



# AdriAquaNet

Enhancing Innovation  
and Sustainability in  
Adriatic Aquaculture

**NEW TECH FOR HEALTHY FISH  
IN CLEAN ENVIRONMENT**



**PROJECT DURATION**  
01.01.2019-30.06.2021



**ERDF**  
2.704.408,15



**TOTAL BUDGET**  
3.224.009,59



# THE PROJECT IN SHORT

Adriatic mariculture provides highly valued fish products for both local and distant markets. To ensure a further development of this sector in terms of economic, environmental and social sustainability, researchers and industries from both Italy and Croatia are developing new smart technologies applied to fish feeding, health, waste management, and marketing.

## GOAL 1

New approaches to improve fish nutrition and ensure efficient waste management

### the fish farm

## ACTIONS

- Implement novel feeds to improve farmed fish welfare
- Provide tailored feeding protocols to allow an innovative food management
- Provide new technologies to improve energy saving and farm environmental footprint

## GOAL 2

New strategies to enhance fish health and welfare

### the fish doctor

## ACTIONS

- Develop new vaccines/ vaccination strategies
- Test novel probiotics/ nutraceuticals for controlling infectious diseases
- Develop easy, rapid and effective methods to assess fish welfare

## GOAL 3

New fish products for different classes of consumers

### the fish market

## ACTIONS

- Apply new technologies to develop high-quality fish products
- Transfer knowledge to SMEs for improving the quality of fish products and their marketing
- Promote to consumers the nutritional value of farmed fish and health benefits of its consumption



# FIRST OBJECTIVE

## OF THE PROJECT

*The fish farm:  
sustainable aquafeeds and green energy  
for the blue growth*

In recent years, research has shown that feeds and feeding practices play a major role in affecting sustainability and quality of farmed fish species. By designing and testing new aquafeeds and by biomodelling fish growth and emissions in cages, we shall provide answers to fish farmers and consumers. Furthermore, by extracting biofuel from waste effluents and through energy saving and renewable energy applications we aim at reducing the environmental footprint of fish farming.

# SECOND OBJECTIVE

## OF THE PROJECT



*The fish doctor:*

*new vaccines and natural therapies for fish health*

New and alternative strategies will be investigated to control infectious diseases, by improving fish health and welfare while ensuring safe products to consumers. We shall develop vaccines against bacterial pathogens that commonly affect seabass and seabream farmed in Adriatic Sea. Natural compounds, extracted from local flora or marine organisms and probiotics from fish gut microbiome, will be tested both in the lab and in the field for their antimicrobial and immunostimulant activity. We shall provide to farmers easy, rapid and effective fish welfare monitoring tools that might be suitable for a wide use on field.

# THIRD OBJECTIVE OF THE PROJECT

## *The fish market: healthy food for all tastes*

The mariculture sector can further grow if consumers are convinced that farmed fish is a high-quality food and they can find a diverse commercial offer. Thus, we shall evaluate the quality of fish farmed in eco-friendly and welfare-based aquaculture farms, by analysing sanitary, sensory and quality parameters of market-size sea bass and sea bream. We shall develop new fish-based products, such as fish hamburger and fillets, and alternative methods of packaging to prolong their shelf life. Surveys will be done to assess the consumer perception of farmed fish and fish products. A pilot marketing campaign will be done to appraise the potential commercial value of the new products.

# THE OUTCOMES OF THE PROJECT

## TECHNOLOGICAL INNOVATIONS

New feeds, feeding protocols, wastewater treatments, energy saving technologies, vaccines, natural therapeutic and immunostimulant substances, welfare monitoring tools, fish products, and marketing strategies.

## TRAININGS

9 training events will be organised for about 60 stakeholders (technical staff and fish farms employers) to apply the studied innovations in their workplace.

## SOLUTIONS

New protocols for fish farming and fish feeding, new strategies for fish health, new products and marketing tools will be available to professionals and experts.

## KNOWLEDGE TRANSFER TO SMEs

Innovative protocols for environmental friendly and cost-effective farm management will be identified and transferred to at least 25 SMEs, that will be involved in testing and exploiting the project's outputs.

## COOPERATIVE R&I

The network of partners in both Italy and Croatia will strengthen their research and innovation capacity to advance the aquaculture sector.

# THE PARTNERS

A map of Italy is shown in light blue, with regional boundaries. Eleven yellow circular markers with black numbers (1-11) are placed on the map to indicate the locations of various partners. Marker 1 is in the northeast (Friuli-Venezia Giulia), marker 2 is in the north (Trentino-Alto Adige), marker 3 is in the south (Basilicata), marker 4 is in the north (Lombardy), marker 5 is in the north (Emilia-Romagna), marker 6 is in the north (Liguria), marker 7 is in the south (Calabria), marker 8 is in the south (Apulia), marker 9 is in the south (Basilicata), marker 10 is in the south (Calabria), marker 11 is in the north (Lombardy), and 'LP' is in the north (Lombardy).

## RESEARCH INSTITUTES

- LP** UNIVERSITY OF UDINE  
Dept. of Agricultural, Food, Environmental and Animal Sciences
- PP1** CROATIAN VETERINARY INSTITUTE
- PP2** UNIVERSITY OF TRIESTE – Dept. of Life Sciences
- PP3** INSTITUTE OF OCEANOGRAPHY AND FISHERIES
- PP4** ISTITUTO ZOOPROFILATICO SPERIMENTALE DELLE VENEZIE
- PP5** UNIVERSITY OF RIJEKA  
Faculty of Tourism and Hospitality Management
- PP6** NATIONAL RESEARCH COUNCIL OF ITALY  
Institute of Biomolecular Chemistry (ICB)

## CONSORTIUM

- PP7** KLAŠTER MARIKULTURA

## SMEs

- PP8** FRIŠKINA Ltd
- PP9** ITTICA CALDOLI sarl -Poggio Imperiale
- PP10** ORADA ADRIATIC Ltd
- PP11** FRIULTROTA DI PIGHIN Ltd

## THE LEAD PARTNER – ITALY

### UNIVERSITY OF UDINE

#### Dept. of Agricultural, Food, Environmental and Animal Sciences



**UNIVERSITÀ  
DEGLI STUDI  
DI UDINE**  
hic sunt futura

The LP Department hosts 120 professors and researchers, over 200 research collaborators, and a staff of 60 technicians and administratives. It is a regional leader for education, research, innovation and international cooperation in the field of applied sciences. LP Department is equipped with laboratories for Fish Pathology, Immunology, Nutrition, Food Microbiology, Wastewater Engineering, and facilities for testing new feeding strategies, vaccination protocols and immunostimulant products.

**Marco Galeotti** / marco.galeotti@uniud.it

Full Professor of Comparative General Pathology and Fish Pathology. His research interest focuses on aetiopathogenesis of teleost diseases, fish immune response to vaccination and immunostimulation treatments, use of natural products as antibacterials and immunostimulants in fish. Leads workpackage 1 - general coordination.

**Emilio Tibaldi** / emilio.tibaldi@uniud.it

Full Professor of Aquaculture and Fish Nutrition. His research interest focuses on new sustainable feed ingredients, complete diets and alternative feeding strategies to improve environmental impact, health, welfare, and quality of Mediterranean fish species. Leads workpackage 3 - "the fish farm".

## PROJECT PARTNER 1 – CROATIA

### CROATIAN VETERINARY INSTITUTE

The PP1 Institute is based in Zagreb. It is the main institution for monitoring and surveillance programs financed by the Government of Croatia. Staff from the Laboratory for Fish Pathology, Analytical Chemistry and Animal Welfare provide advanced technical services to stakeholders.

**Snježana Zrnčić** / zrnccic@veinst.hr

Fish pathologist. She develops new fish vaccines and coordinates the evaluation of fresh fish and fish products quality, safety and nutritional quality. Leads workpackage 5 "the fish market".





2

## PROJECT PARTNER 2 – ITALY

### UNIVERSITY OF TRIESTE

#### Dept. of Life Sciences



UNIVERSITÀ  
DEGLI STUDI DI TRIESTE

The PP2 Department is a regional leader for education, research, innovation and international cooperation in the field of biology. A team of 5 reputed scientists operates laboratories of Molecular Nutrition and Genomics, with expertise in biomarker development.

**Sabina Passamonti** / spassamonti@units.it

Medical doctor, PhD in biochemistry, expert in molecular nutrition and cross-border cooperation. Communication manager of the project, researcher engaged in developing a new biomarker of fish health and quality. Leads workpackage 2 - communication.

**Alberto Pallavicini**

BSc Biology, PhD Genetics, expert in applying advanced genomics methodologies to marine fish species.

3

## PROJECT PARTNER 3 – CROATIA

### INSTITUTE OF OCEANOGRAPHY AND FISHERIES



The PP3 Institute is based in Split. It is the National Reference Centre for the Sea, carrying national and international scientific projects in the field of fisheries and aquaculture, and it provides consultancy service.

The Laboratory of Aquaculture focuses on host-pathogen interactions in aquaculture.

**Ivona Mladineo** / mladineo@izor.hr

Doctor of Veterinary Medicine, PhD in Biomedicine, expert in aquatic parasitology, histology, immunology and molecular biology. Leads workpackage 4 "the fish doctor".

4

## PROJECT PARTNER 4 – ITALY

### ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELLE VENEZIE (IZSVe)

The PP4 Institute is based at Legnaro in the Province of Padova. IZSVe promotes public health, in terms of food safety and prevention of zoonoses, and animal welfare, in terms of animal health and living conditions. It hosts the National Reference Laboratory (NRL) for the Study and Diagnosis of Fish, Crustacean and Mollusc Diseases. The NRL is engaged in the study of known and emerging fish diseases and is equipped with an experimental aquarium to test vaccines and perform experimental infection trials in both freshwater and seawater fish species.



**Amedeo Manfrin** / amanfrin@izsvenezie.it

Doctor in Veterinary Medicine (DVM), expert in aquatic animal health and welfare.

5

## PROJECT PARTNER 5 – CROATIA

### UNIVERSITY OF RIJKA

#### Faculty of Tourism and Hospitality Management

The PP5 Faculty is Croatia's only university institution fully oriented to education for the managerial positions in tourism and hospitality industry. Education and research activities are focused on sustainable tourism development, destination management, tourism impacts, specific forms of tourism etc. Department of Food and Nutrition and Department of Marketing jointly contribute to the nutritional evaluation and promotion of new fish products on market.



SVEUČILIŠTE U RIJECI UNIVERSITY OF RIJKA  
**FAKULTET ZA MENADŽMENT U TURIZMU I UGOSTITELJSTVU**  
 FACULTY OF TOURISM AND HOSPITALITY MANAGEMENT  
 OPATIJA, HRVATSKA CROATIA

**Greta Krešić** / greta.kresic@fthm.hr

Full Professor of Food and Nutrition. She received her PhD in food technology and nutrition from the University of Zagreb. Her scientific interest is focused on food quality and human nutrition. She participates in 5 scientific projects and one Erasmus+ project.

6

## PROJECT PARTNER 6 – ITALY

### NATIONAL RESEARCH COUNCIL OF ITALY Institute of Biomolecular Chemistry (ICB)

The PP6 Department is based in Padova. PP6 staff has a broad and unique expertise in the development of bioactive natural products potentially active on fish bacterial pathogens and fish immune response.

**Paolo Ruzza** / [paolo.ruzza@icb.cnr.it](mailto:paolo.ruzza@icb.cnr.it)

Medicinal chemistry doctor, expert in the synthesis of peptides with biological activities.

#### **Angelo Fontana**

Director of Research for the National Research Council, expert in organic and biological chemistry of marine natural products.



7

## PROJECT PARTNER 7 – CROATIA

### KLASTER MARIKULTURA

PP7 Cluster is based in Split. It is a private body, whose members are 99% of the actors in Croatian marine aquaculture. It provides legal assistance, support in technology purchase and export to its members.

**Kristijan Zanki** / [kristijan.zanki@gmail.com](mailto:kristijan.zanki@gmail.com)

Expert in the field of fishery and mariculture, in charge of promoting and marketing orientation of the association, supporting education of the members and their technical cooperation, working with related organizations.



8

## PROJECT PARTNER 8 – CROATIA

### FRIŠKINA Ltd

PP8 is a private small and medium enterprise, with its headquarter and packaging plant in the Splitsko-dalmatinska County. Its caged cultivation site is in the Movar Bay, close to the city of Rogoznica in Šibensko-kninska County. PP8 uses a set of 6 small cages for R&I projects testing new feeds, alternative feeding regime, new substances for the control of diseases and vaccines against bacterial pathogens.

**Igor Cvitić** / igorcvit@gmail.com

Fish farm manager.



9

## PROJECT PARTNER 9 – ITALY

### ITTICA CALDOLI sarl -Poggio Imperiale

PP9 is a private small and medium enterprise, based in Lesina, in the Province of Foggia. It produces valuable marine fish species; it exports fry to other aquaculture plants in the Mediterranean Sea. It is a modern model of farm, where renewable energy sources are used.

**Andrea Novelli** / direzione@itticacaldoli.it

Administrator. Runs pilot tests on a new waste management system.



10

## PROJECT PARTNER 10 – CROATIA

### ORADA ADRIATIC Ltd

PP10 is a private small and medium enterprise, based in the Island of Cres, in the Primorsko-Goranska County. It is a sea bass and bream farm. It is the first Croatian fish farm that introduced a semi-automatic distributor of feed in the cages, allowing to accurately record data regarding fish feeding.

**Ivana Balenović** / [ivana.balenovic@orada-adriatic.hr](mailto:ivana.balenovic@orada-adriatic.hr)

Fish farm manager.



11

## PROJECT PARTNER 11 – ITALY

### FRIULTROTA DI PIGHIN Ltd

PP11 is a private small and medium enterprise, based in San Daniele del Friuli near Udine. It produces processed seafood, like cold and hot smoked fish, cooked fillets, sauces, etc. All products are processed without using any preservatives.

**Mauro Pighin** / [mauro@friultrota.it](mailto:mauro@friultrota.it)

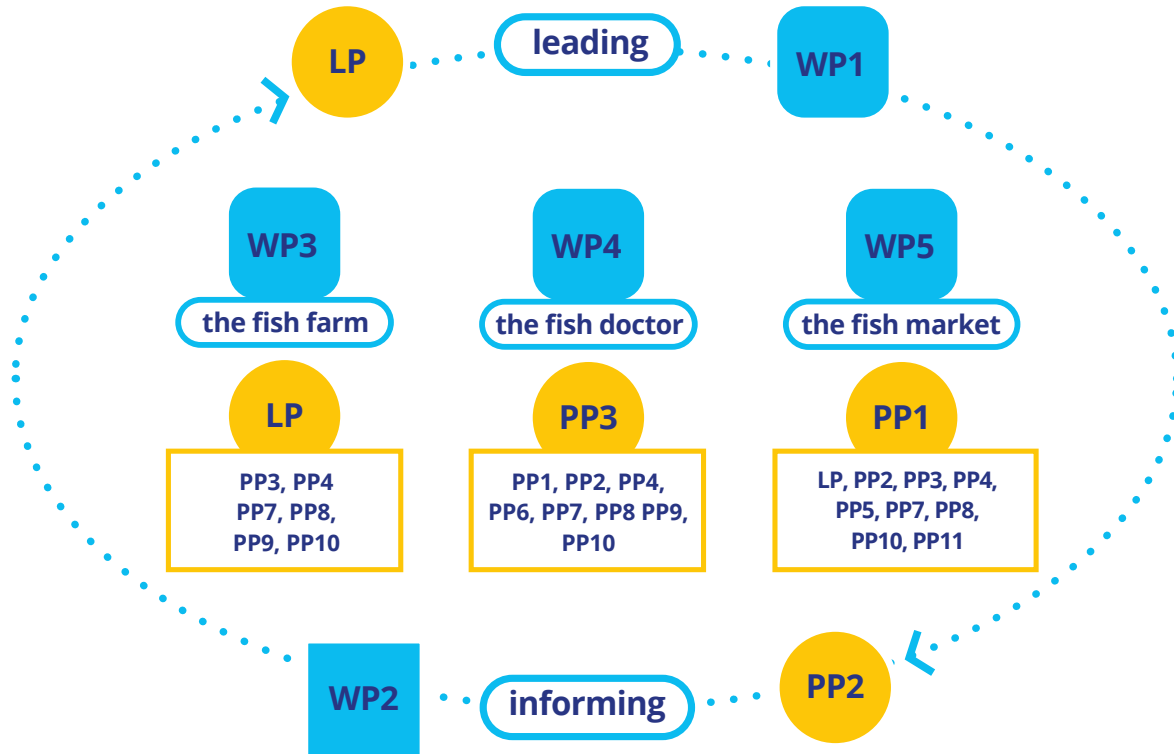
SME owner and manager.

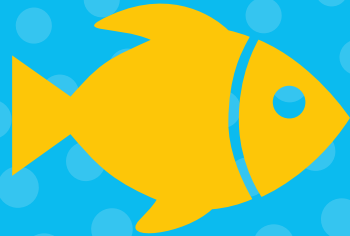


**Friul Trota**



# THE COOPERATION





**CONTACT**

University of Udine  
Prof. Marco Galeotti  
marco.galeotti@uniud.it

European Regional Development Fund

[www.italy-croatia.eu/AdriAquaNet](http://www.italy-croatia.eu/AdriAquaNet)