Indonesia

The Bapedal Rrgional Monitoring Capacity Development Project

Field Survey: July 2003

1. Project Profile and Japan's ODA Loan

Project site location map

Water quality analysis using a UV-Visible (UV-VIS) spectrophotometer

1.1 Background

In Indonesia, rapid population growth and industrial development was accompanied by increasingly severe environmental degradation, including water pollution caused by industrial waste water, air pollution by exhaust fumes and traffic noise, etc. To respond to these problems, in 1982 the government enacted the Basic Environmental Law, establishing the Ministry for Population and the Environment the following year, developing related laws and liaising among the various governmental ministries and agencies. Added to which, in 1990, the Environmental Impact Management Agency (BAPEDAL) was established by presidential decree with the aim of improving the environmental management capacity.

During the first half of the 1990s, responsibility for environmental monitoring was assigned to BAPEDAL at the central government level and to the provincial governments at the local level. With the exception of Jakarta, none of the provincial governments owned independent laboratories for monitoring the environment, instead using those of the Ministry of Health, Ministry of Industry, Ministry of Public Works[1] and universities; however, the quality and volume of the data collected by these laboratories was not of a sufficiently high level. BAPEDAL promoted the establishment of a nationwide environmental monitoring network and in 1993 established the Environmental Management Center (EMC)[2] as a central reference

[1] The Ministry of Industry has been reorganized as the Ministry of Trade and Industry, and the Ministry of Public Works has become the Ministry of Settlement and Regional Infrastructure.

[2] The Environmental Management Center (Pusarpedal) was renamed the Environmental Management Facility (Sarpedal) when BAPEDAL was dismantled and absorbed into the new Ministry of Environemnt. However, it will be

laboratory[3] and a center for data development and training. This project was based on the results of a 1994 JBIC preliminary survey and involved the development of laboratories in the regions, which are the terminals of the environmental monitoring network.

1.2 Objectives

The project's objective was to improve the capability for collection and analysis of environmental data (water/air pollution, etc.), which forms the basis for the development of monitoring programs, by developing the capabilities of regional laboratories (research institutes), and thereby contribute to improvements in Indonesia's environment through improving the efficiency of environmental administration.

1.3 Outputs[4]

Table 1: Targeted Laboratories (excluding the Jakarta EMC)

No.	Province	Provincial capital (location of lab)	Ministerial affiliation at appraisal / target laboratory		
			Ministry of Health	Ministry of Public Works	Ministry of Industry
1	Aceh	Banda Aceh	BLK	PU	BPPI
2	North Sumatra	Medan	BLK	PU	BPPI
3	Riau	Pakanbaru	BLK	PU	-
4	South Sumatra	Palembang	BLK	PU	BPPI
5	Lampung	Tanjungkarang	BLK	PU	BPPI
6	West Java	Bandung	BLK	PU	BBS
7	Central Java	Semarang	BLK	PU	BPPI
8	Yogyakarta	Yogyakarta	BTKL	PU	-
9	East Java	Surabaya	BTKL	PU	BPPI
10	West Kalimantan	Pontianak	BLK	PU	BPPI
11	East Kalimantan	Samarinda	BLK	PU	BPPI
12	South Kalimantan	Bandjarmasin	BLK	PU	BPPI
13	Bali	Denpasar	BLK	PU	-
14	South Sulawesi	Ujung Pandang	BLK	PU	BPPI

Note 1: Laboratory names are as follows: EMC = Environmental Impact Control Agency (BAPEDAL) Environmental Management Center, BLK = Ministry of Health, Public Health Laboratory, BTKL = Ministry of Health, Environmental Health Laboratory, BBS = Ministry of Industry, Cellulose Research and Development Center, BPPI = Ministry of Industry, Industrial Research and Development Laboratory, PU = Ministry of Public Works, Public Works Laboratory

Note 2: All province, city, ministry and laboratory names used were current at appraisal.

Source: compiled from project data

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referred to as the EMC throughout this report.

[3] A laboratory designated by the authority to investigate the accuracy of measurements taken at other laboratories.

[4] The JBIC preliminary survey that was implemented ahead of this project recommended that equipment be provided to the more limited laboratories. Adjustments were made to target regions and equipment provided during project implementation; however, BAPEDAL was established in 1990 and with efforts to develop an institutional framework for environmental management beginning to be made, it is considered that the JBIC preliminary survey was significant in that it stipulated the basic lineup of necessary monitoring equipment and clearly prescribed the role of the regional laboratories.

(1) Provision of water quality monitoring equipment (14 provinces, 39 laboratories)
Atomic absorption spectrophotometers (AAS), gas chromatographs (GC), total organic carbon (TOC) meters, UV-visible (UV-VIS) spectrophotometers, etc.

(2) Provision of air quality / noise monitoring equipment (26 of the Ministry of Industry and Ministry of Health laboratories listed in (1))
High-volume standard flux calibration systems, handy samplers, dust sampling equipment, NOx, SO_2, Ox analyzers, vehicles for mounting equipment, etc.

(3) Provision of mobile laboratory equipment
(15 of the Ministry of Trade and Industry and Ministry of Public Works laboratories listed in (1) and the Jakarta EMC
pH meters, turbidity meters, conductivity meters, sound level meters, vehicles for mounting equipment, etc.

(4) Consulting services: detailed design, construction supervision, training, project management, project supervision

1.4 Borrower / Executing Agency

The Republic of Indonesia / Environmental Impact Management Agency (BAPEDAL) (at that time)

1.5 Outline of Loan Agreement

Loan Amount Loan Disbursed Amount	2,935 million yen 2,743 million yen
Exchange of Notes Loan Agreement	November 1994 November 1994
Terms & Conditions Interest Rate Repayment Date (Grace Period) Procurement	 2.6% 30 years (10 years) General untied (consultant component: partially untied)
Final Disbursement Date	December 2001

2. Results and Evaluation

2.1 Relevance

2.1.1. Consistency with National Development Plan and Environmental Plans / Policies

The projects primary objective, i.e. to improve regional environmental monitoring competence and in so doing tackle environmental pollution in the regions, is considered to have been highly relevant in that it was, and has remained, thoroughly consistent with national development plans and environmental policy.

In the first instance, to outline the changes in national development plans and policy: the Sixth Five-Year National Development Plan (REPELITA VI: 1994-1998), the Seventh Five-Year National Development Plan (REPELITA VII: 1998-2003), the current development plan (PROPENAS: 2000-2004) and the "Environmental Strategies Plan / Work Program" that was formulated by the Ministry of Environment on the basis of it, all emphasized the importance of tackling water and air pollution (particularly exhaust fumes in urban areas and industrial pollution, predominantly in Java) and stressed the need to strengthen regional environmental management systems in this respect. Moreover, the New Environmental Law that was enacted in 1997 provided detailed stipulations on environmental impact assessments of companies to be performed prior to their operational start up and monitoring procedures to be used once a company is in business, thereby expanding the role of the regional governments, which were charged with conducting the assessments / monitoring. The strengthening powers of the regional governments gained further momentum with the enactment of the decentralization laws in 2001.

Table 2: Background to National Development Plans, Environmental Plans / Policy

1990	BAPEDAL (executing agency) established
1993	Sixth Five-Year National Development Plan initiated
1994	Project initiated
1997	New Environmental Law enacted
	Regional Environmental Management Agency (BAPEDALDA) established
1998	Suharto administration collapses
1998	Seventh Five-Year National Development Plan initiated
2001	Decentralization laws enacted
	Ministry of Public Works (one of the ministries to which project laboratories affiliated) dismantled
	Project completed
2002	(Jan.) New Ministry of Environment established, absorbs BAPEDAL
	(Jan.) PROPENAS (new national development plan) initiated
	(Mar.) Notice from Ministry of Environment to the effect that ownership of project equipment is to be transferred from BAPEDAL to provincial governments
	(Apr.) Environmental strategies plan / work program formulated
	(Dec.) Directive making provincial BAPEDALDA responsible for the operation and maintenance of project equipment (Ministry of Environment notice)

Source: Compiled from appraisal data and Ministry of Environment data

This project was also consistent with the construction of a nationwide environmental monitoring network, a task that was being undertaken by BAPEDAL at the appraisal time point with a view to strengthening the regional environmental management system. Around 1997, BAPEDALDA[5], the organizations currently responsible for regional environment management, were set up in the provinces, prefectures and cities under technical assistance provided by the World Bank and the Asian Development Bank (ADB). However, the regional governments did not have independent laboratories designed to take environmental measurements, nor had the newly established BAPEDALDA yet developed the human resources or accumulated the technologies needed to undertake measurements and analysis. Under these circumstances, there continued to be a compelling need to develop a regional environmental monitoring system and this project was thus relevant.

Meanwhile, the efforts to strengthen the regional (provincial) environmental monitoring system, which were originally led by the central government, are now being supervised at the regional level under Indonesia's decentralization policy; with the establishment of the New Environmental Law, several environmental auditors were assigned to BAPEDALDA and other provincial government organizations, including the bureaus of commerce and health, police agencies, etc. and they are gradually gaining the authority to investigate environmental pollution. It is considered that this project prepared the ground for region-driven environmental management.

2.1.2. Consistency with the Projects of Other Donors

Other donors were also involved in the work to strengthen Indonesia's environmental management system. During the planning and implementation of this project, as mentioned above, the World Bank and ADB were providing assistance to BAPEDAL / BAPEDALDA capacity-building projects that were either in progress or under planning, and development of the Environmental Management Center (EMC)[6] was progressing with JICA (Japan International Cooperation Agency) support. These projects focused on soft-type assistance in the form of human resource development and the provision of information, and it was envisioned that there would be a division of roles in that this project and a similar project being undertaken with assistance from the Australian government would take responsibility for facilities and equipment (hard-type assistance). Accordingly, there was no overlap in the content of this project and those being implemented by other donors, and the complementary design is

[5] The name means "Regional BAPEDAL" but these organizations have no direct institutional relationship with the central BAPEDAL.

[6] With the dissolution of BAPEDAL and its absorption into the new Ministry for the Environment, the name of the EMC was changed to the Environmental Management Facility (in Indonesian: from Pusarpedal (center) to Sarpedal (facility)). However, the EMC appellation will continue to be used in this report.

considered to have been appropriate.

2.2 Efficiency

2.2.1. Outputs

Only minor changes were made to project outputs, including the division of the equipment procurement package into two separate components and the modifications made to the lineup of equipment to correspond with that already in place at the laboratories at the detailed design stage; the (1) provision of water quality monitoring equipment, (2) provision of air quality / noise monitoring equipment, (3) the provision of mobile laboratories, and (4) consulting services, were all executed according to the plans.

Figure 1: AAS (Ministry of Public Works laboratory)

Figure 2: Mobile laboratory equipment (Ministry of Industry laboratory)

Figure 3: An air pollution observation vehicle (Ministry of Health laboratory)

2.2.2. Project Period

The project period was scheduled for November 1994 through December 1998 (up to the end of the one-year maintenance period), but the equipment procurement and installation work was in fact completed in October 2000 and the maintenance period ended in November 2001, thus completion was delayed by two years and eleven months. The delays are primarily attributed to time-consuming procedures engendered by the division of the procurement package into air quality monitoring equipment and water quality monitoring equipment components, and to slow decision-making within the government that was the result of the social and economic turmoil that followed the Asian currency crisis (rioting, the change in government).

2.2.3. Project Cost

Total project costs were approximately 2,743 million yen against an initial budget of around 3,336 million with the entire sum being covered by Japan's ODA loan (loan amount was approximately 2.9 million yen). This was primarily because the currency crisis caused a decline in the value of the local currency over and above inflation.

2.3 Effectiveness

As stated earlier, the frequent organizational changes on the executing agency side mean that outstanding BAPEDAL data is insufficient to enable measurement of the status and effects of regional laboratory development. The new Ministry of Environment has been working steadily on a study to identify the current situation since 2002; however, sufficient data was not able to be obtained from the Ministry toallow the effectiveness of the project to be evaluated. Accordingly, project effectiveness will be evaluated focusing on the responses to questionnaires sent to all project laboratories (basic data in the form of responses and comments, which the labs were requested to provide) and the results of interviews conducted during visits[7] to seven laboratories in three provinces that were made during the course of this survey. To summarize, despite a number of problems and concerns, generally speaking, questionnaire responses indicate that the equipment provided is being utilized and that it is generating better measurement results in both qualitative and quantitative terms as compared to pre-project levels in the majority of laboratories. If this survey is combined with the various other data that was collected simultaneously, it is considered that the project's direct objective of improving the environmental monitoring capacity of regional laboratories has been achieved. Questionnaires were sent to 37 regional laboratories in fourteen provinces. This represents the 39 laboratories in fourteen provinces that were covered by the project plus the BAPEDALDA laboratory in North Sumatra (established in 2001 by pooling the equipment provided to the three project laboratories in the province) and excludes the three laboratories that handed over their equipment to this latter facility. Of these, responses have been received from 18 laboratories in twelve provinces for a response rate of approximately 50 percent[8].

2.3.2. Utilization of Supplied Equipment

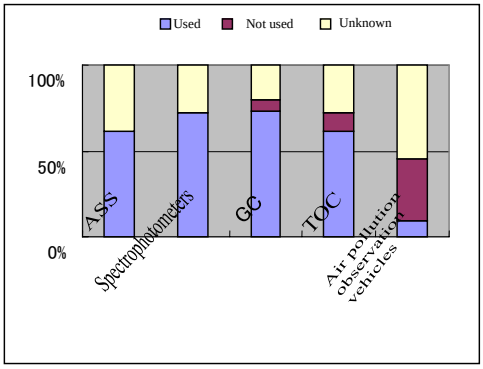
[Use status of key equipment] Whilst it was not possible to collect data on the operating ratios and use frequency of the equipment, as illustrated in Figure 4, although it would be difficult to assert that the key analytical equipment procured is being used sufficiently, the evidence suggests that it is being utilized to a certain extent. This figure was compiled from results to the question as to whether key equipment had been used / not used during the past six months, with the use rate for the five devices shown amounting to 59 percent. In terms of individual pieces,

[7] Visits were paid to a total of seven laboratories: the BPPI and BLK in South Kalimantan, the BBS, BLK and PU in West Java, and the BPPI and BAPEDALDA laboratory in North Sumatra. Sites were selected on the basis of the following criteria: (1) the sites should include at least one Ministry of Health, Ministry of Industry and Ministry of Public Works laboratory, respectively; (2) similar numbers of laboratories that received "good" and "poor" evaluations during the consultant's tour of inspection (2001) should be incorporated; and (3) the sites chosen should be located near another project site.

[8] The response numbers breakdown as follows: 10 Ministry of Health labs, 4 Ministry of Industry labs, 3 Ministry of Public Works labs (although as will be stated later the majority have been transferred to provincial governments), plus the aforementioned BAPEDALDA labs in North Sumatra and the BAPEDALDA labs in South Sumatra.

more than 70 percent of respondents stated that they “are using” the GC and spectrophotometers, whilst the majority also indicated that they are using the AAS and TOC meters; however, at four out of ten sites, the air pollution observation vehicles “are not being used”. Reasons given for not using the equipment included a lack of parts, an absence of need, malfunctioning or uncalibrated equipment (Table 2).

Figure 4: Percentage of respondents using key equipment within last 6 months[1)]



Note 1: Numbers of valid responses: GC 15, air pollution observation vehicles 10, remainder 18 (due to differences in the number of labs supplied with the equipment).

Source: Compiled from answers to laboratory questionnaires

Table3: Reasons for Non-use

Equipment	Reason for Non-use
GC	Necessary parts unavailable
TOC meters	Test necessary for TOC unavailable (fine with just COD, BOD)
Air pollution observation vehicles	Breakdowns, equipment not calibrated (3 BLK labs)
Other	Deionizers are malfunctioning due to power supply instability, or clog easily due to the hardness of mains water.

Source: Compiled from answers to laboratory questionnaires

Responses indicate that, with the exception of the deionizers, the refrigerators, ovens, centrifuges, water baths, and deionizers, etc., that were provided as “experiment aids” in conjunction with the above equipment are all being used, and this fact was confirmed during the laboratory visits. However, it was not possible to obtain comprehensive data on operating rates and use frequency, thus our only evidence is in the form of comments such as “key equipment is being used daily” made by some laboratories.

In terms of factors to encourage the use of the equipment, the aforementioned needs and the condition of equipment / parts may be cited, as well as the handling competence of laboratory staff. Training on the sampling and analytical methods was provided to some 245 laboratory staff using project equipment (167 at EMC, 39 at national universities, 39 via diploma courses at Australian universities). In many cases, sophisticated

Figure 5: Operating procedure card attached to equipment (Ministry of Industry laboratory)

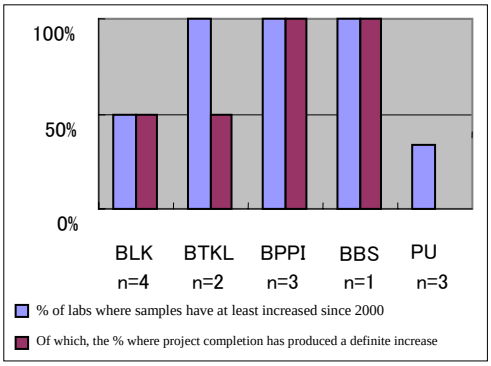
equipment such as the AAS and GC is predominantly being used by staff with experience studying overseas, and at a number of the laboratories visited, it was explained that these staff members are transferring the knowledge and techniques learnt abroad to other personnel. There was also evidence of initiatives being taken: one of the ideas that emerged from training being to attach plastic cards detailing easy-to-understand operating procedures to all equipment as the norm (Figure 5), and the knowledge acquired through training is being utilized and disseminated.

2.3.3. Improvements in Monitoring Capacity

To ascertain the extent to which monitoring competence – one of the project objectives – had been achieved, it was investigated (1) transitions in the number of samples analyzed, (2) the appropriateness of analytical operations, (3) laboratory accreditation status, and (4) satisfaction among client organizations. From the results, it is possible to conclude that monitoring competence has improved at many of the laboratories covered by the project.

[Numbers of Monitoring Samples] Of the 13 laboratories that provided data on **water quality monitoring**, there has been a definite increase in sample numbers since project completion at seven (54%). In terms of individual laboratories, there are records of a post-project increase in sample numbers at all Ministry of Industry laboratories (BPPI and BBS). The performance of Ministry of Health laboratories (BLK and BTKL) varies by site and lab type. Sample numbers had decreased at two of the three Ministry of Public Works laboratories (PU) from which responses were received. In addition, two of the laboratories (East Kalimantan and West Java) were closed between 2000 and 2002 (but reopened in 2003, as detailed hereunder) in consequence of the dissolution of the Ministry of Public Works. There were considerable inter-lab differences in the average number of water samples analyzed per week, which ranged between 8 (West Sulawesi BPPI) and 600 (Central Java BTKL) in 2002.

Figure 6: Changes in Number of Water Quality Monitoring Samples

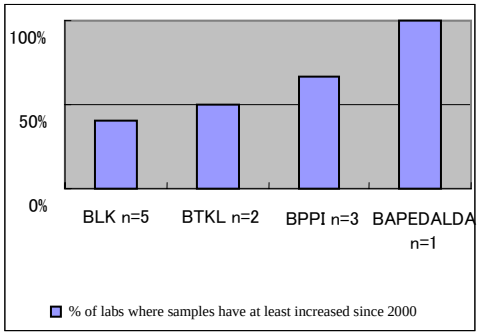


Note: n = number of valid responses from each laboratory.

Source: Compiled from responses to laboratory questionnaires

Eleven responses were collected on **air quality monitoring**. Many of the laboratories only began air quality monitoring after project equipment was provided and it was not possible to identify concrete numbers from the data provided. As a general trend, all eleven laboratories reported results of air pollution measurements from 2000 onwards, with six of these (54%) evidencing subsequent increases in sample numbers. Again, at least three of the eleven labs have records of sample numbers predating the project, and two of these have posted definite increases in sample numbers since project implementation. There was variation in sample numbers among the reports received, with the lowest being 6-8 per year, whilst some laboratories were analyzing an average 200 samples per month; however, the scale is smaller overall than for water quality monitoring. No specific results were received from any of the laboratories regarding noise monitoring.

Figure 7: Changes in Number of Air Quality MonitoringSamples



Note: n = number of valid responses from each laboratory.
Source: Compiled from responses to laboratory questionnaires

[Appropriateness of Analytical Operations] It was not possible to ascertain the extent to which the accuracy of measurement data has improved during the current survey; however, a chemical analysis expert was employed as the local consultant and he/she undertook simple evaluations of sampling and analysis operations at the seven laboratories visited. The items assessed and the results are as shown in Table 4, with the Ministry of Industry laboratories obtaining comparatively high scores. (For assessment points refer to Table 4, Note 1.) The low scores among former Ministry of Public Works laboratories are believed to be attributable to the effects of the closure and suspension of activities at the labs mentioned above. These laboratories have only recently reopened in earlier of this year with newly recruited staff, but future improvements are anticipated.

[Laboratory Accreditation Status] The acquisition of KAN (the National Accreditation Body of Indonesia) 17025 (equivalent to ISO17025) was investigated as another index to express the extent of improvements in laboratory competence. To be accredited laboratories must be in conformity with national standards and have developed standard operating procedures (SOP) based on same; the accuracy of measurement data is also subject to investigation. According to the executing agency, of the 59 regional laboratories[9], 11 have acquired KAN certification since

[9] There were 60 laboratories at the start of the project, but when East Timor was granted independence one was ceded to that country.

project completion (the pre-project figure was zero), and of these, ten were covered by this project and one by the project that was funded by the Australian government, suggesting that this is an effect of this project. All accredited laboratories are either Ministry of Industry or Ministry of Health facilities (BTKL, BPPI or BBS) and are performing well in the various areas detailed above (see Box 1).

Table 4: Evaluation of Laboratories Visited[1)]

Assessed item	Ministry of Health[2)]		Ministry of Industry			Ministry of Public Works[2)]	BAPEDALDA
	South Kalimantan BLK	West Java BLK	South Kalimantan BPPI	West Java BBS	North Sumatra BPPI[3)]	West Java PU	North Sumatra BAPEDALDA
Sample handling	A	B	A	A	A	C	B
Equipment installation	A	A	A	B	A	C	B
Glass appliance handling	A	A	A	C	A	C	B
Analytical procedures	B	B	A	B	A	C	B
Staff proficiency	A	A	A	B	A	C	B
Safety measures	B	B	B	B	A	C	B
SOP development status	B	B	A	B	A	C	B
Average score[4)]	2.6	2.4	2.9	2.0	3.0	1.0	2.0

Note 1: Scores and assessment criteria are as follows: A = very good, B = good, C = average, D = poor.
(1) Sample handling: Appropriate containers are being used, records are accurate, samples are refrigerated or protected against degradation using additives, samples are extracted, packaged and transported to the laboratory using appropriate procedures and in timely fashion.
(2) Equipment installation: Precision instruments are installed in an air-condition room, calibration is performed using standard equipment.
(3) Handling of glass appliances: Measures are being taken for dust (cabinet storage, etc.), pipettes are cleaned in acid after use.
(4) Analytical procedures: Sampling is executed at the laboratory in conformity with SNI procedures.
(5) Staff proficiency: Personnel capable of operating and repairing precision instruments are available.
(6) Safety measures: Fire-prevention equipment and emergency use showers are positioned in visible locations, personnel are wearing lab coats and gloves.
(7) SOP development status[10]: SOP (standard operating procedures for laboratory work) have been prepared and are being conformed with.

Note 2: The Ministry of Health and Ministry of Public Works laboratories that were visited had already been transferred to the respective provincial governments.

Note 3: At the North Sumatra BPPI, most project equipment has now been transferred to the newly established provincial BAPEDALDA, so it has used internal funds to purchase new analytical equipment and is continuing to perform environmental monitoring activities.

Note 4: Average scores were calculated using A = 3 points, B = 2 points, C = 1 point, D = 0 points.

[10] There are inter-lab differences in the SOP used; however, questionnaire responses suggest that the laboratory manual developed via a World Bank technical assistance project is being used on a comparatively wide scale.

Box 1: Relationship Between Lab Type & Performance

The results from this survey evidenced relatively favorable performances among Ministry of Health BTKL and Ministry of Industry BPPI and BPPS laboratories. Again, these laboratories received strikingly high evaluations during the on-site surveys that were undertaken by the project's consultant immediately prior to project completion. These laboratories function as part of the research and development centers of the ministries to which they are respectively affiliated and receive budgetary and institutional support from the central government; sample numbers, client numbers and revenues have all been high since before project implementation. Accordingly, they probably had greater capacity to accept the project than other laboratories. Moreover, since project completion, whilst the majority of Ministry of Health BLK and Ministry of Public Works PU are being transferred to provincial governments in consequence of decentralization, there has been no organizational confusion at BTKL, BPPI and BBS laboratories because they have retained their central government affiliation.

[Levels of Client Satisfaction] The regional laboratories have two types of clients: (1) private-sector businesses (polluters) and (2) regional government organizations (provincial or prefectural BAPEDALDA and health / trade and industry bureaus) and the police, etc. with main laboratory activities being to supply type (1) clients with data on mandatory environmental monitoring activities; whilst for type (2) clients the laboratories check reports submitted by businesses to the bureaus and cooperate with environmental monitoring based on information provided by local residents.

During this survey, several organizations corresponding to both (1) and (2) were solicited to provide opinion[11]. Our results evidenced that laboratory performance has improved across the board, with most clients being satisfied with the service they receive. However, comments such as the following were received from a number of clients: "The laboratory was extremely tardy in presenting test results so we decided to use a laboratory not covered by the project." "We are commissioning a more outstanding laboratory to conduct our tests." Specifically, the comment regarding "outstanding laboratories" was made by the Ministry of Public Works (now the Ministry of Settlement and Regional Infrastructure) research and development center[12] and the SUCOFINDO laboratory, a state-owned company under Ministry of Science and Technology jurisdiction.

[11] The respondents were (1) businesses: a beverage plant and a food plant in South Kalimantan, and a hotel in West Java; (2) government organizations: South Kalimantan's provincial BAPEDALDA, West Java's provincial BPLHD (equivalent to BAPEDALDA), South Kalimantan's provincial trade and industry bureau, West Java's provincial health bureau, and the Bandung district police agency, West Java.

[12] As stated in Box 1, many ministry-affiliated laboratories have retained their central government affiliation since decentralization and are generally performing well.

2.4 Impact

Parallel efforts to improve the regional environmental management system have been making steady progress, and administrative and judiciary measures to tackle environmental pollution are also being undertaken. Site surveys also revealed that BAPEDALDA and police commissioners have contracted the laboratories to investigate sources of environmental pollution and in a number of cases this has led to litigation and actual improvements in the environment. However, in view of the fact that these commissions are not only being made to project laboratories, the extent of the project's contribution in this respect is unclear.

These circumstances are underscored by the fact that (1) there are other outstanding laboratories in addition to the project facilities and (2) within regional environmental administration in the process of decentralizing authority, there are still ambiguities regarding the nature of the activities that are to be undertaken by the project laboratories[13]. Specifically, (2) has been an issue since the project was in its planning stages, and the executing agency's failure to present a concrete policy has been pointed out. Accordingly, at present and as with other laboratories, the laboratories covered by the project are merely functioning to measure and provide data in response to client requests.

Box 2: Project Contributions to Increased Environmental Administration Efficiency

According to the officer responsible for project approval at the South Kalimantan trade and industry bureau, the bureau commissions the Ministry of Industry laboratory (BPPI) to recheck the data in environmental monitoring reports submitted to it on a monthly basis by the factories operating within the province. Due to the project-facilitated increases in the number of items that can be tested at BPPI[14], the bureau is now able to commission BPPI to perform all tests whereas in the past it was forced to outsource them to a number of private-sector laboratories. This has served to improve the efficiency of monitoring report checks.

2.5 Sustainability

2.5.1. Executing Agency

(1) Technical Capacity

The questionnaire responses received from the laboratories reveal that although personnel at one laboratory (Riau BLK) have received no training since project completion, otherwise there are

[13] According to the Ministry for the Environment, the EMC is currently formulating plans for regional monitoring.
[14] There have been no changes in the number of parameters for the water quality tests in the period spanning project implementation; however, as a result of the project the laboratory is now capable of measuring air pollution and exhaust gas.

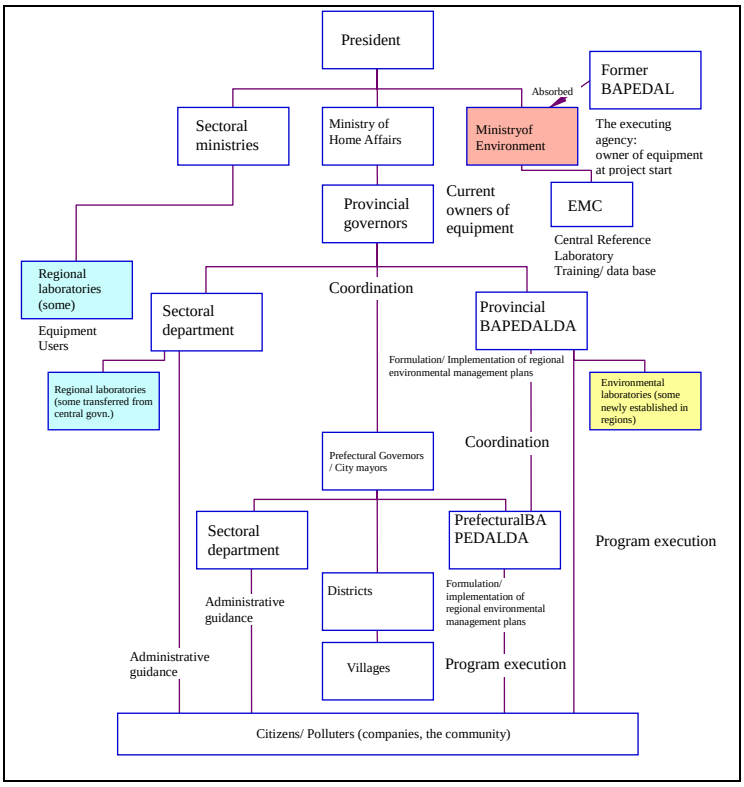
no problems as between 1-60 staff members at the other labs have attended a training course of some description at the EMC, suppliers, other laboratories or ministry-affiliated training facilities. However, information will need to be shared with the forthcoming changes in the system.

(2) Operation and Maintenance System

Indonesia is in the process of decentralizing authority to the regions and a uniform national system has yet to be established.

BAPEDAL was absorbed by the newly established Ministry of Environment in January 2001, and in December of that year, the ministry notified all provincial governors of its intention to transfer ownership of all equipment from the now-defunct BAPEDAL (central) to the various provinces, and to move the equipment transfer right-of-use from the laboratories to BAPDALDA. These changes are currently being effectuated (see Table 4).

Figure 8: Central & Regional Environmental Management Organizations / Institutions (as of July 2003)



Source: Compiled from results of the Ministry for the Environment hearing

Table 5: Division of Roles in Respect of Operation and Maintenance (O&M) and Costs for Project Equipment

Role	Appraisal agreement	Intention of Ministry of Environment (Dec. 2002 notice to provinces)	Present status (as of July 2003)
Ownership of Equipment	BAPEDAL	Provincial governments	Approximately 20 provinces have accepted this intention[1)]. In the other provinces, ownership is recognized to have passed from BAPEDAL to the Ministry of Environment.
Right of use Equipment	Individual laboratories	Where possible, the use rights of all laboratories are to be transferred to provincial BAPEDALDA.	Individual laboratories in almost all provinces. In North Sumatra and South Sumatra, use rights have been transferred to the provincial BAPEDALDA (a newly established laboratory under the direct management of this organization).
Installation site	Individual laboratories	Where possible, the equipment is to be transferred from the laboratories to provincial BAPEDALDA.	Individual laboratories. In North Sumatra, the equipment has been moved to the provincial BAPEDALDA (a newly established laboratory under the direct management of this organization).
Responsibility for O&M cost	BAPEDAL	The owner of the laboratory (central or provincial government) or the owner of the equipment (provincial governments). However, O&M costs for fiscal 2003 are to be covered by the Ministry of Environment's development budget (with provisos).	As indicated at left. In order to receive funding from the Ministry of Environment budget, provincial governments must declare that they accept ownership of the equipment and formulate plans for equipment use.

Note 1: Including both project laboratories and those covered by the Australian project. Twenty out of 25 provinces have accepted the ministry's intention. Of the 14 provinces covered by this project, at least 10 have declared that they will accept the decision.
Source: Compiled from appraisal data, Ministry of Environment hearing results, and responses to laboratory questionnaires.

(3) Financial status

As Table 5 shows those laboratories affiliated with the central government receive regular operation and maintenance budgets from the relevant ministry, whilst the allocations come from provincial government coffers in the case of the laboratories owned by provincial governments. The system is such that all laboratory types initially deliver income from laboratory fees, etc., to their superior organization and receive virtually the same amount in budgetary allocations.

In view of the risk that provincial governments will be unable to secure sufficient funds for operation and maintenance, the Ministry of Environment is subsidizing the operation and maintenance costs of those provincial governments that have accepted ownership of the equipment from the central government development budget.

2.5.3. Human Resources Development System

The EMC has continued to provide training to regional laboratory personnel even after project completion; the executing agency explained that these activities are funded by the JICA technical assistance project that is currently in progress through 2005. Otherwise, training costs are funded from a variety of sources, including the national budget, provincial government budgets and international aid (Australia). Many laboratory staff commented that: “whilst the opportunities to receive training exist, the training for operation and maintenance of equipment needs to be expanded.”

2.5.4. Status of Equipment Operation and Maintenance

The status of maintenance and operation of equipment is generally favorable, excluding those for which precision equipment and imported parts are necessary. With imported equipment, there are indications that since those spare parts that are of foreign origin take time to arrive (in some cases laboratories have to wait more than six months), it is difficult to carry out maintenance work.

3. Feedback

3.1 Lessons Learned

(1) Incorporating carefully designed soft components enhances the effects of projects involving the supply of equipment.

Training was provided to some 245 staff members via this project and since the majority continues to be employed at the laboratories, this has served to bolster the use of precision equipment. Moreover, since the project was designed to be implemented in conjunction with the World Bank’s technical assistance project and the soft-type assistance projects of other donors from the outset, this facilitated the development of laboratory manuals, etc., and resulted in ten laboratories successfully acquiring KAN accreditation.

On future projects, the use of soft components will need to be combined with more detailed research into their content. For example, between those laboratories with experience using sophisticated equipment, such as the AAS and GC, that were already performing well at the start of the project, and those that were receiving such equipment for the first time, training proved more beneficial to the former. Allocating training inputs and content more appropriately has the potential to improve equipment use status across the board. It is also necessary to explore increasing training on equipment maintenance and incorporating components that take user needs into consideration.

3.2 Recommendations

[To the Ministry of Environment] The Ministry of Environment is advised to clarify where the authority and responsibility for equipment operation and maintenance lies, to take measures to ensure that the laboratories are run in conformity with environmental standards, and to construct an environmental management system.

As stated above, the Ministry of Environment is in the process of transferring the ownership of the equipment that was procured through this project, and in North Sumatra and South Sumatra moves are currently in progress to transfer the equipment from the laboratories to which it was originally provided to provincial BAPEDALDA laboratories. The Ministry of Environment indicated management of project equipment by provincial BAPEDALDA to be a clear policy direction in December 2002, and it is considered that this represents a potentially effective means of enhancing environmental management capabilities. To prevent low-level equipment use and conflict among the various institutions as the result of ill-defined authority and responsibility over equipment operation and maintenance, the Ministry of Environment must clarify where the authority / responsibility for equipment operation and maintenance lies in line with decentralization at the earliest possible time. Also, measures must be taken to ensure that the laboratories are run in conformity with environmental standards and an environmental management system that functions even under regional decentralization constructed.

Comparison of Original and Actual Scope

Item	Planned	Actual
1. Outputs		
1. Provision of water quality monitoring equipment	39 laboratories in 14 provinces	As planned
2. Provision of air quality / noise monitoring equipment	26 laboratories in 14 provinces	As planned
3. Provision of mobile laboratories	15 laboratories in 15 provinces	As planned
4. Consulting services	Foreign consultant: 92MM Indonesian consultant: 134MM	Foreign consultant: 110MM Indonesian consultant: 190MM
2. Project period		
1. Consultant selection	June 1995	November 1995
2. Tender / contract	December 1996	November 1999
3. Procurement / installation	November 1997	October 2000
4. Maintenance phase	December 1998	November 2001
3. Project costs		
Foreign currency	2,935 million yen	2,349 million yen
Local currency	401 million yen (8,035 million rupiah)	394 million yen (17,440 million rupiah)
Total	3,336 million yen	2,743 million yen
ODA loan portion	2,935 million yen	2,743 million yen
Exchange rate	Rp1 = 0.05 yen (as of November 1994)	Rp1 = 0.226 yen (average between September 1996 – June 2001)

Third Party Evaluator's Opinion on
The Bapedal Regional Monitoring Capacity Development Project

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Relevance

As elaborated in the sixth five year development plan (94/95-98/99) and PROPENAS (2000-2004), one of most serious problems that challenge Indonesia today, especially due to the rapid growth of population and industrialization, is the increasing environmental pollution. Some efforts have been taken by the government in reducing of environmental pollution. The establishment of the Environmental Impact Management Agency (BAPEDAL) in 1990 is meant to implement an integrated effort in controlling environmental pollution throughout Indonesia. Therefore, overall objective of the project was in line with the goal set in the National Development Planning agenda

Despite several amendments made to the regulations regarding environment, litigation efforts often stumbles on obstacles and failures particularly when it comes to scientific verification. This is caused more by the incomplete and inaccurate laboratory analysis data which can be used as the basis for such verification when environmental problems require settlement in courts. Different perceptions among the governmental institutions in the case of Teluk Buyat, the province of North Sulawesi (which is not included in the target of this project), in which PT. Newmount Minahasa Raya is now declared as the suspect, is a sample of actual case.

The monetary crisis (1997) which was followed with the changes in governance all the way from 1998 until 2001 and the implementation of the decentralization policy in early 2001 has eventually borne heavier load to the central and regional government financially and technically in controlling environmental pollution. The source of this problem is more because of the insufficient laboratory facilities, and the lack of competent human resources to conduct monitoring activities.

Although its completion has been delayed for 35 months from its previous target, this project provided great contribution in the development and establishment of the basis for a nation-wide environmental monitoring system, which is based on regional approach. Development and improvement of 39 laboratory facilities for water quality and 26 laboratories for air quality monitoring in 14 provinces is a significant achievement of the project. In this context, the objectives and outputs of the project are very relevant to the efforts, strategy and policies for the quality improvement of environment in Indonesia.

Sustainability

The most essential challenge to measure the achievement of a project or activity that require large-scale investment is how to make it sustainable, especially its financial (O&M) and human resource. As detailed in the Ex-post Evaluation of this project in which BAPEDAL which was continued by the Ministry of Environment, has prepared the transfer process of ownership and management of laboratory assets of this project to the BAPEDALDA (under the coordination of the provincial government), strong commitment of the central government is still required in the form of financial subsidy in the financing and development of management to certain level in which BAPEDALDA would be able to manage the facilities and implementing good governance as their priority.

In addition to this, as managerial improvement process usually takes considerable time and cost, therefore for efficiency, establishment and development of cooperation with higher educational institutions in each region become the key to the success of this regional capacity development program in monitoring and controlling environmental problems in their own areas.