

**New Sustainable Aquaculture
Techniques in the Atlantic Area
(Welsh Region)**

PROJECT IDENTIFICATION: EAPA_1059/2018 – ACCESS2SEA

www.access2sea.eu

NEW SUSTAINABLE AQUACULTURE TECHNIQUES IN THE ATLANTIC AREA REGION (WELSH REGION)

As part of the programme of work including in Work Package Six of the Access2Sea project, Action Four involved Project Partners undertaking to research and analyse new aquaculture techniques being developed in their regions. This research is aimed at fostering a more sustainable industry by facilitating the dissemination of techniques which could be of value in addressing the needs of companies in other territories of the Atlantic Area Region.

The following seven new sustainable aquaculture techniques were identified by the Welsh Partner of the Access2Sea Project, Swansea University:

1. Biophillic living presentation: this will be a 44 unit residential building in Swansea city centre with aquaculture in the bottom floor and waste from the fish being used to grow plants for consumption on the flat roofs (see attachment).
2. Cleanerfish production
3. Ocean Matters in Anglesey (now owned by Mowi) and 360 aquaculture in Swansea are both producing lumpfish to clean salmon of sealice
4. Smartaqua Project – expanding the non-food aquaculture businesses in Wales
5. Aquaculture Centre of Excellence, Swansea University
6. Pufa-Fish
7. Câr-Y-Môr – For the Love of The Sea

1) Biophillic Living

The vision for Biophillic Living Swansea is to enable reconnection with nature in the urban environment, and the creation of a cohesive community to tackle issues of social exclusion and loneliness in an innovative way. The project will allow residents to help run an urban farm as a social enterprise, with home grown produce consumed and sold locally. Biophillic Living is founded on research that reconnecting with nature is essential to our well-being, and that there are positive community and health outcomes from living more closely with the natural world.

The biophilic design promotes a relationship to nature throughout the project, including roof-top garden amenity space, living walls, balcony planters for each apartment, and greenhouses incorporating a vertical farm utilising aquaponics.

The philosophy of the project is to encourage community engagement and reconnect building users and visitors with nature in the urban environment. The longer-term goal is to change peoples' perception of urban living, and to monitor the health and well-being benefits of living alongside nature.

(From: <http://www.biophilicliving.co.uk/> and <http://www.biophilicliving.co.uk/biophilic-living-swanse-pre-application-consultation-now-underway/>)

2) Cleanerfish Production

Investigation of the efficiency of *U. intestinalis* as a component of a land-based integrated multi-trophic aquaculture (IMTA) system. IMTA systems use by-products from the culture of one species (in this case lumpfish) to enhance the growth in another (here *U. intestinalis*, which is also being used as the effluent remediation species)

From: <https://thefishsite.com/articles/lumpfish-papers-win-swanse-awards>

3) Ocean Matters, Anglesea - Creating sustainable solutions to the sea-lice problem

For the salmon industry and its supporting ecosystems, sea lice have become one of the greatest challenges, impacting all stakeholders significantly. Since its inception, Ocean Matters has acted with focus and urgency to combat this issue through the production of quality lumpfish and the continued development of effective co-habitation approaches. Their land-based farm is situated on the coast of Wales with optimal in-take systems so we can create and maintain ideal conditions in which to breed and raise lumpfish. Fresh seawater is brought into the aquaculture facilities daily from local waters where it is tested, treated and continually monitored to assure an ideal growing environment, creating superior growing parameters that promote robust health and maximum survivability through both deployment and lifecycle. Due to the extensive filtration systems and clean technologies the out-going water is clean and seamlessly reintroduced back into local waterways with no effect on the environment, surrounding life or native species.

The Ocean Matters' aquaculture campus is comprised of numerous controlled systems – each with technologies that assure precise environments specifically calibrated for lumpfish. Our systems incorporate highly sophisticated filtration, ozone, water management and monitoring technologies that enable acute control year-round.

From: <http://www.oceanmattersltd.co.uk/facility>

4) Smartaqua Project – expanding the non-food aquaculture businesses in Wales

Aquaculture – the production of aquatic organisms – is the world’s fastest growing food industry, but it is also highly competitive. In comparison, the non-food aquaculture industry (e.g. production of cleaner fish and nutraceuticals from algae) is a niche market, driven by science. This project offers science based companies the following services:

- A network of researchers, aquaculture boards and multinational businesses
- Scientific expertise and guidance on fish and algae biotechnology
- Collaborative R&D project

From: <http://smartaqua.org.uk/company/collaborations/attachment/360-aquaculture-poster/>

5) Aquaculture Centre of Excellence, Swansea University

The Centre for Sustainable Aquatic Research at Swansea University is currently developing the first Aquaculture Centre of Excellence in Wales (WalesACE) to serve as a technological springboard and exemplar of integrated multi-trophic aquaculture (IMTA). This will support an increase in sustainable finfish production and high value micro-algae in Wales.

IMTA specifically targets the circular economy and represents an area where Wales can expand its Aquaculture potential and increase its food security through innovation and collaboration. WalesACE will develop rearing protocols for finfish, filter feeders and microalgae, which will suit the specific requirements of an IMTA system in Wales.

Within WalesACE fish will be grown in recirculating aquaculture systems where the waste from the fish will be processed into sterile dissolved nutrients, these in turn will grow microalgae in bio-fences. The microalgae will then be processed to produce feed for the fish and hence create a circular nutrient flow.

WalesACE will operate out of a purpose built structure containing two dedicated recirculating aquaculture systems, algal bio-fences and nutrient processing machinery. Each system will be capable of rearing fish in both fresh and saltwater as well as rearing species from cold to tropical climates.

From: <https://www.swansea.ac.uk/bioscience/csar/projects/walesace/>

6) Pufa-Fish

As the worlds most farmed fish at 7 million metric tonnes, Tilapia farming represents an important source of fish protein for many low income countries (LIC’s). Over the next 18 months the Swansea University project’s plan is to develop a global network of stakeholders who aim to raise human health standards in LIC’s by creating systems to produce nutritionally enriched tilapia. A lot of fish in low income countries are produced unsustainably, are deficient in essential omega-3’s such as Poly Unsaturated Fatty Acids (PUFA) and fish waste pollutes local waterbodies.

Based on decades of research expertise developed at Swansea University through the Centre for Sustainable Aquatic Research (CSAR), pump priming funds will strengthen an established SU-Zambia R&D partnership to lay the foundations for a much larger GCRF (approx. £2.6m) grant to pursue three main development opportunities:

- **Poverty alleviation** – Further strengthen the network of stakeholders the university is currently engaged with in Zambia to maximise impact. Work with local communities and members of the community in Siavonga who will benefit from the PUFA-FISH project. Ascertain the potential of community-led income generation initiatives that are based on innovative fish farming techniques at a grass roots level. Case studies selected in 2019-2020 will form the basis of a larger operation in the coming years.
- **Improved nutritional value** – The project will develop a RAS that can be used in Zambia to improve the nutritional value of farmed tilapia by increasing the nutritional quality via the administration of novel microalgae diets developed as part of CSAR's SMARTAQUA project (~£2M). We will use participatory action to create a framework for farmers in Zambia. Parallel research will be conducted in the Wales Aquaculture Centre of Excellence (~£0.8M) 'Wales - ACE' currently under construction at Singleton Campus.
- **Reduction of waste** – Develop methods for near zero nutrient loss in the farming of tilapia and hence minimise any impacts on the environment. Use RAS, reuse waste plastic and improved tilapia strains to create low impact aquaculture systems.

From: <https://www.swansea.ac.uk/bioscience/csar/students/phd/trevi/>

7) Câr-Y-Môr – For the Love of The Sea

Câr-Y-Môr – For the Love of The Sea is a Community Benefit Society that grows and sells seafood using the 3D ocean farming model. The 3D Ocean Farming is a version of the Integrated Multi-Trophic Aquaculture system, where seaweeds (primary producers) and bivalves (filter feeders) are farmed on the same licensing site using the water column depth. The Society also aims to develop a sustainable seafood system including a seafood bistro, café, shop, an education and visitors centre. The key aim is to demonstrate and implement a Sustainable Seafood System that improves people's well-being and the coastal environment. This sustainable food system is supported by the Well-being of Future Generations (Wales) Act 2015 which states the ambition, permission and legal obligation to improve Wales' social, cultural, environmental and economic well-being.

From: <https://carymor.wales/>



Lead Partner



**Centro Europeo de
Empresas e Innovación**

CEEI Bahía de Cádiz

C/ Manantial, 13. Edificio CEEI
Polígono Ind. Las Salinas de San Jose Bajo
11500 El Puerto de Santa María (Cádiz) - Spain
Tlf: (+34) 956 860 654 / Fax: (+34) 956 860 028
E-mail: asuarez@ceeicadiz.com
Web: www.ceeicadiz.com



Partners



**CENTRO TECNOLÓGICO
DE LA ACUICULTURA**

Centro Tecnológico de
Acuicultura de Andalucía
Muelle Comercial S/N
11500 El Puerto de Santa María (Cádiz) - Spain
Tlf: (+34) 956 56 93 63
E-mail: mm.agraso@ctaqua.es
Web: www.ctaqua.es



100
1920-2020



Swansea University
Centre for Sustainable Aquatic Research
Wallace Stores, Singleton Park
SA2 8PP - Swansea
Tlf: +44(0) 1792 29 53 83
E-mail: p.n.howes@swansea.ac.uk
web: www.swansea.ac.uk



Údarás na Gaeltachta

Údarás na Gaeltachta
Na Forbacha, Co. Dublin. Galway
Tel: 091-503100
Fax: 091-503101
E-mail: foh@udaras.ie
web: www.udaras.ie



Innovation & Management Centre
CLG T/A WESTBIC
11 Galway Technology Centre, Wellpark Road
Galway, H91 E2W5 - (Ireland)
Tlf: (+353) 86 2574978
E-mail: smccormack@westbic.ie
web: www.westbic.ie



Technopole Quimper Cornouaille
2 rue François Briant de Laubrière
29000 Quimper - Francia
Tlf: +33(0)298 100 200
E-mail: rachel.sellin@tech-quimper.fr
web: www.tech-quimper.fr



ciimar

Centro Interdisciplinar
de Investigação
Marinha e Ambiental

CIIMAR | Interdisciplinary Centre of Marine and
Environmental Research of the University of Porto
Novo Edifício do Terminal de Cruzeiros do Porto de Leixões
Avenida General Norton de Matos, S/N
4450-208 Matosinhos | Portugal |
Tlf: (+351) 223 401 852
E-mail: rodrigo.ozorio@ciimar.up.pt
web: www.ciimar.up.pt



UALg

UNIVERSIDADE DO ALGARVE

University of Algarve
CRIA - Pavilhão B1
8005-139 Faro (Portugal)
Tlf: +351 289 800 097
E-mail: ajmarq@ualg.pt
web: www.ualg.pt



**INVESTIR EN
FINISTÈRE**

Investir en Finistère
46, quai de la Douane
CS 63825 29238, Brest cedex 2
Tlf: +33 (0)298 339 773
E-mail: a.coppens@investir29.fr
web: www.investir29.fr



Associated Partners

✓ **Technopole Brest Iroise**
www.tech-brest-iroise.fr

✓ **Cuideachta Feamainn Turtar Gorm Teo (TSC – Bleu Turtle)**
www.theseaweedcompany.com

✓ **Association of Aquaculture Marine
Businesses of Andalusia (ASEMA)**
www.asemaonline.com

✓ **Union Chamber of Algae and Marine Vegetables (CSAVM)**
www.chambre-syndicale-algues.org



www.access2sea.eu