

**REPORT OF THE SCIENTIFIC ADVISORY COMMITTEE FOR THE BIOTA/FAPESP
PROGRAM
Campinas - 8 to 10 December, 1999**

Members of the Committee

Arthur D. Chapman, Environmental Resources Information Network, Australia.
Donald C. Potts, University of California, Santa Cruz.
James T. Staley, University of Washington.

Background

1. The Committee attended a number of meetings in São Paulo and in Campinas between 8 and 10 December, 1999.
2. Discussions were held with the Director of FAPESP, Professor José Fernando Perez, the Associate Director, Life Sciences of FAPESP, Professor Antonia Cechelli Paiva, the BIOTA Program leader, Professor Carlos A. Joly, and the Project Leaders for most of the BIOTA Projects.
3. The Committee also attended verbal presentations by Project Leaders and asked questions of the participants. This was followed by free-ranging discussions on the future of BIOTA, the overall aims of the BIOTA Program and on perceived gaps in the BIOTA Program.
4. Each member of the Committee then spent some time on 9-12 December attending and examining in detail three of the projects, viz.
 - Benthic Marine Biodiversity in the State of São Paulo (Potts)
 - Strengthening of the BIOTA/FAPESP information system and study of the development of a GIS for the program (Chapman)
 - Molecular ecology and polyphasic taxonomy of bacteria of environmental and agroindustrial importance (Staley).

Aims of BIOTA

- 5 The stated Aims of the BIOTA Program include:
 - To study and increase the knowledge of São Paulo State's biodiversity and to disseminate this knowledge and its importance
 - To understand the processes of biodiversity generation, maintenance and decline
 - To increase the State's capacity in monitoring, managing and utilizing its biodiversity
 - To evaluate the effectiveness of conservation efforts in the State, identifying areas and priority components for conservation
 - To develop methods and reference standards for environmental impact assessments
 - To estimate the loss of biodiversity in different scales
 - To produce reliable information for decision making
 - To enable the State as well as the public and private organizations to benefit from the sustainable use of genetic/biological resources
 - To enable the State to estimate the value of its biodiversity and services, such as soil and water conservation, biological control, etc.
 - To enable institutions within the State to attend legal dispositions referent to living organisms such as the deposit of specimens
 - To improve the quality of formal and informal teaching of science and environmental education, especially as to knowledge in conservation and use of biological diversity
 - To promote public awareness and knowledge as to conservation and use of biological diversity
 - To contribute towards the implementation of the Convention on Biological Diversity within the State of São Paulo, participating and supporting existing state programs, particularly the PROBIO/SP and other national and international programs and/or efforts.

Discussion

- 5 We would like to praise the efforts of BIOTA in reaching its present stage of development in such a short time. BIOTA appears to be a well structured program with good and enthusiastic coordination. We would like to congratulate Professor Joly and his coordination team. The projects all appear to be well thought out, well structured and, from what we could determine, well led.
- 6 We were impressed with the continuity of funding from FAPESP and are pleased to see Biodiversity being recognised within the FAPESP Program as an area of research in its own right. It is essential that studies in biodiversity have security of funding as many are, of necessity, long-term. The FAPESP Program should be congratulated for recognizing this.
- 7 We were pleased at the multidisciplinary nature of the BIOTA Program and at the way in which the various disciplines of science were being brought together within many of the individual projects.
- 8 The proactive nature of the BIOTA coordinating committee in actively seeking to identify and fill gaps in the program is to be encouraged.
- 9 We also noted that many of the projects included collaborators from outside São Paulo, both from other Brazilian States and internationally, and this should be further encouraged and supported.
- 10 The recent Ford Foundation award is an independent recognition of the quality of the BIOTA program on an international scale, and by a responsible organization.

Review of the Program

- 11 We feel it is premature to comment on individual projects, as many of the projects are in very early stages of development. There are, however, a few cross-cutting issues that the Committee would like to discuss.
- 12 The diversity of projects, approaches, and levels of development, and the varied emphases on different levels of biodiversity (genomic, species, ecosystem structure and function) are evidence of a healthy balance that augurs well for the longterm health, vigor and potential growth of BIOTA.
- 13 Approaches vary from mainly descriptive taxonomic ones to those driven by desires to test ecological, evolutionary or biogeographical hypotheses, to others motivated primarily by conservation or management concerns. This mix should be encouraged. At the same time, criteria should be developed for determining when a project will NOT contribute substantially to the central goals of BIOTA.
- 14 Most projects mentioned training, educational and other "outreach" goals, but these aspects were rarely developed in the reports. Projects should not be expected to address all the stated aims of BIOTA, as some will be much more appropriate than others. It may be more appropriate for individual projects to concentrate on those aspects of BIOTA that they can do well, and let the BIOTA coordinators ensure that, collectively, all aims of BIOTA are effectively met.
- 15 Many projects mention training of personnel. It may not be appropriate for each project to train its own people, especially where there is the possibility for people from several projects to participate in joint training programs.
- 16 Specialized workshops have clearly strengthened informal as well as formal interactions between groups of projects. Further workshops along these lines, especially between groups that may not be aware of common interests, may be of value.
- 17 Few projects mentioned predictive approaches. We suggest that these can be very powerful for assessing adequacy of understanding (e.g. the success of predictions about species, distributions, abundances or habitats, made before sampling a new area, may indicate where to concentrate later efforts).

- 18 Few projects mentioned criteria for estimating completeness or sufficiency of sampling (e.g. cumulative species-effort curves). Perhaps these should be considered in future evaluations of the projects.
- 19 Many projects discussed fragmented habitats, but there was little mention of the possible nature, scales or magnitudes of "edge effects".
- 20 Continued communication among projects about needs for ancillary data should help minimize duplicated effort, and ensure that data are available on appropriate environmental and biological scales.
- 21 Delays in projects may be minimized by having common lists of instruments, supplies etc. purchased for BIOTA/FAPESP projects, and which may be available for sharing with other projects.
- 22 Follow-up examination of the Base de Dados Tropical database and GIS systems at the Fundação Tropical de Pesquisas e Tecnologia "André Tosello" following the FAPESP workshops showed the systems being used to be highly efficient and to some extent world-leading. There are many similarities and overlaps with the systems being used by BDT and the Environmental Resources Information Network in Australia, largely due to informal collaboration between these two institutions since the early 1990s. There are lessons to be learned from both organisations.

Recommendations

- 23 Encourage and increase multidisciplinary efforts. We believe multidisciplinary research that brings together scientists from different backgrounds and expertise is a key aspect of BIOTA. Many exciting findings will come from work at the interfaces between different biological disciplines and other fields such as geology, geochemistry, climatology, modeling, etc.
- 24 Annual Meetings. The scientific exchanges at this meeting were very valuable, not only for researchers sharing information and scientific data, but also for exploring connections with one another's research projects. We highly recommend greater multidisciplinary research, and therefore recommend the continuation of these annual meetings.
- 25 We also suggest bringing more graduate and post doctoral students to these meetings. Perhaps those who have worked for a year or more on the project could present posters. This would expose students to the nature of interdisciplinary research and provide opportunities for fresh insights. It will also help engender a feeling of "ownership" of BIOTA among all participants.
- 26 Semi-annual Meetings in Habitat Areas. Too many meetings reduce productivity; too few meetings create communication problems. One suggestion is the possibility of smaller, less formal meetings at approximately six-month intervals. These could be held in different geographic areas (e.g., a joint meeting of the coastal, the Mata Atlantica and the Cerrado groups of investigators). Assembling the researchers from each of these habitat areas together in a one- to two-day meeting, perhaps even at one of the research sites, should enhance the interchange of research ideas and interests and active collaborations.
- 27 Increase modeling efforts. Modeling will become a key component in the analysis and recording of data, prediction of future consequences of land use changes, and testing ecological/biogeographic hypotheses. Additional personnel and equipment will be needed for this new area. The use of appropriate modeling techniques could also be used in the selection of new survey sites.
- 28 Strengthen coordination. Examples where this may be helpful:
 - Develop a coordinated approach to landowners, schools, etc.

- Examine the combined use of resources such as a collection of instruments, sampling devices, Landsat images, aerial photography, etc.
 - Coordinate combined field trips, meetings, etc.
 - Develop educational and publicity materials (as well as examining the role of BIOTA in environmental education).
 - Coordinate community/school efforts at collecting/monitoring biodiversity where appropriate.
- 29 Increase computer databasing support. It is already apparent that additional personnel and computer capacity will be needed.
- 30 Central location for imagery. There is a need to update the Landsat images to Landsat 7. Since these images are very expensive, it is appropriate to have them housed in a central location so that they are accessible to all BIOTA projects. Remain aware of other satellite resources, e.g. ARIES (a new Australian hyperspectral satellite)
- 31 The marine environment is an important and often neglected part of biodiversity investigations, even though 95% of animal phyla are mainly or exclusively marine. Marine research can be more expensive to conduct than terrestrial research because of equipment and sampling requirements. However, this environment should be an integral part of the BIOTA program because of São Paulo's central location on the Atlantic Coast.
- 32 Consider a microbial ecology project. Much of the structure and function associated with ecosystems involves microorganisms. However, care should be taken to identify an individual(s) who wishes to work in an interdisciplinary setting and who can identify important and discrete programs of research that can be conducted in a reasonable time-frame.
- 33 Increase ties with genomics research. Brasil is one of the leading countries in its microbial genome sequencing efforts which are very closely related to understanding the biodiversity of life at the molecular level. Understanding diversity at the genetic level will be very helpful in understanding the evolution of life and biodiversity.
- 34 There would be considerable advantage in sending a technical staff member of the Base de Dados Tropical to Australia to examine database, modelling and mapping systems being used by organisations such as the Environmental Resources Information Network (ERIN), the the Centre for Resource and Enviornmental Studies (CRES) at the Australian National University and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Many of the systems developed by these organisations are regarded as world-leading, and are likely to be easily adaptable to the work being carried out in the State of São Paulo through the BIOTA program.