

REPUBLIC OF INDONESIA
GEF - BIODIVERSITY COLLECTIONS PROJECT

Grant Summary

<u>Recipient:</u>	Republic of Indonesia
<u>Beneficiaries:</u>	The Research and Development Center for Biology of The Indonesian Institute of Sciences.
<u>Amount:</u>	SDR 5.1 million (US\$ 7.2 million equivalent)
<u>Terms:</u>	Grant
<u>Financing Plan:</u>	<u>(US\$ Million)</u>
GET Grant	7.2
GOI	4.2
Total	<u>11.4</u>
<u>Economic Rate of Return:</u>	Not Applicable

REPUBLIC OF INDONESIA

BIODIVERSITY COLLECTIONS PROJECT

Background

1. Rich Biodiversity. Indonesia is rich in biodiversity. It contains nearly 10 percent of the world's closed tropical forests. It also has extensive coral reefs and more marine coastline than any other tropical country. Although the archipelago represents only 1.3 percent of the earth's land area, it contains an estimated 25 percent of the world's fish species, 17 percent of all bird species, 16 percent of reptile and amphibian species, 12 percent of mammal species, 10 percent of plant species, and unknown numbers of species of invertebrate animals, fungi and microorganisms. Of these, perhaps 30 percent of the flora and 90 percent of the fauna are not yet fully described and scientifically documented.
2. Economic Importance of Biodiversity. Indonesia's biological resources are economically important both globally and nationally. Many plant species originated in Indonesia, including cloves, black pepper, and some tropical fruits. Indonesians use over 6,000 species of plants and animals; daily they gather or cultivate these species for food, handicrafts, medicines, fuel, and building materials. Natural ecosystems strongly influence natural resource development (the agriculture, livestock, forestry and fisheries sectors contributed over 18 percent of GDP in 1991), provide new commercial products (e.g., pharmaceuticals) and also affect water resource management, which is important for industrial and municipal development.
3. Importance of Systematic Biology and Collections. Systematic biology or systematics (i.e., the classification of living organisms) provides the scientific theory, principles, and process to inventory, monitor, and catalogue biodiversity information. Systematic collections (i.e., reference collections of plant and animal specimens that are preserved in chemicals or pressed and dried) and their associated data provide basic reference tools for acquiring, managing, accessing, and disseminating this scientific information on biodiversity. Biodiversity information is required in natural resource management, identification of plants and animals with economic potential, conservation, spatial planning, natural resource valuation, and environmental impact assessment. Improving systematic information through better reference collections and through better access to associated anthropologic, habitat, geographic, and environmental data is therefore an integral component of the global biodiversity strategy.
4. Importance of PPPB's Collections. The Research and Development Center for Biology (PPPB) of the Indonesian Institute of Sciences (LIPI)¹ provides the core scientific resources for systematic collections and associated information in Indonesia. PPPB's collections are the largest in Asia and include many unique and irreplaceable scientific reference specimens, including some dating from the nineteenth century.
5. Constraints. PPPB's institutional capacity to respond to the growing national and international demand for biodiversity information is limited by serious constraints in staffing, specimen storage, geographic and taxonomic coverage, and data management:

¹ LIPI is a non-departmental government institution, which is under the control of and reports directly to the President.

- (a) Staffing. PPPB has a shortage of senior staff experienced in strategic management, systematic biology, and database development, and a shortage of well-trained and motivated curatorial assistants.
- (b) Storage. A significant proportion of the PPPB's collections have been preserved using non-archival quality materials and stored for years under sub-optimal conditions. They urgently require restoration to avoid irreparable damage and loss of valuable information.
- (c) Coverage. The geographic and taxonomic coverage of Indonesia's combined collections, including PPPB's, is patchy, and the sampling density (the average number of specimens collected per unit area) is one of the lowest in the world.
- (d) Data management. The lack of a database seriously restricts access to information within the existing collections. The lack of a database not only makes access to specific taxonomic or geographic information difficult, it also makes identification of gaps in coverage difficult. The weakness of PPPB's linkages with external clients also undermines its effectiveness. Outside groups frequently send specimens for identification to overseas institutions instead of PPPB and then the information is not readily available to other users in Indonesia.

Government Strategy for Biodiversity Conservation and Information

6. The Government of Indonesia's (GOI's) overall conservation strategy has been elaborated in the 1991 Biodiversity Action Plan for Indonesia. To ensure the sustainable use of natural resources and conservation of genetic and biological diversity in the various ecosystems, the Government's strategy is to increase ecosystem types covered in protected areas, improve the management of protected areas, and enhance understanding and participation of people. Support for biodiversity collections was explicitly included in the Plan.

7. Over the long-term, PPPB plans to meet the expanding need for scientific information on biodiversity. The mission of PPPB, as it relates to biodiversity, is to develop systematic research collections and to develop and disseminate associated specimen-based information. Research at PPPB is collections-based and integral to this mission. Research subjects include systematic biology, ethnobiology and study of other plants and animals with economic potential, conservation biology, and ecology. PPPB seeks to integrate and coordinate the organization and dissemination of biodiversity information at the national level, in a way that would be responsive to user needs. This mission requires a transformation of PPPB into an institution that provides essential documentation for an environmental information system and for priority research on biodiversity. The data storage revolution in computational science has only recently made it feasible to readily access information in systematic collections. PPPB has the potential to become a world leader in the use of databases that would enable it to strategically manage the collections and to make information available to users in real time.

8. Within the next ten years, LIPI plans to consolidate several centers for research and development (Biology, Limnology, Biotechnology, and units of Applied Chemistry and Applied Physics) in a new Life Sciences Complex/Center, which would facilitate the integration of biodiversity research and information services. As an initial step, GOI is seeking support from the Government of Japan (GOJ) to provide a replacement building for PPPB's zoological collections which would become part of the Complex/Center. Future improvement of scientific information on biodiversity would also

include developing capacity for inventory and monitoring at new regional centers and at existing facilities within provincial universities.

Rationale for GET Funding

9. The project meets the "demonstration" criteria currently required for GET support. It is the first project of its kind. It would provide an institutional model for developing and strengthening systematic collections in other countries. Furthermore, it would increase basic knowledge in systematic biology and disseminate this knowledge throughout the international scientific community.

10. The project would also contribute to the Bank's Country Assistance Strategy by improving environmental management and strengthening government capacities. It is a logical progression of the Bank's support for conservation and environmental assessment. The Bank, through a number of initiatives under the Indonesia Forestry I and subsequent projects, has assisted GOI in the formulation of the national conservation strategy. Bank-supported projects have included investment in conservation, such as support for specific parks. The Bank has also supported the strengthening of environmental assessment of investment proposals. Systematic collections are a basic tool for biodiversity inventory and monitoring, which in turn is a crucial element of environment assessment.

Project Objectives

11. The proposed project would strengthen the institutional capacity of PPPB to support systematic biological collections, a basic reference tool for biodiversity inventory and monitoring. The project would also make information from the collections available to external clients. The project would establish the foundation required for PPPB to meet the expanding needs for biodiversity information over the long-term, and would provide high priority information during the project period. The main objectives would be:

- (a) to provide support for overall project management and coordination, in order to foster both effective project implementation and long-term institutional transformation;
- (b) to restore and develop the collections and associated functions of the Botany and Zoology Divisions;
- (c) to design and establish a computerized database of specimen-based data for collections management, collection plans and development, and external use; and
- (d) to strengthen the capacity to coordinate and foster collaborative biological research activities and client services.

Project Description

12. The project would be implemented over five years and would include the following components:

- (a) General Project Management and Coordination. This component would comprise the establishment of a steering committee, a project management committee and a project implementation unit (including locally contracted specialists in project and financial management), a technical advisory group (of international advisors with institutional and technical expertise), a user advisory group (representative of external clients), short-term

advisors and trainers (in environmental health and safety, document restoration, data field design, and specialized systematic biologists), provision of language training and project-related workshops for staff of PPPB, including provision of training materials and supplies, a grants program for systematic research and genetic resource conservation², and a financing strategy study.

- (b) Systematic Collections and Research in Botany and Zoology. This component would support the development of systematic collections and associated research in the Botany and Zoology Divisions through:
- (i) *Human Resource Development*: Provision of about 18 graduate-level scholarships in systematic biology and about 11 overseas work-study programs, local management training programs for collection managers, plus advice and extensive on-the-job training for managers, scientists, interns, and technicians in curation, taxa identification, field collecting, and user product development;
 - (ii) *Collections Restoration and Development*: Provision of building renovations, furniture, archival supplies, 40 temporary employees and redeployment of 20 permanent staff to work as curatorial assistants in order to improve and expand specimen storage, to improve the scientific organization of the collections, to restore deteriorating specimens, and to stabilize the specimens as necessary before moving them to new cabinets or buildings³ (these activities would include the integration of the marine reference collections belonging to the Research and Development Center for Oceanology with PPPB's terrestrial-based reference collections);
 - (iii) *Research Facilities*: Building renovation and provision of essential scientific literature and equipment in order to improve systematic biology research facilities; and
 - (iv) *Publications and Products*: Development of an illustrated technical glossary, a computerized bibliography of written reference materials, a computerized gazetteer, a database and handbooks covering specific taxa, national field guides, including a field guide for Gunung Halimun National Park, and a specimen identification service.
- (c) Information Systems Management. This component would set up a computer database and a local area network capable of basic specimen data entry, automated label production, collections management functions, and information dissemination. This system would complement and comprise a node of a wider network, which GOI plans to develop. This component would comprise inputs of technical assistance, an overseas work-study program, computer and network equipment and installation, software development and support, and the establishment of a new sub-division with redeployed and newly recruited staff.

² During negotiations, the Bank obtained assurances that the research grants program would be carried out in accordance with procedures and criteria agreed with the Bank.

³ During negotiations, the Bank obtained assurances that GOI would stabilize specimens as necessary before moving them to new cabinets or to different buildings.

- (d) Scientific Collaboration and Services. This component would provide a small amount of technical assistance and office equipment to strengthen PPPB's capacity to manage collaborative research, client services, and training programs.

Project Financing

13. The proposed GET grant of US\$ 7.2 million equivalent would finance 63 percent of the total project costs (US\$ 11.4 million). GET would finance an estimated US\$ 3.8 million net of taxes for technical assistance, studies and training, for which an estimated US\$ 2.2 million net of taxes would be procured through a single contract in accordance with Bank procedures. A single contract would facilitate provision of highly-specialized technical expertise and training, which is in scarce supply worldwide, and in some cases, unique. GOI would finance an estimated US\$ 1.0 million in taxes and duties on investment costs. In addition, GOI would contribute US\$ 3.2 million net of taxes in local training, research grants, and recurrent institutional operating expenses. Estimated costs and financing are summarized in Schedule A. Procurement methods, disbursement categories, and the disbursement schedule are outlined in Schedule B.

Project Implementation

14. Overall Management. PPPB would implement the project. A Project Manager, supported by a small project implementation unit, and Project Coordinators for botany, zoology, information systems management, and scientific collaboration, would manage the project. The Project Manager would work with a Project Management Committee (which would include PPPB divisional managers) to coordinate project activities with the overall PPPB operations, and would report to the Director of PPPB and an interagency Steering Committee. The Project Manager would also receive guidance from the Technical and User Advisor Groups and from short-term foreign experts and individually contracted specialists. In addition to providing general project oversight, the Steering Committee would direct the financing strategy study and decide on research grant allocations. During negotiations the Bank obtained assurances from GOI that the membership of the Project Management Committee, Steering Committee, and the User Advisory Group would be determined in accordance with criteria agreed with the Bank. GOI has submitted to the Bank evidence that the consultants implementing the technical assistance and specialized training contract, and the individuals to be contracted as the project management and financial management specialists have been selected. During negotiations it was agreed that as a condition of disbursement for equipment, furniture, and materials, and for research grants, that GOI provide evidence that the technical assistance and specialized training contract has been signed and that the project management and financial management specialists have been hired.

15. Planning, Monitoring, and Evaluation. The project design includes a planning process in the first year that would: (a) define an explicit policy framework for managing and developing biodiversity information; (b) develop a work program and set of priorities for overall institutional management, curation upgrading, database development, and client services; (c) specify detailed arrangements for staffing, career development, budget, and other required inputs; and (d) delineate criteria and procedures for evaluating the performance of staff and consultants and the effectiveness of management policies and procedures, training programs, client services. The resulting plan would be used for project monitoring and evaluation. The planning process includes two workshops during project inception, both of which would require participation of the TAG and other specialists. One workshop would determine database fields. The other workshop would determine taxa-specific priorities for project activities, using a methodology which incorporates estimates of accuracy and coverage of existing information, and projections of incremental costs and benefits of improvements.

During negotiations, the Bank obtained assurances that PPPB would: (a) in consultation with the User Advisory Group and the Steering Committee, prepare the content of the project work plan and the format of the progress reports, acceptable to the Bank, by March 31, 1995; (b) subsequently submit the progress reports, including an evaluation of consultant and staff performance, on a semi-annual basis, by April 30 and October 31, beginning April 30, 1995; (c) submit to the Bank a review of the work plan, which would include staffing, management procedures and decisions, budget, technical assistance, training, client services, and other project requirements, by September 30, 1995, and on an annual basis thereafter, and promptly carry out the recommendations of this review, taking into account the comments of the Bank, and (d) submit to the Bank the budget proposals for the project work plan agreed with the Bank, by December 31, 1995 and on an annual basis thereafter. During negotiations the Bank obtained assurances that PPPB would prepare a mid-project review by December 31, 1997, which would incorporate the strategy developed under the Financial Strategy Study, and a report on collections data access policy, and promptly carry out the recommendations of this review, taking into account the comments of the Bank.

16. **Staffing.** Of the 115 positions required for the project, some 53 would be filled by existing PPPB staff (from a pool of some 325 PPPB staff), some 13 staff would be seconded or recruited, and some 49 staff would be locally contracted on a fixed-term basis. All 18 managerial job positions for the project would be filled by existing PPPB personnel, with the exception of the Information Systems Coordinator position, which would be filled initially by an employee seconded from another LIPI agency. Locally contracted specialists would assist with project management tasks, financial management, software applications, engineering design, and various publications and products. New permanent staff would be recruited as required to participate in the graduate scholarship program. Some 20 redeployed staff and 40 temporary employees would work as curatorial assistants on the collections restoration and development, and data entry. This staffing plan is feasible given PPPB's existing labor profile, the standard GOI civil service and contracting regulations, and high retention rates of permanent staff. However, there are significant uncertainties regarding the potential capacities of PPPB permanent and contracted staff. To address this concern and facilitate smooth project implementation, the annual review of the work plan would include a specific focus on staffing and associated financial requirements.

17. **Training.** The training program would consist of: (a) graduate degree scholarships for eighteen staff; (b) overseas work-study and local management training programs for twelve staff; (c) on-the-job training of all project staff by three long-term advisors, eleven short-term advisors and experts, 6-10 scientific mentors, three locally contracted specialists, and PPPB scientists and managers; (d) internships for eight to sixteen faculty from local and provincial universities; (e) language training as required; and (f) inventory and monitoring fieldwork training. The project implementation unit would manage the overall training program, with contractual and staff assistance. As part of the project objective to strengthen PPPB's capacity to manage training, the project would include specific measures to strengthen the mobilization of additional financial resources for human resource development of PPPB staff. During negotiations the Bank obtained assurances from GOI that the graduate scholarship programs and students would be selected in accordance with criteria agreed with the Bank, and recipients of training would be offered positions in PPPB for a minimum of three years where they could make full use of their training.

18. **Project Scope, Phasing, and Focus.** Project designers have made every effort to determine a level of funding and an implementation schedule that is within the implementation capacity of PPPB and that reflects the importance of systematic collections relative to other national biodiversity priorities. Because of the current condition of PPPB's collections and the limited institutional capacity in the field of expertise the project must draw on, both within Indonesia and

worldwide, the project would focus on internal development. Measurable services and products for external clients would be limited in scope and would be achieved only in the later years of the project. Yet these would enable PPPB to demonstrate, albeit on a small scale, the current and potential benefits of project investments to external clients and to possible funding sources.

19. Linkage with Users and Information Policy. This investment is designed to be user-, not supply-driven over the long-term. Early in project preparation, GOI sponsored a workshop to give potential users an opportunity to contribute to project design. Prior to grant negotiations GOI gave these users an opportunity to review the final project proposal. GOI is now establishing a User Advisory Group (UAG) representative of the range of potential users. The project will also support a Collections Data Access Specialist who would draft a report on government policies involved in access to and sharing of data with outsiders.

20. Coordination with Japanese-financed Project. The proposed Japanese-funded project that would replace the buildings that house the Center's zoological collections would supplement, not duplicate, the GEF project. The GEF project schedule has been adjusted to accommodate the projected timing of GOJ-funded investments, giving special consideration of the need to stabilize the specimens before the move. GOI has taken responsibility for further coordination. While the GOJ project would provide a valuable contribution, the GEF project could proceed even if GOJ support does not materialize. During negotiations the Bank obtained assurances from Government that GOI would provide an adequate budget to rehouse the zoological collections in improved facilities by March 31, 1998 should the anticipated Government of Japan support be insufficient or not materialize.

Project Sustainability

21. The project includes financial, staffing, training, technical assistance, and physical investments designed to support long-term institutional transformation. The project includes a study to develop a financing strategy to address financial sustainability after the project period. During negotiations, the Bank obtained assurances that the Financial Strategy Study would be completed by September 30, 1997, and that PPPB would begin to operationalize the strategy developed under this study during the mid-project review. The Financing Strategy Study will help enable PPPB to obtain the long-term increases in the institutional budget to cover incremental operating costs resulting from the project, and the financing required for continued development of biodiversity information. The staffing plan depends on training and motivating a core group of permanent managers and curatorial assistants to maintain the collections and to continue to develop the database after the project, and using temporary staff for much of the restoration work which would be completed by the end of the project. The annual review of the work plan would facilitate any necessary adjustments in the staffing plan and the Government's financial contribution. The selection criteria for the scholarship programs and students and the subsequent employment requirements would address concerns regarding the sustainability of investments in graduate scholarships. The technical assistance would be provided with the goal of transferring expertise and technological resources to Indonesia. The physical investments would provide supplies and equipment necessary for the efficient long-term curation and scientific management of the national biological collections. These physical improvements would also provide improved working conditions, which are essential to staff motivation.

Past Experience and Lessons Learned

22. The Bank has not financed a similar project in Indonesia or elsewhere. Generic implementation issues for the Bank projects in Indonesia have included: (a) inter-agency coordination; (b) timely allocation of government counterpart budget; and (c) timely appointment of consultants and

their effective interaction with government staff. These issues would be addressed through the use of appropriate coordination mechanisms (including a detailed implementation plan and specific reporting relationships), the allocation of budget funds to a specially established project account, the agreement to consultant appointments as conditions of disbursements, and the provision of financial incentives for counterpart project staff. Project design also reflects the lessons learned from agricultural research projects; these lessons center on strategic and financial management.

Environmental Aspects

23. Hazardous Chemicals. The project would contribute to national conservation efforts and would improve information needed for environmental assessment nationwide. The main anticipated negative environmental issue associated with the project is exposure of staff and visitors to the residual hazardous chemicals used to preserve biological specimens prior to project inception. As of January, 1994, PPPB ceased applying mercuric and arsenic compounds and paradichlorobenzene. During the first year of the project, health and safety consultants would review environmental health and safety issues. During negotiations, the Bank obtained assurances that PPPB would prepare, in consultation with the environmental health and safety advisors, an environmental health and safety action plan, by April 30, 1995. The recommendations of this plan and associated training would precipitate changes in collections management procedures that would be implemented under the project to minimize exposure to residual harmful chemicals.

24. Rare and Endangered Species. During negotiations, the Bank obtained assurances that the collection of specimens from the wild under the project (under the field work training and guidebook production program) would be carried out with full regard to the need to conserve rare and endangered species. The overall project, including the collection activities, would improve the information on the status of rare and endangered species in Indonesia.

Agreed Actions

25. During negotiations, the Bank obtained assurances from the Government that:
- (a) The research grants program would operate in accordance with procedures and criteria agreed with the Bank;
 - (b) GOI would stabilize specimens as necessary before moving them to new cabinets or to different buildings;
 - (c) that the membership of the Project Management Committee, Steering Committee, and the User Advisory Group would be determined in accordance with criteria agreed with the Bank;
 - (d) PPPB would: (i) in consultation with the User Advisory Group and the Steering Committee, prepare the content of the project work plan and the format of the progress reports, acceptable to the Bank, by March 31, 1995; (ii) subsequently submit the progress reports, including an evaluation of consultant and staff performance, on a semi-annual basis, by April 30 and October 31, beginning April 30, 1995; (iii) submit to the Bank a review of the work plan, which would include staffing, management procedures and decisions, budget, technical assistance, training, client services, and other project requirements, by September 30, 1995, and on an annual basis thereafter, and promptly carry out the recommendations of this review, taking into account the comments of the

Bank, and (iv) submit to the Bank the budget proposals for the project work plan agreed with the Bank, by December 31, 1995 and on an annual basis thereafter;

- (e) PPPB would prepare a mid-project review by December 31, 1997, which would incorporate the strategy developed under the Financial Strategy Study, and incorporate the report on collections data access policy, and promptly carry out the recommendations of this review, taking into account the comments of the Bank;
- (f) The graduate scholarship programs and students would be selected in accordance with criteria agreed with the Bank, and recipients of training would be employed for a minimum of three years in positions at PPPB where they could make full use of their training;
- (g) GOI would provide an adequate budget to rehouse the zoological collections in improved facilities by March 31, 1998 should the anticipated Government of Japan support be insufficient or not materialize;
- (h) PPPB would: (i) prepare, in consultation with the environmental health and safety advisors, an environmental health and safety action plan by April 30, 1995; (ii) furnish this plan to the Bank for comments; and, (iii) carry out this plan taking into account the comments of the Bank;
- (i) The collection of specimens from the wild under the project would be carried out with full regard to the need to conserve rare and endangered species and in accordance with applicable laws and regulations;

26. GOI has submitted to the Bank, as a condition of Regional Vice President (RVP) approval, evidence that the consultants implementing the technical assistance and specialized training contract, and the individuals to be contracted as the project management and financial management specialists have been selected.

27. During negotiations it was agreed that, as a condition of disbursement for equipment, furniture, and materials, and for research grants, that GOI provide evidence that the technical assistance and specialized training contract has been signed and that the project management and financial management specialists have been hired.

Project Benefits

28. Uses of Biodiversity Information. The project would enable PPPB to become a leader in environmental data management and enable GOI, non-governmental organizations, and commercial users to access priority biodiversity information. This biodiversity information would provide a more factual basis for decision-making in natural resource management, conservation, spatial planning, and environmental assessment. It would also enable the identification of plants and animals with economic potential. The label information associated with specimens in the collections include location, date of collection, soil type, elevation, slope, proximity to water courses, associated species, and local uses. Applications of this label information include:

- (a) Rapid assessments of the biological resources of specific locations, to be used in land-use planning and ecosystem management;

- (b) Environmental monitoring to measure the impact over time of investments and other human activities on ecosystems;
- (c) Identification and monitoring of rare and endangered species, and analysis of geographic distribution patterns for biodiversity conservation;
- (d) Identification of unknown species such as newly introduced agricultural pests;
- (e) Repository of local knowledge about plant and animal uses, which is rapidly disappearing; and
- (f) Database searches for prospecting plants and animals for various uses including therapeutic drugs, food, biological controls, reforestation (e.g., mycorrhizal fungi), and geological species indicators (e.g., discovery of mineral deposits and hot springs).

29. Institutional Benefits. To achieve these applications, the project would accomplish the following:

- (a) Strategic and institutional transformation. The project would enable PPPB to become one of the first examples in the world where the collection, organization, and dissemination of biodiversity information would be driven by user need, integrated and coordinated at a national level; and based on primary specimen-based data. The project would also enable PPPB to take the first step in a long-term process to provide biodiversity information adequate in scope and scale to the task of conservation and sustainable development in a large, developing country with high biodiversity. The project would make PPPB more effective and responsive, and would provide a model of strategic and institutional transformation for similar organizations in both developing and developed countries.
- (b) Improvements in the physical condition of specimens. The project investment in collections and research would significantly improve the physical condition of the collections. Under the project, PPPB would take definitive steps toward international standards of physical curation. Unless immediate measures are taken to restore large numbers of specimens that are deteriorating under tropical conditions, the Center's extensive historical collections will shortly sustain irreparable damage, and large amounts of valuable biodiversity information will be lost. In economic terms, it is four to twenty times more cost-efficient to capture biodiversity information from the existing collections than to collect new data from the field.
- (c) Database design and establishment. The database development would improve collections management, enable collection plans and development, and facilitate external use. The database would be state-of-the-art, and would provide a key part of the scientific and institutional foundation required for a national biodiversity information system. It would provide functional fields of information that meet internal and external needs for the priority taxa that are in the project work program. The project would also establish the basic database infrastructure required for the long-term process of entering 100 percent of the data from PPPB's existing collections.
- (d) Fostering of scientific collaboration and research. The project would help to foster scientific collaboration and research, beyond that which would be provided under the

project itself. This increased scientific collaboration and research would supplement financial and expert resources, and be an important source of new specimens, data, and human resource development.

- (e) Development of user products and services. The project also includes support for a variety of products and services for external clients. These tangible products and services would be based on, and mostly limited to, priority taxa, and might include preliminary species lists, measures of abundance and distribution, identification reference tools and services, field guides, compilations of ethnobiological data, and biotic resource prospecting services.

Project Risks

30. Risks and areas of uncertainty associated with the implementation of the project consist of: (a) provision of sufficient management support; (b) recruitment, motivation, and training of sufficient numbers of new and existing staff; (c) provision of technical expertise from a limited pool worldwide; (d) building of institutional linkages, which would enable the fullest possible utilization of the collections; and (e) sustainability after the project. The project would establish new positions key to project management, make provision for competitive recruitment of new staff, and provide incentives and training for all project staff. It would use a single contract arrangement for procuring specialized technical expertise. The project includes specific measures to strengthen linkages with users. It also includes measures that address financial and institutional requirements for long-term sustainability.

Attachments

Washington D.C.
June 22, 1994

INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

Estimated Costs and Financing Plan

ESTIMATED COSTS a/:

	(Rp Million)			(US\$ '000)			% Foreign Exchange	% Total Base Costs
	Local	Foreign	Total	Local	Foreign	Total		
1. General Project Management & Coordination	2,112	1,345	3,457	1,004	639	1,642	39	17
2. Botany Collections and Research	4,162	1,856	6,018	1,977	882	2,859	31	30
3. Zoology Collections and Research	3,178	2,277	5,455	1,510	1,082	2,591	42	27
4. Information Systems	605	992	1,596	287	471	758	62	8
5. Scientific Collaboration and Services	723	3,006	3,729	343	1,428	1,772	81	18
Total BASELINE COSTS	10,780	9,475	20,255	5,121	4,501	9,622	47	100
Physical Contingencies	892	472	1,364	424	224	648	35	7
Price Contingencies	1,718	646	2,364	816	307	1,123	27	12
Total PROJECT COSTS	13,390	10,593	23,984	6,361	5,032	11,394	44	118

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a/ Includes US\$ 1.0 million in duties and taxes.

FINANCING PLAN:

	Foreign	Local	Total
	(US\$ million)		
Global Environment Trust Fund	5.0	2.2	7.2
Government of Indonesia	..	4.2	4.2
Total	5.0	6.4	11.4

INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

Procurement Method and Disbursement

AMOUNTS AND METHODS OF PROCUREMENT:

	Indonesia Biodiversity Collections Project Procurement Arrangements (US\$ Million)					N.B.F.	Total
	Procurement Method						
	Local Competitive Bidding	Limited International Bidding	Local Shopping	Direct Contracting	Consulting Services		
A. Civil Works	0.1 (0.1)	-	-	-	-	-	0.1 (0.1)
B. Equipment, Materials, and Furniture							
Scientific and Curation Equipment and Materials	-	0.6 (0.5)	0.0 (0.0)	-	-	-	0.6 (0.5)
Computers and Office Equipment	0.2 (0.2)	-	0.1 (0.1)	-	-	-	0.3 (0.3)
Specimen Storage Furniture	1.0 (0.9)	-	-	-	-	-	1.0 (0.9)
Other Equipment, Materials, and Furniture	-	-	0.1 (0.1)	-	-	-	0.1 (0.1)
C. Technical Assistance, Training, and Studies							
1. Technical Advisors and Specialized Training	-	-	-	-	2.4	-	2.4
2. Studies	-	-	-	-	(2.2)	-	(2.2)
3. Graduate Fellowships	-	-	-	1.6	0.1	0.1	1.7
4. Local Training Programs and Internships	-	-	-	(1.6)	-	0.3	(1.6)
D. Misc. Contracts							
Publications and Products	-	-	-	0.4 (0.3)	0.4 (0.4)	-	0.8 (0.7)
Contract Employees	-	-	-	0.5 (0.4)	-	-	0.5 (0.4)
Research Grants	-	-	-	0.1 (0.1)	-	0.4	0.5 (0.1)
E. Allowances and Honoraria	-	-	-	0.4 (0.4)	-	-	0.4 (0.4)
F. Recurrent Expenditures	-	-	-	-	-	2.5	2.5
Total	1.3 (1.1)	0.6 (0.5)	0.2 (0.2)	3.0 (2.8)	2.9 (2.6)	3.4	11.4 (7.2)

NOTES: Figures in parenthesis are the respective amounts financed by the Global Environment Trust Fund.
Numbers may not add due to rounding.

INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

DISBURSEMENT CATEGORIES:

Category	Amount (US\$ million)	Disbursement Rate
Civil Works	0.085	85 percent
Equipment, furniture and materials <u>a/</u>	1.720	100 percent of foreign expenditures, 100 percent of local expenditures (ex-factory costs) and 65 percent of local expenditures for other items procured locally.
Training	3.500	100 percent net of taxes
Research Grants	0.085	100 percent net of taxes
Allowances, Honoraria, and Wages of Contractual Employees <u>b/</u>	0.960	85 percent
Consultants' services	0.550	100 percent net of taxes
Unallocated (except Research Grants)	0.300	..

a/ Excluding vehicles.

b/ Excluding regular staff salaries.

ESTIMATED DISBURSEMENTS:

Bank FY	FY95	FY96	FY97	FY98	FY99	FY00
	-----US\$ million-----					
Annual	0.4	1.2	1.6	1.7	1.6	0.7
Cumulative	0.4	1.6	3.2	4.9	6.5	7.2

INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

Timetable of Key Processing Events and Staff Review Arrangements

TIMETABLE OF KEY PROCESSING EVENTS:

Time Taken to Prepare:	19 months
Prepared by:	GOI with GEF Preinvestment Facility (PRIF) - funded assistance led by Arnold Arboretum of Harvard University
First IBRD Mission (Pre-identification):	October, 1991
Appraisal Mission:	November/December, 1993
Negotiations:	April, 1994
Planned Date of Effectiveness:	October, 1994
List of Relevant PCRs and PPARs:	None

STAFF REVIEW ARRANGEMENTS:

This report is based on the findings of an appraisal mission comprised of Ms. Jessica Mott (Task Manager) and Mr. James Estes (Consultant), which visited Indonesia in November/December 1993. Mr. Ben van de Poll (Sr. Agriculturist) and Ms. Dely Gapasin (Agriculturist) assisted in project processing. The peer reviewers were Mr. Ken Creighton (technical issues), Mr. Tom Walton (institutional issues), and Ms. Susan Shen (sectoral issues). Mr. Antony Cole, Division Chief of EA3AG, and Mrs. Marianne Haug, Department Director, provided managerial oversight. The outside experts who participated in the GEF Technical Review Panel were Mr. Charles Barber and Mr. José Furtado.

INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

Supplemental Annex

June 22, 1994

CURRENCY EQUIVALENTS

(As of December 10, 1993)

Currency Unit = Rupiah (Rp)

US\$ 1.00 = Rp 2105

GOVERNMENT FISCAL YEAR

April 1 - March 31

ABBREVIATIONS, ACRONYMS, AND INDONESIAN TERMINOLOGY

BAPPENAS	Badan Perencanaan Pembangunan Nasional (National Development Planning Agency)
BPKP	Government Audit Agency
GEF	Global Environment Facility
GET	Global Environment Trust Fund
GOI	Government of Indonesia
GOJ	Government of Japan
ICB	International Competitive Bidding
LCB	Local Competitive Bidding
LIB	Limited International Bidding
LIPI	Lembaga Ilmu Pengetahuan Indonesia (Indonesian Institute of Sciences)
MOD	Memorandum of the Director
NGO	Non-Governmental Organization
PCR	Project Completion Report
PPAR	Project Performance Audit Report
PPPB	Pusat Penelitian dan Pengembangan Biologi (Research and Development Center for Biology, LIPI)
PPPO	Pusat Penelitian dan Pengembangan Oseanologi (Research and Development Center for Oceanology, LIPI)
PRIF	GEF Preinvestment Facility
SOE	Statement of Expenditure
TAG	Technical Advisory Group
UAG	User Advisory Group

INDONESIA

BIODIVERSITY COLLECTIONS PROJECT

GRANT AND PROJECT SUMMARY

Recipient: Republic of Indonesia

Amount: SDR 5.1 million (US\$ 7.2 million)

Terms: Grant

Project Description: The proposed five-year project, to be funded by the Global Environment Trust Fund (GET), would strengthen the capacity of the Research and Development Center for Biology (PPPB) to support the systematic biological collections (reference collections of plant and animal specimens that are preserved in chemicals or pressed and dried) and their associated data that are a basic reference tool for biodiversity inventory and monitoring. The project would also make information from the collections available to users in other sectors. The project would *inter alia* support:

- (a) General Project Management and Coordination. This component would comprise the establishment of a steering committee, a project management committee, a project implementation unit, technical advisors, an advisory group representative of external clients, a research grants program for systematic research, a financial strategy study and provision of language training and project-related workshops.
- (b) Systematic Collections and Research in Botany and Zoology. Systematic collections and associated research in the Botany and Zoology Divisions would be developed through:
 - (i) *Human Resource Development*: graduate-level scholarships in systematic biology and overseas work-study programs, local management training plus on-the-job training;
 - (ii) *Collections Restoration and Development*: building renovations, furniture, supplies, and temporary employees to improve specimen storage and organization and to restore deteriorating specimens (these activities would include the integration of the marine reference collections belonging to the Research and Development Center for Oceanology with PPPB's terrestrial-based reference collections);
 - (iii) *Research Facilities*: building renovation and provision of scientific literature and equipment; and
 - (iv) *Publications and User Products*: development of an illustrated technical glossary, a computerized bibliography of written reference materials, a computerized gazetteer, a database and handbooks covering specific taxa, national field guides, and a specimen identification service.

- (c) Information Systems Management. This component includes the design and establishment of a computer database and a local area network capable of basic specimen data entry, automated label production, collections management functions, and information dissemination. This system would complement and comprise a node of a wider network, which GOI plans to develop. Inputs comprise technical assistance, an overseas work-study program, computer and network equipment and installation, software development and support, and the establishment of a new sub-division.
- (d) Scientific Collaboration and Services. Technical assistance and office equipment would be provided to strengthen PPPB's capacity to manage collaborative research, client services, and training programs.

Benefits:

The project would enable PPPB to become a leader in environmental data management and enable GOI, non-governmental organizations, and commercial users to access priority biodiversity information. This biodiversity information would provide a more factual basis for decision-making in natural resource management, conservation, spatial planning, and environmental assessment. It would also enable the identification of plants and animals with economic potential. To accomplish this intent, the project would transform PPPB through strategic planning and institutional development into an effective and responsive organization, improve the physical condition of specimens, design and establish a state-of-the-art database system, foster scientific collaboration, and provide client products and services.

Risks:

Risks and areas of uncertainty associated with the implementation of the project consist of: (a) provision of sufficient management support; (b) recruitment, motivation, and training of new and existing staff; (c) provision of technical expertise from a limited pool worldwide; (d) building of institutional linkages, which would enable the fullest possible utilization of the collections; and (e) sustainability after the project. The project would establish new positions key to project management, make provision for competitive recruitment of new staff, and provide incentives and training for all staff. It would use a single contract arrangement for procuring specialized technical expertise. The project includes specific measures to strengthen linkages with users. It also includes measures that address financial and institutional requirements for long-term sustainability.

Estimated Costs a/:

	(Rp Million)			(US\$ '000)			% Foreign Exchange	% Total Base Costs
	Local	Foreign	Total	Local	Foreign	Total		
1. General Project Management & Coordination	2,112	1,345	3,457	1,004	639	1,642	39	17
2. Botany Collections and Research	4,162	1,856	6,018	1,977	882	2,859	31	30
3. Zoology Collections and Research	3,178	2,277	5,455	1,510	1,082	2,591	42	27
4. Information Systems	605	992	1,596	287	471	758	62	8
5. Scientific Collaboration and Services	723	3,006	3,729	343	1,428	1,772	81	18
Total BASELINE COSTS	10,780	9,475	20,255	5,121	4,501	9,622	47	100
Physical Contingencies	892	472	1,364	424	224	648	35	7
Price Contingencies	1,718	646	2,364	816	307	1,123	27	12
Total PROJECT COSTS	13,390	10,593	23,984	6,361	5,032	11,394	44	118

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a/ Includes US\$ 1.0 million equivalent in duties and taxes.

Financing Plan:

	Foreign	Local	Total
		(US\$ million)	
Global Environment Trust Fund	5.0	2.2	7.2
Government of Indonesia	..	4.2	4.2
Total	5.0	6.4	11.4

Estimated Disbursements:

Bank FY	FY95	FY96	FY97	FY98	FY99	FY00
	-----US\$ million-----					
Annual	0.4	1.2	1.6	1.7	1.6	0.7
Cumulative	0.4	1.6	3.2	4.9	6.5	7.2

**Economic Rate
of Return:**

Not applicable

CONTENTS OF SUPPLEMENTAL ANNEX a/

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a/ This supplemental annex provides detailed information on project administration which complements information in the attached Preparation Report.

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A. PROCUREMENT

1. The proposed procurement arrangements are presented in Table 1 below:

		Indonesia Biodiversity Collections Project Procurement Arrangements (US\$ Million)					N.B.F.	Total
		Procurement Method						
	Local Competitive Bidding	Limited International Bidding	Local Shopping	Direct Contracting	Consulting Services			
A. Civil Works	0.1 (0.1)	-	-	-	-	-	0.1 (0.1)	
B. Equipment, Materials, and Furniture								
Scientific and Curation Equipment and Materials	-	0.6 (0.5)	0.0 (0.0)	-	-	-	0.6 (0.5)	
Computers and Office Equipment	0.2 (0.2)	-	0.1 (0.1)	-	-	-	0.3 (0.2)	
Specimen Storage Furniture	1.0 (0.9)	-	-	-	-	-	1.0 (0.9)	
Other Equipment, Materials, and Furniture	-	-	0.1 (0.1)	-	-	-	0.1 (0.1)	
C. Technical Assistance, Training, and Studies								
1. Technical Advisors and Specialized Training	-	-	-	-	-	2.4	2.4	
2. Studies	-	-	-	-	-	(2.2)	(2.2)	
3. Graduate Fellowships	-	-	-	-	-	0.1	0.1	
4. Local Training Programs and Internships	-	-	-	1.6 (1.6)	-	(0.1)	1.7 (1.6)	
D. Misc. Contracts								
Publications and Products	-	-	-	0.4 (0.3)	0.4 (0.4)	-	0.8 (0.7)	
Contract Employees	-	-	-	0.5 (0.4)	-	-	0.5 (0.4)	
Research Grants	-	-	-	0.1 (0.1)	-	0.4	0.5 (0.1)	
E. Allowances and Honoraria	-	-	-	0.4 (0.4)	-	-	0.4 (0.4)	
F. Recurrent Expenditures	-	-	-	-	-	2.5	2.5	
Total	1.3 (1.1)	0.6 (0.5)	0.2 (0.2)	3.0 (2.8)	2.9 (2.6)	3.4 (7.2)	11.4 (7.2)	

NOTES: Figures in parenthesis are the respective amounts financed by the Global Environment Trust Fund. Numbers may not add due to rounding.

2. Civil Works (US\$ 0.1 million). These consist of building improvements to the herbarium, including window screening, wall partitions, and the installation of air conditioning for selected portions of the building. Because these small contracts would not attract foreign bidders, these works would be procured following local competitive bidding procedures (LCB) acceptable to the Bank.

A. PROCUREMENT

1. The proposed procurement arrangements are presented in Table 1 below:

Indonesia Biodiversity Collections Project Procurement Arrangements (US\$ Million)							
	Procurement Method					N.B.F.	Total
	Local Competitive Bidding	Limited International Bidding	Local Shopping	Direct Contracting	Consulting Services		
A. Civil Works	0.1 (0.1)	-	-	-	-	-	0.1 (0.1)
B. Equipment, Materials, and Furniture							
Scientific and Curation Equipment and Materials	-	0.6 (0.5)	0.0 (0.0)	-	-	-	0.6 (0.5)
Computers and Office Equipment	0.2 (0.2)	-	0.1 (0.1)	-	-	-	0.3 (0.2)
Specimen Storage Furniture	1.0 (0.9)	-	-	-	-	-	1.0 (0.9)
Other Equipment, Materials, and Furniture	-	-	0.1 (0.1)	-	-	-	0.1 (0.1)
C. Technical Assistance, Training, and Studies							
1. Technical Advisors and Specialized Training	-	-	-	-	2.4	-	2.4
2. Studies	-	-	-	-	(2.2)	-	(2.2)
3. Graduate Fellowships	-	-	-	-	0.1 (0.1)	-	0.1 (0.1)
4. Local Training Programs and Internships	-	-	-	1.6 (1.6)	-	0.1	1.7 (1.6)
D. Misc. Contracts							
Publications and Products	-	-	-	0.4 (0.3)	0.4 (0.4)	-	0.8 (0.7)
Contract Employees	-	-	-	0.5 (0.4)	-	-	0.5 (0.4)
Research Grants	-	-	-	0.1 (0.1)	-	0.4	0.5 (0.1)
E. Allowances and Honoraria	-	-	-	0.4 (0.4)	-	-	0.4 (0.4)
F. Recurrent Expenditures	-	-	-	-	-	2.5	2.5
Total	1.3 (1.1)	0.6 (0.5)	0.2 (0.2)	3.0 (2.8)	2.9 (2.6)	3.4 -	11.4 (7.2)

NOTES: Figures in parenthesis are the respective amounts financed by the Global Environment Trust Fund. Numbers may not add due to rounding.

2. Civil Works (US\$ 0.1 million). These consist of building improvements to the herbarium, including window screening, wall partitions, and the installation of air conditioning for selected portions of the building. Because these small contracts would not attract foreign bidders, these works would be procured following local competitive bidding procedures (LCB) acceptable to the Bank.

3. Equipment, Furniture and Materials (US\$ 2.0 million). About US\$ 0.6 million would be for highly specialized scientific and curational equipment and supplies, which are only available from a limited number of suppliers worldwide. These items would therefore be procured through limited international bidding (LIB). An additional US\$ 30,000 of the scientific and curational equipment and curational equipment and supplies, for readily available off-the-shelf purchases in amounts less than US\$20,000, would be procured through local shopping. About US\$ 0.3 million would be for computer and office equipment, of which some 75 percent would be procured through LCB because the small contract values and the need for local servicing would preclude international competitive bidding (ICB). The remaining 25 percent of the computer and office equipment, for readily available off-the shelf purchases in amounts less than US\$ 20,000, would be procured through local shopping. About US\$ 1.0 million would be for custom-built metal cabinets and other curation furniture. These cabinets are produced locally at prices below the international market and they would therefore be procured through LCB procedures acceptable to the Bank. The remaining US\$ 0.1 million would be for readily-available off-the-shelf, small value freezers, office furniture and materials procured through local shopping. The aggregate total of all items in this procurement category procured through local shopping would be limited to US\$ 200,000.

4. Technical Assistance, Studies and Training (US\$ 4.5 million). All technical assistance and studies would be procured in accordance with the Bank's Guidelines on the Use of Consultants and engaged according to the Bank's Standard Conditions of Contract for Consultants. About US\$ 2.5 million would be for technical advisors, specialized training (including overseas work-study programs, local management training programs, and on-the-job training), and the financing strategy study procured through a single contract, which would facilitate provision of highly specialized technical expertise, which is in scarce supply worldwide, and in some cases, unique. In order to expedite the start of project activities after project approval, this contract should be signed as a condition of disbursement of the equipment, materials, and furniture and the research grants. Some US\$ 1.6 million for overseas graduate scholarships and academic co-supervisors would be procured through direct contracting with universities, and reimbursement for other related eligible expenses. A locally contracted specialist would handle administrative arrangements for the graduate scholarship program. The remaining US\$ 0.4 million, mostly for local graduate scholarships, language training, internships for local university faculty, and training in field inventory and monitoring, would be supplied mainly by reimbursement of eligible expenses.

5. Miscellaneous Contracts and Other Expenditures (US\$ 1.8 million). About US\$ 0.8 million for publications and products (e.g., periodicals, computer software development, bibliography and gazetteer compilation, and glossary, handbook, and guidebook production) would be procured through either through consultant service contracts in accordance with Bank Guidelines (about US\$ 0.4 million) or through reimbursement of eligible expenses (about US\$ 0.4 million) as appropriate. Locally contracted specialists who would assist PPPB staff with administrative and financial tasks, and temporary employees who would assist with curation, would be hired through direct contracts totalling some US\$ 0.5 million. In order to expedite the start of project activities after project approval, the specialists in project management and in financial management would be hired as a condition of disbursement of the equipment, materials, and furniture and the research grants. About US\$ 0.5 million for small research grants would be procured through direct contracts in accordance with selection procedures outlined in the Preparation Report paragraph 4.10 and Annex 3, Part C, pages 81-86.

6. Allowances and Honoraria (US\$ 0.4 million). These consist of reimbursements of eligible allowances and honoraria.

7. **Review of Procurement.** For LIB, GOI would use and conform to the Bank's Standard Bidding Documents for the ICB of Goods for all aspects other than advertisement, prequalification and preferences. GOI would also use and conform to the Standard Form of Contract for Consultants, and the proposed Standard Bidding Documents for the LCB of Civil Works and Goods which would facilitate the tender and contract preparation by the various agencies involved. Under LIB, domestic preferences are not applicable in the evaluation of bids. All tender documents and contracts for goods estimated to cost the equivalent of US\$ 200,000 or more, all consultant and service contracts with institutions estimated to cost US\$ 100,000 or more, all consultant and service contracts with individuals estimated to cost US\$ 50,000 or more, and all studies would be subject to prior review by the Bank. For consultancy contracts with institutions, the review would include terms of reference, short list, letter of invitation, selection procedures and criteria, recommendation for award, and the final contract. The prior review by the Bank would cover about 63 percent of total contract values, and the contracted specialist who would handle the administration of the graduate scholarships would provide external oversight for an additional 21 percent of the total contracted values. All contracts and statements of expenditure not subject to prior review by the Bank would be subject to a post-review by the Bank on a sample basis. This review would concentrate on the competitiveness of prices paid and on physical inspections of the relevant items.

B. DISBURSEMENTS, ACCOUNTS, AND AUDITS

8. Disbursements of the GET grant would be made as follows:

Table 2: Disbursement Categories

Category	Amount (US\$ million)	Disbursement Rate
Civil Works	0.085	85 percent
Equipment, furniture and materials <u>a/</u>	1.720	100 percent of foreign expenditures, 100 percent of local expenditures (ex-factory costs) and 65 percent of local expenditures for other items procured locally.
Training	3.500	100 percent net of taxes
Research Grants	0.085	100 percent net of taxes
Allowances, Honoraria, and Wages of Contractual Employees <u>b/</u>	0.960	85 percent
Consultants' services	0.550	100 percent net of taxes
Unallocated (except Research Grants)	0.300	..

a/ Excluding vehicles.

b/ Excluding regular staff salaries.

9. Disbursement Arrangements for Research Grants. In order to facilitate 100% financing by GOI of a large portion of the research grants program, unallocated funds would not be available to the research grants category.

10. Disbursement Documentation. Disbursements under the project would be made against Statement of Expenditure (SOE) for contracts for works, goods, and equipment valued at less than US\$ 200,000, contracts for the employment of consulting firms costing less than US\$ 100,000 equivalent per contract, and contracts for the employment of individual consultants costing less than US\$ 50,000, and research grants, non-contractual training, intern stipends, allowances, honoraria, and other staff expenditures. Disbursement for all other expenditures would be on the basis of full documentation. Contracts disbursed under SOEs would be based on bid documents approved by the Bank. Supporting documentation for SOE expenditures would be retained by PPPB and be made available for inspection by Bank supervision missions; it would not be submitted to the Bank.

11. Disbursement Schedule. The proceeds of the grant are expected to be disbursed over six years, which is shorter than the seven and a half year average disbursement period for projects in Indonesia (Table 3). The Project Completion Date would be March 31, 2000 and the Project Closing Date would be September 30, 2000.

Table 3: Estimated Disbursement Schedule

GEF Fiscal Year	Project Disbursement		%	Disbursement Profile % <u>a/</u>
	Per Semester -----US\$ million-----	Cumulative		
1995				
1	0.2	0.2	3	3
2	0.2	0.4	6	6
1996				
1	0.6	1.0	14	14
2	0.6	1.6	22	22
1997				
1	0.9	2.5	35	34
2	0.7	3.2	44	42
1998				
1	1.0	4.2	58	54
2	0.7	4.9	68	62
1999				
1	1.0	5.9	82	74
2	0.6	6.5	90	82
2000				
1	0.5	7.0	97	86
2	0.2	7.2	100	94
2001				
1		7.2	100	96
2		7.2	100	98
2002				
1		7.2	100	100

a/ For all projects in Indonesia.

Project Closing Date: September 30, 2000.

12. Special Account. To facilitate disbursements, a Special Account would be established in Bank Indonesia to be maintained by the Director General Budget in the Ministry of Finance or a state commercial bank acceptable to the Bank for the purpose of the project. The account would be maintained in US dollars, with an initial deposit of US\$ 0.5 million. The Special Account would be used for all eligible foreign and local currency expenditures. The Government would request replenishment of the Special Account on a monthly basis or when 20 percent of the initial deposit has been depleted, whichever occurs first.

13. Accounts and Audits. PPPB would keep project accounts by government fiscal year which reflect the status of project components and expenditures. Assurances were obtained during negotiations that GOI and its agencies would comply with the following project accounting and auditing arrangements: (a) PPPB would establish and maintain adequate accounts from the beginning of project implementation. Such accounts would be maintained in accordance with sound and generally recognized accounting principles and practices satisfactory to the Bank and in a format in line with the Bank's Guidelines on Financial Reporting and Auditing of Projects Financed by the World Bank for East Asia and the Pacific Region; (b) all project accounts including schedules of expenditures claimed under SOE procedures and usage of the Special Account would be audited annually by the Government Audit Agency (BPKP), or other suitably qualified auditors acceptable to the Bank; and (c) audit reports of project accounts, SOE and Special Account would be submitted to the Bank within six months of each Government fiscal year.

C. AGREEMENTS REACHED DURING NEGOTIATIONS

14. During negotiations, the Bank obtained assurances from the Government that:
- (a) The research grants program would operate in accordance with procedures and criteria agreed with the Bank (MOD para. 13, Preparation Report para. 4.10, and Annex 3, pages 81-86);
 - (b) GOI would stabilize specimens as necessary before moving them to new cabinets or to different buildings (MOD para. 13, Preparation Report paras. 4.20, 4.31);
 - (c) that the membership of the Project Management Committee, Steering Committee, and the User Advisory Group would be determined in accordance with criteria agreed with the Bank (MOD para. 15, Preparation Report paras. 4.7, 4.51-4.52, 4.59, and Annex 3, page 79);
 - (d) PPPB would: (i) in consultation with the User Advisory Group and the Steering Committee, prepare the content of the project work plan and the format of the progress reports, acceptable to the Bank, by March 31, 1995; (ii) subsequently submit the progress reports, including an evaluation of consultant and staff performance, on a semi-annual basis, by April 30 and October 31, beginning April 30, 1995; (iii) submit to the Bank a review of the work plan, which would include staffing, management procedures and decisions, budget, technical assistance, training, client services, and other project requirements, by September 30, 1995, and on an annual basis thereafter, and promptly carry out the recommendations of this review, taking into account the comments of the Bank, and (iv) submit to the Bank the budget proposals for the project work plan agreed

with the Bank, by December 31, 1995 and on an annual basis thereafter (MOD para. 16, Preparation Report paras. 4.62-4.65);

- (e) PPPB would prepare a mid-project review by December 31, 1997, which would incorporate the strategy developed under the Financial Strategy Study and the report on Collection Data Access Policy (which would both be completed by September 30, 1997), and a project completion report by October 31, 2000, in accordance with guidance provided by the Bank (MOD paras. 16, and Preparation Report paras. 4.66-4.68);
- (f) The graduate scholarship programs and students would be selected in accordance with criteria agreed with the Bank, and recipients of training would be offered positions in PPPB for a minimum of three years where they could make full use of their training (MOD para. 18, Supplemental Annex - Annex 3, Preparation Report paras. 4.14, 4.27, 6.9, and Annex 3, pages 87-88);
- (g) GOI would provide an adequate budget to rehouse the zoological collections in improved facilities by March 31, 1998 should the anticipated Government of Japan support be insufficient or not materialize (MOD para. 21, Preparation Report paras. 4.14, 6.11);
- (h) PPPB would: (i) prepare, in consultation with the environmental health and safety advisors, an environmental health and safety action plan by April 30, 1995; (ii) furnish this plan to the Bank for comments and, (iii) carry out this plan taking into account the comments of the Bank (MOD para. 24, Preparation Report para. 4.8, and Annex 4, page 100);
- (i) The collection of specimens from the wild under the project would be carried out with full regard to the need to conserve rare and endangered species and in accordance with applicable laws and regulations (MOD para. 25, Preparation Report para. 6.4);
- (j) All consultants would be selected in accordance with the Bank's Guidelines, and engaged according to the Bank's Standard Conditions of Contract for Consultants (Supplemental Annex para. 4).
- (k) Procurement arrangements would be as outlined in Supplemental Annex paras. 1-7; and,
- (l) GOI would comply with the accounting and auditing requirements as specified in Supplemental Annex para. 13.

15. GOI has submitted to the Bank evidence that the consultants implementing the technical assistance and specialized training contract, and the individuals to be contracted as the project management and financial management specialists have been selected (MOD para. 15).

16. During negotiations it was agreed that, as a condition of disbursement for equipment, furniture, and materials, and for research grants, that GOI provide evidence that the technical assistance and specialized training contract has been signed and that the project management and financial management specialists have been hired (MOD para. 15).

ID	Start	Duration	Start	Finish	1994	1995	1996	1997	1998	1999	20
1	Bank Processing	241d	1/17/93	10/10/94	█						
2	Appraisal	19d	11/7/93	12/2/93							
3	PID/FEPS	0d	12/23/93	12/23/93							
4	Negotiation	5d	4/4/94	4/8/94							
5	VP Approval	0d	7/18/94	7/18/94	◆						
6	Grant Signing	0d	8/15/94	8/15/94	◆						
7	Grant Effectiveness	0d	10/10/94	10/10/94	◆						
8	Project Start-Up and Implementation	1560d	11/7/93	10/31/99	█	█	█	█	█	█	█
9	Confirm Government Commitment	0d	1/28/94	1/28/94	◆						
10	PPP/PPP0 Letter of Agreement	0d	1/28/94	1/28/94	◆						
11	Confirm Gov. Approval of Prep. Report	0d	1/28/94	1/28/94	◆						
12	Budget and Plans	69d	12/28/93	4/1/94	█						
13	Draft SK (Proj. Man. and PIMPROS)	24d	12/28/93	1/28/94	█						
14	94/95 DUP Budget Commitment	24d	12/28/93	1/28/94	█						
15	DIP for FY94/95 Budget Allocation	0d	4/1/94	4/1/94	◆						
16	Staff and Committee Recruitment	126d	11/8/93	5/3/94	█						
17	Job Descriptions for Key Positions	59d	11/8/93	1/27/94	█						
18	Staff and Tec. Comm. Candidates Proposed	66d	1/28/94	5/2/94	█						
19	Steering Committee	0d	5/2/94	5/2/94	◆						
20	Project Management Committee	0d	5/2/94	5/2/94	◆						
21	Approval to Second Inf. Sys. Man.	0d	1/28/94	1/28/94	◆						
22	Staff and Committee Members Appointed	0d	5/3/94	5/3/94	◆						
23	Locally Contracted Specialists	1426d	11/8/93	4/26/99	█						
24	Terms of Reference	59d	11/8/93	1/27/94	█						
25	Recruitment Schedule	0d	1/28/94	1/28/94	◆						
26	Financial Management Specialist Recruited	780d	5/3/94	4/28/97	█						
27	Project Management Specialist Recruited	1300d	5/3/94	4/26/99	█						
28	Recruitment of Other Contracted Individuals	1300d	5/3/94	4/26/99	█						

Project: Biodiversity Collections
Date: 4/15/94

Critical
 Noncritical

Progress
 Milestone

Summary
 Rolled Up

ID	Start	Duration	Start	Finish
29	Specialized Tec. Ass. and Training Contract	1541d	11/7/93	10/4/99
30	Terms of Reference	33d	11/7/93	12/22/93
31	Draft Procurement Documents	29d	12/28/93	2/4/94
32	Revision of Draft Documents	2w	2/25/94	3/10/94
33	Letter of Invitation	0d	3/28/94	3/28/94
34	Evaluation and Selection	4w	5/24/94	6/20/94
35	Bank Review and No Objection	2w	6/21/94	7/4/94
36	Contract Negotiation	4w	7/19/94	8/15/94
37	Mobilization	1318d	9/15/94	10/4/99
38	Team Leader	1318d	9/15/94	10/4/99
49	Botany Institutions Advisor	1301d	10/3/94	9/27/99
59	Zoological Institutional Specialist	1301d	10/3/94	9/27/99
69	Collections Database Expert	26w	10/3/94	3/31/95
70	Short-term Specialists and Mentors	260w	10/3/94	9/24/99
71	Overseas Work-Study Programs	26w	1/2/95	6/30/95
72	Strategic and Policy Studies	446d	10/6/95	6/20/97
73	Collections Data Access Report	50d	10/6/95	12/14/95
74	Hiring Specialist	0d	10/6/95	10/6/95
75	Final Report	2w	12/1/95	12/14/95
76	Financing Strategy Study	255d	7/1/96	6/20/97
77	Draft Procurement Documents	20d	7/1/96	7/26/96
78	Bank NOL and Letter of Invitation	3w	8/19/96	9/6/96
79	Bid Evaluation	6w	11/18/96	12/27/96
80	Bank Review and No Objection	3w	12/30/96	1/17/97
81	Contract Negotiations	8w	1/20/97	3/14/97
82	Mobilization	0d	5/9/97	5/9/97
83	Draft Report and Workshop	4w	5/12/97	6/6/97
84	Final Report	2w	6/9/97	6/20/97

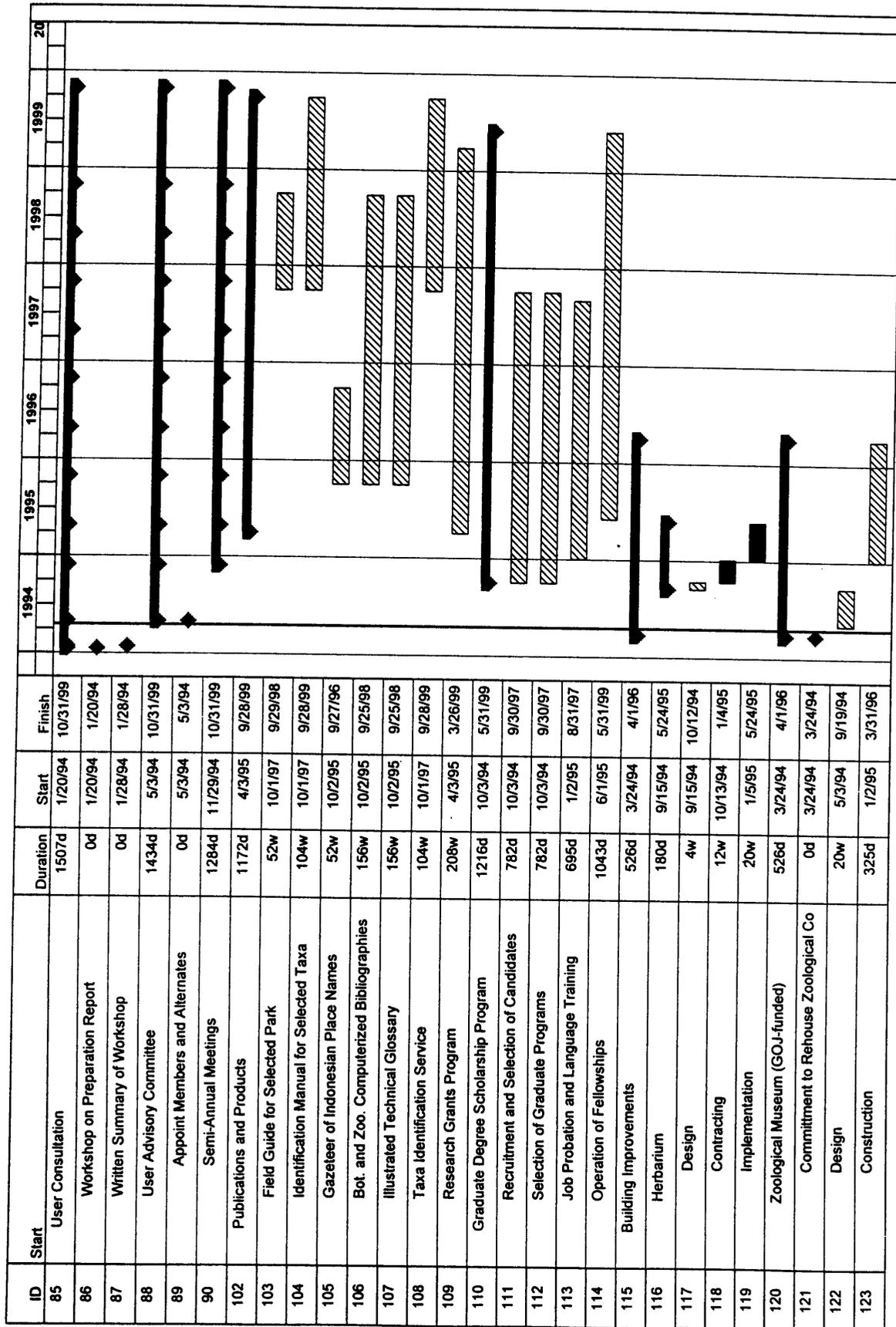


Project: Biodiversity Collections
Date: 4/15/94

Critical
Noncritical

Progress
Milestone

Summary
Rolled Up



Project: Biodiversity Collections
Date: 4/15/94

Critical
 Noncritical
 Progress
 Milestone

Summary
 Rolled Up

ID	Start	Completion	Duration	Start	Finish	1994	1995	1996	1997	1998	1999	2000
124		Completion	0d	4/1/96	4/1/96							
125		LIB Procurement of Scientific Equip. and Mat.	165d	10/3/94	5/19/95							
126		Draft Procurement Documents	6w	10/3/94	11/11/94							
127		Bank Review and Bid Invitation	3w	11/14/94	12/2/94							
128		Bid Evaluation	3w	1/16/95	2/3/95							
129		Bank Review and Bid Award	3w	2/6/95	2/24/95							
130		Delivery	0d	5/19/95	5/19/95							
131		LCB Procurement of Cabinets	450d	10/28/94	7/19/96							
132		Draft Procurement Documents	4w	10/28/94	11/25/94							
133		Bank Review	2w	11/28/94	12/9/94							
134		Advertisement	2w	12/12/94	12/23/94							
135		Bid Evaluation	3w	2/6/95	2/24/95							
136		Bank Review and Bid Award	3w	2/27/95	3/17/95							
137		Delivery of Herbarium Furniture	40w	6/12/95	3/15/96							
138		Delivery of Zoology Museum Furniture	16w	4/1/96	7/19/96							
139		Local Shopping for Oth. Equip., Mat. and Furn.	1044d	10/3/94	10/1/98							
140		Environmental Health and Safety Practices	247d	1/28/94	1/9/95							
141		Cessation of Hazardous Chemical App.	0d	1/28/94	1/28/94							
142		Study and Report Preparation	4w	11/1/94	11/28/94							
143		Training and Training Manual	6w	11/29/94	1/9/95							
144		Collections Renovation	1044d	7/3/95	7/1/99							
145		Contract Temporary Technical Staff	1044d	7/3/95	7/1/99							
146		Recruit Interns	1043d	7/3/95	6/30/99							
147		Renovate Botany Collections	1044d	7/3/95	7/1/99							
148		Stabilize and Pack Zoology Collections	39w	7/3/95	3/29/96							
149		Move Zoology Collections to Cibirong	13w	4/1/96	6/28/96							
150		Renovate Zoology Collections	156w	7/1/96	6/25/99							
151		Database Development	1285d	10/24/94	9/24/99							

Project: Biodiversity Collections
 Date: 4/15/94

Legend:
 Critical:  Critical
 Noncritical:  Noncritical
 Progress:  Progress
 Milestone:  Milestone
 Summary:  Summary
 Rolled Up:  Rolled Up

ID	Start	Duration	Start	Finish	1994	1995	1996	1997	1998	1999	2000
152	User Needs Analysis	4w	10/24/94	11/18/94							
153	System Design/Hardware Specification	12w	11/21/94	2/10/95							
154	Hardware LCB Procurement	145d	2/13/95	9/1/95							
155	Draft Procurement Documents	1w	2/13/95	2/17/95							
156	Bank Review	2w	2/20/95	3/3/95							
157	Advertisement	2w	3/6/95	3/17/95							
158	Bid Evaluation	3w	5/1/95	5/19/95							
159	Bank Review and Bid Award	3w	5/22/95	6/9/95							
160	Delivery	12w	6/12/95	9/1/95							
161	Software Development	46w	2/13/95	12/29/95							
162	Systems installation and testing	26w	1/1/96	6/28/96							
163	Systems Support	169w	7/1/96	9/24/99							
164	Work Plan Design	30d	10/3/94	11/11/94							
165	Policy Framework Formulation	1w	10/3/94	10/7/94							
166	Taxa Priorities Workshop	1w	10/10/94	10/14/94							
167	Field Design Workshop	1w	10/17/94	10/21/94							
168	Establ. Semi-Ann. Goals for Curation Stand.	1w	10/24/94	10/28/94							
169	Establishment of Other Semi-Annual Goals	1w	10/31/94	11/4/94							
170	Semi-Annual Progress Rep. Format Design	1w	11/7/94	11/11/94							
171	Monitoring and Evaluation	1176d	4/28/95	10/31/99							
172	Semi-Annual Progress Reports	1176d	4/28/95	10/31/99							
183	Ann. Review of Budget and Staffing Plans	783d	10/31/95	10/31/98							
188	Mid-Project Review	20d	10/1/97	10/28/97							
189	Preparation	4w	10/1/97	10/28/97							
190	Report	0d	10/28/97	10/28/97							
191	Completion Report	20d	10/1/99	10/28/99							
192	Preparation	4w	10/1/99	10/28/99							
193	Report	0d	10/28/99	10/28/99							

Project: Biodiversity Collections
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 Critical
 Noncritical

 Progress
 Milestone

 Summary
 Rolled Up

ID	Start	Duration	Start	Finish	1994	1995	1996	1997	1998	1999	2000
152	User Needs Analysis	4w	10/24/94	11/18/94							
153	System Design/Hardware Specification	12w	11/21/94	2/10/95							
154	Hardware LCB Procurement	145d	2/13/95	9/1/95							
155	Draft Procurement Documents	1w	2/13/95	2/17/95							
156	Bank Review	2w	2/20/95	3/3/95							
157	Advertisement	2w	3/6/95	3/17/95							
158	Bid Evaluation	3w	5/1/95	5/19/95							
159	Bank Review and Bid Award	3w	5/22/95	6/9/95							
160	Delivery	12w	6/12/95	9/1/95							
161	Software Development	46w	2/13/95	12/29/95							
162	Systems installation and testing	26w	1/1/96	6/28/96							
163	Systems Support	169w	7/1/96	9/24/99							
164	Work Plan Design	30d	10/3/94	11/1/94							
165	Policy Framework Formulation	1w	10/3/94	10/7/94							
166	Taxa Priorities Workshop	1w	10/10/94	10/14/94							
167	Field Design Workshop	1w	10/17/94	10/21/94							
168	Establ. Semi-Ann. Goals for Curation Stand.	1w	10/24/94	10/28/94							
169	Establishment of Other Semi-Annual Goals	1w	10/31/94	11/4/94							
170	Semi-Annual Progress Rep. Format Design	1w	11/7/94	11/11/94							
171	Monitoring and Evaluation	1176d	4/28/95	10/31/99							
172	Semi-Annual Progress Reports	1176d	4/28/95	10/31/99							
183	Ann. Review of Budget and Staffing Plans	783d	10/31/95	10/31/98							
188	Mid-Project Review	20d	10/1/97	10/28/97							
189	Preparation	4w	10/1/97	10/28/97							
190	Report	0d	10/28/97	10/28/97							
191	Completion Report	20d	10/1/99	10/28/99							
192	Preparation	4w	10/1/99	10/28/99							
193	Report	0d	10/28/99	10/28/99							

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Technical Assistance and Specialized Training Contract

Activity	person/weeks	base cost (\$'000) net of taxes <u>a/</u>
<u>Technical Assistance and Specialized Training Contract</u>		
<u>Technical Advisory Team (including Team Leader):</u>		
Team Leader	80	372
Botany Institutions Advisor	52	317
Zoology Institutions Advisor	52	317
subtotal	<u>184</u>	<u>1006</u>
<u>Other Experts and Mentors Providing On-the-Job Training:</u>		
Collections Database Expert	14	103
Database Fields Expert	1	12
Taxa Benchmark Experts	6	64
Botany Scientific Mentors	48	142
Zoology Scientific Mentors	48	142
subtotal	<u>117</u>	<u>463</u>
<u>Work-study Programs:</u>		
Botany	NA	84
Zoology	NA	191
Information Systems	NA	77
subtotal		<u>352</u>
<u>Consultants:</u>		
International Env. Health and Safety Advisor	5	45
Local Env. Health and Safety Advisor	10	30
Archival and Restoration Advisor	2	27
subtotal	<u>17</u>	<u>102</u>
<u>Financing Strategy Study:</u>		
International Specialist	8	37
Local Specialist	8	20
subtotal		<u>57</u>

a/ Including travel, expenses, and overhead; excluding local workshops and physical and price contingencies.

Contractual Employees and Key Products

Contracts/Activity		base cost (\$'000) including taxes <u>a/</u>
<u>Contractual Employees - long-term</u>		
	person/years	
Project Management Specialist	5	65
Financial Management Specialist	3	39
Software Applications Specialist	5	43
Human Resource Development Specialist	5	65
Contracted Office Support Staff	15	32
Curatorial Assistants	120	152
subtotal		<u>334</u>
<u>Contractual Employees - short-term</u>		
	person/weeks	
Structural and Cooling Engineers	-	4
Collections Data Access Specialist	8	7
subtotal		<u>11</u>
<u>Research Grants</u>	NA	<u>416</u>
<u>Other Key Products and Publications</u>		
Field Guides	NA	77
Identification Manuals	NA	45
Gazetteer	NA	10
Glossaries	NA	61
Bibliographies	NA	243
Database Software Development	NA	209
subtotal		<u>645</u>

a/ Excluding physical and price contingencies.

Training Programs

Programs	Number of PPPB Staff	Typical Duration
<u>Graduate Degree Programs a/</u>		
Overseas M.Sc. or Ph.D. Programs	15	2 yr.
Local M.Sc. Programs	3	2 yr.
Local Ph.D. Programs with Overseas Co-supervisors b/	6	2 yr.
<u>Overseas Work-study or Local Management Training Programs</u>		
Botany Coordinator	1	3 mo.
Botany Collections Managers	2	6 mo.
Zoology Coordinator	1	3 mo.
Zoology Collections Managers	7	3-6 mo.
Information Systems Coordinator/Manager c/	2	3-6 mo.
<u>On-the-job Training by Advisors and Specialists</u>		
By 3 TAG Advisors	115 d/	1 yr. e/
By 11 Short-term Advisors and Experts	115	1 wk.-6 mo.
By 6-10 Scientific Mentors	97 f/	1-3 mo.
By 3 Locally Contracted Specialists	75 g/	3-5 yr.
By 18 Recipients of Graduate Degrees	97	ongoing
By 12 Staff in Work-study and Management Training Programs	115	ongoing
<u>Other Local Training</u>		
Internships	8-16	6-12 mo.
Language Training	12	6 mo.-2 yr.
Inventory and Monitoring Fieldwork Training	12	4 mo.

a/ Botany scholarships would focus on priority plants such as grasses, palms, timber trees, and fruit trees. Zoology scholarships would focus on priority animals such as fish, fish parasites and their alternate hosts, biting flies, insect pests, and potential agents for biological control.

b/ Extensions of overseas M.Sc. programs.

c/ Training for both the original information systems coordinator, who would be seconded from another agency, and for the new permanent information systems coordinator in the later years of the project.

d/ All project staff.

e/ In intervals of 5-10 weeks spread over a 5 year period.

f/ All project staff working on the botany, zoology, and scientific collaboration components.

g/ All project staff except contract curatorial assistants.

Staffing Plan

Job Title	Number of Positions	Status <u>a/</u>
<u>General Project Management and Coordination Component</u>		
Project Manager	1	R,T
Financial Manager	1	R,T
Office Support	2	R,T
Project Management Specialist	1	C,T
Financial Management Specialist	1	C,T
Contracted Office Support	3	C,T
subtotal	9	(5C)
<u>Botany Collections and Research Component</u>		
Botany Coordinator	1	R,T
Botany Collections Managers	2	R,P
Botany Curatorial Assistants	10	R,P
Botany Contract Curatorial Assistants	20	C,T
Botany Scientists (scholarship recipients)	9	R&N,P
Interns (local & provincial university faculty) <u>b/</u>	1	C,T
Office Support	1	R,T
subtotal	44	(21C)
<u>Zoology Collections and Research Component</u>		
Zoology Coordinator	1	R,T
Zoology Collections Managers	7	R,P
Zoology Curatorial Assistants	10	R,P
Zoology Contract Curatorial Assistants	20	C,T
Zoology Scientists (scholarship recipients)	9	R&N,P
Interns (local & provincial university faculty) <u>c/</u>	1	C,T
Office Support	1	R,T
subtotal	49	(21C)

a/ R=redeployed from within PPPB, S=seconded from another agency, N=newly recruited, E=existing line position, C=contracted, P=permanent position, T=temporary position for duration of project only.

b/ One position, filled by 4-8 individuals for 6-12 month periods.

c/ One position, filled by 4-8 individuals for 6-12 month periods.

Staffing Plan (continued)

Job Title	Number of Positions	Status a/
<u>Information Systems Component</u>		
Information Systems Coordinator/Manager	1	S&N,P
Database Managers <u>b/</u>	2	R,P
Computer Technician	1	R,P
Software Applications Specialist	1	C,T
Office Support	1	R,P
subtotal	6	(1C)
<u>Scientific Collaboration and Services Component</u>		
Scientific Collaboration & Services Coordinator	1	E,P
Head of Scientific Collaboration Unit	1	E,P
Head of Scientific Services Unit	1	E,P
Head of Human Resources Development Unit	1	E,P
Human Resource Development Specialist	1	C,T
Office Support	2	E,P
subtotal	7	(1C)
<u>Total</u>	<u>115.0</u>	
Redeployed, Temporary	8.0	
Redeployed, Permanent <u>c/</u>	40.0	
New, Permanent <u>d/</u>	12.2	
Seconded	0.8	
Existing, Permanent	5.0	
Contracted, Temporary	49.0	

a/ R=redeployed from within PPPB, S=seconded from another agency, N=newly recruited, E=existing line position, C=contracted, P=permanent position, T=temporary position for duration of project only.

b/ Responsible for training and supervising curatorial assistants (listed under botany and zoology components) in the high quality database entry and maintenance.

c/ Assumes 6 of the botany and zoology scholarship recipients would be redeployed PPPB staff.

d/ Assumes 12 of the botany and zoology scholarship recipients would be newly recruited PPPB staff, and that a information systems manager would be newly recruited in the fifth year of the project, replacing the seconded information systems coordinator/manager.

INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

Preparation Report

Development of Scientific Resources
for Biodiversity Inventory and Monitoring

UPDATED VERSION

June 22, 1994

ABBREVIATIONS, ACRONYMS, AND INDONESIAN TERMINOLOGY

BAPPENAS	Badan Perencanaan Pembangunan Nasional (National Development Planning Agency)
CONABIO	(Mexican National Commission of Biodiversity)
DGHE	Directorate General of Higher Education
GEF	Global Environment Facility
GET	Global Environment Trust Fund
GIS	Geographic Information System
GOI	Government of Indonesia
GOJ	Government of Japan
INBio	Instituto Nacional de Biodiversidad, Costa Rica
IPTeK	Division of Inter-institutional Cooperation in Science and Technology (LIPI)
LH	Lingkungan Hidup (Ministry of State for Environment)
LIPI	Lembaga Ilmu Pengetahuan Indonesia (Indonesian Institute of Sciences)
NGO	Non-Governmental Organization
ODA	Overseas Development Agency (U.K.)
PDII	Pusat Dokumentasi dan Informasi Ilmiah (Scientific Documentation and Information Center, LIPI)
PHPA	Perlindungan Hutan dan Pelestarian Alam (Directorate General of Forest Protection and Nature Conservation, Ministry of Forestry)
PPPB	Pusat Penelitian dan Pengembangan Biologi (Research and Development Center for Biology, LIPI)
PPPO	Pusat Penelitian dan Pengembangan Oseanologi (Research and Development Center for Oceanology, LIPI)
PROSEA	Plant Resources of Southeast Asia
PSL	Environmental Study Center
TAG	Technical Advisory Group
UAG	User Advisory Group
USAID	United States Agency for International Development
WAHLI	Indonesian Wildlife Forum

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This report was prepared by the Research and Development Center for Biology (PPPB) with the assistance of a consultant team led by The Arnold Arboretum of Harvard University. PPPB and the consultant team updated the report in December 1993 to reflect the project design as revised during appraisal. This June 1994 update reflects a number of minor corrections which did not affect basic project content, and minor changes in project content made during negotiations.

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I. PROJECT BACKGROUND

A. Importance of Biodiversity in Indonesia

1.1 Indonesia is exceptionally rich in biodiversity. It contains about 110 million hectares, or nearly ten percent of the world's closed tropical forests--more than any country in the world except Brazil. It also has the most extensive area of coral reefs in the Indo-Pacific Ocean--more marine coastline than any other tropical country (McNeely *et al*, 1990). Although the archipelago represents only 1.3 percent of the earth's land area, it contains an estimated 25 percent of the world's fish species, 17 percent of all bird species, 16 percent of reptile and amphibian species, 12 percent of mammal species, 10 percent of plant species, and unknown numbers of species of invertebrate animals, fungi and microorganisms (BAPPENAS, 1991). Of these, perhaps 30 percent of the flora and 90 percent of the fauna are not yet fully described and scientifically documented.

1.2 Many sectors of the Indonesian economy are dependent, directly or indirectly, on the diversity of natural ecosystems and the environmental functions they protect.

- (a) It is estimated that 40 million Indonesians are directly dependent upon biodiversity¹ for subsistence, utilizing more than 6,000 species of plants and animals daily (BAPPENAS, 1991).
- (b) Approximately 23 percent of the Indonesian gross national product in 1990 was derived from agriculture, livestock, forestry and fisheries (Biro Pusat Statistik, 1991). Of this, agriculture and livestock contributed approximately US \$18.7 billion, fisheries US \$1.8 billion and forestry US \$1.0 billion directly to the national income. It is also estimated that the subsistence of up to 12 million people is to some extent derived from hunting and extracting non-timber natural forest products, valued at more than US \$1.25 billion per year, and many more are dependent on coastal resources (KLH, 1992; BAPPENAS, 1991).
- (c) The export of forest products provided Indonesia with about US \$1.7 billion in foreign exchange in 1987, second only in importance to oil (World Bank, 1993). Moreover, much of the US \$1.8 billion contributed to the national economy in 1990 by the tourism sector may be attributed to visitors' appreciation of the species richness and environmental integrity of the country (BAPPENAS, 1991; KLH, 1992).
- (d) Though difficult to quantify, the value to the Indonesian economy of natural ecosystems in protecting water catchment areas, minimizing soil erosion, and stabilizing climatic change, may be implied from the environmental cost of present deforestation, which is counted in tens of billions of dollars per year (KLH, 1992).

1.3 Indonesia's strategy for long-term economic development is founded on the principle of conserving natural resources, including the sustainable management of commercial forests and fisheries, the maintenance of ecosystem functions such as hydrological and nutrient cycling, and the

¹ In this context biodiversity is "the variety and variability among living organisms and the ecological complexes in which they live...Thus, the term encompasses different ecosystems, species, genes and their relative abundance" (US Congress, Office of Technology Assessment, 1987).

protection of rare and endangered species and their habitats (Repelita V; GOI, 1990; BAPPENAS, 1991; KLH, 1992). Further, under the terms of the Biodiversity Convention (UNEP, 1992), Indonesia has an international and legal commitment to both inventory and monitor its biodiversity.

B. Contribution of Systematic Collections

The Importance of Inventory and Monitoring in Biodiversity Conservation

1.4 Accurate biodiversity information is essential for sound environmental decision-making, policy and planning. It is required in the development of national biodiversity conservation strategies and action plans; priority setting for the conservation of species and/or habitats; and the preparation of environmental impact assessments in the context of planning large-scale development projects. Therefore, there is a growing international consensus that strengthening national capacities to carry out biological inventory and monitoring should be an integral component of the global biodiversity conservation strategy (United Nations, 1992; UNEP, 1992). Inventory may be regarded as biological stocktaking, while monitoring measures changes in stock over time. Both supply a basic knowledge of species diversity, distribution, and abundance that are in turn necessary to support:

(a) Sustainable Economic Development

Access to biodiversity information creates informed options for natural resource managers. Since the maintenance of healthy ecosystem function in any given habitat depends on complex interactions between unique combinations of species and their environment, to ensure the long-term stability and productivity of natural ecosystems estimates of sustainable yield for economically valuable species harvested from the wild must be based on a thorough knowledge of the ecology of the system, and this in turn requires a basic knowledge of the species present.

(b) Applied Research

Because the scientific name of an organism provides the key to access any associated knowledge in the scientific literature, workers in forestry, agriculture, fisheries, veterinary science, medicine, and the social sciences need a reliable means to identify the economic species, pests, predators, parasites and disease vectors with which they are concerned. Current interest in 'Biodiversity Prospecting', particularly the search for new pharmaceutical products and pesticides, and the selection of economically useful genetic traits from populations of wild progenitors, assumes a detailed knowledge of the identity, distribution, and variation of wild species.

(c) In situ Conservation

Effective conservation measures require an ability to identify species of plants and animals with very restricted geographical and ecological ranges that are potentially 'at risk' of serious genetic erosion and possible extinction, and to prepare long-term *in situ* management plans to ensure the survival of critical populations.

(d) Ex situ Conservation

When *in situ* conservation measures are insufficient to ensure the viability of wild populations, occasionally it will be necessary to maintain genetic resources in germplasm

gardens, seed banks, genome banks, or captive breeding programs. To conserve genetically representative samples of the target species, it is essential to have a knowledge of the variation present both within and among all the remaining populations.

(e) Biodiversity Monitoring

The ability to detect short-term changes in ecosystem diversity and function over time provides an early warning system of potentially detrimental and irreversible effects of human activity on the maintenance of biodiversity. Carrying out an inventory to obtain quantitative baseline data on the distribution and abundance of keystone species is an essential prerequisite of all monitoring programs.

(f) Spatial Planning

Spatial planning to minimize environmental impact due to civil works requires a knowledge of the spatial distribution of species and their habitats, and the ability to rank their relative value in terms of biodiversity conservation.

(g) Natural Resource Valuation

To estimate the economic value of specific natural resources, it is necessary to quantify the distribution and density of the target commodity species present. These may include commercial species such as meranti and rotan, as well as species important to the local subsistence economy such as medicinal herbs and wild animals hunted for their meat. Numbers measure only a part of the natural resource values; to estimate the value of healthy ecosystems requires a knowledge of the complex interactions between species and their environment as explained in (a) above.

The Importance of Systematic Biology in Biodiversity Inventory and Monitoring

1.5 Systematic biology provides the basic tools to inventory and catalogue the natural world, the means to access existing biological information, and a way to organize and disseminate new information critical to the conservation of Indonesian biodiversity.

Future Development of Indonesian Systematic Resources

1.6 Progress in inventorying Indonesia's wealth of biodiversity will depend on developing adequate national resources for systematic biology, which in turn can be separated into six critical elements:

(a) Human Resource Development

To achieve technical and scientific self-sufficiency in the provision of biodiversity information for managing its own natural resources, Indonesia will need a critical mass of trained collectors, data managers, curators and researchers.

(b) Upgrading Collections and Research Facilities

To ensure efficient, high-quality scientific output, Indonesia will require improved facilities for the storage and scientific curation of the collections and for taxonomic research.

(c) Collections Development

Most information on biodiversity, especially in tropical countries, is originally derived from--or at least closely dependent upon--the scientific study of preserved specimens. Specimens also provide verifiable biological reference points that, together with the scientific literature, form the basis of a stable and universal system for naming all plants, animals and microorganisms. Biodiversity information is also essential for identifying gaps in the collections. Collections development is therefore an essential part of biodiversity information management.

(d) Systematic Research

The identification and description of the Indonesian biota using information derived from the collections, and the organization of this information into scientific classifications, is a core task. Without adequate systematic research, and the production of basic biological reference tools such as checklists and identification keys, the biodiversity information contained in the collections will remain largely inaccessible.

(e) Information Systems and Management

Increased knowledge about biodiversity will lead toward the goal of conservation and sustainable development only when the information is readily available to decision-makers, conservation managers and applied biologists. An effective means will be required to capture information contained in biological collections and the basic scientific literature; to synthesize this into a format that can be integrated with information relating to topography, land use, climate and soils; and to feed it back through a system accessible to agencies concerned with biodiversity issues within government and the public domain.

(f) International Scientific Cooperation

The rate of growth of Indonesian resources for systematic biology, in the initial stages, will depend on the amount of support received from specialists in other countries. In the longer term, international expertise will continue to complement Indonesian expertise in fields where specialist knowledge resides in only one or two individuals throughout the world. Indonesian biologists may, in turn, support biodiversity efforts in other countries. It is therefore essential that Indonesia develop and maintain active links to the informal international network of systematic resources, and to the growing worldwide electronic knowledge base of taxonomic and bibliographic information.

Experience in Other Countries

1.7 Worldwide, there are few examples where the collection, organization, and dissemination of biodiversity information is:

- (a) driven by user need;
- (b) integrated and coordinated at a national level;
- (c) based on primary, site-based or specimen-based data; and

- (d) adequate in scope and scale to the task of conservation and sustainable development in a large developing country which encompasses great biodiversity.

1.8 The model that is presently receiving most international attention and recognition (Yoon, 1993) is the Environmental Resources Information Network (ERIN), set up in 1989 by the Commonwealth Government of Australia. Using readily available hardware and software platforms, ERIN's mission is to provide geographically-related environmental information of an extent, quality, and availability required for planning and decision-making. Specimen-based information derived directly from collections at national and state herbaria and museums is being integrated, using Geographic Information Systems (GIS), with map data, satellite imagery, and topographic, geological, meteorological and land-use data. ERIN serves users ranging from government ministers, the Australian Environmental Protection Authority, the National Parks and Wildlife Service, and state government agencies, to the Australian National Botanic Gardens, universities, and government research agencies.

1.9 Possible examples from developing countries include the National Biodiversity Institute (INBio) of Costa Rica, and the Mexican National Commission of Biodiversity (CONABIO) which are currently developing and implementing biodiversity information management systems similar to that of the Australian model. However, in common with Indonesia, Costa Rica and Mexico face the additional challenge of developing collections, human resources, and technical facilities adequate to the task of conserving relatively poorly-known tropical biotas.

II. CURRENT STATUS OF SYSTEMATIC COLLECTIONS IN INDONESIA

A. Urgency

2.1 The systematic collections of the national herbarium and the national zoological museum provide the core scientific information and basic reference material for biodiversity inventory and monitoring in Indonesia. However, after several decades of financial constraint when investment in systematic biology received low priority in Indonesia, the institutional capacity of the Center for Research and Development in Biology (PPPB) to respond to an expected growth in demand for biodiversity information presently is severely limited. And, unless urgent measures are taken to restore large numbers of scientific specimens that are deteriorating under ambient tropical conditions, the extensive historical collections of the Herbarium Bogoriense and Museum Zoologicum Bogoriense will shortly sustain irreparable damage, and large amounts of valuable biodiversity information will be lost (see Annex 2).

B. Overview of Present Resources

The Indonesian Institute of Sciences

2.2 Although at least eight agencies within the Government of Indonesia play a role in managing the environment (see Annex 1)--and hence have a need for biodiversity information--the Indonesian Institute of Sciences (LIPI) has principal responsibility for carrying out basic biological research. This it discharges through four Centers for Research and Development in Biology, Oceanology, Limnology, and Biotechnology (Puslitbang Biologi, Oseanologi, Limnologi and Bioteknologi), respectively, and through the Botanic Gardens of Indonesia (most notably the Kebun Raya, Bogor).

2.3 Within this framework, the focus for systematic biology is concentrated in two institutions, the Centers for Research and Development in Biology and Oceanology. Both maintain collections, undertake taxonomic research and provide an advisory service to government agencies, applied researchers and the public, in addition to undertaking a wide range of other activities.

2.4 At the Research and Development Center for Biology, the emphasis is mainly on terrestrial and freshwater organisms; at the Research and Development Center for Oceanology concentrates, through the Marine Biology Division, the emphasis is on the fauna of coastal waters and the open sea--primarily crustaceans and fish. These distinctions are not absolute as many taxonomic groups cross environmental boundaries and, for largely historic reasons, there is a significant collection of marine organisms in the Center for Research and Development in Biology.

The Research and Development Center for Biology

2.5 The Research and Development Center for Biology (PPPB) consists, in turn, of three research divisions and two administrative divisions (see Figure 4). The Division of Botany is responsible for research activities concerning plants and fungi at the Herbarium Bogoriense and the Treub Laboratory, including the maintenance and scientific curation of the botanical collections. The Division of Zoology is responsible for research activities at the Museum Zoologicum Bogoriense concerning multicellular animals, including the maintenance and scientific curation of the zoological collections. The Division of Microbiology has primary responsibilities for research on microorganisms, involving at present only a limited collection bacterial and fungal cultures. (See Annex 2).

2.6 Within the Division of Botany there are six research programs--biosystematics, ecology, ethnobotany, phytochemistry, morphogenetics, and physiology--each with a research coordinator. The botanical collections contain between one and two million specimens of Indonesian plants, representing a national collection two to three times larger than that of any comparable institution in Southeast Asia. Responsibility for the management of the collections at the Herbarium Bogoriense is presently shared by the chief technician and the staff of the taxonomy section.

2.7 Within the Division of Zoology, the collection of nearly 500,000 specimens at the Museum Zoologicum Bogoriense is organized under laboratories representing the main taxonomic groups--entomology, aracology, malacology, carcinology, mammalogy, ornithology, herpetology and ichthyology. Research is organized under three programs--biosystematics, ecology, and physiology. Each laboratory has a curator who is responsible for the maintenance of the collections, and each research program has a coordinator who oversees the research activities.

2.8 The Division of Microbiology presently consists of four sections: agricultural, environmental, industrial and basic microbiology. Of these, the basic microbiology section has responsibility for the maintenance and development of collections. Existing collections of bacteria and fungi number about a thousand, of which perhaps ten percent have been identified to species. They are maintained in culture tubes, rather than lyophilized.

C. Current Constraints

Human Resources

2.9 Given the huge scale of the task of inventorying and monitoring biodiversity in a country as large and diverse as Indonesia, the greatest current constraint is an acute shortage of experienced

Indonesian collectors, collection managers, systematic researchers, and biodiversity information managers.

Collections Maintenance

2.10 The national herbarium and zoological museum house large historical collections, some dating from the nineteenth century, representing many unique and irreplaceable scientific reference specimens, or "type specimens". In economic terms, it has been estimated that it would be four to twenty times more cost-efficient to capture biodiversity information from the existing collections than to collect new data from the field. However, a significant proportion of the collections have been preserved using non-archival quality materials and stored for years under sub-optimal conditions. These are deteriorating rapidly to the point where many are in imminent danger of sustaining irreparable damage or total loss; indeed some specimens may already be beyond repair.

Collections Development

2.11 The sampling density of Indonesian biodiversity (that is the average number of scientific specimens collected per unit area) is amongst the lowest for any region in the world (Campbell & Hammond, 1989); the geographic and taxonomic coverage tends to be patchy and the quality and quantity of the information inadequate for current purposes. The resulting gaps can be detected when the database is in place. Thereafter, new collections, which are also necessary, can be made.

2.12 As with most of the world's highly diverse tropical ecosystems, most organisms indigenous to Indonesia are not represented in scientific collections, and consequently they have yet to be catalogued, described and named. At many Indonesian localities that on empirical evidence might be expected to contain novel endemic species--including the majority of the national parks--even the relatively well-known groups such as flowering plants, birds, mammals, reptiles, and amphibians have yet to be systematically inventoried and new species described.

Collections Facilities

2.13 Although the botanical collections are housed in a relatively modern building, the majority of the dried specimens are contained in old, rusting metal boxes--many of which lack fitting lids. There are no facilities for climate control and all the specimens are subject to ambient tropical temperature and humidity. Insect pests can gain free access to the collections through unscreened, open windows, and as a consequence many newly collected specimens have been destroyed by beetle larvae before even being mounted and inserted in the herbarium.

2.14 The zoological collections are housed in a series of inadequate buildings about a quarter of a mile apart. Recently, part of the collections sustained permanent damage when the basement of the building in which it was stored became flooded with water. A large part of the wet (alcohol preserved) collections is stored in makeshift containers without airtight lids, and there are presently insufficient drawers and storage trays to curate the insect collection scientifically.

2.15 While an attempt is being made to maintain--under sub-optimal conditions--a minimal collection of fungal and bacterial cultures at the Microbiology Division of PPPB, the modern systematic research facilities that would permit Indonesia to develop a national microbial reference collection are presently lacking here.

Research Facilities

2.16 Facilities for systematic research at PPPB are presently less than adequate. The laboratory space used by the scientific staff is mostly cramped, unventilated, poorly lit, and lacking in basic equipment. The availability of recent scientific literature and essential basic reference materials for systematic research in Bogor (and in many cases nationally) is severely limited.

Information Systems and Management

2.17 Existing information on the fauna and flora of Indonesia is widely scattered in the form of biological collections, unpublished reports and obscure scientific literature. Furthermore, there is no electronic database for specimen label data from the botanical and zoological collections. If transferred to an electronic format, this specimen label data could be more readily accessed, verified, updated, combined with other information, and disseminated.

2.18 Indonesian institutions responsible for the collection and management of environmental data are presently operating in a computing environment consisting mainly of scattered, stand-alone PCs or isolated local area networks. There has been no attempt to introduce data transfer standards nor do most institutions have access to wide-area network server systems, such as the INTERNET or TELNET, that would facilitate the development of a distributed network approach to environmental information management, favored by most system developers and endorsed by LIPI planners.

Management Structure

2.19 In the past, the responsibilities of technical staff have been vaguely defined and uncoordinated, especially with respect to carrying out basic curatorial functions, resulting in some large backlogs of unaccessioned specimens. Similarly, the efforts of the research staff have been largely undirected, resulting in an arbitrary and unstructured research program determined more by the interests and initiative of individual staff members than by the need for specific information about high-priority groups of organisms.

Institutional Linkages

2.20 The identification of many groups of plants, animals and microorganisms requires specialized expertise, reference collections, literature and equipment that is generally not available at Indonesian universities and government institutions carrying out applied research. However, the institutional linkages between the applied sector and the national herbarium, zoology museum and microbiology facilities in Bogor historically have been very limited. This has resulted in a situation where Indonesian researchers working, for example, in the field of agricultural entomology have in the past been more likely to send an unknown insect to the Natural History Museum in London for identification than to request assistance from their own national zoological museum. As a consequence, it is unlikely that the information relating to such specimens will ever become available to other users in Indonesia, and the cost and effort of seeking expert technical assistance is largely dissipated.

III. THE LONG-TERM STRATEGY

A. Mission

3.1 The mission of PPPB as it relates to biodiversity is to maintain and develop the national systematic research collections and associated specimen-based information, to carry out collections-based research, and to make this information base available to a wide range of users. This mission is exclusive to PPPB, and is not a function of any other Indonesian organization.

3.2 Collections-based research subjects integral to this mission include systematic biology, ethnobiology and study of other biota with economic potential, conservation biology, and ecology.

3.3 In addition to its own institutional research mission, PPPB has a national coordinating role relating to all biodiversity-related scientific research carried out in collaboration with foreign institutions or researchers.

3.4 PPPB's collections-based activities also include public exhibits and conservation promotion.

B. Priority Needs

Integrated National Biodiversity Information System

3.5 In 1991, LIPI together with the National Planning Board and the (then) Ministry of Population and Environment recognized the need for an integrated national biodiversity information system. The functionality of the system envisaged would in turn depend on maintaining a synergistic effect between its core components (see Figure 1):

- (a) Inventory and monitoring;
- (b) Collections management;
- (c) Systematic research;
- (d) Information systems and management;
- (e) Integration of information from the various collections; and
- (f) Output and products.

Life Sciences Center/Complex

3.6 LIPI is in the process of developing plans for a Life Science Center/Complex in Cibinong. It is anticipated that the Center/Complex will eventually house the present Research and Development Centers for Biology (including both the national botanical and zoological collections), Limnology, Oceanology and Biotechnology, together with the central facility of the National Biodiversity Information Network (NBIN). In this regard, the Research and Development Center for Biotechnology has already been transferred to new facilities in Cibinong, and it is planned to move the Center for Research and Development for Limnology within the next twelve months. Plans to move the zoological collections of the Research and Development Centers for Biology and

Oceanology in 1996, and to build a facility for the proposed NBIN, are presently under preparation by GOI with assistance from the Government of Japan (GOJ).

Regional Institutional Development and Information Networks

3.7 It is recognized that the proposed GEF project is only the first stage in a continuing process of strengthening Indonesian institutional resources for biodiversity inventory and monitoring. Initially, (i.e., within the next five years), the focus would be on developing the core resources for systematic botany and zoology at LIPI. A detailed review of present resources for systematic microbiology in Indonesia would be carried out, and a strategic plan produced for the development the Microbiology Division of PPPB. Future developments would include an increase in collecting activities to fill geographic and taxonomic gaps in collecting.

3.8 Future development (i.e., within the next five to ten years) should lead to the establishment of new regional centers for inventory and research, and to the growth of existing reference collections and expertise at provincial universities. The regional centers will provide services to local government, schools and industry, while at the same time maintaining close links with the national center (PPPB) through the development of a wide-area electronic information network.

Human Resource Development

3.9 To ensure rapid progress in the inventory and documentation of the biota of Indonesia within a timeframe acceptable to biodiversity information users, it will be necessary to simultaneously maintain or increase, nationally, regionally and worldwide, the number of trained systematic researchers working on the fauna and flora of the Malesian region.

3.10 The recruitment and training of new systematic research staff has been identified as one of the highest priorities of PPPB. Recent estimates by the management of PPPB indicate that over the next 5-10 years the number of trained systematic biologists working in Indonesia needs to be increased as follows:

	Present No.	Number Required	
		<u>PPPB</u>	<u>Nationally</u>
Systematic botanists	3	10	50
Systematic zoologists	5	45	150
Systematic microbiologists	0	10	120

Of equal importance to long-term human resource development will be the recruitment and training of corresponding numbers of field collectors, curatorial staff with skills to sort and identify collections, and data managers and data entry staff.

Inventory

3.11 Priorities for the collection of new biodiversity information will need to be decided on the basis of three main criteria:

- (a) the need for site-based inventory, for:
 - assessing conservation status,

- environmental impact assessment,
 - establishing, supporting and assessing conservation management practices, and
 - monitoring change;
- (b) the need for taxon-based inventory to provide an information service to, for example, foresters, agriculturists, pharmacognosists and medical entomologists; and
- (c) the need to identify populations of rare and endangered species, and threatened habitats that are poorly represented under the existing national conservation system.

3.12 Each of these requirements will demand a different biodiversity sampling strategy. In the first case (a), geographically intensive sampling of all habitats in the target area would be carried out with the goal of obtaining a species list of the systematic groups of conservation, and ecological or economic importance. In the second and third cases, in order to establish the spatial distribution patterns of a target species or systematic group, a wider geographical survey would be necessary based, for example, on a stratified list of habitats inferred from large-scale vegetation maps, satellite remote-sensing images, and soil and climate data.

3.13 It should be understood that the accurate designation of rare and endangered species and their habitats could only be derived, *a posteriori*, from the analysis of known distribution patterns.

Monitoring

3.14 It is important to be able to differentiate between long-term trends, natural cyclical variation in abundance, and statistical sampling errors. Monitoring biodiversity therefore requires a consistent and replicable methodology that can accommodate both spatial and temporal change. Essential to this process is sound baseline inventory of a carefully selected array of systematic groups. To assess environmental impact at the local level, it may be necessary to initiate a program of regular sampling on a site-by-site basis. However, to monitor large-scale environmental changes over time effectively, it will probably be necessary to integrate biodiversity information systems with the global change information systems, presently under separate development.

Information Systems and Management

3.15 To close the circle of biodiversity information transfer among systematic researchers, policy makers, environmental managers and researchers in applied fields, it will be necessary to develop a national electronic information network. The output from this information system, based on the best available data, should be made readily and rapidly available to the users. Through the introduction of electronic networks and information system and management tools, this data could be rapidly updated, validated and refined.

3.16 The medium in which the information is accessed should be user-friendly, and the format readily understandable by non-specialists. Spatial information should be map-based and, as far as possible, biodiversity data should be collected and maintained in a form capable of being readily integrated with other environmental information such as topography, climate, soils, and land use.

Systematic Research

3.17 The fauna and flora of Indonesia cannot effectively be studied in isolation. Because the natural range of species does not often conform to political boundaries, the creation of robust species

concepts and maintenance of a stable system of names requires the study of species over the whole of their natural biogeographic range. In the Southeast Asia region, this process was begun in 1950 with the initiation of the Flora Malesiana project, the scope of which includes Indonesia, Papua New Guinea, the Philippines, Brunei, Singapore, and Malaysia, and, in 1988, with the complementary Fauna Malesiana project, which covers the same geographic area.

3.18 For Indonesia to establish a strong leadership role in systematic research in the Malesian region will not only require a commitment to institution building, training and technology transfer, but Indonesian scientists will need to participate on equal terms in the world scientific community. To meet this goal, workers in Indonesia will need to have access to global electronic information networks such as the INTERNET, and be able to travel to conferences and collaborating institutions overseas. Foreign language skills, including proficiency in technical writing, should also be an essential part of Indonesian scientific training.

Output, Products and Services

3.19 The goal of developing a national integrated biodiversity information system in Indonesia is to make high-quality data available to a wide range of users--whether they be schoolchildren, tourists, researchers, or politicians--in a variety of user-friendly formats. These products could range from simple illustrated identification guides and handbooks, to maps produced by geographic information systems (GIS), and interactive computer 'expert systems'. At the core of the system would be a series of (predominantly specimen-based) databases containing all the available information on the spatial distribution and abundance of the Indonesian biota. Augmenting the biodiversity databases would be other kinds of spatial (map-based) data on land use, vegetation, topography, soils, and climate. It is the integration and interaction of these different types of data that would enable both site-based and species-based enquiries to be answered in a meaningful manner, facilitating the decision-making process.

3.20 To complement, support and maintain accurate and up-to-date databases of Indonesian biodiversity, it will be necessary to produce a number of computerized aids including bibliographies, checklists, gazetteers, and glossaries.

3.21 In addition, Indonesian foresters, agriculturalists, ecologists, and conservation managers need tools to aid the field identification of species with particular economic or ecological value. Traditionally this has entailed the use of written keys and, even though these will continue to have enormous value, they are mostly intended for use by systematic specialists. However, with the widespread introduction of personal computers (PCs), the development of multiple entry, interactive 'expert systems' containing images of important field-oriented characters used in identifying the organism in question would make it possible for reliable identifications to be made by non-specialists.

IV. THE PROJECT

A. Project Objectives

4.1 The proposed project would strengthen the institutional capacity of PPPB to support systematic biological collections, a basic reference tool for biodiversity inventory and monitoring. The project would also make information from the collections available to external clients. The project would establish the foundation required for PPPB to meet the expanding needs for biodiversity

information over the long-term, and would provide high priority information during the project period. The main objectives would be:

- (a) to provide support for overall project management and coordination, in order to foster both effective project implementation and long-term institutional transformation;
- (b) to restore and develop the collections and associated functions of the Botany and Zoology Divisions;
- (c) to design and establish a computerized database of specimen-based data for collections management, collection plans and development, and external use; and
- (d) to strengthen the capacity to coordinate and foster collaborative biological research activities and client services.

B. Brief Project Description

4.2 The project would be implemented over five years and would include the following components:

- (a) General Project Management and Coordination. This component would comprise the establishment of a steering committee, a project management committee, a project implementation unit (including locally contracted specialists in project and financial management), a technical advisory group (of international advisors with institutional and technical expertise), a user advisory group (representative of external clients), short-term advisors and trainers (in environmental health and safety, document restoration, data field design, and specialized systematic biologists), a grants program for systematic research and genetic resource conservation², and a financing strategy study.
- (b) Systematic Collections and Research in Botany and Zoology. This component would support the development of systematic collections and associated research in the Botany and Zoology Divisions through:
 - (i) *Human Resource Development*: Provision of about 18 graduate-level scholarships in systematic biology and about 11 overseas work-study programs, plus advice and extensive on-the-job training for managers, scientists, interns, and technicians in curation, taxa identification, field collecting, and user product development;
 - (ii) *Collections Restoration and Development*: Provision of building renovations, furniture, archival supplies, 40 temporary employees and redeployment of 20 permanent staff to work as curatorial assistants in order to improve and expand specimen storage, to improve the scientific organization of the collections, to restore deteriorating specimens, and to stabilize the specimens as necessary before moving them to new cabinets or buildings³ (these activities would include the

² During negotiations, the Bank obtained assurances that the small grants program would be carried out in accordance with procedures and criteria agreed with the Bank.

³ During negotiations, the Bank obtained assurances that GOI would stabilize specimens as necessary before moving them to new cabinets or to different buildings.

integration of the marine reference collections belonging to the Research and Development Center for Oceanology with PPPB's terrestrial-based reference collections);

- (iii) *Research Facilities*: Building renovation and provision of essential scientific literature and equipment in order to improve systematic biology research facilities; and
 - (iv) *Publications and Products*: Development of an illustrated technical glossary, a computerized bibliography of written reference materials, a computerized gazetteer, a database and handbooks covering specific taxa, national field guides, and a specimen identification service.
- (c) Information Systems Management. This component would set up a computer database and a local area network capable of basic specimen data entry, automated label production, collections management functions, and information dissemination. This system would complement and comprise a node of a wider network, which GOI plans to develop. This component would comprise inputs of technical assistance, an overseas work-study program, computer and network equipment and installation, software development and support, and the establishment of a new sub-division with redeployed and newly recruited staff.
- (d) Scientific Collaboration and Services. This component would provide a small amount of technical assistance and office equipment to strengthen PPPB's capacity to manage collaborative research, client services, and training programs.

C. Detailed Features

General Project Management and Coordination Component

4.3 The project would support the establishment of a steering committee, including inter-agency representation, a project management committee, consisting of the project manager, the project coordinators, and PPPB division directors, a project implementation unit, workshops (in taxa priorities, data field design, and mid-project review), a technical advisory group, a user advisory group, short-term advisors and trainers (in environmental health and safety and archival restoration), a grants program for systematic research and genetic resource conservation, and a financial strategy study.

4.4 Project Implementation Unit. A full-time project manager would head the Project Implementation Unit and be responsible for overall project management. He or she would be supported by a Financial Manager and a few PPPB clerical staff. In addition, the Project Manager would receive support from a Project Management Specialist (with expertise in project planning, project monitoring, and other project management skills) and additional office administration staff, locally hired on a long-term contractual basis. A Financial Management Specialist, also hired on a local long-term contract, would provide technical advice and training to the Financial Manager. A short-term Collections Data Access Specialist, would analyze the range of existing policies, both in Indonesia and overseas, regarding accessing and sharing biodiversity information and assist PPPB in drawing up a set of criteria and procedures for determining appropriate levels of biodiversity information access by potential database users, which would be summarized in a report.

4.5 Workshops. The General Project Management and Coordination Component would also provide support for two workshops during project inception (to set taxa priorities and data field definitions), which would help to establish clear benchmarks for measuring project progress in the development of the database, and a workshop for the mid-project review.

4.6 Technical Advisory Group. A Technical Advisory Group (TAG), consisting of a Team Leader⁴, a Botany Institutions Advisor, and a Zoology Institutions Advisor, would provide periodic technical advice and guidance on curation and specimen-based database development, and information systems and management (see Annex 4). Specifically, the TAG would:

- (a) advise on the development of appropriate institutional policies and protocols for collections and information systems and management to bring PPPB's collections up to international standards of curation and documentation;
- (b) visit PPPB at regular intervals throughout the five-year project to discuss progress and advise, as necessary, on actions to be taken by PPPB to met any unforeseen events as they arise;
- (c) recommend to the Project Manager appropriate short-term taxonomic and information technology specialists;
- (d) advise on appropriate priority taxa and specimen data-entry fields for the database; and
- (e) assist the Project Management Committee in setting realistic benchmarks by which to measure the progress of the project.

The involvement of the TAG would be relatively more intensive during the initial years of the project, and would phase down as the technical and institutional capacity of PPPB increased in the later years of the project.

4.7 User Advisory Group. A User Advisory Group (UAG) would meet at least semi-annually to provide the project management committee with user feedback during the course of the project. The UAG would comprise members who reflect the range of users of PPPB collections-based information from the government agencies (e.g., Ministry of Agriculture, Ministry of Forestry, Ministry of Health, Ministry of Mines and Energy, Ministry of Environment, BAPEDAL), academic institutions, commercial firms (e.g., pharmaceutical firms, manufacturers of traditional medicine (Jamu), forestry concession companies, agricultural supply firms, mining companies, energy companies, and environmental assessment consultants), and non-governmental organizations (see Annex 3).

4.8 Health and Safety Improvement. At the beginning of the project, two environmental health and safety specialists, one with local and the other with international expertise, would review the widespread use in the Botany and Zoology Divisions of toxic or potentially hazardous chemicals such as mercuric chloride, naphthalene, paradichlorobenzene, lead arsenate, formalin and naphthalene, and make recommendations for the implementation of measures to reduce to a minimum the future exposure of staff and visitors. The local specialist would also conduct training in the recommended collections management procedures. PPPB ceased the application of mercuric and arsenic compounds

⁴ The Team Leader would also be responsible for coordinating all technical assistance and training provided under the Technical Assistance and Specialized Training Contractual arrangement.

and paradichlorobenzene to collections in January 1994. PPPB has agreed to prepare, in consultation with the environmental health and safety advisors, an environmental health and safety action plan by April 30, 1995 (see Annex 4).

4.9 Document Archival and Restoration Methods. In the second year of the project, the services of a specialist in contemporary archival and restoration methods would be contracted to advise the Project Manager on improved methods of preserving books, photographs, illustrations, specimens labels, and mounting media.

4.10 Research Grants Program. Competitive research proposals in the field of collections-based systematic research and genetic diversity conservation would be invited from PPPB staff, with a funding limit of Rp. 40 million (in 1994 equivalent) per proposal. These would be subject to independent peer review, and awards totalling about US \$490,000 (including contingencies) over the five-year project period would be made by the Steering Committee on the recommendations of the Project Manager (see Annex 3 Part C).

4.11 Financial Strategy Study. The project would support a financial strategy study. This study would be carried out in the third year of the project to analyze potential funding sources and funding mechanisms available to PPPB. Post-project budget projections would be drawn up based on the need to maintain and develop the systematic research collections, and carry out associated research and information and systems management activities. Recommendations would be provided to assist PPPB in developing a strategy for achieving long-term financial sustainability. Although the project budget does not include funding for other strategic planning and policy studies, it may be possible to add one or more such studies during the mid-project review.

Botany Collections and Research Component

4.12 Within the Botany Division of PPPB, the proposed project would support human resource development; collections renovation, maintenance and development; research facilities upgrading; and the development of various publications and support products. The project would involve only those sections of the Botany Division which focus on collections and associated systematic research. A Botany Coordinator, appointed from existing PPPB staff, would manage the project activities within the Botany Division (see Annex 3).

4.13 Human Resource Development. This support would consist of graduate-level scholarships in systematic botany, overseas work-study programs, and local management training programs; on-the-job training in taxa identification, curation, field collecting, and user product development; and an internship program for staff from provincial universities.

4.14 PPPB would tailor the external training programs to the institutional and technical requirements of the project, and to the needs of specific staff. For the graduate-level scholarship program, PPPB would recruit approximately nine candidates for two-year overseas M.Sc.-level training courses (or equivalent⁵) in systematic botany from a national pool of graduate botanists,

⁵ Most of these have been costed on the basis of nominal two-year overseas graduate scholarships, plus, for three of the candidates, an additional two-year local Ph.D. program with an academic co-supervisor. Project Management would have discretion to allocate available funds to provide some M.Sc. scholarships at Indonesian universities, or one or more overseas Ph.D. scholarships, as appropriate to the need of the best candidates. Further, M.Sc.-level students would be selected for aptitude and motivation, on the assumption that a high proportion of these later would have an opportunity to complete Ph.D. degrees.

including those already employed at PPPB (see Annex 3 Part D). Priority areas for training would include specialization in groups of plants of high conservation and economic importance such as the grasses (including bamboo), palms (including rattans), timber trees (including gymnosperms, legumes, dipterocarps, Ebenaceae, Meliaceae and Lauraceae), and fruit trees (including Moraceae, Euphorbiaceae and Rubiaceae). Three- to six-month overseas work-study programs would be provided in collections management and curatorial methods for the Botany Coordinator and two Collections Managers, all of whom would be recruited internally. Depending on the experience and needs of the Coordinator and the Collections Managers, local management training might be partially or fully substituted for the work-study programs. Foreign language training would be supplied as needed to the M.Sc. candidates, Coordinator, and Collections Managers.

4.15 PPPB staff and external experts would provide on-the-job training. From the second year onward, the Coordinator and the Collections Managers would provide continuous in-house training and supervision in herbarium methods to all project technical staff. During the second through fifth years of the project, PPPB would invite up to eight international systematic specialists to visit PPPB, for a total of 24 person-months. These international experts would provide specialized mentoring in identification, collecting and preservation techniques of specialist plant groups. They would also be expected to improve the level of scientific curation of the collections within their specialist taxa group (see Annex 4). The project would cover the mentors' cost of travel, subsistence and incidental expenses, indirect costs and, in some cases, honoraria. In each of years four and five, an eight-week fieldwork training expedition for six junior staff members would be mounted, with the emphasis on the collection and processing of high-quality specimens and field information. The database fields would be used to guide collection of field data.

4.16 During the second through fifth year of the project, temporary internships⁶ in herbarium management and curatorial methods would be made available to up to eight graduate staff from local and provincial universities. Interns would learn basic specimen preparation and collections management, and would participate in on-the-job training programs in the collection, identification, and curation of specialist taxonomic groups. The project would cover the cost of travel, subsistence and honoraria. This internship program would begin to develop the human resources needed for future regional biodiversity inventory and monitoring centers.

4.17 Collections Restoration, Maintenance, and Development. The project would support building improvements, renovation, and expansion of specimen storage facilities, improvement in scientific organization of collections, and restoration of deteriorating specimens.

4.18 Building improvements would be limited. During the first year of the project, the windows of the herbarium would be screened to minimize the entry of harmful insects into the building, and new specimen driers and specimen handling facilities would be installed in the basement. A cooling engineer would be contracted to survey the feasibility of introducing climate control (cooling and dehumidification) in the collections facilities. Should this be found to be physically and economically feasible, air-conditioners would be installed. It should be noted that the budget estimates are based on the cost of new stand-alone cabinets, but if air-conditioning should prove to be feasible, it might be preferable to purchase compactor units in order to reduce to a minimum the volume of air to be cooled.

4.19 Storage facilities would be renovated, expanded, and reorganized. The present storage racks full of rusty metal boxes would be replaced by approximately 785 new metal cabinets, 750 of

⁶ Six to twelve months in duration.

which would be fitted with 21 pigeonholes for housing vascular plant specimens, and 35 of which would have 55 pigeonholes for non-vascular plant (macro-fungi, mosses, liverworts, lichens and larger algae) specimens. The contents of each pigeonhole would be placed in an archival quality, sealable plastic bag and systematically frozen at -20°C for three days to kill the adults, larvae and eggs of all insect pests present in the collection. After rewarming to ambient temperature, the bundles would be replaced--still in their bags--in the appropriate cabinets. The organization of the specimens would be based on scientific principles.

4.20 Individual specimens would be restored. It is estimated that about 200,000 herbarium specimens (about 20 percent of the dry collections) have become so brittle and friable that they urgently require remounting on new archival quality, acid-free sheets. Although every effort would be made to preserve the old specimen labels with the renovated specimen, in many cases new specimen labels would also have to be produced to ensure legibility. Old, deteriorated species covers would be replaced with new, clearly-labeled, protective archival genus covers. Additionally, around 8,000 deteriorating alcohol-preserved specimens of the morphologically complex flowers of the orchid, ginger and *Rafflesia* families (including many irreplaceable "type" specimens) would be transferred to new, airtight bottles with fresh preservative.

4.21 The Botany Coordinator and the two Botany Collections Managers would supervise the restoration work. Twenty temporary herbarium assistants would be recruited and trained to carry out this work. Temporary work areas would be set up on the second and third floors of the herbarium to accommodate the additional staff carrying out the renovation of the collections.

4.22 Research Facilities. The project would support the cost of upgrading the present first floor systematics research laboratory, including the installation of adequate work surfaces, storage space, lighting, and an air-conditioning and ventilation system, and the purchase of research microscopes and essential reference texts and systematic literature. Also during the first year, two self-contained, well-ventilated and air-conditioned work areas⁷ would be created on both the second and third floors of the herbarium (four in all). These would be equipped with work surfaces, binocular dissecting microscopes, networked computer workstations for data entry, and standard plant identification texts. Supplemental support for travel, allowances, supplies, and specialized equipment required for individual PPPB research activities would be provided through a competitive research grants program for Systematic Research and Genetic Resource Conservation, which would be administered under the general project management component.

4.23 Publications and Support Products. The project would support the production of an illustrated technical glossary, a computerized bibliography of written reference materials, a field guide to a nearby national park, a database and handbooks covering specific taxa, and an strengthened taxa identification service (see Annex 5). More specifically, these products consist of:

- (a) a desk-top published Indonesian-language illustrated glossary of botanical technical terms, cross-referenced in English and Dutch, which would facilitate access by PPPB staff and other Indonesian researchers to the international systematic literature;

⁷ In September 1993, PPPB constructed the first of this series of workrooms on the second floor of the Herbarium, in connection with a pilot inventory project funded by the U.S. National Science Foundation and U.S. Agency for International Development. However, it is estimated that four more such rooms will be required.

- (b) a computerized bibliography (with work partly undertaken in major libraries overseas) of key systematic reference books, articles, and papers on Indonesian vascular plants which would permit rapid searches to be made of the available literature;
- (c) a field guide to selected taxa at Gunung Halimun National Park;
- (d) a computerized identification aid and handbook to a selected group of species of economic, ecological or conservation interest; and,
- (e) a taxa identification service which would meet specific accuracy and timeliness standards.

Zoology Collections and Research Component

4.24 Within the Zoology Division of PPPB, the proposed project would support human resource development; collections renovation, maintenance and development; research facilities upgrading; and the development of various publications and support products. The project would involve only those sections of the Zoology Division that focus on collections and associated systematic research. A Zoology Coordinator, appointed from existing PPPB staff, would manage the project activities within the Zoology Division (see Annex 3).

4.25 Human Resource Development. Similar to the Botany Division, this support would consist of graduate-level scholarships in systematic zoology, overseas work-study programs, and local management training programs; on-the-job training in taxa identification, curation, field collecting, and user product development; and an internship program for staff from provincial universities.

4.26 As with botany, PPPB would tailor the external training programs to the institutional and technical requirements of the project and to the needs of specific staff. For the graduate-level scholarship program, PPPB would recruit approximately nine candidates for two-year overseas M.Sc.-level training courses (or equivalent⁸) in systematic zoology from a national pool of graduate biologists, including those already employed at PPPB (see Annex 3 Part D). Research topics would focus on groups of organisms that are ecologically and economically important, and those that play a role in environmental impact assessment and monitoring. Priority groups in Indonesia already identified include freshwater and marine fishes, fish parasites (Isopoda and Copepoda), freshwater prosobranch gastropods (Mollusca), decapods and gammarid amphipods (Crustacea), biting flies (Diptera, including tabanids), insect herbivores and predators (including Coleoptera, Isoptera, Hemiptera and Lepidoptera), and potential agents for biological control (including parasitic Hymenoptera). As with botany, three- to six-month work-study programs would be provided for the Zoology Coordinator and the seven Collections Managers, including the persons responsible for the mammalogy, ornithology, herpetology, malacology, entomology, carcinology and ichthyology collections. Depending on staff needs and experience, local management training might be partially or fully substituted for the work-study programs. Foreign language training would be provided as needed to the M.Sc. candidates, Zoology Coordinator, and the Collection Managers.

4.27 As with botany, PPPB staff and external experts would provide on-the-job training. From the second year onward, the Coordinator and the Collections Managers would provide continuous in-house training and supervision in museum methods to all project technical staff. During the second through fifth years, PPPB would invite up to eight international systematic specialists to

⁸ Options are described in footnote 7.

visit Bogor, for a total of 24 person-months. These international experts would provide specialized mentoring in identification, collecting and preservation techniques of specialist animal groups. They would also be expected to improve the level of scientific curation of the collections within their specialist taxa group. In each of years four and five, an eight-week fieldwork training expedition for six junior staff members would be mounted, with the emphasis on the collection and processing of high-quality specimens and field information.

4.28 As with botany, during the second through fifth year of the project temporary internships⁹ in zoological museum management and curatorial methods would be made available to up to eight graduate staff from local and provincial universities. This internship program would begin to develop the human resources needed for future regional biodiversity inventory and monitoring centers.

4.29 Collections Renovation, Maintenance, and Development. The project would support renovation and expansion of specimen storage facilities, improvement in the scientific organization of the collections, and restoration of deteriorating specimens. It is currently anticipated that the Government of Japan will fund a project to replace the buildings housing the PPPB zoological collections with a new building in Cibinong, scheduled for completion by March/April 1996. The GEF project schedule has been adjusted to accommodate the projected timing of the GOJ-funded investments.

4.30 To improve the storage facilities, the project would provide major investment in new cabinets, drawers, shelving, glass bottles, and curatorial materials. This investment would prevent further physical deterioration of the collections, enable PPPB to physically sort and reorganize specimens, permit the integration of the PPPO marine zoological collections, and allow for future expansion. Further steps to improve environmental conditions and eliminate pests would also be taken, although these aims would be partly achieved through the GOJ-funded provision of a new air-conditioned building. Based on an assessment of the scientific value of the collections, six high-priority areas have been selected for rehabilitation under the project, requiring the provision of:

- (a) metal cabinets and drawers for small mammals--shrews, mice, rats, squirrels and bats;
- (b) metal cabinets and drawers for birds;
- (c) glass bottles and tanks for wet specimens of reptiles, amphibia, fish and mollusks¹⁰;
- (d) metal shelving¹¹ for the wet collections, to provide space for reorganization and expansion;
- (e) microscope slide cabinets for the parasitology slide collections; and
- (f) metal cabinets, drawers, and unit trays for the entomological collections, to provide space for the reorganization of current collections and the curation of unincorporated

⁹ Six to twelve months in duration.

¹⁰ Including the marine collections belonging to the Research and Development Center for Oceanology.

¹¹ It is proposed to renovate and utilize surplus metal shelving from the herbarium for this purpose.

materials. Microscope slide preparations of entomological material (e.g., dissections of genitalia, essential for taxonomic research and critical identification) would be transferred to custom-made cabinets and cross-referenced with the original dry, pinned specimens in the collection.

The new metal cabinets would be of standard size throughout the collections, to facilitate the repositioning of individual shelves. Similarly, the same size of drawers and unit trays would be used throughout the entomology collections.

4.31 Dry individual zoological specimens need to be sorted and transferred to properly sized, insect-proof cabinets--an extensive task in the case of the entomological collections. All the individual wet zoological specimens need to be transferred to new, airtight bottles and fresh preservative before being transferred to new cabinets.

4.32 The Zoology Coordinator and the seven Zoology Collections Managers would supervise the collections renovation. Under the project, ten temporary museum assistants would be recruited to assist with the rehabilitation of the entomological collections and four for the same process in other areas of the Museum. On a long-term basis it is estimated that up to six additional trained technicians or other staff will be required to maintain and develop the collections.

4.33 Research Facilities. The GEF project would provide dissecting and high-powered microscopes, fibre-optic lamps, networked computer workstations, and equipment for a photographic darkroom. Basic reference texts, including back copies of critical journals, would be procured. Supplemental support for travel, allowances, supplies, and specialized equipment required for individual PPPB research activities would be provided through a competitive research grants program for Systematic Research and Genetic Resource Conservation, which would be administered under the general project management component. It is anticipated that the provision of space for research would be incorporated in the design of the proposed GOJ-funded zoology collections building in Cibinong.

4.34 Supporting Activities. As with botany, the project would support the production of an illustrated technical glossary, a computerized bibliography of written reference materials, a field guide to a nearby national park, a database and handbooks covering specific taxa, and an strengthened taxa identification service (see Annex 5). In the case of zoology, the glossary would include cross-referenced terms in English, Dutch, French, and German, and would cover at least insects, fish, and terrestrial vertebrates and mollusks. The bibliography of Indonesian Faunistic Research would be able to be updated from on-line databases (see Annex 5).

Information Systems Management Component

4.35 Value for Collections Management. The project would provide the capability of PPPB to capture in electronic format the basic biodiversity information contained in the collections (see Annexes 3, 4, 5, and 6). As part of the rehabilitation and development of the biological collections, computerized databases would be used routinely in managing the collections to produce (for example) labels for specimens, and data on the location of biological material--both within the organization or on loan to other institutions. Specifically, specimens sent to specialists for identification could be efficiently tracked, and the best available names made available to other biodiversity information users. In addition, a computerized database would provide new ways of checking and upgrading the accuracy of specimen data. Further, the computerization of information would introduce both rigor

and flexibility into the organization of the collections by ensuring that all information would be entered in a standard manner while providing access to large bodies of information.

4.36 Limited Coverage During Project but Sound Design for Long-term Needs. The five-year project would only achieve coverage of limited taxa in the electronic database. However, it would establish the foundation to enable full and functional entry, maintenance (including quality control), and use of PPPB specimen data in a computerized system within the next twenty-five years. During project inception, a workshop of PPPB staff, the Technical Advisory Group (TAG), and taxa specialists would determine priority taxa to be included in the database and would establish specific project benchmarks, taking into account relative levels of accuracy, coverage, and costs and benefits. Another workshop of PPPB staff, the TAG, and an expert in data field definition would determine standardized fields of information which would meet long-term internal and external needs common to all taxa categories. This workshop will also define field requirements for the specific taxa in the project work program (see Annex 6).

4.37 Local Area Network and INTERNET Support. Under the project an institution-wide local area network would be developed to provide a platform for databasing the information in the collections and efficiently performing routine collections management tasks such as automated label production. The institutional network would be capable of interfacing with national, regional and global electronic networks such as the INTERNET. This facility, when complete, would give on-line access to the rapidly growing international knowledgebase and bibliographic services regarding biodiversity. Connection to the INTERNET would also allow--through e-mail and the electronic transfer of data files--rapid and low-cost communications with scientific colleagues and institutions worldwide. In the long term, incorporating data from collections in other institutions and from literature would significantly raise the quality and quantity of biodiversity information available to Indonesian users.

4.38 Compatibility with National Biodiversity Information Network. It is important to note that the collections-based database system proposed under the GEF project would be designed to interface with, and greatly complement, the development of the proposed Indonesian National Biodiversity Information Network (NBIN). It may in fact comprise the first "node" of the proposed NBIN-distributed network model, hence becoming the pilot for the whole system.

4.39 Technical Design. A short-term Collections Database Expert in experienced in information technology would be recruited to perform a user-need analysis and advise on appropriate software and hardware options (see Annex 4). The Collections Database Expert would also train the Information Systems Coordinator on how to carry out this analysis, so that the Information Systems Coordinator would be able to manage the process of updating and upgrading the systems in the future. Specifically, the consultant would recommend a data management system that is capable of:

- (a) managing specimen-based records;
- (b) facilitating quality control of the data;
- (c) meeting all the foreseeable needs of PPPB for sorting and searching, and for exporting records to other databases;
- (d) ensuring that the databases from the various collections are inter-compatible;
- (e) scaling-up to meet the database needs of PPPB for foreseeable future;

- (f) interfacing with community-standard geographical information system and image processing software (such as ARC-INFO and ERDAS);
- (g) interfacing with local area and wide-area networks; and
- (h) being maintained through availability of adequate long-term internal and external support, including upgrading and training.

4.40 Programming Support. In addition to the Collections Database Expert, it is estimated that the development and support of an appropriate system would require a further two person-years of programming effort, followed by eight months programming in the fourth year and four months in the fifth year of the project. The Collections Database Expert would advise PPPB on appropriate terms of reference for this programming support.

4.41 Gazetteer. To facilitate fast and accurate specimen data entry, the project would provide support for the compilation of a computerized gazetteer of the names of Indonesian collecting localities, with their geographical coordinates (see Annex 5).

4.42 Organizational Responsibility. Functionally, this component would involve the establishment of a new subdivision in the Scientific Services and Information Division, since PPPB does not currently have a subdivision capable of computerized database management. However, internal reorganization will enable PPPB to create this subdivision without expanding the total number of subdivisions within the affected division.

4.43 Staffing. An Information Systems Coordinator/Manager would head this new subdivision and be responsible for the long-term development of database and network services. Since PPPB does not currently have a staff member with appropriate qualifications, PPPB would arrange the secondment or transfer from another government agency, or the recruitment of a suitable candidate. Data Managers, one from the Botany and one from the Zoology Division, would be appointed. The Information Systems Coordinator/Manager would participate in an overseas work-study program (and prior foreign language training) as needed. The Information Systems Coordinator/Manager would train the Data Managers to oversee data entry and day-to-day data management (including quality control). A PPPB computer technician, who is currently responsible for office computer maintenance, would be responsible for routine installation and maintenance of computer hardware and software (see Annex 3).

4.44 Importance of Quality Control. As with any information system, the quality of the biodiversity information output and products from PPPB will be determined largely by the quality of data input. Since it is anticipated that the proposed GEF project would comprise an integral part of the long-term development of future biodiversity information systems in Indonesia, it is therefore essential that the project set the highest possible standards for the collection and management of specimens and data. Establishing a policy, from the outset, of maintaining strict data quality control should also prove more cost-effective than trying to validate, edit and refine the information in the system at a later date.

4.45 Data Entry and Quality Control. It is anticipated that a large part of the effort and cost of developing a biodiversity information system would be invested in maintaining quality control over the data entry process, including proofreading and editing. To facilitate this process, careful attention would be given to:

- (a) designing appropriate data entry fields (para. 4.36);
- (b) producing taxonomic and geographical reference files of rigorously verified names (paras. 4.15, 4.27, and 4.41); and
- (c) choosing a database design with built-in capability to flag "outlier" records in relation to the known ecological and geographical range of the species.

During the project, two Database Managers would be designated and trained, with primary responsibility for maintaining data quality in the botany and zoology databases.

4.46 Administrative Software Applications. The project would also provide five years of full-time technical assistance from a Software Applications Specialist who would be responsible for introducing, developing and maintaining a wide range of commercial database, spreadsheet and word processing applications to increase the efficiency of managerial and administrative operations within PPPB (see Annex 3).

Scientific Collaboration and Services Component

4.47 The project would strengthen the capacity of an existing subdivision within PPPB, the Scientific Collaboration and Client Services Subdivision of the Scientific Services and Information Division, to manage collaborative research, client services, and training programs. Under the project, the subdivision head would serve as the Scientific Collaboration and Services Coordinator. The Coordinator would be assisted by the respective Heads of the Scientific Collaboration Unit, Scientific Services Unit and the Human Resources Development Unit (Annex 3 Part A). A Human Resource Development Specialist would provide advice on training programs (Annex 4 Part A). The Technical Advisory Group and the Software Applications Specialist would also provide technical advice. The project would also provide office equipment.

4.48 The Coordinator, together with the Scientific Collaboration Unit Head, would have the responsibility to develop the capacity of PPPB to foster, coordinate and monitor collaborative biodiversity research nation-wide, and to develop Memoranda of Understanding and Research Agreements between PPPB and collaborating institutions and individuals.

4.49 The Coordinator, together with the Scientific Services Unit Head, would facilitate PPPB services involving inquiries and requests for services from GOI agencies, the general public, and other external clients, and develop protocols for responding to these requests.

4.50 The Coordinator would also receive support from the Human Resources Development Unit Head and the Human Resource Development Specialist, to coordinate administrative and logistical aspects of the all graduate level scholarship programs and local external and on-the-job training activities. These responsibilities would also include the fostering and mobilization of additional financial support for overseas graduate-level scholarships that would supplement the GET-financed scholarships. Logistical and administrative details of the work-study programs would be handled by the technical assistance contract.

D. Project Organization and Management

- 4.51 Project Management Authority. A full-time Project Manager would be designated from within the senior management staff of PPPB who would be responsible for the smooth implementation and performance of the project, and who would have overall financial and reporting accountability. The Project Manager would report through the Director of PPPB to an inter-agency Steering Committee, which would be chaired by a representative of BAPPENAS, and include a representative of LIPI's head office (see Figure 2).
- 4.52 Project Management Committee. A Project Management Committee would provide the main mechanism to coordinate project activities with regular PPPB line organizational structure. The Project Management Committee would be chaired by the Project Director, with the Project Manager serving as secretary. It would also comprise the project Botany, Zoology, Information Systems, and Scientific Collaboration and Services Coordinators, the Financial Manager, and the five PPPB division heads, with *ex officio* advice from the Technical Advisory Group, the Project Management Specialist, the Financial Management Specialist, and the Human Resource Development Specialist. The Project Management Committee would meet as often as necessary to deal with project activities, and to ensure that schedules are adhered to, benchmarks achieved, and project goals met.
- 4.53 Staffing. Of the 115 positions required for the project, some 53 would be filled by existing PPPB staff (from a pool of some 325 PPPB staff), some 13 staff would be seconded or recruited, and some 49 staff would be locally contracted on a fixed-term basis. All 18 managerial job positions for the project would be filled by existing PPPB personnel, with the exception of the Information Systems Coordinator position, which would be filled initially by an employee seconded from another LIPI agency. Locally contracted specialists would assist with project management tasks, financial management, software applications, engineering design, and various publications and products. New permanent staff would be recruited as required to participate in the graduate scholarship program. Some 20 redeployed staff and 40 temporary employees would work as curatorial assistants on the collections restoration and development, and data entry. This staffing plan is feasible given PPPB's existing labor profile, the standard GOI civil service and contracting regulations, and high retention rates of permanent staff. However, there are significant uncertainties regarding the potential capacities of PPPB permanent and contracted staff. To address this concern and facilitate smooth project implementation, the annual review of the work plan would include a specific focus on staffing and associated financial requirements.
- 4.54 Managerial Positions. The key managerial positions consist of: the Project Manager, the Financial Manager, the Botany Coordinator, the Zoology Coordinator, the Information Systems Coordinator/Manager, and the Scientific Collaboration and Services Coordinator. Two Botany Collections Managers, seven Zoology Collections Managers, a Botany Database Manager, a Zoology Database Manager, a Computer Technician, a Scientific Collaboration Unit Head, a Scientific Services Unit Head, and a Human Resource Development Unit Head, would also play important managerial roles. The project Coordinators, Collection Managers, Data Managers, and Unit Heads would be responsible to the Project Manager for supervising, on a day-to-day basis, the scientific and technical quality of work carried out by personnel temporarily seconded or hired under the project, including Interns seconded to the project from other institutions.
- 4.55 Reporting Channels. The two Botany Collection Managers and seven Zoology Collection Managers would report to the Botany and Zoology Coordinators, respectively. The Zoology Database Manager, Botany Database Manager and a Computer Technician would report to the Information Systems Coordinator/Manager. The Scientific Collaboration Unit Head, Scientific

Services Unit Head, and Human Resource Development Unit Head would report to the Scientific Collaboration and Services Coordinator.

4.56 Permanence of Managerial Positions. As currently envisaged, in the absence of a follow-on project, the positions of the Project Manager, the Financial Manager, the Botany Coordinator, and the Zoology Coordinator would exist only for the duration of the five-year project. At the close of the project, the Information Systems Coordinator/Manager, the Scientific Collaboration and Services Coordinator, the Computer Technician, the Scientific Collaboration Unit Head, the Scientific Services Head, and the Human Resource Development Unit Head would revert to their regular line positions in the PPPB organizational structure. By the close of the project, new regular permanent line positions would also have been established within the PPPB organizational structure for the Collections Managers and Database Managers.

4.57 Locally Contracted Specialists. Locally recruited specialists from the private sector, who would be hired under long-term individual contracts, would be provided to assist project staff in project management tasks, financial management tasks, software applications, and clerical office work. The Project Management Specialist, probably recruited from the private business sector, would assist the Project Manager throughout the five years of the project with administrative details including data analysis and collection, budget preparation, and report preparation. The Financial Management Specialist would provide advice, guidance, and in-house training to the Financial Manager on budget control, financial information management, procurement and associated contracting, disbursement procedures, arrangements for audits, and other measures as necessary during the first three years of the project. The Software Applications Specialist, under the supervision of the Information Systems Coordinator/Manager, would identify and adapt appropriate software applications for project management, scientific collaboration and services, and other project-related administration tasks as required. The Human Resource Development Specialist would provide advice, guidance, and in-house training to the Human Resource Development Unit Head on the administration arrangements for overseas scholarships and local training programs, and on the mobilization of additional financial resources for overseas scholarships and other relevant training.

4.58 Management of Studies. The Financing Strategy Study would be directed by the Steering Committee and administered by the Project Manager with support from the LIPI central office and BAPPENAS in Jakarta.

4.59 Support from Technical and User Advisory Groups. The Project Manager and members of the PPPB project management committee would be supported by the TAG and the UAG. The TAG, comprising the Team Leader of the Technical Assistance Contract, a Botany Institutions Advisor and a Zoology Institutions Advisor who would provide technical and institutional development support and advice as required. The UAG, comprising members representative of the wider user community for biodiversity information products, would provide feedback and direction on the relevance and prioritization of project activities.

E. Project Planning, Monitoring, Evaluation and Supervision

Project Planning

4.60 Importance of Explicit Work Plan Goals. During the project's five years, benefits to external clients would be limited. However, an overall policy framework, specific measurement of project progress, and a few selected user products would help to justify the project and demonstrate the potential benefits of further investments after the project period. Because of the current condition

of PPPB's collections and PPPB's limited existing capacity, the project would focus on internal institutional development. Measurable services and products for external clients would be limited in scope and would be achieved only in the later years of the project. Yet an explicit policy framework, realistic and meaningful benchmarks, specific user products, and clear evaluation criteria would enable PPPB to demonstrate, albeit on a small scale, the current and potential benefits of project investments to external clients and to possible funding sources. The policy framework, benchmarks, and user products would also establish the technical design foundation for further developments in biodiversity information after the project period. Together, the policy framework, the benchmarks, and the user products would establish the basis for monitoring project outputs and evaluating project impact.

4.61 Design of Work Plan Goals. During project inception, PPPB would develop a work plan and standards for measuring project progress through the formulation of the policy framework, specific goals for the management of the collections and associated information, semi-annual benchmarks for all five project components, user products, and evaluation methods (see Annex 6). Specifically, these would comprise:

- (a) Policy Framework. The project management committee, with technical advice from the TAG and Information Technology and Systematic Specialists as required, would formulate overall institutional goals and policies¹² with respect to the development and use of the systematic collections.
- (b) Physical Curation. PPPB would determine semi-annual benchmarks needed to reach the five-year project goals for physical curation.
- (c) Database. PPPB would conduct two workshops, one to agree upon an optimal field-structure for the specimen-based database developed under the project, and the second to determine priorities and realistic goals for the scientific curation of the collections, and the computerization of associated information, during the subsequent five-year, ten-year and twenty-five-year periods.
- (d) Benchmarks. PPPB would develop a semiannual monitoring framework for semi-annual progress reports which incorporates these goals (and related benchmarks involving the production of written guidelines and protocols), establishes specific benchmarks for the scientific collaboration and services (including training) and general project management components, and delineates criteria and procedures for monitoring the effectiveness of management policies and procedures, training programs, and other project activities.
- (e) User Products. Products for external clients would be achieved only in the later years of the project. These products would be based on and mostly limited to priority taxa. Possible products include preliminary species lists, measures of abundance and distribution, identification reference tools and services, biota resource management strategies, field guides, biotic resource prospecting, and identification of geological indicator species.

¹² The policy framework might be modeled along the lines of the Agricultural Sector Objectives developed under the GOI-World Bank Agriculture Research Management Project.

- (f) Required Inputs. PPPB would specify detailed arrangements for staffing, career development, budget, and other inputs required for the project, and delineate criteria and procedures for monitoring the performance of staff and consultants.
- (g) Evaluation Methods. Appropriate criteria, methodology and operational plans for measuring project impact would be developed. The evaluation criteria would build upon the policy framework and project benchmarks, and also would address global impact. The methodology might include measures to provide external, independent analysis reflecting the interests of both the national and international scientific and user communities. The operational plans would explore the possibility of a long-term evaluation process that could be sustained over the next twenty-five years. All evaluation exercises would be kept simple, reflecting the basic long-term goals.

4.62 Review of Work Plan and Progress Report Design. During project inception, the Project Management Committee, with the assistance of the Project Management Specialist and the TAG, would develop a suitable format for semi-annual progress reports that incorporate work plan measurements. The work plan content and progress report format would be subject to review and endorsement by the UAG, the Steering Committee, and the Bank by March 31, 1995.

Monitoring, Semi-annual Progress Reports, and Annual Review of Work Plan and Budget

4.63 Objectives of Monitoring. The main objective of the semi-annual reports and of any other monitoring which is required is to assist prompt managerial problem-solving. A secondary objective is to provide a regular communication channel to the GOI (through the Steering Committee), and GET funders (through the Bank) by: (a) providing information on project implementation status and impacts; (b) demonstrating the effectiveness of project management; and (c) identifying issues which require Steering Committee and/or Bank intervention. The Project Manager would be responsible for ensuring that the reports meet these objectives, that they are timely, and that they do not become a burdensome bureaucratic exercise.

4.64 Contents of Semi-annual Progress Reports. In addition to the day-to day internal monitoring, the Project Manager would periodically review the progress of the project and submit a semi-annual progress report to the UAG, the Steering Committee and the Bank. These progress reports would incorporate measurements of project progress for all five project components, as reflected in the policy framework, semi-annual benchmarks, and user products. They would also include data on other aspects of project implementation status, such as staffing, technical assistance, studies, training, budget, procurement, expenditures, and coordination mechanisms. The reports would include explanations of the current status and problem-solving strategies.

4.65 Annual Review of Work Plan and Budget. During project preparation, there were significant uncertainties regarding the potential capacities of PPPB project staff and local consultants. To address this concern and facilitate smooth project implementation, PPPB, LIPI, and BAPPENAS, with advice from the TAG, would annually review the work plan and budget required for project implementation, with a specific focus on human resource requirements and associated financial requirements, and would promptly carry out the recommendations of this review taking into account the comments of the Bank.

Mid-Project Review, Completion Report, and Long-term Evaluation

4.66 Mid-Project Review. At the end of the third year of the project (i.e., early in the fourth fiscal year), the Project Manager, with the assistance of the Project Management Specialist, the TAG, and the Project Management Committee would prepare a Mid-Project Review. This review would be a more detailed and comprehensive report than the semi-annual progress reports. It would provide the opportunity to adjust officially project benchmarks and to make other changes in project design if necessary. It would provide a channel for reporting initial measurements of project impact as measured through the evaluation process. It would also incorporate and build upon the financing strategic planning study, the collections data access report, and other relevant planning exercises. In addition, it would provide the Steering Committee with the opportunity to expand the policy framework for biodiversity information to cover institutional development outside of PPPB. The Steering Committee would use the review exercise to develop coherent plans and proposals for the next, post-project stage of developing biodiversity information in Indonesia.

4.67 Completion Report. Within six months of project completion, the Project Manager would prepare a Project Completion Report on the basis of GOI and Bank guidelines. The primary objective of the Project Completion Report would be to describe and analyze the state of the project at, or shortly after, its completion, to compare the costs and currently expected benefits with those expected at appraisal/project inception and thereby to contribute to an assessment of the effectiveness of the project and the implementing agency. It would reinforce self-evaluation, would draw lessons from experience and would serve as a mechanism to disseminate these lessons. It would include an assessment of the original project objectives and design and of the methods used and decisions taken in the course of project implementation. Topics covered would include project identification and preparation, implementation, operating performance, financial performance, institutional performance and development, and reevaluation of project impact and benefits.

4.68 Long-term Evaluation. While initial evaluations of project impact would be reported in the Mid-Project Review and Completion Report, a more accurate and comprehensive evaluation of project impact would only be possible well after the project period. In order to facilitate such evaluation and to address long-term development goals, PPPB will design evaluation criteria, methodology, and plans which would contribute to its ability to achieve its twenty-five-year objectives for the development of scientific information on biodiversity.

Supervision

4.69 The project would be supervised semiannually. In addition to the Bank task manager, it would be desirable to include on these supervision missions, annually, at least one systematic biologist with extensive experience in institutional development and collections management.

V. PROJECT COSTS AND FINANCING

A. Costs

5.1 The total cost of the proposed project is estimated to be about US \$11.4 million (Rp 24.0 billion) with a foreign exchange component of US \$5.0 million (Rp 10.6 billion). The cost is estimated on November, 1993, prices and includes taxes and duties estimated at US \$1.0 million (Rp 2.0 billion). Baseline project costs (excluding physical and price contingencies) are estimated at US \$9.6 million (Rp 20.3 billion). Physical contingencies (to allow for possible design variations)

have been estimated at 5 percent for investment costs and 15 percent for recurrent costs. Price contingency estimates assume increases in local currency costs of 5.5 percent per annum and increases in foreign exchange costs of 2.5 percent per annum throughout the project.

5.2 The estimated project costs are summarized in Table 5.1, and elaborated in Annex 9 and the Project Files.

B. Financing

5.3 The proposed GET grant would finance 100 percent of the foreign exchange costs and 63 percent of the total project costs. The Government of Indonesia would need to contribute an estimated US \$1.0 million (Rp 2.0 billion) in taxes and duties, and US \$3.2 million (Rp 6.8 billion) in research grants, local training, and recurrent institutional operating expenses.

Table 5.1: PROJECT COST SUMMARY

	<u>(Rp Million)</u>			<u>(US\$ '000)</u>			<u>%</u>	<u>% Total</u>
	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>Local</u>	<u>Foreign</u>	<u>Total</u>	<u>Exchange</u>	<u>Base Costs</u>
I. Investment Costs								
A. Facilities Upgrading								
1. Civil Works	35	15	49	16	7	23	30	-
2. Air Conditioning Install.	44	82	126	21	39	60	65	1
Subtotal Facilities Upgrading	79	96	175	37	46	83	55	1
B. Equipment, Supplies, and Furniture								
1. Computer and Office Equipment	312	729	1,042	148	346	495	70	5
2. Other equipment and Supplies	195	1,104	1,298	93	524	617	85	6
3. Furniture	1,503	373	1,876	714	177	891	20	9
Subtotal Equipment, Supplies, and Furniture	2,010	2,205	4,216	955	1,048	2,003	52	21
C. Human Resources								
1. Honoraria and Allowances	740	-	740	352	-	352	-	4
2. Training								
Technical Advisors and Work-study Programs	924	3,603	4,528	439	1,712	2,151	80	22
Graduate Scholarships	154	2,951	3,106	73	1,402	1,475	95	15
Miscellaneous Local Training	587	-	587	279	-	279	-	3
Subtotal Training	1,666	6,555	8,221	791	3,114	3,905	80	41
Subtotal Human Resources	2,406	6,555	8,961	1,143	3,114	4,257	73	44
D. Publications & Products	525	521	1,045	249	247	497	50	5
E. Research Grants	835	31	866	397	15	411	4	4
F. Strategic Planning and Policy Studies	69	67	136	33	32	65	49	1
G. Contract Employees	906	-	906	430	-	430	-	4
Total Investment Costs	6,830	9,475	16,305	3,245	4,501	7,746	58	80
II. Recurrent Costs								
A. Facility Maintenance	737	-	737	350	-	350	-	4
B. Equipment & Supplies								
1. Curation	208	-	208	99	-	99	-	1
2. Travel	373	-	373	177	-	177	-	2
3. Other Research Expenses	1,361	-	1,361	646	-	646	-	7
Subtotal Equipment & Supplies	1,942	-	1,942	922	-	922	-	10
C. Human Resources								
1. PPPB Staff	1,120	-	1,120	532	-	532	-	6
D. Support								
1. Administration	152	-	152	72	-	72	-	1
Total Recurrent Costs	3,950	-	3,950	1,877	-	1,877	-	20
Total BASELINE COSTS	10,780	9,475	20,255	5,121	4,501	9,622	47	100
Physical Contingencies	892	472	1,364	424	224	648	35	7
Price Contingencies	1,718	646	2,364	816	307	1,123	27	12
Total PROJECT COSTS	13,390	10,593	23,984	6,361	5,032	11,394	44	118

VI. PROJECT IMPACT

A. Benefits and Justification

Institutional Benefits

- 6.1 The proposed project would accomplish the following:
- (a) Strategic and institutional transformation. The project would enable PPPB to become one of the first examples in the world where the collection, organization, and dissemination of biodiversity information would be driven by user need, integrated and coordinated at a national level; and based on primary specimen-based data. The project would also enable PPPB to take the first step in a long-term process to provide biodiversity information adequate in scope and scale to the task of conservation and sustainable development in a large, developing country with high biodiversity. The project would make PPPB more effective and responsive, and would provide a model of strategic and institutional transformation for similar organizations in both developing and developed countries. The project would begin to address the severe lack of Indonesian personnel trained in strategic management, systematic biology, database development, and physical curation. It would provide an institutional model for the seamless integration of fieldwork, collections management and information management. The project would lay the foundation for future regional expansion of regional inventory and monitoring of biological resources.
 - (b) Improvements in the physical condition of specimens. The project investment in collections and research would significantly improve the physical condition of the collections. Under the project, PPPB would take definitive steps toward international standards of physical curation. Unless immediate measures are taken to restore large numbers of specimens that are deteriorating under tropical conditions, the Center's extensive historical collections will shortly sustain irreparable damage, and large amounts of valuable biodiversity information will be lost. In economic terms, it is four to twenty times more cost-efficient to capture biodiversity information from the existing collections than to collect new data from the field.
 - (c) Database design and establishment. The database development would improve collections management, enable collection plans and development, and facilitate external use. The database would be state-of-the-art, and would provide a key part of the scientific and institutional foundation required for a national biodiversity information system. It would provide functional fields of information that meet internal and external needs for the priority taxa that is in the project work program. The project would also establish the basic database infrastructure required for long-term process of entering 100 percent of the data from PPPB's existing collections.
 - (d) Fostering of scientific collaboration and research. The project would help to foster scientific collaboration and research, beyond that which would be provided under the project itself. This increased scientific collaboration and research would supplement financial and expert resources, and be an important source of new specimens, data, and human resource development.

- (e) Development of user products and services. The project also includes support for a variety of products and services for external clients. These tangible products and services would be based on, and mostly limited to, priority taxa, and might include preliminary species lists, measures of abundance and distribution, identification reference tools and services, field guides, compilations of ethnobiological data, and biotic resource prospecting services.

Benefits of Biodiversity Information

6.2 The project would enable PPPB to become a leader in environmental data management and enable GOI, non-governmental organizations, and commercial users to access priority biodiversity information. This biodiversity information would provide a more factual basis for decision-making in natural resource management, conservation, spatial planning, and environmental assessment. It would also enable the identification of plants and animals with economic potential. The label information associated with specimens in the collections include location, date of collection, soil type, elevation, slope, proximity to water courses, associated species, and local uses. Applications of this label information include:

- (a) Rapid assessments of the biological resources of specific locations, to be used in land-use planning and ecosystem management;
- (b) Environmental monitoring to measure the impact over time of investments and other human activities on ecosystems;
- (c) Identification and monitoring of rare and endangered species, and analysis of geographic distribution patterns for biodiversity conservation;
- (d) Identification of unknown species such as newly introduced agricultural pests;
- (e) Repository of local knowledge about plant and animal uses, which is rapidly disappearing; and
- (f) Database searches for prospecting plants and animals for various uses including therapeutic drugs, food, biological controls, reforestation (e.g., mycorrhizal fungi), and geological species indicators (e.g., discovery of mineral deposits and hot springs).

B. Environmental Impact

6.3 Building. Because no new building or construction would be funded under the GET project, the environmental impact in Bogor would be negligible.

6.4 Collections Development. The collection of specimens from the wild under the fieldwork training and guidebook production program would be carried out with full regard to the need to conserve rare and endangered species. Selection of specimens for collection would exclude those proposed for future inclusion in the IUCN *Red Data Books* for Indonesia, and those already covered by the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES) regulations. Further, all collecting would conform to current GOI regulations on the collection and distribution of biological materials and information, as covered under Act No. 5, 1990, *Conservation of Living Resources and their Ecosystems*.

6.5 It should be noted that one of the major benefits of the proposed collections-based biodiversity information system at PPPB would be increased quantity, quality, and availability of information on the distribution and status of rare and endangered species in Indonesia.

6.6 Hazardous chemicals. The use of toxic and potentially carcinogenic and mutagenic chemicals to preserve collections from insect and fungal pests was ceased in January 1994. Specialist health and safety advice would be sought, and active measures taken by PPPB, to reduce to a minimum future exposure of staff and visitors to the residual toxic chemicals in the collections (paragraph 4.8).

C. Equal Opportunity

6.7 All recruitment and training under the project would be carried out on an equal opportunity basis.

D. Sustainability

6.8 A large portion of the project inputs would provide lasting benefits well after the close of the project. A large part (21 percent) of the investment proposed under the project would be in materials and equipment necessary for the efficient long-term curation and scientific management of the national biological collections. Similarly, 41 percent of the proposed investment would be in training personnel who would contribute to the long-term human resource needs of Indonesia. It is currently estimated that approximately 37 percent of the total cost of the project would be met from matching funds provided by the Government of Indonesia.

6.9 The project includes specific provisions to ensure adequate provision and allocation of financial and human resources both during and after the project period. The annual review of the work plan and budget (paragraph 4.65) would provide the mechanism to adjust, if necessary, the Government's contribution. The Financing Strategy Study would analyze the financial resources required to maintain and further develop the systematic collections, and to carry out associated research and information systems and management activities, and recommend a strategy for how PPPB could achieve long-term financial sustainability. The Government has agreed that incremental operating costs at PPPB (currently estimated at US \$200,000 over the five-year period, and subject to adjustments based on the annual reviews and the Financing Strategy Study), resulting from the project, would be met through long-term increases in the institutional budget. Recipients of training provided under the project would be subject to the standard requirements of returning to Government service for a three-year period. In addition, the Government would provide assurances that they would also be employed in positions in PPPB where they could make full use of the training.

E. Risks

6.10 The main risks or areas of uncertainty associated with the implementation of the project are believed to be: (a) providing sufficient management support to carry out nearly fifty years of deferred maintenance to the collections in Bogor in just five years; (b) recruitment, motivating and training of sufficient numbers of new and existing staff to carry out the immense amount of work involved in bringing the institution up to modern international standards; (c) establishing and implementing new management plans for collections development and systematic research based on user need and national priorities; (d) building institutional linkages and information systems that would enable the fullest possible utilization of the collections; and (e) sustainability after the project.

6.11 The logistical aspects of the Zoology sub-project would be strongly influenced by a GOI proposal, presently under development with the Government of Japan, to re-house the zoological collections in a new, custom-built building in Cibinong. This move is presently scheduled to take place around March-April, 1996. Close coordination would be required to avoid potential gaps or duplication, and scheduling conflicts between the two proposed projects. GOI would assume responsibility for coordinating these aspects, and for providing an adequate budget to rehouse the zoological collections in adequate facilities should the proposed GOJ support not materialize.

6.12 The appointment of strong and experienced candidates to the positions of Project Manager, Financial Manager, and four sub-project Coordinators would be critical to the success of the project. To ensure one hundred percent of the effort of the key personnel would be spent on the project, GET would provide honoraria for five years. In keeping with established institutional practice, honoraria would also be provided to all other key project staff as extra compensation for additional work performed during the course of the project.

6.13 The project would use a single contract arrangement for procuring specialized technical assistance. The annual review of financial and human resource requirements would include a review of the requirements for technical assistance and local specialists.

6.14 The project includes specific measures to strengthen linkages with users. These include the establishment of a User Advisory Group, institutional strengthening of the Scientific Collaboration and Services Subdivision, and a report which would analysis issues of interagency data access and sharing. The Steering Committee would provide essential interagency coordination. The internship program would strengthen linkages with provincial universities. The specialized technical assistance, overseas training program, and on-the-job mentoring would strengthen linkages with international research institutions. The collections training and field guide production program at Halimun National Park would involve park staff and local NGOs. The user products developed with project support would provide direct benefits to a variety of users.

6.15 As explained above, the project includes measures which address financial and institutional requirements for the long-term sustainability of project investments (paragraph 6.8).

6.16 It should also be noted that the full benefit, in terms of improved conservation and sustainable management of Indonesian biodiversity resulting from the implementation of this project, would be contingent on future levels of investment in a range of complementary activities including: (a) retroactive data capture from existing collections to computer databases; (b) increased support, nationally and internationally, for systematic research on the biota of the region; (c) an increased rate of inventory and collecting throughout Indonesia; and (d) the means to collect, integrate, analyze and synthesize environmental and biodiversity information on a national scale and to disseminate functional information projects to a wide range of users.

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Figure 2: Proposed Management Structure
 GEF-Indonesia Project; Systematic Resources Component

FIG. 2

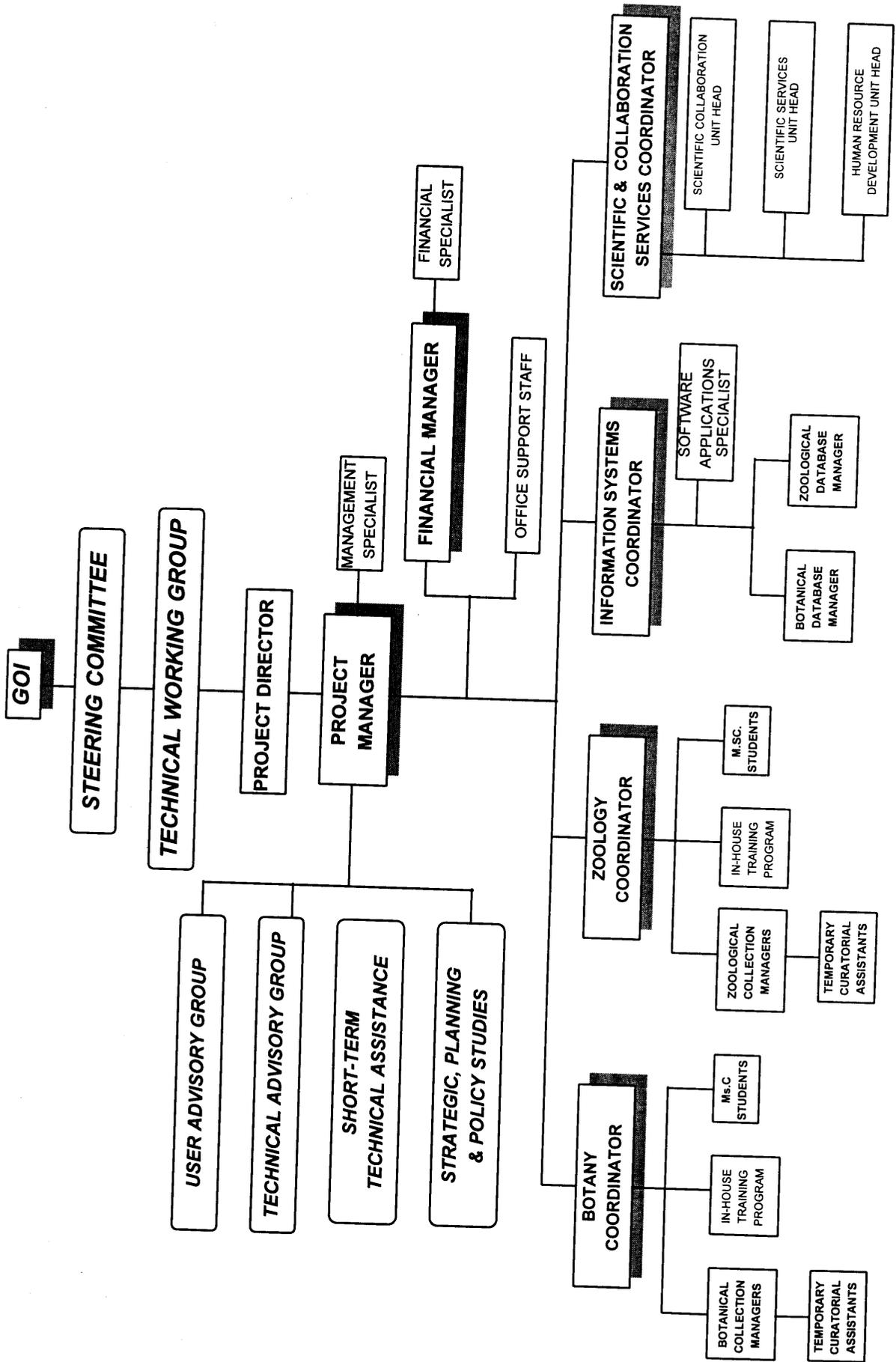


Figure 3: Principal Government of Indonesia Agencies with Responsibilities for Conservation and Environment

FIG. 3

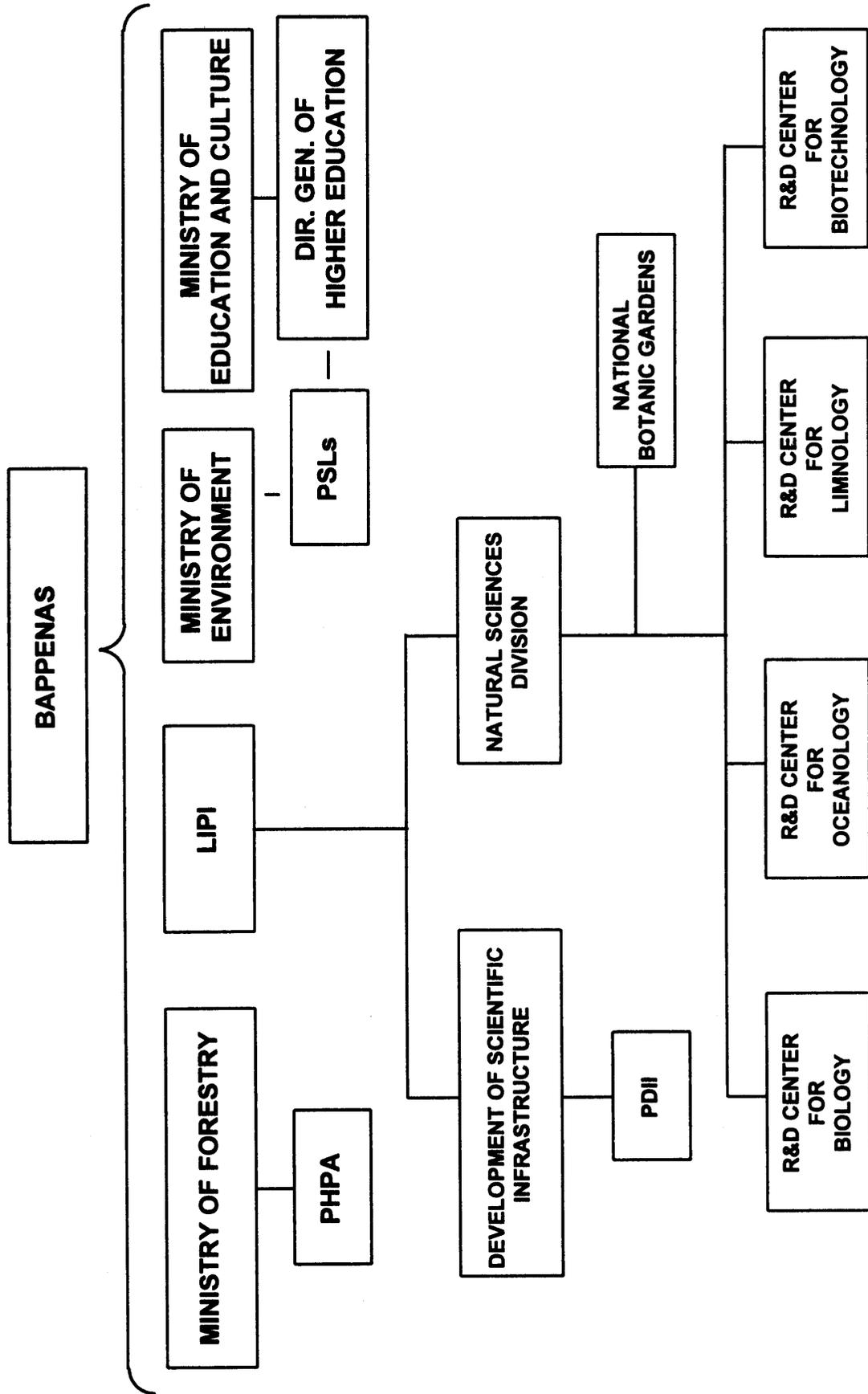
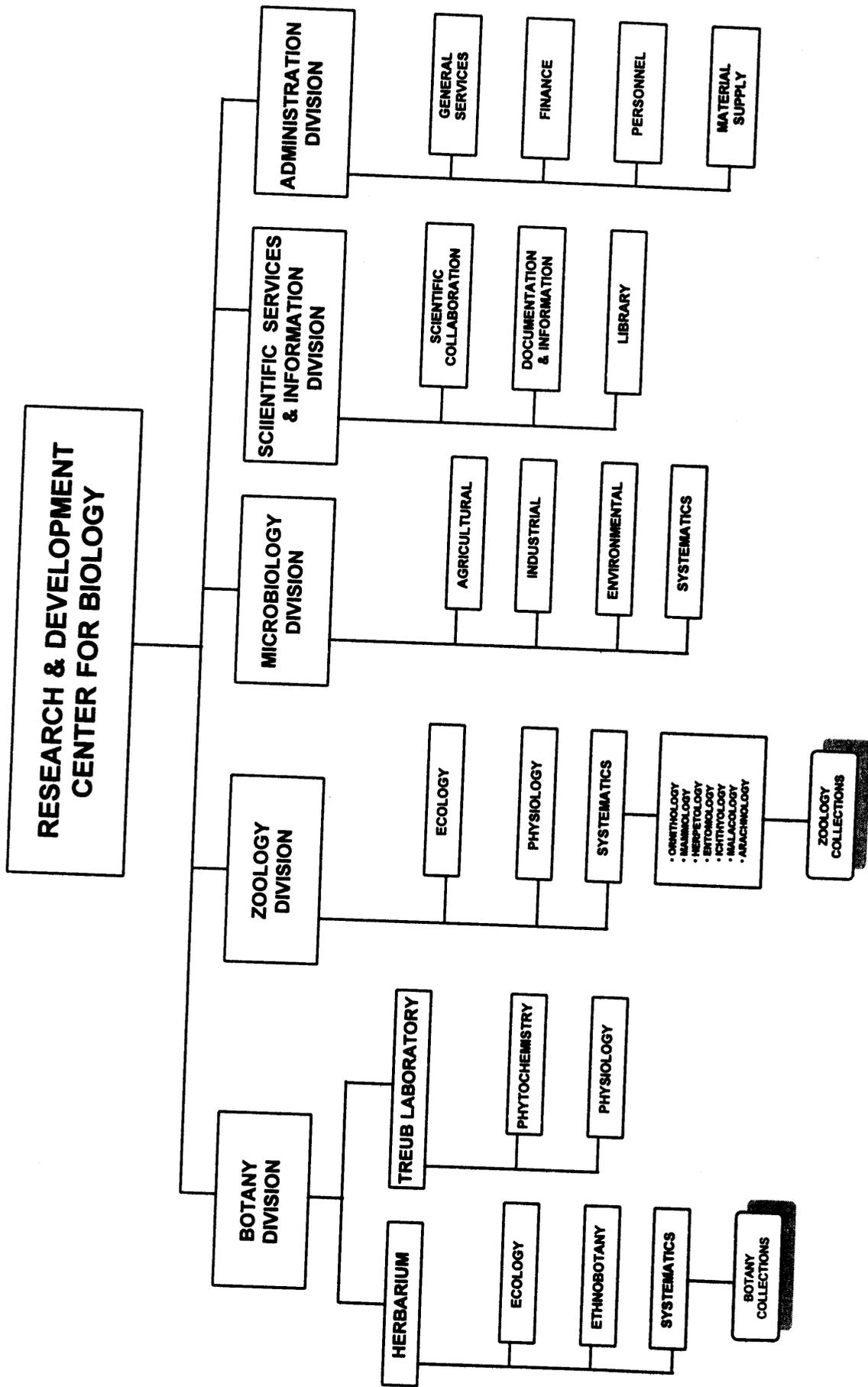


Figure 4: Organizational Structure of the Center for Research and Development in Biology
 GEF-Indonesia Project, Systematic Resources Component

FIG. 4



INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

ANNEX 1

**Overview of Institutions with Conservation
and Environmental Responsibilities**

Overview of Institutions with Conservation and Environmental Responsibilities

1. At least eight agencies of GOI have major responsibilities for the environment--and hence have a need for biodiversity information. These and other activities are coordinated by the National Development Planning Board (BAPPENAS) (see Figure 3):

- (a) The Ministry of State for Environment (LH) has broad responsibility for environmental monitoring, conservation, and for the development of policy and planning.
- (b) The Ministry of Forestry (Kehutanan) has responsibility, under the aegis of the Directorate General of Forest Protection and Nature Conservation (PHPA), for the administration of all national parks and nature reserves in Indonesia (both terrestrial and marine). Issues under Kehutanan' purview, such as forest research leading to sustainable methods for forest utilization, reforestation, and the regulation of the private sector in the logging industry, have major implications for the conservation of Indonesian biodiversity.

The Forestry Research and Development Center (Puslitbang Hutan), Bogor, is engaged in a number of joint research and sustainable forest management projects with international development agencies (e.g., USAID, ODA). Puslitbang Hutan also maintains the second largest herbarium in Indonesia, with more than 45,000 specimens of commercial timber species, as well as modest collections of insects of importance to forestry.
- (c) The Ministry of Agriculture has responsibility for a range of renewable resources including food, industrial, and spice and medicinal crops; freshwater and marine fisheries and animal husbandry; and for enforcing plant and animal quarantine regulations.
- (d) The Ministry of Health carries out research on human parasites, vectors of disease and methods for their control.
- (e) The Ministry of Research and Technology has broad responsibilities for natural resources inventory, and ecological and oceanographic research.
- (f) The Ministry of Trade regulates trade in protected plants and animals.
- (g) The Ministry of Public Works is responsible for water management, and for monitoring and controlling air and water pollution.
- (h) The Ministry of Education and Culture has broad responsibility for environmental education. Its Directorate General of Higher Education (DGHE) provides university courses in the environmental sciences, supports research by faculty, and is closely associated with the Environmental Study Centers (PSLs) located at many universities throughout the country.

- (i) The Indonesian Institute of Science¹ (LIPI), Natural Science Division, has a major role in issues of the environment and biodiversity both through the Research and Development Centers and through the Center for Scientific Documentation and Information (PDII).

Of the four Research and Development Centers responsible for biodiversity, the Center for Biology (PPPB) is designated as a center for collections-based research. It is a key partner in many regional biodiversity projects focused on Southeast Asia. PPPB is a leading participant in the long-established Flora Malesiana Project, and it is currently involved in the planning stages of a parallel Fauna Malesiana Project. The Plant Resources of Southeast Asia project (PROSEA), which is producing a series of manuals to the economically important plants of the region, has both a regional office and a country office located in the Herbarium Bogoriense.

PDII, under the division for the Development of Scientific Infrastructure, maintains the central LIPI library and coordinates scientific data management activities. For this reason PDII has been designated by LIPI as the coordinating agency responsible for the development of the proposed National Biodiversity Database.

All international collaborative research programs involving LIPI, and visits by foreign researchers, are coordinated by the Bureau of Inter-institutional Cooperation in Science and Technology (IPTEK) in the division of General Affairs.

2. Non-governmental organizations. In addition to governmental agencies, there are a number of non-governmental agencies (NGOs) with active programs in the area of conservation and biodiversity. The Indonesian Environmental Forum (WAHLI) is an umbrella organization for in-country NGOs. There are also a number of international conservation organizations with active programs in Indonesia (e.g., World Wide Fund for Nature, Asian Wetland Bureau, International Council for Bird Preservation, The Nature Conservancy, Wildlife Conservation International and Conservation International).

¹ LIPI is a non-departmental government institution, which is under the control of and reports directly to the President. Its main tasks include assisting the President. Its main functions include organizing research, providing guidance, providing services, and developing science and technology. LIPI is headed by a Chairman who is assisted by a Vice Chairman and five deputies. LIPI directs some 19 Research and Development/technical Centers, 8 Implementation Units, and 5 Bureaus.

INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

ANNEX 2

**DETAILED REVIEW² OF PRESENT RESOURCES
AT THE RESEARCH AND DEVELOPMENT CENTER
FOR BIOLOGY**

² This review was carried out by five consultant institutional specialists as part of the Project Preparation in Indonesia in August 1992, and as such, is a composite view edited from three separate reports.

Detailed Review of Present Resources at the Research and Development Center for Biology

A. Institutional Overview

Human Resources

1. Individuals involved in systematic biology form a minority of the total staff employed, even though in terms of area, systematic work occupies the overwhelming majority of the space. Similarly, considering the amount and scope of the work to be accomplished within the institution, there is an acute shortage of trained staff in collection management and systematic research. The age structure is strongly skewed towards staff under forty.
 2. All trained staff undertake a wide range of activities other than research, including:
 - popular writing;
 - editing journals and books;
 - teaching in universities;
 - providing advisory services, including identifications;
 - supervising student projects;
 - curating collections;
 - undertaking Government projects; and
 - assisting foreign scientists in the field.
 3. The amount of time spent on these activities varies, but the government projects which are usually non-systematic in nature, can occupy as much as 80 percent of an individual's time. Some of this work attracts additional monies that are important sources of funding for PPPB, and supplement the income of staff.
 4. Promotion and career development for most staff is based on annual reports and an assessment made every four years by a small group of senior researchers. This assessment is the basis for awarding incentive payments, which may represent up to 50 percent of an individual's salary. Payment of these incentives is nearly universal. Individuals lacking degrees, for example technicians, have experienced barriers to promotion.
- #### Financial Support
5. Any analysis of the nature of the institution, the availability of facilities, or lack of training reflects the comparatively low level of financial support that PPPB receives for all activities, not only systematic biology, even though improvements have occurred recently and the overall operating budget from the Government has increased. Staff salaries are not included in this budget, but are paid from central LIPI funds. It is frequently remarked that salaries in the government sector tend to be lower than in the private sector and consequently it is difficult for PPPB to recruit and retain the most able people in the labor market.
 6. For financial reasons, PPPB's purchase of foreign journals and basic texts declined over recent years and finally ceased about three years ago. The fact that these texts or journals may no longer be available anywhere in Indonesia seriously limits research. For similar reasons, regular servicing of scientific equipment has not been maintained, and many potentially useful instruments such as microscopes are no longer functional.

Organization and Management

7. Each discipline represented in the different departments--systematics, ecology, physiology--is headed by a senior researcher. There is no additional remuneration for this and responsibility rotates. Although there are regular staff meetings to discuss work, these appear to be more concerned with sharing information than providing a critical forum where research priorities or progress can be evaluated.

8. The choice of topic for personal research remains the prerogative of the individual staff member. In contrast, government projects are organized centrally from PPPB, and are clearly in the directed mode. Annual reports of government projects are published in a house journal in either English or Indonesian (if the latter, then an abstract in English is provided).

9. Training for senior and middle managers is provided centrally within LIPI at intensive courses lasting up to three months.

Health & Safety

10. Some of the wide variety of chemicals and equipment in use throughout the three institutions are potentially hazardous to staff who work with the materials and to visiting scientists who are exposed to them. However, there is little evidence that any special precautions are taken to minimize the risks and only a few staff are even aware of the problems.

Chemicals

- (a) Hazardous chemicals are employed routinely in preservation of the collections, often in high concentrations and in the form of 'cocktails'. These include mercurial and arsenical compounds, naphthalene and PCBs. Contact is made with these chemicals by handling specimens and breathing fumes.
- (b) Hazardous chemicals are kept on open shelves or in cupboards that are unlocked and unsuitable for highly flammable substances.
- (c) Formalin (the use of which is now restricted in North America, Europe and Australia) is used on open benches in the fixation of zoological material.

Equipment

- (d) Equipment such as autoclaves are not regularly serviced.
- (e) Fume cupboards are not always available to staff who use hazardous chemicals.
- (f) There are no laminar downflow workstations for handling potentially pathogenic micro-organisms.

Work Practices

- (g) Work areas for staff are not isolated from the collections and their associated chemical preservatives.
- (h) Staff eat and drink in areas highly contaminated with hazardous chemicals.
- (i) There is no safety training in the use of hazardous chemicals and equipment.

B. Botany Division

Human Resources

11. The Botany Division presently has a total of 98 staff, 30 (30 percent) of whom are identified with the Taxonomy section. 15 (50 percent of the Taxonomy Section) of these individuals have degree-level training in biology, including 7 (23 percent) with graduate-level training. 15 technicians support the maintenance of the botanical collections and the research and fieldwork needs of 29 scientific staff in the Taxonomy and Ecology sections.

12. The research interests of the degree-level staff include orchids (3 people), palms (1), bamboos (1), legumes (3), citrus (1), Myrsinaceae (1), ferns (1), bryophytes and lichens (1), and mycology (2). Three of the senior research staff regularly publish in scientific journals, but the majority of the junior staff have a very limited command of foreign languages, which severely limits their capacity to carry out independent research.

Buildings

13. The botanical collections are housed in a spacious, four-story concrete building constructed around 1965. The basement of the building is largely occupied by the Museum of Ethnobotany, but it also provides storage space and access to three outside drying ovens used for processing plant specimens. The first floor houses collections of dried fungi, bryophytes, lichens, fruits and seeds; type collections of higher plants; a large collection of specimens preserved in alcohol; the Botany Library; offices for administrative staff; office and laboratory facilities for research staff; office space occupied by the PROSEA project; an air-conditioned room containing several stand-alone personal computers; and a room used for mounting herbarium specimens. The dried collections of Ferns and Seed Plants occupy most of the second and third floors. Much of the fourth floor has been converted to provide office cubicles for the research staff, but these remain largely unoccupied due to uncomfortably high day-time temperatures.

Facilities and Equipment

14. Most of the systematic research staff work in a large, non-air-conditioned room on the ground floor, which functions as both laboratory and office space. Storage space for books and papers is lacking, and the available working surfaces are cramped and overcrowded. Access to computer facilities is limited to a single stand-alone PC which is shared by all the staff in the Botany Division; many of the junior staff are unfamiliar with its use. Several binocular microscopes are available for general use by the systematic staff on the first floor, but all cytogenetic work is carried out on a research microscope personally owned by one of the staff.

15. Newly-collected herbarium specimens are usually temporarily preserved in alcohol in the field, then dried, pressed and sorted on arrival at the herbarium. The present drying ovens are heated by charcoal, which occasionally leads to the loss of specimens due to accidental fires. Poor air circulation makes the drying process inefficient. Many of the plant presses in use lack adequate straps, and thus it is impossible to tighten them enough to produce high-quality herbarium specimens. The basement area presently used for processing incoming specimens is cramped, unventilated and poorly lit.

16. Working conditions on floors two and three, housing the higher plant collections, are hot and uncomfortable during most of the day. The only facilities present are a few old desks and tables

used by the technical staff and by occasional visitors. Staff who work in this area presumably are continuously exposed to mercury residues in the form of airborne dust from the specimens. There is no access to microscopes, identification guides, or computers on the second or third floors.

Collections

17. The majority of the vascular plant collections are housed in racks full of old metal boxes, many with ill-fitting or missing lids. Approximately 6,300 (33 percent) of the original boxes were replaced in the mid-1980s with custom-built metal cabinets. Many of the remaining 12,790 metal boxes are presently filled to capacity, leaving no room to expand the collection. Of the old boxes housing the fungal, bryophyte (mosses and liverworts) and lichen collections, 990 (40 percent) have been replaced by cabinets, leaving approximately 1500 boxes still to be replaced.

18. The botanical collections also includes a large number of specimens preserved in alcohol, contained in assorted glass jars stored on shelves in wooden cabinets. The majority of the older jars have glass tops, sealed by paraffin wax, and require little maintenance. However, in recent years, only poor-quality jars, manufactured for domestic use, have been available for making new spirit collections, and the lids of these quickly corrode and leak alcohol vapor. The most important research material in the spirit collection belongs to the Orchidaceae (orchid) and Zingiberaceae (ginger) families, totaling approximately 6,800 and 960 specimens, respectively. This material, including many type specimens, has become very brittle as the composition of the preservative has changed with time. It is now so vulnerable to damage that it will need to be expertly restored before it can be used again for research purposes.

19. Except for material accessioned or remounted during the last few years, the dried herbarium specimens of higher plants are mostly mounted on poor-quality, acidic paper. In some cases, this has deteriorated to the point where the sheets and labels disintegrate with even the most careful handling. Approximately 200,000 sheets (20 percent of the collection) are presently at risk, and require remounting. In addition, it is estimated that there are approximately 200,000 deteriorating or inadequate species covers which will require replacement in order to safeguard the collection during storage and handling.

20. Between 1,500 and 6,000 new accessions have been added to the collections each year for the past 10 years. However, the number of new specimens mounted, labeled and inserted in the herbarium comprises only 52 percent of the total number of specimens collected, and the remaining collections have built up over the past 5 years into a backlog of approximately 4,000 unmounted specimens.

21. Up to the present, all new specimens have been poisoned to a greater or lesser extent using Sublimate (mercuric chloride) to reduce the incidence of insect attack. This procedure is not 100 percent effective, and there is evidence of considerable damage having occurred both to unmounted specimens in storage, and to mounted specimens in the collections. Para-dichlorobenzene, naphthalene and industrial fumigants have also been used on an *ad hoc* basis to deter insects, but without any apparent lasting effect.

C. Zoology Division (Balitbang Zoologi)

Human Resources

22. The total number of staff is approximately 70, organized under technical and research staff, and working in the three disciplines of systematics, ecology and physiology. All the research staff in the Zoology Division have degree-level training in biology, but less than one-third (13) are identified with systematics and the greatest concentration of these are working on insect and vertebrate groups. Amongst the junior staff, a number are studying for--or have just completed--a higher degree, predominantly overseas, but only two of these have received training in systematics. The age profile of the systematics research staff shows a gap between the senior and junior members, which will have future repercussions on continuity in on-the-job training.

23. The publication record of the research staff shows that only three (23 percent) have published in international journals, while all have published articles or reports in-country. It should be noted that the two most senior and productive members of the staff will shortly be retiring. To place this publication record in a broader context, most publications on Indonesian fauna are produced by foreign scientists, with Indonesians and the MZB making only a small contribution. The publication of the zoological section of *Treubia*, the in-house journal of the Museum, has been delayed for financial reasons. A few individuals are producing specialist newsletters and, in one instance, a collaborative international journal, as a vehicle for their publications and a commodity to exchange for other publications.

Buildings

24. The zoological collections are housed in two complexes, about one kilometer apart, within the boundaries of the Kebun Raya, Bogor:

- (a) the North Museum, which was built originally as a guest house for the Istana (Palace), Bogor and now houses the dry collections and staff working in entomology, ornithology, mammalogy and herpetology; and
- (b) a complex of old buildings known collectively as the South Museum and housing the wet collections, some dry material, libraries, taxidermy laboratory, and staff working in parasitology, malacology, crustacea, ichthyology and herpetology. The office of the Director and the public displays are also in this complex.

25. Both sets of buildings are simple in design and construction and some are probably over 60 years old. All are suffering from a lack of general maintenance and upgrading: wood used in the construction of the building is being attacked by termites, the roofs leak, and nowhere are there functional screens to prevent the entry of insect pests. Air-conditioning is available only in the area housing the insect collections in the North Museum and in one room of the South Museum which acts as a communal instrument facility with a computer and microscope.

26. In the North Museum, building renovations are being undertaken after extensive flooding damaged the basement and collections, while the weight of the collections storage facilities caused structural damage and necessitated modifications to the above-ground floors. Both these renovations will provide only short-term solutions.

Facilities and Equipment

27. Many research staff have individual offices and most collection areas have some room to expand, but this space leaves much to be desired and is mostly inadequate for research purposes. Nearly all the staff work in non-air-conditioned rooms, sometimes without windows, and many are continuously exposed to a cocktail of toxic chemicals used to combat insect pests in the collections. Difficulties arise when equipment sensitive to adverse environmental conditions, particularly humidity, is stored or used regularly under these conditions.

28. General laboratory facilities, including adequate bench space, running water and a stable power supply, are lacking. The number of both high-power and dissecting microscopes is limited and these instruments are sometimes poorly maintained or not functioning. Only one desk-top computer is owned by the museum, although a few individuals have joined together to privately purchase their own equipment or use a computer supplied by an overseas collaborator.

Collections

29. The overall size of the zoological collections, consisting in part of unincorporated material (including type specimens), is probably close to 500,000 specimens. The dry collections are housed in wooden or metal cupboards and cabinets of varying size and construction. Except for a few metal cabinets which were purchased recently, all of these cupboards and cabinets are at least 50 years old and many may be older than 80 years. All of the old metal cabinets used in entomology, mammalogy and ornithology, for example, are badly corroded and distorted, and sealing gaskets have deteriorated. Inside these cabinets, specimens are housed in metal or wooden drawers with or without glass lids, or in cardboard boxes. There is no modular size of drawer between or within most of the collections. Pests have been controlled over many years with a wide range of toxic chemicals (including arsenic), used in an *ad hoc* manner and often in high concentrations. Humidity in the drawers and cabinets is reduced by the use of quicklime (anhydrous calcium hydroxide), which must be frequently replaced.

30. In the case of the wet collections, material is stored in alcohol in glass bottles or jars of many different sizes and styles--90 percent of which have badly corroded metal lids. Although alcohol is used as a preservative, formalin is widely used for initial fixation of specimens. In the Parasitology Laboratory, extensive slide collections are housed in a wide variety of boxes and containers.

31. There is considerable variation in the level of organization both within and between collections. It can vary from being well-arranged in systematic order, with dry, wet, and slide collections separate, to a state where material has been added in an *ad hoc* manner depending largely on the availability of space rather than systematic position. In most of the invertebrate collections at least, there is also a significant backlog of unlabeled, unsorted, or unprepared material which is currently unavailable for research purposes.

32. Catalogues are available for many groups, consisting mostly of handwritten cards or ledgers, and although most have not been regularly maintained, a few have been transferred to up-to-date, simple computer-generated databases. The information captured is usually very basic, covering species name, locality, collector, date collected, the number of specimens and, for some groups of organisms, a registration and collector's number. Only the recent collections contain more detailed information on, for example, habitats. A series of publications on holdings of type material was begun but has not been completed, although the information is available in manuscript form.

33. For most groups of animals the collections are expanding slowly. The exceptions are in areas where foreign collectors are working and making regular donations to the Museum. Unfortunately, it must also be recognized that although all collectors working in Indonesia are required by LIPI to deposit specimens in the Museum, they are often reluctant to submit valuable material because of their concern about the long-term maintenance of the collections.

D. Microbiology Division

Human Resources

34. Presently, most research activity within the Microbiology Division is in microbial physiology and ecology. There are three main sections: agricultural microbiology, environmental microbiology and industrial microbiology.

35. The agricultural group contains eleven researchers and two technicians. Most of this group's investigations have been concerned with root nodule bacteria (*Rhizobium* spp.) of legumes, although some attention has been paid to nitrogen fixation of cyanobacteria associated with *Azolla* plants and the dual inoculation of local leguminous trees (e.g., *Albizia* spp.) with *Rhizobium* and vesicular arbuscular mycorrhizae (VAM).

36. The environmental group consists of four research staff and two technicians. Apart from studies of fungal decomposition of wood, they have worked recently on composts inoculated with cellulolytic fungi and on the use of plant extracts (e.g., of *Derris* spp.) as microbial inhibitors.

37. The industrial group is concerned with fungi active in the production of fermented foods and with growing edible fungi (e.g., *Pleurotus ostreatus*, the oyster mushroom). There is a research staff of nine graduates and two technicians.

38. A new group was recently assigned to basic microbiology. Of three researchers, one has been recently transferred from the Botany division and is still working partly with the phytochemistry section of the Botany division. Of another three, one was until recently a "candidate" researcher and the other two are still in this probationary category. There are four technicians.

39. At present, eleven staff are studying overseas, in Australia, France, Germany, Japan, New Zealand, UK, and USA, for M.Sc. or Ph.D. degrees. Topics under study include the preservation of animal fodder, food microbiology, rumen microbiology, enzymes in *Euglena gracilis*, microbial decomposition of chicken eggs and genetically-modified microbes. The current interests of the host institution seem to be paramount in the choice of research topics. In many cases, returning students do not pursue the subject of their postgraduate studies on return to Indonesia. It is estimated that the total number of staff in the microbiology division is 51.

40. Within the Botany Division collections, fungal systematics (especially the larger Ascomycetes and endomycorrhizae) has been studied by two staff for many years. On the other hand, no resources are allocated to the systematic study of non-pathogenic actinomycetes, algae, bacteria and protozoa in Indonesia despite the importance of nitrogen fixation by cyanobacteria in rice paddy systems and the potential value of actinomycetes and protozoans as biological control agents. Thus there is a gross mismatch between the current level of systematic expertise and the huge range of biological diversity in Indonesia and the needs of the agricultural and food industries.

Buildings

41. The buildings housing the Microbiology Division are single-story and arranged around a courtyard. Although the buildings are old, the general fabric appears to be sound and in a good state of repair. Within the courtyard, there is a substantial and well-designed greenhouse in good condition.

Facilities and Equipment

42. The Microbiology Division is modestly equipped for microbiology; several important items (e.g., microscopes and freeze-drying equipment) are non-operational. There is presently a lack of resources to keep such specialized equipment in working order. The autoclaves are small and cannot sterilize large quantities of materials quickly. Only a few air-conditioning units exist in the laboratories. The division has one horizontal laminar airflow workstation and a containment room with UV lights for fungal subculture work. In the mycological rooms of the Herbarium, there is one good light microscope equipped with high-power objectives and one room is air-conditioned.

Collections

43. The Microbiology Division has custody of more than 1000 isolates of fungi, bacteria and cyanobacteria--the latter consisting of mixed cultures in soil and liquid nutrients. Specific names are attached to 94 isolates of microscopic fungi, 12 basidiomycete isolates and 6 bacterial isolates. The remainder are unidentified and, without microscopical examination it is impossible to judge how many isolates are duplicates or contaminants. Most of the cultures are on agar slopes tubes plugged with cotton wool. In the Indonesian climate, such cultures need to be subcultured frequently if stored at ambient temperatures. The only available refrigerator, set at 5°C, is occupied by freeze-dried ampoules of bacteria, principally *Rhizobium* spp. The viability of these cultures is unknown.

E. Information Systems and Management

44. At present a range of information management systems are used in the botany and zoology collections, from partial card index catalogues and journal entries to recent, uncoordinated attempts to enter data on computer databases. The production of labels for new collections is not integrated with database development, which leads to situations where the data may have to be entered twice for the same specimen. There has been no attempt to establish standardized data entry protocols and data coding, either within PPPB or with collaborating institutions.

F. Scientific Services and Information Division

45. Within the present organizational structure of PPPB, responsibility for providing information, including library services, and for coordinating scientific collaboration with external agencies, falls under the Scientific Services and Information Division. Recently, the role of this Division has been extended to include responsibility for coordinating and tracking all biodiversity-related research--including systematic biology, ethnobiology and ecology--carried out by foreign researchers in collaboration with Indonesian agencies. Thus, in future, all applications from foreign biologists for research permits to work in Indonesia will be processed by PPPB.

46. Present capacity at PPPB to coordinate and monitor research activities, including the processing of progress reports and publications, is limited to a small office organized under three subdivisions: Scientific Collaboration and Services, Documentation and Information, and Library Services.

SCIENTIFIC COLLABORATION AT PPPB (1991-1993)

Institution/Agency	Subject		Study Area	Person Months	MOU	Products
	Botany	Zoology				
Rijksherbarium, The Netherlands	Floristic Study		Irian Jaya, Kalimantan Java & Moluccas	3	N	Collections Publications Training
Royal Ontario Museum, Canada		Systematics (Insects, small mammals & fish)	Kalimantan, Sulawesi & Java	3	N	Collections Insect database Publications Training
Harvard University, USA : Gunung Palung Project NCI Bukit Baka Project	Forest Ecology	Forest Ecology	Kalimantan	25	N	Training Publications Collections
	Floristic study, medicinal plants		Irian Jaya, Kalimantan Sulawesi & Java	12	Draft	Phytochemistry Collections Database Publications Training
	Floristic Study		Kalimantan	15	Y	Publications Training Education
West Australia Museum, Australia		Systematics (small mammals & birds)	Nusa Tenggara	4	N	Collections Publications Training Education
La Trobe University, Australia	Forest Ecology	Animal Ecology	Krakatau Island	2	N	Collections Publications Education
University of Tokyo, Japan	Floristic Study		Kalimantan, Moluccas & Java	8	N	Collections Publications Education Training
University of Osaka, Japan	Forest Ecology		Kalimantan & Sumatra	6	N	Collections Publications Education Training
Kanazawa University, Japan		Animal Ecology	Java & Sumatra	2	N	Collections Publications Training Education

Institution/Agency	Subject		Study Area	Person Months	MOU	Products
	Botany	Zoology				
WWF-Indonesia	Forest Ecology		Kalimantan	18	N	Collections Publications Training
URA 882, ERASME, EHESS, France	Ethnobotany		Moluccas & Nusa Tenggara	2	N	Collections Database Publications
Kagoshima University, Japan	Forest Ecology		Kalimantan	1	N	Collections Publications Education
Osaka City University, Japan	Medicinal plants		Sumatra & Java	4	N	Collections Publications
Oslo University, Norway	Systematics Ethnobotany Forest Ecology	Ethnozoology	Sumatra	12	N	Collections Publications
Natural History Museum, U.K.		Systematics (fish)	Kalimantan	1	Y	Collections Publications
Royal Botanic Gardens Kew, U.K.	Systematics Forest Ecology		Irian Jaya & Java	2	Y	Collections Publications
International Council for Bird Preservation U.K.		Conservation & Ecology	Nusa Tenggara & Moluccas	2	Draft	Collections Database Guidebooks
Rhino Survey Society *		Conservation	Sumatra	18	N	Publications Training
International Board for Plant Genetic Resources, Italy	Genetic prospecting Inventory		Java & Sumatra	2	N	Collections Publications

Institution/Agency	Subject		Study Area	Person Months	MOU	Products
	Botany	Zoology				
WWF-Indonesia	Forest Ecology		Kalimantan	18	N	Collections Publications Training
URA 882, ERASME, EHESS, France	Ethnobotany		Moluccas & Nusa Tenggara	2	N	Collections Database Publications
Kagoshima University, Japan	Forest Ecology		Kalimantan	1	N	Collections Publications Education
Osaka City University, Japan	Medicinal plants		Sumatra & Java	4	N	Collections Publications
Oslo University, Norway	Systematics Ethnobotany Forest Ecology	Ethnozooology	Sumatra	12	N	Collections Publications
Natural History Museum, U.K.		Systematics (fish)	Kalimantan	1	Y	Collections Publications
Royal Botanic Gardens Kew, U.K.	Systematics Forest Ecology		Irian Jaya & Java	2	Y	Collections Publications
International Council for Bird Preservation U.K.		Conservation & Ecology	Nusa Tenggara & Moluccas	2	Draft	Collections Database Guidebooks
Rhino Survey Society *		Conservation	Sumatra	18	N	Publications Training
International Board for Plant Genetic Resources, Italy	Genetic prospecting Inventory		Java & Sumatra	2	N	Collections Publications

Institution/Agency	Subject		Study Area	Person Months	MOU	Products
	Botany	Zoology				
WWF-Indonesia	Forest Ecology		Kalimantan	18	N	Collections Publications Training
URA 882, ERASME, EHES, France	Ethnobotany		Moluccas & Nusa Tenggara	2	N	Collections Database Publications
Kagoshima University, Japan	Forest Ecology		Kalimantan	1	N	Collections Publications Education
Osaka City University, Japan	Medicinal plants		Sumatra & Java	4	N	Collections Publications
Oslo University, Norway	Systematics Ethnobotany Forest Ecology	Ethnozooology	Sumatra	12	N	Collections Publications
Natural History Museum, U.K.		Systematics (fish)	Kalimantan	1	Y	Collections Publications
Royal Botanic Gardens Kew, U.K.	Systematics Forest Ecology		Irian Jaya & Java	2	Y	Collections Publications
International Council for Bird Preservation U.K.		Conservation & Ecology	Nusa Tenggara & Moluccas	2	Draft	Collections Database Guidebooks
Rhino Survey Society *		Conservation	Sumatra	18	N	Publications Training
International Board for Plant Genetic Resources, Italy	Genetic prospecting Inventory		Java & Sumatra	2	N	Collections Publications

Institution/Agency	Subject		Study Area	Person Months	MOU	Products
	Botany	Zoology				
Conservation International, U.S.A. *		Conservation	Sumatra	20	N	Training Publications Awareness
Manchester Polytechnic University, U.K. *		Conservation	Moluccas	3	N	Publications Training
Oxford University, U.K. *		Conservation	Sulawesi	2	N	Publications
Cambridge University, U.K. *	Forest Ecology	Conservation	Sulawesi	12	N	Collections Publications Training
			Kalimantan	6	Draft	Collections Publications Education
Tsukuba University, Japan *	Forest Ecology		Sumatra	4	N	Collections Publications
Museum of Natural History, Italy		Systematics	Sulawesi	4	N	Collections Publications

* Note: PPPB acting as coordinator, with counterparts from local universities and/or Indonesian NGOs.

INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

ANNEX 3

**Job Descriptions and Terms of Reference
for Government Staff and Committees**

- Part A: Job Descriptions**
- Part B: Terms of Reference - User Advisory Group**
- Part C: Research Grants Program**
- Part D: Criteria and Procedures for Graduate-level
Scholarships**

Job Description
Project Manager

Duration: Five (5) year position for permanent PPPB staff person with associated honoraria funded by GET.

Reports to: Project Director and Steering Committee.

Responsibilities:

1. The post of Project Manager would be a full-time appointment, responsible for all PPPB activities which receive GEF and GOJ project support. Although the Steering Committee would have overall responsibility for the Project and would be accountable for financial management and reporting, the Manager would be delegated responsibility for the day-to-day management of the Project and the budget. The Manager would be an *ex officio* member of the Steering Committee. Progress reports would be presented to the Steering Committee on a regular basis, and between meetings the Manager would liaise closely with the Chairperson and other members of the Steering Committee.
2. The Project Manager would be responsible for the scientific quality and efficiency of the day-to-day operations of the project, with assistance from the Project Management Specialist, the Financial Management Specialist, translation services, the Financial Manager, and administrative office staff. The Manager would establish a central project coordination office that would support the Project Management Committee (see below) and act as a communications center equipped with an independent telephone system, facsimile and e-mail.
3. The Manager would hire project staff, either on a temporary or a permanent basis, funded wholly or partly by the GEF project, in close consultation with the Director of PPPB and the Botany and Zoology Division Heads.
4. The Project Manager would serve as secretary of the Project Management Committee. The Project Management Committee would be chaired by the Project Director and also comprise the Botany, Zoology, Information Systems, and Scientific Collaboration and Services Coordinators, the Financial Manager, and the five PPPB division heads, with *ex officio* advice from the Technical Advisory Group, the Project Management Specialist, and the Financial Management Specialist. This Team would deal with many of the day-to-day affairs of the project, coordinating project activities, ensuring that timetables are adhered to and targets met.

Qualifications: The Project Manager would have extensive government management experience, strong managerial and scientific skills, and a Ph.D. in Biology. He or she should be fluent in English.

Job Description
Financial Manager

Duration: Five (5) year position for permanent PPPB staff person with associated honoraria funded by GET.

Reports to: Project Manager.

Responsibilities:

The Financial Manager would be accountable to the Project Manager for budget control and the provision of financial information. He/she would also assist in all contractual arrangements, procurement of equipment and supplies, disbursement applications, audits, and ensuring that legal requirements are met. In these activities he/she, together with other senior staff of the Project, would have the support of a Financial Management Specialist, and administrative support staff.

Qualifications: The staff member would have financial management experience in government, proven financial management skills, and a B.Sc. or equivalent in financial management or accountancy.

Job Description
Information Systems Coordinator/Manager

Duration: Five (5) year position for seconded or permanent PPPB staff person with associated honoraria funded by GET. If position filled by secondment, PPPB will arrange to acquire qualified staff person to fill permanent position by the close of the project.

Reports to: Project Manager.

Responsibilities and Duties:

1. The Information Systems Coordinator/Manager would have a critical role in guiding and supervising the institutional development of information systems at PPPB. To build upon M.Sc.-level qualifications (see below), training would be provided in the use of whichever specific information system and other software is installed during the project. The person would be expected to manage the system in each Division and 'trouble shoot' where necessary, but on a day-to-day basis, much of the routine maintenance would be overseen by Botany and Zoology Database Managers.
2. He/she would establish procedures and methods for using the system, ensuring back-up procedures are followed and that security and quality control of information is maintained.
3. In the context of the project, the Information Systems Coordinator/Manager would be responsible to the Project Manager and would be an integral member of a Management Team, ensuring coordination and overall cohesiveness within the PPPB information system.
4. Specifically, the Information Systems Coordinator/Manager would:
 - (a) manage the installation of the system, including the network and associated hardware;
 - (b) install and maintain software (including updates) for databases, spreadsheets, financial control, and word-processing;
 - (c) maintain a security system to ensure that access to privileged information is restricted and data are not corrupted;
 - (d) ensure compatibility between fields in databases;
 - (e) train Data Managers and data entry staff in the Botany and Zoology Divisions;
 - (f) supervise the Software Applications Specialist who would provide support to the Project Coordination Office and the Scientific Collaboration and Services Unit;

- (g) trouble shoot any software and hardware problems or seek outside advice;
- (h) establish procedures for using the system and for quality control of data, then ensure these are followed; and
- (i) heading a newly created Information Systems Unit in the Scientific Services and Information Division that would manage the above tasks.

Qualifications: The staff member (to be seconded or transferred) must have M.Sc. in computer science and/or information technology and be able to demonstrate a strong general computing and networking background. Work experience in information systems management needed. The person would have proven ability to absorb additional training and strong managerial skills. He or she should be fluent in English.

Job Description
Botany Coordinator

Duration: Five (5) year position for permanent PPPB staff person with associated honoraria funded by GET.

Reports to: Project Manager.

Responsibilities:

1. The Botany Coordinator would have both collective and individual responsibilities. He or she would be an active member of the Project Management Committee, dealing with day-to-day affairs of the Project and ensuring coordination and overall cohesiveness. Within the Botany Division, his or her responsibilities would extend across activities concerning those aspects of the collections, library, research and information-gathering covered by the project.
2. Major tasks would include:
 - (a) preparing, in collaboration with staff, a detailed plan for the Botany Division that establishes timetables and targets within the broad outline already agreed within the Project Preparation documentation that will be developed during project inception workshops;
 - (b) managing the implementation of the Project in the Botany Division and ensuring that timetables and targets are met;
 - (c) oversee botanical quality control of data entered into database;
 - (d) coordinating tasks both within the Botany Division and involving other divisions;
 - (e) with the assistance of the Scientific Collaboration and Services Coordinator, establishing work practices covering, for example, visitors and loans;
 - (f) with assistance of the Environmental Health and Safety Advisors, establishing work practices covering control of pests and health and safety, and then ensuring they are clearly understood, documented and executed; and
 - (g) communicating with staff to keep them informed about the Project and its progress.

Qualifications: The Botany Coordinator would be a staff person within the Botany Division with strong scientific credentials (including a minimum of a M.Sc.-level degree in botany) and strong managerial skills (including an ability to communicate and to motivate others). He or she should be fluent in English.

Job Description
Zoology Coordinator

Duration: Five (5) year position for permanent PPPB staff person with associated honoraria funded by GET.

Reports to: Project Manager.

Responsibilities:

1. The Zoology Coordinator would have both collective and individual responsibilities. He or she would be an active member of the Project Management Committee, dealing with day-to-day affairs of the Project and ensuring coordination and overall cohesiveness. Within the Zoology Division, his or her responsibilities would extend across activities concerning those aspects of the collections, library, research and information-gathering covered by the project.
2. Major tasks would include:
 - (a) preparing, in collaboration with staff, a detailed plan for the Zoology Division that establishes timetables and targets within the broad outline already agreed within the Project Preparation documentation that will be developed during project inception workshops;
 - (b) managing the implementation of the project in the Zoology Division and ensuring that timetables and targets are met;
 - (c) oversee zoological quality control of data entered into the database;
 - (d) coordinating tasks both within the Zoology Division and involving other divisions;
 - (e) with the assistance of the Scientific Collaboration and Services Coordinator, establishing work practices covering, for example, visitors and loans;
 - (f) with assistance of the Environmental Health and Safety Advisors, establishing work practices covering control of pests and health and safety, and then ensuring they are clearly understood, documented and executed; and
 - (g) communicating with staff to keep them informed about the project and its progress.

Qualifications: The Zoology Coordinator would be a staff person within the Zoology Division with strong scientific credentials (including a minimum of a M.Sc.-level degree in zoology) and strong managerial skills (including an ability to communicate and to motivate others). He or she should be fluent in English.

Job Description
Scientific Collaboration and Services Coordinator

Duration: Five (5) year position for permanent PPPB staff person with associated honoraria funded by GET.

Reports to: Project Manager.

Responsibilities:

1. The Scientific Collaboration and Services Coordinator would have both collective and individual responsibilities. He or she would be an active member of the Project Management Committee, dealing with day-to-day affairs of the Project and ensuring coordination and overall cohesiveness. He or she would also be responsible for strengthening the PPPB's capacity for scientific collaboration and services.
2. Major tasks would include:
 - (a) developing a system to facilitate, coordinate, and manage scientific collaboration and services;
 - (b) coordinating tasks both within the Scientific Collaboration and Services Unit and involving other units and divisions;
 - (c) helping the Botany and Zoology Coordinators to establish work practices covering scientists and other visitors;
 - (d) in consultation with the Project Management Committee, establishing protocols for handling external affairs, e.g., requests for information or assistance, visitors, loans, honorary staff members;
 - (e) communicating with staff to keep them informed about the Project and its progress; and
 - (f) managing the work of the heads of scientific collaboration, scientific services, human resource development units.

Qualifications: The staff member would be the head of the Scientific Collaboration and Services Subdivision. He or she would have strong scientific credentials (including a minimum of a M.Sc.-level degree in biology) and strong managerial skills (including an ability to communicate with external clients and collaborators). He or she should be fluent in English.

Job Description
Collections Managers

Duration: Five (5) year position for permanent PPPB staff person with associated honoraria funded by GET.

Reports to: Botany or Zoology Coordinator.

Responsibilities:

1. The Collection Managers would have responsibility for rehabilitating and developing the collections, dealing with external users of the collections and coordinating collections management with fieldwork and data management. They would be accountable to the Botany or Zoology Coordinator for these activities and would manage a work force of permanent and temporary staff, the latter being employed solely for the duration of the GEF project.
2. Collection Managers would receive training in collection management and curatorial techniques and would receive six months further experience becoming familiar with current practices at major systematic institutions overseas. They would assist the Botany or Zoology Coordinator in preparing a plan for rehabilitation and development of the collections, establishing priorities and a timetable.
3. The Collections Managers would train all staff associated with the collections, prepare guides to work practices and enforce standards for such critical tasks as the control of pests in the collections and health and safety measures. They would direct the installation of new cabinets and shelving, the transfer of specimens to new storage and the reorganization of the material following standard classifications.
4. The Collections Managers would establish and maintain high standards of accuracy of information associated with the collections.

Qualifications: The Collection Managers would be staff persons within either the Botany or Zoology Divisions and would have extensive experience working with collections and strong managerial skills (including an ability to communicate and to motivate others).

Job Description
Database Managers

Duration: Five (5) year positions for permanent PPPB staff person with associated honoraria funded by GET.

Reports to: Information System Coordinator/Manager.

Responsibilities:

A Botany Database Manager and Zoology Database Manager would be designated to oversee the development and day-to-day maintenance of the electronic database and its use in the production of specimen labels. Most importantly, they would ensure high standards and quality are maintained in data entry. In collaboration with the Information Systems Coordinator/Manager, they would be involved in training staff in the use of the software to be employed. Within the framework established by the project inception workshops, the Database Managers would work with the Collection Managers to develop appropriate fieldwork data collection protocols for inventory and monitoring, to be introduced in the fourth year of the project. The Database Managers would work in collaboration with the research scientists and field collectors in designing and executing collecting programs, and would be responsible for data entry and data management relating to all materials incorporated into the collections.

Qualifications: The Database Managers would have experience with personal computers, an aptitude for learning database applications, a B.Sc. degree or equivalent in biology, and strong managerial skills (including an ability to supervise clerical workers and ensure quality control).

Job Description
Computer Technician

Duration: Five (5) year position for a permanent PPPB staff person, with associated honoraria funded by GET.

Reports to: Information System Coordinator/Manager.

Responsibilities:

1. To install and maintain computer hardware and software.
2. To train PPPB staff in computer use.
3. To develop operating procedures to maintain and upgrade the computer equipment as necessary.
4. To trouble shoot and solve problems which arise in computer use.

Qualifications: The Computer Technician would have experience in installing and maintaining personal computer hardware and software, and strong technical skills.

Job Description
Head of Scientific Collaboration Unit

Duration: Five (5) year position for a permanent PPPB staff person, with associated honoraria funded by GET.

Reports to: Scientific Collaboration and Services Coordinator.

Responsibilities:

1. To facilitate scientific collaboration involving research institutions and individual researchers.
2. To develop memoranda of understanding with collaborating institutions.
3. To coordinate with PPPB staff and other GOI staff as needed for logistical arrangements.

Qualifications: The Head of Scientific Collaboration would have experience in PPPB's existing arrangements related to scientific collaboration. He or she would have a B.Sc. or equivalent in biology, good foreign language ability, and strong organizational and interpersonal skills.

Job Description
Head of Scientific Services Unit

Duration: Five (5) year position for a permanent PPPB staff person, with associated honoraria funded by GET.

Reports to: Scientific Collaboration and Services Coordinator.

Responsibilities:

1. To facilitate scientific services involving inquiries and requests for services from GOI agencies, the general public, and other external clients.
2. To develop protocols for responding to external inquiries and requests.
3. To coordinate with PPPB staff and other GOI staff as needed for logistical arrangements.

Qualifications: The Head of Scientific Services would have experience in PPPB's existing arrangements related to scientific services. He or she would have a B.Sc. or equivalent, good foreign language ability, and strong organizational and interpersonal skills. College coursework in biology desirable.

Job Description
Head of Human Resource Development Unit

Duration: Five (5) year position for a permanent PPPB staff person, with associated honoraria funded by GET.

Reports to: Scientific Collaboration and Services Coordinator.

Responsibilities:

1. To provide smooth day-to-day administration of the overseas graduate scholarship placements, including:
 - (a) advising candidates on relevant visa and educational requirements;
 - (b) assisting with visa and travel arrangements;
 - (c) arranging for the timely payment of fees, subsistence and travel expenses;
 - (d) arranging adequate accident and health insurance;
 - (e) submitting vouchers and receipts to the project Finance Manager for all allowable expenses incurred by the graduate students; and
 - (f) providing logistical support and advice in the event that candidates or their immediate family experience a personal emergency.
2. To coordinate and provide logistical support for academic co-supervisors.
3. To coordinate scheduling and logistical support for project human resource development activities with the single contractor for the Technical Assistance and Specialized Training Contract).
4. To coordinate and provide logistical support for local training programs.
5. To monitor human resource development activities supported under the project.
6. To mobilize additional financial resources for project-related training, including overseas graduate scholarships.
7. In all the above activities the Human Resource Development Unit Head would have the guidance and support of the Human Resource Development Specialist.

Qualifications: The Head of Human Resource Development Unit would have experience in PPPB's existing arrangements related to overseas training programs. He or she would have a B.Sc. or equivalent, good foreign language ability, and strong organizational and interpersonal skills.

Terms of Reference
User Advisory Group (UAG)

Duration: Five (5) years [two meetings per year and time for review of project documents].

Reports to: Project Manager and Steering Committee.

Responsibilities:

1. Advise the Project Manager on project plans as they relate to the user community.
2. Serve as a communication channel to and from the broader user community on project plans and activities.
3. Specific tasks include:
 - (a) Develop, with the assistance of the Project Manager, a list of potential users, including government agencies, universities, non-governmental organizations, businesses, industries, and environmental consulting firms.
 - (b) Advise on which project documents should be disseminated to the wider user community (e.g., progress reports, minutes of UAG meetings, etc.) procedures for this dissemination, and other potential communication mechanisms.
 - (c) Review project documents and progress.
 - (d) Consult with counterparts and others in the user community prior to meetings.
 - (e) Meet twice a year for discussions of project plans and developments.
4. Minutes of the meetings and any reports will be made available to the public. The chairperson will be selected at the first meeting. The Project Manager will serve as secretary of the committee.

Qualifications: Members and Alternates should be highly respected leaders with strong interest in conservation and natural resource management. They will be recruited by the Project Manager to reflect the broad views and interests of the user community. Individuals will be invited by name, rather than as representatives of agencies or organizations.

Research Grants Program

Need for Systematic Research and Genetic Resource Conservation

1. The conservation of the biological diversity of the Indonesian biota is a clear goal of GOI (BAPPENAS, 1991; KLH, 1992). For this goal to be accomplished, it is essential that the biology of the indigenous species be thoroughly understood. The scientific staff of PPPB need to take the lead in studying the systematics of key taxa at all taxonomic levels. Subsumed within that goal is the need to maintain diversity within animal, fungal, microbial, and plant species, i.e., genetic diversity. Genetic diversity provides the resources necessary for selective breeding of domesticated and potentially domesticated species, and low levels of genetic diversity place taxa at risk in the face of habitat destruction. Genetic diversity may be manifest as subspecies and varieties or as polymorphisms within species. The study of genetic diversity is dependent upon strong, well-curated biological collections and associated specimen-based information systems. Computerization and sharing of collection data enhance the management of a collection and its use. However, levels of diversity and its significance have not been thoroughly studied, especially in tropical settings. For the information archived within these databases to have maximum utility in conservation, it must be translated through active research programs.
2. Accordingly, PPPB is sponsoring a competition for collections-based research on systematic biology and genetic resource conservation on important taxa of the Indonesian biota. Proposals will be solicited once a year, with a specific deadline for application. Three *ad hoc* reviewers will review and critique the proposals concerning the proposal's scientific merit and whether it meets the research grant program criteria, and complete a brief review form. A Review Panel convened by the Project Manager will review the proposals and the evaluations of reviewers. Membership of the Panel will be experts in biodiversity from both inside and outside PPPB. Written evaluations and recommendations of the Review Panel will be considered by the Project Manager, who will make recommendations for funding to the Steering Committee. Each of the Principal Investigators that have obtained a research grant shall enter into a contract with PPPB setting forth the terms and conditions of the grant.
3. The Project Manager will be responsible for monitoring scientific progress on any awards and for ensuring that funds are disbursed and used for the purposes described in the research proposal. Funds may be transferred between categories only through a written request from the Principal Investigators to the Project Manager. Reasons for such transfers must be to enhance the scientific value of the study. Monitoring will be via a series of year-end and project-end reports by the Principal Investigators. PPPB would make provisions to adequately supervise all research which is finalized after the project close.
4. It is expected that the results of these investigations will be submitted for publication in peer-reviewed, national and international journals.

Draft Request for Proposals

1. The Research and Development Center for Biology requests proposals from biologists in the field of collections-based systematic research and genetic diversity conservation.

Proposal Preparation

2. Who May Submit. Proposals will be accepted from Indonesian scientists and technical staff members of PPPB, LIPI, Universities, and other research institutions.

3. Budget and Eligible Expenses. The budget for each proposal is restricted to a maximum of Rp 40 million (1994 equivalent). It may be used for travel, honoraria, field assistants' wages (excluding regular salary), per diem, specialized equipment not otherwise available, and supplies.

4. Proposal Content. Proposals are restricted to no more than fifteen typewritten, single-spaced pages in English. The proposal should include the following sections:

- (a) brief discussion of prior research related to conservation, if any;
- (b) protocol for the collection, identification, and/or management of specimens and the database;
- (c) the potential impact of the study on conservation of genetic and/or biological diversity, and description of proposed report(s) and products;
- (d) schedule of research activities;
- (e) references (limit of 5); and
- (f) budget.

5. Selection of the successful proposals will be made by the Steering Committee upon recommendations of the Project Manager. Review will be via a Review Panel convened by the Coordinator.

Proposal Review

6. The criteria to be used by the Panel and Manager to make awards are listed below in descending order of significance:
 - (a) significance of the research to understanding genetic diversity in tropical ecosystems or the significance of the resource; and
 - (b) innovative use of the collections and database.

Reporting and Products

7. For interim years of multiple-year grants, Principal Investigators (PI) must file an annual technical progress report in English on the anniversary of the award.
8. PIs must file a final technical report in English with the Project Manager within six (6) months of the termination of the award.
9. It is anticipated that PIs will submit research results in English for publication in peer-reviewed, international journals at appropriate times during the conduct of the funded research.
10. PIs should complete and submit annual financial reports to the Project Manager.

Terms of Reference
Ad Hoc Reviewers of Research Grants Program Proposals

Arrangements: Typically a reviewer would receive no more than one proposal per year.

Reports to: Review Panel through Project Manager.

Responsibilities:

1. Provide anonymous peer review of proposals in the competition.
2. Identify any conflicts of interest with the proposal or the investigator, and return those proposals unreviewed.
3. Review and critique the proposal assuming there is no conflict of interest.
4. Make decisions concerning the proposal's scientific merit and whether it meets the criteria for the competition.
5. Write a thorough review of the proposal, including strengths and weaknesses, on the provided form.
6. Rate the proposal in one of three categories: excellent, good, unsatisfactory.
7. Return two copies of the reviews for each proposal, one of which is signed, to the Project Manager. The reviews will remain anonymous; however, the unsigned copy will be provided to the members of the Advisory Panel. The *ad hoc* reviews and the Panel Review will serve as the primary documents to be used by the Project Manager in ranking the proposals. The Project Manager will forward recommended rankings to the Steering Committee who will make the awards.

Qualifications:

Reviewers should have detailed knowledge about some aspect of the subject and have a reputation for sound scientific judgement regarding research design and conduct. The reviewers may be selected based on the Project Manager's personal knowledge of their ability or, more often, from searches of the literature or computer files. Generally three reviewers will be selected per proposal, of whom at least one should be Indonesian.

Terms of Reference
Review Panel of Research Grants Program Proposals

Arrangements: The size and composition of the Panel will depend on the number of proposals received for consideration and their research areas. Five to six members are anticipated.

Reports to: Steering Committee through Project Manager.

Responsibilities:

1. Discuss proposals and *ad hoc* reviews prior to making a written recommendation to the Project Manager concerning funding.
2. Discuss future competitions with the Project Manager.
3. Receive one copy of each proposal submitted in the competition from the Project Manager. If a conflict of interest exists with one of the investigators or their work, return the proposal unreviewed. Following discussion of all of the proposals, and their *ad hoc* reviews, prepare a Panel Review in which the consensus views of the panelists are expressed, perceived strengths and weaknesses are enumerated, and final rating and recommendations are included. Submit a signed copy of this document to the Project Manager. Individuals' opinions should remain anonymous. An unsigned copy of the Panel Review, with anonymous *ad hoc* reviews, will be made available to the investigator. The Project Manager will make funding recommendations to the Project Director. Awards will be made by the Director, Center for Research and Development for Biology. The Technical Advisory Group will be *ex officio* members of the Advisory Panel.
4. Tasks include:
 - (a) Thoroughly read each proposal.
 - (b) Reach conclusions concerning the proposal's merit, its strengths and weaknesses.
 - (c) Attend the Panel Meeting.
 - (d) Discuss each proposal and the *ad hoc* reviews with one member selected beforehand by the Project Coordinator as discussion leader.
 - (e) Record provisional rankings privately.

- (f) After all proposals have been discussed, determine by vote which are meritorious (i.e., eliminate those that do not merit funding because they fail to satisfy the criteria).
- (g) Rate the meritorious proposals on a continuous scale of 1 (for excellent) to 3.
- (h) Cast the ratings.
- (i) Write Panel Reviews for each proposal with the discussion leader responsible for the text, and each member sign the completed document.

Qualifications:

Invitation by the Project Manager based on his or her knowledge of Indonesian and non-Indonesian biologists and search of computer files and the literature. Must be a senior, highly respected biologist with broad views of biodiversity and conservation.

Procedures and Criteria Candidates for Graduate Degrees in Systematic Biology

1. A crucial initiative in the GEF project would be to train graduate students in systematic biology at overseas institutions³--either at a university or a museum associated with a university.

Selection of programs

2. The taxa-focus of the scholarship programs (and associated selection of the appropriate academic institution) should correspond to the overall project work plan priorities, as determined during project inception. The project work plan should explicitly outline the relationship between the focus of individual scholarship programs and the overall project work plan priorities.

3. The period of instruction would normally last from two to four years and lead to an M.Sc. or Ph.D. degree. Prior training in a foreign language, as appropriate, would be given in Indonesia.

4. All overseas M.Sc. degree programs (or equivalent) should provide:

- (a) lectures, seminars and discussions on a broad spectrum of topics in systematic biology, including molecular biology and computational biology;
- (b) a research project on a clearly defined problem relevant to the needs of Indonesia;
- (c) tutoring in writing technical research papers;
- (d) work study in museums or herbaria; and
- (e) opportunities for contact with a range of people in academia, libraries and museums--as these people will provide the basis for future support.

5. Where appropriate, this initial period of training would be followed by study for a Ph.D. on the systematics of groups of organisms having high priority based on their conservation and economic importance in Indonesia. It is expected that at least six of the graduate degrees would be at the Ph.D. level. All local Ph.D. programs would include an overseas co-supervisor.

Recruitment and Selection of Candidates

6. It is expected that individuals receiving this training would provide the focus for systematic biology in Indonesia by the quality of their own research, the leadership they provide and the stimulus given to new research students.

³ In some cases it may be desirable for a candidate to attend an Indonesian university, possibly with an overseas co-supervisor.

7. Recruitment. About twelve new staff would be recruited through a nation-wide advertised competition. Under existing Government regulations, graduate scholarships funded under the GEF project would only be provided to new staff members after a minimum period of six months probation and orientation within the institution. A small recruiting team of senior PPPB staff would directly contact local and regional universities to solicit from members of the biology faculty nominations of promising candidates from among the undergraduate population. Recruitment would be carried out by means of exhaustive screening and interview.

8. Selection. Current PPPB staff would be eligible to compete for the overseas scholarships on an equal basis with the newly recruited staff. Standardized selection criteria for overseas scholarships would be established *a priori* by the recruiting team in consultation with the Project Manager and members of the Steering Committee, with advice as necessary from the TAG. As a basic requirement, internal and external applicants should have graduated in botany, zoology or an associated discipline and have some work experience. It would be vital that the candidates are selected for their drive, determination and self-motivation, as well as their interest and aptitude to proceed on to Ph.D. level research. It is expected that candidates for local and overseas Ph.D. programs would first complete an M.Sc. program (or equivalent) at an overseas institution.

9. PPPB would describe the resulting staff recruitment and scholarship selection criteria and procedures in the initial project progress report.

INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

ANNEX 4

**Terms of Reference
for Contracted Specialists, Advisors, and Specialized Training**

- Part A: Contracts with Individuals**
- Part B: Technical Assistance and Specialized
Training Contract**

Terms of Reference
Project Management Specialist

Duration: Five (5) years.

Reports to: Project Manager.

Responsibilities:

To assist the Project Manager with administrative details to include, but not restricted to, gathering and analyzing data, assisting with budgets, drafting reports, scheduling, completing requisitions and disbursement, and other tasks designated by the Project Manager.

Qualifications: Diploma; five years experience in office management, public administration, or accountancy; extensive experience with accountancy and managerial software. Strong interpersonal and managerial skills are necessary. Fluency in spoken and written English is required.

Terms of Reference
Financial Management Specialist

Duration: Three (3) years.

Reports to: Financial Manager.

Responsibilities:

Provide advice, guidance, and in-house training to the financial manager on budget control, financial information management, procurement and associated contracting, disbursement procedures, arrangements for audits, and other measures that ensure that all legal and financial responsibilities are met.

Qualifications: The Financial Management Specialist would have M.B.A.-level or equivalent in business or accountancy, have extensive business and accounting experience with managing large projects, have demonstrated skills in managing financial budgets, procurement, project accounting, disbursement, financial reporting, and audits. Strong mentoring, interpersonal, and managerial skills. Experience with international donor-financed projects desirable.

Terms of Reference
Software Applications Specialist

Duration: Five (5) years.

Reports to: Information Systems Coordinator/Manager.

Responsibilities:

1. To identify and adapt appropriate software applications for project management, scientific collaboration and services, and other project-related administration tasks as required. This role would not include responsibility for the development of the specimen-based database.
2. To train PPPB staff in the use of the selected software applications.
3. To develop operating procedures to maintain and upgrade the selected software applications.
4. To trouble shoot and solve problems which arise in software use.

Qualifications: Extensive work experience in identifying and adapting commercial software applications for office use, providing associated training, guidance on operating procedures, and problem-solving.

Terms of Reference
Human Resource Development Specialist

Duration: Five (5) years

Reports to: Scientific Collaboration and Services Coordinator and the Human Resource Development Unit Head.

Responsibilities:

1. To provide guidance and assistance to PPPB staff in the following tasks:
 - (a) To provide smooth day-to-day administration of the overseas graduate scholarship placements, including:
 - (i) advising candidates on relevant visa and educational requirements;
 - (ii) assisting with visa and travel arrangements;
 - (iii) arranging for the timely payment of fees, subsistence and travel expenses;
 - (iv) arranging adequate accident and health insurance;
 - (v) submitting vouchers and receipts to the project Finance Manager for all allowable expenses incurred by the graduate students; and
 - (vi) providing logistical support and advice in the event that candidates or their immediate family experience a personal emergency.
 - (b) To coordinate and provide logistical support for academic co-supervisors.
 - (c) To coordinate scheduling and logistical support for project human resource development activities with the single contractor for the Technical Assistance and Specialized Training Contract).
 - (d) To coordinate and provide logistical support for local training programs.
 - (e) To monitor human resource development activities supported under the project.
 - (f) To mobilize additional financial resources for project-related training, including overseas graduate scholarships.

Qualifications: The specialist would have a demonstrated capacity, and previous experience, in administering training programs, including overseas graduate scholarships. He or she would have good foreign language ability, and strong organizational and interpersonal skills.

Terms of Reference
Collections Data Access Specialist

Duration: Eight (8) weeks

Reports to: Project Manager and Steering Committee.

Responsibilities:

1. Analyze the range of policies regarding information access and sharing used in a variety of overseas institutions with systematic research collections. Institutions analyzed should include a range of government, academic, commercial, and other non-governmental institutions, from a wide range of countries. This analysis will take into account findings from earlier studies on this topic.
2. Analyze PPPB's and GOI's existing policies and practices regarding access to and sharing of scientific information on biodiversity. This analysis will take into account findings from earlier studies on this topic in Indonesia.
3. In consultation with the Project Manager, the Project Management Committee, the User Advisory Group, and others as necessary, identify and analyze the range of issues involved in access to and sharing of scientific information on biodiversity.
4. Identify economic, political and ecological constraints in the context of sustainable management of biological resources, which should be taken into account in the formulation of information policy.
5. Recommend policies and protocols for PPPB which address issues identified above, including actions required for implementation.
6. Present a report (in Indonesian, with at least a summary in English) covering the above.

Qualifications: Must have experience analyzing information policies of GOI agencies. Both experts must have M.A. or equivalent degrees (in law, political science, economics, social science, communications, biology, information management, or other relevant discipline), plus a minimum of five years work experience in institutional and information policy analysis. Must be fluent in English and Indonesian and have strong writing skills. Must have strong interpersonal and cross-cultural skills.

Terms of Reference
Team Leader of the Technical Assistance Contract

Duration: Eighty (80) weeks inclusive of travel over five (5) years.

Reports to: Project Manager.

Responsibilities:

1. To manage the contractual responsibilities and obligations of the contracting agency, and to assign tasks, coordinate activities, and schedule meetings of Technical Advisory Group (TAG).
2. To visit PPPB at regular intervals throughout the five-year project to discuss progress on all phases of the GEF project with the Project Manager and his/her staff and to offer informed advice on technical and institutional matters and on applications of the database.
3. To provide leadership for TAG activities, which include the provision of technical advice to the Project Manager on (a) appropriate methods of managing specimens; (b) development and utilization of specimen-based electronic databases; and (c) development of information-management models for the analysis and dissemination of information derived from the database.
4. To recommend specialists to the Project Manager and arrange short-term technical assistance in the fields of environmental health and safety, and archival and restoration curation.
5. To recommend specialists to the Project Manager and arrange short-term, hands-on, in-country training for PPPB staff in the collection, identification and curation of targeted high-priority taxa in Indonesia.
6. To recommend to the Project Manager appropriate institutions for overseas work-study placements and arrange short-term training for the Botany, Zoology and Information Technology Project Coordinators, and the Collection Managers.
7. To recommend systematic and information technology specialists to the Project Manager and arrange for their participation in workshops on (i) work program priorities, (ii) the development of information fields for the database, respectively, and (iii) other workshops as required during the project.
8. To advise on improvements in scientific collaboration and services.
9. To advise the Project Manager on all aspects of the GEF project requiring coordination with the GOJ-funded project.

Qualifications: A Ph.D. in Systematics or Ecology with extensive research experience in collections-based biodiversity projects and fieldwork and specimen collection in tropical terrestrial biomes; experience in the development and use of specimen-based electronic information systems and their utility in biodiversity management; experience in the maintenance of natural history museum/herbarium collections in tropical countries; proven managerial ability; extensive political, managerial, and financial experience; strong interpersonal and cross-cultural skills; first-hand knowledge of the government and culture of Indonesia; knowledge of Bahasa Indonesia or willingness to become proficient during the first year of the project.

Terms of Reference
Technical Advisory Group (TAG): Botany Institutions Advisor

Duration: Fifty-two (52) weeks over five (5) years inclusive of travel.

Reports to: Project Manager, in consultation with other TAG members.

Responsibilities:

1. To visit PPPB at regular intervals throughout the five-year project to assist the Project Manager in monitoring progress and solving problems.
2. To advise the Project Manager and relevant PPPB staff on:
 - (a) the development of appropriate institutional policies, and management, curation and conservation procedures to bring the botanical collections at PPPB up to international standards. Included within the scope of this task are all matters related to the collection of specimens and field notes; preparation of specimens; identification techniques; storage practices; conservation of specimens and notes; label production; data entry; and data searches.
 - (b) the development, management, and use of specimen-based electronic databases--including the standardization of specimen and field note collection; the development of information fields; the integration of computer software; data searching, sorting and reporting functions.
 - (c) the organization of workshops to establish realistic benchmarks for collection development, and development of fields of information for the database, and to participate in these discussions.
 - (d) research goals and methods in plant systematics and biodiversity-related topics.
 - (e) international sources for research- and collections-based funding.
3. To offer informal tutoring to the staff of PPPB on methods in plant identification and relevant aspects of plant systematics.
4. To recommend to the Project Manager appropriate taxonomic and information specialists to visit PPPB, and identify short-term training opportunities for PPPB personnel at pertinent herbaria overseas.

Qualifications: The Botany Institutions Advisor should have a Ph.D. in Systematic Biology; extensive experience in the institutional development of systematic research organizations and in curating botanical collections; and research experience in collections-based biodiversity projects in the tropics. Strong mentoring, managerial, interpersonal and cross-cultural skills are prerequisites. Experience with developing or managing large specimen-based databases is desirable. Experience of working in Indonesia an advantage.

Terms of Reference
Technical Advisory Group (TAG): Zoology Institutions Advisor

Duration: Fifty-two (52) weeks over five (5) years inclusive of travel.

Reports to: Project Manager, in consultation with other TAG members.

Responsibilities:

1. To visit PPPB at regular intervals throughout the five-year project to assist the Project Manager in monitoring progress and solving problems.
2. To advise the Project Manager and relevant PPPB staff on:
 - (a) the development of appropriate institutional policies, and management, curation and conservation procedures to bring the zoological collections at PPPB up to international standards. Included within the scope of this task are all matters related to the collection of specimens and field notes; preparation of specimens; identification techniques; storage practices; conservation of specimens and notes; label production; data entry; and data searches.
 - (b) the development, management, and use of specimen-based electronic databases--including the standardization of specimen and field note collection; the development of information fields; the integration of computer software; data entry searching, sorting and reporting functions.
 - (c) the organization of workshops to establish realistic benchmarks for collection development, and development of fields of information for the database, and to participate in these discussions.
 - (d) research goals and methods in animal systematics and biodiversity-related topics.
 - (e) international sources for research- and collections-based funding.
3. To offer informal tutoring to the staff of PPPB on methods in animal identification and relevant aspects of animal systematics.
4. To recommend to the Project Manager appropriate taxonomic and information specialists to visit PPPB, and identify short-term training opportunities for PPPB personnel at pertinent museums overseas.

Qualifications: The Zoology Institutions Advisor should have a Ph.D. in Systematic Biology; extensive experience in the institutional development of systematic research organizations and in curating zoological collections; and research experience in collections-based biodiversity projects in the tropics. Strong mentoring, managerial, interpersonal and cross-cultural skills are prerequisites. Experience with developing or managing large specimen-based databases is desirable. Experience of working in Indonesia an advantage.

Terms of Reference
Collections Database Expert

Duration: Fourteen (14) weeks including travel.

Reports to: Project Manager and Information Systems Coordinator/Manager.

Responsibilities:

1. The Collections Database Expert would provide advice and training on information technology including:
 - (a) an available and appropriate, specimen-based information system for PPPB, and associated external support;
 - (b) an appropriate hardware platform to support the selected information system;
 - (c) the organization and management of a compatible local area network within the Botany and Zoology Divisions of PPPB;
 - (d) supplemental systems for specimen descriptions and keys, and for other information technology requirements as needed, which complement and are compatible with the specimen-based information system;
 - (e) appropriate electronic communication systems for internal use and external connection to wide area e-mail and the INTERNET; and
 - (f) suggested terms of reference for software development.

Qualifications: The Collections Database Expert would have a minimum of a M.Sc.-level or equivalent degree in information systems and software development, proven ability, and extensive experience in designing large database systems. Experience in systematic collections would be desirable.

Terms of Reference
Health and Safety Advisors

Duration: Five (5) weeks including travel for international specialist and ten (10) weeks for local specialist.

Report to: Project Manager.

Responsibilities:

1. Advise the Project Manager on the present state of health and safety standards at PPPB.
2. Identify explicit steps to attain national and international standards for health and safety.
3. Educate the staff of PPPB in appropriate health and safety measures.
4. Specific tasks include:
 - (a) Visit the systematics collections early during the first year of the GEF project for four to five weeks.
 - (b) Complete a thorough analysis of worker safety and health in the botany and zoology collections.
 - (c) Prepare an immediate report of serious conditions that require immediate action to protect worker and produce a direct plan-of-action to reduce these hazards to acceptable levels.
 - (d) Write a detailed and explicit report including recommendations and cost estimates to bring PPPB to international standards in health and safety.
 - (e) Teach a formal course on health and safety procedures to PPPB employees that are potentially at risk (local specialist).
 - (f) Prepare a training manual on health and safety standards at PPPB for use in orienting new employees (local specialist).

Qualifications: Two individuals; at least one must be an Indonesian national. M.D. or Ph.D. in Public Health, Occupational Health and Safety, or Safety Engineering with an emphasis on toxicology and/or air-borne or contact pollutants. Applicants must have extensive experience developing health standards for laboratories, and be fully cognizant of national and international standards for health and safety.

Terms of Reference
Archival and Restoration Advisor

Duration: Three (3) weeks including travel.

Reports to: Project Manager.

Responsibilities:

1. Recommend to the Project Manager detailed methods for restoring and preserving books, photographs, illustrations, specimen labels, mounting materials, and other archived items commensurate with present patterns of use and present conditions, as well as under improved conditions. Specific tasks include:
 - (a) Visit the library and systematics collections early during the first year of the GEF project for two weeks.
 - (b) Complete a thorough written analysis of the present state of manuscripts, books, labels, and other archived paper.
 - (c) Write a detailed report that describes current archival conditions in the library and natural history collections at PPPB and that makes detailed recommendations for quality preparation and protection of archives. Include cost-analyses of procedures necessary to ameliorate damage resulting from insects, fungi, high humidity, and high temperatures, and to protect books and specimens in the future.

Qualifications: Ph.D. or M.Sc. in Library Science or Museum Science; experience as an archivist and/or restoration specialist. Teaching experience, experience working with scientific materials and manuscripts, and experience in the tropics are highly desirable.

Terms of Reference
Taxon-Specialists and Mentors

Duration: Four (4) to twenty-six (26) weeks (dependent upon size and complexity of taxonomic groups).

Reports to: Project Manager and appropriate Project Coordinator.

Responsibilities:

1. Share systematic knowledge with the staff of PPPB.
2. Upgrade the scientific and information content of the collection holdings within his or her systematic specialties.
3. Advise the Project Manager concerning collection management and database development relating to mentor's specialty.
4. Specific tasks include:
 - (a) Tutor PPPB staff on systematics and diversity, the collection and identification of specimens in the taxon-specialists' areas of expertise.
 - (b) Study the specific taxa under investigation and make taxonomic decisions.
 - (c) Record data, write descriptions, and develop aids and keys to identification of the taxa in question.
 - (d) Designate type materials as appropriate.
 - (e) Produce annotation labels and oversee affixing the labels to specimens, with each taxon annotated as fully as possible (i.e., all specimens in the collections within his or her systematic specialties).
 - (f) Review the information in the database or provide advice concerning entry of label data into the database.

Qualifications: By invitation of the Project Manager following consultation with the Technical Advisory Group Leader. Invitees should be expert in the systematics and identification of Indonesian taxa of ecological or economic interest and demonstrate willingness to interact with and tutor the staff of PPPB. Teaching experience desirable, especially in small-group settings. Strong interpersonal and cross-cultural skills are required. Professional interest in developing research program in flora and fauna of Malesiana region. Ability to use electronic databases desirable.

Terms of Reference Financing Strategy Study

Duration: Eight (8) weeks each of two financial experts, one of whom must be an Indonesian national.

Reports to: Project Manager and Steering Committee.

Responsibilities:

1. Help PPPB to operationalize the GOI policy stated in Repelita VI on the financial sustainability of LIPI's Research and Development Centers.
2. Analyze the range of funding sources and financing mechanisms used in a variety of overseas institutions with systematic research collections. Institutions analyzed should include a range of government, academic, commercial, and other non-governmental institutions, from a wide range of countries.
3. Analyze PPPB's existing funding sources and financing mechanisms.
4. Analyze the opportunities for cost-recovery user fees for selected services. This analysis would take into account findings of the Information Policy Study to ensure consistent analysis between the two studies on issues regarding access to and sharing of data.
5. Analyze other opportunities for financing, including government budget, and programs of overseas and local donors.
6. In consultation with the Project Manager and the Project Management Committee, make rough projections for post-project budget required to maintain and further develop PPPB's systematic research collections and associated information activities.
7. Recommend strategy on how PPPB can achieve financial sustainability.
8. In consultation with the Project Manager, members of the Steering Committee, and other relevant officials, make rough projections for post-project, non-PPPB budget required to further develop Indonesia's scientific information on biodiversity. Recommend strategy on how to finance these budget requirements.
9. If appropriate, draft user fee policies and initial proposals for donor financing.
10. Present draft report (in English, with at least a summary in Indonesian) covering the above at a workshop, and produce final report which responds to comments.

Qualifications: One expert must be a financial analyst or economist with experience analyzing funding sources and financing mechanisms of government, academic, commercial, and other non-governmental research institutions from a variety of countries. The other expert must be a financial analyst or economist with experience analyzing funding sources and financing mechanisms of GOI agencies. Both experts must have M.B.A.s or equivalent degrees, plus a minimum of five years work experience in financial and/or economic analysis. Both experts must be fluent in English and have strong writing skills. At least one expert must be fluent in Indonesian.

INDONESIA
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ANNEX 5

Publications and Support Products

Terms of Reference Glossaries of Technical Terms

Need for Glossaries of Technical Terms

1. Much of the scientific literature on the flora and fauna of Indonesia is written in English, Dutch, and for zoology, German and French. There are presently no published Indonesian language glossaries of technical terms in use in the systematic literature. Consequently, for non-specialist Indonesian workers in the field of biodiversity research, much of the literature--including taxonomic descriptions and identification keys--remains inaccessible.

Guidelines

2. In the second through fourth year, the project would support the creation of a database of technical terms used for the description of vascular plants and for the major groups of animals (including at least terrestrial vertebrates, fish, insects and mollusks), with explanatory text in Bahasa Indonesia. Where appropriate, the text would be illustrated with simple black and white drawings that could be scanned into the database. At the end of the three-year period, printouts of the glossaries would be produced using desk-top publishing methods. Electronic copies, which could be updated and customized by users, would be distributed on request.

3. The compilation work would be carried out by PPPB staff research and technical illustrators, under the direction of a designated task coordinator who would report to the Project Manager. The project would hire a full-time contract editor for three years, and obtain assistance as necessary from specialists at Indonesian universities and overseas institutions. The editor would require either a degree in biology or extensive experience of editing biological technical material, and a knowledge of foreign languages.

4. Funds are budgeted for the salary of the editor, *ex gratia* payments to contributors, and hard-copy production and distribution costs.

Terms of Reference Bibliographies of Key Systematic Works

Need for Bibliographies of Systematic Literature

1. The scientific literature relating to the descriptions and names of Indonesian plants and animals dates from the late eighteenth century through the present, and is scattered throughout hundreds of periodicals and miscellaneous faunas and floras, many of which are not available in Indonesia. It is therefore difficult--if not impossible--for Indonesian researchers in systematic biology to determine what has already been published in their chosen field, and to locate appropriate descriptions and identification aids. There is an urgent need for bibliographic research, at least on the priority groups of plants and animals selected by PPPB for intensive study and collections development. This need is particularly acute in the case of the zoological systematic literature, as it is both more diverse and less well-documented than the corresponding botanical literature for the Malesian region.

Guidelines

2. In the second through fourth years, the project would support botanical and zoological bibliographic studies on selected groups of plants and animals--corresponding to the groups targeted as priorities in the setting of benchmarks for the first five to ten years. Since many of the key reference works for this task are not available in Indonesia, a significant part of the work would need to be carried out at the libraries associated with major herbariums and museums in Europe or North America. The bibliographic references collected would be entered in a standard and consistent format in a database, cross-referenced by taxonomic name and by author.

3. Given the large amount of additional work and travel involved, it is anticipated that there would be a division of effort between PPPB research staff, short-term contract assistants and overseas collaborators. It is anticipated that overseas collaboration would take place largely under the aegis of existing arrangements within the Flora and Fauna Malesiana Projects. The task would be coordinated by one staff member from Botany and one from Zoology, who would be designated by the Project Manager and given overall responsibility for managing the project. Both coordinators would require a good working knowledge of the basic systematic literature, and prior experience in carrying out bibliographic library studies. In the fourth year of the project, a hard-copy version would be produced by desk-top publishing and distributed on request. However, it would be important that the database be maintained and updated by working systematists on the staff of PPPB, who would use the resulting information as an integral tool for their research.

4. The budget would provide for the contracting of up to six local assistants, foreign collaborators, and library assistance overseas. It would also fund the cost of up to eighteen person-months travel by Indonesian researchers to overseas institutions and libraries in order to consult literature not available in Indonesia. It is important that this task be carried out in careful consultation with the database design process, and use a field structure agreed upon at the database fields workshop.

Terms of Reference Computer Gazetteer of Indonesian Collecting Localities

Need for Computer Gazetteer

1. In order to better understand the geographic distribution of species, and the spatial relationships of Indonesian plants and animals populations to, say, topography or soils, it will be necessary to translate specimen-based data into map-based data. To achieve this, the place name associated with the collection locality--normally recorded as part of the specimen label information--must be linked to a set of geographical coordinates. This process would enable the specimen-based proposed PPPB database to be interfaced with GIS mapping programs, greatly increasing the power and flexibility of the resulting biodiversity information system.
2. However, in the Indonesian context, many of the historical collecting localities of specimens in the Bogor collections have been recorded under place names which have since changed or which were incompletely or ambiguously recorded. To compensate for this situation it will be necessary to carefully research old maps and printed gazetteers, and to refer to original accounts of collecting expeditions where available.
3. To facilitate accurate and rapid specimen data entry, it is essential to develop a computer file of commonly-used place names, with standard spellings, and associate these with carefully checked coordinates. This file would provide a pick-list of options for the data entry operator, who would only enter a new locality name after all known variants had been eliminated.

Guidelines

4. Funds are provided in the second year to assist with the process of compiling a computer gazetteer of known Indonesian collecting localities. The budget would cover only limited honoraria and salaries of local staff, plus the cost of *ad hoc* materials such as maps and printed publications. Two or more persons with an extensive knowledge of Indonesian geography, possibly contracted from university or from other government agencies, would be needed to carry out this work under the direction of a PPPB staff member designated by the Project Manager. The cost of procuring overseas assistance, should this be necessary, is not covered in the budget. It is important that this task be carried out in careful consultation with the database design process, and use a field structure agreed upon at the database fields workshop.

Terms of Reference Identification Manuals

Need for Identification Manuals

1. To date, less than a quarter of the species of Indonesian plants, and probably less than a tenth of Indonesian animals, have been scientifically described in floras, faunas and systematic monographs. This means that, for the large majority of Indonesian biodiversity, identification keys are not available. For workers in applied fields such as foresters, agricultural entomologists, and ecologists, who do not have ready access to large reference collections and extensive libraries, there is no convenient way to identify most organisms in the field.
2. New computer software facilitates taxonomic coding, then produces automated, multiple-access keys that use everyday language in written descriptions and can include computer-generated illustrations. This makes it quick and efficient to generate both interactive computer and hard-copy keys to aid the user in the identification process.

Guidelines

3. In the fourth and fifth year the project would support the pilot production of one botanical and one zoological identification manual to selected groups. Selection would be based on user need and the need to choose groups that are neither too large nor too taxonomically complex.
4. In the fourth year, a training workshop would be arranged for PPPB staff to learn a suitable software package (such as DELTA, produced by CSIRO, Canberra), including the provision of overseas trainers. Two work groups would be set up, one in Botany and one in Zoology, under the direction of coordinators designated by the Project Manager. The coordinators should have extensive systematic research experience and a good working knowledge of their chosen plant or animal group. The work groups would be composed of two or three junior systematic staff who, under the supervision of the coordinators, would use the Bogor collections and literature--supplemented as necessary with loan material from overseas--to produce computer keys and hard-copy descriptions and keys to their selected groups. Assistance from international specialists would be sought as required, but any associated cost is not included in the budget.
5. The products would be published, as appropriate, in the scientific literature.
6. The budget covers the cost of an in-house training workshop, including the travel costs and honorarium of an overseas trainer, plus honoraria for up to six PPPB staff and miscellaneous production costs.

Terms of Reference Field Guides

Need for Field Guides

1. The need for simple guidebooks to Indonesian national parks was identified in the *Biodiversity Action Plan* (BAPPENAS, 1991), and further reiterated in discussions between PPPB and PHPA. At present, most of the available information on Indonesian biodiversity is in the form of specialized taxonomic monographs, written in English, Dutch, French or German, and often published in obscure scientific journals. Visitors to national parks need non-specialist illustrated guidebooks to the major groups of interesting plants and animals, written in Bahasa Indonesia. With geographic scope of the publication limited to a single well-defined locality, the reader is not faced with the problem of separating closely-related species which do not naturally occur in the same area, when identifying an unknown organism.

Guidelines

2. The production of guidebooks would be carried out on a pilot scale in the fourth and fifth years of the project. The first phase would require a field survey of Gunung Haliman National Park. Clearly-defined groups, such as birds, butterflies, mammals, trees, orchids or ferns, would be selected for this purpose. Two six-week periods of fieldwork would be carried out by up to twenty botanists, zoologists and technicians from PPPB, with assistance as appropriate from NGO volunteers such as the Biological Science Club. Collections of unidentified plants, invertebrates and small mammals would be made at this time, together with color photographs of the living organisms.
3. In the second phase, checklists would be constructed for the selected groups--based on field observations and collections, but also supplemented by records from earlier collections. Species for inclusion in the guides would be selected on the basis of conservation and ecological importance, as well as general interest and visual appeal. Detailed descriptions from scientific publications would be edited for non-specialist readers and supplemented with illustrations and photographs.
4. As far as possible, production of the guides would be kept technically simple and low-cost, using desk-top publishing methods and camera-ready copy. It might be desirable to adopt a booklet or ring-bound format that could readily be supplemented in future as guides to new groups became available.
5. The Project Manager would designate a coordinator on the PPPB staff for each group of organisms to be covered in the guide. The coordinators should have a specialist knowledge and prior field-collecting and research experience for their group. The assistance of international systematic specialists would be sought as required (but any additional cost involved is not included in the budget). A professional copy-editor, with prior experience with natural history publications, would be contracted to assist with the final editing and production of the guides.
6. The budget covers the cost of local travel, fieldwork and miscellaneous collecting and photographic supplies, plus the cost of publication which includes the temporary services of the copy-editor.

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ANNEX 6

Design of Work Plan Goals

Design of Work Plan Goals

Project Goals

1. The proposed project would support the initial five-year segment of a 25-year GOI effort to meet the increasing need for scientific information on biodiversity. Of the overall goals, the urgent priority and the focus of the first five years is to strengthen the capacity of PPPB to handle biodiversity information.
2. The mission of PPPB, as it relates to biodiversity information, is to develop systematic research collections and to develop and disseminate associated specimen-based information. Useful working collections are the necessary basis for research on subjects including systematic biology, ethnobiology as it relates to the study of other biota with economic potential, conservation biology, and ecology.
3. During the project's five years, benefits to external clients would be limited. Because of the current condition of PPPB's collections and PPPB's existing capacity, the project would focus on internal institutional development. Measurable services and products for external clients would be limited in scope and achieved only in the later years of the project. Nevertheless, an explicit policy framework, realistic and meaningful benchmarks, and specific user products would enable PPPB to demonstrate, if only on a small scale, current and potential benefits of project investments to external clients and to possible funding sources. The policy framework, benchmarks, and user products would also establish the technical design for further developments in biodiversity information after the project period. Together, the policy framework, benchmarks, and user products would establish the basis for monitoring and evaluating project impact.

Policy Framework

4. The project design therefore includes a process in the first year that would define the overall policy framework. During project inception, the Project Management Committee and PPPB work groups, with advice if necessary from the Technical Advisory Group, would formulate an overall institutional policy framework, modeled in simplified form on the Agricultural Research Policy Statement developed for the World Bank's Agricultural Research Management Project and comparable exercises as appropriate. This policy framework would define: (a) criteria for determining PPPB's biodiversity information activities which would receive corresponding resource allocation; (b) organization and management of these activities; (c) external linkages and communication; and (d) operational financing for PPPB's biodiversity information.

Work Plan Benchmarks

5. The project design also includes steps to define specific benchmarks in curation standards and database goals. These benchmarks would be set in the context of the policy framework and be subject to review by the User Advisory Group.
6. Curation Standards. Under the project, PPPB would take definitive steps toward international curation standards. PPPB has already determined overall benchmarks for the physical condition of its collections. In twenty-five years, PPPB aims to achieve 100 percent international curation standards (e.g., restoration of all specimens that are seriously deteriorating--to the extent this is economically and physically feasible--and establishment of climate control. Selected from this overall goal, five-year benchmarks consist of:

- (a) consolidating and integrating the (largely zoological) marine collections belonging to PPPB with the collections belonging to PPPB;
- (b) restoring 100 percent wet zoological collections to international curation standards;
- (c) sorting and transferring the dry entomological collections to modular unit trays;
- (d) remounting and restoring 200,000 'at risk' dry botanical specimens restored;
- (e) replacing 100 percent of the species and genus covers in the dry botanical collections with archival quality materials;
- (f) systematically freezing the whole dry botanical collection at -20° C for three days to kill insect pests and their eggs and larvae;
- (g) restoring the wet specimens for orchids, gingers, and *Rafflesia*; and
- (h) transferring 100 percent of dry botanical and zoological collections to adequate, insect-proof metal cabinets.

During project inception, the Project Management Committee and PPPB work groups, with advice if necessary from the TAG, would determine the semi-annual benchmarks needed to reach the five-year project goals.

7. This improvement in curation standards is critical. Unless immediate measures are taken to restore large numbers of specimens that are deteriorating under tropical conditions, the Center's extensive historical collections will shortly sustain irreparable damage, and large amounts of valuable biodiversity information will be lost. In economic terms, it is four to twenty times more cost-efficient to capture biodiversity information from the existing collections than to collect new data from the field.

8. Taxa Priorities for Database Work Plan. PPPB would determine the taxa-specific work program priorities for specimen-based data entry by taking into account estimated levels of accuracy of the collections information, extent of species and geographical coverage of the collections, and incremental costs and benefits of improvements. This determination of specific work program priorities by taxa would require careful consideration and expert advice. During project inception, appropriate PPPB staff, the Technical Advisory Team, and taxa specialists would participate in a workshop which would set realistic benchmarks for taxa categories. The workshop would base work program priorities on a matrix which illustrates the status and importance of PPPB's collections information. This matrix would include rough measures of the status of collections information specifying accuracy, species representation, and geographical representation, on a scale of 1 to 3 (1=high or numerous relative to total for specified taxa, 2=medium or patchy, and 3=low or scarce), for years 0, 5, and 25. Taxa categories would be broad or narrow as appropriate. The matrix would also include a ranking on scale of 1 to 3 for incremental costs and values, with 1=low cost or high value, 2=medium, and 3=high cost or low value. Once five-year benchmarks are determined, PPPB work groups would set corresponding semi-annual benchmarks.

9. Database Goals. Twenty-five-year goals for the database include:

- (a) fields of information for taxa in work program to meet internal and external needs;

- (b) 100 percent of data keyed into PPPB database, including quality control and maintenance;
- (c) database upgraded as technical developments warrant; and
- (d) PPPB database fully integrated in national database.

Five-year goals include having well-functioning fields of information that meet internal and external needs for taxa in work program. They also include developing a crucial part of the scientific and institutional foundation for a national biodiversity information system. Fields of information for the specimen-based database would be designed to meet internal and external needs over the long term. During project inception, a workshop of PPPB staff, the Technical Advisory Group, and an expert in data field definition, would determine standardized fields of information.

Products for External Clients

10. Products for external clients would be based on and mostly limited to the selected taxa. These products might include preliminary species lists, measures of abundance and distribution, identification reference tools and services, biota resource management strategies, field guides, biotic resource prospecting, and identification of geological indicator species. The User Advisory Group would review the list of planned products for external clients. These products would be limited in scope and available only in later years of the project. It will be important to keep project goals realistic and expectations limited. The following paragraphs illustrate the range of products possible within the next 25 years; products in the first 5 years would be selected from this list.
11. Protected Area Management and Environmental Assessment. Products relevant to protected area management and environmental assessment include:
- (a) analysis of information in database (e.g., preliminary species list, measure of abundance and distribution, identification of threatened and endangered species)
 - (b) collections as a reference source for identification needed in inventory and monitoring (including a specimen identification service);
 - (c) staff expertise as a reference source not available at regional level; and
 - (d) training.
12. Biotic Resource Management. Products relevant to biotic resource management include these products. In addition, PPPB would be able to analyze its database information to develop a species-based genetic resource management strategy, in 25 years identifying a range of target taxa and implementing conservation strategies. In 5 years, PPPB would be able to develop and help to implement a conservation strategy for bamboo and a few other selected taxa.
13. Conservation Promotion. Products relevant to conservation promotion include field guides for national parks.
14. Ethnobiology and Research on Economic Biota. Products relevant to ethnobiology and research on other economic biota include:

- (a) biotic resource prospecting;
- (b) identification and use of geological indicator species; and
- (c) collection of disappearing ethnobiological information.

15. Environmental Planning. Products relevant to environmental planning, including spatial planning and valuation, include provision of database information including species distribution and ethnobiological and economic traits.

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ANNEX 7

Notes on the Preparation Process of the Project

Notes on the Preparation Process of the Project

Origin of the Project

1. For a number of years there has been growing concern--both within PPPB and in the wider biological community--regarding the urgent need to renovate and safeguard the scientifically invaluable collections of PPPB's Botany and Zoology Divisions. The national and international importance of these collections, as the principal reference source for information on the fauna and flora of Indonesia, was clearly recognized in the *Biodiversity Action Plan for Indonesia* (BAPPENAS 1991), which called for further investment in biodiversity collections restoration, maintenance and development.
2. The *Biodiversity Action Plan* "Project Profile #21", "Development of Systematic Resources for Biodiversity Inventory", specifically recommended the following actions:
 - (a) Training for new systematic biologists and curatorial staff;
 - (b) Improved facilities for the processing and storage of biological collections;
 - (c) A computer data management and retrieval system;
 - (d) An expanded collection program; and
 - (e) A network of international collaboration for the exchange of data, specimens and scientific reference material.

Administrative Arrangements

3. In September, 1991, following a joint reconnaissance mission by the World Bank/UNDP, GOI submitted a request for funds under the GEF Project Preparation Facility (PRIF) to prepare a three-part project including a "Biodiversity Collections" component.
4. Based on the outline provided in the *Biodiversity Action Plan*, PPPB subsequently submitted an expanded concept paper, prepared with the assistance of the Arnold Arboretum of Harvard University and the Royal Ontario Museum, Toronto, two of the participating agencies identified in the original "Project Profile".
5. Following UNDP approval of the PRIF in April, 1992, a Bank preparation start-up mission visited Indonesia in June, 1992, to finalize the details of the preparation arrangements with GOI. At this time it was agreed by GOI that the Arnold Arboretum would continue to take the lead in coordinating the provision of technical assistance to PPPB in the preparation of the project.

Preparation

6. In August and early September, 1992, a team of five consultants⁴ (including botany, zoology and microbiology institutions specialists, and team leader) visited Indonesia for five weeks to assist with PPPB with the preparation of the project. Over this period an intensive survey of existing collections, facilities and staff resources at PPPB, and an informal survey of "user need" was carried out.

7. The process of user need consultation included meetings with representatives of BAPPENAS; the (former) Ministry of State for Population and Environment; Ministry of Forestry (PHPA and Forest Research Institute); Ministry of Agriculture (Institute for Medicinal Plants and Spices Research); Plant Resources of Southeast Asia (PROSEA) project; Southeast Asian Regional Center for Tropical Biology (SEAMO BIOTROP); Universities (University of Indonesia and University of Pattimura, Ambon); LIPI (Center for Scientific Documentation and Information (PDII), Research and Development Center for Limnology, Research and Development Center for Oceanology, National Botanic Gardens); and various conservation NGOs (WAHLI, LATIN, Biological Sciences Club, Asian Wetland Bureau, World Wildlife Fund, International Council for Bird Preservation).

8. The July, 1992, version of the Project Concept Document was reviewed, and a draft management plan prepared in the form of a workshop discussion document. Topics covered in the report included:

- (a) Human resource development;
- (b) Restoration and stabilization of collections;
- (c) Facilities upgrading and increasing capacity;
- (d) Introduction of a computer information system;
- (e) Institutional linkages with users;
- (f) International scientific cooperation; and
- (g) Proposed management plans for Botany, Zoology and Microbiology.

Workshop

9. A three-day, international workshop, attended by about sixty persons, was held at the beginning of September, 1992, at which the draft report was presented and feedback sought from participants. A list of agencies and organizations represented at the workshop is attached. The first day consisted of a tour of collections and research facilities at PPPB, Bogor.

⁴ John Burley; Arnold Arboretum of Harvard University, Cambridge (Team Leader)
John Darbyshire; (formerly MacCauley Soil Research Institute, Aberdeen)
Christopher Darling; Royal Ontario Museum, Toronto
Kees Kalkman; (formerly Rijksherbarium, Leiden)
John Peake; (formerly Natural History Museum, London)

10. Three sessions were held on the second day of the workshop, chaired by Prof. Aprilani Soegiarto, (then) Deputy Chairman for Natural Sciences, LIPI:

- (a) Introduction and background to GEF-Biodiversity Collections project; overview of draft management plans for Botany, Zoology and Microbiology;
- (b) Perspectives of GOI agencies and NGOs; and
- (c) Perspectives of the international scientific community.

11. On the third day, the workshop split into three working groups for Botany, Zoology and Microbiology, followed by a plenary session. Discussion topics included:

- (a) Priorities for the development of systematic biology in Indonesia (including inventory, collections, human resources, and information systems and management);
- (b) Coordination of systematic research with conservation and development needs;
- (c) National and international collaboration by PPPB with other research, conservation and development organizations.

Follow-up and Reporting

12. In August, 1993, a draft Preparation Report was completed by PPPB, with assistance from the consultant team. This was subsequently approved by BAPPENAS on November 2, 1993.

13. The project proposal was reviewed by a World Bank preappraisal mission, which visited Indonesia November 9 - December 1, 1993, and several changes in project content were agreed with PPPB and BAPPENAS. These changes were incorporated in a final version of the Preparation Report.

14. On the recommendation of the preappraisal mission, PPPB held a further workshop on January 10, 1993, to enable potential users to comment on the revised project proposal. In addition to Government agencies and NGOs with an interest in biodiversity conservation, PPPB invited representatives of the private sector, including Indonesian pharmaceutical firms, manufacturers of traditional medicine (Jamu), forestry, agricultural, mining and energy companies, and consultants specializing in environmental impact assessment. The inclusion of private sector interests in the consultative process, including the proposed User Advisory Group, would be expected to lay the groundwork for future studies on the sustainable management of biological resources, and promote linkages between commercial users and the proposed biodiversity information network.

Agencies and Organizations Participating in GEF-Biodiversity Collections Workshop
Safari Garden Hotel, Cisarua; August 31-September 2, 1992.

GOI Agencies:

Ministry of Agriculture (Institute for Medicinal Plants and Spices Research)
Ministry of Forestry (PHPA and Forest Research Institute)
Ministry of State for Population and Environment
Center for Scientific Documentation and Information (PDII), LIPI
Research and Development Center for Biology, LIPI
Research and Development Center for Limnology, LIPI
Research and Development Center for Oceanology, LIPI
National Botanic Gardens, LIPI
Bogor Agricultural University (IPB)
Southeast Asian Regional Center for Tropical Biology (SEAMO BIOTROP)
University of Indonesia

NGOs:

Biological Sciences Club
KONPHALINDO
LATIN
SKEPI
WAHLI
World Wildlife Fund

**International Organizations
& Foreign Institutions:**

UNDP
World Bank
Arnold Arboretum of Harvard University, Cambridge
Bishop Museum, Hawaii
Commonwealth Agricultural Bureau International
International Institute of Entomology, London
International Mycological Institute, London
Natural History Museum, London
Natuurhistorisch Museum, Leiden
Rijksherbarium/Hortus Botanicus, Leiden
Royal Botanic Gardens, Kew
Royal Ontario Museum, Toronto
Smithsonian Institution, Washington DC
Universiti Kebangsaan Malaysia, Kota Kinabalu
University of West Sydney, Richmond

Agencies and Organizations Participating in GEF-Biodiversity Collections Workshop
Safari Garden Hotel, Cisarua; August 31-September 2, 1992.

GOI Agencies:

Ministry of Agriculture (Institute for Medicinal Plants and Spices Research)
Ministry of Forestry (PHPA and Forest Research Institute)
Ministry of State for Population and Environment
Center for Scientific Documentation and Information (PDII), LIPI
Research and Development Center for Biology, LIPI
Research and Development Center for Limnology, LIPI
Research and Development Center for Oceanology, LIPI
National Botanic Gardens, LIPI
Bogor Agricultural University (IPB)
Southeast Asian Regional Center for Tropical Biology (SEAMO BIOTROP)
University of Indonesia

NGOs:

Biological Sciences Club
KONPHALINDO
LATIN
SKEPI
WAHLI
World Wildlife Fund

**International Organizations
& Foreign Institutions:**

UNDP
World Bank
Arnold Arboretum of Harvard University, Cambridge
Bishop Museum, Hawaii
Commonwealth Agricultural Bureau International
International Institute of Entomology, London
International Mycological Institute, London
Natural History Museum, London
Natuurhistorisch Museum, Leiden
Rijksherbarium/Hortus Botanicus, Leiden
Royal Botanic Gardens, Kew
Royal Ontario Museum, Toronto
Smithsonian Institution, Washington DC
Universiti Kebangsaan Malaysia, Kota Kinabalu
University of West Sydney, Richmond

INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

ANNEX 8

Future Developments and Funding Opportunities

Future Developments and Funding Opportunities

Introduction

1. Through human resource development, collections development, and improved data entry and management methods, the proposed project would lay the institutional foundation for a national biodiversity information network in Indonesia. However, to maximize the benefits to Indonesian biodiversity conservation, it would be desirable to support a number of complementary activities which would be synergistic to the present GEF project component (see Figure 1).

Human Resource Development

2. It is estimated (see para 3.9) that an approximately twenty-five- to thirty-fold increase in the number of Indonesian trained systematic researchers will be necessary over the next decade. This might best be achieved through the methodical recruitment of new systematic biologists from a national pool of talented biology students in their senior undergraduate years at public and private universities throughout Indonesia. A small team of recruiters would travel to provincial universities on an annual basis to interview and test prospective candidates. This would be followed by a rigorous procedure to identify the best candidates on the basis of their aptitude, academic records, desire to train as systematists, and the recommendations of their university mentors. The final selection decision would be made by a panel of leading Indonesian scientific educators and researchers.

3. Once the finalists had been awarded scholarships to study overseas, a period of intensive language training would follow. Candidates for higher degrees would be placed at institutions with a prior track record of scientific collaboration and research in Indonesia, which could best offer training compatible with the research priorities of Indonesia. The performance of both the student and the academic institution in which they were placed would be carefully monitored.

4. In the longer term, the capacity of Indonesian universities to train systematic researchers should be strengthened. As an intermediate step, however, candidates for higher degrees could be co-supervised in Indonesia by both local and foreign faculty.

Provincial Inventory and Monitoring Programs

5. The majority of Indonesia's biodiversity occurs in the forests and reefs of the outer islands. To inventory and monitor these areas more effectively, it would be desirable to set up regional centers with access to local systematic expertise and biological reference collections. In most instances these centers would probably be closely associated with the regional universities, and they would play an important role in biodiversity education, inventory, research, and local planning and land management. The regional centers would in turn be supported by the National Centers for Systematic Biology (see para 3.5) in Bogor. The rapid and efficient exchange of information and specimens between Bogor and the regional centers would require a national network of databases for biodiversity and environmental information management.

Databasing Biodiversity Information

6. It is known to be much more cost-effective to capture biodiversity information from existing biological collections than to collect information *de novo* from the field. Investment is required to enable the entry of selected data from the labels of up to 1.5 to 2 million specimens at the national herbarium and zoology museum, and to validate, edit and manage this information in an electronic format.

National Biodiversity Information Network

7. The development of a National Biodiversity Information Network has been proposed (see paragraph 3.15) that will serve to integrate biodiversity information with other environmental data, and disseminate functional information products in a number of user-friendly formats to a wide range of users.

Small Grants Program

8. The development of a long-term facility to competitively award small grants to Indonesian researchers is required that would enable them to:

- (a) attend overseas scientific meetings and conferences;
- (b) study at overseas libraries and collections; and
- (c) undertake local inventory and monitoring, and carry out individual systematic research and collection development projects.

9. One option, which recently has been explored in the context of a proposed joint GOI-US-Japan Biodiversity Conservation Project, would be to set up an independent trust fund to generate sustainable annual revenue for this purpose.

Regional Systematic Research

10. A sound knowledge of the fauna and flora of Indonesia will only be possible through the study of geographic variation within and between species over the whole region. This process was begun in 1950 with the initiation of the Flora Malesiana project, the scope of which includes Indonesia, Papua New Guinea, Philippines and Malaysia. The project, which has so far published around ten volumes covering approximately fifteen to twenty percent of the flora, is an international cooperative effort based on the voluntary collaboration of large numbers of systematic botanists around the world. A complementary Fauna Malesian project, which was launched around 1988, is still in the early stages of development and has the potential to fill the same role as the Flora.

11. Both of these initiatives are likely to make important future contributions to the scientific study of the biota of Indonesia, and will complement research carried out at the herbarium and the zoological museum. However, the long time scale presently envisaged for completion of the Flora⁵ and Fauna are not commensurate with the needs of conservation. An injection of funds would make a major impact in speeding up the rate of production.

International Scientific Cooperation

12. Progress in strengthening institutional resources for systematic biology in Indonesia would be enhanced through strong international scientific cooperation. Many of the basic resources for systematic research--historical collections and libraries, and specialist expertise--are only available at a few overseas institutions. To make these resources more widely accessible to Indonesian

⁵ At the present rate of progress, the Flora Malesiana would not be completed until the year 2250. The Fauna--which unless strictly selective in the groups covered, could include several orders of magnitude more species than the Flora--would not be completed in the foreseeable future.

researchers and students, a series of sister institutional relationships between Indonesian and overseas organizations could be sponsored through bilateral agreements. To be fully sustainable, such support should take into account the full economic cost of scientific collaboration and not depend upon an 'invisible' subsidy by one of the participating institutions.

Identification Aids

13. The most important single factor limiting the rate of biodiversity inventory and monitoring in Indonesia is a lack of trained systematic biologists (paragraph 2.9). Specialist expertise in many systematic groups is limited, worldwide, to one or two persons. It would therefore be a great advantage if this expertise could be made more widely accessible to non-specialists, such as foresters, agriculturalists and ecologists who need a reliable way to identify organisms in the field. The recent development of "expert systems" for biological identification provides the means to construct PC-based, interactive, multiple-entry keys, with images of the important characters used to differentiate between taxa. Support is required to bring together small groups of world experts to "capture" their knowledge into an electronic format that can readily be distributed to PC users, or printed out in the form of inexpensive 'desk-top published' hard-copy.

Checklists

14. Basic working checklists of the names of species published in the scientific literature are an essential precursor to both inventory and systematic research. These are urgently needed by researchers in Indonesia, where even a rough estimate of the number of species present is not yet available.⁶

Genome Bank of Indonesian Wildlife

15. Molecular techniques are becoming increasingly important in assessing the viability of populations of animals conserved by *ex situ* methods. The development of appropriate technical resources to maintain genome banks and measure genetic variation will probably be essential if *ex situ* populations of rare and endangered species, or even *in situ* populations with highly restricted ranges, are to be maintained for indefinite periods.

Surveys of Plant Genetic Diversity

16. The development of strategies for the *in situ* and *ex situ* conservation of genetic diversity of selected plant taxa is of critical importance for long-term sustainable management of biological resources for forestry, agriculture and pharmacognosy. Integral to this task is the ability to survey genetic variation both within and between populations of the target taxa. There is a need to develop Indonesian capacity to sample and elucidate genetic variation, using a range of morphological, isozyme and molecular techniques, and to implement pilot projects for a range of high-priority woody plant groups.

⁶ The best available estimate of the number of flowering plant species in the Malesian region increased from 25,000 in 1989 to nearly 40,000 in 1992.

INDONESIA
BIODIVERSITY COLLECTIONS PROJECT

ANNEX 9

Summary Project Cost Tables

Indonesia
Biodiversity Collections Project
Inflation and Exchange Rates

	Up to Negotiation	Up to Project Start	94/95	95/96	96/97	97/98	98/99	99/00
Inflation (in %'s) /a								
Most Goods and Services								
Annual rates								
Local	1.9	2.8	2.8	5.5	5.5	5.5	5.5	2.3
Foreign	1.0	1.3	1.3	2.5	2.5	2.5	2.5	1.3
Compounded rates								
Local	1.9	2.8	4.2	8.5	14.4	20.7	27.4	32.3
Foreign	1.0	1.3	1.9	3.8	6.4	9.1	11.8	13.9
Contract for International Services								
Annual rates								
Local	1.3	1.5	1.5	3.0	3.0	3.0	3.0	1.5
Foreign	1.0	1.3	1.3	2.5	2.5	2.5	2.5	1.3
Compounded rates								
Local	1.3	1.5	2.3	4.6	7.7	10.9	14.3	16.8
Foreign	1.0	1.3	1.9	3.8	6.4	9.1	11.8	13.9
Exchange rates (Local/Foreign) /b								
Most Goods and Services								
Rates actually used	2,105.0	2,105.0	2,105.0	2,105.0	2,105.0	2,105.0	2,105.0	2,105.0
Constant purchasing parity rates	2,105.0	2,136.2	2,184.0	2,232.5	2,297.9	2,365.1	2,434.4	2,481.3
% deviation	0.0	-1.5	-3.6	-5.7	-8.4	-11.0	-13.5	-15.2
Contract for International Services								
Rates actually used	2,105.0	2,105.0	2,105.0	2,105.0	2,105.0	2,105.0	2,105.0	2,105.0
Constant purchasing parity rates	2,105.0	2,110.2	2,118.0	2,125.9	2,136.2	2,146.7	2,157.1	2,165.0
% deviation	0.0	-0.2	-0.6	-1.0	-1.5	-1.9	-2.4	-2.8

\a Yearly values are within Each Project Year
\b Yearly values are at Project Year Midpoints

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Indonesia
Biodiversity Collections Project
Project Cost Summary

	(Rp Million)			(US\$ '000)			% Foreign Exchange	% Total Base Costs
	Local	Foreign	Total	Local	Foreign	Total		
I. Investment Costs								
A. Facilities Upgrading								
1. Civil Works	35	15	49	16	7	23	30	-
2. Air Conditioning Install.	44	82	126	21	39	60	65	1
Subtotal Facilities Upgrading	79	96	175	37	46	83	55	1
B. Equipment, Supplies, and Furniture								
1. Computer and Office Equipment	312	729	1,042	148	346	495	70	5
2. Other equipment and Supplies	195	1,104	1,298	93	524	617	85	6
3. Furniture	1,503	373	1,876	714	177	891	20	9
Subtotal Equipment, Supplies, and Furniture	2,010	2,205	4,216	955	1,048	2,003	52	21
C. Human Resources								
1. Honoraria and Allowances	740	-	740	352	-	352	-	4
2. Training								
Technical Advisors and Work-study Programs	924	3,603	4,528	439	1,712	2,151	80	22
Graduate Scholarships	154	2,951	3,106	73	1,402	1,475	95	15
Miscellaneous Local Training	587	-	587	279	-	279	-	3
Subtotal Training	1,566	6,555	8,221	791	3,114	3,905	80	41
Subtotal Human Resources	2,406	6,555	8,961	1,143	3,114	4,257	73	44
D. Publications & Products	525	521	1,045	249	247	497	50	5
E. Research Grants	835	31	866	397	15	411	4	4
F. Strategic Planning and Policy Studies	69	67	136	33	32	65	49	1
G. Contract Employees	906	-	906	430	-	430	-	4
Total Investment Costs	6,830	9,475	16,305	3,245	4,501	7,746	58	80
II. Recurrent Costs								
A. Facility Maintenance	737	-	737	350	-	350	-	4
B. Equipment & Supplies								
1. Curation	208	-	208	99	-	99	-	1
2. Travel	373	-	373	177	-	177	-	2
3. Other Research Expenses	1,361	-	1,361	646	-	646	-	7
Subtotal Equipment & Supplies	1,942	-	1,942	922	-	922	-	10
C. Human Resources								
1. PPPB Staff	1,120	-	1,120	532	-	532	-	6
D. Support								
1. Administration	152	-	152	72	-	72	-	1
Total Recurrent Costs	3,950	-	3,950	1,877	-	1,877	-	20
Total BASELINE COSTS	10,780	9,475	20,255	5,121	4,501	9,622	47	100
Physical Contingencies	892	472	1,364	424	224	648	35	7
Price Contingencies	1,718	646	2,364	816	307	1,123	27	12
Total PROJECT COSTS	13,390	10,593	23,984	6,361	5,032	11,394	44	118

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Indonesia
Biodiversity Collections Project
Disbursement Accounts by Financiers
(US\$ '000)

	Global Environment		Government of Indonesia		Total		For. Exch.	Local (Excl. Taxes)	Duties & Taxes
	Trust Fund	Amount	Amount	Amount	Amount	Amount			
	\$	\$	\$	\$	\$	\$			
A. Civil Works	78	85.0	14	15.0	92	0.8	50	28	14
B. Equipment, Furniture, and Materials									
1. Computers and Office Equipment /a	281	85.0	50	15.0	330	2.9	194	86	50
2. Other equipment, furniture, and materials /b	<u>1,520</u>	<u>85.0</u>	<u>268</u>	<u>15.0</u>	<u>1,788</u>	<u>15.7</u>	<u>819</u>	<u>701</u>	<u>268</u>
Subtotal Equipment, Furniture, and Materials	1,801	85.0	318	15.0	2,119	18.6	1,013	788	318
C. Training	3,666	84.4	675	15.6	4,341	38.1	3,438	656	247
D. Research Grants	81	16.6	409	83.4	491	4.3	15	425	50
E. Allowances, Honoraria, & Contract Employee Wages	1,003	85.0	177	15.0	1,180	10.4	115	908	157
F. Consultant services	571	90.0	63	10.0	634	5.6	401	170	63
G. Recurrent costs	-	-	<u>2,537</u>	<u>100.0</u>	<u>2,537</u>	<u>22.3</u>	-	<u>2,432</u>	<u>105</u>
Total	7,200	63.2	4,193	36.8	11,394	100.0	5,032	5,408	954

\a Hardware (including installation, service contracts and associated software) and commercial software.
\b Excluding vehicles.

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Indonesia
Biodiversity Collections Project
Disbursement Accounts by Financiers
(US\$ '000)

	Global Environment Trust Fund		Government of Indonesia		Total		For. Exch.	Local (Excl. Taxes)	Duties & Taxes
	Amount	%	Amount	%	Amount	%			
A. Civil Works	78	85.0	14	15.0	92	0.8	50	28	14
B. Equipment, Furniture, and Materials									
1. Computers and Office Equipment /a	281	85.0	50	15.0	330	2.9	194	86	50
2. Other equipment, furniture, and materials /b	1,520	85.0	268	15.0	1,788	15.7	819	701	268
Subtotal Equipment, Furniture, and Materials	1,801	85.0	318	15.0	2,119	18.6	1,013	788	318
C. Training	3,666	84.4	675	15.6	4,341	38.1	3,438	656	247
D. Research Grants	81	16.6	409	83.4	491	4.3	15	425	50
E. Allowances, Honoraria, & Contract Employee Wages	1,003	85.0	177	15.0	1,180	10.4	115	908	157
F. Consultant services	571	90.0	63	10.0	634	5.6	401	170	63
G. Recurrent costs	-	-	2,537	100.0	2,537	22.3	-	2,432	105
Total	7,200	63.2	4,193	36.8	11,394	100.0	5,032	5,408	954

\a Hardware (including installation, service contracts and associated software) and commercial software.
\b Excluding vehicles.

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Indonesia
Biodiversity Collections Project
Components by Financiers
(US\$ '000)

	Global		Government		Local		Duties		
	Environment		of Indonesia		Total		For.	(Excl.	&
	Trust	Fund	Amount	₹	Amount	₹	Exch.	Taxex	Taxes
1. General Project Management & Coordination	1,264	66.3	644	33.7	1,908	16.7	710	987	211
2. Botany Collections and Research	1,566	44.7	1,939	55.3	3,505	30.8	980	2,229	295
3. Zoology Collections and Research	1,964	64.2	1,095	35.8	3,059	26.8	1,201	1,533	324
4. Information Systems	685	78.9	183	21.1	868	7.6	522	251	96
5. Scientific Collaboration and Services	1,722	83.8	333	16.2	2,054	18.0	1,619	407	28
Total Disbursement	7,200	63.2	4,193	36.8	11,394	100.0	5,032	5,408	954

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Indonesia
Biodiversity Collections Project
Expenditure Accounts by Financiers
(US\$ '000)

	Global Environment		Government		Total		Local Duties		
	Trust	Fund	of Indonesia			For.	(Excl.	&	
	Amount	\$	Amount	\$	Amount	\$	Exch.	Taxes	Taxes
I. Investment Costs									
A. Facilities Upgrading									
1. Civil Works	22	85.0	4	15.0	26	0.2	8	15	4
2. Air Conditioning Install.	56	85.0	10	15.0	66	0.6	42	14	10
Subtotal Facilities Upgrading	78	85.0	14	15.0	92	0.8	50	28	14
B. Equipment, Supplies, and Furniture									
1. Computer and Office Equipment	483	87.0	72	13.0	555	4.9	385	99	72
2. Other equipment and Supplies	578	85.0	102	15.0	680	6.0	578	-	102
3. Furniture	858	85.0	151	15.0	1,009	8.9	193	664	151
Subtotal Equipment, Supplies, and Furniture	1,919	85.5	325	14.5	2,244	19.7	1,156	763	325
C. Human Resources									
1. Honoraria and Allowances	360	85.0	63	15.0	423	3.7	-	369	54
2. Training									
Technical Advisors and Work-study Programs	2,160	90.1	239	9.9	2,398	21.0	1,905	254	239
Graduate Scholarships	1,591	94.3	95	5.7	1,686	14.8	1,591	95	-
Miscellaneous Local Training	-	-	348	100.0	348	3.1	-	333	15
Subtotal Training	3,750	84.6	682	15.4	4,433	38.9	3,496	683	254
Subtotal Human Resources	4,110	84.6	746	15.4	4,856	42.6	3,496	1,051	308
D. Publications & Products	506	86.8	77	13.2	583	5.1	279	226	77
E. Research Grants	81	16.6	409	83.4	491	4.3	15	425	50
F. Strategic Planning and Policy Studies	66	90.0	7	10.0	74	0.6	36	31	7
G. Contract Employees	440	85.0	78	15.0	518	4.5	-	451	67
Total Investment Costs	7,200	81.3	1,656	18.7	8,856	77.7	5,032	2,976	848
II. Recurrent Costs									
A. Facility Maintenance	-	-	474	100.0	474	4.2	-	454	20
B. Equipment & Supplies									
1. Curation	-	-	133	100.0	133	1.2	-	127	6
2. Travel	-	-	238	100.0	238	2.1	-	228	10
3. Other Research Expenses	-	-	870	100.0	870	7.6	-	833	37
Subtotal Equipment & Supplies	-	-	1,241	100.0	1,241	10.9	-	1,189	52
C. Human Resources									
1. PPPB Staff	-	-	725	100.0	725	6.4	-	695	30
D. Support									
1. Administration	-	-	97	100.0	97	0.9	-	94	4
Total Recurrent Costs	-	-	2,537	100.0	2,537	22.3	-	2,432	105
Total Disbursement	7,200	63.2	4,193	36.8	11,394	100.0	5,032	5,408	954

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Indonesia
Biodiversity Collections Project
Expenditure Accounts by Components - Totals Including Contingencies
(US\$ '000)

	General Project Management & Coordination	Botany Collections and Research	Zoology Collections and Research	Information Systems	Scientific Collaboration and Services	Total
I. Investment Costs						
A. Facilities Upgrading						
1. Civil Works	1	25	-	-	-	26
2. Air Conditioning Install.	-	66	-	-	-	66
Subtotal Facilities Upgrading	1	91	-	-	-	92
B. Equipment, Supplies, and Furniture						
1. Computer and Office Equipment	50	-	-	458	47	555
2. Other equipment and Supplies	32	275	371	1	-	680
3. Furniture	2	381	620	-	6	1,009
Subtotal Equipment, Supplies, and Furniture	85	657	991	460	52	2,244
C. Human Resources						
1. Honoraria and Allowances	132	92	122	35	43	423
2. Training						
Technical Advisors and Work-study Programs	676	683	815	224	-	2,398
Graduate Scholarships	-	-	-	-	1,686	1,686
Miscellaneous Local Training	-	201	105	-	42	348
Subtotal Training	676	884	921	224	1,728	4,433
Subtotal Human Resources	808	976	1,042	258	1,771	4,856
D. Publications & Products	169	179	235	-	-	583
E. Research Grants	491	-	-	-	-	491
F. Strategic Planning and Policy Studies	74	-	-	-	-	74
G. Contract Employees	212	92	93	61	59	518
Total Investment Costs	1,838	1,995	2,361	779	1,882	8,856
II. Recurrent Costs						
A. Facility Maintenance						
	-	252	170	26	26	474
B. Equipment & Supplies						
1. Curation	-	34	95	3	-	133
2. Travel	-	195	43	-	-	238
3. Other Research Expenses	-	763	21	-	86	870
Subtotal Equipment & Supplies	-	992	160	3	86	1,241
C. Human Resources						
1. PPPB Staff	70	223	330	46	58	725
D. Support						
1. Administration	-	42	38	14	3	97
Total Recurrent Costs	70	1,509	697	88	172	2,537
Total PROJECT COSTS	1,908	3,505	3,059	868	2,054	11,394
Taxes	211	295	324	96	28	954
Foreign Exchange	710	980	1,201	522	1,619	5,032

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Indonesia
 Biodiversity Collections Project
 Project Components by Year
 (US\$ '000)

	<u>Totals Including Contingencies</u>						<u>Total</u>
	<u>94/95</u>	<u>95/96</u>	<u>96/97</u>	<u>97/98</u>	<u>98/99</u>	<u>99/00</u>	
1. General Project Management & Coordination	346	310	359	331	325	237	1,908
2. Botany Collections and Research	263	1,104	644	683	578	233	3,505
3. Zoology Collections and Research	132	1,372	518	525	368	145	3,059
4. Information Systems	47	460	118	96	115	31	868
5. Scientific Collaboration and Services	57	332	573	589	408	96	2,054
Total PROJECT COSTS	844	3,578	2,212	2,224	1,794	741	11,394

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Indonesia
Biodiversity Collections Project
Expenditure Accounts by Years
(US\$ '000)

	<u>Totals Including Contingencies</u>						<u>Total</u>
	<u>94/95</u>	<u>95/96</u>	<u>96/97</u>	<u>97/98</u>	<u>98/99</u>	<u>99/00</u>	
I. Investment Costs							
A. Facilities Upgrading							
1. Civil Works	2	22	1	1	1	-	26
2. Air Conditioning Install.	-	66	-	-	-	-	66
Subtotal Facilities Upgrading	2	88	1	1	1	-	92
B. Equipment, Supplies, and Furniture							
1. Computer and Office Equipment	43	288	92	69	50	14	555
2. Other equipment and Supplies	11	496	48	105	16	4	680
3. Furniture	65	827	89	28	-	-	1,009
Subtotal Equipment, Supplies, and Furniture	119	1,611	229	201	66	18	2,244
C. Human Resources							
1. Honoraria and Allowances	51	72	82	97	84	36	423
2. Training							
Technical Advisors and Work-study Programs	438	801	404	332	293	131	2,398
Graduate Scholarships	-	243	499	532	347	66	1,686
Miscellaneous Local Training	10	48	40	122	128	-	348
Subtotal Training	448	1,093	942	985	769	197	4,433
Subtotal Human Resources	498	1,165	1,024	1,082	853	233	4,856
D. Publications & Products	5	114	183	180	71	30	583
E. Research Grants	-	59	83	87	136	125	491
F. Strategic Planning and Policy Studies	1	-	73	-	-	-	74
G. Contract Employees	31	107	135	123	86	35	518
Total Investment Costs	656	3,144	1,728	1,674	1,214	440	8,856
II. Recurrent Costs							
A. Facility Maintenance	36	75	91	105	110	57	474
B. Equipment & Supplies							
1. Curation	12	25	26	27	29	15	133
2. Travel	21	44	46	49	51	27	238
3. Other Research Expenses	77	161	169	178	187	97	870
Subtotal Equipment & Supplies	110	229	241	254	267	139	1,241
C. Human Resources							
1. PPPB Staff	33	112	134	171	181	94	725
D. Support							
1. Administration	9	18	19	20	21	11	97
Total Recurrent Costs	188	434	485	550	580	301	2,537
Total PROJECT COSTS	844	3,578	2,212	2,224	1,794	741	11,394

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Indonesia
Biodiversity Collections Project
Procurement Arrangements
(US\$ '000)

	Procurement Method					N.B.F.	Total
	Local Competitive Bidding	Limited International Bidding	Local Shopping	Direct Contracting	Consulting Services		
A. Civil Works	92 (78)	-	-	-	-	-	92 (78)
B. Equipment, Materials, and Furniture							
Scientific and Curation Equipment and Materials	-	600 (510)	32 (27)	-	-	-	632 (537)
Computers and Office Equipment	210 (178)	-	70 (59)	-	-	-	280 (238)
Specimen Storage Furniture	1,004 (853)	-	-	-	-	-	1,004 (853)
Other Equipment, Materials, and Furniture	-	-	103 (88)	-	-	-	103 (88)
C. Technical Assistance, Training, and Studies							
1. Technical Advisors and Specialized Training	-	-	-	-	2,398 (2,160)	-	2,398 (2,160)
2. Studies	-	-	-	-	74 (66)	-	74 (66)
3. Graduate Fellowships	-	-	-	1,591 (1,591)	-	95	1,686 (1,591)
4. Local Training Programs and Internships	-	-	-	-	-	348	348
D. Misc. Contracts							
Publications and Products	-	-	-	375 (319)	433 (390)	-	808 (708)
Contract Employees	-	-	-	518 (440)	-	-	518 (440)
Research Grants	-	-	-	81 (81)	-	409	492 (81)
E. Allowances and Honoraria	-	-	-	423 (360)	-	-	423 (360)
F. Recurrent Expenditures	-	-	-	-	-	2,537	2,537
Total	1,306 (1,110)	600 (510)	205 (174)	2,988 (2,790)	2,905 (2,616)	3,390	11,394 (7,200)

Note: Figures in parenthesis are the respective amounts financed by Global Environment Trust Fund

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Indonesia
Biodiversity Collections Project
Procurement Accounts by Years
(US\$ '000)

	<u>Totals Including Contingencies</u>						<u>Total</u>
	<u>94/95</u>	<u>95/96</u>	<u>96/97</u>	<u>97/98</u>	<u>98/99</u>	<u>99/00</u>	
A. Civil Works	2	88	1	1	1	-	92
B. Equipment, Materials, and Furniture							
Scientific and Curation Equipment and Materials	2	483	39	98	10	0	632
Computers and Office Equipment	22	209	10	11	17	11	280
Specimen Storage Furniture	58	828	89	28	-	-	1,004
Other Equipment, Materials, and Furniture	<u>38</u>	<u>17</u>	<u>15</u>	<u>13</u>	<u>13</u>	<u>7</u>	<u>103</u>
Subtotal Equipment, Materials, and Furniture	119	1,538	154	150	40	18	2,019
C. Technical Assistance, Training, and Studies							
1. Technical Advisors and Specialized Training	438	801	404	332	293	131	2,398
2. Studies	1	-	73	-	-	-	74
3. Graduate Fellowships	-	243	499	532	347	66	1,686
4. Local Training Programs and Internships	<u>10</u>	<u>48</u>	<u>40</u>	<u>122</u>	<u>128</u>	<u>-</u>	<u>348</u>
Subtotal Technical Assistance, Training, and Studies	448	1,093	1,015	985	769	197	4,506
D. Misc. Contracts							
Publications and Products	5	187	258	231	98	30	808
Contract Employees	31	107	135	123	86	35	518
Research Grants	<u>-</u>	<u>59</u>	<u>83</u>	<u>87</u>	<u>136</u>	<u>125</u>	<u>491</u>
Subtotal Misc. Contracts	36	353	476	441	320	190	1,816
E. Allowances and Honoraria	51	72	82	97	84	36	423
F. Recurrent Expenditures	<u>188</u>	<u>434</u>	<u>485</u>	<u>550</u>	<u>580</u>	<u>301</u>	<u>2,537</u>
Total	844	3,578	2,212	2,224	1,794	741	11,394

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