H2020

TOOL FACTSHEET

Tool name

EcoWin.net

Tool type

Ecological model

Short description of the tool

The EcoWin.net model is an ecosystem scale ecological model that combines a 3D hydrodynamic model with biogeochemical models, shellfish growth models, and a eutrophication screening model for the determination of shellfish production and for the assessment of water-quality changes on account of shellfish cultivation. In Long Island Sound a 2 layer, 42 box EcoWin model grid was used to simulate system-scale oyster production, and associated drawdown of Chl, POM, and N using relevant transport, biogeochemistry, and shellfish model components. Oyster populations were modeled using standard population dynamics equations driven by individual growth and mortality, using 20 heterogeneous weight classes spanning 0-100 g live weight. Seeding and harvest are explicitly simulated, defined from expert knowledge of local growers. Seeding takes place annually from Year 1, with first harvest in Year 3. Harvest is regulated by the availability of market-sized animals and market demand. Model inputs include water quality (temperature, salinity, chlorophyll, particulate matter), farm dimensions and operations (seeding density, mortality, culture period, and type of operation [i.e. cage or bottom with no gear], seed price, harvest value). Outputs include harvest amount, value of product, particulate and nutrient removal, nutrient excretion, feces and mortality of oysters, changes in dissolved oxygen and chlorophyll. The model was used to evaluate the capacity for aquaculture operations to remove nutrients directly from the water, and the value of that ecosystem service, at current and expanded oyster cultivation areas (e.g. Bricker et al., 2014, 2017).

Source (where/ link)

EcoWin page at www.longline.co.uk

Licence cost or other type of costs (e.g. maintenance)

Context-dependent, please see source link.

General requirements (technical and input data)

Input data are usually tabular data of any kind of nature: environmental.

Management dimension for which the tool could be used

☒ Policy / Management

☒ Environmental

☒ Economic / Market

☒ Other sectors

Main functionality

☒ Site identification
☒ Modelling
☒ Mapping
☒ Stakeholder engagement
☒ Economic analysis
☒ Ecosystem services assessment
☒ Scenario analysis
☐ Other: (Please specify)

Fields of application (i.e. issue to be solved)

EcoWin can be used to determine production, nutrient removal, changes in environmental variables, and economic value of product and nutrient removal.

Circumstances in which it can be implemented (strength and opportunities)

EcoWin lets user to combine both empirical data and expert opinion.

Limitations

Required environmental data measured at site where analysis takes place. Circulation model should be available at location where model is being applied for maximum utility.

Technical skills needed to operate the tool

Basic computer skills are necessary to input data and analyse out puts.

Background knowledge needed to implement the tool

User needs to have enough expertise of the system to be modelled (e.g. ecosystem functioning, economic trade-offs, etc.) in order to analyse performance and results.

How can the tool contribute to the EAA

Please select the EAA steps that the tool can contribute:

1. ☒ Scoping
2. ☒ The identification of issues and opportunities
3. ☒ Prioritisation of issues
4. ☒ Objectives
5. ☒ Management actions
6. ☒ Monitoring

How can the tool contribute to the MSP

Please select the MSP steps that the tool can contribute:

1. ☒ Define goals and objectives
2. ☒ Gather data and define current conditions
3. ☒ Identify issues, constraints, and future conditions
4. ☒ Develop alternative management actions
5. ☒ Evaluate alternative management actions
6. ☒ Monitor and evaluate management actions
7. ☒ Refine goals, objectives and management actions

AquaSpace case studies in which it has been implemented

Case study name:

Long Island Sound, USA

Reference and link to case studies report:

AquaSpace D4.2 at www.aquaspace-h2020.eu Library/Reports page

Other bibliographic references

Bricker, Suzanne B., Joao Gomes Ferreira, Changbo Zhu, Julie M Rose, Eve Galimany, Gary Wikfors, Camille Saurel, Robin Landeck Miller, James Wands, Philip Trowbridge, Raymond Grizzle, Katharine Wellman, Robert Rheault, Jacob Steinberg, Annie Jacob, Erik D. Davenport, Suzanne Ayvazian, Marnita Chintala, and Mark A. Tedesco. 2017. The role of shellfish aquaculture in reduction of eutrophication in an urban estuary. *Environ. Sci. Technol.*, Just Accepted Manuscript • DOI: 10.1021/acs.est.7b03970

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