

How can we improve the management of fish by-products and discards?

According to data obtained from the Hellenic Statistical Authority, about 65-77,000 tonnes are fished in Greece. However, in reality, after reconstitution of the professional fisheries production (both registered and unregistered), the actual biomass amounts to 90-100,000 tonnes. If this biomass is processed for human consumption, then about 15-25% (offal, scales, backbone and heads) are rejected. Scientific studies showed, that they represent a potential source of raw material for the production of high value added biomolecules from Category 3 animal by-products (ABP) of approximately 12,000 tonnes from the processing of fishery and aquaculture products in the commercial and processing chain. To these quantities must be added about 11,000 tonnes of discards that end up in the sea by the Greek fishing fleet and about 700 tonnes of fish which are not finally sold at the fish landing sites after the auction procedure. Disposal of unprocessed fish by-products and discards into the environment is a significant environmental burden and a financial loss. Thus, in Greece, there is a 20,000 ton biomass of fish by-products and discards that remain completely unused, despite the fact that it contains high value biomolecules. Indicatively, 1kg of fatty acids currently costs 15-30 €, 1kg of gelatine 4-8 € and 1kg of collagen peptides from 14-180 €, depending on their purity and properties.

Also, from the collagen content, oligopeptides containing the proline-hydroxyproline dipeptide (Pro-Hyp) and the proline-hydroxyproline-glycine (Pro-Hyp-Gly) tripeptide can be derived and can be used in the pharmaceuticals, cosmetics and food industries (their synthetic analogues have a cost that ranges between US \$ 10,000 -27,000 per kilo and their widespread use is prohibited due to the high cost).

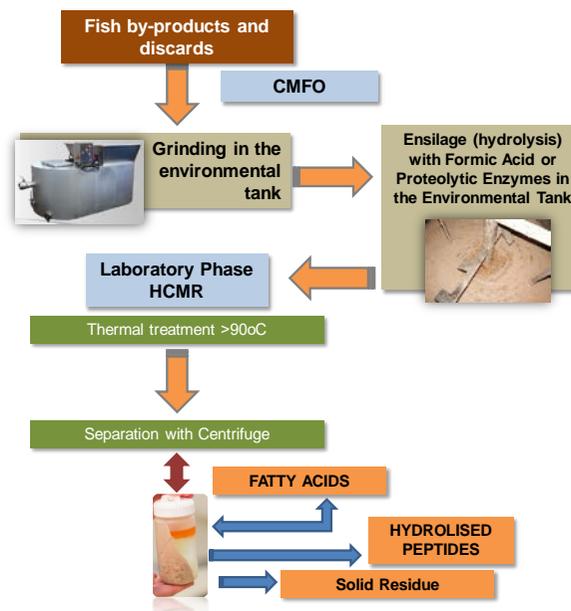
Contact info

Coordinator: Dr. Yannis Kotzamanis
Hellenic Centre for Marine Research
 Address: 46.7 km Athens-Sounio Avenue
 PO Box 712, GR 19013 Anavyssos, Attica, Greece

Tel. +30 69 44 26 84 12,

E-mail: jokotz@hcmr.gr

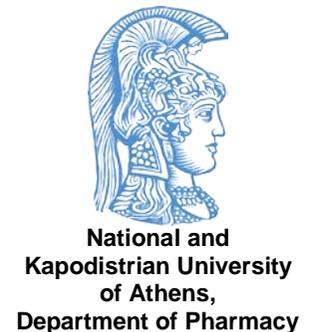
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Production of high quality and added value biomolecules utilizing fishery by-products and discards

“VIOAXIOPOIO”
Project Code: T1EAK-02509

NATIONAL RTDI ACTION
«RESEARCH-CREATE-INNOVATE»



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IOANNA N. ARGYROU
 PROJECT PLANNING AND
 DEVELOPMENT
 CONSULTANTS



VIOAXIOPIO project aims at the exploitation of fish by-products and discards (FBPD), which currently are thrown away through the current supply chain (handling, marketing and processing), towards the production of high added value biomolecules (HAVB), such as gelatine, various forms of collagen, unsaturated fatty acids and minerals-trace elements.

The objectives of the Project include:

1. Designing and developing a network for the collection, handling, maintenance and transfer of raw material FBPD from the fish auction as well as the various fish resale points (central fish markets, super markets, fish markets, open markets) to selected collection points and processing facilities of OKAA.

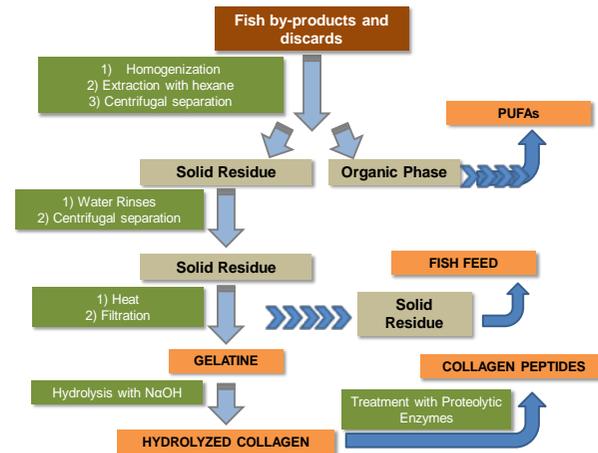
2. The creation of practical solutions for the separation and proper storage of FBPD according to the category of HAVB to be produced.

3. The development of protocols, adapted to Greek species of FBPD, for production of HAVB (gelatine, hydrolyzed collagen, collagen peptides, fatty acids and minerals-trace elements).

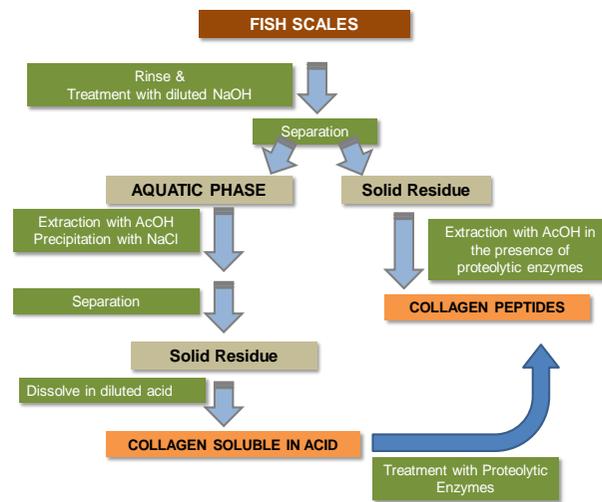
4. The elaboration of an integrated National Business Plan for the exploitation of all raw materials from FBPD by OKAA.

The above objectives are intended to add value to each kilogram of harvested and later discarded fish biomass and to apply practices that have been already applied in several European countries, following adaptation to Greek conditions (species, way of transport, legislation, etc.).

The circular economy model offers a new chance of innovation and integration between natural ecosystems, businesses, quality of human life, and waste management.



Indicative flow chart for the production of high quality and value added products utilizing fishery by-products and discards.



Methodology for the production of acid-soluble collagen and collagen peptides from fish scales developed at the Laboratory of Pharmacognosy and Chemistry of Natural Products, Department of Pharmacy, National and Kapodistrian University of Athens.

In a society striving to incorporate the circular economy principles into its day-to-day life, discarding by-catches is not an acceptable option as it has unbearable costs and risks to the environment. On the contrary, it is clearly to the benefit of all citizens that a wide range of animal by-products and discards to be used in a sustainable way for various applications, as long as health risks are eliminated. Indeed, biomolecules obtained from the processing of fish by-products can be valuable ingredients in a wide range of industrial sectors, such as the pharmaceutical, cosmetic and feed industries.

The utilization of fish by-products and discards is therefore very important for the Blue Economy as a whole, as they can generate high value-added products and at the same time have multiple and significant environmental benefits. According to the European Union legislation, it is appropriate for the collection and disposal system to take into account the actual quantity of animal by-products collected in the Member State concerned, so **VIOAXIOPIO** is moving in that direction in order to create a National Plan for the exploitation of fish by-products and discards in the context of the circular economy. The results of the **VIOAXIOPIO** project aim to provide to the Central Markets and Fishery Organization (OKAA) with the tools and elements needed to make decisions for further economic and commercial exploitation of by-products and discards derived from the fishing activity.