ARtificial Intelligence for Ecosystem Services (ARIES) Tool Review

Ecosystem Services Tools

TABLES Project 2012: Mini reviews		
Guidance	*Using your experience and expertise, consider the following tasks in relation to the tool. It may not be possible to complete all tasks for each tool due to a lack of available information, the task not applying to the tool, etc.* ***Please note where this is the case by writing in the reason in the space provided****. Please use a maximum of 6 pages of A4 (excluding diagrams and appendices).* ***Your responses are required in the white spaces****.*	
Task 1: Basic information		
Name of the tool	**ARIES: ARtificial Intelligence for Ecosystem Services**	
Type of tool (list all that apply)		Mapping, modelling, decision, ecosystem services
Group members	1. Ron Corstanje	
	2. Jim Harris	
	3. Claudia Carter	
	4. Alister Scott	
Please provide a brief synopsis of the tool	ARIES is a web-based technology offered to users worldwide to assist rapid ecosystem service assessment and valuation (ESAV). Its purpose is to make environmental decisions easier and more effective. ARIES has been used for spatial mapping/quantification of services and valuation of services; PES; conservation; spatial planning; future change; land management decisions. ARIES helps discover, understand, and quantify environmental assets and what factors influence their values, in a geographical area and according to needs and priorities set by its users. ARIES is a suite of applications, all delivered to end users through the Web. All applications have been designed with the help of professional usability engineers, and are accessible through a standard web browser. Along with the main toolkit (Ecosystem Services Explorer, Valuation Database, and Biodiversity Explorer), custom ARIES interfaces can be built to simplify use by specific groups of end users. ARIES uses a benefit transfer approach. Under this methodology, each point on the landscape is assigned ecosystem service provision and value largely according to its land use and land use change, where the ecosystem service provision and values are calculated using value transfer methodologies. Ultimately, and in its most fundamental form, ARIES links services to recipients.	

Task 2: Use of the tool

Position / Use

Stage	Currently used	Could be used
Ideas	Y	Y
Survey	Y	Y
Assess	Y	Y
Policy / decision	Y	Y
Implement	Y	Y
Evaluate	Y	Y

Please add any further comments here:

Task 3: Existing literature about the tool

Are you aware of any KEY policy and / or academic literature evaluating your tool?

Author & Date	Title Vol pages	Web link (if available)
Bagstad *et al.* (2011) Bagstad, K.J., Villa, F., Johnson, G.W., and Voigt, B. ARIES – Artificial Intelligence for Ecosystem Services: A guide to models and data, version 1.0. ARIES report series n.1. http://www.ariesonline.org/docs/ARIESModelingGuide1.0.pdf		

Please add any further comments here:

Task 4: Your experience of working on the tool

Have you done any research/consultancy work on this tool in terms of its development, testing and/or evaluation?

N/A

Guidance

For Tasks 5-7, please also try to consider the **future** development and application of this tool in the TABLES project in your answers.

Task 5: Incorporating the ecosystem approach (EA) and ecosystem services (ES)

Using examples (from practice, research or consultancy), explain how EA and/or ES are currently incorporated in/by the tool

Ten ecosystem services have been modelled so far: carbon sequestration & storage, open space proximity, aesthetic viewsheds, flood regulation, sediment regulation, water supply, coastal flood regulation, subsistence fisheries, recreation, nutrient regulation. The Appendix, of this review, shows the countries where this has occurred.

How could the ecosystem approach and/or ecosystem services be (further) incorporated within the existing

Valuation of ecosystem services within the tool is currently lacking, but planned.

A global version is planned which can model major services across the globe using globally available datasets (more distant future). Linkages between terrestrial and aquatic systems are limited at present and need improving.

tool?	

Task 6: Situating the tool within priority questions/criteria arising from the scoping interviews

Explain how the tool can be situated within the priority questions/criteria that arose in the scoping interviews

Priority question/criteria	**Does your tool address/implement this question/criteria?** *If yes, please explain how.*
Language and communication	
1. Contribution to aiding the development of shared vocabulary within which principles of EA and ES can be shared with multiple stakeholders across built and/or natural environment	Yes, through visualization.
2. Capacity of the tool to develop shared understandings of the many identities and values of places from the perspectives of multiple visitors, residents and businesses	N/A
3. Capacity of the tool to improve or enable engagement across different publics so avoiding the usual suspect problem	Yes, through visualization and scenarios.
Learning from experience/pedagogy	
4. Capacity of the tool to help reveal and value 'hidden' assets that are not recognised by communities or publics that use them	Potentially, since ARIES incorporates a conceptual framework for mapping services comprising: source, users, sinks, flows, and includes positive and negative 'carrier' impacts.
5. Extent to which tool is building on other tools or EA/ES progress	N/A
6. Extent to which tool is locally derived or grounded or can be adjusted to closely reflect 'local' context. Is the tool suitable for an open source approach?	In principle, it can be applied at any scale. The structure allows users to supply data and knowledge at fine-scales to develop locally relevant case studies.
7. Extent to which the tool is open to interpretation and application in a variety of forms (that reflect 'cultural' differences)	Yes, through the networks. ARIES provides a modelling framework which can run external models via model-wrapping (choice of models is subjective; interpretation of 'outputs' is subjective).
Developing and selecting tools	
8. Is the tool dependent on a specific funding source? How	No. Some modelling background is needed in its application.

onerous is the application procedure? What are the chances of success?	ARIES provides a modelling framework which can run external models via model-wrapping in addition to its internal Bayesian probabilistic models. It can be run remotely via web browsers and therefore does not need extensive computing power or data storage capacity to be held by the user.
9. Does skills development (essential or optional?) and support exist for the tool or is there a body to ensure the optimal and correct use of it?	There is, the website featured earlier in this review provides more information on this. This is a key area for more effective engagement
10. Extent to which current statutory hooks can be exploited by the tool or will benefit the quality or application of the tool (e.g. NPPF's duty to cooperate, SUDS, ecol. networks)	There are important statutory hooks and EU directives which may bring this model into policy maker's radar.
Informing resultant policies effectively	
11. Extent to which the tool informs or improves policies/decisions. What does the tool cover? (full range of positive and negative economic, social and environment impacts / trade-offs?)	The tool supplies ecosystem service flows.
12. How does the tool link into the planning system (applications and processes)? At what cost / extra burden?	This is not applicable at the moment.
Delivering management objectives	
13. Suitability or capacity of the tool to assist with managing visitor needs and pressures within protected areas / the considered area? How?	N/A
Local ownership/new governance	
14. To what extent can the tool assist in developing statutory plans (local and management plans) and improve ownership and use by publics?	In principle it should be able to visualize the delivery of ecosystem services
15. To what extent does/could the tool contribute to a new form of community governance in management of the environment?	N/A
Improved tools: understanding flows, interconnections and spatial issues	
16. Capacity to improve spatial understandings of the flows and interactions of various ecosystem services between	The tool is very effective with this.

sectors and at different scales	
17. Capacity of the tool to reconcile assessments of options and benefits across different scales (and sectors)	Not as effective.
18. Extent to which the tools is capable or can be manipulated to work across sectoral and administrative boundaries	It is a GIS based tool that can be applied at a variety of scales.
19. Extent to which the tool can handle data shortages and gaps (or is effectiveness considerably compromised?)	Very effective through the Bayesian Network Approach; uses benefit transfer approach.
20. To what extent has/could the tool put landscape/nature conservation and designated species/sites on the radar (positively or resulting in resentment?)	The tool can visualise benefits.

Please add any further comments here:

Task 7: A SWOT analysis of the tool

Referring back to the relevant policy and academic literature (listed in Task 3), plus your own expertise (listed in Task 4) and the way in which the tool is situated within the priority questions/criteria (listed in Task 6), please complete a summary SWOT analysis ensuring that each point is well justified

Strengths *(of the tool in delivering intended outcomes)*
Can handle soft, uncertain and incomplete data
Can show interactions and handle interactions

Weaknesses *(factors that detract from the tool's ability to deliver intended outcomes)*
Complex to apply, not freely available to use (must go through the ARIES consortia team)
Not good at flows
Not good at temporal changes

Opportunities *(consider opportunities for application of the ecosystem approach and services)*
A good tool to model trade-offs.

Threats *(factors which negatively affect the tool and its outcomes)*

Threat	Seriousness (high, medium, low)	Probability of occurrence (high, medium, low)
Availability	High	High
Technical competence	High	High

Please add further comments here:

Guidance	*Please now use the remainder of the document (box below) to make any general comments, observations or analyses of the tool*
Further comments	

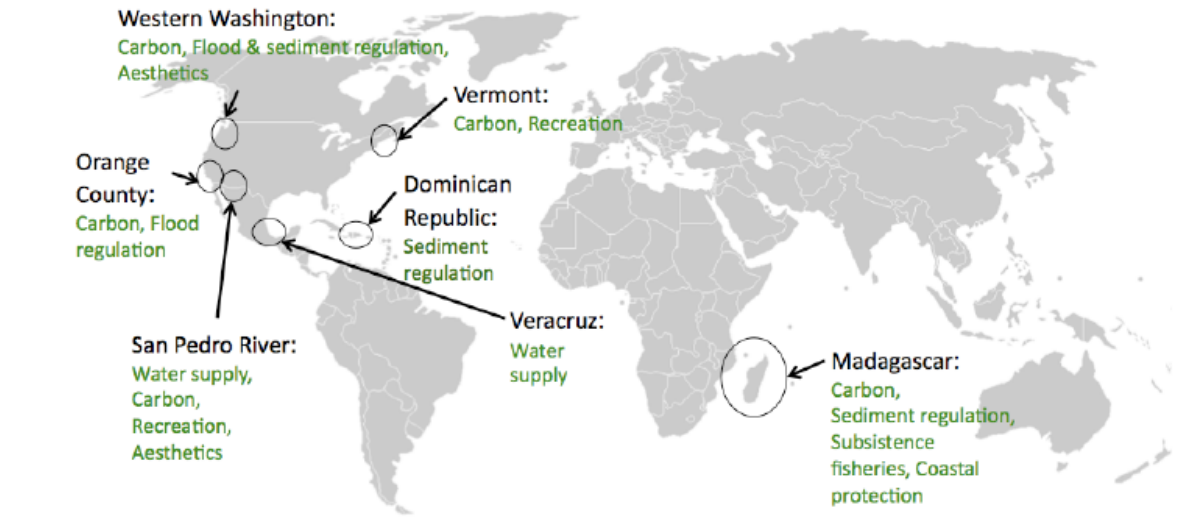

Figure: Case study applications of the ARIES model. From Bagstad *et al.* (2011)