



Tools for Assessment and Planning of Aquaculture Sustainability (2016/2020)

H2020 Project No: 678396

Project Partners



- **University of Stirling (UK)** (coordinator)
- **NIVA** (Norway)
- **DHI** (Denmark)
- **Water Insight BV** (Netherlands)
- **Alterra-Wageningen UR** (Netherlands)
- **Plymouth Marine Laboratory** (UK)
- **Universidad de Murcia** (Spain)
- **Université de Nantes** (France)
- **Hellenic Centre for Marine Research** (Greece)
- **Szent Istvan University** (Hungary)
- **AquaBioTech Group Ltd** (Malta)
- **Marine Institute** (Ireland)
- **NACEE – Eastern European** (Hungary)
- **Aquaculture Stewardship Council** (UK)
- **Fundacion Imdea Aqua** (Spain)



What are the challenges TAPAS is addressing?

- **Fragmented approaches to licensing and regulation**, together with limited availability of suitable areas for aquaculture, are a major barrier to future development and expansion of the aquaculture sector.
- There is a **need to support member states to establish more efficient regulatory frameworks** and to reduce cost and time of licensing aquaculture farms.
- There is a **need to ensure there are appropriate tools, models and approaches** available to predict and monitor environmental impacts and also quantify ecosystem services provided by aquaculture.
- There is a **need to strengthen environmental sustainability of aquaculture and enhance its image.**



Aims and objectives to address these ...

- Identify sustainability requirements and licensing approaches, and identify bottlenecks hampering cost-efficient licensing and regulatory practices.
- Identify the gap between the availability of and needs for models, modelling and decision frameworks, and critically analyse and refine existing tools and technologies, developing new approaches if needed.
- Assess the environmental services provided by European aquaculture
- Strengthen management practices and develop an Aquaculture Sustainability Toolkit for timely and cost-efficient environmental assessment and regulation



What will the project offer?

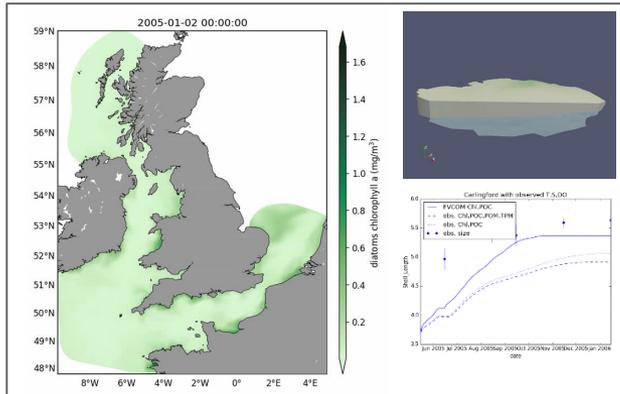
- Improved regulatory frameworks for adoption by Member states
- Improved tools for quantification of environmental services
- Improved spatial planning linked to carrying capacity and sustainability indicators
- Improved, more efficient tools for licensing and aquaculture development
- Improved, more efficient tools for monitoring and prediction of environmental impacts
- Improved conditions for investment in the sector through provision of state of the art tools and integrated, holistic, decision support
- Significantly enhanced real time in-situ monitoring linked to early warning and sustainability



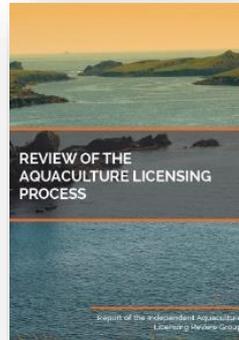
What will TAPAS deliver?

- Environmental models, tools, management approaches, decision frameworks (*Aquaculture Sustainability Toolbox*) and **policy recommendations** to support EU Member States towards establishing a coherent and efficient regulatory framework

- **Examples:**



Site selection, growth potential and carrying capacity models

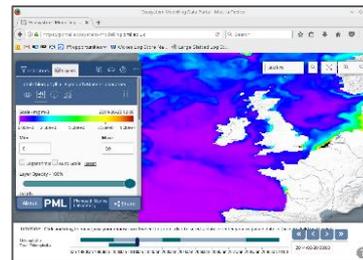


Provide information for policy, licensing and regulations

Ecosystem services and societal models



Use of earth observation data



Use of regional scale models



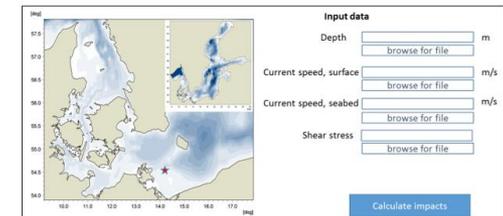
In-situ and real-time monitoring systems



Assess risk of potentially toxic substances

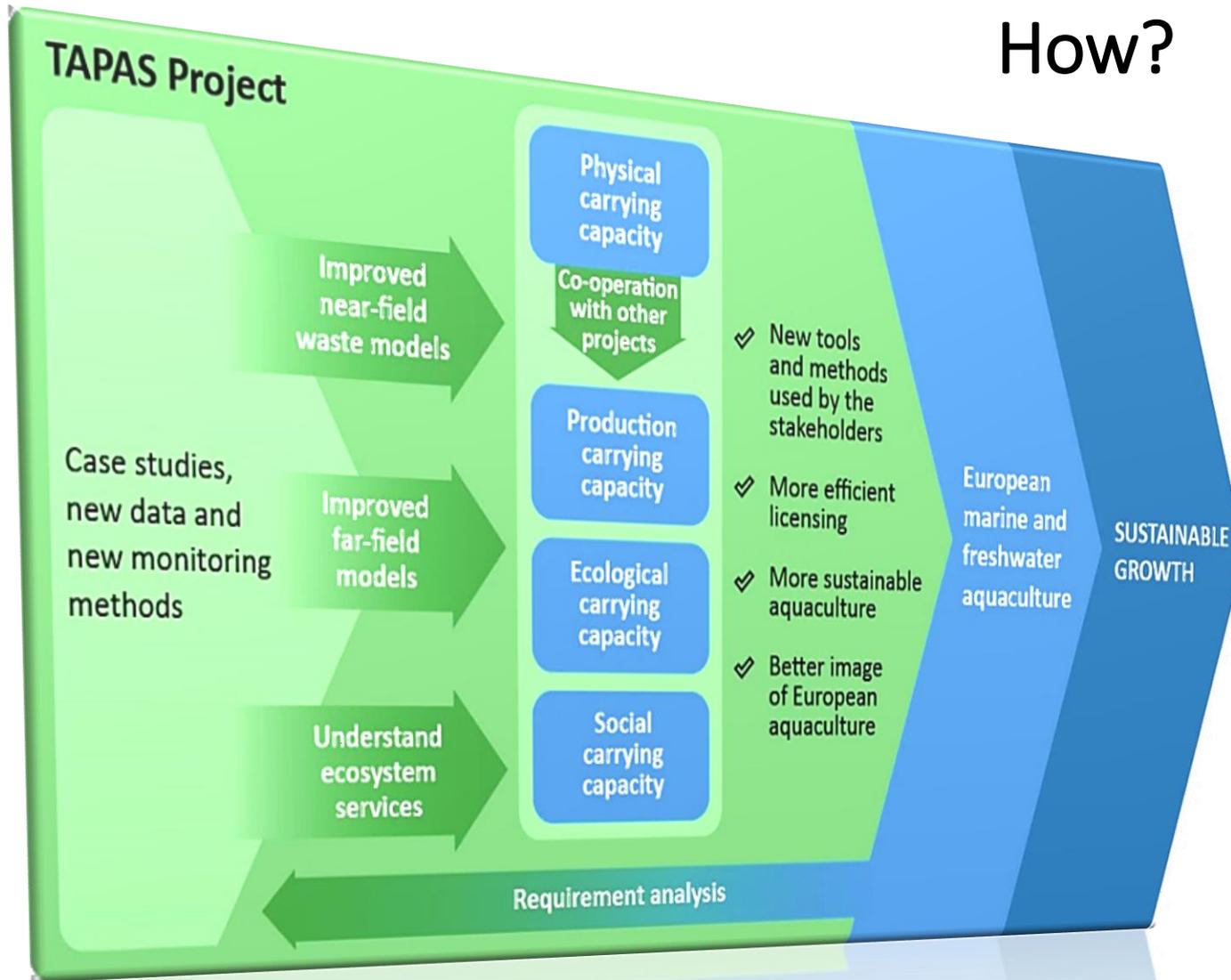


DSS (TAPAS-Smart?) and toolbox



Tools (e.g. environmental assessment)

How?

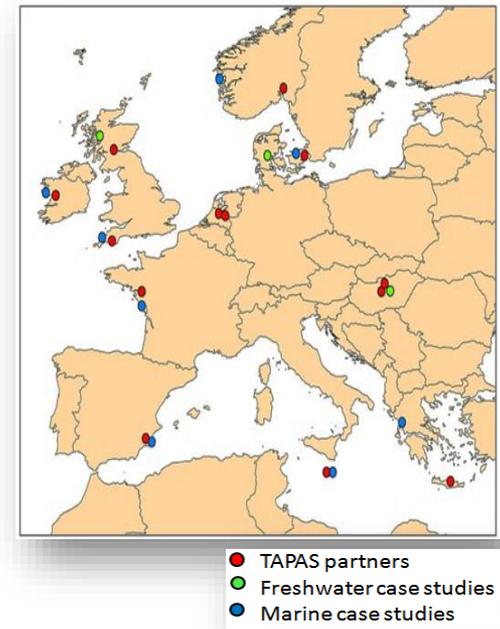


Case studies

Include production systems throughout Europe:

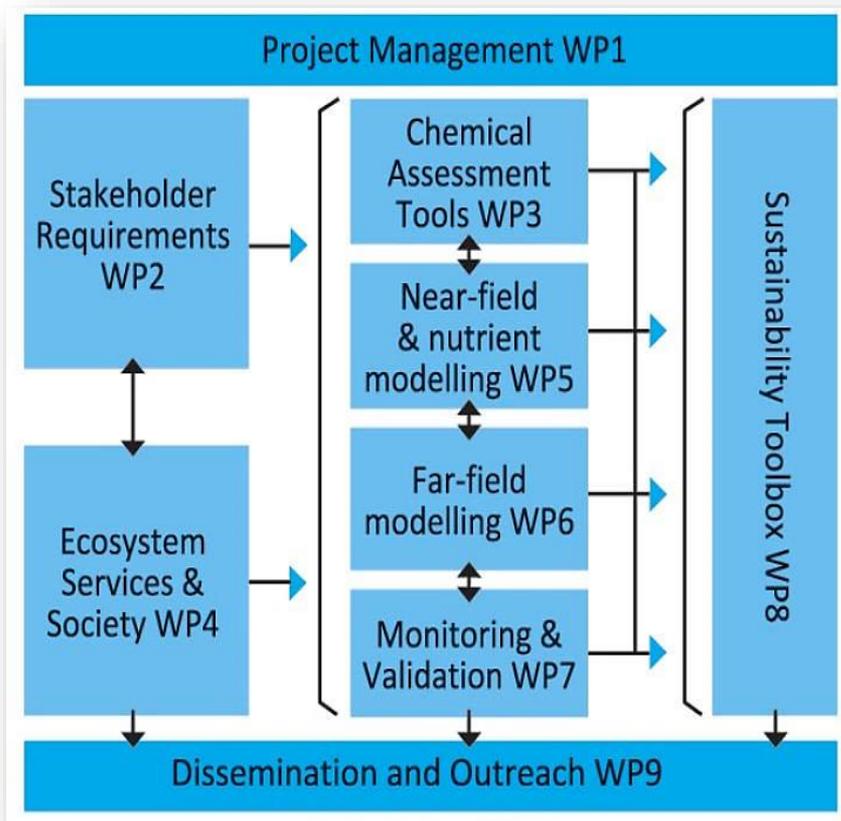
- Coastal shellfish (France, UK)
- Marine cages (Ireland, Norway, Malta, Greece, Spain)
- Freshwater cages (UK)
- Freshwater ponds (Hungary)
- Recirculating systems (Denmark)
- Integrated multi-trophic aquaculture (IMTA) (Ireland, Malta)

[Feed into the WPs for data provision and validation](#)



Workpackages

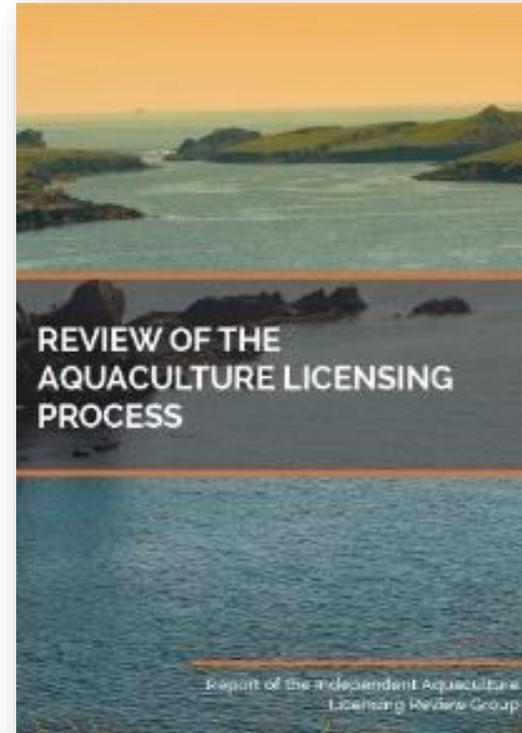
- **WP1** – Project management (*UOS*)
- **WP2** - Requirements Analysis and Stakeholder Integration (*MI*)
- **WP3** - Environmental Risk Assessment of potentially toxic substances (*ALT*)
- **WP4** - Ecosystem Services and Societal models (*NIVA*)
- **WP5** - Near Field Models for regulation and site selection (*UOS*)
- **WP6** - Far Field Models (*PML*)
- **WP7** - Monitoring and Validation (*WI*)
- **WP8** - Aquaculture Sustainability Toolbox (*DHI*)
- **WP9** - Dissemination, Outreach and Exploitation (*ABT*)



Work Package 2 : Requirements Analysis and Stakeholder Integration

Objectives

1. Evaluate existing **regulatory and licensing frameworks** across the EU
2. Design new, flexible approaches to licensing working to common standards
3. Ensure the acceptability and utility of the approach by close engagement and **collaboration with industry, regulators and certifiers**
4. Take account of the range of production environments and sub-sectors and the need to integrate with other sectors
5. Develop **timely and cost efficient tools** that incentivise investment in sustainable aquaculture



Provide information for policy, licensing and regulations

Work Package 2 : Requirements Analysis and Stakeholder Integration

Consultation/questionnaires:

- The issues and bottlenecks outline in consultation - highlighted areas where a tool was needed.
- The tools asked for directly by consultees.
- Tools suggested by partners from workshop.
- Collated and formed report.

TAPAS Tools for Assessment and Planning of Aquaculture Sustainability

TOOLS FOR ASSESSMENT AND PLANNING OF AQUACULTURE SUSTAINABILITY

These concrete ground sustainability of food security contributing to the sustainability of aquaculture are carrying out a four year study to identify new strategies and models for sustainable aquaculture in the European aquaculture industry. The Tools for Assessment and Planning of Aquaculture Sustainability (TAPAS) project will assess cost-effective management tools and practices for the aquaculture sector to identify the current status to the farming activity in all sectors, local environmental, general environmental aspects and any future risks. TAPAS will work to establish a questionnaire "toolkit" to assess transparent and efficient farming, reduce environmental sustainability and aquatic food security while helping into the potential for food production and aquaculture.

The consortium will evaluate structures currently in operation across the EU, including various aquaculture and developing new approaches to deliver support systems for sustainable aquaculture expansion. TAPAS aims to identify strong and cost-effective tools that facilitate transition to sustainable aquaculture. The time that a leading process takes to deliver EU countries as well as their governments will be assessed. In consultation with a qualitative study of the causes of the variation in the same processing time and identification of bottlenecks.

TAPAS Questionnaire

The aim of this questionnaire is to evaluate the existing regulations, licensing and monitoring framework in place in the EU, including all marine, brackish and freshwater aquaculture sectors. We have highlighted information about your system as follows:

- Your operation.
- EU legislation and licensing.
- National legislation and licensing.
- Current national EU policy.
- The licensing process in your country.
- Public perception of your industry's identity.
- Environmental monitoring of your operation.
- Quality planning for your industry.
- Cost management in your area.
- Public perception of your industry's identity.

We hope to identify bottlenecks, obstacles and cost drivers that have an effect on the progress and expansion of your industry. This data will be used to critically review the legislative process on expansion and EU level. The goal of this questionnaire is to help map the impact of the "TAPAS toolbox".

Information

- All questionnaires will be treated in confidence. Confidentialisation details will not be published, or unless confidential information is available. This is voluntary, responses will be kept safe without copying the document.
- Please mark 'X' for the questions that do not relate to your activities.

Please complete your contact details below

Name: _____
 Department / Organisation: _____
 Title / Role: _____
 Address: _____
 Country: _____
 Telephone: _____
 Email: _____
 Website: _____
 Date: _____

3.1 How many people do you employ?

Age profile of workforce

Age	18-24	25-40	41-55	Over 55
Number of employees				

3.2 How many people do you employ? Yes No Other

3.3 How the training structure (please list)

Primary	Apprent	Academy	College	Other
Number of employees				

3.4 Is it easy to recruit suitable employees?

Level	Primary	Secondary	Tertiary	Post Grad	Other
Number of employees					

3.5 Is training available for your employees?

YES	NO	Comment
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3.6 What facilities are available to train employees? (please list)

Regional Training Centres	YES	NO
Local Schools	YES	NO
Technical Colleges	YES	NO
National Training Facilities	YES	NO
Other	YES	NO

3.7 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.8 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.9 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.10 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.11 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.12 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.13 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.14 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.15 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.16 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.17 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.18 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.19 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.20 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

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Irregular	YES	NO
Other	YES	NO

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Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.23 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

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Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

3.25 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular	YES	NO
Other	YES	NO

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Irregular	YES	NO
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Other	YES	NO

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Irregular	YES	NO
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Irregular	YES	NO
Other	YES	NO

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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
Other	YES	NO

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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
Other	YES	NO

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Irregular	YES	NO
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Irregular	YES	NO
Other	YES	NO

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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
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Irregular	YES	NO
Other	YES	NO

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Irregular	YES	NO
Other	YES	NO

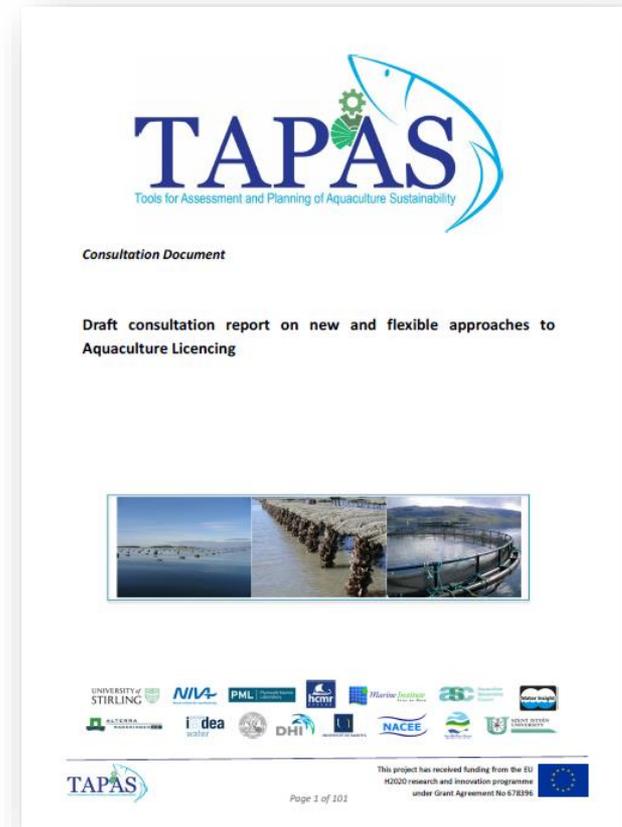
3.98 How do you monitor the progress of your employees?

Regular	YES	NO
Irregular		

Work Package 2 : Requirements Analysis and Stakeholder Integration

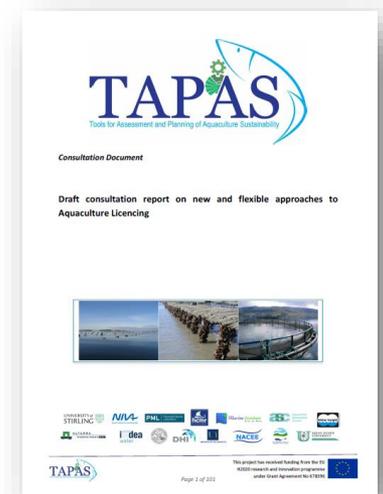
Draft consultation report

- Overview of issues, bottlenecks to regulation of aquaculture in the EU.
- Recommendations to improve these issues and highlighting the potential positive impact of each.
- 11 summary recommendations to tackle issues and bottlenecks.
- Appendix - Exploring case studies and potential new approaches



Work Package 2 : Requirements Analysis and Stakeholder Integration

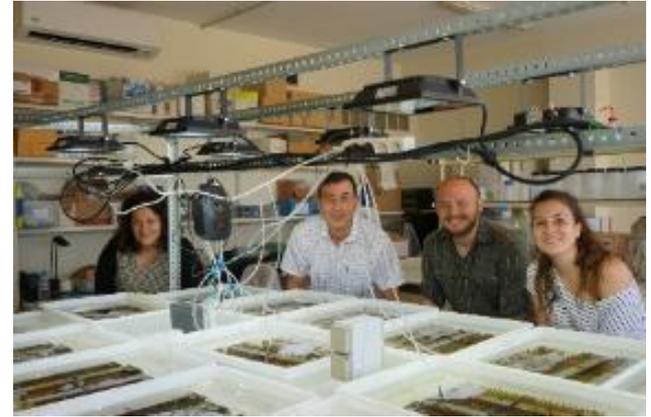
- Develop a modern **electronic licensing system**
- Provide **clear guidance** for quantifying impact and balancing risk
- Develop and improve **tools and environmental models**; site identification, site optimisation and carrying capacity.
- Carry out **real time**, inexpensive, **risk focused monitoring**
- **Level the playing field** for costs of applying for licences
- **Streamline aquaculture legislation**; flexibility, assess license term, use trial licence models.
- **Harmonise implementation** of EU regulations; reducing the variation, harmonising of EIA procedures.
- Encourage implementation of National Plans and amended EIA Directive across jurisdictions to **help simplify processes and administration**.
- Designate **strategic national aquaculture zones** where risk assessments, capacity and impact studies are carried out on an 'area' basis.
- Develop local scale, **producer lead, communication platforms** to facilitate dispute resolution and enhance cooperation.
- Develop **public communication platforms** to make monitoring information publicly available.



Work Package 3: Environmental Risk Assessment (ERA) of potentially toxic substances

Objectives

1. To evaluate and improve existing **farm-scale modelling tools** for the evaluation of the **ecotoxicological risks** generated by **antifouling agents, veterinary medicines** and potentially toxic compounds.
2. To compile, develop, and test **environmental thresholds** for potentially toxic substances used in EU aquaculture.
3. To develop **rapid assessment tools for the prospective ERA** of potentially toxic substances that can be used by farm applicants and regulators (WP8).



Work Package 3: Environmental Risk Assessment (ERA) of potentially toxic substances

Tools for Assessment and Planning of Aquaculture Sustainability

TAPAS

SHORT TITLE: TAPAS
 COORDINATOR: Prof. Trevor Telfer
 ORGANISATION: University of STIRLING, UK
 TOPIC: H2020- SFS-11b-2015
 PROJECT NUMBER: 678396

DELIVERABLE: 3.1

Review of existing models for the environmental risk assessment of chemicals used in aquaculture in the EU

Authors:
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 Paul J. Van den Brink, Alterra (The Netherlands)
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 Lynne Falconer, University of Stirling (United Kingdom)
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With contributions from:
 Nuria Garcia Blanco, University of Murcia (Spain)
 Arnaldo Marín, University of Murcia (Spain)

History of changes

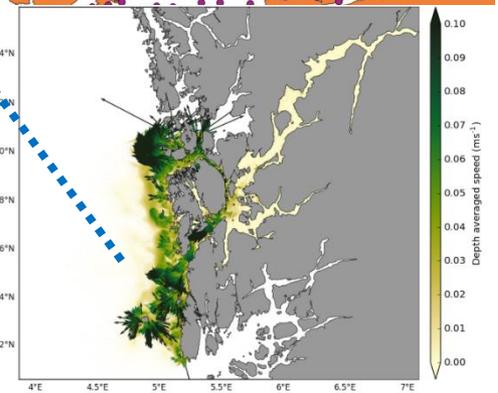
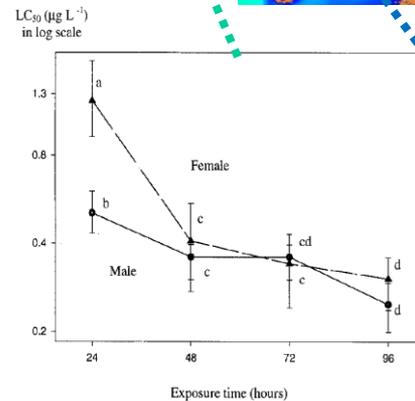
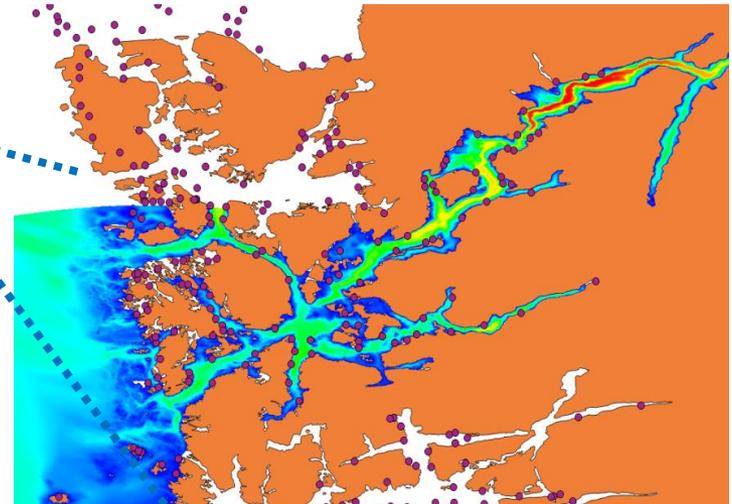
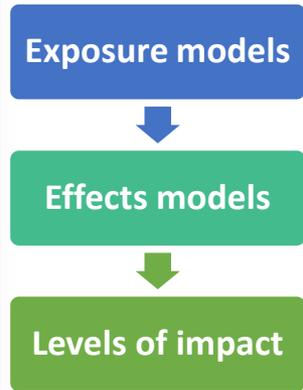
Ver	Date	Changes	Author
1	01/08/2016	First Draft	AR, MV, TT
2	18/08/2016	Final draft	All authors
3	31/08/2016	Minor corrections based on internal review	AR

Internal review

Date	Name
29/08/2016	Lindsay G. Ross, University of Stirling (United Kingdom)
29/08/2016	Árpád Ferencz, Szent István University (Hungary)

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This project has received funding from the EU H2020 research and innovation programme under Grant Agreement No 678396



Work Package 4: Ecosystems services and Societal models

Objectives

1. To build an **analytical framework for the assessment of ecosystems services (ES)** and benefits provided from European aquaculture based on the general concept of Ecosystems services cascades.
2. To identify what **trade-offs and possible synergies** that exists between aquaculture provisioning services and other ecosystem services and to be able to quantify these.
3. To assess how **negative trade-offs can be minimized** and sustainability improved through management and planning approaches (e.g. selection of adequate sites, species diversification and IMTA) and through adaptations in the farm operating practices .
4. To analyse how the knowledge gained from **assessment of ES and ES trade-offs can be incorporated into current planning and licensing**

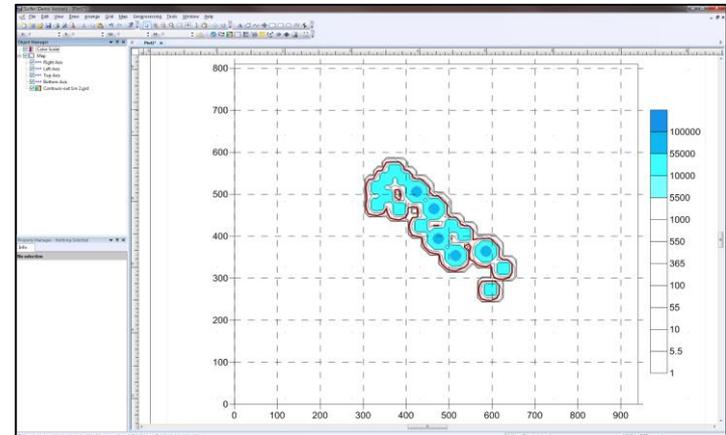
Current Conditions and Alternative Future Scenario (Model Input)		Change in Ecosystem Services (Model Output)			
		Aquaculture Yield	Coastal Protection	Fisheries	Recreation
Current conditions		---	---	---	---
Scenario 1 Aquaculture: add netpens and oyster racks		↑	---	---	↓
Scenario 2 Restore and Protect: add MPA, remove armoring to restore beach		↓	↑	↓	↑

Source: Silvestri, S., Kershaw, F. (eds), 2010. Framing the flow: Innovative Approaches to Understand, Protect and Value Ecosystem Services across Linked Habitats, UNEP World Conservation Monitoring Centre, Cambridge, UK

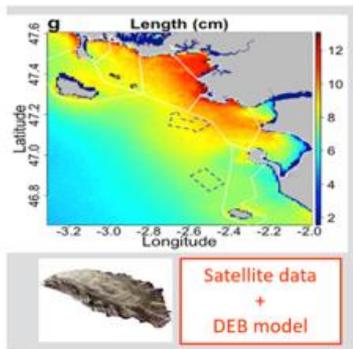
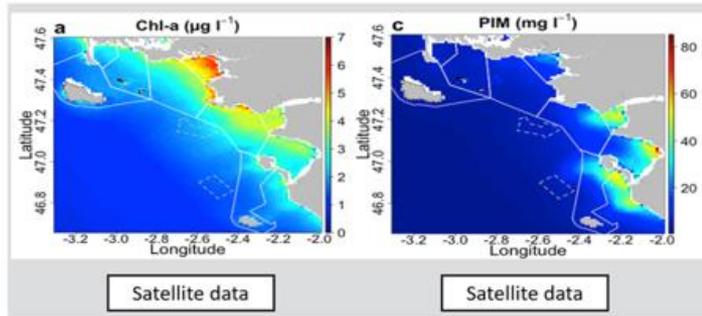
Work Package 5: Near-field models for regulation and site selection

Objectives

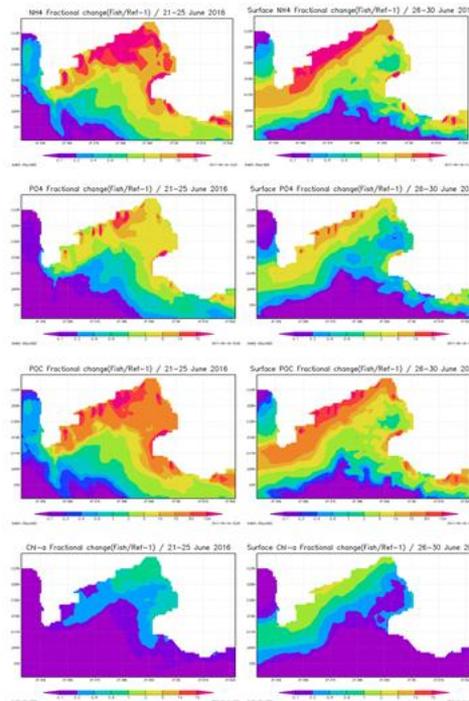
1. Evaluate capabilities of **near-field models** for the purposes of aquaculture development and regulation in the EU in different environments and for different culture organisms.
2. Using data from WP7, **test existing or potential, simple or complex near-field models as management tools** for estimating environmental fate of wastes from fish and shellfish culture within fresh-water and coastal marine environments throughout the EU.
3. Develop **integrated site selection models** using GIS – through integration of models into a “water-body scale” spatial systems which will be incorporated into WP8.



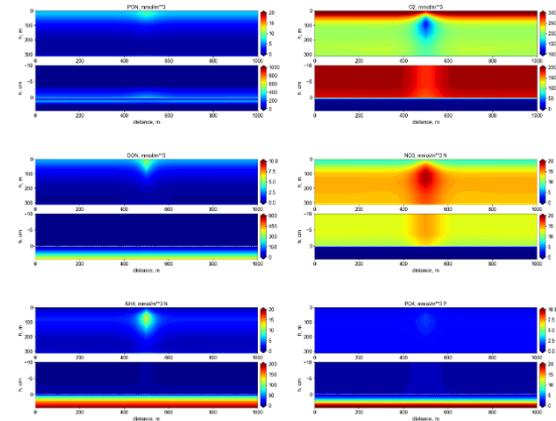
Work Package 5: Near-field models for regulation and site selection



Example of simulation of individual Pacific oyster growth at the scale of a coastal area (UN)

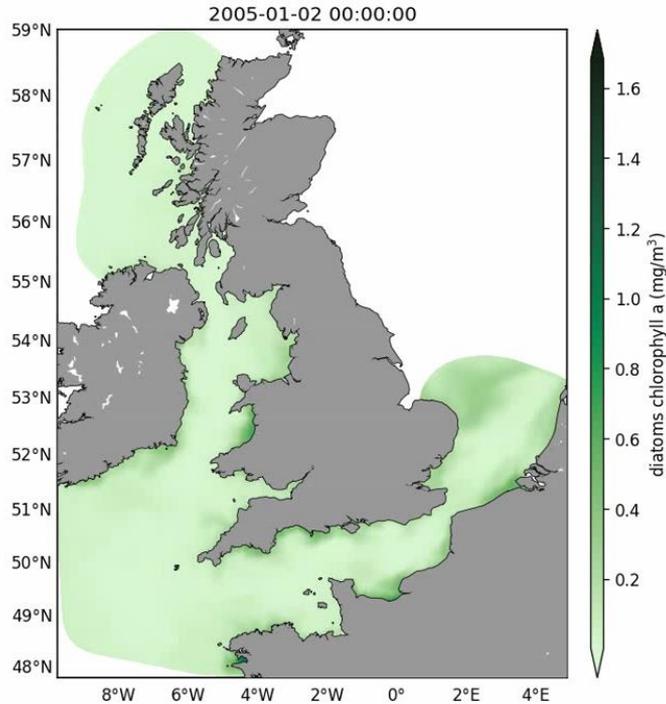


AIM (HCMR)

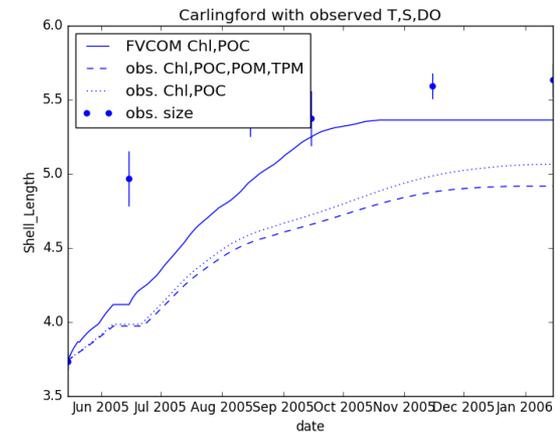
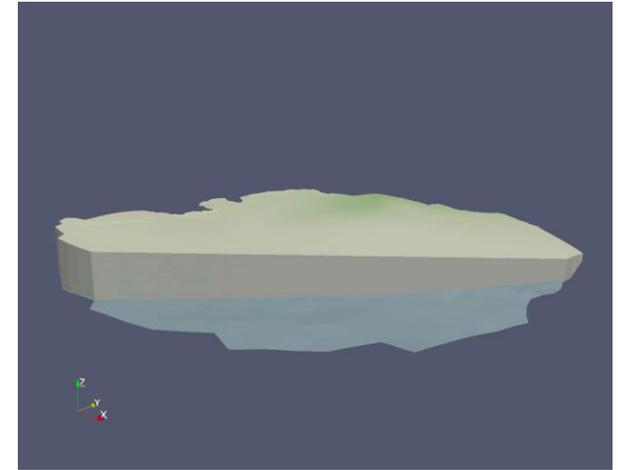
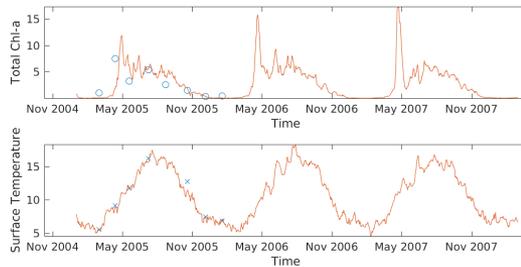


BROM/2DBP (NIVA)

Work Package 5: Near-field models for regulation and site selection



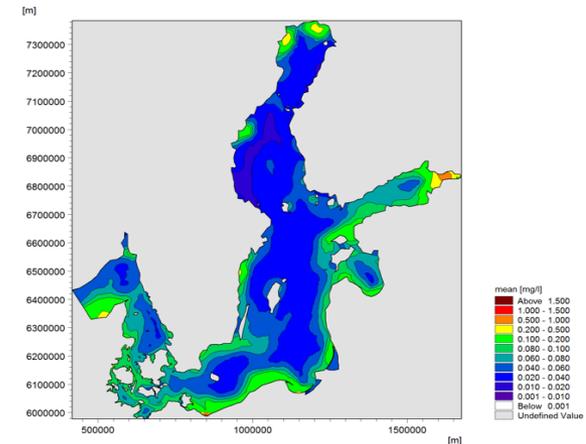
Simulations with
ShellsIM feeding
FVCOM-ERSEM
results (PML)



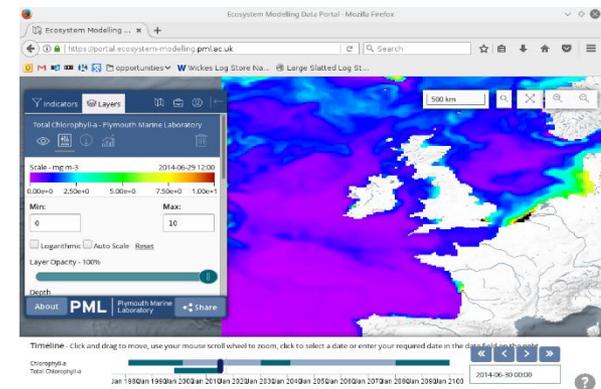
Work Package 6: Far-field models

Objectives

1. Improve existing approaches to combine **Earth Observation and modelling**
2. Develop additional indicators for operational use
3. Provide **relevant far field models and EO data** to the other WPs



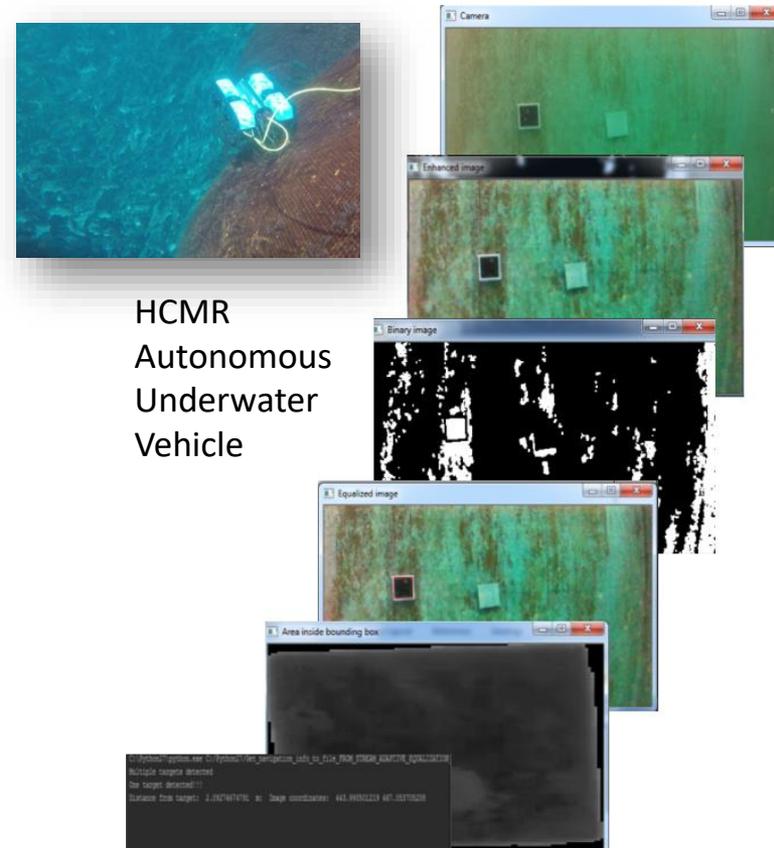
Modelled summer (June-Sept) concentration of phytoplankton carbon in surface waters (0-10m) in 1992 in the Baltic Sea.



Work Package 7: Monitoring and Validation

Objectives

1. Evaluate available and contribute to the development of new **in situ observation technologies** of physical, ecological and chemical water quality including novel biosensors and optical sensors as well as monitoring the integrity of the cage material
2. Establish methods for **quality control of the large data streams** produced by the automated measurement stations
3. Develop methods to detect **emerging problems with water quality**
4. Develop methods for using the upcoming **Copernicus Sentinel-2 MSI**
5. Inventory of available **in-situ datasets** collected in decades of regulatory monitoring of fish farms, and field campaigns



Work Package 7: Monitoring and Validation

Objectives

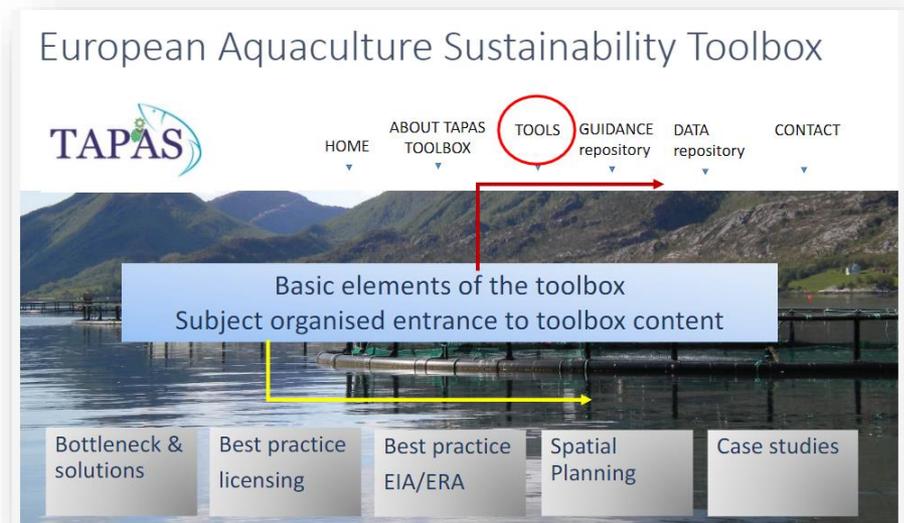
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5. Inventory of available **in-situ datasets** collected in decades of regulatory monitoring of fish farms, and field campaigns



Work Package 8: Aquaculture Sustainability Toolbox

Objectives

1. Collating, refining and developing methods, guidelines and integrated tools to support best practise for aquaculture impact assessments in Europe.
2. Case-based examples of best practise using the sustainability tool selecting, analysing and weighting assessment results.
3. Incorporating feedback from decision-makers into the prototype tool design process to ensure the final tools are as useful as possible.



Work Package 8: Aquaculture Sustainability Toolbox

From WP2 outcomes:

- E-licensing
- One-stop-shop
- Tools for Guidance
- Communication Platforms
 - Guidance
 - Pre-application process
- Public Information Platform
- The Aquaculture Licence
 - Term, Flexibility, Trial licences, Alternative approaches
- Environmental monitoring databases
- Quantifying impact and balancing risk

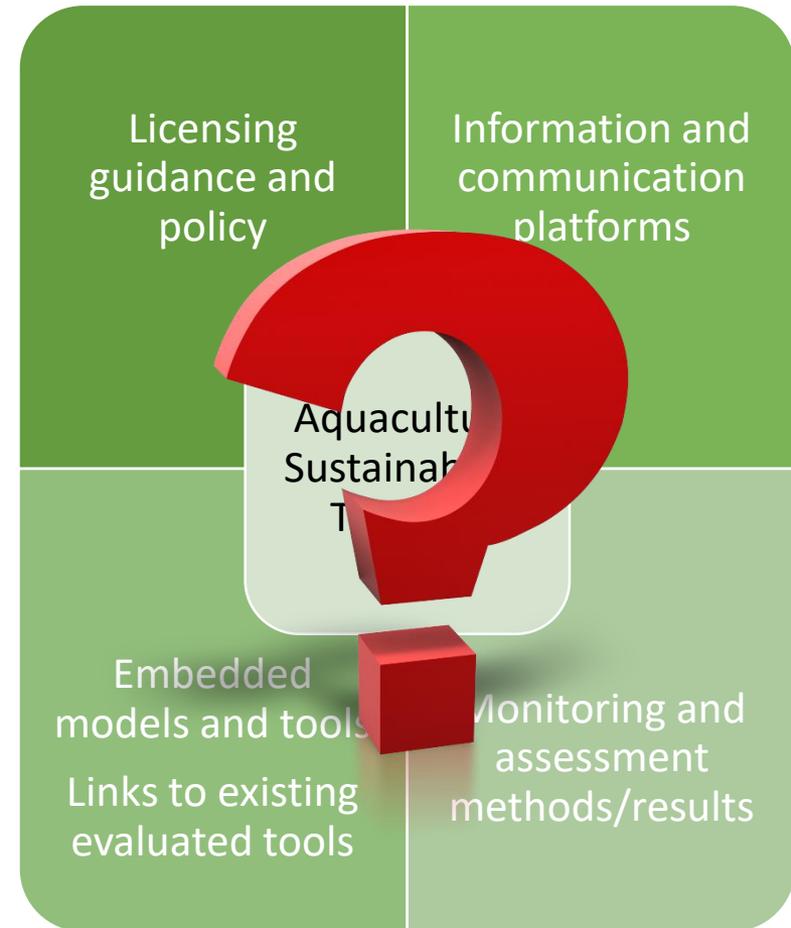
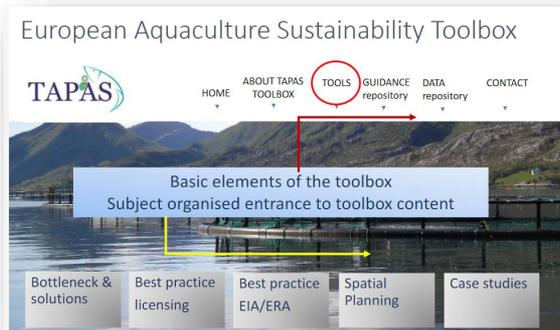


Work Package 8: Aquaculture Sustainability Toolbox

Outputs

Still under construction and consultation with stakeholders

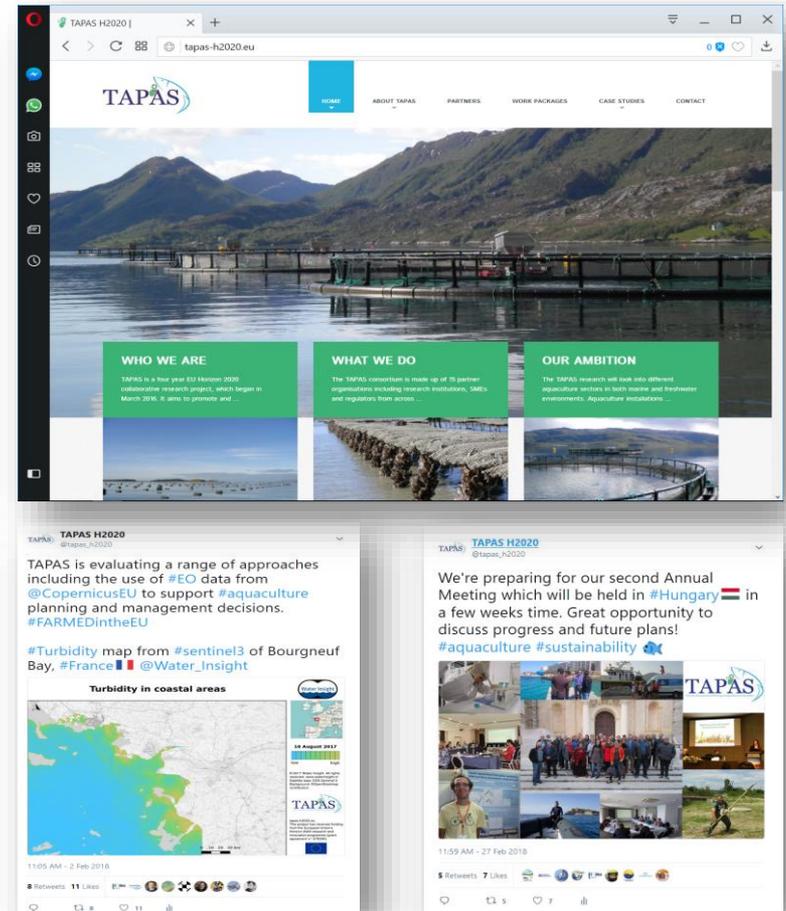
- WAS/EAS Montpellier 2018
- EAS Berlin 2019



Work Package 9: Dissemination, Outreach and Exploitation

Objectives

1. **Communication strategy** to provide information about the project for all relevant stakeholder groups.
2. Coordinate and encourage the **exploitation of the project results**
3. Enhance the use of project results by **EU decision making bodies, national and regional authorities.**
4. Ensure the **involvement of the European aquaculture industry** in the project (links to WP2).
5. **Enhance the image of EU aquaculture** through communication of TAPAS results to the public.



Links with other EU projects

Related projects?

- TAPAS
- AquaSpace
- ClimeFish
- CERES
- SUCCESS
- PrimeFish
- PerformFish
- MedAid
- Others ???



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