and hence maximise profitability.

In the challenging external environment experienced in Southeast Asia with seasonal storm conditions and poor water quality, exacerbated by a relatively high density of producers in the area, hatchery production in particular is problematic. The enclosed, bio-secure and controlled AquaCirc™ systems protect the valuable hatchery breeding stock and early-stage fish, which are highly sensitive, from environmental risks and diseases, ensuring consistently high survival rates essential to the success of the industry.

AquaCirc™, designed by the AquaBioTech Group, is a unique energy efficient system which combines various state-of-the-art specialist technologies. The various components are designed for land-based recirculating systems, for both marine and freshwater set-ups. AquaCirc™ focuses on the key specific aquaculture filtration criteria of biological, chemical and mechanical filtration, for the particular culture species. The technology is unique in its adaptation to different capacities and requirements; it is designed to work with either no filtration or with many different components, providing clients with optimal flexibility and choice.

During the last year and a half, we have achieved a significant leap forward in the way that we approach international projects that can utilise our RAS technology. Moving away from being seen as mostly a technology supplier, we have worked hard to highlight the close partnership we have with our clients in developing the best production strategies and that our relationship goes far beyond the scope of engineering, supply and commissioning. The integration of a new monitoring and control system to our technology package ensures that we can support our clients remotely on a continuous basis. The access to operational information enables our ever growing team of staff to share their collective experience and knowledge with our clients, as and when it is required. Going beyond just reacting to requests and problems, we are now seeking to become part of the operational process, not only through management contracts and / or the provision of experienced staff, but by also offering the collective knowledge of our global team. To facilitate this development internally, we have invested heavily in our research and development facility so as to effectively recreate a number of fish farming operations on a small scale, by using and developing the same technology, and monitoring and control system. This has enabled us to expand our internship and training facilities, as well as ensure that future clients are well-versed in the operation of the technology, long before they commercialise their own project.

Globally, Southeast Asia is an important aquaculture region, constituting around seventeen per cent (17%) of global aquaculture production and sales. Aquaculture is a significant part of the economy, food supply and rural livelihoods within Southeast Asia. The lack of space and environmental restrictions pose limitations to further expansion of conventional aquaculture. However, the importance of aquaculture due to the high consumption of high quality fresh and live seafood, the expanding ornamental industry and the exploitation of new marine bio-sourced compounds make Recirculating Aquaculture System (RAS) developments in markets like Singapore, Malaysia, Indonesia and Vietnam highly attractive.

AquaBioTech Group is one of the 30 European SMEs participating at Singapore International Water Week 2016 under the EU Business Avenues in South East Asia's inaugural business trip before proceeding to Vietnam for the rest of the mission. Launched on 15 June 2016, the EU-funded programme aims to help European companies establish long-lasting collaborations in South East Asia through matchmaking and business support services. Over the next 5 years, 1000 European SMEs from 7 different industrial sectors will take part in this programme. For more information, please visit: https://www.eubusinessavenues.com/.

About the Author

Shane A. Hunter (British) is the technical director of the AquaBioTech Group, having created the company at its conception in 1996. He is responsible for overseeing all international contract engagements for the projects, services and research. Shane is also in charge of all strategic planning and corporate strategy for the Group, liaising directly with each of the heads of department. He is a principal consultant with the AquaBioTech Group and has a wealth of experience in working with companies from over fifty-five countries. Shane has also been responsible for developing an innovative RAS technology which the company continually develops, markets and sells globally.