



PHYCOMORPH EUROPEAN GUIDELINES FOR A SUSTAINABLE AQUACULTURE OF SEaweeds

Michèle Barbier¹ and Bénédicte Charrier²

(1) Institute for Science & Ethics, Nice, France

(2) Station Biologique de Roscoff, CNRS- Sorbonne Université, France

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SEAWEEDS, GLOBAL PRODUCTION

30 MT/year (+ 5,2 % /yr) 50 countries
1MT harvested 29 countries (2015)

In **CHINA**, in 2015, 13 M tons of seaweed were produced through cultivation, 24,300 tons was harvested from the natural habitat

Indonesia 9M Tons and largest producer of red algae for carrageenan market

Philippines : 1,5 MT third largest producer of the red algae *Kappaphycus* and semi-refined carrageenan,

The republic of Korea produces 1,2 M tons . In 2016, export of *Pyropia* products was 353 million US\$

Europe: 1%

Norway: 13,5% GSW harvesting

Canada - Quebec:
250 T/yr harvested

Northern African coast,
Morocco: red alga

Asia: 97%

North & south America

Western african coasts: Ghana, Senegal, Nigeria

8.1 B€ /yr (+ 6.7 % /yr)

In **Tanzania**, *Kappaphycus* & *Euchema*

In **South Africa**,
Harvest *Ecklonia Laminaria*

Chile: 31,6% GSW harvesting

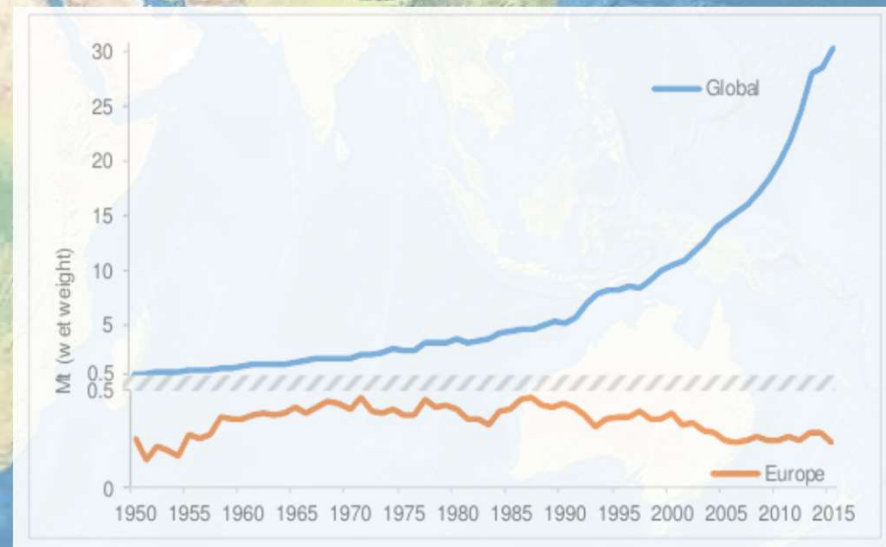
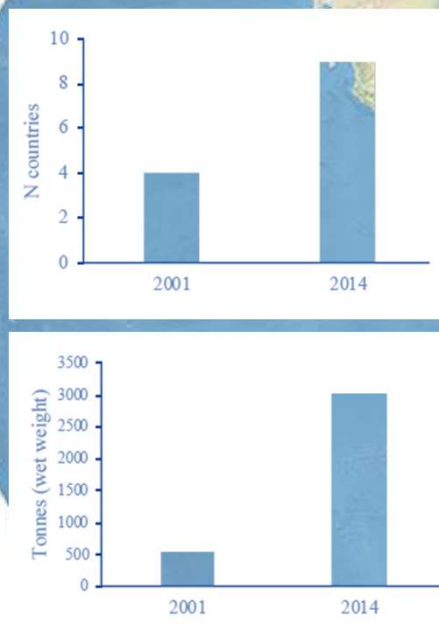


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www.farmAfrica.org

SEAWEEDS PRODUCTION IN EUROPE ONLY 1% OF GLOBAL PRODUCTION



Camia et al., Biomass production, supply, uses and flows in the European Union

SEAWEEDS, Important ecological role

- Support complex food web in coastal system
- Defence role
- Carbon sequestration
- Removal of dissolved nutrient (N & P uptake)
- Removal of ions (petrol, dyes)

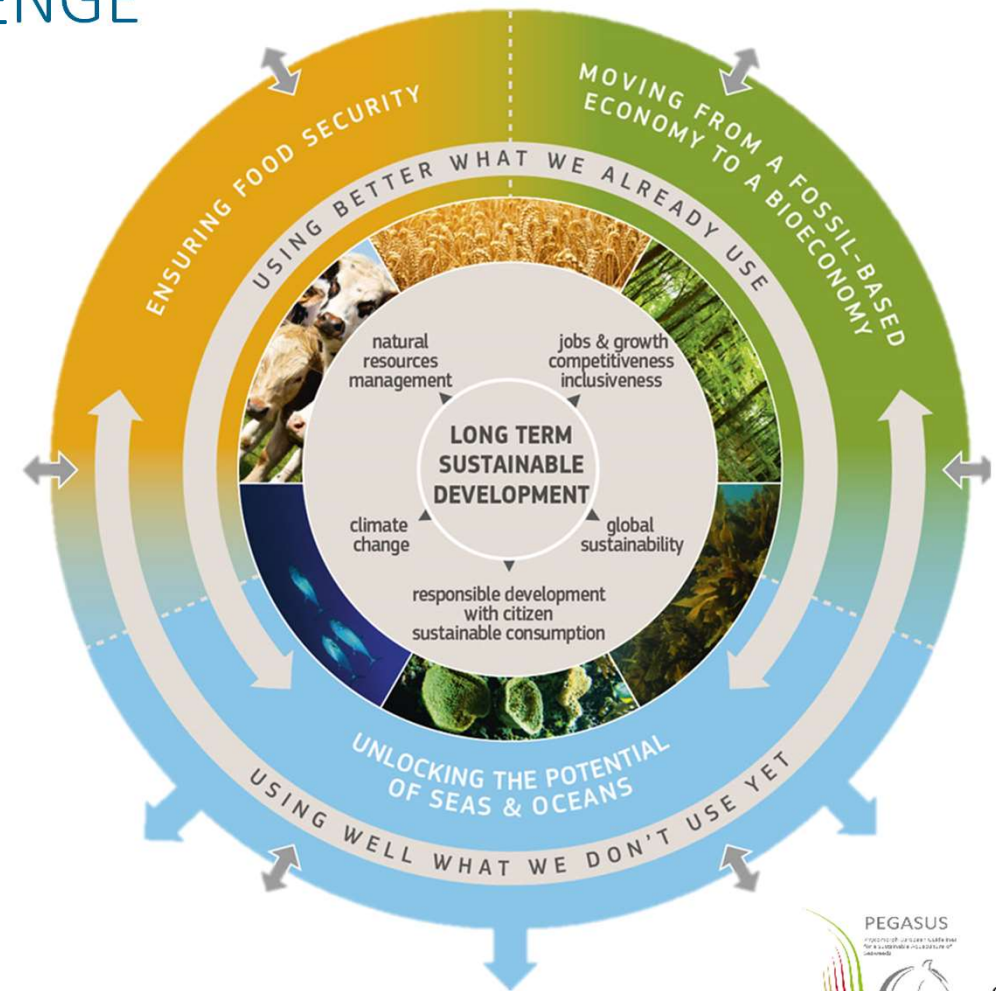


SEAWEEEDS, a source for human needs

- HEALTH & HUMAN WELL-BEING
- FOOD & food processing/additive
- AGRICULTURE
- BIOFUEL
- POLYMER (bioplastics)
- ECOSYSTEM MANAGEMENT



FOOD SECURITY PRESSING GLOBAL CHALLENGE



SUSTAINABLE DEVELOPMENT GOAL 14

Conserve and sustainably use the oceans, seas and marine resources for sustainable development



How to obtain economic and environmental sustainability and competitiveness of primary production and processing industries?

A sustainable management of resources essential for establishing the balance between **economic growth** and **healthy ecosystem** and incentivised by **policymakers**



PEGASUS

PHYCOMORPH EUROPEAN
GUIDELINES FOR A SUSTAINABLE
AQUACULTURE OF SEaweEDS



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COST ACTION
FA1406

Michèle Barbier
Bénédicte Charrier
Rita Araujo
Susan L. Holdt
Bertrand Jacquemin
Céline Rebours

Edited by Michèle Barbier
& Bénédicte Charrier



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SUSTAINABLE SEaweEDS
AQUACULTURE – PEGASUS**

26 FEBRUARY 2019 / 10⁰⁰–12⁰⁰ H
EUROPEAN PARLIAMENT / ASP 3H1

BESINE MEISSNER PRESIDENT OF THE SEARICA-INTERGROUP
RICARDO SERRÃO SANTOS VICE-CHAIR IN CHARGE OF MARINE KNOWLEDGE

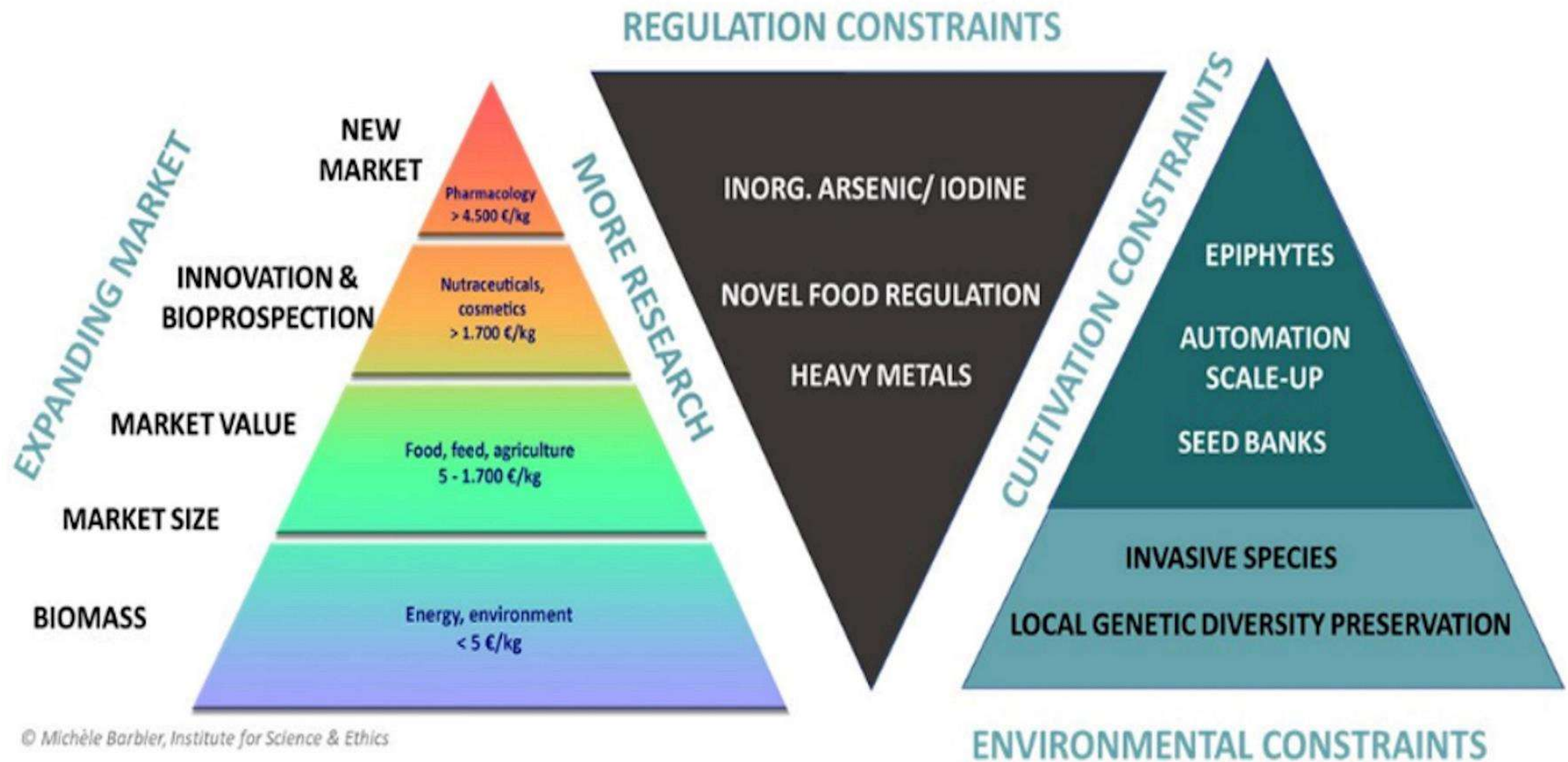
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FOR REGISTRATION AND ACCESS BADGE PLEASE CONTACT
LUCAS.BOSSENG@CPMR.ORG / +33 966 668 425



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PRESERVE THE LOCAL GENETIC DIVERSITY

USE LOCAL – THINK GLOBAL

NO INTENSIVE CULTIVATION

SHARE EXPERTISE

Xbzje6hA



Cultivated strains & cultivation techniques must be adapted to the local environment of the farm

Obtain the best cultivar

Storage of strains

Improvement of strains



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Sourcing

Environmental factors

Cultivation, abiotic and biotic factors

Genetics

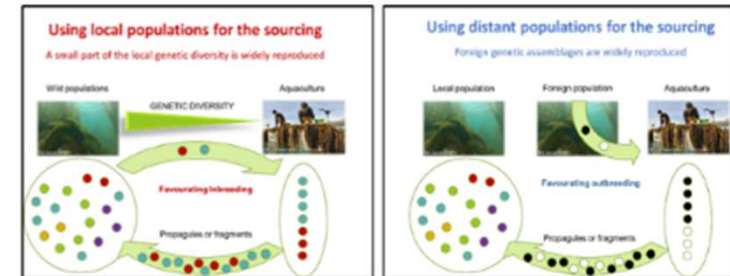
Cryopreservation
Breeding

Controlled fertility

Disease

Risk in the lab, in greenhouse
cultivation, in mariculture

Seaweeds Aquaculture



Environmental impact

Genetic dispersion
Invasive species



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PRODUCTION TECHNIQUES

Controlled conditions

Mechanization and automation,

Reduction in transportation times and volumes



At sea



Open water
Seaweed carrier

EU project At-sea, 2015



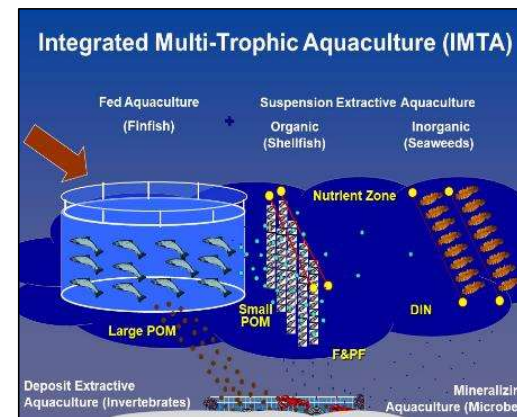
Benthic production
2D textile substrate

EU project SEABIOPLAS

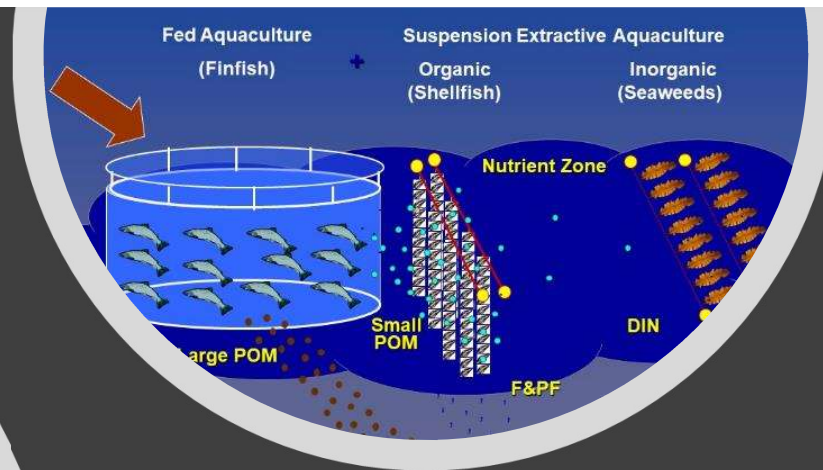


Land-based

Courtesy T. Chopin,



IMTA
Combination of different aquaculture productions (trophic relationship, reduce environmental impact, diverse markets.



MARITIME SPACE USAGE

Need regulatory framework

Acceptability by the society

Sourcing from indigenous species

Consider seaweed reproduction

More research on breeding & selection programmes under controlled conditions

More research on pests & diseases

More research on impact on the environment



Design: Michèle Barbier, Institute for Science & Ethics on [Freepik](#)

Choose best location for cultivation

More research on the biology of seaweeds and gene flow, connection with the environment

Assess impact of introduced species on the environment

Reconsider some regulations on alien species and some European regulations/ directives

HOMOGENIZE REGULATIONS &
UPGRADE LEGISLATIONS



ASSESS BENEFITS- RISKS

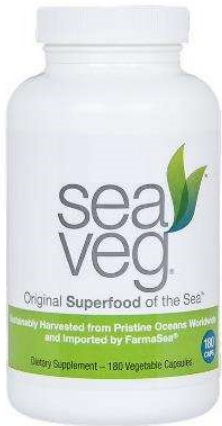
EDUCATE PEOPLE



SEA VEGETABLES: EXPENDING MARKET

- EU Vegan/vegetarian diet, Organic food increase (+ 350% in last 3 yrs)
- Rich in fibers, proteins, low in fat, pigments
- Low Na/K ratio
- Minerals: Na, K, P, Ca, Mg, I, Fe
- Vit A, B1, B2, B6, B12, C, D, E
- Polyphenols

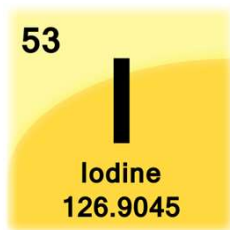
CHALLENGES FOR THE INDUSTRY: REGULATIONS



Update Novel food list with species already on the market.
An official list of all seaweed species (accepted as food before May 15, 1997) to facilitate its use by stakeholders

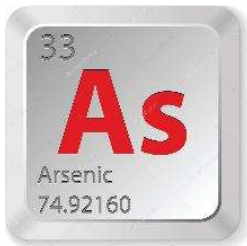
Unclear signals/regulation on the threshold values of different contaminants in seaweeds as food

Update the Arsenic threshold level in legislation (harmful inorganic)



Need for standards and definitions of chemical compound classes, activities, traceability, standards of methods and claim

Definition of Best storage procedures



Industrial classification codes defined by the seaweed experts & industry and put forward to the authorities for food control

Scale-up production and lower its costs

More technological development
Support Investment

Reliable production

More research on the biology of seaweeds and on pests & diseases

Standardization of the product & production line
Post-harvest treatment & storage

ENSURE QUALITY : Quality control, traceability for food, & high level product

Improve the market

Secure food safety

Update legislation
More research on:

- heavy metals, iodine, arsenic uptake
- post-harvest treatment, storage
- risk-benefit analysis

Educate consumers

Implement public consumer panels
Create seaweed flavour words

Diversify the offer

Update the list of novel foods
Cultivate additional seaweeds
More research on domestication
Bioprospection

@Michèle Barbier



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PROVIDE THE BEST SCIENCE TO ANSWER SOCIETAL REQUIREMENTS

COLLABORATE ACROSS SECTORS – SHARE EXPERTISE

CONTRIBUTE TO IMPROVE SOCIAL ACCEPTABILITY



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Responsibility
Resources
Environment
Actions
Stewardship



Sustainability
Stability
Resilience

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*Michèle Barbier¹, Bénédicte Charrier², Rita Araujo³,
Susan L. Holdt⁴, Bertrand Jacquemin⁵, Céline Rebours⁶*

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<http://www.phycomorph.org/pegasus-phycomorph-european-guidelines-for-a-sustainable-aquaculture-of-seaweeds>

(1) Institute for Science & Ethics, Nice, France; (2) CNRS, Station Biologique de Roscoff, CNRS, France; (3) European Commission – DG JRC – Ispra; (4) Technical University of Denmark, Copenhagen; (5) CEVA, Centre d'Etude et de Valorisation des Algues, France; (6) Møreforskning Ålsund AS, Norway;

With the contribution of Helena Abreu, ALGApplus, Portugal; Jaume Alberti, UNESCO Chair in Life Cycle and Climate Change, ESCI-UPF; Isabel Azevedo, CIIMAR, Portugal; Sara Barrento, University of Porto, Portugal; Suzannah-Lynn Billing, Scottish Association for Marine Science, UK; Tjeerd Bouma, NIOZ, Netherlands; Annette Bruhn, Aarhus University, Denmark; Alejandro Buschmann, Universidad de Los Lagos, Chile; Iona Campbell, Scottish Association for Marine Science, UK; Thierry Chopin, University of New Brunswick, Canada; Olivier de Clerck, University of Gent, Belgium; Elizabeth Cottier-Cook, Scottish Association for Marine Science, UK; Alan Critchley, Verschuren Centre for Sustainability in Energy and Environment, Cape Breton University, Canada; Maeve Edwards, Irish Seaweed Consultancy, Ireland; Jan Emblemståg, Norwegian University of Science and Technology, Norway; Aschwin Engelen, CCMAR, Universidade do Algarve, Portugal; Jon Funderud, Seaweed Energy Solution, Norway; Claire Gachon, Scottish Association for Marine Science, UK; Alexander Golberg, Tel Aviv University, Israel; Aleksander Handå, SINTEF, Norway; Jos Heldens, Hortimare, Netherlands; Anicia Hurtado, Integrated Services for the Development of Aquaculture and Fisheries, Philippines; Eun Kyoung Hwang, National Institute of Fisheries Science, Korea; Kapilkumar Ingle, Tel Aviv University, Israel; Leila Ktari, INSTM – National Institute of Marine Sciences et Technologies, Tunisia; Rafael Loureiro, Winston-Salem State University, USA; Adrian Macleod, Scottish Association for Marine Science, UK; Nagwa G. Mohammady, Faculty of Science Muharem Bey, Alexandria University, Egypt; Michéal Mac Monagail, National University of Ireland, Ireland; Valéria Montalescot, Scottish Association for Marine Science, UK; Pedro Murúa Andrade, Scottish Association for Marine Science, UK; Frank Neumann, Seaweed Energy Solution, Norway; Amir Neori, Morris Kahn Marine Research Station, University of Haifa, Israel; Sotiris Orfanidis, Fisheries Research Institute (HAO Demeter), Greece; Hilde-Gunn Opsahl Sorteberg, Norwegian University of Life Sciences, Norway; Shaojun Pang, Institute of Oceanology, Chinese Academy of Sciences, China; César Peteiro, IEO - Instituto Español de Oceanografía, Spain; Ronan Pierre, CEVA, Centre d'Etude et de Valorisation des Algues, France; Dagmar Stengel, Ryan Institute, National University of Ireland, Ireland; Pierrick Stévant, Møreforsking Ålesund AS, Norway; Eric Tamigneaux, CÉGEP-GÎM, École des Pêches et de l'Aquaculture du Québec, Canada; Klaas Timmermans, NIOZ - Royal Netherlands Institute for Sea Research, Netherlands; Julio A. Vásquez, Universidad Católica del Norte, Chile; Florian Weinberger, GEOMAR, Germany; Thomas Wichard, IAAC, Friedrich Schiller University Jena, Germany; Charles Yarish, University of Connecticut, USA, the Global Seaweed-STAR Team and Latin Seaweed network

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Michèle Barbier, PhD
mbarbier@sciencethics.org
Tel: +336 3307 9899



www.sciencethics.org

Founder and CEO, Institute for Science & Ethics,
Scientific officer, the Mediterranean Science Commission

Ethics Expert H2020, European Commission
Co-coordinator of the International Association for Promotion of Geoethics, section France