FAST BREAKING PAPERS - 2008

October 2008

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Angel Borja talks with *ScienceWatch.com* and answers a few questions about this month's Fast Breaking Paper in the field of Plant & Animal Science. The author has also sent along images of thier work.

Article Title: Using historical data, expert judgement and multivariate analysis in assessing reference conditions and benthic ecological status, according to the European Water Framework Directive
Authors: Muxika, I;Borja, A;Bald, J
Journal: MAR POLLUT BULL
Volume: 55
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Year: 2007
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(addresses have been truncated)

SW: Why do you think your paper is highly cited?

In 2000 we developed and published in *Marine Pollution Bulletin* an index of quality—a Marine Biotic Index (AMBI)—which has since been applied to different anthropogenic impacts in many geographical areas—throughout the European Union, Uruguay, Brazil, Morocco, Algeria, Tunisia, China, the USA, Mexico, Canada, Turkey, Indonesia, Greenland, Reunion Island, etc.

Together with this paper we decided to develop free software which made it easier to calculate and to represent the index, which probably has helped to spread the use of the AMBI index. *Essential Science Indicators*SM from Thomson Reuters selected this paper as a Fast Moving Front article in September, 2007.

Figure 1: +details

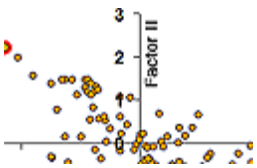
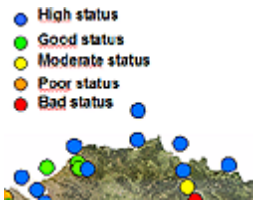


Figure 2:



The increasing need in Europe to find environmental tools able to assess marine quality led us to adapt our methodology in detecting anthropogenic impacts upon marine benthic communities to the European Water Framework Directive (WFD). This legislation requires the use of good methodologies in detecting such impacts. The ease of use in applying our methodology, along with its reliability for research investigation, makes this approach quite useful and, subsequently, the paper is highly cited.

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

Yes, we proposed a new methodology (M-AMBI or multivariate AMBI), based upon previous findings, such as the AMBI index, but also in our previous investigations in assessing physico-chemical quality in marine waters—see Bald *et al*., "Assessing reference conditions and physico-chemical status according to the European Water Framework Directive: A case-study from the Basque Country (Northern Spain)," *Marine Pollution Bulletin* 50 (12): 1508-22, 2005.

Here, we include AMBI, together with two structural parameters (richness and Shannon diversity—an index which is commonly used to characterize species diversity in a community) into a factor analysis, which permits, in a simple way, the assessment of marine and estuarine benthic quality. This allows scientists to readily show the quality of a specific location to policymakers and stakeholders.

SW: Would you summarize the significance of your paper in layman's terms?

The M-AMBI offers a "pollution or disturbance classification" of a particular site, representing the soft-bottom benthic community "health," assessing the ecological status of a location, following the WFD. This is very important in terms of management of marine habitats and also in assessing the ecological and environmental status of marine ecosystems in Europe.

SW: How did you become involved in this research and were there any particular problems encountered along the way?

Authors - left to right: Iñigo Muxika, Angel Borja, and Juan Bald.

My background, as senior leader of the group, is in benthic ecology, and, at AZTI, I have been involved for many years in marine monitoring and ecological assessment. One of the problems we faced was related to the absence of ecological tools with which to determine and illustrate, in a simple way, the impact on marine systems. We need these tools both for marine monitoring and marine environmental impact assessment.

I was supervisor of the Ph.D. thesis of Iñigo Muxika, who participated in these investigations, and the subject of this paper was one of the findings within his thesis. This research team, together with the AZTI's team involved in the WFD implementation, decided to develop different methodologies in order to help other scientists with the task of making complicated biological data accessible to stakeholders, M-AMBI for benthic communities being one of the results.

SW: Where do you see your research leading in the future?

We are trying to improve the methodology, specifically relating to reference conditions in estuarine waters, and also the development of new methods, applicable to hard-bottom substrata as well as to other elements of the ecosystem, such as physico-chemical, chemical, phytoplankton, macroalgae, and fishes. Moreover, we are investigating and publishing integrative approaches while including all these aspects into a unique assessment of water bodies.

SW: Do you foresee any social or political implications for your research?

Yes, this research is being applied to the implementation of the WFD. Many European countries have officially adopted this methodology in their marine assessments, or have adapted it to their particular needs. Moreover, it has been intercalibrated with other methods in Europe and the USA, with very good results.

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Keywords: marine biotic index, european water framework directive, assessment of marine and estuarine benthic quality, anthropogenic impacts upon marine benthic communities, benthic ecology, management of marine habitats, ecological and environmental status of marine ecosystems in europe.

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