

Republic of Indonesia

## Ex-Post Evaluation of the Japanese Grant Aid Project

“Project for Improvement of Research Facilities for Biodiversity Conservation and Utilization”

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### 0. Summary

The implementation of the project has been highly relevant to the development policies and needs of Indonesia, as well as to the development policies of Japan, and thus the relevance is high. However, the efficiency of project inputs is fair since the project period was slightly longer than planned, while the project cost was lower than planned. Through the project, the procurement of equipment for research, collection, and educational purposes at the botanical and microbial divisions of the Research Center for Biology (RCB) has brought about research effects (e.g., the volume of research and collections increased/maintained) and educational effects (e.g., the number of visitors increased). These are either the same as or higher than planned. The impact is also high, since research and development of new drugs and biofuels that utilize plants and microbes are conducted in the project. No major problems have been observed in the structural, technical, and financial aspects of the operation and maintenance of the equipment and facilities at RCB. Thus, the sustainability of the project effects is high.

In light of the above, the Project is evaluated to be highly satisfactory.

### 1. Project Description



Project Location



Building of Research Center for Biology

#### 1.1 Background

The landmass of Indonesia is approximately 1.3% of the world's landmass, and it was home to approximately 20% of the earth's organism species. The number of mammals and reptiles found in Indonesia was the highest and the third highest in the world, respectively. However, economic development, triggered by population growth in Indonesia, has worsened their living environment and caused the speed of species extinction to become unprecedentedly fast. Thus, it was necessary to

conserve the biodiversity<sup>1</sup>.

In 1990, the Government of Indonesia designated RCB, under the Indonesian Institute of Science, as a research institute for the conservation of biodiversity. Since RCB did not have adequate research facilities and capabilities, the Government of Japan has implemented the following cooperation projects at the Indonesian government's request.

**【Grant Aid Projects:】**

1995: Biodiversity Conservation Project (for constructing facilities at the zoological division)

1996: Biodiversity Conservation Project (for procuring equipment at the zoological division)

**【Technical Cooperation Projects:】**

1995-1998: Biodiversity Conservation Project I (for strengthening research capabilities)

1998-2003: Biodiversity Conservation Project II (for establishing management systems)

As the facilities and equipment at the botanical and microbial divisions were decrepit, the Project for Improvement of Research Facilities for Biodiversity Conservation and Utilization has been implemented as part of a series of projects on the conservation of biodiversity in Indonesia.

**1.2 Project Outline**

The objective of the project is to promote research in and education on the conservation of plants and microbes by constructing a building for the botanical and microbial divisions of RCB at Cibinong in the suburbs of Bogor. The project also aims to procure equipment for research, collection, and educational purposes at the facility.

Grant Limit/ Actual Grant Amount		2,172 million yen / 2,151 million yen
Exchange of Notes Date		July, 2004
Implementing Agency		Research Center for Biology, Indonesian Institute of Science
Project Completion Date		September, 2006
Parties Involved	Main Contractors	Construction: Taisei Corporation (Japan) Procurement: (1) Itochu Corporation (Japan), (2) Lot-1 Itochu Corporation (Japan), Lot-2 Itochu Corporation (Japan), Lot-3 Ogawa Seiki Corporation (Japan)
	Main Consultant	Kume Sekkei Corporation (Japan) • Intem Consulting (Japan) (JV)
Basic Design		April, 2003 – December, 2003
Related Projects		• Grant Aid Project Biodiversity Conservation Project (1995 & 1996) • Technical Cooperation Project Biodiversity Conservation Project (I: 1995-1998, II: 1998- 2003)

<sup>1</sup> For us, the conservation of biodiversity in Indonesia is not someone else's problem. Most of the fibers for our clothes, our food, and building materials for our houses are imported. Our lives depend on ecosystem services (supporting services, provisioning services, regulating services, and cultural services) abroad. Since the foundation of ecosystem services is biodiversity (lives on earth), the loss of our biodiversity leads to poorer ecosystem services and thus, a lower standard of living.

	<p>The Project on Improvement of Collection Management and Biodiversity Research Capacity of the Research Center for Biology (2007-2009)</p> <ul style="list-style-type: none"> <li>• (Science &amp; Technology) Project for Development of Internationally Standardized Microbial Resources Center to Promote Life Science Research and Biotechnology (2011-2016)</li> </ul>
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As mentioned above, the project is part of a series of cooperation projects spread over 10 years, in which the Government of Japan contributes toward improving the research facilities and capabilities of RCB. These series of projects have fortified the position of RCB as a center of excellence in the conservation of biodiversity in the Government of Indonesia.

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Mr. Koichiro Ishimori, Value Frontier Co., Ltd

### 2.2 Duration of the Evaluation Study

The ex-post evaluation study was implemented according to the following schedule:

Duration of the Study: October 2010– October 2011

Durations of the Field Studies: November 27<sup>th</sup>–December 11<sup>th</sup>, 2010 and April 2<sup>nd</sup>–April 9<sup>th</sup>, 2011

### 2.3 Constraints during the Evaluation Study

Due to limitations on the budget and time available for the ex-post evaluation study, it was not possible to observe the operation and maintenance situations of all 420 items procured by the project for research, collection, and educational purposes. However, this information has been verified through the RCB database.

Moreover, the external evaluator was unable to disclose certain research results in this report due to issues of intellectual property rights.

## 3. Results of the Evaluation (Overall Rating: A)

### 3.1 Relevance (Rating: ③)

#### 3.1.1 Relevance to the Development Policies/Plans of Indonesia

Program Pembangunan Nasional (PROPENAS) (2000–2004) at the time of the basic design aimed at “strengthening the sustainable and fair development foundations based on the promotions of economic reconstruction and national economic system” as one of its 5 priorities, and tried to seek “the development of natural resources and the environment” to realize the aim.

The Indonesia Biodiversity Strategy and Action Plan (2003–2020) aimed at “enhancing the Indonesian community through the conservation and utilization of its biodiversity” as its vision, and sought “the utilization of scientific and technological knowledge on biodiversity” to realize this. One of the priorities of the plan was the promotion of basic and applied scientific research in biodiversity

issues and provision of support to the existing financial and human resources in order to disseminate related information.

Rancangan Pembangunan Jangka Menengah Nasional (RPJMN) (2010-2014), at the time of the ex-post evaluation, aims at “enhancing economic development and national welfare” as one of its 5 priorities. It seeks “the improvement of science and technology necessary for achieving sustainable natural resources development” as a step towards realizing the aim.

The Indonesia Biodiversity Strategy and Action Plan (2003–2020) still remains the same.

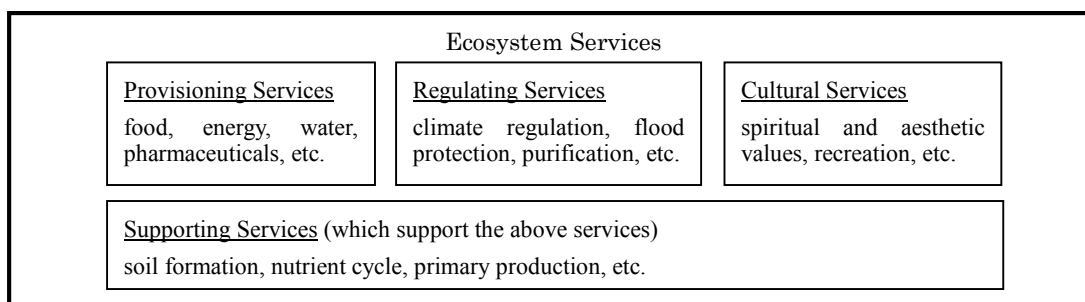
In sum, the national development plans and the Indonesia Biodiversity Strategy and Action Plan, both at the time of the basic design and the ex-post evaluation, acknowledge the importance of “the development of natural resources and the environment” and “biodiversity”. In light of the above, the project is judged to be relevant with the national development plans and the Indonesia Biodiversity Strategy and Action Plan.

### 3.1.2 Relevance to the Development Needs of Indonesia

At the time of the basic design, approximately 40 million people in Indonesia worked in the agricultural and fishery industries and lived a life that was directly dependent on the ecosystem. By using foods, drugs, and construction materials originating from wild animals and plants, the remainder of the Indonesian population was also indirectly dependent on ecosystem services (see figure 1). Meanwhile, the habitat areas of wild animals and plants were decreasing year by year due to human economic activities and forest fires. According to the International Union for Conservation of Nature (IUCN) (2002), the number of endangered species in Indonesia was 1,393, which was approximately 12.5% of all the 11,167 species found in the world. Therefore, the project that was going to be implemented to promote research in and education on the conservation of wild plants and microbes met the development needs at that time. In light of the above, the needs of the project were judged to be high.

At the time of the ex-post evaluation, approximately 40 million people in Indonesia still work in the agricultural and fishery industries and live a life that is directly dependent on the ecosystem. The remainder of the Indonesian population is also still indirectly dependent on ecosystem services. At the same time, according to IUCN (2009), the number of endangered species in Indonesia is 1,126, which is approximately 3.4% of the world’s 33,039 species. The project that constructed a building for the botanical and microbial divisions of RCB and procured equipment for research, collection, and educational purposes promotes not only the discovery and utilization of previously unknown biological resources, but the sustainable management and use of known biological resources. It also helps the people to understand the meaning of conservation of biodiversity and biological resources. This is expected to contribute to maintaining and expanding both ecosystem services and the conservation of biodiversity that forms the foundation of the services. Therefore, the project still meets the development needs of today, and in light of the above, the needs of the project are judged

to be high.



Source: Millennium Ecosystem Assessment

### 3.1.3 Relevance to Japan’s ODA Policies

The Charter on Official Development Assistance (ODA) (2003) highlighted the importance of “contributing to resolving global issues” including environmental issues as one of its 4 priorities. Among the 7 priorities stated in the mid-term policy on ODA (1999), “conservation of the environment” was included under the priority of global issues.

From this perspective, the Government of Japan has implemented a wide range of biodiversity conservation projects in Indonesia. The grant aid projects have constructed facilities and procured equipment for promoting scientific research, while the technical cooperation projects have strengthened research capabilities. The project discussed in this ex-post evaluation is also relevant in that it is a grant aid project, since it aimed at reconstructing decrepit facilities and procuring equipment for the purpose of conserving and researching biodiversity, which are common assets for mankind. In light of the above, the project is judged to be relevant with Japan’s ODA policies.

In sum, the project has been highly relevant with Indonesian development policies/plans and development needs, as well as Japan’s ODA policies. Therefore, its relevance is high.

## 3.2 Efficiency (Rating: ②)

### 3.2.1 Project Outputs

Table 1 describes the planned and actual outputs of the project, including notes and reasons for difference between the two.

Table 1: Details of Project Outputs

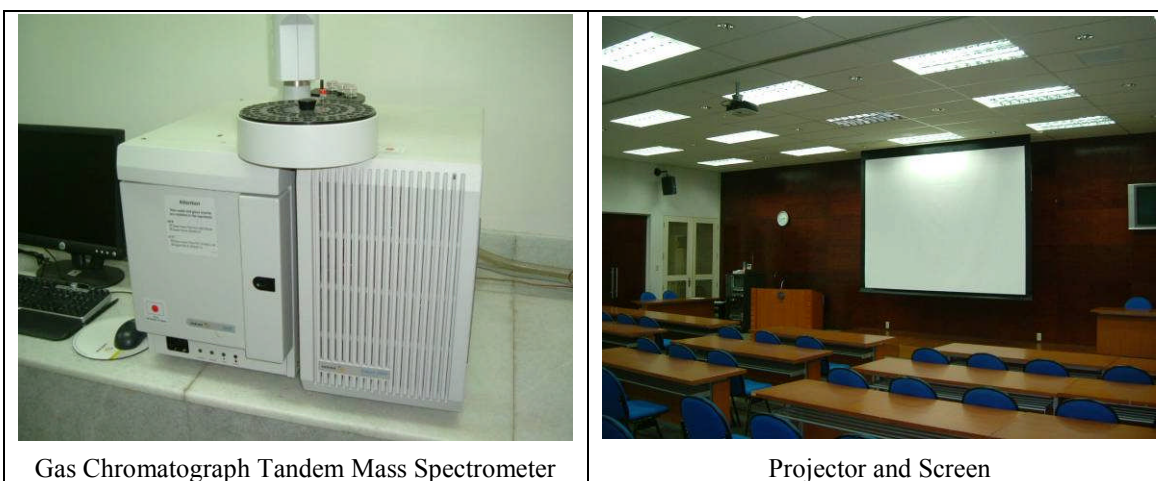
Plan (Basic Design)	Actual (Ex-post Evaluation)	Notes
(1) Construction of a building for botanical and microbial divisions of RCB: 1	(1) Construction of a building for botanical and microbial divisions of RCB: As planned.	Both (1) and (2) were appropriate outputs that enhanced the effectiveness and sustainability of the project. A liquid nitrogen maker is currently not in use due to lack of engineers who have
(2) Procurement of equipment for research, collection, and educational purposes:	(2) Procurement of equipment for research, collection, and educational purposes: As planned	

<p><b>【 Measurement/Analytical Equipment at Botany】</b></p> <ul style="list-style-type: none"> <li>• Plant chemistry: 30 items</li> <li>• Plant physiology: 51 items</li> <li>• Morphologic genetics/anatomy: 44 items</li> <li>• Taxonomy: 37 items</li> <li>• Ecology: 22 items</li> <li>• Ethnobotany: 5 items</li> <li>• Collection: 19 items</li> <li>• Others: 43 items</li> </ul> <p><b>【 Measurement/Analytical Equipment at Botany】</b></p> <ul style="list-style-type: none"> <li>• Biology/physiology: 45 items</li> <li>• Microbial development: 21 items</li> <li>• Phylogenetics/genetics: 27 items</li> <li>• Biochemistry: 32 items</li> <li>• Others: 17 items</li> </ul> <p><b>【 Equipment for Environmental Education】</b></p> <ul style="list-style-type: none"> <li>• Audio-visual room: 18 items</li> <li>• Library: 5 items</li> <li>• Information center: 4 items</li> </ul>		<p>mastered in its operation. The OECD guideline<sup>2</sup> demands that biological research centers should preserve collections using liquid nitrogen and RCB attempts to ensure the same. Therefore, the liquid nitrogen maker was an appropriate output in the medium and long terms.</p>
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Source: RCB



<sup>2</sup> “OECD Best Practice Guidelines for Biological Resource Centres” (2007)



Gas Chromatograph Tandem Mass Spectrometer

Projector and Screen

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Cost

While the project cost planned for the basic design was 2,172 million yen, the actual cost for realizing the planned outputs was 2,151 million yen (99% of the planned cost). Thus, it was lower than planned.

#### 3.2.2.2 Project Period

While the project period planned for the basic design was 23 months, from July 2004 (Date of Exchange of Notes) to May 2006, the actual project period was 27 months (117% of the planned period). This meant a 4-month delay, from October 2004 (Date of Exchange of Notes) to September 2006. The reason behind this was the additional time required for the procedures for the second tender, which was necessitated due to the failure of the first bid that was higher than the budget. Thus, this had nothing to do with the increases/decreases in outputs.

In sum, while the project cost was lower than planned, the project period was longer than planned, and therefore, the efficiency of the project is fair.

### 3.3 Effectiveness (Rating: ③)

#### 3.3.1 Quantitative Effects

##### 【Promotion of Research】

##### 1. Effects of Procuring Equipment for Research

Table 2: Effects of Procuring Equipment for Research

Indicators	Base (2002)	2006	2007	2008	2009	2010
Total number of joint research projects on botany	15	18	19	30	16	14
Joint research projects on botany with Japanese	2	5	2	4	3	3

Total number of visiting researchers	281	9	104	250	286	289
Visiting researchers from Japan	4	1	3	3	3	6

Source: RCB

While the project planned to achieve 20 joint research projects on botany in 2010, it actually achieved 14, which was 70% of the planned target. However, the average from 2006 to 2010 was 19, which was 95% of the planned target.

There was no planned target with regard to visiting researchers, thereby making it impossible to compare the planned number with the actual figure. However, the number of visiting researchers remained more or less consistent before and after the project was implemented. The only exceptions were in 2006, when the RCB building was under construction and in 2007, immediately after its completion.

In addition, Biodiversity Conservation Project I (1995–1998) and II (1998–2003) of the Technical Cooperation Project that were implemented before this project, has provided researchers and support staff at the botanical and microbial divisions of RCB with training in operations, such as in conducting measurements and using analytical equipment like electron microscopes and DNA analyzers. This is believed to have improved their analytical and research capabilities. Thus, these projects are believed to have effects of promotion of research. Such observations recognize the synergy between the technical cooperation projects and the grant aid projects.

## 2. Effects of the Procurement of Equipment for Collection

Table 3: Effects of the Procurement of Equipment for Collection

Indicators	Base (2003)	2006	2007	2008	2009	2010
Dried specimens	20,000	716,146	720,544	729,554	732,626	737,550
Spirit specimens	8,194	49,614	49,614	49,772	49,825	49,846
Microbes	864	37,259	62,102	93,641	134,002	183,645

Source: RCB

While the project planned to achieve 707,000 collections of dried specimens in 2007, it actually achieved 716,146, which was 102% of the planned target. In the same year, it had planned to achieve 50,000 collections of spirit specimens and actually achieved 49,614, which was 99% of the planned target. Similarly, while the project planned to achieve 37,800 collections of microbes, it actually achieved 62,102, which was 164% of the planned target. However, 300 out of 37,800 collections that the project had planned to preserve using liquid nitrogen have not been preserved. This was due to lack of engineers qualified in the operation of the liquid nitrogen maker and collection techniques using the chemical.

In addition, the Project on the Improvement of Collection Management and Biodiversity



Research Capacity of the Research Center for Biology (2007–2009), of the Technical Cooperation Project implemented earlier, had trained botanical and microbial researchers belonging to the RCB and their support staff in the collection techniques of plants and microbes. Such an improvement of the collection capabilities and promotion of efficient research further demonstrates the synergy between the technical cooperation projects and the grant aid projects.

**【Promotion of Education】**

3. Effects of the Procurement of Equipment for Educational Purposes

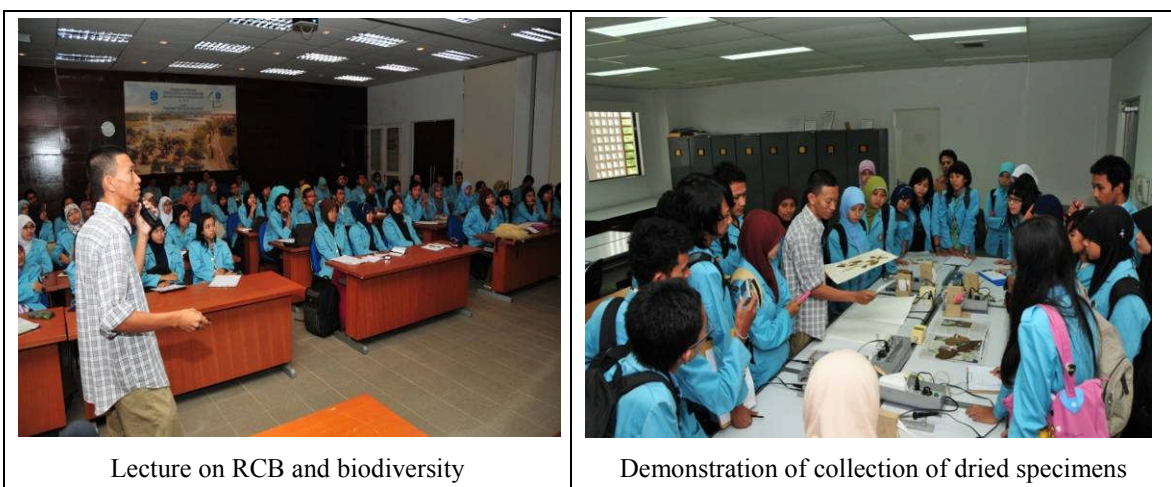
Table 4: Effects of the Procurement of Equipment for Educational Purposes

Indicator	Base (2002)	2006	2007	2008	2009	2010
Visitors to botanical and microbial division	1,054	311	1,115	1,247	1,054	1,399

Source: RCB

While the project planned to attract 1,300 visitors to the botanical and microbial division in 2010, it actually witnessed 1,399 visitors, which was 108% of the planned target. Every Thursday, the RCB hosts groups of students from all over the country and educates them on different aspects of the environment. The photographs provided below were taken at such sessions.

In addition, the Project on the Improvement of Collection Management and Biodiversity Research Capacity of the Research Center for Biology (2007–2009), as part of the Technical Cooperation Project, has made posters showing their research results. These, along with the RCB website (<http://www.biologi.lipi.go.id/>), are believed to have strengthened the dissemination of information on the environment. Thus, this technical cooperation project has visibly succeeded in promoting education. Therefore, the synergy between the technical cooperation projects and the grant aid projects is evident.



3.3.2 Qualitative Effects

According to 20 researchers at RCB with whom the external evaluator had an interview, all of

them expressed their satisfaction with the project as being higher than before. They also attributed improvements in their research quality to the enhanced research environment in terms of facilities and equipment.

In sum, the project has largely achieved its objectives, and therefore its effectiveness is high.

### 3.4 Impact

#### 3.4.1 Intended Impacts

Table 5: Effects of Promotion of Research

Indicators	Base (2003)	2006	2007	2008	2009	2010
Publications	119	186	170	227	173	178
External research funds (Rp 1 million)	NA	3,354	1,829	1,411	14,816	13,628

Source: RCB

While the project planned to have 160 publications in 2010, it actually managed 178, which was 111% of the planned target.

There was no planned target with regard to external research funds and thus, it is not possible to compare the planned funds with the actual ones. In 2010, the actual funds<sup>3</sup> were approximately 4 times higher than in 2006. However, it must be noted that the dramatic increases after 2009 can be explained by the fact that, in addition to the continual efforts of RCB, the Government of Indonesia increased its research budget in each sector.

Table 6: Effects of Promotion of Education

Indicator	Base (2002)	2006	2007	2008	2009	2010
Seminars and workshops	14	104	175	133	82	39

Source: RCB

There was no target with regard to the number of seminars and workshops<sup>4</sup> planned by the project. Thus, it is not possible to compare the planned number with the actual one. However, the number of seminars and workshops after the project was implemented increased in comparison to the period before its initiation. Such events are believed to have contributed to the promotion of education. The period after 2007 witnessed a decreasing trend due to the fact that researchers at RCB wanted to focus on their own research activities rather than on educational ones. This resulted in the number dropping to 39 in 2010 (an average of 3.25 times per month), the lowest in recent years.

<sup>3</sup> The funds were provided by the Research Incentive for Researchers and Inventors as the national research grant agency, United Nations Educational, Scientific and Cultural Organization (UNESCO) as the international organization, and National Institute of Health (NIH) as the foreign research institute.

<sup>4</sup> Contents of seminars and workshops ranged from “an introduction to biodiversity” and “biology of the Pandanus” to “the antibacterial effect of aromatic materials” and “the surveillance of avian influenza viruses.”

Further, 100 undergraduate and graduate students who have used RCB facilities were interviewed; they provided a number of reasons for visiting RCB. From among the 100, 50 students provided study tours organized by their universities or graduate schools as the reason for visiting. 32 students mentioned that it was because they required particular information from researchers at RCB, 30 stated that they wanted to use the RCB experiment facilities, and 18 mentioned that they wanted to use the RCB library. Overall, 99 out of the 100 students said that their visit to RCB was very useful to their studies and research. Therefore, the project is also believed to have successfully contributed to the promotion of education at the center.

**【Others (Various research examples)】**

1. A major Japanese pharmaceutical company has been conducting research, in collaboration with RCB, on the development of anti-aging products using the center's collections of plants. The development and utilization of anti-aging products can contribute to expanding ecosystem services, particularly provisioning services.
2. ICGB<sup>5</sup> has been conducting research, in collaboration with RCB, on the development of anticancer drugs and biofuels using the center's collections of microbes. As in the case above, the development and utilization of anticancer drugs and biofuels can also contribute to expanding ecosystem services, particularly provisioning services.
3. In combating soil degradation, the Government of Indonesia has been using microbes that RCB found to improve the soil quality of forest areas degraded by the eruption of Mt. Merapi in central Java. Improvements in the soil quality can contribute toward maintaining and expanding ecosystems, particularly as a supporting service.
4. Poultry farmers in Indonesia have been using high carotene microbes that RCB found to behave as prevention of disease. The development of such foods can contribute to expanding the ecosystems, particularly by providing provisioning services.

### 3.4.2 Other Impacts

#### 1. Impact on the Natural Environment

While conducting various chemical experiments, RCB generates toxic wastes and effluents that must be dealt with appropriately. In order to respond to such needs, the Technical Cooperation Project on Improvement of Collection Management and Biodiversity Research Capacity of the Research Center for Biology (2007–2009) has trained staff at the administrative division in the

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<sup>5</sup> The official name is International Cooperative Biodiversity Groups. They include University of California at Davis in the United States of America, Bandung Institute of Technology, Ministry of Forestry, and RCB in Indonesia, and are financed by the Government of the United States of America.

management of toxic wastes and effluents. A waste management plan has also been created. This, once again, demonstrates the synergy between the technical cooperation projects and the grant aid projects. Currently, local professionals handle toxic wastes, while effluents are treated using water purification equipment installed at RCB. Therefore, there seems to be no negative impact on the natural environment.

## 2. Resettlement and land acquisition

Four farmers had been using a part of the land allocated for the construction of the building for the botanical and microbial divisions of RCB. The Government of Indonesia solved the land acquisition problem by purchasing their agricultural products and allocating alternative lands for them. Currently, there seems to be no problem with resettlement and land acquisition.

## 3. Other Unintended Impacts

Since 1995, the series of projects with Japan, spanning over 10 years, have fortified RCBs position as a center of excellence on the conservation of biodiversity in Indonesia. RCB had also sent its members, as representatives of the Government of Indonesia, to the 10<sup>th</sup> Conference of the Parties to the Convention on Biological Diversity held at Nagoya in 2010. Thus, RCB plays an important role in the Government of Indonesia.

In sum, the project has had impacts on promoting research and education and other things, and therefore, many positive impacts are acknowledged.

### **3.5 Sustainability (Rating: ③)**

#### 3.5.1 Structural Aspects of Operation and Maintenance

At the time of the basic design, the operation and maintenance of the constructed facilities was to be done by 5 administrative officers and 4 technical officers (1 engineer and 3 others) from the general affairs section of the administrative division. In reality, this is actually done by 14 administrative officers and 7 technical officers (5 engineers and 2 others). The procured equipment was to be operated by a team comprising of 74 researchers (21 PhDs, 7 MS and 46 BS holders) and 29 technical officers from the botanical division, and 40 researchers (8 PhDs, 5 MS and 27 BS holders) and 8 technical officers from the microbial division. The team now comprises of 102 researchers (30 PhDs, 30 MS and 42 BS holders) and 49 technical officers from the botanical division, and 47 researchers (8 PhDs, 13 MS and 26 BS holders) and 12 technical officers from the microbial division.

Similarly, the maintenance of the procured equipment was planned to be done by 8 administrative officers and 5 technical officers (1 engineer, 3 librarians and 1 information system officer) from the botanical section of the collection management division alongside 8 administrative officers and 5

technical officers (3 librarians, and 2 information system staff) from the microbial section of the collection management division. Currently, maintenance of the procured equipment is actually done by 4 administrative and 12 technical officers (1 engineer, 9 librarians, and 2 information system officers) from the botanical section of the collection management division and 1 administrative and 4 technical officers (3 engineer and 1 information system officer) from the microbial section of the collection management division. In the botanical division of the collection management division, librarians undertake the same role at the microbial section of the collection management division as well.

The Government of Indonesia considers the importance of conserving biodiversity from the combined viewpoints of “utilizing biological resources” as well as “maintaining the balance of biodiversity”. Accordingly, it expects RCB to play the role of the center of excellence in the conservation of biodiversity. In order to help it to do this, the Government of Indonesia enhances the functions of the operations and maintenance of the facilities at RCB. Therefore, there seems to be no structural problem with its operation and maintenance.

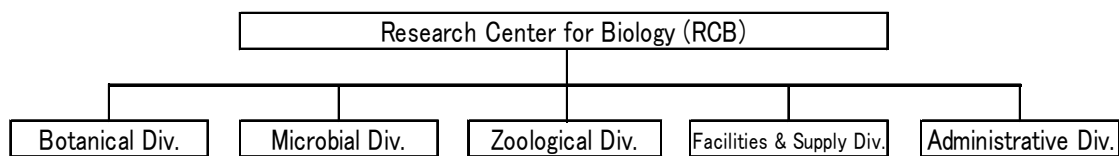


Figure 2: Organizational Diagram of RCB

### 3.5.2 Technical Aspects of the Operation and Maintenance

Officers at the facilities and collection management division conduct daily operations and maintenance of the constructed facilities. External contractors conduct regular maintenance and ensure no technical problems arise with the operation and maintenance of the facilities.

The researchers and technical officers are well qualified to handle the procured equipment (except a liquid nitrogen maker), while local agents provide the replacements and spare parts. In addition, the Technical Cooperation Project on Improvement of Collection Management and Biodiversity Research Capacity of the Research Center for Biology (2007–2009) has created maintenance manuals for the equipment. Therefore, there seems to be no major technical problem with their operation and maintenance.

### 3.5.3 Financial Aspects of the Operation and Maintenance

The project assumed that it would cost Rp. 1.6 billion for the operation and maintenance of the constructed facilities and procured equipment. From 2008 to 2010, the cost of this was actually Rp. 1.9 billion on average. However, the overall budget of RCB in this period was 1.3 times higher than the budget in 2003. This implied that, while the overall budget in 2003 was Rp. 27.6 billion, in the

period from 2008 to 2010, it was Rp. 35.7 billion on average. Thus, RCB has maintained a positive balance every year. Profit carried forward at the end of every financial year can be used for operations and maintenance whenever necessary. With this in mind, it would be safe to say that the financial situation with regard to the operation and maintenance of facilities and equipment at RCB seems to be sound.

Table 7: Profit and Loss Sheet

(Unit: Rp 1,000)

	2008	2009	2010
(1) Routine budget	27,021,832	24,725,326	26,889,579
(2) Supplementary budget, etc	13,139,224	6,969,955	8,363,946
<b>(3) Total budge ((1) + (2))</b>	<b>40,161,056</b>	<b>31,695,281</b>	<b>35,253,525</b>
(4) Personnel expenses	18,897,496	17,438,457	18,182,473
(5) Operational expenses	12,275,862	10,089,178	9,575,501
(6) Maintenance expenses	2,090,611	2,002,908	1,785,824
(7) Travel expenses	2,448,843	1,048,200	1,983,632
<b>(8) Total expenses ((4) + (5) + (6) + (7))</b>	<b>35,712,812</b>	<b>30,578,743</b>	<b>31,527,430</b>
<b>(9) Net ((3) - (8))</b>	<b>4,448,244</b>	<b>1,116,538</b>	<b>3,726,095</b>

Source: RCB

#### 3.5.4 Current Status of the Operation and Maintenance

No problem has been observed in the operation and maintenance of the constructed facilities.

Similarly, there have been no problems observed in the operation and maintenance of the procured equipment, over 420 items, except in the case of a liquid nitrogen maker. The liquid nitrogen maker is not currently in use due to lack of engineers who are qualified to operate it and perform the collection techniques that utilize liquid nitrogen. However, researchers have been attempting to learn the necessary techniques with help from other institutes.

In sum, no major problem has been observed in the structural, technical, and financial aspects of the operation and maintenance of RCB, and therefore, the sustainability of the project effects is high.

## 4. Conclusions, Recommendations, and Lessons Learned

### 4.1 Conclusions

The implementation of the project has been highly relevant to the development policies and needs of Indonesia, as well as to the development policies of Japan, and thus the relevance is high. However, the efficiency of project inputs is fair since the project period was slightly longer than planned, while the project cost was lower than planned. Through the project, the procurement of

equipment for research, collection, and educational purposes at the botanical and microbial divisions of the RCB has brought about research effects (e.g., the volume of research and collections increased/maintained) and educational effects (e.g., the number of visitors increased). These are either the same as or higher than planned. The impact is also high, since research and development of new drugs and biofuels that utilize plants and microbes are conducted in the project. No major problems have been observed in the structural, technical, and financial aspects of the operation and maintenance of the equipment and facilities at RCB. Thus, the sustainability of the project effects is high.

In light of the above, the Project is evaluated to be highly satisfactory.

## **4.2 Recommendations**

### **4.2.1 The Research Center for Biology (RCB)**

Since the OECD Best Practice Guidelines for Biological Resource Centers (2007) demands that centers should preserve their collections using liquid nitrogen, RCB should make efforts to master operating the liquid nitrogen maker and the collection techniques that use liquid nitrogen. This would enable the center to preserve the collections using liquid nitrogen as mandated.

### **4.2.2 The Japan International Cooperation Agency (JICA)**

The Japan Science and Technology Agency and JICA plan to implement a science and technology project at RCB, called the Development of Internationally Standardized Microbial Resources Centers as the core of the Biological Resources Center. This will be done with the aim of promoting life science research and biotechnology for 5 years, beginning from 2011. The National Institute of Science and Evaluation plans to improve the collection techniques at RCB within the project. Therefore, it is recommended that JICA transfer the operation techniques of the liquid nitrogen maker and collection techniques for using liquid nitrogen to RCB within the project.

## **4.3 Lessons Learned**

The sustainability of the project is high (③). This can be attributed to the fact that, over the past 10 years, the Government of Japan has provided the implementing agency with comprehensive cooperation, consisting of the grant aid projects and the technical cooperation projects. This has resulted in the improvement of infrastructure and techniques at the implementing agency, and that the Government of Indonesia has created a policy that ascribes importance to the conservation of biodiversity including utilizing genetic resources, and then strengthened the structures and finances of the implementing agency.