AZTI

MEMBER OF
BASQUE RESEARCH
& TECHNOLOGY ALLIANCE

www.azti.es

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AZTI REPORT

THE ANSWER LIES IN SCIENCE

CONTENT

1 FOREWORD

1.1.
INTRODUCTION BY THE PRESIDENT

Amaia Barredo Martín,

Minister of Food, Rural Development, Agriculture and Fisheries of the Basque Government

AZTI Places the Basque Country at the Forefront of European Marine Peripheral Regions

The 44 years of AZTI - the Basque Centre for Marine and Nutritional Research - are a source of pride for our country because of its meticulous and specialised work. With effort and professionalism, we are moving towards a better international scientific position in marine research and in the field of healthy food.

The European Union and the national and regional governments have a strategic resource of the first order in the Basque Country. AZTI works intensively, and on the basis of knowledge and science, on the development of an integrated and sustainable European Maritime Policy, in all activities related to the oceans, seas, coasts and all the life that takes place in these scenarios. The basic principles of the Blue Economy, sustainability and the environment are key to guaranteeing the future of the planet and the fisheries resources that sustain our fishing fleet.

Fortunately, in addition to those of us in coastal regions, our continent is now becoming aware that

Amaia Barredo. President of AZTI.

1.1.
INTRODUCTION BY THE PRESIDENT

Amaia Barredo Martín,

Minister of Food, Rural Development, Agriculture and Fisheries of the Basque Government

all marine activities are interlinked, and that maritime policies and decisions require advanced attention based on science and research.

The main objectives and fields of action of the European Integrated Maritime Policy focus on maximising the sustainable use of the seas and oceans to enable the growth of maritime and coastal regions; creating a knowledge and innovation base for maritime policy; improving the quality of life in coastal regions; promoting the Union's leadership in international maritime affairs; and increasing the visibility of maritime Europe. AZTI contributes to all these objectives.

Studies, theses, work, training, dissemination and the organisation of specialised forums and conferences complete AZTI's daily agenda to discover the potential of the blue economy and support the development of sustainable maritime and food economy activities.

Furthermore, we must not forget that in the future we will have to produce 70% more food to feed the world's population, which will require the development of new sources of protein: algae, vegetables, insects and fungi, within a healthy, safe and waste-free diet.

In 2025, AZTI will continue to face current and new challenges, but most importantly to collaborate with companies, universities and other similar and innovative centres. We will be able to learn about this at conferences such as *Food 4 Future - Expo Food Tech; MARTECH 2025 - The 12th International Workshop on Marine Technology; the Summer School 'Artificial Intelligence and Citizen Science in Monitoring and Assessing Biodiversity and Invasive Species at Sea'*; or the Cantabrian Sea's first experience with bluefin tuna farming off the coast of Gipuzkoa. With AZTI, the Basque Country is taking giant steps forward in European science.

1.2.
LETTER FROM AZTI'S CEO

Rogelio Pozo

Transformative Science: AZTI, a Benchmark in Solutions for Global Challenges

In a world of increasingly complex environmental, social and economic challenges, progress requires new ideas and the rigorous application of knowledge. In this context, AZTI is consolidating its position as an international benchmark science and technology centre specialising in the marine environment and food, translating science into tangible solutions for society, industry and the planet.

At AZTI, we understand that science and technology must serve as tools to strengthen society's capacity to meet current and future challenges. Every discovery and breakthrough we make holds the promise of a more sustainable, healthy and resilient future. Our work transcends the boundaries of science and technology and has a direct impact on the well-being of people and the preservation of the environment for generations to come. Through applied research, we work to better understand natural and human systems and seek solutions that balance economic needs with the protection of natural resources.

Protecting the environment and human health is at the heart of everything we do. We recognise that the health of our planet is inextricably linked to human health and the success of our economies. For this reason, we strive to develop technologies and practices that minimise environmental impact, promote the conservation of natural resources and facilitate more efficient processes.

Differentiation Through Knowledge, Specialisation and Experience

AZTI's strength lies in its in-depth sector knowledge, its specialisation in the marine and food sectors, and the experience gained from decades of applied research and technology transfer. Our multidisciplinary team of more than 300 professionals - 69% of whom hold a PhD - integrates skills ranging from operational oceanography, sustainable fisheries and aquaculture, blue and food biotechnology to personalised nutrition, food safety and advanced digitalisation of industrial processes. This diversity enables us to approach challenges from a holistic perspective, adding value to every project.

Innovation That Creates Value and Customer Service

Innovation is AZTI's driving force. We develop cutting-edge products, technologies and services, such as artificial intelligence systems for fisheries

Dr. Rogelio Pozo. CEO at AZTI.

1.2.
LETTER FROM AZTI'S CEO

Rogelio Pozo

management, digital tools for industrial sustainability or biotechnological solutions to improve health and food safety. Our customer focus means we work closely with companies and institutions to adapt scientific knowledge to the real needs of the sector. The result is a high level of satisfaction among our strategic clients, reflected in excellent ratings year after year.

Operational Multidisciplinarity and Applied Science With Tangible Impact

AZTI stands out for its multidisciplinary operational capacity, integrating science, technology and management to provide effective responses to complex problems. Our activities range from basic research to the implementation of solutions in productive environments, with a focus on applicability and tangible impact. Projects such as the valorisation of agri-food by-products, advanced monitoring of marine ecosystems or the development of new functional foods demonstrate our ability to transform knowledge into concrete improvements for sustainability, competitiveness and social welfare.

Leadership in Data-Based Solutions and Scientific Advice

In the age of digitalisation, AZTI is a leader in the development of solutions based on data, artificial intelligence and predictive modelling. These tools enable us to optimise resource management, reduce environmental impact and anticipate market trends. We also act as a reference scientific advisor to companies and public bodies, helping them to define and implement strategies that improve their competitiveness and resilience. Our participation in international committees, high-impact publications and institutional recognition confirm our leadership and scientific credibility.

Creating Value for Clients, Employees and Employers

AZTI's commitment goes beyond scientific excellence. We focus on creating sustainable value for our customers, employees and sponsors, ensuring profitability and long-term growth. We promote the creation of skilled jobs, professional development and diversity, and foster a working environment based on innovation, transparency and respect. Our progressive management, certified to international standards, ensures efficiency and quality in all our activities.

Leadership in Transformative Projects and Vision of the Future

AZTI leads transformative projects that contribute to the ecological transition, the circular economy, food security and adaptation to climate change. Our ability to mobilise public-private partnerships, attract investment and stimulate the industrial and social fabric puts us at the forefront of innovation in the Basque Country and Europe.

Progress Requires Ideas

At AZTI, we firmly believe that progress requires ideas and that science is the best tool for finding answers to the major challenges facing humanity. Our Activity Report is evidence of a collective effort to build a healthier, more sustainable and prosperous future. We will continue to promote scientific excellence, innovation and collaboration, convinced that the answer lies in science and the ability to turn knowledge into value for society.

2

ABOUT AZTI

2.1.
WHO WE ARE

Impact

AZTI is a scientific and technological centre that **develops high-impact transformation projects with organisations aligned with the United Nations' 2030 SDGs.**

Purpose

Our dream is **to contribute to a healthy, sustainable and whole society.** A society that enjoys, in balance with nature. A society where science and high-impact technology drive positive change for people's future.

Specialisation

Specialising in the marine environment and food, AZTI provides cutting-edge products and technologies with added value, based on solid science and research.

2.2.
MISSION, VISION AND VALUES

MISSION

Our mission is to create and transmit knowledge, through the development of transformational projects with organisations that are willing to accept the challenge of achieving the sustainability goals of the United Nations, generating wealth and improving the well-being of humanity.

VÍSION

By 2030 we will have become a key player in the European marine and food scene, providing cutting-edge, value-added products and technologies based on sound science and research.

VALUES

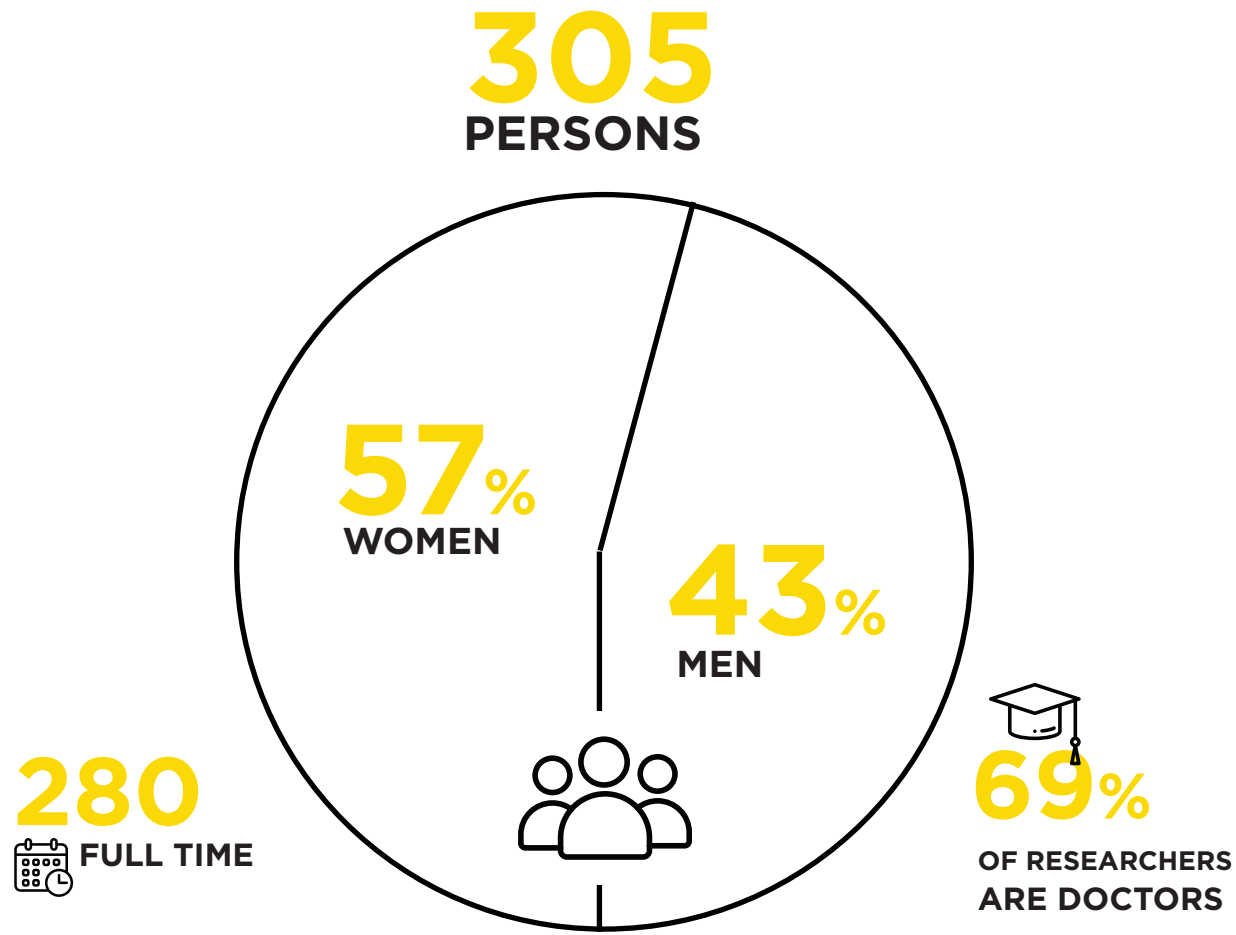
Our culture is driven by collaborative and transformative innovation, value generation, respect, transparency, commitment, efficiency and curiosity.

- **Networked innovation** across teams, and together with clients and the environment to connect ideas and generate value.
- **Empathy** for all points of view to broaden our capacity to understand and transform.
- **Diversity**, driving positive change for the future of people.
- **Transparency** when communicating to build trust and credibility.
- **Commitment** to science to find innovative solutions to society's challenges and questions.
- **Efficiency** at work to create a competitive, motivating and agile environment.
- **Curiosity** to learn what we do not know and grow as professionals and as people.

2.3.
OUR TEAM

People are the driving force of AZTI. In a knowledge-based organisation, we shape experience and foster a culture of innovation.

That is why we put people at the centre. We value diversity, address needs, and **promote a work environment where well-being and health are a priority**. When we care for those who make change possible, the impact multiplies.



2.4.
RESEARCH AREAS

CLIMATE CHANGE AND GLOBAL CHANGE

- **Observation and Impact**
  - Climate Change Monitoring in the Bay of Biscay
  - Analysis of Fisheries Impact
  - Biodiversity Assessment and Environmental Effects
- **Trends and Scenarios**
  - Climate Modelling and Coastal Scenario Analysis
  - Predicting Marine Species Distribution and Resilience
  - Big Data Applications in Ecological Studies
- **Adaptation**
  - Development of Adaptation Plans and Preventive Strategies
- **Mitigation**
  - Solutions To Reduce Fleet Emissions
  - Estimation of Blue Carbon and Nature-Based Solutions
  - Eco-Design of Diets and Processes

EFFICIENT AND SUSTAINABLE FISHING AND AQUACULTURE

- **Sustainable Fisheries Management**
  - Fishery Resource Assessment
  - Mitigation of Fishing Impact on Marine Biodiversity
  - Marine Governance
- **Marine Technologies**
  - Reduction of Environmental Impact in Fishing
  - Digital Transformation of the Fleet
  - Innovation in Onboard Processes
- **Aquaculture**
  - Development of New Species
  - Design, Development, and Optimisation of Production Systems
  - Environmental Management
  - Food Safety

OPERATIONAL OCEANOGRAPHY

- **Observation Systems and Development**
  - Coastal and Ocean Observation Networks
  - Autonomous Technologies
  - Multi-Platform Integration
- **Numerical Modelling**
  - Coastal and Ocean Models
  - Operational Models and Data
  - Lagrangian Transport
  - Climate Scenarios

2.4.
RESEARCH AREAS

MARINE AND COASTAL MANAGEMENT

- **Marine Environment Health Assessment**
  - Development of Ecological Assessment Tools
  - Ecological Quality Monitoring
  - Assessment of Fishing Gear Impacts
  - Support for Marine Environmental Management
  - Biofouling Assessment
- **Environmental Impact and Monitoring in the Marine Environment**
  - Environmental Impact Studies
  - Toxicity and Pollution Studies
  - Analysis of Marine Litter Sources
- **Conservation and Restoration of Marine Species and Habitats**
  - Identification and Management of Protected Areas
  - Protection of Endangered Species
  - Marine Ecosystem Restoration
  - Biodiversity Assessment and Monitoring
  - Control of Invasive Alien Species
- **Assessment of Ecosystem Goods and Services**
- **Marine Spatial Planning and Management**
  - Zoning for New Activities
  - Energy Resource Assessment
  - Marine Spatial Planning and Management

EFFICIENCY AND SUSTAINABILITY IN THE FOOD INDUSTRY

- **Production Efficiency**
  - Water Management
  - Food-Loss Reduction
  - Process Optimisation and Data Management
- **Sustainability**
  - Environmental Assessment
  - Eco-Design
  - Communication
- **New Protein Sources and Bioproducts**
  - Bioproducts From Microalgae and Fungi
  - Protein Hydrolysates with Nutritional Benefits
  - New Ingredients with Health Benefits
  - Multicriteria Decision-Making Tools for Selecting Food By-Product Valorisation Options
- **Digitalisation and Artificial Intelligence**
  - Advanced Sensor Technology
  - Predictive Models for Quality and Processes
  - Industry 4.0 Diagnostics
- **Health and Safety in the Workplace**
  - Job Adaptation for Diversity
  - Risk Factor Analysis and Prevention of Workplace Accidents

2.4.
RESEARCH AREAS

FOOD SAFETY AND CONTROL

- **Minimisation of Food Risks**
  - Phages: Biocontrol of Pathogens and Unwanted Bacteria
  - Contaminant and Toxicity Assessment
  - Shelf-Life Studies
- **Food Control and Traceability**
  - Development of Food Authentication Methods
  - Continuous Quality and Traceability Monitoring

FOOD AND HEALTH

- **Precision Nutrition**
  - Clinical Studies and Biomarkers
  - Personalised Nutritional Recommendations
- **AI Applied to Nutrition**
  - AI for Nutritional Assessment (Scoring)
  - AI for Nutritional Recommendations
- **Food Innovation for Specific Needs**
- **New Ingredients with Specific Health Properties**
- **Application of Bacteriophages in Human and Animal Health**

CONSUMER BEHAVIOUR

- **Trend Identification**
- **Behavioural Studies and Neuromarketing**
- **Advanced Sensory Analysis**
  - Panel of Experts
  - Consumer Sensory Studies

NOVEL FOODS

- **Formulation and Processing**
  - Foods Designed for Specific Consumer Profiles
  - New Foods
  - New Food Ingredients
- **Processing and Preservation Technologies**
  - Technologies and Processes to Improve Food Properties
  - Process and Technology Innovation and Validation
  - Standardisation of Production Processes and Technologies

FOOD AND MARINE BIOTECHNOLOGY

- **Blue Biotechnology**
  - Marine-Based Bioproducts
  - Bioremediation
  - Biomimetics
- **Food Biotechnology**
  - Bioproducts from Microalgae and Fungi
  - Biocontrol for the Agri-Food Sector
  - Food Bioproduction
  - Biosensors and Rapid Detection Systems for Chemical and Biological Markers

2.5.
CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS

At AZTI, we are committed to addressing the major challenges facing humanity.

We develop sustainable and healthy solutions in different areas to respond to these challenges, **putting research and science at the service of the common good.**

ZERO HUNGER

Ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture.

GOOD HEALTH AND WELL-BEING

Ensuring healthy lives and promoting well-being for all at all ages.

RESPONSIBLE CONSUMPTION AND PRODUCTION

Ensuring sustainable consumption and production patterns.

CLIMATE ACTION

Taking urgent measures to combat climate change and its effects.

LIFE BELOW WATER

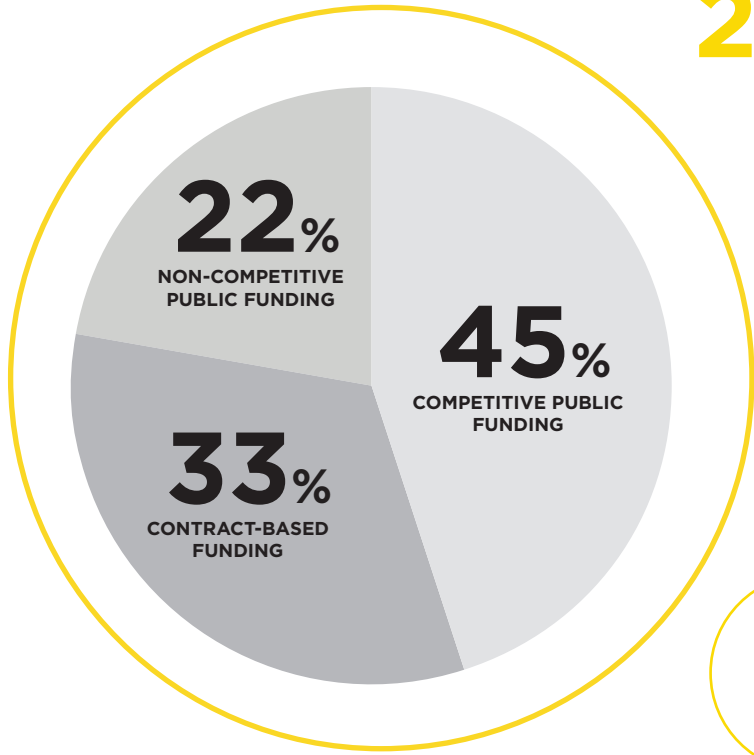
Conserving and managing oceans, seas, and marine resources sustainably.

2.6.
AZTI IN FIGURES

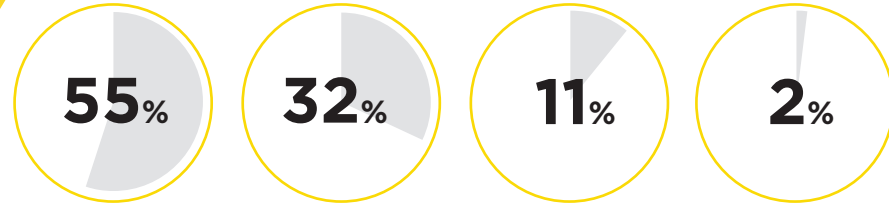
478
Indirect jobs
promoted

388
Live projects

199
Clients



REVENUE
24 Millon



2.7.
ACCREDITATIONS AND CERTIFICATIONS

Golden recognition in Advanced Management

Golden Q 2011
Excellence in management

Accredited laboratory

Security and Health at Work
management

Information security
management systems

Environment
management system

Quality
management systems

R & D
management System

3

RESEARCH ACTIVITY RESULTS

3.1.
OUR COMMITMENT TO THE FUTURE OF FOOD

VALORISATION AND CIRCULAR ECONOMY_

Valorisation of Agri-Food By-Products for Animal Feed

Circular economy offers innovative solutions for the valorisation of agri-food by-products in feed production. The **NEWFEED** project **has transformed waste** such as grape pomace (Spain), orange peels (Greece), and olive cake (Egypt) **into assessed ingredients for ruminants and poultry**. Through techniques such as solid-state fermentation and hydrolysis, ingrediets' safety, stability, and nutritional value are ensured, contributing to the sustainability of Mediterranean livestock farming.

The **LIFE ECOFFEED** project has validated the **use of coffee grounds in dairy cattle feed**, demonstrating that their inclusion (10-20%) does not affect performance or milk quality. In sheep, it improves the fatty acid profile and reduces methane emissions by 19%. Additionally, over 1.1 tonnes of animal feed pellets have been generated, promoting the reuse of coffee waste.

Meanwhile, **LIFE BREWERY has studied brewer's yeast** (*Saccharomyces cerevisiae*), a by-product rich in proteins, carbohydrates, fatty acids, and bioactive compounds. Through enzymatic hydrolysis, its digestibility and functionality have been enhanced, **supporting its use in aquaculture** and other animal nutrition applications.

3.1.
OUR COMMITMENT TO THE FUTURE OF FOOD

VALORISATION AND CIRCULAR ECONOMY_

Recovery of High-Nutritional-Value Ingredients for Human Food

In the field of human food, circular economy enables the recovery of ingredients with high nutritional value. **LIFE BREWERY** has demonstrated that **brewer's yeast**, in addition to its application in feed, **can be incorporated into human food products** due to its antioxidant and cardiovascular benefits. This innovation has been supported by EFSA. Its ß-glucan and antioxidant content make it a functional ingredient for bakery, supplements, and healthy products.

Additionally, the **WASEABI** project has developed an innovative methodology for **valorising effluents generated in mussel cooking**. Using membrane filtration and diafiltration, flavour compounds such as glutamic acid have been concentrated up to twenty times, improving organoleptic properties and reducing salinity. This innovation enables the creation of natural ingredients for the food industry while reducing effluent volume by 80% and organic load by 90%, minimising environmental impact.

These projects showcase the potential of the circular economy to optimise resources, reduce waste, and produce innovative ingredients for animal feed and human food.

3.1.
OUR COMMITMENT TO THE FUTURE OF FOOD

SUSTAINABILITY IN THE FOOD CHAIN_

Sustainable Gastronomy

Sustainability in the restaurant sector is advancing with the **Sustainable Gastronomy Certification**, developed by AZTI and Basque Know How Fundazioa. This certification aims to **promote environmental and socio-economic best practices in gastronomy**, helping businesses integrate sustainable development principles and differentiate themselves in an increasingly demanding market. It also **raises consumer awareness of the impact of their food choices**.

This initiative allows establishments to assess their sustainability performance and adopt improvements that strengthen their competitiveness. By combining environmental responsibility and economic viability, the certification contributes to positioning the restaurant industry as a key sector in the transition to a more sustainable model.

3.1.
OUR COMMITMENT TO THE FUTURE OF FOOD

SUSTAINABILITY IN THE FOOD CHAIN_

Environmental Management in the Food Industry

To reduce the environmental impact of food production, AZTI has developed Envirodigital, an **innovative software tool that analyses the ecological footprint of products throughout their value chain**. Based on the European Commission's PEF (Product Environmental Footprint) methodology, it measures key indicators such as carbon footprint, water consumption, and emissions, identifying critical production phases and proposing eco-design solutions.

Food companies such as **Kaiku have begun using this tool to enhance product sustainability**, aiming to reduce their environmental impact by up to 10%. Such digital solutions enable data-driven decision-making, promoting a more efficient and environmentally friendly production model.

Transparency and Communication in Sustainability

In a context of increasingly stringent sustainability regulations, the **Ingurulabel project has developed the "Guide for Environmental Improvement and Communication in the Food Industry."** This document provides strategies for companies to reduce their environmental impact and communicate their efforts clearly and verifiably, avoiding greenwashing.

Funded by IHOBE and promoted by BASQUE FOOD CLUSTER and Eroski, the project has involved SMEs in the sector, such as Artomaña Txakolina and Casa Eceiza. The guide also anticipates the EU Green Claims directive, set for 2025, which will regulate environmental communication for market products.

With these initiatives, the food industry is advancing towards greater sustainability, combining innovation, digitalisation, and transparency to strengthen its commitment to the environment and society.

3.1.
OUR COMMITMENT TO THE FUTURE OF FOOD

BIOTECHNOLOGY_

Microalgae as a Source of Functional Ingredients

Microalgae are emerging as a key solution for food sustainability and the circular bioeconomy. As part of the **Basque Country's microalgae pole, Algakin,** AZTI is developing algal fermentation and cultivation processes to obtain biomass rich in proteins and other high-value compounds.

In addition to being an alternative source of protein, microalgae contain functional biomolecules such as pigments and extracts with applications in human and animal nutrition, nutraceuticals and health. These innovations harness the **potential of algae to improve the sustainability of food production** and diversify the market for natural ingredients.

3.1.
OUR COMMITMENT TO THE FUTURE OF FOOD

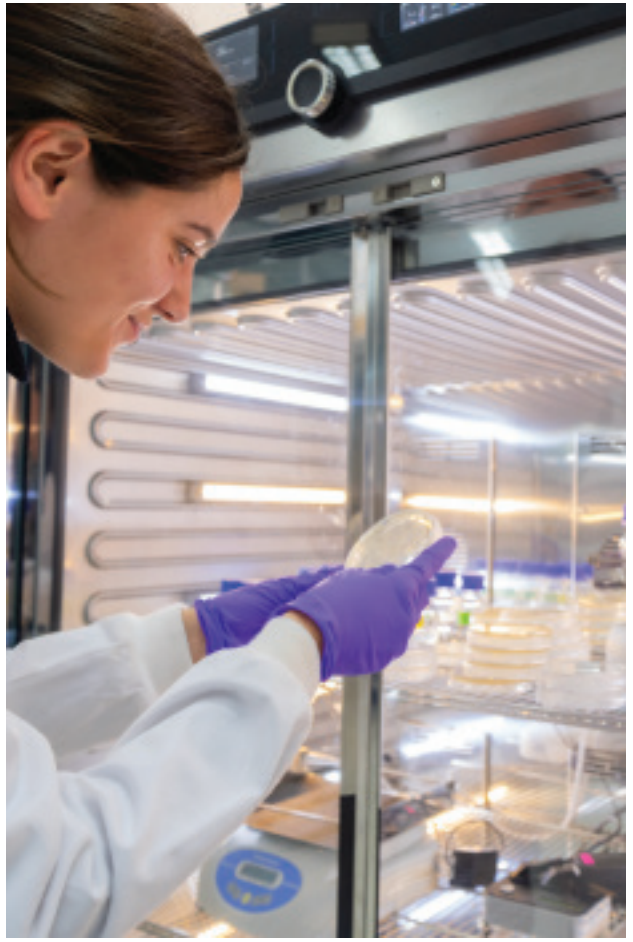
BIOTECHNOLOGY_

Marine Biotechnology and Business Development

Within the **Oarsoaldea Urdina Innovation Pole**, AZTI has promoted a new biotechnological business initiative focused on the extraction of high-value ingredients from marine and aquatic sources. These compounds are aimed at sectors such as food, nutraceuticals and cosmetics, combining innovation and sustainability.

The project not only contributes to the development of functional products, but also acts as an **economic driver, stimulating job creation and attracting new investment to the region**. The initiative has progressed with the development of pilot prototypes, validation with users and identification of strategic markets.

Work in marine biotechnology has led to the **selection of a number of products with high commercial potential**, including: microalgae biomass for human consumption, protein concentrates for human food and cosmetics, functional pigments for nutraceuticals and lysed biomass for animal feed. In addition, a future large-scale production facility was designed and a detailed business plan was developed to consolidate the viability of the project.



3.1.
OUR COMMITMENT TO THE FUTURE OF FOOD

DIGITISING THE FOOD CHAIN_

AI for Quality Prediction in the Agri-Food Sector

The **SensAIfood** project has developed an advanced sensor-technology using NIR technology to analyse the cocoa content in chocolate and other products. Integrated into a digital platform based on artificial intelligence, this system enables **improved quality prediction in the food industry through fast and accurate measurements**.

The combination of low-cost, non-destructive sensors and customised predictive models enables continuous, uninterrupted monitoring of the production process. By providing real-time analysis, the technology optimises efficiency, reduces environmental impact and enables adaptation to different measurement needs within the industry.

3.1.
OUR COMMITMENT TO THE FUTURE OF FOOD

DIGITISING THE FOOD CHAIN_

Innovation in Pilot Plant Management for the Food Industry

AZTI has developed **AZPilotManager**, a technology solution designed to optimise the management of pilot plants and R&D trials in the food industry. This tool enables **intelligent inventory and shelf-life management, eliminating the need for physical inspections and reducing the margin of error** in the management of raw materials and equipment.

Thanks to its full traceability system (both direct and reverse), users can quickly access detailed information on ingredients, batches and processes, ensuring compliance with food safety regulations and facilitating response to audits or inspections.

AZPilotManager centralises all operational information, ensuring that test and production data is always available, regardless of when it is performed or the team involved. Its ability to generate automatic reports streamlines administrative tasks and supports a collaborative environment where decision making is based on up-to-date and accurate information.

The digitisation of these operations not only improves efficiency, but also **drives innovation and continuous product development, optimising resource management** in an increasingly demanding industry.

3.2.
A STEP FORWARD IN FOOD SAFETY FOR EUROPE AND SPAIN

FOOD AND NUTRITION SAFETY_

Ocean Resources in Food and Nutrition Security in Europe

The forward-looking research **"Navigating Tomorrow's Tide: Exploring the Future of Ocean Resources and Their Impact on Food and Feed Safety,"** conducted by a multidisciplinary AZTI team in collaboration with CIIMAR for the European Food Safety Authority (EFSA), provides a comprehensive analysis of how global changes could impact ocean resource use and, consequently, the food safety of marine-origin products in Europe.

The research highlights the challenges and opportunities in ocean resource exploitation and how these could influence the future of food and food safety. The future of ocean resources and their impact on food security will depend on responsible management and effective collaboration among the scientific community, policymakers, and industry. The sustainability of marine products requires balancing resource demand with ecosystem conservation.

3.2.
A STEP FORWARD IN FOOD SAFETY FOR EUROPE AND SPAIN

FOOD AND NUTRITION SAFETY_

Biotechnology to Improve Livestock Safety in Spain

The **BIOTEGANIA** project, launched in 2024 and funded by the CDTI and the State Research Agency of the Spanish Ministry of Science, Innovation, and Universities, is an innovative response to the challenges faced by the Spanish livestock sector, which contributes nearly 1% of the national GDP and supports over 700,000 jobs. In collaboration with several companies, meat associations, technology centres, and universities, AZTI is developing **biotechnological solutions to prevent and control pathogens in agri-food production.**

AZTI focuses on developing biotechnological tools for the diagnosis, prevention, and efficient control of bacterial pathogens in livestock production. The aim is to reduce the use of antibiotics, minimise antimicrobial resistance spread, and enhance safety in the meat production chain. These innovations strengthen the sustainability and competitiveness of the pork and poultry sectors, ensuring safer and more efficient practices.

3.2.
A STEP FORWARD IN FOOD SAFETY FOR EUROPE AND SPAIN

FOOD AND NUTRITION SAFETY_

Optimisation of Cooking Techniques for Greater Food Safety

AZTI researchers continue to work on adapting and optimising cooking techniques to ensure food safety. This is demonstrated by the results of a recent study published in the journal Foods, which examined the effectiveness of low-temperature and vacuum cooking in eliminating dangerous microorganisms in food.

According to the results of AZTI's research, although this cooking method is effective against a wide range of microorganisms, some microbiological risks remain, especially if the microorganisms present in the food can develop a defence mechanism against the cooking conditions, such as the formation of spores. This underlines the **importance of choosing the right cooking method, adapted to the specific risks of each type of food**.

3.3.
CREATING THE FOODS OF TOMORROW, TODAY

FOOD PRODUCT INNOVATION_

Fourth-Range Vegetable Products

AZTI has participated in designing and developing a new line of vacuum-packed fourth-range vegetable products with a shelf life of at least seven days. This project, in collaboration with **EROSKI and FRIBASA**, involved defining product specifications and selecting the most advanced technology for FRIBASA's facilities. Following its work-plant expansion, AZTI assisted in implementing the new production line and adjusting processes for seven new product references, set to launch under the EROSKI brand.

Innovative Printed Tortillas

General Mills, in collaboration with AZTI, has developed **tortillas with images of Team UK's most iconic Olympic medal moments**, using secure food printing technology. AZTI has brought its knowledge and experience to create an innovative and unique product.

Old El Paso, the UK's number one Mexican food brand, has launched this product as part of its 'Make Some Noise for Your Home Team' campaign to celebrate its partnership with the British Olympic team ahead of the Paris 2024 Olympic Games.

In commemoration of Team UK's historic achievement of reaching 1,000 Olympic medals, Old El Paso launched a limited edition of 1,000 packs of fajitas in gold, silver and bronze versions, allowing fans to own a commemorative collector's pack.

3.3.
CREATING THE FOODS OF TOMORROW, TODAY

FOOD PRODUCT INNOVATION_

Finger Food Based on Alakrana Tuna

AZTI is working, together with **Echebastar**, on the **development of a new range of 'Alakrana Tuna Bites'**, designed to respond to market trends in 'finger food' type foods. These products stand out for being nutritious, healthy and practical, made with top quality tuna and adapted to the needs of today's consumers.

The range includes several main products: ready-to-cook tuna nuggets and burgers, which are high in protein, rich in fibre, a source of Omega-3, gluten-free and additive-free; and finger foods, with potato coating and tuna and vegetable filling, also gluten-free and additive-free, non-fried and rich in protein. Finger foods have a **highly innovative component as they represent a complete meal option (carbohydrate + protein + vegetables)** that can be adapted to different recipes so that you can experience all the flavours in a single bite.

AZTI has also worked with Echebastar in the development of exclusive packaging for the range, aligned with the defined brand identity. At the same time, technical tests have been carried out to guarantee the quality and shelf life of the product. The project is currently in the conceptualisation phase, with commercial meetings to validate the range and prepare a future production line and market launch.

3.3.
CREATING THE FOODS OF TOMORROW, TODAY

FOOD PRODUCT INNOVATION_

Development of The Cookie Biscuit for Ogiberri

AZTI has collaborated with **Gureak** in the development of its cookie for Ogiberri, a product designed to offer a delicious and attractive option to its customers. The project consisted of replicating and adapting a formula previously produced by the company in other facilities, achieving a biscuit similar in texture and flavour.

The result is a classic cookie with an irresistible flavour and made with chocolate 'drops'. During the process, AZTI worked closely with Ogiberri to **adjust the formulation, ensuring that the product met the expected quality and taste standards.**

Nutritionally Balanced Powdered Beverages

AZTI, in collaboration with **YUIT**, has developed a range of seven nutritionally balanced powdered beverages designed for rehydration with water, offering **healthy, convenient options tailored to different age groups and their specific consumption needs**. These formulations comply with EFSA's nutritional standards, ensuring a balanced profile suitable for various consumption moments.

This development combines innovation in formulation and nutritional design, providing a versatile and flavourful solution that meets the demands of today's consumers.

3.4.
INNOVATION FOR A HEALTHIER LIFE

PERSONALISED NUTRITION AND HEALTH_

Advances in personalised nutrition: The new startup LIPIWELL

After over a decade of research and 19 scientific publications, AZTI has launched **LIPIWELL**, a pioneering startup in personalised nutrition. Its innovative approach tailors dietary recommendations to each individual's unique metabolic profile through real-time biomarker analysis.

LIPIWELL's method combines **artificial intelligence (AI)** with advanced techniques, including **six-frequency bioimpedance**, analysis of glycation products to assess cellular ageing, **heart rate variability measurement**, and **lipidomic studies of red blood cell membranes**. By integrating data on body composition, metabolic stress, and lifestyle habits, it delivers personalised nutritional advice with unprecedented precision.

3.4.
INNOVATION FOR A HEALTHIER LIFE

PERSONALISED NUTRITION AND HEALTH_

Precision Nutrition in Elite Sports

LIPIWELL, a company founded by AZTI, has signed an agreement with **Athletic Club** to develop and implement its technology. The goal: to enhance nutritional management and athletic performance through personalised lipid analysis.

Additionally, AZTI is collaborating with **Real Sociedad** on a bespoke supplementation study involving both male and female players. Funded by **PiLeJe**, the three-year project will assess the impact of personalised supplements on 100 athletes, using advanced **lipidomic and gut microbiome analysis** to evaluate performance, health, and quality of life.

As a technological centre, AZTI contributes expertise in **detailed nutritional and metabolic assessment** of athletes, enabling tailored dietary plans that address individual needs. The rigorous scientific methodology ensures optimal performance and player well-being.

A **doctoral thesis** has also been developed on precision nutrition for professional female footballers. This multidimensional study employs **omics tools** (e.g., lipidomics, microbiomics) alongside data on body composition, hormonal status, dietary habits, and physical activity. Its primary aim is to deepen understanding of female footballers' metabolism and nutritional requirements to improve performance and health.

3.4.
INNOVATION FOR A HEALTHIER LIFE

PERSONALISED NUTRITION AND HEALTH_

Personalised Nutrition for Breast Cancer Survivors

To improve the quality of life for **breast cancer survivors**, an innovative personalised nutrition programme has been designed to meet their specific needs. Nutritional interventions are customised to promote optimal recovery and long-term well-being.

This approach considers **metabolic conditions, dietary requirements, and individual preferences**, ensuring more effective and personalised support. Nutrition plays a vital role in post-treatment recovery, and this programme aims to maximise its benefits.

Artificial Intelligence for Predicting Protein Properties

Under the **GIANT LEAPS** project, AZTI has developed **AI algorithms** capable of predicting protein properties and assessing their suitability for sustainable diets. Recognised by the **European Commission's Innovation Radar**, this breakthrough aligns with the **European Green Deal** and the **Farm to Fork Strategy**.

These algorithms accelerate the development of **alternatives to animal-based proteins**, supporting the transition to **sustainable food production**. Beyond advancing food technology, they provide critical data for policymaking, fostering a **more resilient and environmentally friendly food system**.

3.5.
ADVANCING SUSTAINABLE MANAGEMENT OF FISHERY RESOURCES

BIOMASS ASSESSMENT AND SUSTAINABLE MARINE RESOURCE MANAGEMENT_

Scientific campaigns for anchovy management

The **BIOMAN 2024** scientific campaign, funded by the Basque Government and the European Commission and conducted in collaboration with the Secretariat General for Fisheries, assessed the biomass of anchovy (*Engraulis encrasicolus*) in the Bay of Biscay, estimating a total of 143,000 tonnes. This figure is significantly higher than the historical average of 80,000 tonnes and over six times the biological safety limit of 21,000 tonnes.

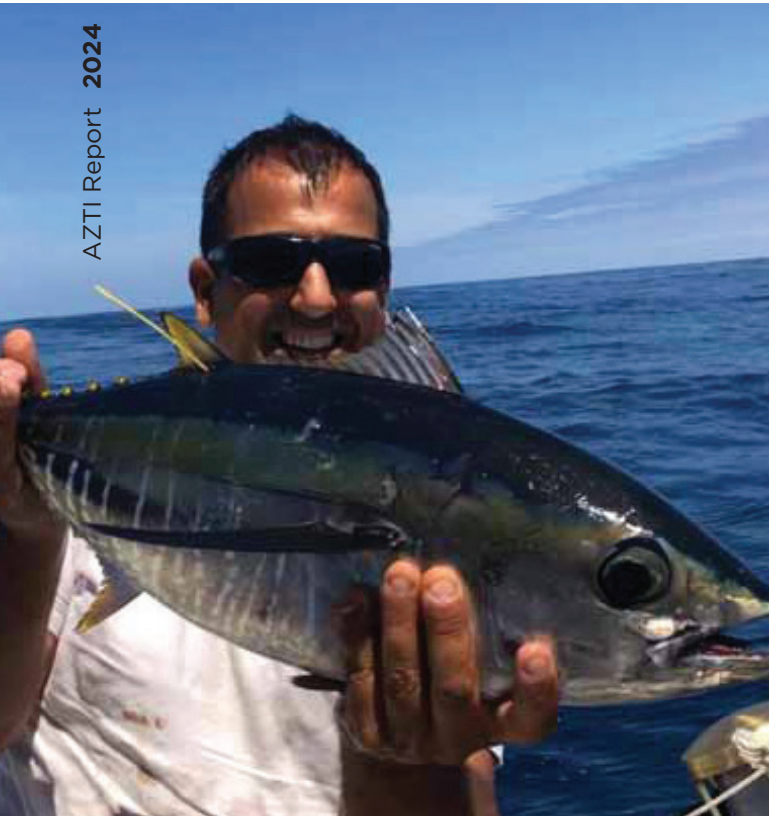
The **JUVENA 2024** campaign, led by the Basque Government's Department of Food, Rural Development, Agriculture, and Fisheries, alongside the technology centre AZTI, in collaboration with the Spanish Institute of Oceanography (IEO) and the Ministry of Agriculture, Fisheries, and Food, has completed its annual analysis of juvenile anchovy and other pelagic species populations in the Bay of Biscay.

In 2024, juvenile biomass was estimated at **255,434 tonnes**, a figure within the medium-low range of the historical series but exceeding the results from the 2019, 2020, and 2021 campaigns. Additionally, the average juvenile size of **9.7 cm** is the second-largest recorded since these surveys began—a positive indicator for recruitment prospects in the **2025 fishing season**. Meanwhile, adult anchovy biomass reached **245,825 tonnes**, reflecting a globally healthy stock.

These studies highlight the importance of **inter-institutional collaboration** and **advanced technologies** to ensure accurate data for decision-making. The stability of the anchovy stock is vital not only for ecological balance but also for the local economy, as over **3,500 people** depend directly on its fishery.

3.5.
ADVANCING SUSTAINABLE MANAGEMENT OF FISHERY RESOURCES

BIOMASS ASSESSMENT AND SUSTAINABLE MARINE RESOURCE MANAGEMENT_



Monitoring of Albacore Tuna and Tuna Migrations

The recapture of two albacore tuna specimens tagged by AZTI in the Bay of Biscay has provided unprecedented data on their distribution and behaviour, confirming that **albacore tuna are faithful to these waters**.

This breakthrough stems from AZTI's tagging and release programme, supported by the Basque Government, which involves recreational fishers in tracking the growth and movements of these species, key to the Basque economy. Juvenile tuna species, such as bluefin tuna and albacore, return each summer to these waters, attracted by abundant prey like anchovy. These findings are essential for optimising fisheries management and ensuring the **sustainability of tuna populations**.

Progress in Sustainable Tuna Management

AZTI continues its **scientific advisory role for the Bermeo Tuna World Capital Association**, which reinforces its global commitment to sector sustainability through the Universal Declaration for Tuna Sustainability.

This initiative, aligned with the 2030 Agenda and the UN Sustainable Development Goals (SDGs), promotes the competitiveness and sustainability of tuna fisheries. The association is also part of the **Tuna Cities Alliance**, a collaborative network advocating for responsible fishing practices worldwide.

3.5.
ADVANCING SUSTAINABLE MANAGEMENT OF FISHERY RESOURCES

PROTECTION OF MESOPELAGIC RESOURCES AND MARINE CONSERVATION_

The Critical Role of Mesopelagic Resources

The **SUMMER** project has highlighted the importance of mesopelagic resources (organisms inhabiting depths of 200–1,000 metres) in global ocean and climate dynamics.

Among its key discoveries is the **nocturnal migration** of fish, zooplankton, and other mesopelagic organisms to surface waters to feed—the planet's largest daily biomass migration. The study found that 44% of mesopelagic biomass participates in these vertical movements.

The report emphasises that this active biomass flux is critical for **carbon cycles**, equivalent to 1.5 times the global CO_2 emissions from all automobiles. These results underscore not only the ecological significance of mesopelagic organisms but also the urgent need to manage and preserve this ecosystem for planetary balance.

Beyond their ecological role, mesopelagic species hold high potential for pharmaceutical, nutraceutical, and aquaculture applications, reinforcing the need to protect them from overfishing.

3.5.
ADVANCING SUSTAINABLE MANAGEMENT OF FISHERY RESOURCES

ENHANCING SHARK SUSTAINABILITY AND CONSERVATION_

Improving sustainability and conservation of sharks

As part of efforts to improve fisheries management and marine conservation, AZTI has developed a **shark identification guide**.

Aimed at researchers, crews, and skippers of tuna vessels in the Eastern Atlantic, this tool enables accurate species identification, improving catch data collection. Its use supports **shark protection**, promoting more sustainable fishing practices and strengthening conservation strategies in the tuna industry.

3.5.
ADVANCING SUSTAINABLE MANAGEMENT OF FISHERY RESOURCES

TECHNOLOGICAL INNOVATION IN SUSTAINABLE FISHING_

Artificial Intelligence for Pelagic Species Identification

AZTI has developed an AI model to automatically identify and classify pelagic species (e.g., anchovy, sardine, mackerel) using **acoustic records**. The model achieves **80% accuracy** and has been published in the ICES Journal of Marine Science.

This technology enhances fishing selectivity, reducing bycatch and supporting sector sustainability. Through multidisciplinary collaboration and campaigns like JUVENA, the system optimises data processing and enables deeper marine ecosystem studies—a significant step toward a **more efficient, selective, and eco-friendly fishing industry**.

Genetic Methods for Marine Trophic Analysis

AZTI has developed an advanced **genetic method** to precisely identify prey consumed by key species (e.g., anchovy, sardine, hake, horse mackerel) through DNA stomach content analysis. Funded by the EUMAP programme and the GENGES project, this innovation allows simultaneous analysis of hundreds of samples, revolutionising the study of marine trophic dynamics.

The data are vital for understanding temporal and spatial variations in food webs and for designing ecosystem-based management models—a leap toward sustainable fisheries.

3.5.
ADVANCING SUSTAINABLE MANAGEMENT OF FISHERY RESOURCES

TECHNOLOGICAL INNOVATION IN SUSTAINABLE FISHING_

Advancing Fisheries Ecology with Omics Sciences

In 2024, AZTI hosted **the Annual Symposium of the Fisheries Society of the British Isles (FSBI),** gathering 150 global experts in omics sciences. Titled *"Advancing Fish Ecology, Management, and Forecasting through Omics"*, the event highlighted the impact of genomics and proteomics on fish conservation and management.

From genetic connectivity to environmental DNA (eDNA) analysis, the topics explored enable precise, effective management strategies—key to fisheries sustainability. The symposium solidified the Basque Country's scientific leadership and fostered international collaboration.

Predictive Models for Mackerel Fisheries

AZTI has developed **machine learning-based predictive models** to forecast mackerel (*Scomber scombrus*) distribution and catches under **climate change**. Using historical data and environmental variables (e.g., temperature, salinity, sea-level anomalies), the models achieve 81% accuracy for purse seine and 72% for handline fisheries, optimising fishing efforts by reducing search time and distances.

This approach is critical for climate adaptation and sustainable fisheries management.

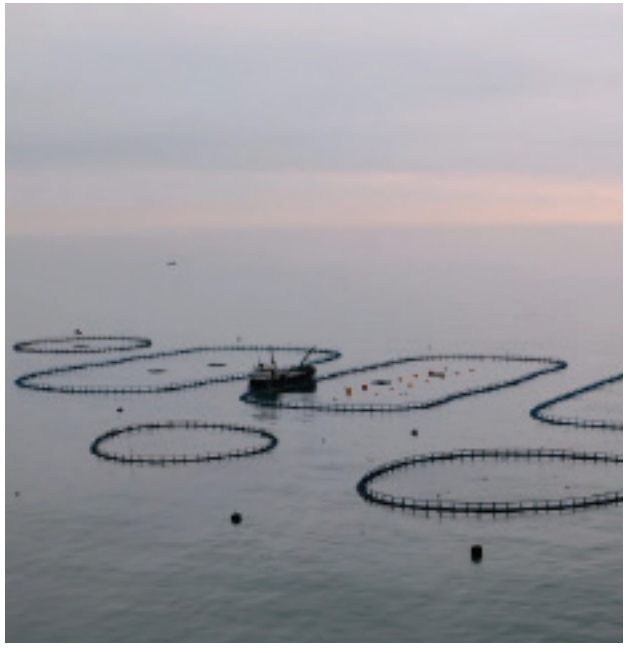
3.5.
ADVANCING SUSTAINABLE MANAGEMENT OF FISHERY RESOURCES

TECHNOLOGICAL INNOVATION IN SUSTAINABLE FISHING_

Revitalising Bluefin Tuna Fisheries in the Cantabrian Sea

AZTI, in collaboration with the Catalan company Balfegó through Itsasbalfegó, has installed two submersible aquaculture cages off Getaria for bluefin tuna fattening. A pilot test will begin in summer 2025, with a limited number of wild-caught tuna fattened on-site to assess economic and environmental viability.

The project aims to **revive Cantabrian bluefin tuna fisheries**, where adverse weather and smaller specimens have reduced profitability. The cages, designed to withstand harsh Cantabrian conditions, will undergo flotation and durability tests this autumn/winter. Approved by the International Commission for the Conservation of Atlantic Tunas (ICCAT), the initiative ensures compliance with fishing and environmental regulations. If successful, expansion is planned from 2026, improving fisheries management and end-product quality.



3.5.
ADVANCING SUSTAINABLE MANAGEMENT OF FISHERY RESOURCES

TECHNOLOGICAL INNOVATION IN SUSTAINABLE FISHING_

Innovation in Tuna Fishing Devices

With Zunibal, AZTI has developed **biobased, compostable floating and submersible devices** for tuna aggregation. Tested under semi-controlled conditions at the IATTC's Achotines Laboratory (Panama), followed by real-world trials (210 devices deployed in the Atlantic and Indian Oceans), the project involves industry leaders like Albacora, Nauterra, Pevasa, Echebastar, and Inpesca.

The goal is to prove these materials reduce environmental impact while maintaining efficacy—a milestone for **sustainable tropical purse-seine fisheries**.

Enhancing Aquaculture Sustainability with Nature-Based Solutions

Under the TRANSEATION project, AZTI and Zunibal installed **acoustic sensors** at AZTI's mussel farms. Evaluated over a year, these **Nature-based Solutions (NbS)** aim to improve low-trophic aquaculture sustainability, validating technologies for marine conservation and promoting eco-friendly practices.

3.5.
ADVANCING SUSTAINABLE MANAGEMENT OF FISHERY RESOURCES

COMPETITIVENESS OF THE EUROPEAN FISHING SECTOR_

Challenges and strategies for the fisheries and aquaculture sector

Over the past 15 years, the EU—the world's largest seafood market—has faced **declining competitiveness** and **growing import reliance**. An AZTI-led study for the EU reveals **self-sufficiency dropped to 38% in 2021**, attributed to strict **conservation and management measures (CMMs)** binding EU producers, unlike laxer standards in some exporting nations.

A report funded by the **FutureMARES project** identifies internal challenges (e.g., restricted resource access, stringent aquaculture regulations) and external pressures (e.g., subsidised foreign fleets, illegal fishing). Recommendations include:

1. Effective **Common Fisheries Policy (CFP)** implementation.
2. **Differentiated labelling** for imports to highlight production standards.
3. Stronger **EU trade-fisheries policy coordination**.
4. Optimised use of the **European Maritime and Fisheries Fund (EMFF)** for sustainable practices.

This analysis underscores the need for policy adjustments to balance competitiveness and sustainability, ensuring the EU sector meets market demands fairly, efficiently, and eco-consciously.

3.6.
GUARDIANS OF THE OCEAN: STRATEGIES FOR A SUSTAINABLE BLUE FUTURE

MARINE ENVIRONMENTAL RESEARCH AND MANAGEMENT_

International Recognition for AZTI's Summer Course

Marking its 20th anniversary, AZTI's Summer Course has been awarded the **MakeEUBlue Award** by the European Commission's EU4Ocean Coalition, recognising its contributions to marine education and sustainable marine resource management. Presented during European Maritime Day, this accolade underscores AZTI's commitment to marine sustainability and its dedication to delivering high-quality education in coastal and marine sciences. The achievement reflects the course's innovative curriculum and its success in inspiring students and professionals alike, fostering a new generation of leaders in marine science and policy.

3.6.
GUARDIANS OF THE OCEAN: STRATEGIES FOR A SUSTAINABLE BLUE FUTURE

MARINE ENVIRONMENTAL RESEARCH AND MANAGEMENT_

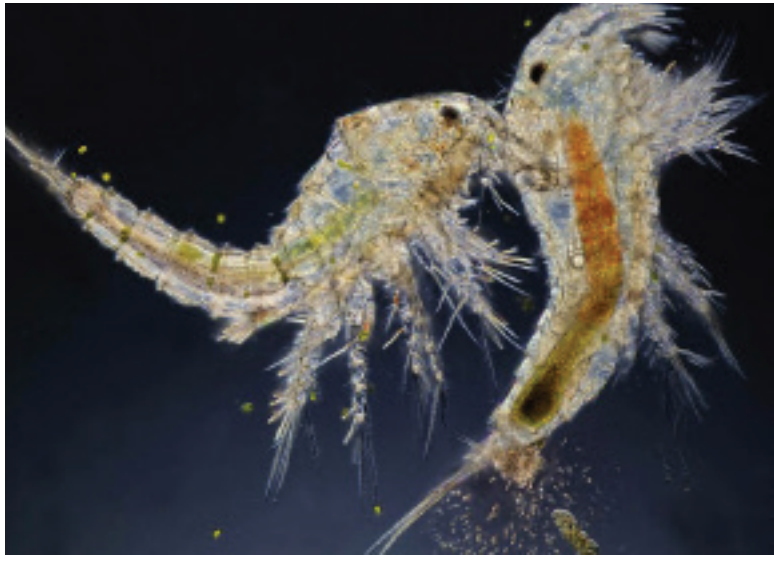
New Discoveries on Zooplankton Communities

A **global study** led by AZTI has analysed the biodiversity and connectivity of **zooplankton communities** across ocean depths, revealing stark differences between surface and deep-sea ecosystems. Published in *Molecular Ecology*, the research employed genetic techniques to examine samples from the Atlantic, Indian, and Pacific Oceans, finding that ocean currents and environmental conditions dictate zooplankton distribution.

Key findings show:

1. Surface zooplankton communities are more homogeneous due to strong currents.
2. Deep-sea communities are more isolated and diverse, with the Indian Ocean harbouring particularly rich hidden biodiversity.

This study advances understanding of zooplankton's role in marine ecosystems and their potential as indicators of environmental change, aiding predictions of climate change impacts on ocean health.



3.6.
GUARDIANS OF THE OCEAN: STRATEGIES FOR A SUSTAINABLE BLUE FUTURE

MARINE ENVIRONMENTAL RESEARCH AND MANAGEMENT_

Environmental Assessment Tool for Marine Renewable Energy

AZTI has developed **WEC-ERA**, a tool for assessing ecological risks linked to marine renewable energy technologies, such as oscillating water columns, wave energy converters, and tidal turbines. The tool analyses interactions between energy installations and marine environments, providing a scientific foundation for sustainable planning.

WEC-ERA supports strategic environmental assessments (SEAs) and environmental impact assessments (EIAs), ensuring renewable energy projects align with marine ecosystem protection.

Renewed Collaboration with Bilbao Bizkaia Water Consortium

AZTI has extended its partnership with the Bilbao Bizkaia Water Consortium to implement Receiver Environment Monitoring Plans at multiple Wastewater Treatment Plants (WWTPs)—including those in Galindo, Gorliz, Bakio, Lekeitio, Ondarroa, Muskiz, and Lemoiz. These plans are critical for securing discharge permits from the Basque Water Agency (URA).

The monitoring includes comprehensive analyses of aquatic ecosystems, using AZTI-developed methodologies to assess:

- Physicochemical water quality
- Phytoplankton communities
- Macroinvertebrate populations

3.6.
GUARDIANS OF THE OCEAN: STRATEGIES FOR A SUSTAINABLE BLUE FUTURE

MARINE ENVIRONMENTAL RESEARCH AND MANAGEMENT_

New Partnership with the European Investment Bank

AZTI has launched a strategic collaboration with the **European Investment Bank (EIB)**, the world's largest multilateral financial institution. This milestone cements AZTI's position as a leader in **international environmental consultancy**.

The partnership focuses on technical assistance services to evaluate environmental compliance in EIB-funded projects and ensuring projects meet the EIB's rigorous sustainability standards while promoting eco-responsible practices.

Three Decades of Water Quality Monitoring in the Basque Country

2024 marks **30 years** of AZTI's collaboration with **URA** in monitoring the **transitional and coastal waters** of the **Basque Autonomous Community (CAPV)**. This work is integral to programmes tracking the **ecological and chemical status** of water bodies, supporting compliance with the EU Water Framework Directive and evaluation of hydrological planning measures.

The Water Quality Network, established to build a comprehensive knowledge base, is vital for sustainable water resource management.

3.6.
GUARDIANS OF THE OCEAN: STRATEGIES FOR A SUSTAINABLE BLUE FUTURE

MARINE ENVIRONMENTAL RESEARCH AND MANAGEMENT_

Launch of the EB-MSP Assessment Tool

In 2024, AZTI unveiled the **Ecosystem-based Marine Spatial Planning (EB-MSP) Assessment Tool**, a publicly accessible platform (**aztidata.es/EB-MSP**) designed to evaluate marine spatial plans under ecosystem-based management principles. It also identifies **strengths, weaknesses, and improvement opportunities** during plan revisions and provides **best-practice guidelines** for sustainable marine planning.

The tool's methodology and its role in addressing global marine governance challenges have been featured in **Nature's *Communications Earth & Environment***.

3.7.
ADDRESSING CLIMATE CHANGE CHALLENGES

IMPACT OF CLIMATE CHANGE ON MARINE ECOSYSTEMS_

Even Pristine Marine Habitats Face Human Threats

In 2024, AZTI contributed to a study published in *PLoS ONE*, examining the effects of climate change and human activities on over **21,000 marine species**. The findings revealed that many species and habitats—including coastal areas previously considered pristine—face greater risks than anticipated. Vulnerable species such as **corals, molluscs, echinoderms, and crustaceans** are primarily affected by **fishing, maritime transport, and environmental factors** like **ocean acidification**.

This study employed an innovative approach, combining **species-specific models** with **functional diversity metrics**, to highlight the need for conservation strategies integrating **biological and socioeconomic factors**. The research provides a robust foundation for **sustainable marine resource management**.

3.7.
ADDRESSING CLIMATE CHANGE CHALLENGES

IMPACT OF CLIMATE CHANGE ON MARINE ECOSYSTEMS_

Global Warming's Impact on European Marine Ecosystems

AZTI led a study published in *Nature Communications*, analysing how **global warming** is reshaping marine ecosystems across Europe. Key findings include the ***tropicalisation*** in the Atlantic, with an increase in warm-water species, and the ***deborealisation*** in the Mediterranean and Baltic, where cold-water species are declining due to rapid ocean warming.

Supported by 39 international experts and the EU FutureMARES project, the study used the Community Temperature Index to track long-term biodiversity shifts. These changes affect keystone species like European sardine and cod, with profound economic and social consequences. The research underscores the urgency of adapting conservation policies and fishing practices to protect marine biodiversity and ensure resource sustainability.

3.7.
ADDRESSING CLIMATE CHANGE CHALLENGES

IMPACT OF CLIMATE CHANGE ON MARINE ECOSYSTEMS_

Shifting Migration Routes of Balearic Shearwaters

A study in *PNAS*, co-authored by AZTI and researchers from Oxford, Liverpool, IRBI, SEO/BirdLife, and CNRS, tracked Balearic shearwaters using geolocators since 2010. Findings show the birds are migrating further north upon leaving the Mediterranean, driven by rising sea temperatures and prey availability.

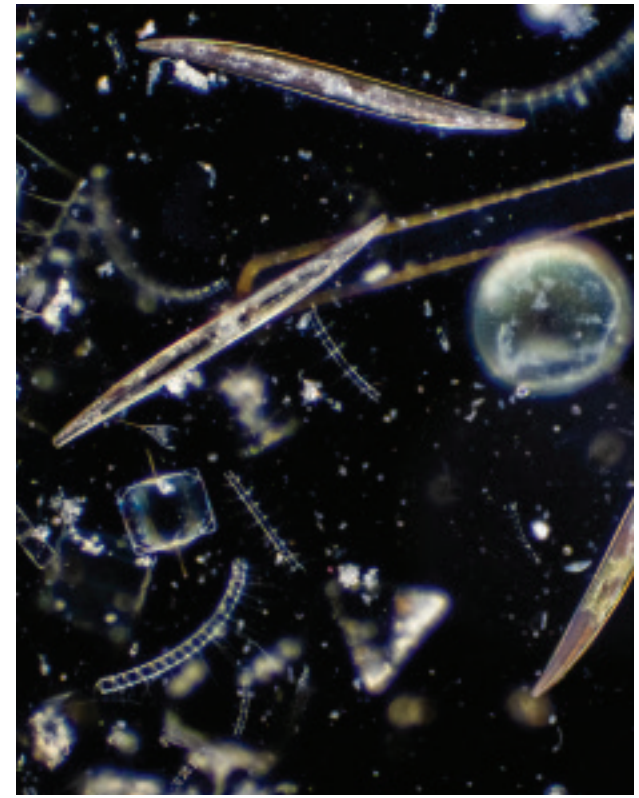
While this adaptability improves migration success, the long-term impacts on reproduction and survival remain uncertain. The study provides critical insights into species' responses to environmental change, supporting conservation efforts for this critically endangered bird.

Mesozooplankton and Deep-Sea Biodiversity

AZTI researchers published a study in *Molecular ecology* on mesozooplankton biodiversity and connectivity across ocean depths. Using advanced genetic techniques and samples from the 2010 Malaspina Expedition, the team analysed patterns from the surface to 3,000 metres in the Atlantic, Indian, and Pacific Oceans.

Key insights include how surface communities are more homogeneous due to strong currents and the fact that deep-sea communities are more diverse and isolated, influenced by environmental stability.

The study highlights mesozooplankton's role in global climate regulation and carbon sequestration, emphasising its ecological importance amid climate change.



3.7.
ADDRESSING CLIMATE CHANGE CHALLENGES

ADAPTATION AND MITIGATION IN THE FISHERIES SECTOR_

Adapting fisheries conservation strategies to challenges of climate change

Published in *Ecological Modelling*, an AZTI-CSIC study used the **GAM-NICHE model** to map the distribution of 30 commercially important species in the Atlantic. This 3D modelling approach, combining Generalised Additive Models (GAMs) with ecological niche theory, covers 67% of regional fish biomass, aiding sustainable fisheries planning and climate adaptation strategies.

3.7.
ADDRESSING CLIMATE CHANGE CHALLENGES

ADAPTATION AND MITIGATION IN THE FISHERIES SECTOR_

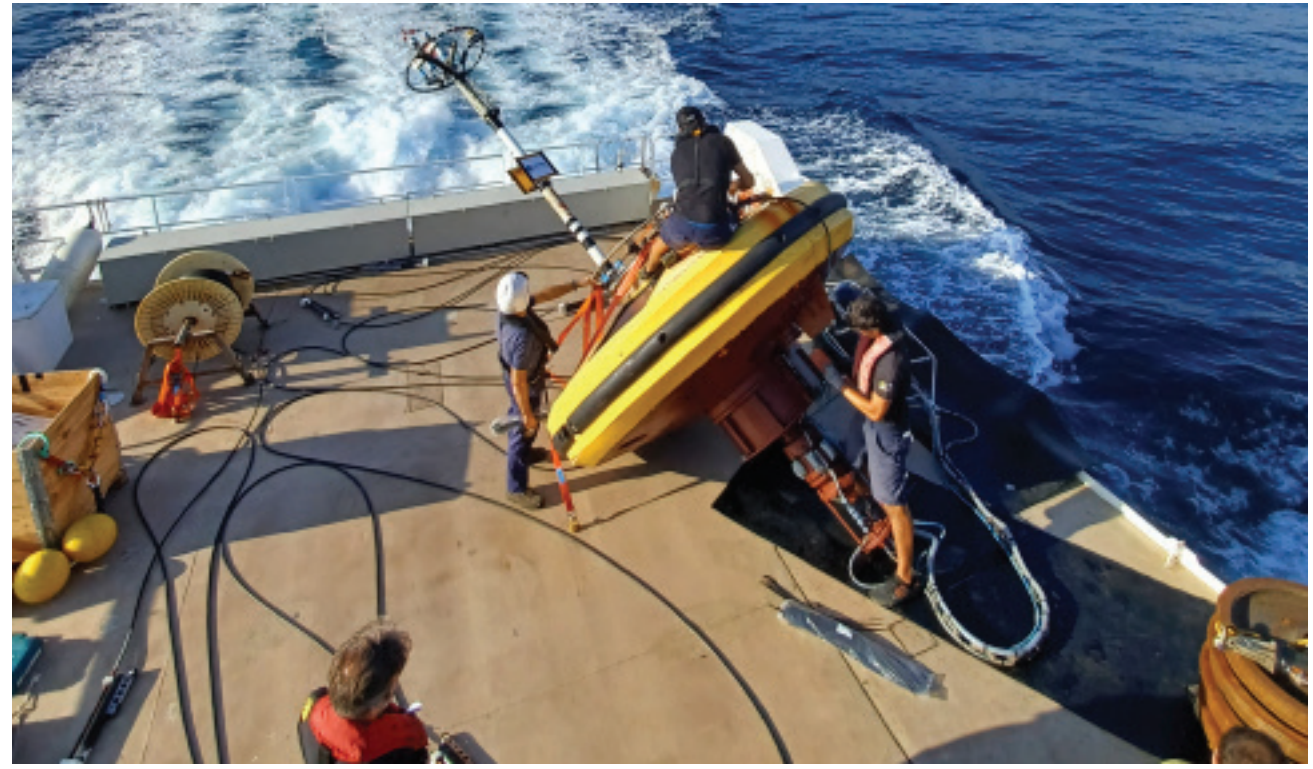
Uhinak 2024: Tackling Coastal Climate Change

The sixth **Uhinak Transboundary Climate and Coastal Congress**, co-organised by AZTI and Ficoba, brought together 160 international participants in Irun. Discussions focused on the Atlantic Meridional Overturning Circulation's (AMOC) climate impacts, nature-based solutions for coastal risk management, and projects such as **Regions4Climate**, promoting regional climate adaptation.

The event highlighted the need for cross-border collaboration and science-driven policies to address global climate challenges.

3.8.
TECHNOLOGY FOR ENHANCED MARINE EMERGENCY RESPONSE

INNOVATIONS IN COASTAL SAFETY AND RISK MANAGEMENT_



Improving Plastic Pollution Emergency Response

The 2023 sinking of the Toconao vessel demonstrated the value of operational oceanography in marine emergencies. AZTI's surface drift models, combined with data from the **EuskOOS** coastal observatory, accurately predicted plastic dispersion.

The **LAMARCA** project (published in *Science of the Total Environment*) revealed how ocean fronts concentrate marine litter offshore, increasing wildlife interactions.

These advances are vital for emergency response optimisation and marine waste management.

3.8.
TECHNOLOGY FOR ENHANCED MARINE EMERGENCY RESPONSE

INNOVATIONS IN COASTAL SAFETY AND RISK MANAGEMENT_

KOSTASystem: Expanding Coastal Safety Networks

Developed by AZTI, **KOSTASystem**—a videometry network—now spans 30+ locations across Spain, France, and Morocco, including 150 km of Basque coastline. Its real-time monitoring of beach morphology and currents enhances climate risk management and swimmer safety.

In 2024, the system integrated the "***LPA Beach***" app in Las Palmas de Gran Canaria, **tracking beach occupancy, tides, and weather.** This tool is critical for efficient coastal management and visitor safety.

The impact and versatility of KOSTASystem in coastal monitoring continues to grow, demonstrating its effectiveness as a key tool for coastal adaptation and management in the face of today's environmental and social challenges.

3.8.
TECHNOLOGY FOR ENHANCED MARINE EMERGENCY RESPONSE

INNOVATIONS IN COASTAL SAFETY AND RISK MANAGEMENT_

Boosting Coastal Resilience Against Storms

AZTI's operational oceanography team has been studying the impact of storms on 13 Basque beaches for three years, using the **KOSTASystem** videometry network. Published in the journal *Ocean and Coastal Management*, **the study reveals that geomorphological characteristics such as the height and width of the beaches, together with protective barriers, are essential to mitigate the effects of storms.**

This analysis underlines the importance of continuous monitoring with advanced technologies for effective coastal management by establishing preventive measures following evidence-based planning. The research not only contributes to the understanding of coastal dynamics but also strengthens the implementation of regional and transboundary strategies to increase the resilience of coastal zones to climate change.

3.8.
TECHNOLOGY FOR ENHANCED MARINE EMERGENCY RESPONSE

INNOVATIONS IN COASTAL SAFETY AND RISK MANAGEMENT_

Advancements in Marine Monitoring Technology

EuskOOS, the operational oceanography system for the Basque coast operated by **Euskalmet** and AZTI, has incorporated **gliders** (autonomous subsurface vehicles) into its monitoring network since 2023. These devices, which move through the sea by means of buoyancy changes without using propellers or fossil fuels, are equipped with sensors to collect critical data such as temperature, salinity, oxygen, nutrients and fish biomass. Their two-way satellite communication capability allows for real-time adjustments, optimising data collection even under adverse conditions.

These AZTI-operated underwater gliders are equipped with a series of sensors that enable the collection of detailed oceanographic data. In 2024, with funding from the Provincial Council of Gipuzkoa, the technology centre carried out a campaign that allowed it to measure detailed characteristics of the water column off the coast of the Basque Country, related to the marine biogeochemical cycle and primary production. The information collected complements the continuous monitoring provided by the euskoos.eus observatory and is crucial to better understand the impact of climate change on our coasts.

In addition, other campaigns have also been carried out to measure fish biomass, which contributes to improving the sustainable management of marine resources.

4

INTERNATIONAL BENCHMARK: SCIENTIFIC EXCELLENCE

4.1.
TAKING OUR KNOWLEDGE TO THE GLOBAL STAGE

2024 has been significant in terms of our staff's participation in international forums and specialised committees. This participation has highlighted our team's relevance within the global scientific community and its influence in shaping policies and strategies at an international level.

Among the key contributions are presentations before the Spanish Congress of Deputies and the European Parliament on decarbonisation and circular economy in fisheries, the production of the scientific advice report for fisheries, sustainable coastal zone management, speeches in committees on the EU Protein Strategy, and participation in global food technology summits and international fisheries congresses.

Our team has also been invited to share results with the regional fisheries advisory councils (CCSur and LDAC) and European platforms on food loss and waste, as well as contributing to high-level events on ocean and water restoration, and symposia on fisheries resource modelling and assessment. These activities underscore our commitment to sustainability, innovation, and science in the fisheries and aquaculture sector.

4.1.
TAKING OUR KNOWLEDGE TO THE GLOBAL STAGE

Manuel González attended the Spanish Congress of Deputies, invited as an author in the presentation of the report *"Sustainable Management of Coastal Zones"*, commissioned by the Congress Board. The report includes, among other topics, success stories from the Basque Country aimed at reorganising coastal space. These initiatives seek to reduce pressure on beaches, promote the naturalisation of these areas, and anticipate future sea-level rises.

AZTI presented the study *"Policy Options for Strengthening the Competitiveness of the EU Fisheries and Aquaculture Sector"* to the Fisheries Committee of the European Parliament in Brussels, as part of the legislative term's conclusion. This study was led by AZTI in collaboration with the University of Western Brittany and the University of Coruña. **Martín Aranda, Marga Andrés, Leire Arantzamendi, Ane Iriondo, and Gorka Gabiña** were part of the multidisciplinary research team.

4.2.
OUR PRESENCE IN THE MOST INFLUENTIAL COMMITTEES

AZTI continues to coordinate and actively participate in several working groups within European scientific institutions:

- **Estibaliz Díaz** has been appointed President of the Iberian Society of Ichthyology (SIBIC) for the next two years. SIBIC's main objective is to promote the study and conservation of native fish species in the inland and marine aquatic ecosystems of the Iberian Peninsula.
- **Gorka Gabiña** has been elected as a member of the expert advisory group supporting the EU Fisheries and Aquaculture Energy Transition Partnership (ETP). This working group is a key initiative within the European Commission's 2023 decarbonisation strategy.
- **Julien Mader**, Director of Marine Technology, has been appointed member of the Executive Directors Board at the EuroGOOS General Assembly. This appointment marks a step forward for AZTI in its mission to lead research and innovation in operational oceanography, contributing to the well-being of marine ecosystems and the sustainable economic development of ocean-related activities. Additionally, he co-chairs the Atlantic regional system IBIROOS and is a member of the Operational Committee of the European Ocean Observing System (EOOS). Since 2021, he has also co-chaired the transboundary KOSTARISK laboratory, focused on coastal risk management.
- **Anna Rubio** is a member of the Scientific Council of the French national coastal and littoral research infrastructure, ILICO. Established in 2016, ILICO aims to observe and understand coastal and littoral environments and ecosystems holistically. Anna's participation in this council further consolidates AZTI's position as an expert centre in operational oceanography research.
- **Iñigo Martínez de Marañón**, AZTI's Director of Technology, serves as an adviser to the Scientific Advisory Committee of the Basque Council for Science, Technology, and Innovation. This committee functions as a consultative body providing advice and proposals on the Basque science, technology, research, and innovation system. It comprises ten professionals of recognised expertise in these fields, appointed by the Lehendakari (President of the Basque Government).
- **Raul Prellezo** is President of the Economic Committee for Fisheries (AER) of the European Commission.
- **Leire Ibaibarriaga and Raul Prellezo** are members of the **Scientific, Technical and Economic Committee for Fisheries (STECF)**, an advisory body to the EU composed of highly qualified scientists, particularly in marine biology, marine ecology, fisheries science, fisheries technology, and fisheries economics. Additionally, since 2022, Raul has served as Vice-President of this committee.
- **Dorleta García** continues as Vice-President of the **Advisory Committee of the International Council for the Exploration of the Sea (ICES)**. This committee provides fisheries recommendations to the European Commission for all fish stocks.

4.2.
OUR PRESENCE IN THE MOST INFLUENTIAL COMMITTEES

- **Gorka Merino** remains Vice-President and European Scientific Coordinator of the **Scientific Committee of the Indian Ocean Tuna Commission (IOTC)**, as well as Chair of the **Tropical Tunas Working Group**.
- **Haritz Arrizabalaga** is the European Scientific Coordinator for the **International Commission for the Conservation of Atlantic Tunas (ICCAT)** and Chair of the **White Tuna Working Group** within this commission.
- **Josu Santiago** is Chair of the **FADs Working Group** of the **Inter-American Tropical Tuna Commission (IATTC)** and continues as European Scientific Coordinator for this commission.
- **Ángel Borja** is a member of the Advisory Board of **MARE** (Portugal's equivalent to the Spanish CSIC-IEO) and of the **Scientific Council of SustainMare** (Germany's marine research alliance).
- **Mireia Valle** has been selected as an expert in the **International Panel on Biodiversity (IPBES)**, contributing as Lead Author in Chapter 4: *Options for Strengthening the Capacity to Monitor Biodiversity Worldwide*. She also coordinates the **IPBES Fellows & Alumni Network**.

AZTI researchers hold various **chair positions** in multiple working groups within the ICES Advisory Committee:

- **Arantza Murillas**: Chair of the **Working Group on Resilience and Marine Ecosystem Services (WGRMES)** (2024-2026).
- **Guillermo Boyra**: Chair of the **Acoustic and Egg Surveys for Small Pelagic Fish Working Group (WGACEGG)**.
- **Josean Fernandes**: Chair of the **Working Group on Artificial Intelligence (WGMLEARN)**.
- **Naiara Rodriguez-Ezpeleta**: Chair of the **Bluefin Tuna Technical Subgroup on CKMR (ICCAT)** and the **Working Group on the Application of Genetics in Fisheries and Aquaculture (WGAGFA, ICES)**.
- **Estanis Mugerza** has completed his three-year term as **chair** of the **ICES Working Group on Recreational Fisheries Studies (WGRFS)** this year.
- **María Jesús Belzunce** has been **co-chair** of the **ICES Working Group on Marine Chemistry** since 2018.

4.2.
OUR PRESENCE IN THE MOST INFLUENTIAL COMMITTEES

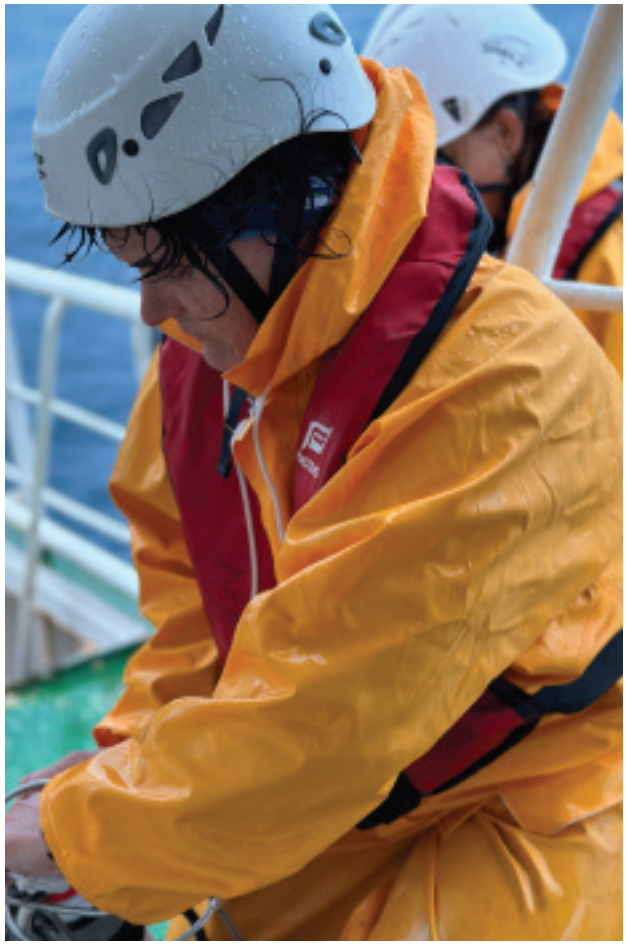
AZTI scientific staff participate in or lead different scientific committees, including the board of directors of the Scientific Association of Economists in the field of Economics of Natural and Environmental Resources (AERNA), the vice-presidency of the Iberian Society of Ichthyology (SIBIC) in the European Society of Sensory Sciences and in the European Association for Food Safety, as well as holding relevant positions in the Scientific Committees of the Regional Environmental and Fisheries Management Bodies, especially in those dealing with the most important fisheries for the Basque fleets.

- **Jaime Zufia** and **David San Martin** continue their participation as members of the **European Platform on Food Losses and Food Waste** until 2026. We are one of only **seven European research institutes** that form part of this platform. Promoted by the **European Commission**, it provides recommendations on food waste prevention and sets targets included in the **EU's binding regulatory framework** to reduce food waste.
- **Noelia Da Quinta, Elena Santa Cruz, and Yolanda Ríos** remain active members of the **European Sensory Science Society (E3S)**, a non-profit organisation dedicated to promoting cooperation, shared objectives, knowledge integration, and information exchange among national sensory science organisations across Europe. They are part of the **E3S Children Working Group**, which aims to facilitate research-based knowledge exchange on the mechanisms influencing **children's sensory perception and food preferences**, as well as promoting the development of suitable methodologies for data collection from this demographic.

- AZTI is an active member of the management committee of the Food 4 Life Spain technology platform, collaborating in five operational groups: Marta Rentería in the Dairy Sector group; Mónica Gutierrez and Jaime Zufía in the Quality, Production, Packaging, and Sustainability groups; Itziar Tueros and Sara Arranz in the Food and Health group; Elena Santacruz in the Consumer group.

4.2.
OUR PRESENCE IN THE MOST INFLUENTIAL COMMITTEES

- **Itziar Tueros** and **Ainara Cano** participate as experts in the **EIT Food Think & Do Tank on Healthy Ageing through Nutrition**.
- **David San Martin, Bruno Iñarra, and Mónica Gutierrez** are part of **five working groups** of **Conama**, a foundation recognised for its role in promoting sustainable development in **Spain and Ibero-America**. These groups focus on: **Circular Economy of Water, Public Strategies for the Circular Economy, Digital Transformation of the Waste Value Chain, Innovation in the Circular Economy, Eco-design and Blue Economy.**
- **Ángel Borja** has been appointed to the advisory boards of several European research institutions: Institute of Oceanography, HCMR (Greece), SustainMare (German Marine Research Alliance), International Center for Environmental Management of Enclosed Coastal Seas (EMECS, Japan, 2024–2027), Scientific Committee of the Fundación Gadea por la Ciencia (Spain).
- **AZTI** is part of the **EIT Food Consumer Observatory (2023–2025)**, involving four countries, where we lead the identification of European trends from Spain.
- **AZTI** has participated as the technical secretariat in the development and monitoring of the **Basque Aquaculture Strategic Plan, Euskal Akuikultura 2030**.



Several **AZTI researchers** serve as **editors** for **scientific journals**, including:

- **Ángel Borja**: Editor-in-Chief of *Frontiers in Ocean Sustainability* (launched in 2023), with several AZTI researchers as associate editors.
- **Raúl Prellezo**: Associate Editor of *ICES Journal of Marine Science.*
- **Naiara Rodríguez-Ezpeleta**: Associate Editor of *Molecular Ecology* and *Molecular Ecology Resources.*
- **Iñigo Muxika**: Associate Editor of *Marine Ecosystem Ecology*.
- **Ibon Galparsoro**: Associate Editor of *Discover Oceans* (Springer).
- **José A. Fernandes**: Associate Editor of *Fisheries Research*.
- **Gorka Merino**: Associate Editor of *Frontiers in Ocean Sustainability*.
- **María Lavilla**: Associate Editor of *Foods* (Food Biotechnology section).
- **Eduardo Puértolas**: Associate Editor of *Journal of Food Quality*, *Journal of Food Biochemistry*.

4.2.
OUR PRESENCE IN THE MOST INFLUENTIAL COMMITTEES

Finally, several AZTI researchers organised international events in 2024 on key topics for the organisation:

- **Naiara Rodriguez-Ezpeleta** was organiser and chairwoman of the annual symposium of the Fisheries Society of the British Isles (FSBI), which this year presented the latest omics advances for fisheries sustainability.
- **Guillem Chust** was the scientific organiser and chairman of Uhinak, a cross-border conference on climate change and coastal areas held biennially in Irún.

4.3.
HIGH-IMPACT PUBLICATIONS

The number of **scientific publications exceeds 122 indexed publications per year** (>75% in Q1), with more than 6300 citations to AZTI work this year. In terms of quality, the number of citations is regularly increasing and exceeds 30 citations per publication. The publication of a scientific article in Nature Communications stands out, with an impact factor of 14.7.

AZTI is **recognised in the SCIMAGO index**, which measures excellence at a global level for its contribution to research, innovation and social impact, in the percentile that indicates that only 33% of institutions worldwide in our fields of knowledge have results equal to or better than ours, reflecting a good level of impact and contribution to society. These percentiles are a way of comparing AZTI's performance with that of other institutions around the world in different areas. For an institution to be included in the SCIMAGO index, it must have exceeded a minimum threshold of production over the last year, which is equal to twice the percentage of the world in that field, as measured by Scopus and/or SciVal.

4.3.
AWARDS THAT INSPIRE US TO KEEP INNOVATING

Ramón Rubial Award for Sustainability and Environmental Protection (17th edition): This award highlights the positive impact of AZTI's initiatives in building a healthier, more sustainable and integrated society, as well as our commitment to the major challenges facing humanity.

MakeEUBlue Award from the European Commission: Recognition for our work in promoting ocean literacy and sustainable management of marine resources.

URA Award at the LURRA Bizkaia Sariak 2024: The Ulysses project, scientifically coordinated by AZTI, was awarded for its contribution to the protection of the marine environment. This prize, awarded by the Bilbao Bizkaia Water Consortium, recognises the project's impact on improving the health of the Basque coast and oceans through the study and reduction of marine and coastal pollution, and the promotion of environmental awareness and education.

And what we value most: the continued high level of satisfaction of our strategic clients with the quality of AZTI's services, reflected in a score of 5.7 out of 6 in all the characteristics evaluated, year after year.

5

INDUSTRIAL AND SOCIAL DEVELOPMENT

5.1.
FOSTERING GROWTH AND INNOVATION IN THE BASQUE COUNTRY

Opportunities

At AZTI, we drive innovation, **create value and promote competitiveness** in the public and private sectors. We transform knowledge into commercial opportunities

Collaboration

We prioritise collaboration with companies to **transfer results to industry**. This is done through licensing and the creation of new companies based on technologies emerging from our research.

Knowledge

A remarkable number of innovation projects are underway to **create new knowledge, products and services** in areas such as combating climate change, ecosystem-based fisheries management, personalised nutrition and food chain sustainability, among others.

5.1.
FOSTERING GROWTH AND INNOVATION IN THE BASQUE COUNTRY

FoodTech Business Incubator

After a year of work, Inkuba Sarea, the first Basque FoodTech incubator in the New Aquitaine-Euskadi-Navarre Euroregion, has completed its cross-border immersion phase. This project has provided four start-ups with an intensive training programme, personalised mentoring and marketing strategies, thanks to the collaboration of AZTI, INTIA and Agour.

The programme started in February at AZTI (Bizkaia), where consumer trends and new product development were studied. It continued at INTIA (Navarre) with a focus on internationalisation, and concluded at Agour (Iparralde) with a focus on marketing and analysis of the French market. This comprehensive approach covered all stages, from product transformation to marketing, and enabled the participating companies to make significant progress in their projects.

The start-ups that successfully completed the programme are:

- **Chichorium**, specialising in organic endive, based in Tudela (Navarra).
- **Ekhi Gold,** creator of chocolates covered in 22.5 carat gold, from Bera (Navarre).
- **O'Taste**, which uses Israeli technology to reduce sugar and sodium without the use of chemicals.
- **Ondoegone Laboratoire**, a laboratory in Uhart-Mixe (Navarre) that develops natural products for consumers and smokers.

This project strengthens cross-border cooperation and promotes a sustainable and innovative economy in the three territories.

5.1.
FOSTERING GROWTH AND INNOVATION IN THE BASQUE COUNTRY

Alliance to Boost Entrepreneurship in Urdaibai

U-BAI Faktoria, an association dedicated to strengthening the business fabric and economic development of the Urdaibai-Busturialdea region, and AZTI, a leader in marine sciences and food, have signed a collaboration agreement to boost the region's entrepreneurial ecosystem.

This strategic agreement consolidates an alliance aimed at identifying, analysing and ultimately investing in innovative business initiatives that will boost the economic and technological development of Urdaibai.

5.1.
FOSTERING GROWTH AND INNOVATION IN THE BASQUE COUNTRY

International collaboration in food innovation

During the Food4Future event in Bilbao, AZTI and the J**apanese business development company UnlocX & Co**. signed a three-year strategic agreement.

The agreement aims to strengthen collaboration between Spain and Japan in the field of food innovation. It includes participation in key events such as **SKS JAPAN2024 and Food4Future 2025**, promoting a dynamic community of knowledge exchange between the two countries. In addition, co-creation programmes will be developed to foster entrepreneurship, and joint research areas in food well-being and artificial intelligence will be explored under the FoodTech 6.0 concept.

This partnership is expected to be a milestone in transnational collaboration, generating innovative initiatives that address global challenges in the food sector.

5.1.
FOSTERING GROWTH AND INNOVATION IN THE BASQUE COUNTRY

Oarsoaldea: a benchmark in the blue economy

The Oarsoaldea region is moving towards a sustainable economic model with the holding of a new technical conference of the Oarsoaldea Urdina Park. This initiative, led by AZTI, the Oarsoaldea Development Agency and the Pasaia Port Authority, with funding from the Basque Government, aims to diversify the supply of goods and services related to the sea, as well as stimulating economic growth and job creation. The park has established itself as a strategic space for the development of innovative blue economy projects.

As part of the **Basque Government's ZAP** (Zones of Preferential Action) strategy, the Park has managed investments of more than 20 million euros from the Berpiztu programme.

During 2024, the Park has strengthened its position with several outstanding initiatives:

- **LASANAVAL**, making progress in its decarbonisation centre.
- **BRANKA**, in collaboration with AZTI, to deepen its marine robotics.
- **BlueTech**, focusing on marine biotechnology, led by AZTI.

New initiatives include the installation of an onshore power supply system in the Port of Pasaia, an advanced data centre developed by ISURKI, and sustainable research projects led by the University of Mondragón and HRC Ingeniería SL. These initiatives consolidate the **Oarsoaldea as a benchmark for innovation and sustainability in the Blue Economy.**

5.1.
FOSTERING GROWTH AND INNOVATION IN THE BASQUE COUNTRY

Food 4 Future: Key Space for Innovation and Business Development in the Food Sector

The fourth edition of Food 4 Future - Expo Foodtech, co-organised by AZTI and held in Bilbao, marked a milestone in the region's economic and business drive. With the **participation of 287 exhibiting companies, 300 start-ups and 40 international venture capital funds**, Food 4 Future has established itself as a key space for innovation and business development in the food sector.

During the event, **482 experts** discussed adapting to an inflationary economic context, product customisation through artificial intelligence and the implementation of sustainable practices. The importance of digitalisation in optimising production and logistics, which is crucial for the growth and competitiveness of local companies, was also highlighted.

In addition to its direct economic contribution, Food 4 Future facilitated a dynamic environment for collaboration between companies, fostering innovation and opening up new business opportunities. This focus on supporting and developing the local business fabric and economy of Bizkaia underlines AZTI's commitment to advancing the food industry through technology and innovation.

The event brought together more than 9,000 professionals from 35 countries and generated an economic impact of 19 million euros in Bizkaia.

5.1.
FOSTERING GROWTH AND INNOVATION IN THE BASQUE COUNTRY

BTEM Awards: Boosting Food Innovation in the Basque Country

The Basque Food Innovation Awards (BTEM), organised by the BASQUE FOOD CLUSTER and AZTI, aim to promote innovation among companies in the Basque food value chain. This year, in the fourth edition, **the companies Ecolumber - Uriarte Iturrate, Delicass and Paturpat were recognised for their innovative initiatives**, which not only demonstrate their commitment to excellence, but also aim to improve their competitiveness and visibility in the market.

Ecolumber - Uriarte Iturrate was awarded for its Air Nuts dried fruit snack, the result of a patented technology after four years of R & D, which has also boosted its international expansion. Paturpat received the award for its V range potatoes, which combine convenience and sustainability by using products that would otherwise be discarded for aesthetic reasons. Finally, Delicass was recognised for its range of vegetable patés, an innovation in the food category that combines taste, well-being and environmental responsibility.

These awards are intended to serve as a platform for Basque food companies to expand their influence and improve their positioning both nationally and internationally, reinforcing the image of the Basque food sector as a leader in innovation.

5.1.
FOSTERING GROWTH AND INNOVATION IN THE BASQUE COUNTRY

Commitment to Science Education

Since 2016, more than 12 AZTI mentors have collaborated with the **Inspira STEAM project**, which aims to motivate young people, especially girls, to develop an interest in science and technology, thus promoting equal opportunities in these fields.

In addition, AZTI researchers participated in the inspirational sessions of the **First Lego League** (FLL), an initiative aimed at primary and secondary school students. FLL aims to stimulate young people's interest in science and technology through collaborative, fun learning experiences based on real-world challenges. In its 16th edition, the focus was on explaining the exploration of the oceans.

We also contributed to the **Pasaia Itsas Festibala**, where AZTI presented various projects related to the Oarsoaldea Blue Economy Pole to the festival audience. These included the Xixili and Mari autonomous underwater gliders, the Ortze electric boat and the Kaindar charging infrastructure, which facilitates the connection of electric boats while they are moored at the dock.

With the aim of bringing science closer to society, since 2019 AZTI has been an active member of the **EuroGOOS** Marine Literacy working group and the **REEDUCAMAR** platform. In addition, we have been invited to lead the **Basque Blue Schools** Network in 2024 and to be a member of the Advisory Board of **PROBLEU**, a project that aims to promote the development of the European Blue Schools Network.

In a continuous effort to co-create and collaborate with different sectors, AZTI has developed over the last two years a series of **maps to address the opportunities and complexities involved in the development of wave energy projects.** This project has involved more than 75 people from local, national, European and international levels, highlighting the importance of multidisciplinary collaboration.

In addition, we participated in the **Macaronight** event at the Elder Museum of Science and Technology in Las Palmas de Gran Canaria. There we presented **FoodEducators**, a platform dedicated to educating about healthy eating habits, food waste awareness and careers in the food sector. More than 600 children enjoyed a science show and monologues that showed how fun science outreach can be.

5.2.
FROM IDEA TO MARKET: SUPPORTING THE CREATION OF NEW COMPANIES

The creation of new technology companies has been encouraged thanks to the support of private promoters, who have managed to mobilise investments totalling 32 million euros.

Among the most outstanding initiatives supported by AZTI are the following start-ups:

Zambrana BIO-REFINERÍAS

Valorisation of wine by-products for the production of bioethanol and high-value bioproducts.

Partners: Destilerías y Biorefinerías Zambrana and AZTI

Investment: 32 M€

Lipiwell

Personalized nutrition service based on biomarkers that connect metabolism with nutrition in real time, with the aim of improving people's well-being. It will begin operations in 2025.

datafish

Digital platform for collecting, analyzing, and visualizing fisheries data in real time, improving the sustainability and management of marine resources.

Partners:: DataFish and AZTI

Turnover 1,3 M€

Employment: 12 people

ItsasBalfegó

Research and development related to fishing and aquaculture, with the aim of restoring bluefin tuna fishing in the Cantabrian Sea, leading to improvements in social, environmental, and economic sustainability.

Partners:: Balfegó and AZTI

Investment: 2 M€ (1ª fase)

AZTI is also supporting the development of the Basordas Aquaculture Park, which has attracted investments of over 100 million euros for the production of salmon and sole, to be implemented in the coming years.

5.3.
WE DO NOT WALK ALONE: PARTNERSHIPS MAKE US STRONGER

TECHNOLOGY PLATFORMS

Technology and innovation platform

Spanish Network for Life Cycle Analysis

European Global Ocean Observing System

Spanish Technology Platform

European Fisheries and Aquaculture Research Organizations

Spanish Aquaculture Society

Spanish Technological Platform for Fisheries and Aquaculture

STCEF: Scientific, technical and economic support for the Common Fisheries Policy

FLW: Platform on Food Losses and Food Waste

Food Innovation Community

5.3.
WE DO NOT WALK ALONE: PARTNERSHIPS MAKE US STRONGER

FORUMS

Spanish Agency for Food Safety and Nutrition

Basque Food Cluster

Bio-Based Industries Consortium

Basque Energy Cluster

European Food Safety Authority

Basque Maritime Forum

Spanish Association of Sensory Analysis Professionals

European Association of Research and Technology Organisations

West European Fish Technologists Association

European Association of Surimi Producers

INDAGA

Thematic network on Innovation, Research and Development applied to gastronomy

5.3.
WE DO NOT WALK ALONE: PARTNERSHIPS MAKE US STRONGER

OUR ECOSYSTEM

One more year at the service of a healthier and more sustainable society... because today, more than ever,

the answer lies in science.

MEMBER OF
BASQUE RESEARCH
& TECHNOLOGY ALLIANCE