

The Blue Circular Bioeconomy in the Mediterranean

# ITEM

## "TECHNOLOGICAL INNOVATION FOR THE PROTECTION AND VALORIZATION OF MARINE ECOSYSTEMS"

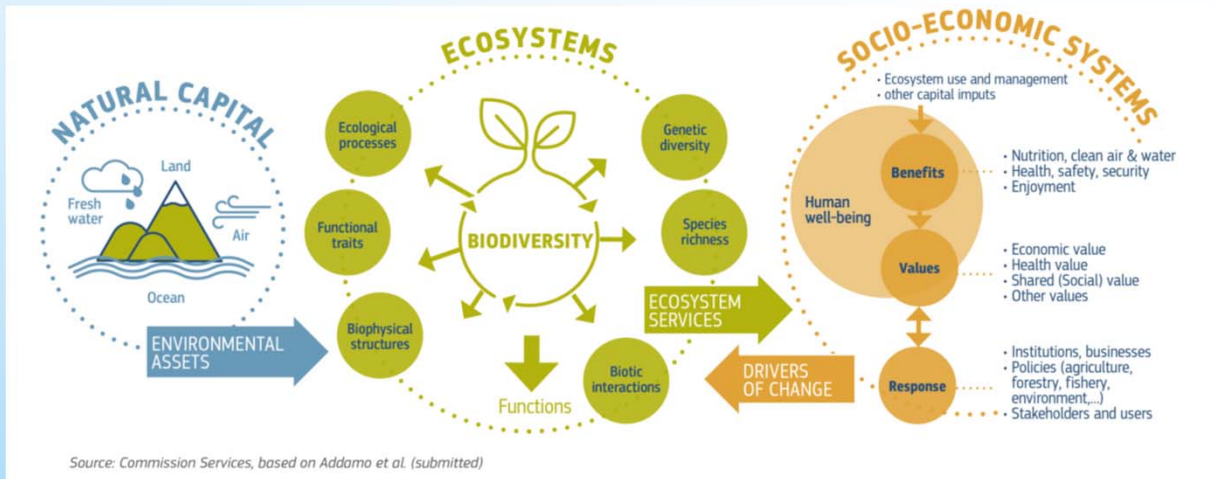
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*Stazione Zoologica Anton Dohrn*



# The EU Blue Economy



**A sustainable Blue Economy allows society to obtain value from the oceans and coastal regions, whilst respecting the long-term capacity of the oceans to regenerate and endure such activities through the implementation of sustainable practices.**

**SUSTAINABLE DEVELOPMENT GOAL 14**  
Conserve and sustainably use the oceans, seas and marine resources for sustainable development

**LIFE BELOW WATER**

<p><b>14.1</b></p> <p><b>REDUCE MARINE POLLUTION</b></p>	<p><b>14.2</b></p> <p><b>PROTECT AND RESTORE ECOSYSTEMS</b></p>	<p><b>14.3</b></p> <p><b>REDUCE OCEAN ACIDIFICATION</b></p>	<p><b>14.4</b></p> <p><b>SUSTAINABLE FISHING</b></p>	<p><b>14.5</b></p> <p><b>CONSERVE COASTAL AND MARINE AREAS</b></p>
<p><b>14.6</b></p> <p><b>END SUBSIDIES CONTRIBUTING TO OVERFISHING</b></p>	<p><b>14.7</b></p> <p><b>INCREASE THE ECONOMIC BENEFITS FROM SUSTAINABLE USE OF MARINE RESOURCES</b></p>	<p><b>14.A</b></p> <p><b>INCREASE SCIENTIFIC KNOWLEDGE, RESEARCH AND TECHNOLOGY FOR OCEAN HEALTH</b></p>	<p><b>14.B</b></p> <p><b>SUPPORT SMALL SCALE FISHERS</b></p>	<p><b>14.C</b></p> <p><b>IMPLEMENT AND ENFORCE INTERNATIONAL SEA LAW</b></p>

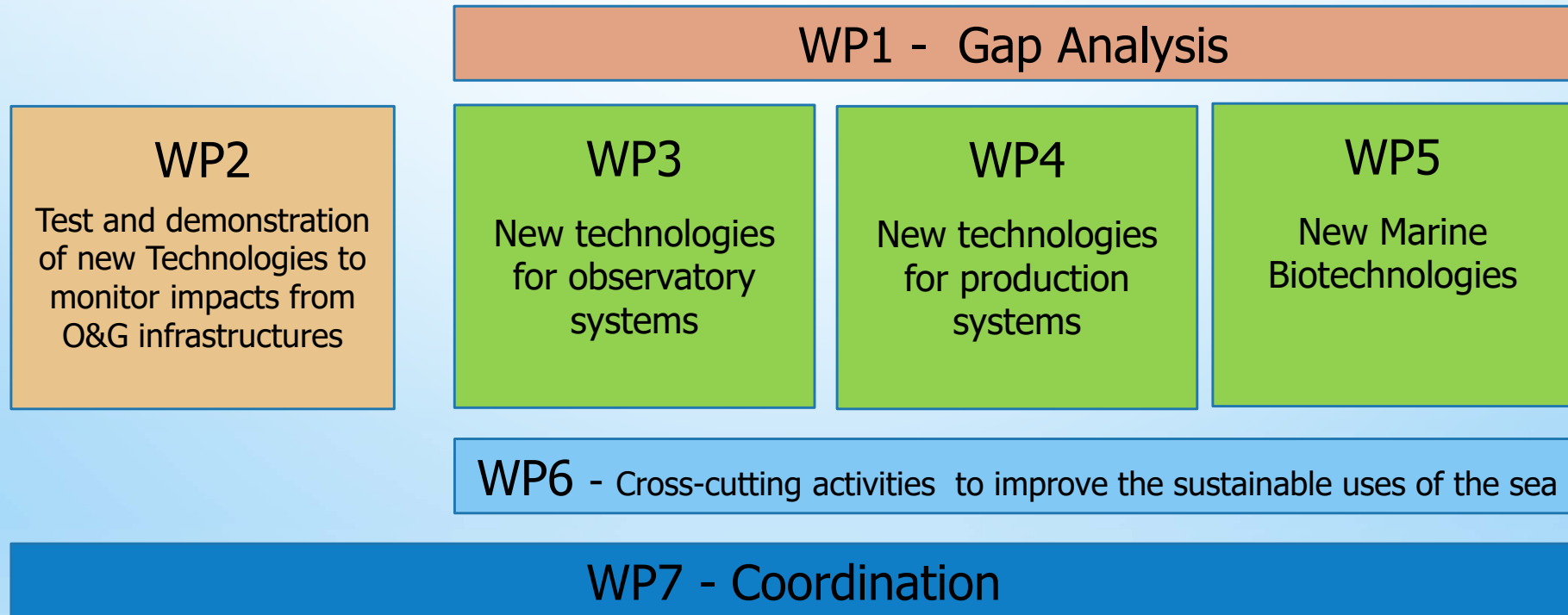


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## ITEM Main Objective

*ITEM aimed to planning necessary actions for the development of new technologies to fill the technological gaps and to validate available technologies for the protection and remediation of marine ecosystems. Commitment to feed and support the consolidation of the National Cluster BIG*



## ITEM



- ✓ 5 Public Research Institutions (CNR, Conisma, OGS, INGV, SZN)
- ✓ 3 Private companies (ENI, eGeos, Italtiotec)
- ✓ 60 Researchers
- ✓ Funded by the Italian Ministry for Research
- ✓ 36 months (11 June 2019 – 10 June 2022)

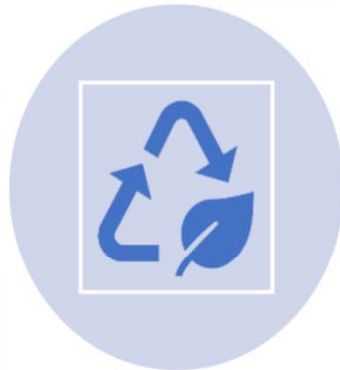
### OUTCOMES

- Provide knowledge for the transition towards new development models and for new policies on the sea and for the sea.
- Connecting activities and results and identifying the potentials of the different sectors, formulating proposals.
- Foster the aggregation of the public and private marine/maritime research community around common visions and objectives.

## Gap analysis and proposals to foster the Italian Blue Growth



**RESTORATION AND  
PROTECTION OF MARINE  
HABITATS:  
INTEGRATED APPROACH FROM  
OBSERVATION TO SOLUTIONS**

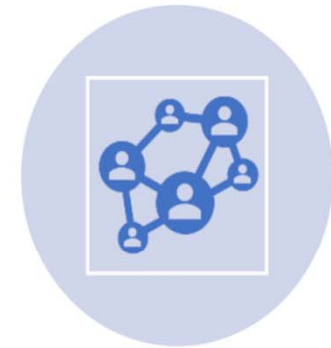


**INNOVATION FOR BLUE  
BIOECONOMY AND CIRCULAR  
ECONOMY**



**DIGITAL & DATA TECHNOLOGIES:  
KEY ENABLERS**

**The Digital Tween of the Ocean**



**TRANSFORMATION AND  
TRANSITION TOWARDS AWARENESS  
OF COASTAL COMMUNITIES ON  
ENVIRONMENTAL ISSUES AND  
CHALLENGES**



# T6 - Blue Biotechnologies

## For human health and wellbeing

*Production of molecules of industrial interest*



*New biotechnologies for pharmaceutical industry*



*Development of new nutraceuticals*



*New biotechnologies for Food Industry*

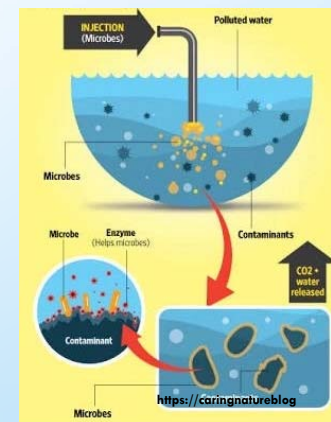


*Development of new biomaterials*



## For environment protection and bioremediation

*Decontamination of polluted areas*



*Restoration and Preservation of the Ocean*

# Companies operating in the Biotechnology sector in Italy.



## HEALTH

Research and development, diagnostics, prevention, treatment (drugs, vaccines, new therapies)



## AGRICULTURE AND ZOOTECHNY

Animal and vegetable production, organic products for the defense of animals and plants, and veterinary



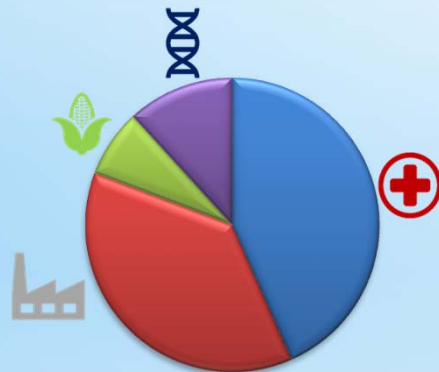
## INDUSTRY AND ENVIRONMENT

Use of renewable biomass for bioproducts and bioenergy, environmental remediation, food applications, nutraceutical, cosmeceutical fields



## GENOMICS, PROTEOMICS AND ENABLING TECHNOLOGIES

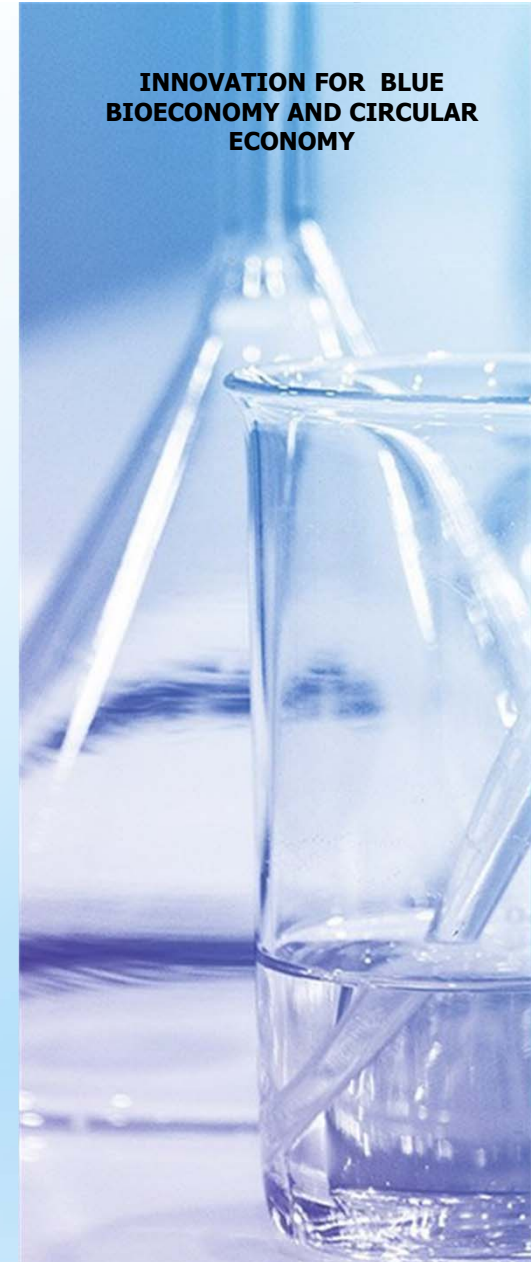
Bioinformatics technologies, systems biology, biosensors and basic research through the use of - omics disciplines



Companies operating in the microalgae sector  
26

- Health, including companies operating in the pharma sector;
- Industry & Environment, including companies operating in the food sector

INNOVATION FOR BLUE BIOECONOMY AND CIRCULAR ECONOMY





## INNOVATION FOR BLUE BIOECONOMY AND CIRCULAR ECONOMY

### Potential sustainable sources

By-catch from fisheries  
By-products from food and aquaculture processes  
Algae biomass (macro and micro)

### Gaps and limits

The still marginal interest in these raw materials and the lack of companies responsible for their treatment prevents the transformation into final products limiting their marketing

Limits in the regulatory and legislative aspects that regulate the management of waste from the fish supply chain and the production and use of marine biomass

### Possible solutions

**Development of integrated biorefineries and bio-based supply chains from the sea.**

**Development of pilot projects on a regional scale to favour the evolution of the rules and legislative aspects**

### Impact

Maximize the exploitation of marine resources, contributing in addition to the sustainability of the fish supply chain

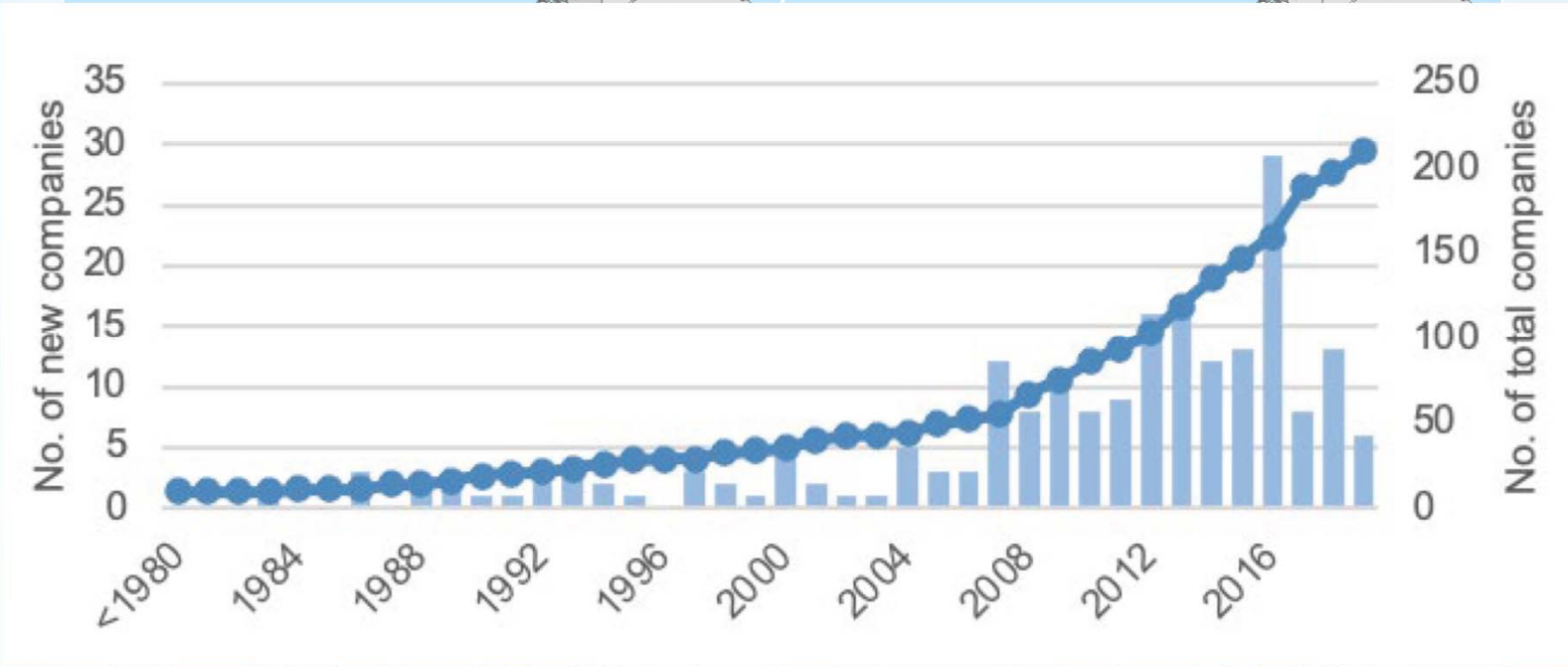
### Recommendations

- Analyse the feasibility of the supply chains, the available biomasses and the techniques capable of supporting the scalability of the processes, which are environmentally sustainable and economically convenient
- Foster the creation of networks between research and industry for the development and application of new technologies for the exploitation of marine resources
- Favour the co-creation of di win-win solutions.



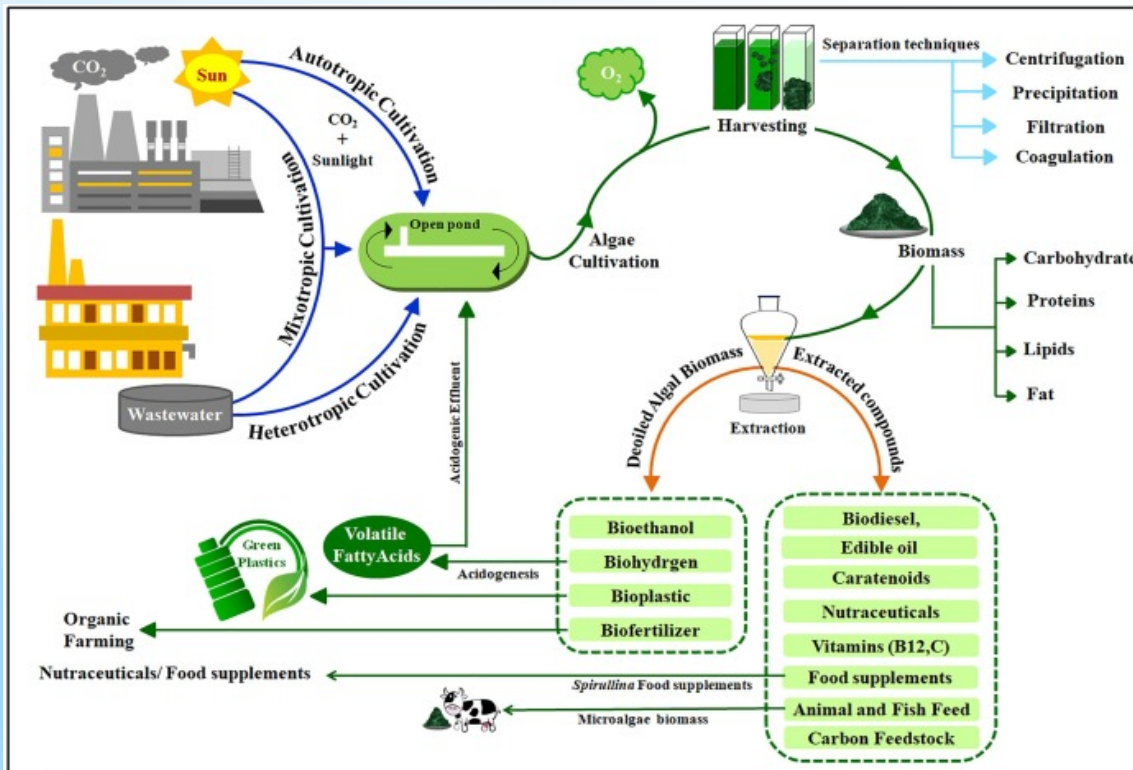


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Araújo et al Front. Mar. Sci., 27 January 2021

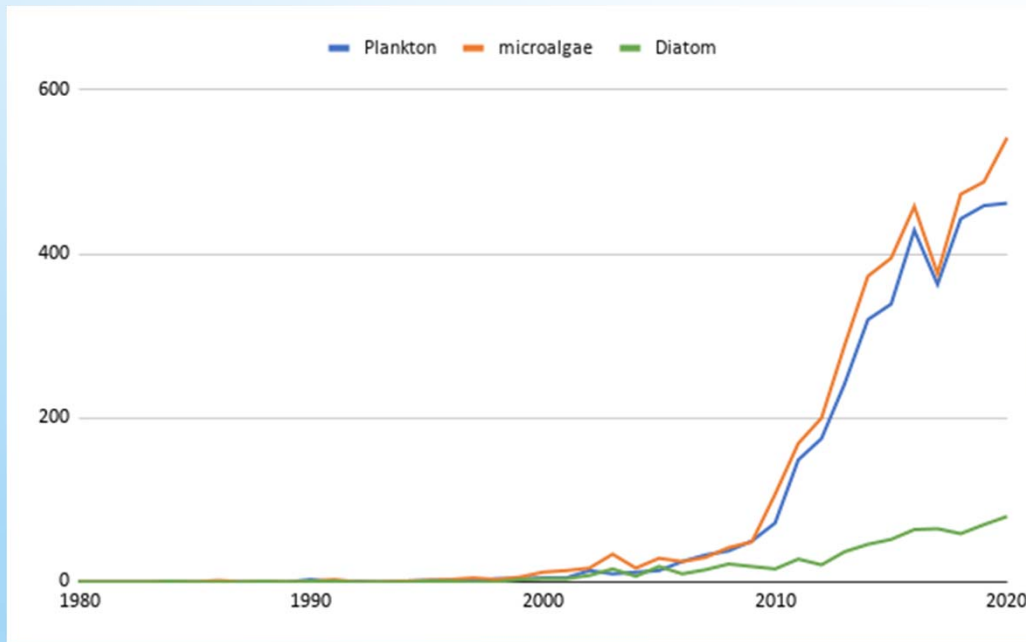
# Microalgae advantages



- ✓ **No competition for land and space**
- ✓ **High yields**
- ✓ **Less water required**
- ✓ **Directly related with CO<sub>2</sub> fixation (1 kg of algal biomass = 1,8 Kg of CO<sub>2</sub> adsorption)**
- ✓ **Flue gas can be used (no CO<sub>2</sub> addition; NO<sub>x</sub> and SO<sub>x</sub> adsorption) (lowering of carbon release in the atmosphere)**
- ✓ **Wastewater can be used (Water recycle)**
- ✓ **No herbicides /pesticides required**

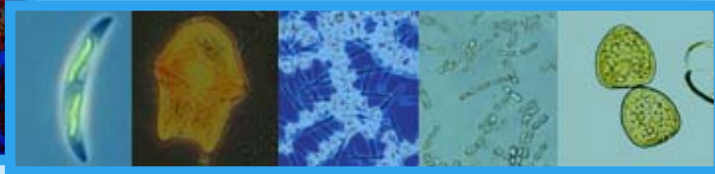
# The biotechnological potential of microalgae

**Number of publication per year (PubMed)**  
 Query: biotechnology + plankton/ microalgae/diatom



**Microalgae species in the production system**

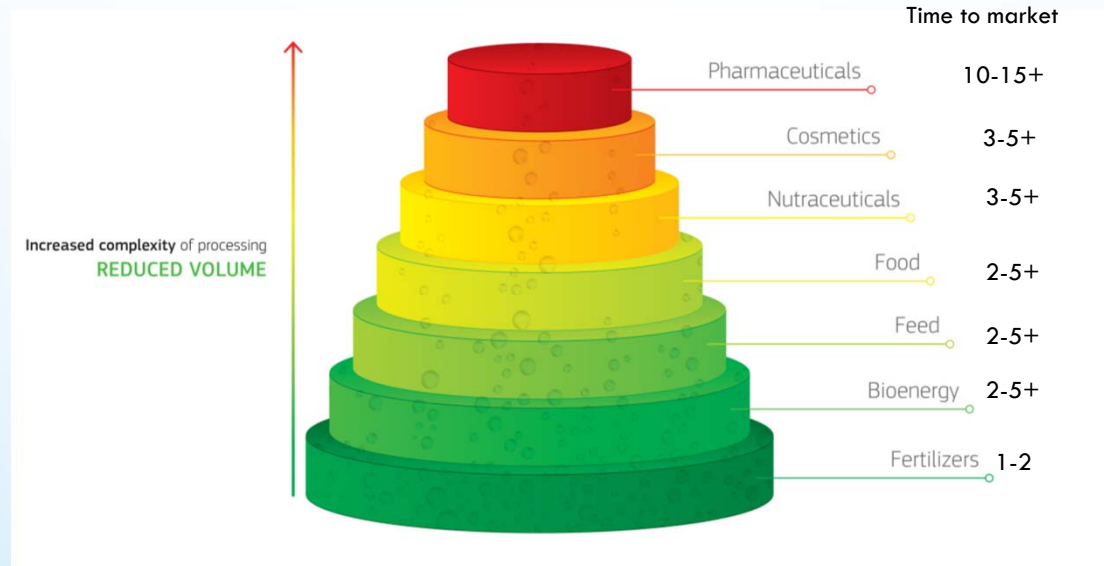




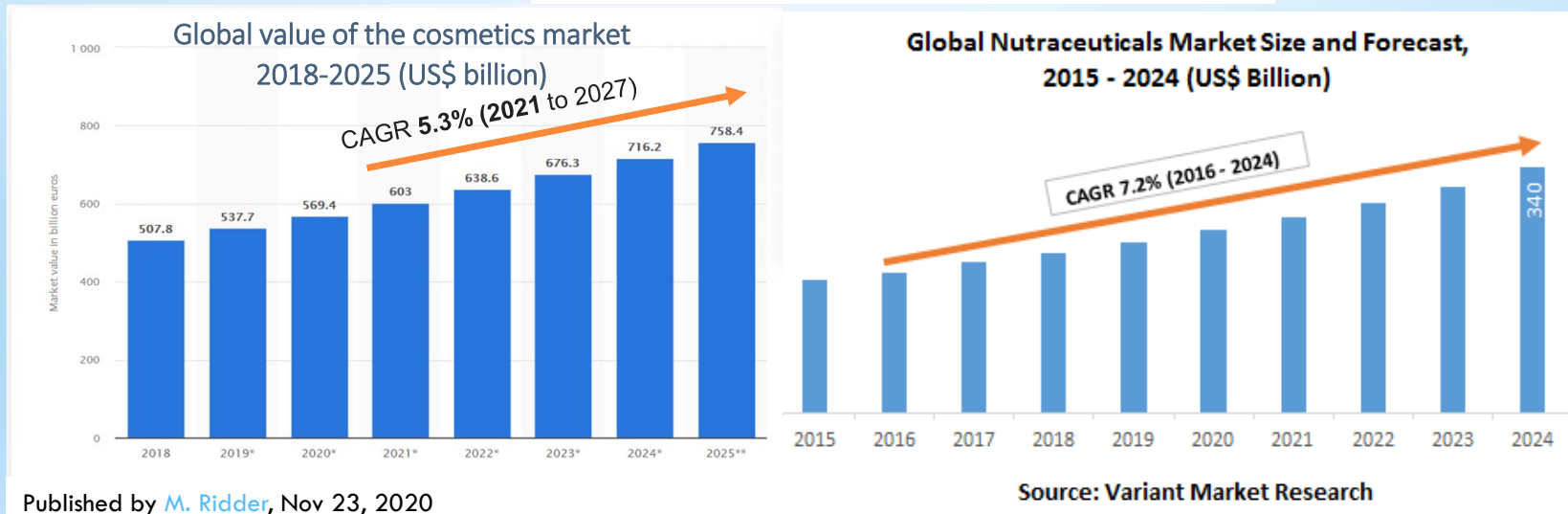
Thank you



## Industrial sectors and Volume-value pyramid.



Source: Blue Bioeconomy Forum: Roadmap for the blue bioeconomy



Published by [M. Ridder](#), Nov 23, 2020

# Key points for the development of Marine Biotechnology in Italy

- sustaining the policy of reusing marine waste will favour eco-sustainable industrial development
- Create new business opportunities fostering the biorefinery approach, through the introduction of new methodologies for the simultaneous production of various active ingredients (eg extraction of oils for biodiesel, carbohydrates for the production of bioethanol, pigments and other antioxidants, proteins for flour to be used in the production of feed)
- Create networks of laboratories on a national level, valorising and enhancing existing skills fostering interactions between different research disciplines
- Collaboration between academia and industry
- Involvement of big industries, to help completing the technology transfer process.
- Ensure specific education and training both in academy and industry
- Address issues related to regulatory barriers
- Creation of databases for data storage and sharing (digitalization)

