



# CoCliME: Investigating the socio-economic impacts of HABs through co-development with CoCliME stakeholders in European marine coastal areas



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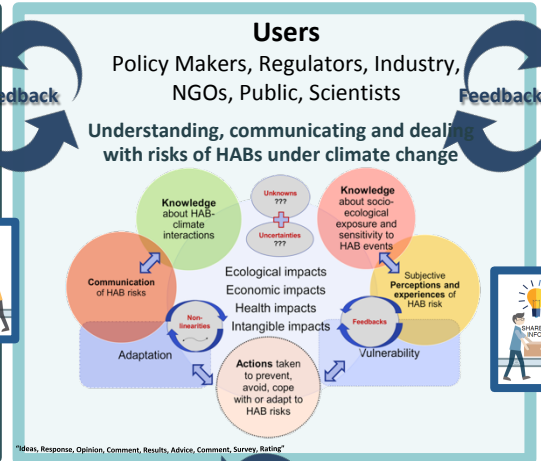
## CoCliME general AIM: Co-develop proof-of concept or prototype marine ecosystem climate services to support adaptive decision-making in European Seas

### Ecosystem Understanding through Laboratory and Observational Studies

Example Results:

- In 2019, Norway and Germany teams cooperated in the monitoring and observing of an exceptional bloom in the Norwegian Sea; the causative organism, called *Chrysochromulina*, led to massive fish kills at aquaculture sites

**ACQUACULTURE HARMS NORWAY'S MOST IMPORTANT EXPORT INDUSTRY**



### Modelling

Biological, Physical, Chemical, Atmospheric, Hydrographic

Example Results

- In Ireland, no clear historic trends identified except for the increase in the number of weeks that HABs are present, e.g., the number of weekly samples with more than 100 cells per litre of *Dinophysis acuminata* in Bantry Bay is increasing with the annual average cell numbers of *D. acuminata* in Bantry Bay also increasing.

The onset of an *Ostreopsis* bloom is a function of temperature. If the water is warmer earlier in the year then the bloom occurs earlier; 23 °C - 24 °C is needed for *Ostreopsis*.

- Cold spring (April, May & June) = late bloom
- Warm spring (April, May & June) = earlier bloom

Photo credit: Marine Institute, Ireland

### Example Case Study

#### The impact of shellfish trade bans caused by HABs on a French regional economy: an Input-Output approach

Between 2004 and 2018, 432 prefectural decrees enacted for a cumulated number of 16 849 days of trade bans

688 shellfish farms

**SOUTHERN BRITANNY - 392 units**

Rivières de Crach et St Philibert - 70

**Golfe du Morbihan - 86**

**PAYS DE LA LOIRE - 296 units**

Baie de Bourgneuf - 200

Shellfish sales (2017):  
37 600 tons  
141 million €  
=> 20% of national shellfish trade

Average number of days of shellfish trade bans by year

Number of impacted jobs for the regional economy

**LO regional Model: Two scenarios with contrasted impacts for the shellfish industry**

without monetary compensation through higher prices, or through state aid	DIRECT	-8.0	-48
	INDIRECT	-25.6	-152
	<b>TOTAL DEFICIT</b>	<b>-33.6</b>	<b>-200</b>
with an equivalent amount of state aid benefitting only to the local shellfish industry	DIRECT	-5.3	-35
	INDIRECT	-16.8	-110
	<b>TOTAL DEFICIT</b>	<b>-22.1</b>	<b>-145</b>

30% loss of sales volume or final demand (-13.2 M€)

### Example Case Study

#### Ascertaining the economic impacts of *Ostreopsis* beach blooms

**Steps**

- Measuring the current level of knowledge of risks associated with HAB *Ostreopsis* (Tourist and resident population):  
Knowledge and experience of *Ostreopsis*  
Means of information concerning HAB  
Health consequences of *Ostreopsis*
- Evaluating their perception and their reactions (e.g. in terms of beach attendance) toward a future (hypothetical) emergence of proven health risks related to *Ostreopsis*, in connection with climate change
- Assessing their Willingness-to-Pay (WTP) to reduce or avoid these health risks, in a context of climate change = Monetary valuation of the well-being variations associated with these future HAB risks.
- Obtaining evidence to help the implementation of public policies against *Ostreopsis* health risks

**Method**

Observation of the **current frequentation** of beaches then the **contingent frequentation** following the introduction of 2 levels of risks (moderate / serious) concerning *Ostreopsis* (2 contingent scenarios)

- Marseille** : Travel Cost Method (TCM) with a multi-sites approach
- Nice** : Travel Cost Method with a single-site approach (twin-beaches method)
- Monaco** : Choice Experiment Method = Choice between 2 beaches (+ status quo) with different characteristics in terms of :  
  - ✓ Absence / Presence of **jellyfish**
  - ✓ Absence / Presence of ***Ostreopsis*** (Moderate / Serious symptoms)
  - ✓ Absence / Presence of **bacteria and viruses** (→ Moderate intestinal disorders)

⇒ Approach that is different compared to Marseille and Nice case studies: the risk *Ostreopsis* is put in a **more general context of risks** (Jellyfish, Bacteria and Viruses, ...)

### Some Key Messages

- HABs lead to a range of social and economic impacts for affected populations and industries. These impacts are context-specific due to variations in the biophysical and societal processes and interactions at play, the type of HABs, and the relevant stakeholders in each case
- The underlying mechanisms driving HABs and HAB-climate linkages remain unclear in many cases, complicating understanding of potential future impacts
- Understanding current HAB risks and socio-economic vulnerabilities, impacts perceptions and experiences is a basis for understanding future risks and impacts
- Transdisciplinary communication between biologists, physical oceanographers – modellers, social-scientists and stakeholders is a learning process.
- Face-to-face consultations, meetings and interviews are the most conducive way to create interest, encourage participation and build trust.