THE SKIMMER ON MARINE ECOSYSTEMS AND MANAGEMENT

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The EBM Toolbox: Marxan, Present and Future

[**Editor's note:** The goal of The EBM Toolbox is to promote awareness of tools for facilitating EBM and MSP processes. It is brought to you by the EBM Tools Network, a voluntary alliance of tool users, developers, and training providers.]

Marxan is the most widely used conservation planning tool worldwide. With more than 5600 users in over 180 countries, Marxan helps planners make informed decisions on where to make conservation investments, such as siting marine protected areas. In recent months, the Marxan development team has introduced several updates to the tool. We caught up with Matt Watts and Hugh Possingham of the University of Queensland to learn more. Watts is the lead technical developer for Marxan, while Possingham co-developed Marxan and serves as custodian of Marxan development and research.

MEAM: Can you give us an overview of the new developments with Marxan?

Matt Watts and Hugh Possingham: We're constantly working to make Marxan easier to use, and improving it so it can solve more problems that encompass the "triple bottom line": society, the environment, and economics. Some recent developments include:

- It's now open source. Computer software wants to be free for everyone to use and modify. We've released all the source code for Marxan, Marxan with Zones, Zonae Cogito, C-Plan, and Marxan.net into the wild under the AGPLv3 open source software license. This will stimulate innovation and lead to improved sustainability and improved management of threatened species worldwide.
- Users can explore optimal tradeoffs between different objectives. We're making it easy for users to apply Pareto front analysis to conservation planning problems. These techniques allow planners to explore optimal tradeoffs between different objectives, such as between conservation and fisheries.
- R language is supported. R is the programming language most widely used by scientists worldwide. We've implemented virtually every part of the Marxan workflow with R. Users can construct and automate conservation planning workflows very easily with these tools. This includes powerful and simple graphical interfaces for Marxan.
- Users can store, analyze, and share scenarios in the cloud We've created an online infrastructure for cloud computing - Marxan.net - with easy-to-use graphical interfaces as well as a flexible command line interface.

MEAM: Clearly Marxan is adapting to user needs. What's your vision for where the tool is headed?

Watts and Possingham: There are a number of possibilities for directions we'll take the software in the future:

- Support for more programming languages and environments. We'd like to provide programming interfaces for other languages such as Matlab. This would allow users to integrate Marxan into systems and workflows in these languages.
- New algorithms. Different problems require different algorithms. We want to visualize the solution space for problems so users can decide which algorithm is best, then provide a range of algorithms that will work best for solution space of a problem. This will allow users to provide more optimal solutions to difficult problems.
- Supercomputing. We're developing techniques to improve the scalability of Marxan analysis. Users will be able to utilize massively scalable computer networks in easy-to-use interfaces to solve big problems more quickly.
- Global spatial prioritization system. We want to integrate a scalable real-time optimization system with a number of online repositories of environmental, social, and economic data. Users will be able to construct and analyze complex planning problems on the fly in a cloud environment.

[Learn more about Marxan atwww.uq.edu.au/marxan. Sarah Carr is coordinator for the EBM Tools Network. Learn more about EBM tools and the EBM Tools Network at www.ebmtools.org.]