

**REPORT OF THE THIRD EVALUATION OF THE BIOTA-FAPESP PROGRAM BY THE
SCIENTIFIC ADVISORY COMMITTEE
Hotel Fonte Colina Verde, São Pedro – 08 to 10 December 2001**

Members of the Scientific Advisory Committee (all present in a personal capacity)

- 1) Frank A. Bisby, Professor
Director, Centre for Plant Diversity & Systematics
School of Plant Sciences
The University of Reading,
Reading RG6 6AS, UK
f.a.bisby@reading.ac.uk
- 2) Arthur D. Chapman,
Assistant Director & Scientific Coordinator,
Environmental Resources Information Network,
GPO Box 787,
Canberra ACT 2601, Australia
arthur.chapman@ea.gov.au
- 3) Barry Chernoff, Professor
Department of Zoology
Field Museum of Natural History
1400 South Lakeshore Dr.
Chicago, IL 60605, USA
chernoff@fmnh.org
- 4) Donald C. Potts, Professor
Department of Ecology and Evolutionary Biology
A316 Earth and Marine Sciences Building
University of California,
Santa Cruz. CA 95064 USA
potts@biology.ucsc.edu

Background

1. The Committee attended a number of meetings in São Pedro and Campinas from 8 to 11 December 2001
2. Discussions were held with the Director of FAPESP, Professor José Fernandez Perez, three members of the Coordenação Biota, Professor Carlos A. Joly (Program Leader), Dr Vanderlei Perez Canhos and Dr Naercio A. Menezes. Discussions were also held with Dr Marcio de Miranda Santos of the Ministério da Ciência e Tecnologia and Dr Bráulio F.S. Dias, Ministério do Meio Ambiente.
3. The Committee attended verbal presentations by Project Leaders of 19 of the Biota projects over two days (9-10 December).
4. The Committee held discussions with students involved with the projects who met prior to the Program Evaluation meeting. The Committee also viewed and studied poster papers presented to the meeting by both the students and project leaders and discussed these with the presenters. The Committee held discussions with participants on the Biota program, its aims and future plans and on perceived gaps in the Biota Program.
5. Before and after the Program Evaluation meeting, during the period of 7-17 December, the Committee members examined in more detail some aspects of the program, including:

- Strengthening of the Biota/FAPESP information system and study of the GIS for the program - especially SinBiota and Species Link (Bisby, Chapman, Chernoff and Potts),
 - Diversity of Mites of agricultural importance, G. Moraes - Piracicaba (Bisby)
 - Benthic Marine Biodiversity, V. Hadel, A. Migotto, C. Tiago – CEBIMar (Potts)
 - Freshwater fish projects by Osvaldo Takeshi Oyakawa and by Ricardo Macedo C. de Castro (Chernoff).
6. Discussed with Coordenação Biota and the people from the Ministeries of Science and Technology and Environment, the possibility of holding a Species 2000 Team meeting, and International Taxonomic Databases Working Group in Campinas in October 2002 and discussed the Species 2000/ITIS Catalogue of Life Workshop associated with the Global Biodiversity Information Facility (GBIF) and to which one of the BIOTA database custodians is likely to be invited.

Objectives of Biota

Biota is a program established to provide the scientific basis:

- to inventory and to characterize the biodiversity of the State of São Paulo;
- to define the mechanisms for conservation of biodiversity; and
- to explore the economic development and sustainable use of biodiversity

Review of the Program

General Comments

1. The Committee is extremely impressed with the efforts the Biota program has made since the last evaluation. In particular, the Committee is impressed with the speed and extent of implementation of many of its recommendations from that report. As concluded in previous reports, Biota continues to be a vigorous, well-structured and well-coordinated program. We would like to congratulate Professor Joly and his Coordenação Biota team.
2. The Biota program continues to mature rapidly in the scope, depth and quality of individual projects, and integration between projects. This maturation provides a sound basis for development of long-term strategies for its continuation.
3. The science in most Biota projects is of high quality equivalent to that in other countries, and in several projects it is of outstanding quality at the cutting edge of international efforts. In many respects the Biota program provides an example and sets standards that many countries would be happy to follow.

FAPESP-Biota Coordination

4. The Biota Program is a complex program and provides a number of challenges to FAPESP that it may have not faced in its other programs. The coordination issues that this introduces are not easily solved. The Biota program has now matured considerably to an extent that many of the coordination issues are more easily identified. With the “half-term” evaluation approaching, FAPESP may consider ensuring that this evaluation consider the Coordination role of the Coordenação Biota, the relationship between FAPESP and the Coordenação Biota, and the role related programs (such as the Biological Sciences Program) has with the Biota Program.
5. The Committee has only been able to spend a brief period examining the Program, however, we have noted a number of coordination issues. These include:
 - Coordenação Biota does not see the final proposals,
 - Coordenação Biota does not have any formal ongoing management role within the projects,
 - Coordenação Biota does not have an organizational role in selecting sites, methods or projects that are placed within the Biota program,
 - The FAPESP Biological Sciences Program appears to us to be funding a number of projects that parallel topics within the Biota program
 - Conversely, one or two projects in Biota seem to extend the boundaries of the Biota Program and may be better suited to the Biological Sciences Program
 - The long-term succession of the Director and Coordenação Biota should be considered so that the momentum of the Biota Program does not slip if anyone leaves the program.
6. At present we see existing coordination processes for projects submitted through Biota to be extremely minimal. The Coordenação Biota informs FAPESP if the projects submitted through it fall within the Biota objectives, but then seemingly loses control of the future development of the projects through the acceptance process. Other than contributing to the annual review of the projects, and assisting with cross-cutting issues of coordination and training through workshops, etc., the Coordenação Biota does not seem to have an ongoing role in further direction of the projects. None of these mechanisms actually guarantee a genuinely united and coordinated program. We suggest, as a *matter of urgency*, that FAPESP and Coordenação Biota consider implementing improved coordination actions, prior to the commencement of the second phase of Biota (i.e. years 5 – 8).

Recommend: that

- i) *Coordenação Biota, in conjunction with FAPESP, develop precise targets covering*
 - *a coordinated State-wide biodiversity inventory framework*
 - *a coordinated State-wide biodiversity conservation network*
- ii) *Coordenação Biota set minimum specific targets for the levels of co-ordination between thematic projects running separately*
- iii) *FAPESP fund a full-time program co-ordinator to work within the Biota program to liaise with project leaders to secure the agreed set of target coordination goals.*
- iv) *FAPESP facilitate improved liaison between the directors of the Biota and Biological Sciences Programs to create a proper balance between these two programs.*

- v) *Coordenação Biota be expanded (to 6 or 8 members) to give a broader spectrum of expertise relevant to the now expanded program*
- vi) *discretionary funds be made available each year to the Director for targeted repair, linkage and co-ordination actions. After discussion with Coordenação Biota and the Programme Coordinator, up to 4 assistants could be placed by the Director in particular project centers.*
- vii) *the co-ordination targets be clearly documented for all to see, and that all future projects adopt these from the start.*

Program Balance

7. While there is no doubt that Biota is a major biodiversity science program, there remain some gaps in the knowledge base. The Committee is aware that the Coordenação Biota is already encouraging the development of projects to fill some of these gaps but may wish to also consider the development of projects on the following:
 - a) soil biota (eg bacteria, nematodes, earthworms, crustacean, soil arthropods),
 - b) Coleoptera, Homoptera and Hemiptera
 - c) birds
 - d) terrestrial Mollusca
 - e) higher plants
 - f) secondary, regenerating and planted forests,
 - g) abiotic characteristics of ecosystems (e.g. sediments in freshwater, marine and terrestrial systems)
 - h) the human dimension of biodiversity (e.g. cultural and social aspects).
 - i) marine organisms and habitats (e.g. plankton, microorganisms, fishes and habitats >45m depth)
8. Much of the ongoing research in Biota is properly focused on relatively pristine areas of the State, including old-growth forests, conservation reserves and marine reserves. It is important that studies also be carried out in less pristine, degraded and agricultural habitats. These will become even more valuable as baselines for relatively pristine habitats become known and studies on regeneration and extractive values in less-pristine areas become more advanced.
9. Biota is supported by a research and teaching infrastructure that will continually need to be maintained and improved as research and teaching activities alter. It is important to see that collections are well supported, including living collections of microorganisms as well as museum collections. In addition, equipment and database support will increasingly need to be provided as the biodiversity effort becomes more extensive and complete.

Recommend: that

- viii) *The Coordenação Biota continue to encourage the development of projects to fill data and information gaps for organisms such as Coleoptera, Homoptera, Hemiptera and birds, studies on soil biota and other organisms (eg. bacteria, nematodes, earthworms, soil arthropods); marine and freshwater abiotic characteristics, studies on ecosystem boundaries and relevant geographic areas.*
- ix) *consideration be given to expanding studies on less pristine & regenerating habitats, as well as habitats in the vicinity of disturbed, agricultural or urban areas.*

Future Planning

10. The success of Biota will be judged by progress towards the three programmatic goals and on the balance and integration among them. To remain on track, Biota should establish achievable targets and develop strategies for achieving them; establish criteria for monitoring their success; and establish criteria for addition or modification of projects within the context of the entire program. As an example, consideration of expanded marine roles may be justified for the conservation and sustainable use goals and bioprospecting for the sustainable use of biodiversity goal.
11. There is an urgency for expanding marine projects within the Biota program. There is, at present, only 1 out of 34 currently funded Biota projects that is exclusively marine. The biota of subtropical coasts such as São Paulo's, in the transition between major warm and cool systems, are likely to be particularly sensitive to the effects of global climatic change. The steepness of biogeographic and habitat gradients (onshore-offshore as well as alongshore), make issues such as water quality, consequences of natural and anthropogenic processes onshore, and invasive species of increasing concern.
12. To date, we are unaware of any projects being funded under Biota's third objective (economics and sustainable use of biodiversity). Consideration should be given to projects under this objective. For example, under the criteria mentioned in paragraph 10 above, could be used in a detailed exploration of the efficacy of establishing a network of bioprospecting laboratories across the State as part of the Biota program. It will be critical to ensure that the rights of indigenous peoples are respected.

Recommend: that

- x) *urgent consideration be given to establishing a strategy for future development of the Biota program, and setting criteria for determining priorities under each of the Biota objectives*

Collaboration and cohesion amongst Biota projects

13. The Coordenação Biota has made good progress in encouraging linkages between projects. We share their view and encourage Biota to continue to expand these efforts. Such coordination may include the joint characterization of selected environments and/or areas (e.g. Mata Atlantica, Parque Estadual Intervales) as these will provide bigger and more robust scientific and conservation outcomes than will isolated efforts in disparate regions.
14. Strategic workshops that emphasize each of the objectives and combinations of objectives would be valuable to the program. Such workshops are critical to the

stimulation of linkages between taxonomic and scientific disciplines, as well as to the coverage of geographic gaps.

15. The students indicated that they found holding the Symposium in conjunction with the Evaluation workshop extremely valuable as a means of networking among projects as well as beyond their own research groups. Periods of interaction between the students alone, and then with the Principal Investigators present was found to be an effective mechanism for networking and professional development of students. It was suggested that the overlap should be expanded from half a day to a full day.
16. An important outcome of Biota activities has been the establishment of a publications database (as recommended in our last report). Now that the database has been established, **all** publications, articles, handbooks, Web Pages and databases that arise from the Biota Program should be included in the database.
17. A number of projects related to the Biota objectives, including other FAPESP Programs such as the Flora of São Paulo, State Government projects, and even Federally funded programs are collecting critical biodiversity data. Information from many of these projects could make a significant contribution to the aims and objectives of Biota. Examples include:
 - the State Public Works project on RPPNs with data from 100 priority areas
 - the Flora of São Paulo with information on several thousand species.Such information, although not collected under the Biota Program, would be a valuable addition to it.

Recommend: that

- xi) at the 2002 Evaluation Workshop, workshops on each of the Biota objectives be convened in order to:
 - encourage and create linkages among related projects
 - identify needed projects to fill taxonomic and/or geographic gaps
 - coordinate and promote data standardsand at the 2003 Evaluation Workshop, cross-cutting workshops be held (e.g. inventory with conservation, conservation with sustainable use)*
- xii) results from projects arising under other FAPESP Programs and other State programs that are related to the Biota objectives, be integrated into SinBiota.*
- xiii) future Symposia held for the project students continue to provide opportunities for junior workers to interact among themselves without the Principal Investigators being present.*
- xiv) the overlap between students and coordinators at the symposium be extended to a full day.*
- xv) present coordinators be encouraged to incorporate publications, articles, handbooks, Web Pages and databases that arise from the Biota Program in the SinBiota database. This should become a requirement for all future projects.*
- xvi) annual project reports include an entry on the number of publications entered into SinBiota bibliographic database.*

Student career development

18. The Scientific Advisory Committee applauds the achievements made by the Biota program in the training of students through individual projects, short courses and the

annual symposia. Through discussions with individuals and examination of the work of the students (poster presentations, etc.) we have been impressed by the quality, enthusiasm and knowledge of the students.

19. The Biota program may wish to develop cross-training opportunities for students in other projects, and develop specific training in management and related skills. Students that have access to a broader range of techniques and skills in biodiversity sciences through exposure to different projects are likely to become scientists with broader and more integrated approaches.
20. It is now extremely important that some attention be given to the long-term employment of the best students trained in Biota (see 28a, previous report). Clearly FAPESP and the São Paulo State authorities will want to continue the growth of this community as a 'Center of Excellence', as well as to continue the development of this research sector. There could also be some disenchantment with the program if the best students are unable to find posts.
21. An important question is how to build up a core of expertise in taxonomic groups or disciplines where there are presently no experts in São Paulo State? Any solution could include a partnership with an appropriate expert or center outside the State, whilst definitely encouraging that person to build up a facility here.
22. Biota has also provided opportunities to bring out the best in 'young star performers' in the program. The program should reward these people by bringing them in to core functions of Biota or by encouraging them towards developing further projects under their own leadership.

Recommend: that

- xvii) *through intensive field courses, develop the breadth of natural history knowledge among students or junior researchers. This could be accomplished with a program of rotation through different projects for short periods.*
- xviii) *Institute a management training course of 1-2 weeks for Biota students that may include*
 - *Program management*
 - *Grant and report writing*
 - *Staff and contract management*
 - *Ethics*
 - *Legislative environment*
- xix) *FAPESP consider a pro-active call for Biota personnel to seek Young Investigators posts.*
- xx) *the Young Investigator or Biota programs encourage applications using partnership arrangements in order to stimulate activities in areas or with groups not presently covered by Biota researchers.*
- xxi) *Coordenação Biota identify 'young star performers' and encourage them to take roles within the program and/or to make further applications to develop their research.*

Public education and outreach

23. The Scientific Advisory Committee applauds the Biota program for the development of a long-term plan to increase public awareness and appreciation of the habitats and organisms of the São Paulo State. The demonstration video on Biota prepared by Canal

Azul, and the planned follow-up series of 4 Cultural TV shows is a major development. We encourage continued strategies and planning in this area at the State level as well as nationally and internationally. Such programs can only benefit the program.

24. The continued development of high quality handbooks and field guides and their distribution into public, educational and commercial arenas needs to be encouraged and pursued. Partnership with commercial organizations and publishers may be advantageous to the Biota program.
25. Field guides and community awareness programs present an opportunity to involve students and the community in the recording and monitoring of biodiversity. Programs such as Stream Watch, Frog Watch, a Bird Atlas etc. where the community and/or school children can be motivated to record biodiversity information are advantageous. Field guides and local educational material are essential to the success of such an endeavor.
26. There is an opportunity for the Biota program to develop student assistantships for public outreach. Students enlisted as 'teachers' could become the basis for natural history tours to areas such as the Mata Atlantica and Cerrado parks or reserves within São Paulo State. This would contribute directly to conservation and the training of students.

Recommend: that

- xxii) *Biota develop or commission high quality field guides to birds, mammals, fishes, amphibians and reptiles, butterflies, and common trees of the State with editions in Portuguese, English, and Spanish.*
- xxiii) *support projects within Biota on childhood educational outreach, and include interactions with programs in other states and/or countries.*
- xxiv) *collaborate with State and National Park administrations to develop intensive training courses for local natural history guides and make use of student assistantships and improve trail systems that maximize access to both characteristic and unusual habitats or organisms, especially old-growth forest.*
- xxv) *support additional projects within Biota on ecotourism, including travel to other states and/or countries to learn more about their experiences and techniques, with the specific objective of recommending a master plan for developing ecotourism in São Paulo.*

Database protocols

27. Biota still needs a clear protocol for handling unnamed and unidentified species records, both for record-keeping and in the databases. There are two issues: (i) to make the label unique across the whole of Biota to avoid confusion, and (ii) to handle the record in linked data when the organism is subsequently identified or named. (There are a number of systems in use elsewhere that may act as prototypes).
28. Biota still needs a clear protocol for assigning version numbers and dates, and crediting database contributors, both within SinBiota and in the associated satellite databases. These may be comparable to existing norms in citing conventional publications. A set of standards need to be agreed and incorporated into metadata records. These will assist users to avoid confusion and to accurately cite databases.

Recommend: that

- xxvi) *each database include a title, author(s) or editor(s), and owner/custodian*

xxvii) each database include a clearly displayed version number or edition number and date

xxviii) each database have an agreed system of acknowledging contributors, collaborators and employees.

These issues need to be addressed at an early stage to avoid disputes at a later stage. All contributors, including employees and collaborators, should clarify the terms and conditions on which they contribute to all database and other products.

Annual Project Reports

29. We suggest that future annual project reports include a brief outside summary sheet which includes the following information:

- Starting date
- Ending date
- Level of funding
- Brief objectives of study
- Deliverable outcomes (e.g. database, publications, manuals, CDs etc.)
- Concrete accomplishments to date
- Numbers of active collaborators, staff, students
- As well as the number of collections in SinBiota, also the number of species and number of individuals
- Home page for project