We transform science into sustainable and healthy development for society today and in the future







Contents

AZTI in a changing world	4
Major challenges, sustainable solutions	10
The food value chain	14
Key 2018 results	16
Revitalisation of the industrial and social fabric	18
Scientific Excellence	22
Safe, sustainable and healthy food	26
Sustainability of the seas and of their resources	30



AZTI in a changing world

The growing population and income per capita are giving rise to a global food revolution, converting it into a strategic resource. In agreement with the population projections to feed the almost 10 billion people, estimated to be living on the planet by 2050, a 70% increase in annual food production will be required with respect to the current production.

Sociodemographic changes

The population growth also entails **important sociodemographic changes.**

The world of the future will, above all, be urban, where **lifestyles become homogeneous and we, people, become more sedentary,** spend less time cooking and buying food, seeking, above all, comfort and health.

In an urban world, there will be **more** homes, which will be digitally connected, older and smaller; there will more older people who live alone, more people with chronic diseases and also a higher percentage of healthy elderly people; couples will start families at an older age and have less children; there will even be more couples who decide not to have children, which will cause an increase in single-parent units. This will entail smaller formats, purchasing methods, packaging, and new, different distribution channels where an omni-channel approach will become more and more prevalent.

Obesity will increase and 30% of the world population will have this serious health problem, triggering multiple diseases such as diabetes, arteriosclerosis, etc., all of which will have a considerable impact on health expenditure.

Life expectancy will continue to increase. The number of people over 65 continues to grow (today more than 560 million, in 2030 more than 1 bilGlobal demographic trends, such as population growth, the growing middle class, population ageing and urbanisation, increase the demand for food and modify consumer patterns. Consequently, this places greater pressure on natural resources.

lion). However, the constant increase in life expectancy is "limited", mainly due to obesity and other health-related diseases. In industrialised countries, 75% of deaths of people over 65 are caused by cancer and cardiovascular diseases, both of which are strongly related to food and lifestyle.

Collaboration between Health and Food will increase and in the future they will form an indissoluble pair.

Major challenges and needs of the production system

These changes are giving rise to major challenges and needs to transform the current food production systems.

1.25 billion hectares of fertile land, 3 times more than those available today, will be required to feed the growing population. Land that does not exist and that will entail the **destruction of natural habitats.** Likewise, the world per capita consumption of fish will increase and the demand will be difficult to satisfy as **the majority of the**

Climate change will bring about alterations in the ecosystems of both land and sea, which, in turn, will lead to water shortage and land scarcity, thus affecting food production; and subsequently, increased prices of raw material. Add in the fact that greenhouse gas emissions must be reduced, and adaptations made to the changing climate and resource limitations. This will lead companies from the food value chain towards "circular business" models that promote a more efficient and sustainable production.

natural marine resources are at their maximum sustainable yield.

Climate change will bring about **dramatic alterations in land and sea ecosystems.** New migration patterns, changes in primary production, the appearance of and substitution for new species; in short, great pressure will be generated on natural resources, especially, on those resources, like fish, that are caught in wild state. The water scarcity in the future and the additional implications of climate change will require a more efficient use of this scarce resource, as well as improved management of climate risks in food production. Vulnerabilities to extreme events will also have to be identified and reduced.

Faced with this scenario, it is important to highlight that the price of raw materials will increase, and access to them will be strategic; **food will be a strategic resource like energy.** This will cause an increase in the policy of purchasing fertile land, fishing rights and access to natural resources by countries and private companies, to guarantee the food supply. This tendency will increase, and it is one of the lesser-known aspects in today's conflictive geopolitics; the race towards the acquisition and control of fertile land on the planet by consolidated



FOSTERING HUMAN HEALTH THROUGH THE SUSTAINABILITY OF THE OCEAN



* Figura obtenida de: Fleming, L. E., B. Maycock, M. P. White, M. H. Depledge, 2019. Fostering human health through ocean sustainability in the 21st century. People and Nature: 10.1002/pan1003.10038.

or emerging powers, showing what is going to be a key factor in 21st century international relations. These geostrategic movements are also entailing the purchase of large American and European food companies by capital from these emerging countries. The food sector is and will be, in coming years, one of the most active sectors in capital flows, to guarantee the supply of food. Europe, Spain and the Basque Country are no strangers to these European movements and companies, especially leading technology companies - those that have quality products and control access to scarce raw materials - will be the target for investment funds.

Demographic changes are very important in terms of how we produce, distribute, market, prepare and consume food. Today's **system is not at all efficient, and a third of the world food production is wasted.** The production and distribution of food generate 25% of CO2 emissions, and use 70% of the world's drinking water, with a considerable ecological impact. The UN has promoted 12 measures to try to change an unsustainable system in the mid-term, which is responsible for 60% of the global loss of biodiversity.

Another variable that will continue to grow is the percentage of **people who are increasingly aware of the more sustainable production systems** that ethically respect animal well-being. The market share of vegan products today has reached 7.8% of people over the age of 18 who live in Spain. Veggies diets are a nutritional option of the new middle classes, and one of their main motivations, apart from health, is their rejection of animal abuse. The large retail sector is highly concentrated. For instance, in Spain,

three main operators own more than 50% of the market share, and five concentrate more than 70% the total activity volume: the bargaining power and decision-making capacity that they have in terms of purchases is unbeatable. In this reality, we also have to start from the context that the volume of consumers is stagnant, the number of intakes in the home is not growing, and the distribution brand is the main channel to reach the retail market. Consequently, penetration is the only leverage to grow, offering customers more consumer moments and greater added value. However, the large retail sector continues in a battle to gain market share and compete for prices. Commitment to efficiency is leading companies, which do not control raw materials. to seek replacement products and place the product quality at risk. This tendency could increase in the future, so the controls carried out by the administration must increase to guarantee the security and defence of citizens' rights.

Process efficiency and added value differentiation

Consequently, the only leverages that SMEs have to be able to compete are process efficiency and added value differentiation in products. This is where innovation and technology become one of the main levers to compete. The food value chain will be one of the most innovative areas in coming years.

New food production methods will be developed as a result of the revolution that biotechnology is experiencing.

Innovation and technoloav become one of the main channels to compete. leveraged on factors such as biotechnoloav, aene technologies, and the integration of ITCs into production, logistics and commercialisation processes, as well as an evolution towards other sectors such as tourism, gastronomy or health. Specialisation and innovation in their broadest sense – both technological and marketrelated – are the guarantee for the future survival of companies from the sector.

This will permit the production of meat and fish protein, functional ingredients and other nutrients via bioprocesses, new gene technologies to improve the production of milk, meat or fish, and new, more productive and pest-resistant vegetable varieties, or with nutrients with specific functional properties. New cultivation techniques that permit the introduction of new characteristics. or efficiently modify already existing ones, vertical soil-free farming, closed system and Offshore aguaculture, as well as other more efficient food production methods that require little water and soil. The integration of ITCs into production, logistics and marketing processes are already representing important advances in process efficiency, leading to the use of less fertilisers, water, agrochemicals, antibiotics, the generation of fewer losses and by-products, more efficient logistics, more traceable and safer processes, more consumer-con-



nected food, and many other unimaginable features a few years ago.

However, today we are just seeing the tip of the iceberg of what the new advanced production systems will be like in the food value chain. **Investing** in these developments will be a differentiating factor for countries to be able to have an advanced and efficient system. They are also going to help to make the sector more attractive, favouring generation takeover and attraction of talent.

Food: a sector with an important economic weight

In addition to the geostrategic movements that are taking place to guarantee the supply of food in the future, the food sector is a sector with considerable weight in the global, European and Basque Country economy. With a turnover of 1.24 trillion Euros, it is the main manufacturing sector of the EU, providing 44 million jobs. The hallmark of the sector is that 99.1% of the companies are SMEs with 63.3% employment in the sector and 49.6% turnover. Food is a value chain whose scope goes from the primary to the tertiary sector, and cuts across other economic sectors. In its broadest

sense – including primary production, food industry, food trade, restaurant and group sector, gastronomic tourism and food transport – it represents 10.7% of the GDP and gives direct employment to 96,000 people in the Basque Country.

The Basque Country is a small nation, with no natural resources and with little control over the production of raw material. Only a small proportion of the territory is arable land, and the orographic conditions are not very favourable. Our capacity to generate resources is based, almost exclusively, on our ability to innovate, and the productivity of our people and our companies. Specialisation and innovation. in their broadest sense (technology and market), are essential to generate value; they guarantee future survival, as it will be necessary to adapt quickly to the continuous global changes that are occurring, and that will occur, in coming years. Cooperating to compete under the value chain concept will be essential and a guarantee of success, as it is there where the strengths lie, to position ourselves globally from a local level, from guality food production to top class global gastronomy. This will enable us to develop a unique and attractive ecosystem for new investors, to position

Specialisation and innovation, in their broadest sense (technology and market), are essential to generate value; they guarantee future survival.

ourselves with a reputation based on quality and innovation, to attract companies and start-ups, to retain and attract talent and capital.

It is in this changing and challenging environment where AZTI positions itself as a scientific and technological organisation, with a global vision and presence to act locally, where the values of excellence in results and proximity to our customers' and society's current and future needs are the levers that we use to make our Vision come true: We transform science into sustainable and healthy development.

Our contribution

The UN Sustainable Development Goals

SDGs provide the global community with a roadmap on how to combat world challenges related to economic, social and environmental sustainability.

At AZTI, we are **committed to the major challenges faced by mankind,** and we believe that we can play a key role in SDGs 2, 3, 12, 13 and 14, which are closely aligned with our approach towards sustainability and health.

We contribute to the sustainability of life on the planet, and to improving the health of people, with companies and institutions willing to assume challenges, creating new, innovative solutions that generate sustainable value by means of new products, businesses and policies.





Major challenges, sustainable solutions

At AZTI, we are committed to the major challenges facing mankind. Therefore, we work on developing sustainable and healthy solutions in different fields of application, with which we aim to address the challenges we face.





Climate Action

Adopt urgent measures to combat climate change and its effects

At AZTI, we are researching the effects of climate change on the ocean, coast and marine resources, defining adaptation strategies to these effects and establishing mitigation measures, turning this global challenge into an opportunity to be explored. This commitment is transferred to AZTI's work in the following fields:

Climate change



management



Health and Well-being

Guarantee a healthy life and foster well-being for everyone at all ages

At AZTI, we understand that food is key to improve life quality and prevent diseases. Therefore, we use precision nutrition for the innovation of products, providing solutions for a personalised diet. This commitment is transferred to AZTI's work in the following fields:

- Biotechnology-based products
- Food integrity and safety
- Food and health
- Consumer behavior

Responsible production and consumption

Guarantee sustainable consumption and production models

At AZTI, we foster the innovative power of companies, designing social, economic and environmentally sustainable solutions that motivate and inspire society to live in a more responsible way, which is translated into greater sustainability and increased general well-being. This commitment is transferred to AZTI's work in the following fields:

- Efficient and sustainable food chain
- Consumer behaviour
- Sustainable fisheries management



azti tecnalia

Zero Hunger

End hunger, obtain food safety, improve nutrition and foster sustainable agriculture

At AZTI, we focus on searching for innovative solutions for the food value chain which lead to better nutrition for people and the increased sustainability of the food we consume.

- This commitment is transferred to AZTI's work in the following fields:
- Biotechnology-based products
- Food integrity and safety
- Consumer behaviour
- Sustainable fisheries management
- Efficient and sustainable food chain





The food value chain

The value chain perspective helps us to identify what we, at AZTI, can do to boost the circular economy (reduce, reuse, refurbish, repair and recycle)







SUSTAINABLE ECOSYSTEMS

We work to conserve and use the seas and their resources from an **integrated perspective** (physical, ecological and socioeconomic characteristics of the marine environment and its interactions).

PRODUCTION

We generate solutions, products, technologies, tools and strategies geared towards guaranteeing the most efficient and sustainable sea-origin food production, as well as the development of new, more competitive and sustainable conservation and production processes in the food industry.

TRANSFORMATION

Our research is orientated towards the efficient use of resources; to increasing production efficiency and cost saving; to reducing losses, rejects, food losses, food waste, by-products, waste and discharges in origin; to assessing and decreasing the environmental and social impact of products, processes and food facilities throughout their whole lifecycle; and to integrating the circular economy, making the most of underutilised resources.



MARKETING

With the user-consumer in the centre, we **pay attention to the consumer's needs, tendencies and expectations,** applying this knowledge to the generation of innovative solutions. Further, we monitor relevant information (technology, regulations and legislation, products and market, competitors, etc.), so that the companies are updated and can take data-based decisions.



The applications that we generate for

the food industry and the HORECA

sector go from the chefs' creativity,

logical knowledge, continuing right

through to the end product. These

lation sectors, with nutritional and

products can focus on specific popu-

health profiles that adapt to specific

pathologies or other needs demanded

by today's consumers, such as conve-

nience, enjoyment and pleasure.

to the researchers' scientific-techno-



CONSUMERS

Our work entails discovering and keeping ahead of the market and consumer demands. Our **research approach connects to the consumer from the start,** enabling R&D&I to be addressed more efficiently and in a more profitable manner.

We generate value

By giving advice to public and private administrations, it is possible to achieve the sustainable management of the marine environment and of its natural resources, conserving the sea wealth (species, habitats, spaces, processes).

We generate value

Making efficient and sustainable use of the resources, affording value to the product, and increasing process efficiency, we encourage short-term competitiveness, and long-term economic, environmental and social sustainability in the entire food chain.

We generate value

We promote the addition of value to products, and greater efficiency of products and processes, all of which are key aspects in the competitiveness of companies.

We generate value

We keep ahead of the threats and opportunities of our customers' competitive environment, affording them value in market niches and new business opportunities that result in successful products and market solutions.

We generate value

HORECA

The interaction between science, technology and gastronomy, together with knowledge of the market and consumer needs, enable us to design and generate new food product proposals, improve already existing ones and exploit new market opportunities.

We generate value

With our services, companies increase the value and differentiation of their products and services, they connect to the consumer, and in short, they innovate more quickly, more efficiently and more sustainably, in agreement with today's demands, and keeping ahead of future demands.

Key 2018 results



People on our team



57% Doctors on our research staff



247

Customers who placed their trust in us in 2018



Women on our team



The number of living **projects** in 2018



Our customers' **average evaluation** (over 6)







1.016

Indexed **publications**



Jobs generated in the NTBCs promoted



In the top 10 of the world's best institutes in the **scientific production quality** index, in our fields of knowledge and specialisation*



Indirect jobs promoted

*One of our researchers is on the exclusive list of highly cited researchers worldwide

AZTI - MEMORIA 2018



At AZTI, we contribute to innovation, value creation and to an increase in competitiveness in the public and private sectors. To this end, we transform knowledge into business opportunities and we commit to collaboration with companies as the main path to transfer the results to the industrial fabric. We achieve this by granting licenses and creating new technology-based companies, developed as part of our research activities.

Noteworthy are the considerable number of innovation projects carried out by us to generate new knowledge, products and services in areas such as protection of the oceans, sustainable fisheries management, new food preservation technologies, healthy and convenience food.

On the other hand, the food and beverages industry is an essential motor for our economy, with the addition, today, of a wave of start-ups, which are causing an authentic food revolution. A movement that many see as the next great global business; according to *Research and Markets*, the global food-tech market will exceed 250 billion dollars in 2022.

Consequently, at AZTI, and in the context of the European initiative, EIT Food, **we back innovative people and food sector startups**, so they can have a high impact on the agri-food sector. Within this framework, we participate in different training projects with students and entrepreneurs, as well as in incubation and start-up acceleration programmes, in order to promote business projects that are able to respond to the global food challenges.

Partners of:

Revitalisation of the industrial and social fabric





Transferring results to the food sector

Over the last fifteen years, AZTI has promoted and participated in the capital of the following technologybased companies: Bionor, Agrocommerce. Ondartxo Arrainak. Oceantec. NFS, Roboconcept, Iparprest and Matxitxako Moluskoak. The creation of these companies has represented an investment of over €40 M, and has generated 124 direct jobs. Further, based on the developments carried out by AZTI, we have helped to create, from zero, but without participating in the capital: Naturber, Paturpat, Be&Be, Wild Pilot Foods, Naia and IM Solutions.

In 2018 AZTI has collaborated with Lantegi Batuak, an organisation that focuses on incorporating disabled people into the labour world, **creating Naia**, a new company that markets ready-to-eat salads and fresh vegetables, supplied by 7 organic farms. In a first phase, NAIA has generated **14 jobs for disabled people**, and in two years, it plans to increase the number to 20.

Together with the investment group, TGT, AZTI has contributed to the industrial implementation of a **dairy product processing plant** in Carranza, with an investment of around 20 million Euros and the **creation**, **for the moment**, **of 50 jobs**, which will increase to 90 when production reaches full capacity. This is a considerable boost for the Basque dairy sector.

We have collaborated in the creation of the company Accua HPP Solutions, a processing centre that offers food SMEs high pressure technology-based processing services. As a result, innovative products have been generated, permitting, too, the export of certain food products or increasing their commercial life with a longer presence on cold shelves, and a lower turnover rate due to returns.

Offshore aquaculture. an opportunity to diversify the activity of the fisheries sector

The research carried out by AZTI in matters related to the breeding and marketing of mussels has resulted in the creation, in 2018, of the company **Matxitxako Moluscos, S.L.** in Mendexa (Vizcaya), a new open-sea industrial implementation business project.

This initiative, which is the result of the R&D actions developed within the Basque Government's 'Strategic Fishing and Aquaculture Plan. Euskadi 2020', has emerged with the objective of promoting employment in the fisheries sector, a sector that has a strong tradition in the Basque Country, and to generate new locally-produced high-demand seafood, with great brand potential.

There is another initiative, in addition to this sea park of Mendexa, which is on the mainland: the aquaculture research and production centre of **Balura**. AZTI has conducted a study where it has verified that the former nuclear power station of Lemoiz, an industrial coastal space that has been vacant for several decades, has some exceptional conditions for aquaculture.



Incubation and acceleration of start-ups

EIT FOOD BASQUE has been created in the framework of the strategic programme, European Institute of Innovation and technology, EIT FOOD, within the southern node. This initiative seeks to develop the entrepreneurial and innovation axes of the food value chain. This will entail the execution of actions related to the incubation and acceleration of start-ups in the Basque **Country** over the coming years, with the participation of up to a total of 60 new enterprises.







Our research team has become an international reference as a result of their high scientific quality, combined with the application of their research results. An example of this is that the Basque Government has acknowledged the research work and scientific merit of **two AZTI experts**, Naiara Rodriguez Ezpeleta and Angel Borja, **out of the 21 researchers of the Basque Science and Technology Network**.

AZTI researchers represent 10% of the *Scientific, Technical and Economic Committee for Fisheries* (STECF), a scientific committee of experts that advises the European Union in fishery-related matters. Ours is the **research centre with the highest representation** on this committee at a European level.

AZTI scientific personnel participate or head different scientific committees in the Regional Environment and Fisheries Management Organisations, especially in those that deal with the most important fisheries for the Basque fleets. They highlight the **scientific presidency of the IOTC** and their work as European scientific coordinators before the fisheries management organisations, ICCAT, IOTC, IATTC and WCPFC.

Our research personnel also participate in the Scientific Committee of the European Environmental Agency, in the executive board of the European Association of Environmental and Resource Economics (EAERE), in the European Sensorial Science Society and in the European Food Safety Association.

AZTI has also been required by the Secretary General for Fisheries to give advice on the impacts of the new European regulation on discards.





High impact publications

The number of scientific publications remains at around **90 indexed publications per year.** In terms of quality, the number of citations continues to increase on a regular basis, exceeding 20 citations per publication. Publications in high impact journals such as **Nature Communications** are worthy of note.

Angel Borja, an AZTI scientist, now forms part of the list of *Highly Cited Researchers*, that is, he ranks in the top 1% of citations in his field at a worldwide level.



AZTI - 2018 REPORT

Innovating with the best

The quality of AZTI projects is reflected in the results obtained in the calls they apply to. Thus, in the report on Participation of the Basque Country in the European research and innovation project financing programme, **HORIZON 2020** (H2020), AZTI appears in **11th position of all the Basque entities** that have participated in this programme, and the one that has achieved most returns. Regarding the ranking of all the agents of the Basque Science and Technology Network, it is in sixth position.

Within the framework of H2020 projects, AZTI collaborates in a total of 13 projects. Of these, AZTI coordinates a **project to study the ecosystem of** **mesopelagic species,** which includes a total of **22 international partners** and a budget of around **6.5 million Euros.**

Furthermore, an Interreg European Territorial Cooperation project has been achieved. It is coordinated by AZTI, and includes a total of 28 international partners and a budget of around 2.5 million Euros to study the small-scale coastal fleet.

Finally, our **participation in EIT Food** is especially relevant. This is the main European food innovation initiative that works to make the food system more sustainable, healthy and trustworthy. AZTI is a **founding member** of this consortium, which is currently comprised of more than 50 companies, start-ups, European universities and research centres from the entire value chain, which include, among others: Danone, Pepsico, Nestle, Siemens, the University of Cambridge ...

Within the framework of this initiative, AZTI is immersed in around **20 projects (with financing of more than €2M),** whose objective is to develop innovation and entrepreneurship in the food sector.





At AZTI we provide companies with support, from the generation of innovative ideas to their transformation into the food of the future. We are also aware that food is essential to improve people's quality of life, as well as for prevention and for recovery purposes. Consequently, **precision nutrition** provides the grounds for our innovation in healthy products.

Especially relevant is the technical secretariat work carried out by AZTI for the steering group "Food, Territory of Opportunity for the CAPV (Basque Country Autonomous Community)". This function is carried out in coordination with the Vice Ministry of Agriculture, Fisheries and Food Policy of the Basque Government, and in collaboration with representative agents from the value chain. Moreover, the cross-sectoral steering group between Food and Health has been consolidated, allowing for the coordination of research between both areas, and discovering new business development opportunities, placing the focus on people's needs and establish priorities based on the main health problems related to food.

In addition, work continues, in coordination with other organisations and under the leadership of the Vice Ministry of Agriculture, Fisheries and Food Policy, in the deployment and implementation of the Strategic Gastronomy and Food Plan Euskadi 2020. The objective of this Plan is to work and advance in the Ss of Basque food and gastronomy: Safe, Salutary (healthy), Singular and Sustainable (socially, culturally, economically and environmentally).

Safe, sustainable and healthy food



Safer and healthier food

AZTI has participated, in collaboration with food industries, biotechnology companies, and hospitals, in the creation of **solutions against the pandemic of diabetes.** More specifically, AZTI, together with other food companies, is developing healthier products for people with diabetes and pregnant women. The first achievement of the consortium is an early detection test for gestational diabetes.

Moreover, **technological alliances** have continued to be developed, complementing the capacities of our organisation to be able to advance more quickly in achieving the objectives of the Technological and Specialisation Plan, highlighting those signed with **Onkologikoa** and BioCruces in the healthy food area. The results obtained in 2018 include: / New food and products specifically developed for patients receiving chemotherapy treatment, which will help to eliminate the metal taste that these patients usually identify in their meals, and even increase their appetites.

/ The development of a range of protein-based **adapted mastication** products.

/ The execution of software that seeks to create healthy eating habits during childhood, to favour a healthier lifestyle in the future and to avoid chronic diseases in adulthood.

The search for greater **food safety and integrity** has also had results. Noteworthy among the achievements are:

/ The development of a new line of

kits for the genetic identification of species (tuna, cod, panga, hake, anisakis) and for the fast detection of toxic compounds (pesticides, HAP, flame-retardant brominated compounds, perfluorinated compounds, marine toxins).

- / The isolation and culture of marine bacteria producing other bacteria that produce polysaccharides.
- / The isolation of several virus families with antibacterial effect against Listeria monocytogenes.

More sustainable food

We, at AZTI, **foster the innovative power of companies**, designing socially, economically and environmentally sustainable solutions that encourage and inspire society to live in a more responsible fashion, thus translating into greater sustainability and an increase in general well-being.

Among other results to be highlighted is the Sectoral Diagnosis carried out by AZTI research personnel to discover the degree of implementation of different 4.0 technologies, as well as the needs and barriers that exist in this area in the entire Basque food sector. The aim of this diagnosis is to quantifiably and objectively visualise the level of introduction of 4.0 processing in different areas of the business, to help companies to gradually implement these technologies in an integrated fashion, adapted to their needs, and above all, in agreement with the objectives and realities of each of the companies and their value chains.

AZTI scientific personnel have also worked on the **recovery of by-products from the beer distillery sector as a source of raw material for aquaculture.** Less dependence of use on sea ingredients (whose production is starting to be insufficient to satisfy the increasing demand) and the use





In this field, in 2018, it also presented a guide that includes **innovative strat**egies for the recovery of waste generated in the aquaculture sector. The aim, with this guide, is to offer options to the value chain agents of this sector to make better use of the industry's by-products.

In collaboration with EROSKI, AZTI has developed an advanced system for the calculation, information and verification of the environmental footprint of food products in the Basque Country. In addition this initiative has sought to promote the responsible behaviour of consumers and suppliers through some environmental information product guides, which will provide a more effective knowledge of the environmental consequences of their purchasing decisions.



Recognition to food innovation

The European Innovation and Technology Institute (EITI) has granted one of the EIT Awards to the EIT Food 'Improving Trust of Fish Chain' project, acknowledging the most talented agents of the European Union in the fields of entrepreneurship and innovation. The awardwinning project is led by the company, Tellspec, with the participation, too, of AZTI, Microbion (Italy) and Queen's University of Belfast (United Kingdom). The aim of this innovative initiative is to increase consumers' trust in fishery products by developing three monitoring, portable and easy-touse devices, which assess the freshness. nutritional value and identity of white fish in real time, to improve the level of transparency in terms of their marketing.

AZTI - 2018 REPORT

AZTI - 2018 REPORT



Climate change and marine litter are two of the great challenges of mankind, in addition to the unavoidable need to conserve marine life: if we do not intervene on these factors urgently, the consequences in the future could be catastrophic.

The protection of marine areas is fundamental to help to efficiently and sustainably manage fisheries, as well as to reduce marine pollution, and the acidification of the oceans. Conserving and **sustainably exploiting the oceans and their resources is the responsibility of all of us.**

That is why, we, at AZTI, work to start up initiatives that will enable us to analyse the functioning of the marine ecosystem, assessing and studying the environmental management of seas and coasts, knowing the effects of climate change (on the ocean, coast and marine resources), and developing technologies and adaptation strategies that help to improve the conservation of marine life.

Sustainability of the sea and of their resources



Technological development and responsible fishing

The innovation, development and technology transfer carried out by us respond to the need of the marine and coast economy sectors to ensure an efficient use of the resources that will guarantee environmental, economic and social sustainability of their activity.

In order to advance towards a more sustainable fisheries management (in social, environmental and economic aspects), in 2018, we launched the **FL-BEIA software.** This is a bio-economic simulation model that describes the entire fishery system, and that permits assessing the consequences of the different fishery management strategies before they are implemented.

To drive environmental sustainability, we continue, alongside the freezer tuna sector, to implement improvements in the good practice code for responsible seine fishing. **Good practices help in the selectivity of tuna seine fishing** in terms of minimising the impact on the marine ecosystem. In 2018, work has been carried out to progressively replace fish aggregating devices (FADs) for new non-tangling and biodegradable models to be implemented by the tuna companies.

At a more social level, the **advice and support to reach compliance with the certification conditions** has permitted the maintenance of the sardine certification in 2018, and helped to achieve Echebastar certification, - in this case as pioneers in the world -, for fishing skipjack tuna, caught by all modalities of seiners, in Indian Ocean waters.

Finally, in the field of economic sustainability of the sector, we continue

to commit to the application of knowledge in the development of fishing technologies, making the sector more efficient and permitting fishing at a lesser cost. Thus, for example, in 2018, AZTI scientific personnel have fine-tuned a habitat model for albacore that predicts the distribution of shoals of this species, and consequently, recommends where to fish, thus reducing the consumption of fuel and days at sea of the fishing vessels. This model will be integrated into the remote-sensing service of the inshore fishing fleet during the albacore campaign.

Leadership in fishery management

In 2018, we have remained steadfast in our commitment to an important and **strategic international presence** on key scientific committees and forums for the sustainable management of fishery resources of the main species of interest for the Basque fishery sector.

Thus, noteworthy is the presence of AZTI research personnel on the Scientific Technical and Economic Committee for Fisheries (**STECF**) where, with a representation of 10%, we are **the entity with the greatest presence** in the European body.

Remarkable, too, is the value contribution for the sustainable fishery



Selectivity improvement and discard reduction

Once again this year, we continue to work on the research of devices that will help to improve selectivity and reduce discards in the trawling fleet. The use of one of these devices will be incorporated into the Spanish regulation on these fisheries in 2019.

Further, to adapt to the **Compulsory Landing Act**, which came into force in 2019 and that requires fishers to take everything they catch to port, work continues on different strategies to recover by-products from aquaculture and from fishing discards. A guide was published in 2018, using a comprehensive approach to analyse the multiple possibilities and existing recovery methodologies, which can also be adapted to any specific geographic scenario.

management of species such as anchovy, hake, roosterfish and northern

monkfish, northern albacore, bluefin

work has also been carried out in the

presidencies of scientific committees

and international working groups in the different world oceans, as well as

in European scientific institutions and

groups that advise the Commission on

We would also like to point out our

leadership in European projects, such

as, for instance, SUDOANG, a decisive

initiative for the concerted and sustainable management of eels in the

fishery management.

SUDOE area.

tuna and tropical tuna. Important



Bermeo Tuna World Capital

Bermeo Tuna World Capital is a global initiative that promotes good practices and sustainability in the tuna sector. As Technical Secretariat. AZTI has led the creation of this Association, in collaboration with the Basque Government, Bermeo Local Council, the Regional Council of Vizcaya, the Freezer Tuna Vessel Associations (ANABAC and AOPAGAC), the Fishers Guild of Bermeo and the main canning companies of Bermeo. Up to a total of 24 companies and institutions from the entire value chain have been involved in this processing project of the location of Bermeo, and its global challenge to make tuna fisheries sustainable at a global level.

Bermeo **Tuna Tagging Race**, the first bluefin tuna electronic tagging event for angling in the Bay of Biscay, was held within the framework of Bermeo Tuna World Capital in 2018.

AZTI - 2018 REPORT

AZTI - 2018 REPORT



Minimising the effect of climate change

At AZTI, we research to discover the effects of climate change on the ocean, the coast and on marine resources, defining strategies to adapt to these effects and to establish mitigation measures, **transforming this great global challenge into an opportunity than can be exploited.** Based on the threat that climate change and environmental degradation represent for companies all around the world, opportunities related to greater competi-

tiveness can be made use of, resulting in greater growth and development of the companies, which have new markets to explore.

In 2018, we carried on with our work to minimise the effect of climate change on marine resources, natural ecosystems and coastal urban areas. In this line, and in collaboration with IHOBE, we have **led the studies on climate change and its impact on** coastal areas of the Basque Country in the framework of the PIMA Adapta plan. The aim of this plan is to start up projects that will reduce vulnerability faced with the effects of climate change, and it has positioned us as a benchmark for the impacts of climate change on the Basque coast.



Solutions for cleaner seas

At AZTI, we seek solutions to cope with marine litter, especially plastics, a blot that represents a threat, not only for the health of our seas and coasts, but also for our economy and our communities.

Thus, in the case of plastics, we seek alternatives, so that local authorities can intelligently collect and manage marine litter. So, in collaboration with institutions and other research centres, AZTI is leading the LIFE **LEMA project** to tackle the growing challenge of floating marine litter in the Bay of Biscay. Prototypes are being developed within this project to reduce discharges and to minimise their impact on the environment. Consequently, this will contribute to the efficient management of floating marine litter, collecting 100 tonnes of this waste in Guipuzcoa and the Atlantic Pyrenees region.



On the other hand, AZTI is working to develop tools that will permit the assessment and prediction of the environmental impact that the different human activities have produced or may produce in the future on the marine environment, to be able to propose adequate measures and minimise the impacts. In this sense, work continues to improve the AMBI and M-AMBI tools, created within the framework of the sea water quality monitoring work carried out for the Basque Water Agency, URA. These tools are used in many places throughout the world, including all the continents, and countries, such as: New Zealand, China, Mexico, Canada, Chile, Morocco, Algeria, Iran, Arabia, India, the whole of Europe...

A better use of the goods and services of the sea

The ecosystems, and in particular, the marine ecosystem, provide us, among other things, with natural resources for food, regulation of the climate and spaces where recreational activities are carried out; in other words, it provides us with the so-called ecosystem services.

Due to their relevance, and the global intensification of economic activities in the sea and in coastal areas, the assessment of these services is becoming extremely interesting from the marine management and social awareness viewpoint. That is why we, at AZTI, are working on the **Marine Spatial Planning**, based on achieving the best use of the goods and services derived from the marine ecosystem. Among other initiatives, in 2018, AZTI research personnel conducted studies within the framework of the Natura 2000 Network, helping to **identify marine areas to be protected** in the future, off the Basque Country coasts.

We have also developed a tool for the Regional Government of Guipuzcoa, which will allow it to assess future offshore renewable energy development proposals on the coast of Guipuzcoa, and thus be able to respond quickly, based on scientific knowledge of the problem and of the environment (taking all the existing technical, environmental and socioeconomic restrictions into account).





Observing and predicting the behaviour of the sea and of the coast

By implementing marine process monitoring systems in real time, complemented with numerical applications that provide us with predictions on the future behaviour of the sea, we, at AZTI, continue to help to **improve security and efficiency in all the activity sectors of the maritime and coast economy.**

In 2018, our team developed the following solutions, among others:

/ Kostasystem videometric tools applied to the smart management of beaches and the safety of their uses. These tools include an app for mobile devices that permits access of the rescue service, in real time, as well as information on the behaviour of the currents and waves, which guarantees safer bathing for all the citizens.

/ Software to improve the management of marine litter on beaches.

/ A system of cameras and artificial vision to measure the transport of plastics in rivers.

/ A system of buoys equipped with low-cost sensors that permits instrumentalising beaches and other offshore installations for the online monitoring and decision-making of control variables and management.

In addition, the EUSKOOS portal (www.euskoos.eus) was launched in 2018 to disseminate information about the marine-weather network of the Basque Autonomous Community and about the operational products. This website was created to be a reference for sectors such as fisheries, maritime transport, marine leisure and tourism, as the coast and its resources –beaches, cliffs, tidal plains, ports, etc.- have become one of the territory's most important assets.

Worthy of note is that last year, AZTI entered EuroGOOS, the European elite of operational oceanography research, which places emphasis on the quality of our research in this field.



AZTI - 2018 REPORT

Major challenges, sustainable solutions



T. (+34) 946 574 000

E-mail: info@azti.es

(
www.azti.es

Transforming Science into Business

Txatxarramendi Ugartea z/g E-48395 Sukarrieta - BIZKAIA (Spain)

Bizkaia Technology Park Astondo Bidea, Edificio 609 E-48160 Derio - BIZKAIA (Spain)

Herrera Kaia - Portualdea z/g E-20110 Pasaia - Gipuzkoa (Spain)