

# PEGASUS

Phycomorph European Guidelines  
for a Sustainable Aquaculture of  
Seaweeds



# SEaweEDS in their ENVIRONMENT



## Biological environment

Food

Herbivores  
(incl land ones)

Shelter

Seabirds,  
Mammals, Fishes

1 kelp → 8000 invertebrates  
40 species

## Physical environment

Light

Sedimentation rate

Hydrodynamics

Erosion : 5.4 B€/y (1990-2020)

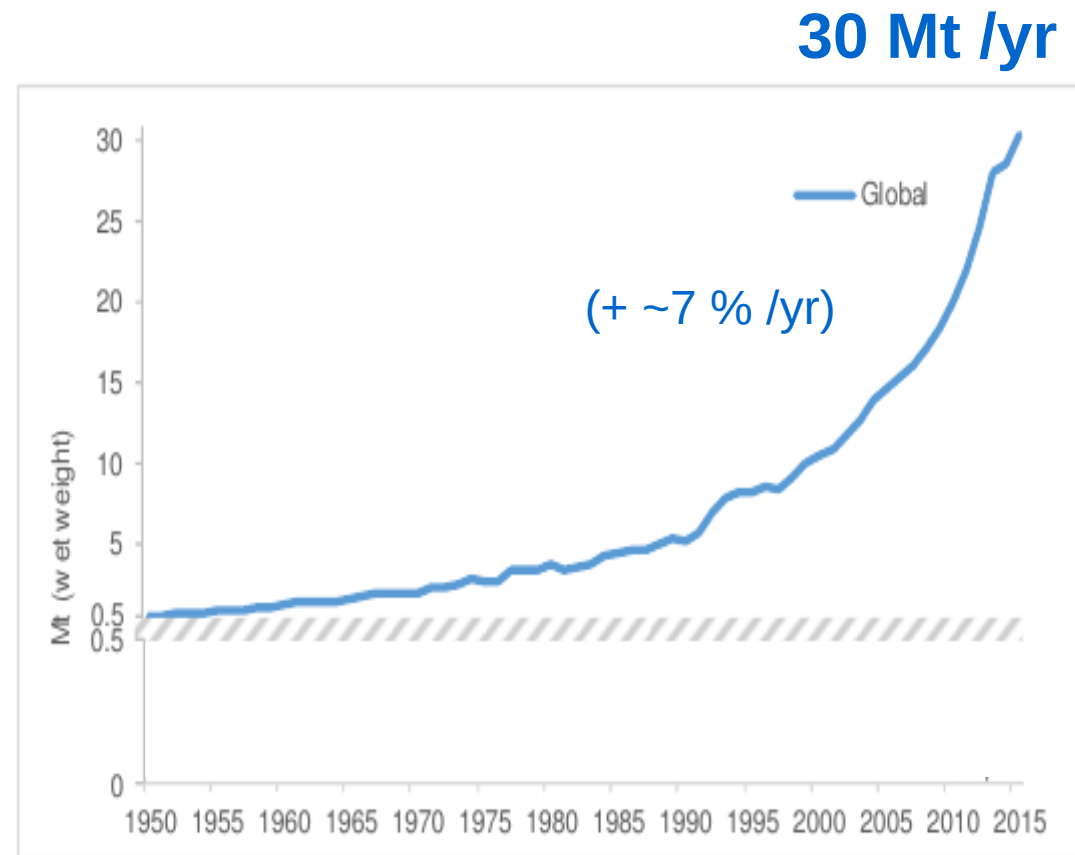
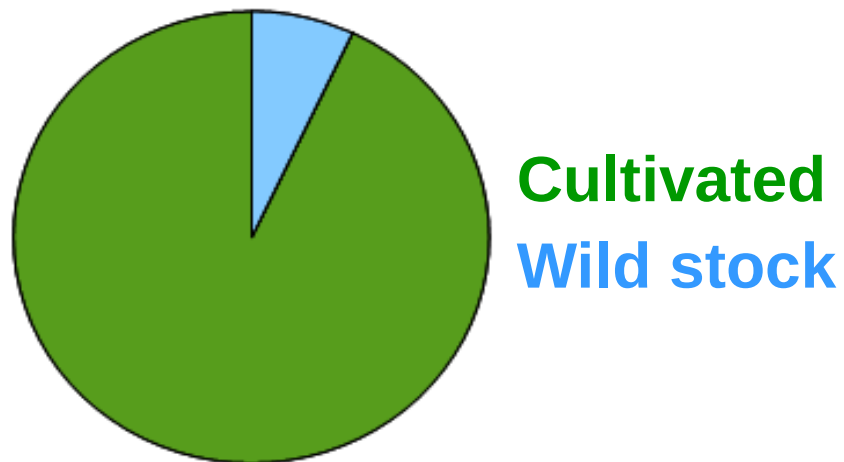
## Chemical environment

C- sequestration

N & P remediation

# ECONOMICS of SEAWEEDS

## WORLDWIDE



## ECONOMICS of SEAWEEDS

Value : 7.5 B€ / y

WORLDWIDE

### Biomass exploitation

30 Mt /yr

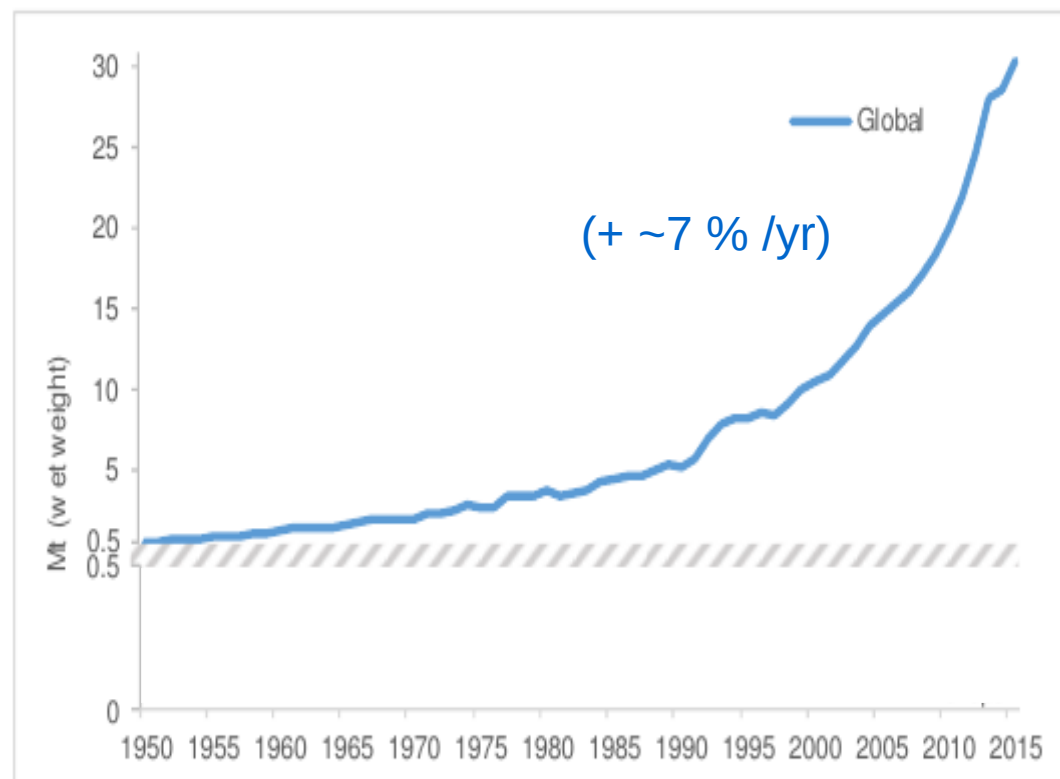
- **Texturising agents** (56% of the production) : carrageenan, agar-agar and alginates



- **Food and supplements** (39%)



- **Others** (5%) : feed, fertilizers, plastic ersatz, pharmaceuticals, cosmetics, nutraceuticals, biofuels



# In EUROPE

PROMOTING FORCES

- No competition with land crops
  - ! Water scarcity !
- Food features
  - Healthy
    - Proteins up to 40% dw
    - Fat 3 % dw (Omega 3)
    - Vitamins, mineral salts
- Specific food
  - Vegan
    - ~4 % in U-K, < 34 y old
  - Organic
    - 13 % in DK, 33 % increase
  - Local
- Cosmetics
  - Up to 2000€ / kg
- Demand for diversification (SMEs)
- Importation
- EU Bioeconomy strategy
  - Waste reduction, Sustainability





## In EUROPE

### CAN WE SUPPLY ?

Long coastlines

Good nutrient  
concentration

High biodiversity

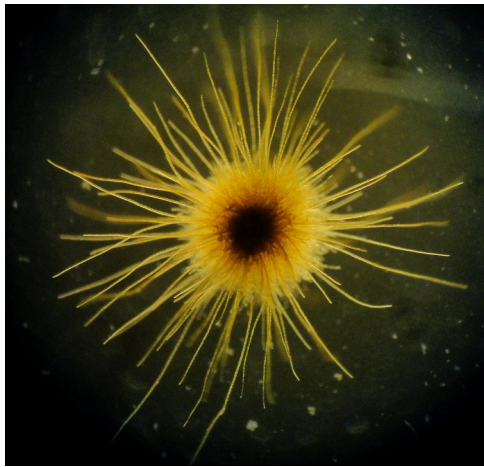
Technical development & innovation

Leadership in fundamental research



## EU LEADERSHIP IN SEaweED BASIC KNOWLEDGE

### Seaweed Genomics



*Ectocarpus siliculosus*

Cock et al., 2010



*Chondrus crispus*

Collen et al., 2013



*Ulva mutabilis*

De Clerck et al., in press

Population genetics,  
Cell biology,  
Metabolomics,  
Transgenics  
Genome-Editing

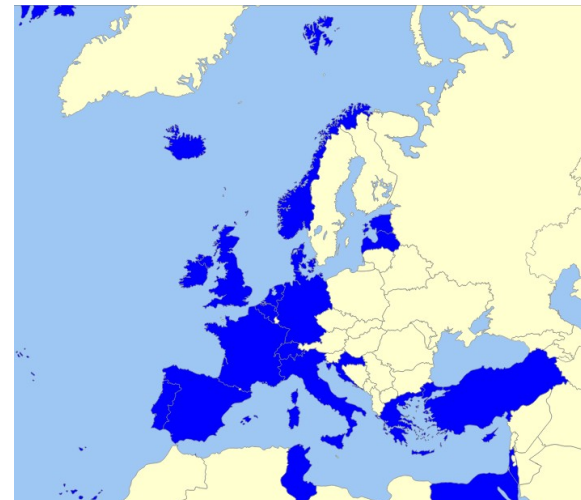
## EU LEADERSHIP IN SEAWEED BASIC KNOWLEDGE

### Networking



European  
Cooperation in Science  
& Technology

« COST is an EU-funded programme that enables researchers to set up their interdisciplinary research networks in Europe and beyond. »





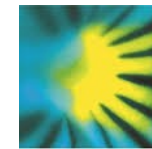
# EU LEADERSHIP IN SEaweED BASIC KNOWLEDGE

## Networking



- PRODUCER OF KNOWLEDGE

- Generate
- Disseminate



New  
Phytologist



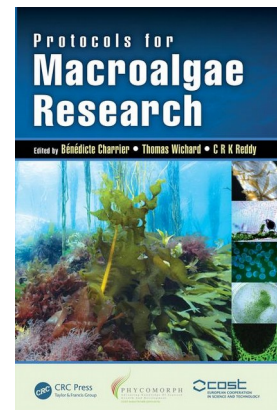
frontiers  
in Plant Science



- PRODUCER OF KNOW-HOW

- 31 protocols specific for macroalgae
- 25 short-term lab-exchanges
- 4 workshops, 3 Training Schools

Seaweed Cultivation, Genomics, Metabolomics, Imaging



## In EUROPE

**CAN WE  
SUPPLY ?**

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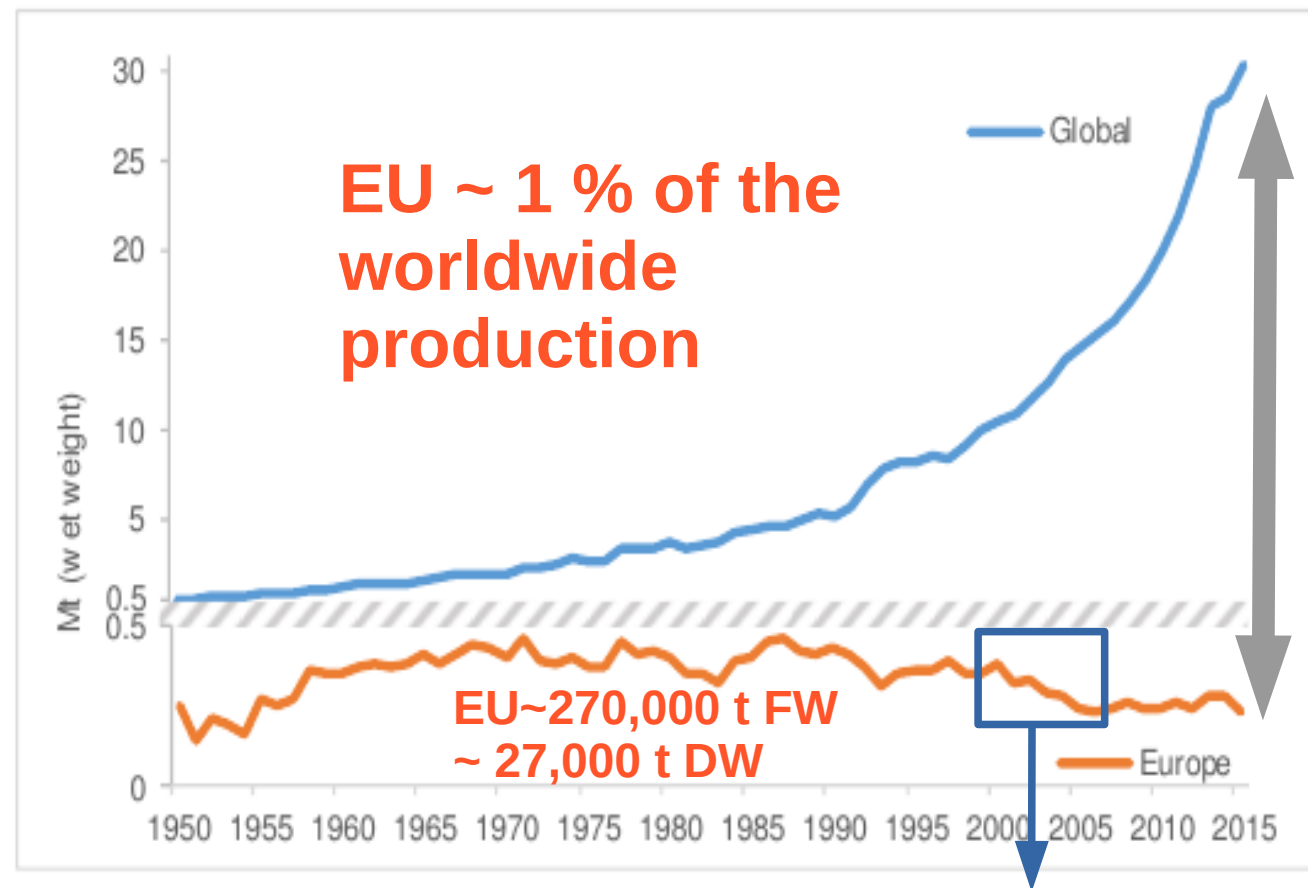
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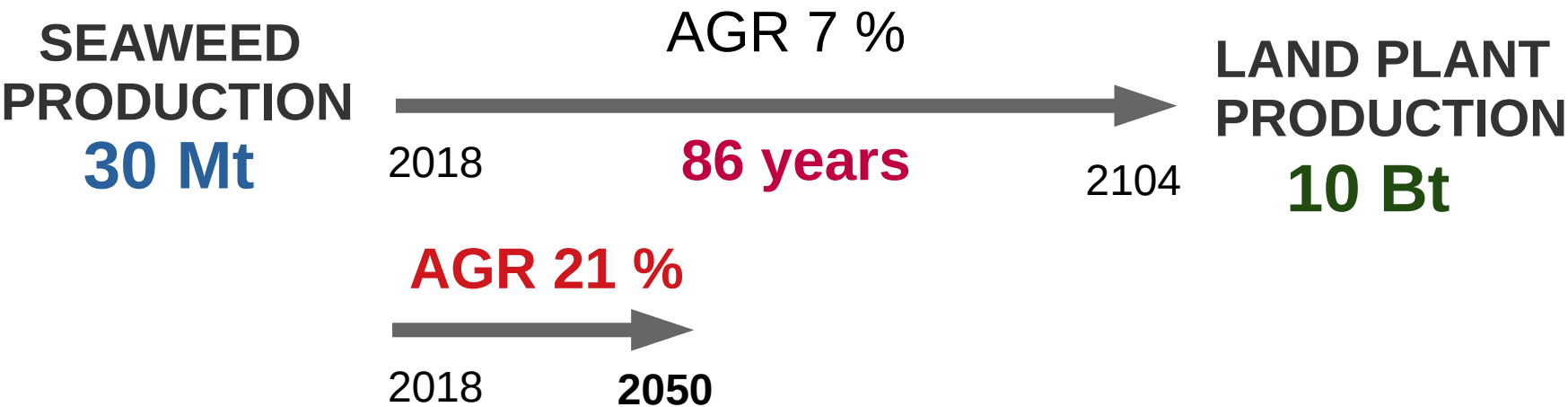
## In EUROPE

DO WE ?

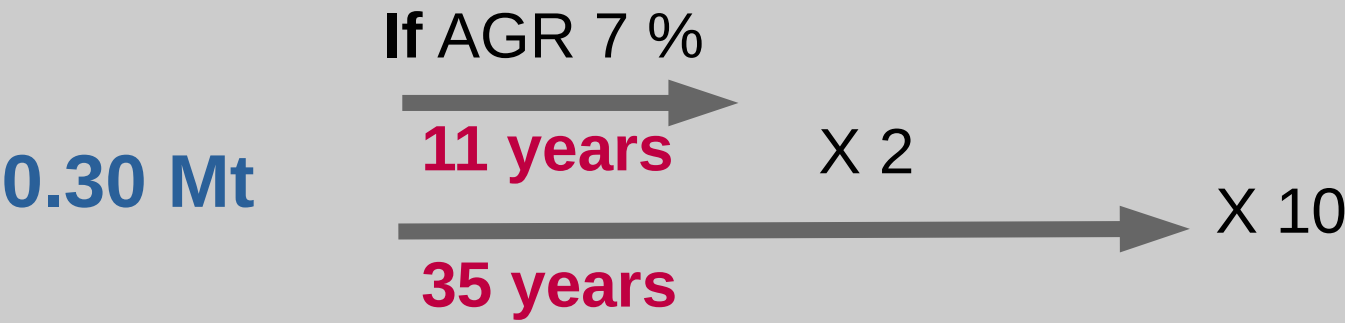


# SOME PREDICTIONS

## WORLDWIDE



## EU



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