

STE: SCUBA TOURISM FOR THE ENVIRONMENT - RED SEA BIODIVERSITY MONITORING PROGRAM

PROPONENTS

STEFANO GOFFREDO¹, CORRADO PICCINETTI², FRANCESCO ZACCANTI¹

***ALMA MATER STUDIORUM - UNIVERSITY OF BOLOGNA
MARINE & FRESHWATER SCIENCE GROUP***

¹ DEPARTMENT OF EVOLUTIONARY AND EXPERIMENTAL BIOLOGY, via Selmi 3, 40126 Bologna, Italy

² LABORATORY OF MARINE BIOLOGY AND FISHERY OF FANO, viale Adriatico 1/n, 60123 Fano, Italy

KEY WORDS:

Biodiversity

Red Sea

Environmental Monitoring

Naturalistic Education

Sustainable Tourism

Sustainable Development

Conservation

Contents

THE PEOPLE AND INSTITUTIONS INVOLVED	3
RESEARCH SCIENTISTS	5
INTRODUCTION	
THE VALUE OF ENVIRONMENTAL MONITORING	6
PREVIOUS RELATED PROJECTS – UNIVERSITY OF BOLOGNA	6
THE RED SEA PROJECT	7
OBJECTIVES AND STRATEGIC RELEVANCE	9
DESCRIPTION OF THE PROPOSED STUDY	
KEY ACTIONS FOR RESEARCH	10
KEY ACTIONS FOR CONSERVATION	12
KEY ACTIONS FOR SUSTAINABLE DEVELOPMENT	12
RELATED INITIATIVES	13
TIMELINE	14
REFERENCES	14
PROPONENTS' RESUMES	16

Annex A: "Mediterranean *Hippocampus* Mission"

Annex B: "Scuba Diving for the Environment. 2002-2005: Mediterranean Underwater Biodiversity Project"

THE PEOPLE AND INSTITUTIONS INVOLVED

INSTITUTIONAL PROMOTERS:

Alma Mater Studiorum – University of Bologna, Department of Evolutionary and Experimental Biology, Marine & Freshwater Science Group

PROJECT CHAIRMAN:

Francesco Zaccanti

SCIENTIFIC DIRECTOR:

Stefano Goffredo

ADMINISTRATIVE DIRECTOR:

Francesco Zaccanti

ADMINISTRATIVE HEADQUARTERS:

Department of Evolutionary and Experimental Biology, Alma Mater Studiorum - University of Bologna

CITY Bologna; PROV. BO; Postal Code 40126

TELEPHONE +39 051 2094244 FAX +39 051 2094286 E-MAIL info@marinesciencegroup.org

OPERATIONS HEADQUARTERS:

Marine & Freshwater Science Group, Department of Evolutionary and Experimental Biology, Alma Mater Studiorum - University of Bologna

CITY Bologna; PROV. BO; Postal Code 40126

TELEPHONE +39 051 2094244 FAX +39 051 2094286 E-MAIL info@marinesciencegroup.org

SCIENTIFIC DIRECTOR:

Stefano Goffredo, Marine & Freshwater Science Group, Department of Evolutionary and Experimental Biology, Alma Mater Studiorum – University of Bologna

TELEPHONE +39 051 2094244, +39 339 5991481; FAX +39 051 2094286 E-MAIL

stefano.goffredo@marinesciencegroup.org

EXTERNAL ADVISORS:

Umberto Pepoli, President of Underwater Life Project, Via C.Puini nr.97 int.34, 57128 Livorno, Italy

TELEPHONE +39 0586 501019; Fax +39 0586 509597; presidente@underwaterlifeproject.it

Pier Gianni Addis, President of Kel 12, Piazza XXVII Ottobre 32, 30172 Mestre (VE), Italy

TELEPHONE +39 041 2385711; FAX +39 041 984217; www.kel12.com

Goffredo, Piccinetti, Zaccanti - **STE: Scuba Tourism For the Environment - Red Sea Biodiversity Monitoring Program**

Roberto Martinez, President of Pianeta Terra, Via M. Gioia 72, 20125 Milan, Italy. TELEPHONE
+39 02 678401 FAX +39 02 66982171; www.pianetatterra.it

RESEARCH STAFF

SURNAME AND NAME	DEGREE	ACADEMIC POSITION	INSTITUTION	POSITION
Zaccanti Francesco	Biological Sciences	Department Chair	University of Bologna, Dept. of Evolutionary Biology	Project Chairman
Goffredo Stefano	Biological Sciences	Appointed Research Scientist	University of Bologna, Dept. of Evolutionary Biology	Scientific Director
Piccinetti Corrado	Biological Sciences	Associate Professor	University of Bologna, Lab. Marine Biology and Fishery, Fano	Research Project Advisor
Patrizia Neri	Biological Sciences	Scholarship holder	Marine & Freshwater Science Group	Statistical Data Analysis and Head of Public Relations
Scholarship holder	Biological / Natural Sciences	Scholarship holder	Marine & Freshwater Science Group	Head of Statistical Data Analysis

INTRODUCTION

The Value of Environmental Monitoring

A priority and intrinsic objective of the environmental and cultural policies of local, regional, national, and international governments is the conservation of biodiversity and the balanced management of natural resources (Convention on Biological Diversity – Directive 92/43/EEC, May 21, 1992). The wide scale geographical monitoring of the components of biodiversity is one of the eight priority actions identified by the Rio de Janeiro Convention on Biological Diversity (De Fontaubert et al. 1996; Baird et al. 2000; Danielsen et al. 2000). Monitoring and quantifying alterations in resources over time and space furnish the guide lines for biological diversity management (Sheil 2001). Studies by Schmitt and Sullivan (1996), Fore et al. (2001), Newman et al. (2003) underline the fact that citizens can be adequately trained to collect reliable data and to perform assessments comparable to the same work done by professionals and at a lower cost; an important component when we consider how expensive monitoring the environment over time and on a wide geographical scale can be. Medio et al. (1997), Bryskle (2002) and Goffredo et al. (2004) also pointed out the important educational value of involving the general public in conservation efforts such as monitoring the environment because it raises awareness of the problems inherent in preserving our natural resources. Raised awareness also positively influences people's behavior which can lead to reducing negative impact on the environment (Medio 1997; Bryskle 2002).

Previous Related Projects – University of Bologna

Since 1999, the Marine & Freshwater Science Group (www.marinesciencegroup.org) of the Department of Evolutionary and Experimental Biology of the Alma Mater Studiorum - University of Bologna has been experimenting the use of volunteers in scientific research with encouraging results. Recreational divers are being used in Marine Science Group projects concerning the monitoring of marine biodiversity. The results of the first of these projects called, “Mediterranean *Hippocampus* Mission,” are going to be published shortly in the December 2004 issue of *Conservation Biology*, a scientific journal published by the American Association for Conservation of Biodiversity (<http://www.conbio.org>). The project, endorsed by the Italian Ministry of the Environment, was supported by funds from two educational scuba diving agencies, SSI and SNSI, with the collaboration of Underwater Life Project, an environmental association. Completed in 2001, project data was used to publish the first census ever taken of the two species of seahorses living in Italy's coastal waters. Even though some of the findings may have been influenced by the fact that the data is primarily based on sightings reported by recreational divers, “Mediterranean

Hippocampus Mission” allowed us to map a representative profile of the geographic and ecological distribution of seahorse populations in our seas. Another equally important result was that the project highlights the interest shown by the general public and recreational divers’ eagerness to take part in biological monitoring. We also found that the media was especially inclined to inform the public on these types of initiatives (over the project’s 3-year period more than 8,700 questionnaires were collected and the project received coverage in newspapers and on radio and television).

In 2002, based on the results of the previous experience, a new campaign was begun, “Scuba Diving for the Environment. 2002-2005: Mediterranean Underwater Biodiversity Project”. The aim of this study was to collect data on the state of marine biodiversity along the Mediterranean’s coastlines and to continue using the help of volunteer divers to report sightings. The study is endorsed by the Ministry of the Environment and the following associations are collaborating with the University of Bologna in its realization: ASTOI, Association of Italian Tour Operators (www.astoi.com), ADI SUB, Association of Diving Schools IDEA, PADI, SNSI, SSI (www.adisub.org) and QUARK, a popular scientific magazine. “Scuba Diving for the Environment,” presented at the 10th International Coral Reef Symposium in Okinawa, Japan (<http://www.plando.co.jp/icrs2004/>), has produced significant results from the start: 12,000 questionnaires have already been collected since the project began two years ago, and we have made a conservative estimate when we say that approximately 35 million contacts have been produced in the last 20 months through coverage by national mass media. Visit www.marinesciencegroup.org for a complete review of press coverage.

The Red Sea Project

Tourism, in the Red Sea’s politically more secure areas, has grown steadily since the 1970’s and has reached the point of becoming an essential part of the region’s economy. Hawkins and Roberts (1994) estimated that sleeping accommodations for tourists along the Red Sea’s Egyptian coasts will break the one hundred thousand mark in the year 2005 (roughly two million visitors a year). Sinai’s southern coast around Sharm el Sheikh is one of the most popular areas. Sources from the Egyptian Tourist Authority confirm that 25% of tourism in that area is made up of recreational scuba divers especially around the coral reef of Ras Mohamed National Park (see Hawkins e Roberts 1992). Hawkins e Roberts (1994) also state that the economic impact of tourism alone should encourage local and national governments to work to protect the coral reef and to guarantee a coordinated and sustainable development of tourism that will not threaten the existing ecosystems. Medio et al. (1997), in a brilliant study conducted in Ras Mohammed National Park, demonstrated that pre-dive briefings on the delicate nature of coral ecosystems and on underwater neutral buoyancy techniques can improve recreational divers’ behavior decreasing

impact on the reef by 93%. Over the five-year period of study in the Mediterranean project, the innovative monitoring method introduced by the University of Bologna's Marine Science Group in 1999 attracted thousands of divers and proved not only that they were interested in participating in biological monitoring but that, once trained, they were capable of collecting an impressive amount of reliable data (Goffredo et al. 2004, Annexes A and B).

"STE: Scuba Tourism for the Environment – Red Sea Biodiversity Monitoring Program," whose goals are to;

- to involve dive tourists in the collection of data on the marine biodiversity in the area of Sharm el Sheikh and the Egyptian Red Sea;
- promote environmental education to tourists;
- contribute to the development of sustainable tourism,

fits in perfectly as successor to the Marine Science Group's (Department of Evolutionary Biology of the University of Bologna) previous projects for its scientific continuity and work in the same context of innovative actions in the fields of environmental monitoring and naturalistic educations.

The joining of the academic world to a socio-economic one, "Scuba Tourism for the Environment" could very well become a model for interdisciplinary scientific work aimed at developing a system through which nature's demands and those of mankind may both be met.

OBJECTIVES AND STRATEGIC RELEVANCE

STUDY OBJECTIVES:

- to involve dive tourists in the collection of data on the marine biodiversity in the area of Sharm el Sheikh and the Egyptian Red Sea;
- to supply information on the “health status” of the marine environment in which the dives take place;
- to classify the “health status” of the marine environment in which the dives take place by developing an environmental quality index.

CONSERVATION OBJECTIVES:

- to contribute to the development of a data bank useful to the work of both public and private institutions and organizations in charge of the study, management, and conservation of natural resources in and around the Red Sea;
- to give scientific support to all activities sponsored by said institutions and organizations related to environmental and ecological education.

OBJECTIVES FOR SUSTAINABLE DEVELOPMENT:

- to promote ecological and naturalistic awareness of marine biodiversity in the area of Sharm el Sheikh both in the general public and, especially, in recreational divers;
- to contribute to the development of ecotourism in the area by educating tourists in a discerning, active, and useful way to experience scuba diving;
- to identify any “banner species” that could be used to evoke interest in the conservation of marine biodiversity as a whole.

STRATEGIC RELEVANCE:

- to implement a project that will stand as a model for the study and responsible management of tourist seaside localities;
- to increase knowledge and awareness of the naturalistic marine patrimony that the area of Sharm el Sheikh offers;
- to make it possible for a resource of such high social, cultural, and economic value to receive the important scientific attention it deserves;
- to promote interdisciplinary teamwork in research and study development;
- to help develop studies of marine biodiversity that centers for research would not otherwise be able to implement alone;
- to promote a synergistic collaboration between Academia and the general public in order to raise naturalistic and environmental awareness;
- to stimulate environmental and ecological tourism, especially with respect to marine and underwater environments;
- to promote interest and satisfy the desire that tourists have to take part in environmental monitoring;
- to contribute to the promotion of the social, cultural, and economic development of the area of and around Sharm el Sheikh through offering educational activities for tourists (guided tours, exhibitions and shows, workshops and meetings).

DESCRIPTION OF THE PROPOSED STUDY

KEY ACTIONS FOR RESEARCH

Six Research Key Actions have been identified for the realization of the objectives of this study.

KA1 RES – Questionnaire Development

The questionnaire is the tool of reference that will be used by recreational divers taking part in the project. The three-part questionnaire will be printed on glossy paper. The first part will contain information on the correct behavior to adapt in and around coral reefs, the second part will be high resolution photographs of the organisms to be reported if sighted, and the third part will be for reporting sightings. The steps in questionnaire development are as follows:

- A) Researchers of the Marine Science Group of the University of Bologna will identify plant and animal organisms found in the area of and around Sharm el Sheikh that are held to be indicators of environmental quality but that may also be easily identified by recreational divers;
- B) A Marine & Freshwater Science Group research scientist and underwater photographer will be in charge of taking the pictures of the organisms to be reported if sighted; pictures will be printed on the questionnaire. Gianni Neto will be our underwater photographer (www.giannineto.it). Mr. Neto was the photographer for the University of Bologna's Marine Science Group's first two projects: "Mediterranean *Hippocampus* Mission" and "Scuba Diving for the Environment." His photographs appeared on the questionnaires, in newspapers and brochures, and on the website. Travel and living expenses for both the research scientist and underwater photographer will be incurred by contributing partners of the University of Bologna's Marine Science Group;
- C) Printing the questionnaires; costs will be incurred by contributing partners of the University of Bologna's Marine Science Group.

KA2 RES – Questionnaire distribution

Questionnaires will be distributed to those institutions, facilities, and centers that the University of Bologna's Marine Science Group and contributing partners deem appropriate. We recommend that they be distributed to travel agencies, airports (and also made available for consultation on commercial aircrafts), hotels, tourist villages, and diving centers in and around the area we will be monitoring as well as to the diving centers affiliated with the educational diving agencies participating in this initiative. Questionnaires could also be distributed at the University of Bologna and at contributing partners' headquarters. Newspapers and magazines interested in advertising

our study could also include the questionnaire as a supplement or insertion. A copy of the questionnaire will be put on our website and whoever wishes will be able to download it from there.

KA3 RES –Collection of data on underwater biodiversity in and around Sharm el Sheikh.

Data sampling is divided into the following phases:

A) Training

Contributing partners, in collaboration with researchers of the University of Bologna's Marine Science Group, will organize training seminars and workshops for their operators (animators, guides, diving instructors, etc.) working in the area of Sharm el Sheikh.

B) Raising the awareness and interest of tourists

Trained personnel will then be able to educate recreational divers by briefing them before and after dives. Tourists will also be encouraged to take part in the study during public events specifically organized in collaboration with the media, and the localities and other questionnaire distribution points.

KA4 RES – Questionnaire Collection and Forwarding to the Department of Biology, University of Bologna

Diving centers involved in the study will be called "Field Stations;" divers completing questionnaires will be asked to leave them at the Field Station nearest the dive. The Field Stations will collect and send the questionnaires to the Marine & Freshwater Science Group, University of Bologna's Department of Biology which will then process the data. How often and exactly when the questionnaires are to be sent by the Field Stations to the Marine & Freshwater Science Group will be decided when the study is fully implemented; certainly questionnaires must be sent in all through the year.

KA5 RES – Data Processing

The Marine & Freshwater Science Group will systematically process information as it arrives and will produce an annual progress report.

KA6 RES – Disseminating Results

The study's annual progress report and the final results of the project will be periodically published and communicated to the public in order to disseminate information and to give participants feedback on the study. For this KA, the Marine & Freshwater Science Group will make its experience, knowledge, and sizeable list of well-established contacts with the media (newspapers and magazines, television and radio programs, customer-copy magazines found on airlines, etc.) available to recreational divers, diving schools, and diving centers.

KEY ACTIONS FOR CONSERVATION

Two key actions are necessary to achieving conservation objectives:

KA1 CONS: collected data will be made available to institutions in charge of the management and administration of the Red Sea's naturalistic patrimony. This will allow said institutions to collate data collected by recreational divers with those collected through other studies using different environmental surveying techniques. This will contribute to the development of KA2 CONS and aid in achieving sustainable development goals.

KA2 CONS: supply the above institutions with a valid monitoring program of marine biodiversity that will substantially contribute to the management of the Red Sea's protected marine environments regularly frequented by divers.

KEY ACTIONS FOR SUSTAINABLE DEVELOPMENT

Two key actions are necessary to achieving sustainable development objectives:

KA1 SD: Promoting Environmental Education.

Creating, developing, and coordinating a network of Travel Agencies, Diving Agencies, Environmentalist Associations, Naturalist and Cultural Associations, Tour operators, Diving Centers, Nature Parks, and television, mass media that, once having understood the principle and value of the resource called "biodiversity," will be able to appropriately and effectively propagate and promote its importance and role.

KA2 SD: Promoting Ecotourism: "A Biologist's Vacation."

To make an educational and informative program available to all tourist centers and all tourist-related businesses in and around Sharm el Sheikh that they can offer their clients vacationing on the Red Sea.

RELATED INITIATIVES

We have programmed other initiatives that are related to the proposed study. These activities are all aimed at aiding in achieving the goals of Sustainable Development and Conservation of Underwater Biodiversity in the area of Sharm el Sheikh:

- revision of the **project's website** to include information about the Red Sea Project (problems to be faced, objectives, methods, results, network of supporting Field Stations) and to introduce activities related to the project and the organizations supporting said activities;
- creation of a **scientific and educational video/photographic exhibit** on Red Sea animal and plant life that we will be monitoring. The exhibit will also illustrate the problems to be faced, objectives, methods, and results of the project. Costs for the exhibit (which could even become a traveling exhibition) will be incurred by contributing partners;
- production of **educational and promotional material** for the project (stickers, brochures, posters, articles, videos, gadgets, etc.), costs of which will be incurred by contributing partners;
- promotion of **recreational and educational days** called "*Red Sea BIODIVERSity Day*," dedicated to the observation of marine bottoms and to guided tours of scientific and photographic exhibits (see above). We thought of several promotional events to be offered during Red Sea BioDIVERSity Days, costs for which will be incurred by our partners: making agreements to discount lodging and diving prices; giving divers a chance to meet and talk with scientists from the University of Bologna's Marine Science Group and to go with them on dives. In order to inform the public of these events, Red Sea BioDIVERSity Days will be advertised through newspapers and on radio and television;
- **periodic reporting to volunteers** on the works-in-progress and project results via regular mail, e-mail, internet and mass media;
- to promote dives in the study areas by using **awards and/or prizes** as incentives. For example, thanking the divers who contribute the greatest efforts by name on our website and/or in our works-in-progress reports; sending divers thank-you letters or awarding them with popular diving, travel, or scientific magazine subscriptions, or awarding trips paid for by contributing partners;
- organizing **conferences about the project and training seminars** directly in the tourist localities (with costs to be incurred by our contributing partners).

TIMELINE

months	KA1 RES Questionnaire Development	KA2 RES Questionnaire Distribution	KA3 RES Sampling	KA4 RES Questionnaire Collection	KA5 RES Data Processing	KA6 RES Disseminating Results	KA1 CON Creating a Data Bank	KA2 CON Proposals for Sustainable Management	KA1 SD Promoting Environmental Education	KA2 SD Promoting Ecotourism
1-6										
7-12										
13-18										
19-24										
25-30										
31-36										
37-42										
43-48										
49-54										
55-60										

Literature cited

- Baird B. E., Miller-Henson M., Semmens B. X. 2000: Improving California's system of marine managed areas: final report of the State Interagency Marine Managed Area Workgroup. Resource Agency of California, Ocean Resources Management Program, Sacramento. <http://ceres.ca.gov/cra/ocean>
- Bryskle A. F. 2002: The role of environmental education in mitigating tourist-related damage to coral reefs: a training model for tourism professionals and resource managers. Instructional Technologies Inc., Cape Coral.
- Danielsen F., Balete D. S., Poulsen M. K., Enghoff M., Nozawa C. M., Jensen A.E. 2000: A simple system for monitoring biodiversity in protected areas of a developing country. *Biodiversity and Conservation* 9: 1671-1705.
- De Fontaubert A. C., Downes D. R., Agardy T. S. 1996: Biodiversity in the seas: implementing the Conservation on Biological Diversity in marine and coastal habitats. IUCN Cambridge.
- Fore S. L., Paulsen K., O'Laughlin K. 2001: Assessing the performance of volunteers in monitoring streams. *Freshwater Biology* 46: 109-123.
- Goffredo S., Piccinetti C., Zaccanti F. 2004: Volunteers in marine conservation monitoring: a study of the distribution of seahorses carried out in collaboration with recreational scuba divers. *Conservation Biology* 18 (6) (in press).
- Hawkins J.P., Roberts C.M. 1992: Can Egypt's coral reefs support ambitious plans for diving tourism? *Proceedings of the 7th International Coral Reefs Symposium* 2: 1007-1013.
- Hawkins J.P., Roberts C.M. 1994: The growth of coastal tourism in the Red Sea: present and future effects on coral reefs. *Ambio* 23: 504-508.
- Medio, D., Ormond R. F. G., Pearson M. 1997: Effects of briefings on rates of damage to corals by scuba divers. *Biological Conservation* 79: 91-95.
- Newman C., Buesching C. D., Macdonald D. W. 2003: Validating mammal monitoring methods and assessing the performance of volunteers in wildlife conservation – "Sed quis custodiet ipsos custodies". *Biological Conservation* 113: 189-197.
- Schmitt E. F., Sullivan K. M. 1996: Analysis of a volunteer method for collecting fish presence and abundance data in the Florida keys. *Bulletin of Marine Science* 59: 404-416.
- Sheil D. 2001: Conservation and biodiversity monitoring in the tropics: realities, priorities, and distractions. *Conservation Biology* 15: 1179-1182.

PROPONENTS' RESUMES

Stefano Goffredo was born in Bologna in 1969. He has been an Assigned Research Scientist since 1997 for the Faculty of Biological Sciences (Zoology) in the Department of Evolutionary and Experimental Biology of the University of Bologna, under Prof. Francesco Zaccanti. He has been a scuba diving instructor for Scuba Schools International since 1991. He has worked in the field of recreational diving and tourism in Italy and in Egypt. He is founder and current President of the University of Bologna's "Marine Science Group," an association of scientists and citizens dedicated to underwater research. He is also conducting individual research studies in the Department of Evolutionary and Experimental Biology of the University of Bologna. His main fields of research are reproductive biology and population dynamics in Mediterranean and tropical marine animal life; the geographic and ecological distribution of endangered marine animal life; and marine environmental monitoring with emphasis on biodiversity, environmental education, and sustainable tourism. He is a member of the International Society for Reef Studies. He is also working with Dr. Elisabeth Chadwick-Furman (Interuniversity Institute for Marine Science of Eilat, Israel and Auburn University, Alabama, USA) on several studies. He is the Scientific Director of two research projects endorsed by the Italian Ministry of the Environment: "Mediterranean *Hippocampus* Mission," and "Scuba Diving for the Environment. 2002-2005: Mediterranean Underwater Biodiversity Project". He has co-authored more than 50 articles of both a scientific and popular nature published in national and international journals; the following are 5 of the most important ones:

Goffredo S., Chadwick-Furman N. E. 2000: Abundance and distribution of mushroom corals (Scleractinia, Fungiidae) on a coral reef at Eilat, northern Red Sea. *Bulletin of Marine Science* 66: 241-254.

Goffredo S., Arnone S., Zaccanti F. 2002: Sexual reproduction in the Mediterranean solitary coral *Balanophyllia europaea* (Scleractinia, Dendrophylliidae). *Marine Ecology Progress Series* 229: 83-94.

Goffredo S., Chadwick-Furman N. E. 2003: Comparative demography of mushroom corals (Scleractinia, Fungiidae) at Eilat, northern Red Sea. *Marine Biology* 142: 411-418.

Goffredo S., Piccinetti C., Zaccanti F. 2004: Volunteers in marine conservation monitoring: a study of the distribution of seahorses carried out in collaboration with recreational scuba divers. *Conservation Biology* 18 (6) (in press).

Goffredo S., Mattioli G., Zaccanti F. 2004: Growth and population dynamics model of the Mediterranean solitary coral *Balanophyllia europaea* (Scleractinia, Dendrophylliidae). *Coral Reefs*, 23: 433-443.

Corrado Piccinetti (Fano, 8 April 1943) graduated with a degree in Biological Sciences from the University of Bologna in 1966. He attended an international course on Marine Biology and Fishing Techniques at the University of Malta (summer of 1965), a more specialized course on the same subjects organized by the FAO in Kelibia, Tunisia (1968), and a course on population dynamics and assessment of fish stocks organized by FAO and CNEOX in Brest, France (1973). He has taken part in all the research studies of the Laboratory of Marine Biology and Fishery of Fano, affiliated with the University of Bologna, from 1964 to the present.

He has been director of the University of Bologna's Laboratory of Marine Biology and Fishery of Fano for 20 years. He is Associate Professor of Ecology in the Faculty of Mathematical, Physical, and Natural Sciences at the University of Bologna; he received this post after teaching Hydrobiology and Fishculture in the Faculty of Agricultural Sciences. He is currently holding classes on Fishing and Aquiculture for the graduate course in Marine Environmental Sciences in Ravenna. Since 1939, the Laboratory of Marine Biology and Fishery of Fano has been responsible for research conducted through the University of Bologna on fishing and marine organisms.

He has concluded studies on the biological and technological aspects of fishing, the biology of some species and marine animal groups; on the problems of ichthyoplankton, particularly the eggs and larvae of Tunnidae, anchovies, and sardines; on some types of marine culture; on the development of underwater artificial structures, and on the creation of repopulation zones in the sea.

His scientific activities have produced over 150 articles all of which are concerned with marine biological research. As Director of the Laboratory of Marine Biology and Fishery, he is a member of several committees for the Management of Sea Fishing and Regional Fishing Commissions.

Principal scientific publications:

Piccinetti C., Marceta B., Jukic-Peladic S., Vrgoc N., Dadic V. 1997: Ground fish stocks expedition EU MEDITS '96. Proceedings with abstracts of the papers presented at the Sixth Congress of Croatian Biologists, Zagreb: 349-350.

Jukic S., Vrgoc N., Dadic V., Krstulovic-Sifner S., **Piccinetti C.**, Marceta B. 1999: Spatial and temporal distributions of some demersal fish populations in the Adriatic Sea described by GIS technique. *Acta Adriatica* 40 (suppl.): 55-66.

Jukic-Peladic S., Vrgoc N., Krstulovic-Sifner S., **Piccinetti C.**, Piccinetti-Manfrin G., Marano G., Ungaro N. 2001: Long-term changes in demersal resources of the Adriatic Sea: comparison between trawl surveys carried out in 1948 and 1998. *Fisheries Research* 53(1): 95-104.

Tinti F., Di Nunno C., Guarniero I., Talenti M., Fabbri E., **Piccinetti C.** 2002: Mitochondrial DNA sequence variation suggests the lack of genetic heterogeneity in the Adriatic and Ionian stocks of *Sardina pilchardus*. *Marine Biotechnology* 4: 111-120.

Guarniero I., Franzellitti S., Ungaro N., Tommasini S., **Piccinetti C.**, Tinti F. 2002: Control region haplotype variation in the central Mediterranean common soles (*Solea vulgaris*) indicates geographical isolation and population structuring in Italian stocks. *Journal of Fish Biology* 60: 1466-1481.

Francesco Zaccanti

Born in Bologna on 18 September 1940

Professor of Zoology at the University of Bologna, Faculty of Mathematical, Physical, and Natural Sciences

Department Chair of Biology at the University of Bologna since 1998 to 2004

Member of the Academic Senate of the University of Bologna

Member of the *Unione Zoologica Italiana*

Member of the *Gruppo Embriologico Italiano*

Founding Member of the *Associazione Italiana Ittiologi delle Acque Dolci*

Founding Member of the *Associazione Marine & Freshwater Science Group*

Scientific Activities

Early sexual differentiation of germinal cells in vertebrates

Cytological sexual dimorphism in non mammal vertebrates

Distribution and management of freshwater fish life in the Region of Emilia-Romagna

Taxonomy of cyprinids and salmonids in northern Italian rivers, isoenzymatic techniques and analysis of mitochondrial DNA were used for classification

Reproductive biology and population distribution of Mediterranean Madreporaria

Geographic distribution of Mediterranean species of *Hippocampus*

Biodiversity in coastal marine environments

Principal scientific publications:

Petrini S., **Zaccanti F.** 1998: The effects of aromatase and 5 α -reductase inhibitors, antiandrogen, and sex steroids on Bidder's organ development and gonadal differentiation in *Bufo bufo* tadpoles." J Exp Zool, 280, pp. 245-259.

Manaresi S., Mantovani B., **Zaccanti F.** 1999: Molecular markers for the diagnosis of autochthonous *Salmo (trutta) trutta* (morpha *fario*) populations: preliminary data. J. Fresh. Biol. 28:7-12.

Falconi R., Rizzoli M., Anacardi F., Dal Piaz D., **Zaccanti F.** 1999: Comparison of fish population general lines in rivers of High and Middle Appennino Bolognese and Romagnolo Quaderni ETP J. Fresh. Biol. 28: 87-94.

Falconi R., Petrini S., Quaglia A., **Zaccanti F.** 2001: Fine structure of undifferentiated gonads in *Rana dalmatina* tadpoles. ITAL J ZOOL, 68, pp. 15-21.

Goffredo S., Piccinetti C., **Zaccanti F.** 2004: Volunteers in marine conservation monitoring: a study of the distribution of seahorses carried out in collaboration with recreational scuba divers. Conservation Biology 18 (6) (in press).

Goffredo S., Arnone S., **Zaccanti F.** 2002: Sexual reproduction in the Mediterranean solitary coral *Balanophyllia europaea* (Scleractinia, Dendrophylliidae). Marine Ecology Progress Series, 229: 83-94.