

Artificial Intelligence for Ecosystem Services (ARIES)

Basque Centre for Climate Change

Publication year: 2014

Version of tool: 0.9.9



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Overview

ARIES (ARTificial Intelligence for Ecosystem Services) is a semantic, cloud-based ecosystem services modeling framework designed to advance ecosystem service assessment on several fronts. To improve conceptual detail and representation of ES dynamics, it adopts a uniform conceptualization of ES that gives equal emphasis to their production, flow and use by society, while keeping model complexity low enough to enable rapid and inexpensive assessment in many contexts and for multiple services. To improve fit to diverse application contexts, the methodology is assisted by model integration technologies that allow assembly of customized models from a growing model base. By using computer learning and reasoning, model structure may be specialized for each application context without requiring costly expertise. These features are designed to support more accurate decision making in diverse application contexts.

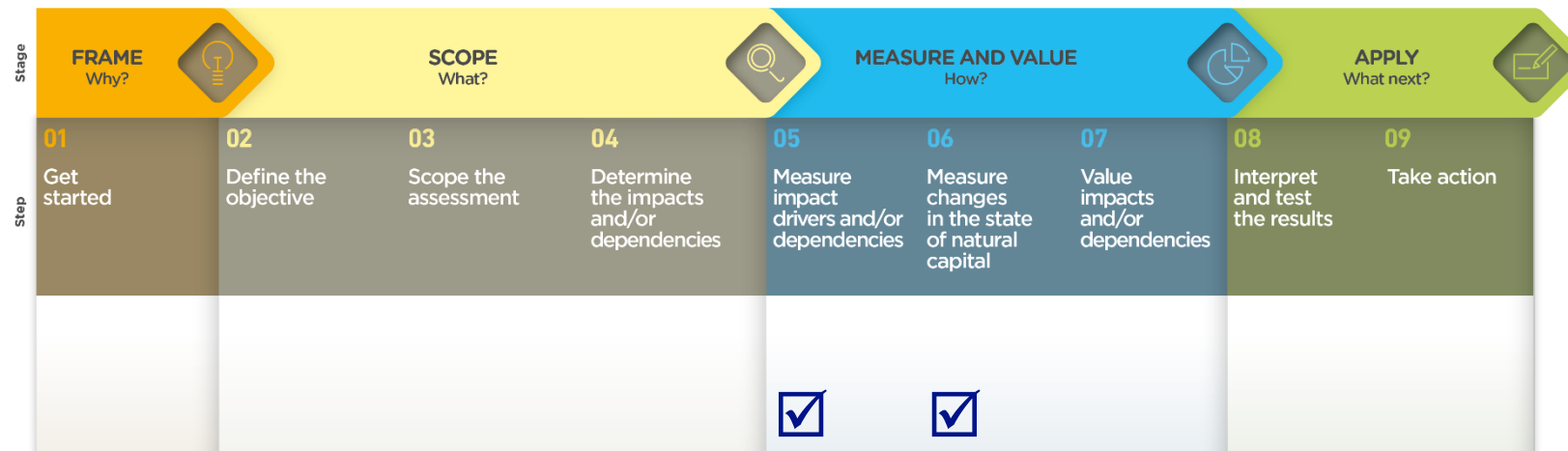
Section 1: Relationship to the Natural Capital Protocol

Impact drivers

Water use <input checked="" type="checkbox"/>	Terrestrial ecosystem use <input checked="" type="checkbox"/>	GHG emissions
Water pollutants <input checked="" type="checkbox"/>	Fresh water ecosystem use <input checked="" type="checkbox"/>	Non-GHG air pollutants
Soil pollutants	Marine ecosystem use	Disturbances
Solid waste	Other resource use	Impact on Biodiversity <input checked="" type="checkbox"/>

Dependencies

Energy	Regulation of physical environment <input checked="" type="checkbox"/>	Knowledge <input checked="" type="checkbox"/>
Materials <input checked="" type="checkbox"/>	Regulation of biological environment <input checked="" type="checkbox"/>	Well-being and spiritual/ethical values <input checked="" type="checkbox"/>
Nutrition <input checked="" type="checkbox"/>	Regulation of waste and emissions <input checked="" type="checkbox"/>	Dependency on biodiversity
Water <input checked="" type="checkbox"/>	Experience <input checked="" type="checkbox"/>	



Details on valuation if applicable:

- Qualitative
- Quantitative
- Monetary
- Value to business
- Value to society

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Section 2: Details for business users

Organizational Focus:

The part or parts of the business to be included in a natural capital assessment.

- Corporate:** Assessment of a corporation or group, including all subsidiaries, business units, divisions, different geographies or markets, etc.
- Project:** Assessment of a planned undertaking or initiative for a specific purpose. NOTE this includes assessments of sites, activities, processes, and incidents.
- Product:** Assessment of particular goods and/or services, including the materials and services used to produce these products

Value Chain Boundary

The part or parts of the business value chain to be included in a natural capital assessment.

- Upstream** (or cradle-to-gate): covers the activities of suppliers, including purchased energy
- Direct operations** (or gate-to-gate): covers activities over which the business has direct operational control Including majority-owned subsidiaries.
- Downstream** (or gate-to-grave): covers activities linked to the purchase, use, reuse, recovery, recycling, and final disposal of the business' products and services.

Geographical scope

- | | | | |
|---|--|-------------------------------------|--|
| <input checked="" type="checkbox"/> All | <input type="checkbox"/> Africa | <input type="checkbox"/> Antarctica | <input type="checkbox"/> Asia |
| <input type="checkbox"/> Europe | <input type="checkbox"/> North America | <input type="checkbox"/> Oceania | <input type="checkbox"/> South America |

Sectoral Scope

- | | |
|---|---|
| <input checked="" type="checkbox"/> All sectors | <input type="checkbox"/> Agriculture |
| Apparel | Banks, finance and insurance |
| Capital goods (including electrical equipment and machinery) | Chemicals |
| Commercial and professional services | Construction and engineering services |
| Construction materials | Consumer services (including hotels, restaurants and leisure) |
| Energy: non-renewables (including oil, gas and consumable fuel) | Energy: renewables |
| Environmental and ecological management services | Fisheries |
| Food and beverage (including tobacco) | Healthcare and pharmaceutical |
| Household and personal | Information and communication technology |
| Media | Metals and mining |
| Paper and forest products | Real estate |
| Retailing | Transportation |
| Utilities (including electricity, gas and water) | |

Type of tool and key features

- | | |
|--|--|
| <input checked="" type="checkbox"/> Equations, formulae, methods used for computations | <input checked="" type="checkbox"/> Spatial mapping or modelling, GIS data or files of measurements/values |
| General framework or guidelines | <input checked="" type="checkbox"/> Specially designed to compare multiple options/scenarios/strategies |
| List of references and sources to find measurements/values | Spreadsheet that already includes background measurements/values |
| List of measurements/values | Spreadsheet that does not include any background measurements/values |
| Mechanism to collect ecological data | Survey or questionnaire |
| <input checked="" type="checkbox"/> On-line calculator or model | |
| Other: ARIES integrates mathematical deterministic models, ecological process models, Bayesian belief network models, agent-based models, lookup tables. | |

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Section 3: Requirements of use

Intended User:

Business General public Conservation organization

Policy / government Science / academia

Other: Variable depending on use. Ranges from advanced modelling to simple mapping.

Skills required:

No specific skills are required Modelling expertise

Some environmental background needed LCA (Life Cycle Assessment) expertise

Environmental economics Ecology expertise

GIS (Geographic Information Systems) expertise Computing expertise

Other: Variable. Minimal expertise needed for the planned web based explorer. Extensive environmental modelling expertise needed if customize the tool.

Data required:

No Yes

If yes, details: To develop a custom case study, diverse input spatial and aspatial data of all kinds can be very useful. In the absence of custom data, global models will run based on available global data.

Average time required:

Hours Days Weeks Months Years

Variables that may affect the time required:

A screening assessment using the web explorer could be done in a matter of hours, while a highly customized analysis using user-contributed data and models could take months to years. Time requirements are highly dependent on the complexity of the assessment.

Software requirements if applicable:

The developer toolkit requires download of the kLAB software and for each user to receive a custom certificate that regulates their data and model access. The web explorer will not require software download.

Cost to access:

Free to access Indefinitely (pay once, permanent access)

\$1 – 1,000 Per use

\$1,001 – 5,000 Per license

\$5,001 – 10,000 Per year

>\$10,000

Other: Free for noncommercial use (academic/NGO/government). Commercial license required for commercial use

Other information regarding the cost to access:

N/A

Other conditions of use:

N/A

Planned updates:

Updates to the software and data and model base take place continuously.

Links to pilots, case studies or reviews (max 3)

<http://aries.integratedmodelling.org/?project=western-washington-case-study>

<http://aries.integratedmodelling.org/?project=agricultural-trade-offs-in-alava-basque-country>

<http://aries.integratedmodelling.org/?project=rocky-mountains-case-study>