

# The European Commission's science and knowledge service

## Joint Research Centre

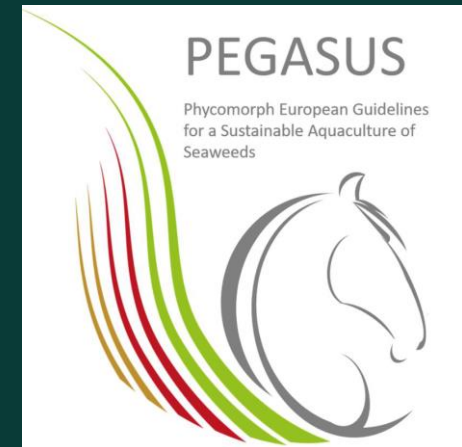


# Phycomorph European guidelines for a sustainable aquaculture of seaweeds

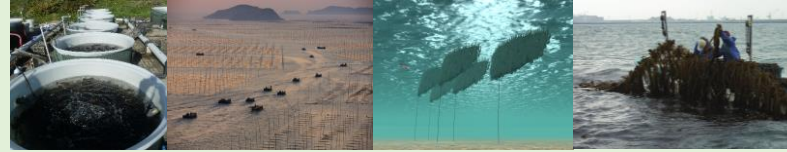
**RITA ARAUJO**

Directorate D: Sustainable Resources  
Water and Marine Resources Unit

Barbier M, Charrier B, Araujo R, Holdt SL, Jacquemin B, Rebours C



# SEAWEED AQUACULTURE



## ECOLOGICAL and ENVIRONMENTAL IMPACT

- Nutrient removal
- Increase sedimentation
- Risk introduction non-native species
- Change natural communities
- Spread diseases



## MANAGEMENT of MARITIME SPACE USE

- Physical structures
- Visual pollution

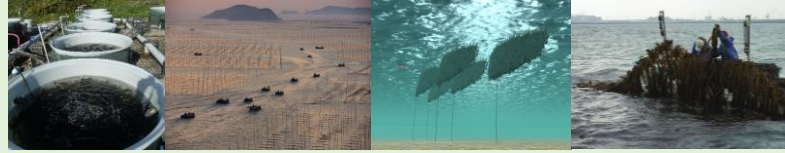


## PRODUCT SAFETY and REGULATION

- Food
- Feed
- Fertilizers
- Cosmetics and Pharmaceuticals



# SEAWEED AQUACULTURE



## ECOLOGICAL and ENVIRONMENTAL IMPACT

- Nutrient removal **92/43/EEC**
- Increase sedimentation **2008/56/EC**
- Risk introduction non-native species **2000/60/EC**
- Change natural communities **2014/1143/EC**
- Spread diseases **2014/1143/EC**



## MANAGEMENT of MARITIME SPACE USE

- Physical structures **2014/89/EC**
- Visual pollution **2011/92/EC**

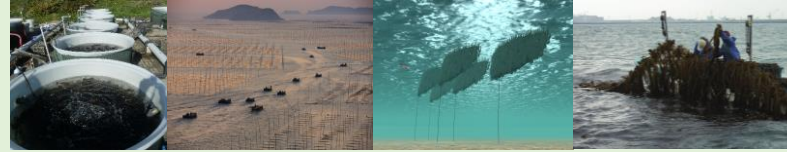


## PRODUCT SAFETY and REGULATION

- Food **2015/2283/EC**
- Feed **1831/2003/EC**
- Fertilizers **2003/2003/EC**
- Cosmetics and Pharmaceuticals **1223/2009/EC**



# SEAWEED AQUACULTURE



## I. EUROPEAN RELEVANT LEGISLATION

Directive/Political initiative	Objectives	Topics related to seaweed aquaculture	Challenges
<a href="#">Habitats directive (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora</a>	Promote the biodiversity by protecting natural habitats and species, contributing to the sustainable development of ecosystems at the EU level	Natural habitat types of community interest include coastal and halophytic habitats and specifically open seas and tidal areas with reefs	Aquaculture development should be compatible with natural habitats and biodiversity protection
<a href="#">Marine Strategy Framework Directive (MSFD)(2008/56/EC , CD 2017/848) establishing a framework for community action in the field of marine environmental policy</a>	Achieve and maintain Good Environmental Status of EU marine environment by 2020	<a href="#">Descriptor 1</a> (Biodiversity): Benthic habitats including rock and biogenic reefs, <a href="#">Descriptor 2</a> (Invasive species) including macroalgae, <a href="#">Descriptor 5</a> (Eutrophication) with criteria on macroalgae (opportunistic macroalgae and macrophyte communities) and <a href="#">Descriptor 6</a> (Sea-floor integrity) considering the structure and functioning of intertidal ecosystems	Aquaculture development should not negatively affect biodiversity and intertidal ecosystems , should not contribute to the introduction of invasive species and should not contribute to the eutrophication in marine waters (coastal areas and open sea)

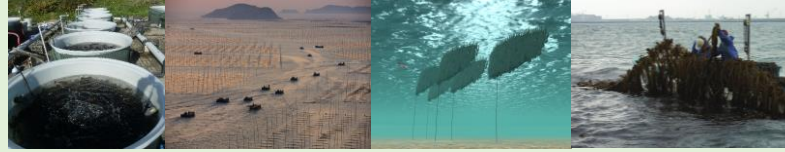
## II. NATIONAL AQUACULTURE REGULATIONS AND STRATEGIC PLANS



Designed by Freepik.com

[https://www.freepik.com/free-vector/flat-european-map-with-blue-background\\_1115055.htm](https://www.freepik.com/free-vector/flat-european-map-with-blue-background_1115055.htm) Designed by Freepik

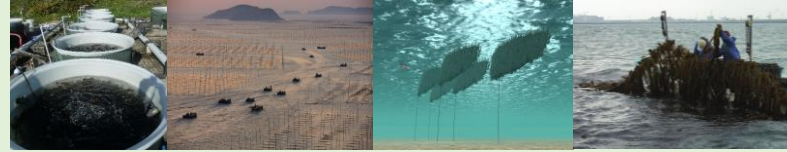
# SEAWEED AQUACULTURE



## PROTECTION of HABITATS and BIODIVERSITY in COASTAL and MARINE AREAS

- **Habitats directive** (92/43/EEC) on the conservation of natural habitats and of wild fauna and flora
  - **Marine Strategy Framework Directive** (MSFD)(2008/56/EC, CD 2017/848) establishing a framework for community action in the field of marine environmental policy
  - **Water Framework Directive** (WFD)(2000/60/EC) establishing a framework for the protection and enhancement of good status of inland surface, transitional, coastal and ground water

# SEAWEED AQUACULTURE



## PROTECTION of HABITATS and BIODIVERSITY in COASTAL and MARINE AREAS

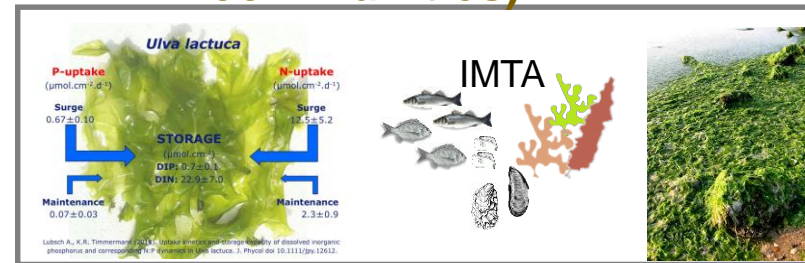
Open seas and tidal areas with reefs are habitat types of community interest



### Biodiversity



Eutrophication (opportunistic macroalgae and macrophyte communities)



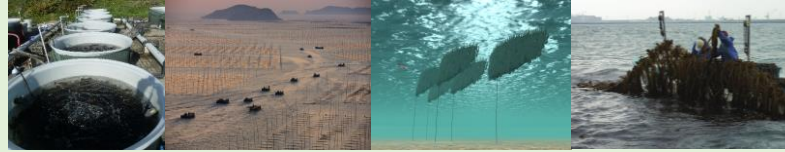
### Invasive species



Structure and Functioning of coastal ecosystems



# SEAWEED AQUACULTURE



## NON NATIVE SPECIES

- [Alien Species Regulation](#) (1143/2014 EU) on the prevention and management of the introduction and spread of invasive alien species

### LIST of INVASIVE ALIEN SPECIES of UNION CONCERN

An invasive alien species should be considered to be of Union concern if the damage that it causes in affected Member States is so significant that it justifies the adoption of dedicated measures applicable across the Union, including in the Member States that are not yet affected or are even unlikely to be affected

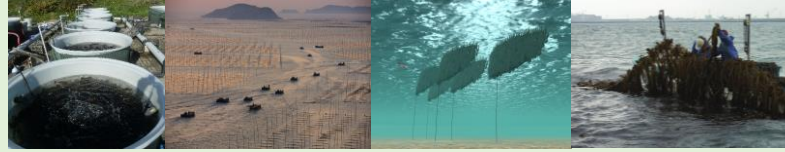
**No marine species included**

### National list of invasive alien species of Member State concern

**Seaweed species included**



# SEAWEED AQUACULTURE



## NON NATIVE SPECIES

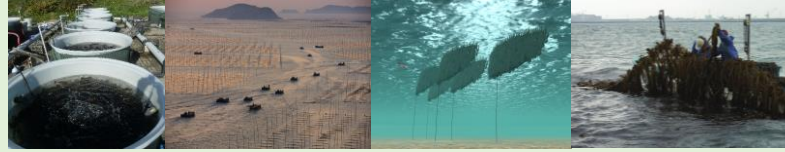
- **Regulation 708/2007** concerning the use of alien and locally absent species in aquaculture

**Scope:** introduction of alien species and translocation of locally absent species

**Annex IV:** Species to which the regulation mostly does not apply given that these species have been commonly used in aquaculture for a long time in certain parts of the Community

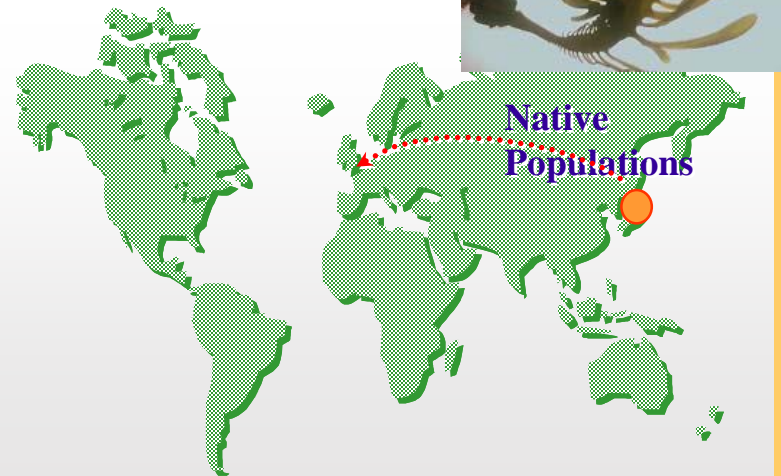
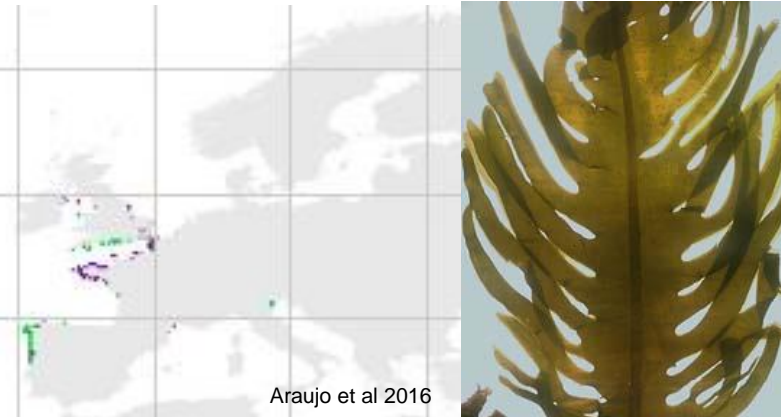
No seaweed species included in Annex IV

# SEAWEED AQUACULTURE

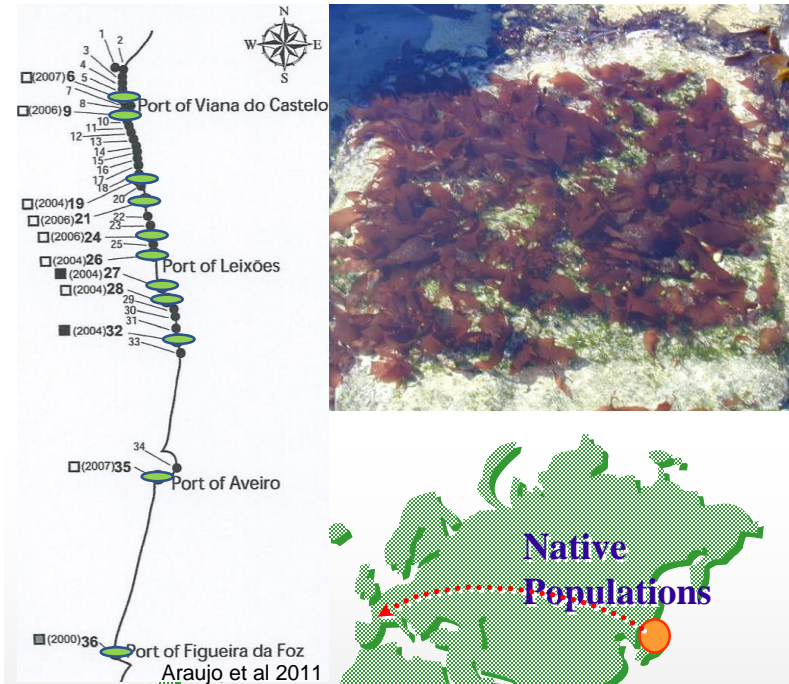


## NON NATIVE SPECIES

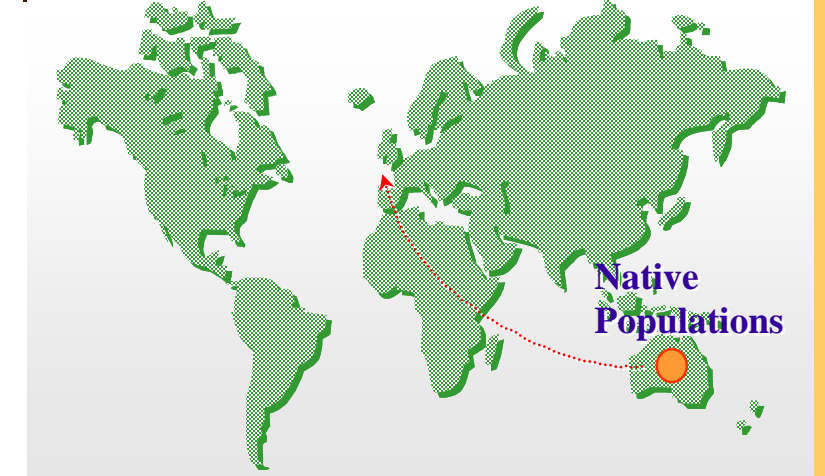
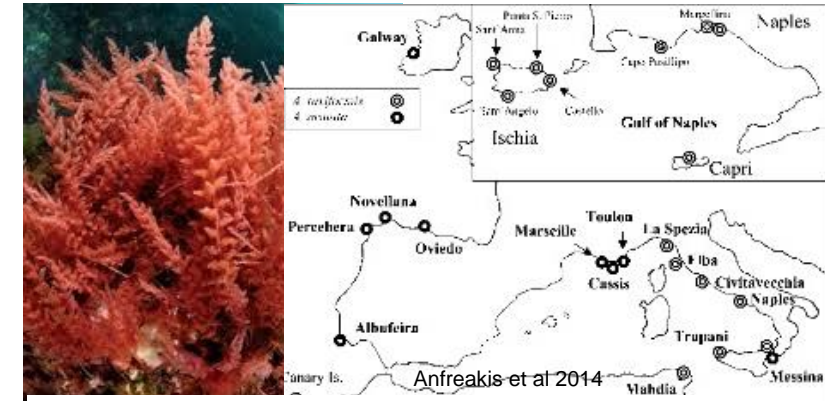
### *Undaria pinnatifida*



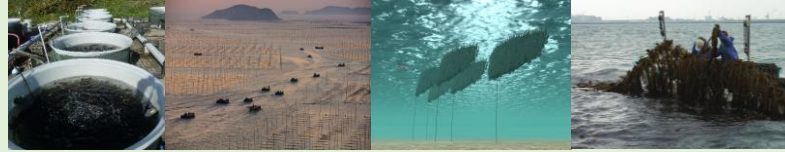
### *Grateloupia turuturu*



### *Asparagopsis* sp.



# SEAWEED AQUACULTURE



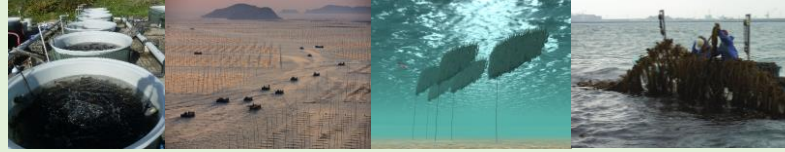
## NON NATIVE SPECIES

### MARINE STRATEGY FRAMEWORK DIRECTIVE

DESCRIPTOR 2: Non indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems

- Newly introduced non indigenous species
- Established non indigenous species
- Species groups and broad habitat types at risk from non indigenous species

# SEAWEED AQUACULTURE



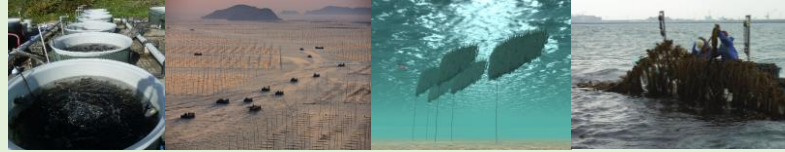
## NON NATIVE SPECIES

### MARINE STRATEGY FRAMEWORK DIRECTIVE

DESCRIPTOR 2: Non indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems

- **Newly introduced non indigenous species** (primary)
- Established non indigenous species (secondary)
- Species groups and broad habitat types at risk from non indigenous species (secondary)

# SEAWEED AQUACULTURE



## FOOD SECURITY

**NOVEL FOOD CATALOGUE** (non-exhaustive list, based on MS volunteer information)

***Chondrus crispus***

***Gracilaria verrucosa***

***Porphyra sp.***

***Palmaria palmata***

***Alaria esculenta***

***Laminaria digitata***

***Laminaria hyperborea***

***Saccharina latissima***

***Undaria pinnatifida***

***Ulva sp.***

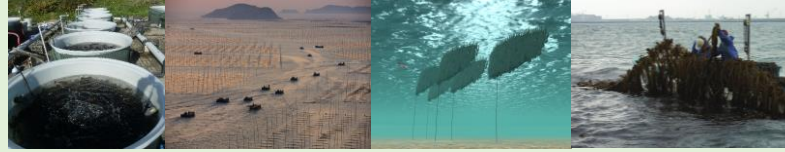
➤ *Laminaria hyperborea*

➤ *Polysiphonia lanosa*

➤ *Osmundea pinnatifida*

➤ *Codium sp.*

# SEAWEED AQUACULTURE



## FOOD SECURITY

**NOVEL FOOD CATALOGUE** (non-exhaustive list, based on MS volunteer information)

***Chondrus crispus***

***Alaria esculenta***

***Ulva sp.***

***Gracilaria verrucosa***

***Laminaria digitata***

***Porphyra sp.***

***Laminaria hyperborea***

***Palmaria palmata***

***Saccharina latissima***

***Undaria pinnatifida***

➤ *Laminaria hyperborea*

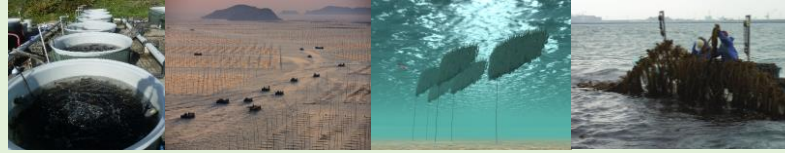
➤ *Polysiphonia lanosa*

➤ *Osmundea pinnatifida*

➤ *Codium sp.*

Listed in EU recommendation 2018/464:  
Monitoring of metals and iodine in seaweeds and products based in seaweeds

# SEAWEED AQUACULTURE



## CHALLENGES at the NATIONAL LEVEL

- Standardization
- Social acceptability
- Knowledge impact and biological interactions
- Local strains *versus* breeding
- Technological constraints

## SIMPLIFICATION of the LICENCING PROCEDURES

## ACCESS and UNDERSTANDING of LEGAL FRAMEWORK