Antonio Bodini
Curriculum Vitae et Studiorum

PERSONAL DATA
Born in Cremona September 2, 1960.
Private Address: Via Donatori del Sangue 167, 43100 Parma, Italy
Working Address: Department of Environmental Sciences, Viale Usberti 11/A, University of Parma, 43100 Parma, Italy
Phone +39-0521-905614
Fax +39-0521-905402
e-mail: antonio.bodini@unipr.it

PRESENT POSITION

- 1993 – present. Researcher (scientific area BIO/07, Ecology), Department of Environmental Sciences, University of Parma.

PROFESSIONAL BACKGROUND

- June 1997- September 1997: Visiting Scientist, Chesapeake Biological Laboratories, University of Maryland System, Solomons, MD
- 1990-1992: Post-doctoral position, Institute of Ecology and Department of Environmental Sciences, University of Parma;
- October 1989- October 1990: Post-doctoral Fellow, Department of Population and International Health, Harvard School of Public Harvard University, Cambridge, MA, USA (funding organization: CNR-NATO, Italy);
- February 1988-July 1988: Visiting Fellow, Department of Population Sciences, Harvard School of Public Health, Harvard University, Cambridge, MA, USA.

EDUCATIONAL BACKGROUND

- Bachelor degree in Biological Sciences (cum laude) (University of Parma);
- Ph.D. in Environmental Sciences (University of Parma);
- Training Course in "Biological Models", Summer School on Environmental Dynamics" CNR-Istituto Veneto di Scienze, Lettere ed Arti (1-12 June 1992);
- Workshop "Biodiversity and Ecosystem function in an European Perspective". London, 11-13 July 1993.
- Advanced Study Course "Environmental Change: Valuation Methods and Sustainable Indicators", Commission of the European Communities, DGXII, Science, Research and Development (29 August-5 September 1998).

SCIENTIFIC ACTIVITY

Main research directions are in the field of ecosystem ecology. Theoretical approaches and modelling applications are developed to study natural and human ecosystems. Results are translated into potential applications in the fields of sustainability, environmental impact assessment and environmental management.

- Food web analysis (Publications # 2, 3, 4, 5). Food webs are investigated in their topological features in search of structural and functional patterns. In particular, effort has been devoted to explore secondary extinction, food web sensitivity to species removal, and scaling relations in food webs.
- Ecosystem study through network analysis (Publications # 1, 7, 11; Publications on national journals # 1, 2, 3). Ecosystems are represented as flow networks and studied to unveil patterns of growth and development. In this framework, studies have been conducted to detect early signs of stress. Representing urban ecosystems as networks of different resources (i.e. water, energy) patterns of growth and development provide clues as for their propensity to sustainability.

- Qualitative modelling of ecosystems (Publications # 9, 10, 12, 13, 15, 16, 17, 18; Publications on national journals n. 4, 5, 7, 8). Often the quantitative description of ecological systems is precluded by the lack of data and difficulty to give precise mathematical form to ecological processes. This hampers the possibility to investigate phenomena that are of practical relevance, such as it often occurs in environmental impact assessment. Qualitative modelling allows the study of partially specified systems as signed digraphs. Table of predictions from the analysis of these models become diagnostic tools to identify sources of changes in the ecosystem and to interpret patterns of cause and effect.
- Management studies. (Publications # 6, 8, 10, 14). The human environment is the broad object of investigation in this field. Research efforts go in the directions of defining indices of environmental quality and shaping strategies for sustainable management. Case studies of practical interests are investigated.

EDUCATIONAL ACTIVITIES

Courses Taught through the University of Parma

- **Environmental Impact Assessment** for undergraduate students, degree in Environmental Sciences, academic years 2004-2005, 2005-2006.
- **Strategic Environmental Assessment** for undergraduate students, degree in Environmental Sciences and Technologies, academic years 2004-2005, 2005-2006;
- **Species Interactions** for undergraduate students, degree in Ecology, academic years 2004-2005, 2005-2006.
- **Political Ecology** for undergraduate students, degree in Environmental Science and Technology, academic year 2005-2006;
- **Sustainable Development** for undergraduate students, degree in Environmental Science and Technology, academic year 2005-2006.

Courses Taught outside the University of Parma

- **Qualitative Modelling and Network Analysis for Marine Ecosystem Study**. 1st Summer School on 'Mathematical Modelling in the Marine Sciences', Mytilini, Lesvos, Greece, 4-17 July 2005.
- **Environmental Problems and Policies in Europe** for undergraduate students of the Boston College. Exchange program between the University of Parma and the Boston College. Academic years 2002-2003, 2004-2005, 2006-2007.
- **Environmental Decision Making** for graduate students. European Master in Environmental Managament, Application Module "Management of River Basins and Related Coastal Areas". European Association for Environmental Management Education. Years 1995, 1996, 1998, 1999.
- **Natural Resource Management** for graduate students. Master in Integrated management of Coastal Areas. University of Bologna–Ravenna. Academic years 2000-2001 e 2002-2003.
- **Tools for Planning: the Strategic Environmental Assessment**. High specialization course for public administrators. Organized by e-Ambiente and Veneto Regional Administration. Marghera (Venice) 6-8 April 2005.

Graduate Students Supervised as Major Advisor

- **Stefano Allesina** (Ph.D. 2004) "Ecologial Flow Networks: Topological and Functional Features"
- **Nicola Clerici** (Ph.D. 2005) "Monitoring and Assessing Fire Impact and land Cover Change in Tropical and Subtropical Ecosystems using Satellite Remote Sensing and GIS Techniques".

UNIVERSITY ACTIVITIES

- Member, Committee Ph.D. program in Ecology, University of Parma

CONSULTING ACTIVITIES

- 2002-2005. Municipality of Spinadesco (province of Cremona, Italy). Environmental impact assessment of a natural gas power plant.
- 2003 - present. Province of Parma. Disseminating knowledge and implmenting projects involving the use of renewable energies.
- 2003 – present. Province of Piacenza. Member of the provincial observatory on sustainable development.
- 2005 – present. Municipality of Parma. Member of the Commission for Environmental Compatibility of Building Activity.

CONTRACTS AND GRANTS

- Project "Flows of matter and energy and indicators of ecosystem health. Applications to lake ecosystems", 1999-2001. Ministry of Scientific Research. Coordinator of the local research unity Grant 28,405 Euros.
- Project "Impact Assessment of a dredging activity and restoration of a perifluvial area", year 2002. Muncipality of Montechiarugolo (Parma). Principal Investigator. Grant 22,000 Euro
- Project "Environmental accounting through ecological footprint and energy flow networks for an urban ecosystem". 2002-2003. Municipality of Piacenza. Principal investigator. Grant 20,000 Euro
- Project "Development of an Information Technology Tool for the Management of European Southern Lagoons under the influence of river-basin runoff". European Union. Coordinator of the local research unit in charge of the task "development of Ecological Models". 2002-2005. Grant 43.520 Euro
- Project "Saving water in the civil sector" Emilia Romagna Region. 2003-2005. Principal investigator. Grant 15,000 Euro
- Project "Sustainable use of water resource and renewable energy in a mountain district (Parma, Italy). 2006-2009. Principal investigator. Grant 70,000 Euro.
- Project "Environmental Assessment of Energy Planning Activity in the Province of Parma (Italy)". Province of Parma. 2007-2008. Principal investigator. Grant 70,000 Euro

EDITORIAL ACTIVITIES

Collaboration as e referee with the following journals:

- Ecology (1 paper)
- Environmental Management (3 papers)
- Ecological Modeling (4 papers)
- Canadian Journal of Fisheries and Aquatic Sciences (3 papers)

- Honorary Theme Editor for the section "Ecology" within the on-line **"Encyclopedia for Life Support Systems"** (EOLSS) UNESCO publisher (http://www.eolss.com/).

PRESENTATIONS ON INVITATION

- Boston, 1-3 June 2000. Workshop "The thruth is the whole". (prof. Richard Levins' Festshrift) Harvard School of Public Health. Title: "The potential of qualitative modelling in descriptive and predictive ecology. Applicaztions to kelp forest ecosystems".
- Beaufort, North Carolina, 21- 24 March 2001. Workshop "Networking the invisible colleges: application of network theory to biocomplexity". Duke Marine Laboratory. Title of the speech: "Environment as the outcome of natural and human-induced processes and mechanisms. Exploring the mixed network by qualitative modelling".
- Abano Terme (PD – Italy), 2-5 October 2003. XVI International Congress on Clinical Biology, Environment and Safety. Title of the speech: "Ecosystem approach and sustainable use of the water resource".

LIST AND SHORT CONTENTS OF THE 10 MOST SIGNIFICANT PAPERS

1. **Bodini, A. 1998. Representing ecosystem structure through signed digraphs. Model reconstruction, qualitative predictions and management: the case of a freshwater ecosystem. Oikos 83: 93-106.** Predictions occupy a central position in environmental management. To make predictions, models are constructed and analyzed. In this framework the quantitative approach based on large simulation models dominates. It has been shown in various ecological contexts that relevant aspects of the systems behavior may depend on the structure of the interactions. In this paper a strategy to reconstruct the structure of a freshwater ecosystem is presented. It uses statistical patterns and field observations combined with a qualitative algorithm, that of the loop analysis. This procedure leads to unambiguous conclusions about system structure, although alternatives are possible. The models obtained are then qualitatively investigated and results discussed about management opportunities.

2. **Bodini, A. 2000. Reconstructing trophic interactions as a tool for understanding and managing ecosystems: application to a shallow eutrophic lake. Canadian Journal of Fisheries and Aquatic Sciences 57: 1999-2009.** Disturbance and human interventions on lake ecosystems often emerge as impacts in the food web. The consequences of such impacts are difficult to anticipate solely by intuition because of the complex interactions that arise in lake communities. Understanding how species interact and how the structure of the interactions buffers or amplifies external impacts is a current focal point of the ecology of lakes because of its profound practical implications. This paper shows how the structure of a lake food web can be reconstructed by applying a procedure that uses the results of an external intervention combined with a qualitative algorithm that of the loop analysis. Attention focuses here on Lake Mosvatn (Norway), a moderately eutrophic body of water, which was monitored for two years after a biomanipulation experiment. By reconstructing the main interactions that are thought to form the food web of this lake it is shown how the effects of biomanipulation are converted into a number of predictions that can shed light on the observed patterns of abundance, and provide clues about consequences of external impacts. Emphasis in this respect is given to nutrient enrichment, and management opportunities are discussed.

3. **Bodini A., Ricci A., Viaroli P. 2000. A multi-methodological approach for the sustainable management of perifluvial wetlands of the Po river (Italy). Environmental Management 26: 59-72.** Marginal aquatic systems (wetlands) of the Po River (Italy) have become the target of a renewed interest because of their value for recreation, natural reserves, and deposits of sand. To preserve these sites, wise management must be the objective of local administrations. In this paper a strategy for the sustainable use of 11 wetlands is presented. It uses simple economic analysis and multiple criteria techniques and provides suggestions to promote sustainability in terms of conservation of natural resources, economic selfsufficiency, and minimization of potential conflicts about the use of the wetlands. In the understanding that sustainability is framed in a long-term perspective, stability analysis is also considered and performed by means of loop analysis, a qualitative technique. Conditions for stability are then discussed about management opportunities.

4. **Allesina S., Bodini A. 2005. Food web networks: scaling relation revisited. Ecological Complexity 2: 323-338**. Food webs seem to possess scale invariant attributes among which efficiency has been recently included. Considering food webs as transportation networks it has been shown that minimum spanning trees, topologies that minimize cost for delivering medium, satisfy a universal scaling relation. It is not clear, however, whether resource distribution follows the criterion of minimum cost, because longer, less efficient routes are used as well. Because of this, instead of focusing on minimum length spanning trees (MLST), we consider directed acyclic graphs (DAGs) as better descriptors of food web hierarchies. Twenty well known empirical food webs have been transformed into DAGs and a scaling relation has been observed between number of nodes and their level of effective connectivity. Although we derived the scaling relation for DAGs using topological arguments, the exponent of the equation C / Ah shows same mathematical properties than its functional counterpart computed through flow analysis. This suggests that h can be used as a proxy for efficiency in food webs. The values of this coefficient for DAGs are lower than the ones obtained for minimum spanning trees, suggesting that food webs lie in the range of medium-to-low efficiency networks. This challenges the idea that these systems would be more efficient than other types of networks.

5. **Allesina S., Bodini A., Bondavalli C. 2005. Ecological subsystems via graph theory: the role of strongly connected components. Oikos 110: 164-176.** This paper investigates ecological flow networks via graph theory in search of the real sequential chains through which energy passes from producers to consumers in complex food webs. We obtain such fundamental pathways by identifying strongly connected components (SCCs), subsystems that groups species that take part in cycling, and performing topological sorting on the acyclic graphs that are obtained. Topological sorting identifies preferential directions for energy to flow from sources to sinks, while recycling remains confined within each SCC. Resolving food web networks for SCC highlights the possibility that compartments can be found in ecosystems, but this does not seem a general rule. The four aquatic food webs described in detail show a rather clear subdivision between benthic and pelagic subcommunities, a result that is discussed in the light of other studies. Should further research confirm these results, new insight into the way ecosystems use energy will be provided, with implications on cycling, reciprocal dependency of variables and indirect effects.

6. **Allesina S., Bodini A. 2004. Who dominates whom in the ecosystem? Energy flow bottlenecks and cascading extinctions. *Journal of Theoretical Biology* 230: 351-358**. This paper investigates the problem of secondary extinction in food webs through the use of dominator trees, network topological structures that reduce food webs to linear pathways that are essential for energy delivery. Each species along these chains is responsible for passing energy to the taxa that follow it, and, as such, it is indispensable for their survival; because of this it is said to

dominate them. The higher the number of species a node dominates, the greater the impact resulting from its removal. By computing dominator trees for 13 well-studied food webs we obtained for each of them the number of nodes dominated by a single species and the number of nodes that dominate each species. We illustrate the procedure for the Grassland Ecosystem showing the potential of this method for identifying species that play a major role in energy delivery and are likely to cause the greatest damage if removed. Finally, by means of two indices that measure error and attack sensitivity, we confirm a previous hypothesis that food webs are very robust to random loss of species but very fragile to the selective loss of the hubs.

7. **Allesina S., Bodini A., Bondavalli C. 2005. Secondary extinction in ecological networks: bottlenecks unveiled. Ecological Modelling, in press**. In ecosystems, a single extinction event could eventually precipitate in a mass extinction, involving species that may be several connections away from the target of the perturbation. This topic has been illuminated by recent studies on network mechanics, thanks to the concepts of hub, error and targeted removal, attack sensitivity, small world, and so forth. To forecast the effects of a species removal one can use an algorithm that unfolds a complex food web into a topologically simpler scheme, called its dominator tree. This structure is simple, elegant, and highly informative; all the bottlenecks and the effects of species removal are clearly traceable. While food web studies are mostly qualitative, in this paper the use of the dominator tree is extended to weighted food webs, in which link magnitude is specified. These structures were obtained from ecological flow networks. In eight of these food webs, the analysis consisted in removing links that were weaker than a threshold of magnitude and building the dominator tree associated to the remaining structure. By progressively increasing the threshold up to the value that would make the graph disconnected, we had the opportunity to investigate patterns of dominance as a function of link magnitude.

8. **Bondavalli C., Bodini A., Rossetti G., Allesina S. 2006. Detecting stress at the whole ecosystem level. The case of a mountain lake: Lake Santo (Italy). Ecosystems 9(5): 768-787.**. Detecting early signs of stress is a key issue for the conservation of natural ecosystems. This may, however, be difficult to achieve because ecosystems, when disturbed, may act as sinks that absorb the external impact without undergoing evident changes. This seems to be the case of Lake Santo, a small water body located in a mountain area of Northern Italy. Tourism activity in this area began to develop in the early seventies and grew continuously during the following twenty years. This caused a continually increasing nutrient load into the waters, but surprisingly the lake has remained oligo-mesotrophic as it was before human pressure became a stressor to the lake. To anticipate possible severe damage to the ecosystem we searched for early signs of stress by carrying out a retrospective analysis based on a whole ecosystem approach using trophic flow networks. Ecosystem properties of the lake as calculated from network analysis for the disturbed (year 1991) and unimpacted (year 1973) configurations were compared with the support of sensitivity analysis and statistical tests. We found evidence that in the period 1970-1990 nutrient enrichment did change the course of normal development as the observed increase in the system throughput was accompanied by a drop in the level of mutual organization of flows, which instead would be expected to increase during ecosystem natural progression. The scenario that emerges from the comparison of system level indices, cycling activity, trophic structure and trophic efficiency indicates that the ecosystem was subjected to stress. In particular, the type of disturbance matches with a quantitative definition of eutrophication.

9. **Bodini, A. 1991. What is the role of predation on stability of natural communities? A theoretical investigation. BioSystems 26: 21-30.** A basic question in ecology concerns the role of species interaction on dynamics of natural communities. In this framework, ecologists have considered predation, competition, mutualism, the three most important interactions, highlighting their specific effects on distribution and abundance of species, providing knowledge about phenomena like coexistence and extinction. This paper seeks to identify the effects of predation on stability of natural communities by mathematical models. Simple multispecies community models, organized in trophic levels, are analyzed by means of a qualitative technique, loop analysis, combined with a computer calculation procedure. Results do not support the hypothesis of predation as a stabilizing factor. Rather, the outcomes of the analysis suggest that predation may or may not stabilize a community. This depends on the predator's behaviour and on the network of the community.

10. **Giavelli, G., Bodini, A. 1990 Plant-ant-fungus communities investigated through qualitative modelling. Oikos 57: 357-365.** Qualitative models are applied to investigate aspects related to the activities of leaf-cutting ant populations, pernicious agents in the tropical areas of the New World for the productivity of forests and crop fields. The modelling approach allows global evaluation of interactions occurring in a natural system. In particular, loop analysis allows one to qualitatively handle the dynamic behaviour of complex systems subject to external actions that tend to modify their parameters. The peculiar mutualism between these insects and some Baisdiomycetes is articulated on subtle behavioural and biochemical mechanisms which confer a primary role to the leaf-cutting ants in the process of organic decomposition and mineral cycling. If one adds the diverse forms of interactions the ants undertake with other organisms to the variety of functions they carry out, one obtains a picture the would be reductive to analyse only from the point of view of the food chain, under the hypothesis of simple two-trophic level structures. The complexity of the community system generates feedback processes which condition the dynamics of the components, that involve cause-effect processes easily missed when intuitive or linear interpretations prevail. Alterations of parameters carried on to control the harmful action of these organisms can generate situations opposite to the expectations, as shown in the models here investigated.

PUBLICATIONS

Articles on International Journals

1. Bondavalli C., Bodini A., Rossetti G., Allesina S. 2006. Detecting stress at the whole ecosystem level. The case of a mountain lake: Lake Santo (Italy). ECOSYSTEMS, 9: 768-787. ISSN: 1432-9840 (**IF=3,283**). (Long Paper).
2. Allesina S., Bodini A., Bondavalli, C. 2006. Secondary extinctions in ecological networks: bottlenecks unveiled. ECOLOGICAL MODELLING, 194: 150- 161. ISSN: 0304-3800 (**IF=1,652**). (LP).
3. Clerici N., Bodini A., Eva H., Gregoire J., Dulieu D., Paolini C. 2006. Increased isolation of two Biosphere Reserves and surrounding protected areas (WAP ecological complex, West Africa). JOURNAL FOR NATURE CONSERVATION, 15: 26-40. ISSN: 1617-1381. (LP).
4. Scotti M., Allesina S., Bondavalli C., Bodini A., Abarca-Arenas L.G. (2006). Effective trophic positions in ecological acyclic networks. Ecological Modelling. vol. 198, pp. 495-505 ISSN: 0304-3800. (**IF=1,652**). (LP).
5. Allesina S., Bodini A. 2005. Food web networks: Scaling relation revisited. ECOLOGICAL COMPLEXITY, 2: 323-338 ISSN: 1476-945X (**IF=1.409**).
6. Allesina S., Bodini A., Bondavalli C. 2005. Ecological subsystems via graph theory: the role of strongly connected components. OIKOS 110: 164-176 ISSN: 0030-1299 (**IF=2.901**). (LP).
7. Allesina S., Bodini A. 2004. Who dominates whom in the ecosystem? Energy flow bottlenecks and cascading extinctions. JOURNAL OF THEORETICAL BIOLOGY, 230: 351-358. ISSN: 0022-5193 (**IF=1.683**). (LP).
8. Clerici N., Bodini A., Ferrarini A. 2004. Sustainability at the local scale: defining highly aggregated indices for assessing environmental performance. The province of Reggio Emilia (Italy) as a case study. ENVIRONMENTAL MANAGEMENT 34: 590-608. ISSN: 0364-152X (**IF=0.914**). (LP).
9. Bodini A., Bondavalli C. 2002. Toward a sustainable use of water resources. A whole-ecosystem approach using network analysis. INTERNATIONAL JOURNAL OF ENVIRONMENT AND POLLUTION, 15: 463-485. (**IF=0.156**). (LP).
10. Ferrarini A., Bodini A., Becchi M. 2001. Environmental quality and sustainability in the province of Reggio Emilia (Italy): using multi-criteria analysis to assess and compare municipal performance. JOURNAL OF ENVIRONMENTAL MANAGEMENT 63: 117-131. ISSN 0301-4797 (**IF=0.780**). (LP).
11. Bodini A. 2000. Reconstructing trophic interactions as a tool for understanding and managing ecosystems: application to a shallow eutrophic lake. CANADIAN JOURNAL OF FISHERIES AND AQUATIC SCIENCES 57: 1999-2009. ISSN 0706-652X (**IF=1.972**). (LP).
12. Bodini, A., Ricci, A.and Viaroli, P. 2000. A multi-methodological approach for the sustainable management of perifluvial wetlands of the Po river (Italy). ENVIRONMENTAL MANAGEMENT 26: 59-72. ISSN: 0364-152X (**IF=0.914**). (LP).
13. Bondavalli C., Ulanowicz R.E., Bodini A. 2000. Insights into the processing of carbon in the South Florida Cypress Wetlands: a whole-ecosystem approach using network analysis. JOURNAL OF BIOGEOGRAPHY, 27: 697-710. ISSN 0305-0270 (**IF=2.329**). (LP).
14. Bodini A. 1998. Representing ecosystem structure through signed digraphs. Model reconstruction, qualitative predictions and management: the case of a freshwater ecosystem. OIKOS 83: 93-106. ISSN: 0030-1299 (**IF=2.901**). (LP).
15. Bodini A., Giavelli G., Rossi O. 1994. The qualitative analysis of community food webs: implications for wildlife management and conservation. JOURNAL OF ENVIRONMENTAL MANAGEMENT 41: 49-65. ISSN 0301-4797 (**IF=0.780**). (LP).

16. Bodini A., Giavelli G. 1992. Multicriteria analysis as a tool to investigate the compatibility between conservation and development on Salina Island, Aeolian Archipelago, Italy. ENVIRONMENTAL MANAGEMENT 16: 633-652. ISSN: 0364-152X (**IF=0.914**). (LP).

17. Bodini A. 1991. What is the role of predation on stability of natural communities? A theoretical investigation. BIOSYSTEMS 26: 21-30. ISSN 0303-2647 (**IF=1.016**). (LP).

18. Giavelli G., Bodini A. 1990 Plant-ant-fungus communities investigated through qualitative modelling. OIKOS 57: 357-365. ISSN: 0030-1299 (**IF=2.901**). (LP).

19. Giavelli G., Bodini A., Rossi O. 1990. An extension of the complexity concept derived from the analysis of colonisation processes in small island environments. COENOSES 5: 1-5. (presently Community Ecology ISSN 1585-8553. (**IF=none**). (LP).

20. Bodini A., Giavelli G. 1989. The qualitative approach in investigating the role of species interactions on stability of natural communities. BIOSYSTEMS 22: 289-299. ISSN 0303-2647 (**IF=1.016**). (LP).

Books

1. Bodini A., Bondavalli C. Allesina S. 2007. The Ecosystem and its relationships. Ideas and tools for Environment Impact and Incidence Assesment. Franco Angeli, Milano, pp.160. (in Italian)

Chapters in books

1. Bodini A. Klotz S. 2002. The Science of Ecology for a Sustainable World. In: KNOWLEDGE FOR SUSTAINABLE DEVELOPMENT. AN INSIGHT INTO THE ENCYCLOPEDIA OF LIFE SUPPORT SYSTEMS. Chapter 11.2. EOLSS-UNESCO Publisher.

2. Bodini, A., Puccia, C.J., e Giavelli, G. 1990.Understanding resource management strategies under different ecological constraints: the case of oligotrophic and eutrophic lakes. pp 583-592 in Ravera, O. (ed.) TERRESTRIAL AND AQUATIC ECOSYSTEMS: PERTURBATION AND RECOVERY. Ellis Horwood, London, UK.

Articles on national journals

1. Casella V., Bondavalli C., Bodini A. 2005. L'uso dell'acqua in ambito urbano: un approccio ecosistemico per valutarne la sostenibilità. BIOLOGIA AMBIENTALE, 19: 1-13 ISSN: 1129-504X.

2. Peretto B., Bondavalli C., Bodini A., Rossi D. 2003. Propensione alla sostenibilità energetica degli ecosistemi urbani valutata mediante network analysis. BIOLOGI ITALIANI, 7: 53-63 ISSN: 0329-2510.

3. Rigoli, A., Bondavalli, C., Bodini, A. 2002. Uso sostenibile della risorsa acqua: un approccio ecosistemico mediante network analysis. ESTIMO E TERRITORIO 10: 26-36. ISSN: 0016-6863.

4. Bodini, A. 1996. Uncertainty and resource exploitation: exploration based on qualitative modelling. STATISTICA APPLICATA 8: 185-199. ISSN: 1125-1964.

5. Villa F., Bodini A., Rossi O. 1993. Esperimenti di simulazione come contributo allo studio delle soglie di disturbo antropico nelle comunità fluviali. QUADERNI ISTITUTO RICERCA SULLE ACQUE, C.N.R. 95 (7): 1-7.

6. Villa F., Bodini A., Sartore F. 1992. Nuovi approcci allo studio della complessità in ecologia: automi cellulari e la prospettiva agroecosistemica. SCIENZA DIRITTO & ECONOMIA DELL'AMBIENTE 3. 10-21.

7. Bondavalli C., Bodini A. 1991. Modellizzazione qualitativa in ecologia. Applicazioni alla lotta biologica. SCIENZA DIRITTO & ECONOMIA DELL'AMBIENTE 3:18-27.

8. Bodini A., Paris G. 1991. La modellizzazione qualitativa nello studio delle reti trofiche lacustri. Un contributo per programmi gestionali. SCIENZA DIRITTO & ECONOMIA DELL'AMBIENTE 4: 11-23.

Papers in proceedings of national congresses

1. Allesina, S., Zaccagnini, A., Bodini A., 2001. Un modello di simulazione abbinato ad un algoritmo qualitativo per lo studio dei sistemi ecologici. SITE Atti 2001 CDROM.

2. Ricci, A., Viaroli, P., and Bodini, A. 1997. Valutazione di alternative di gestione di ambienti acquatici marginali del fiume Po mediante analisi a criteri multipli. Atti del VIII Congresso Nazionale della Società Italiana di Ecologia, Parma, 10-12Settembre 1997. S.IT.E. Atti 18: 443-444.

3. Casadei, F., Bodini, A., Sartore, F., and Viaroli, P. 1997. Classificazione dei laghi nord appenninici in relazione alla vulnerabilità e al rischio ambientale Atti del VIII Congresso Nazionale della Società Italiana di Ecologia, Parma, 10-12 Settembre 1997. S.IT.E. Atti 18: 425-426.

4. Bondavalli C., A. Bodini and R.E.Ulanowicz, 1997. Il Contributo della Network Analysis nelle indagini a livello di ecosistema. Un caso di studio. SITE (Italian Society of Ecology) ATTI 18: 213-215.

OTHER PUBLICATIONS

Opinions

1. Ecological research and sustainable development. S.IT.E. Notizie, 1993, Vol XIV: 57-59. (in Italian)
2. What if Ecology would create one million employments? S.IT.E. Notizie, 1994, Vol XV: 32-35. (in Italian)
3. Urban wastes: technological problem or global emergency? S.IT.E. Notizie, 1995, Vol XVI: 70-78. (in Italian).
4. Encyclopedia of Life Support System (EOLSS): an knowledge-oriented initiative. SITE, Lettera ai Soci, Settembre-Ottobre 2002, Vol. 5: 3-6. (in Italian).

Book reviews

1. Vanishing Tuscan Landscapes (W. Vos and A. Stortelder) S.IT.E. Notizie, 1992, Vol XIII: 204-205. (in Italian)
2. Sistemi Biologici (A. Parise) S.IT.E. Notizie, Vol XV: 86-87. (in Italian)
3. Ecology: The Ascendent Perspective (R. Ulanowicz) S.IT.E. Notizie, 1998. (in Italian)