Wells, Taps and Toilets:
Safe water and sanitation for Eastern Indonesia

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The Australian Government's
Overseas Aid Program

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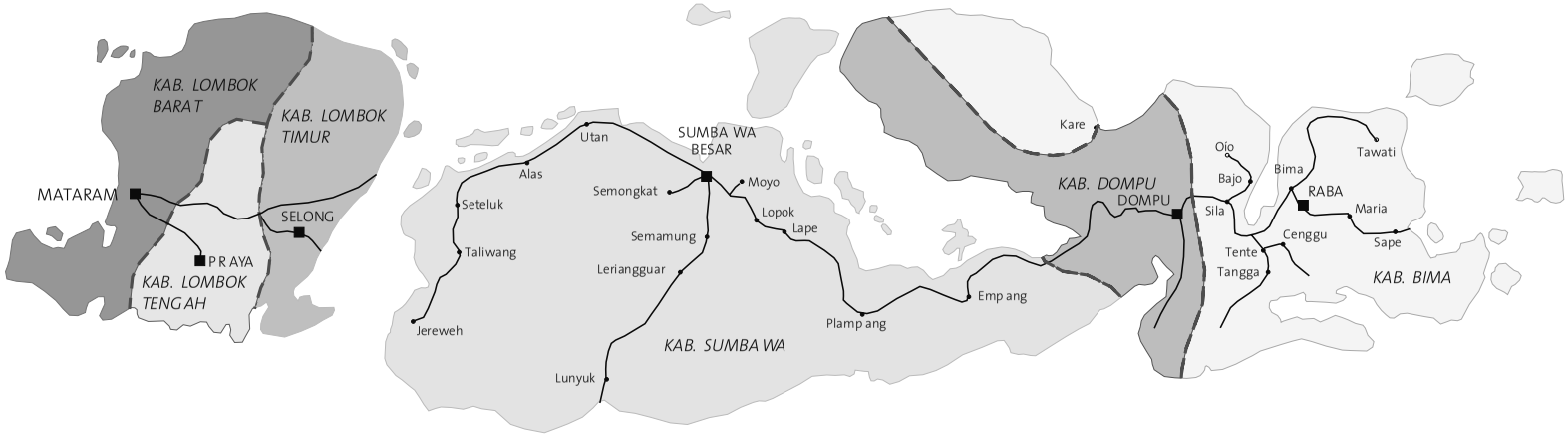

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NUSA TENGGARA BARAT PROVINCE

EXECUTIVE SUMMARY

The Nusa Tenggara Barat – Environmental Sanitation and Water Supply Project (NTB-ESWS) was undertaken jointly by the Governments of Australia and Indonesia in the period 1991-1996, within the framework of Australia's international development co-operation program managed by AusAID. Total project expenditure was A$39.048 million, of which Australia provided A$25.587 million (66% of total). The project aimed to contribute to improved socio-economic and environmental health conditions in NTB, by providing environmental sanitation and water supply facilities focusing on both community and institutionally managed components. The implementation process adopted for the community managed activities was relatively complex, with various project staff, particularly Community Facilitators and Technical Officers (CF-TOs), working closely with recipient communities in rural areas of NTB to upgrade water supply and sanitation (WSS) facilities and conditions.

An independent team appointed by AusAID has prepared this project evaluation report. The evaluation team undertook a desk review in Canberra in December 1998, and a field mission to Indonesia (24 January-26 February 1999). In addition, a community survey was carried out in late 1998 of the NTB-ESWS Project area by the Regional Water and Sanitation Group for East Asia and the Pacific (RWSG-EAP), of the UNDP-World Bank Water and Sanitation Program.

The evaluation team found that there were major achievements in the community managed component of the project, with an estimated 232,000 water supply beneficiaries (dug wells and small piped systems) and some 463,000 sanitation beneficiaries (mainly household toilets). However, there is some concern as to the sustainability of sanitation facilities in locations without piped water, and follow-up monitoring is recommended. The project also provided significant support to the institutionally managed water supply sector in NTB, in which there were some 94,000 beneficiaries of these facilities (piped systems operated by PDAMs).

Project achievements were less impressive in some other areas. There was a lack of gender equity in project implementation, and the extent of community participation in project planning and implementation could have been greater. Concerns exist over the technical management abilities of the PDAMs. The micro-finance activities were too ambitious and under-resourced. The desired longer term behavioural changes in communities in response to environmental health awareness measures are difficult to identify.

The assessment of the evaluation team is that, taking into account the mix of activities, the performance of the project was satisfactory overall and there were significant achievements made towards improving socio-economic and environmental health conditions in NTB. The evaluation team also considers that the project was implemented in a suitably efficient manner. The project provided a valuable set of development experiences in the WSS sector in Indonesia, which have been detailed in the report, along with recommended follow-up actions.

RINGKASAN

The Nusa Tenggara Barat Environmental Sanitation and Water Supply Project (NTB Proyek Sanitasi Lingkungan dan Penyediaan Air Bersih) adalah proyek kerjasama Pemerintah Republik Indonesia dengan Pemerintah Australia yang dilaksanakan pada dari tahun 1991 sampai dengan tahun 1996 dalam rangka program kerjasama pembangunan internasional Australia yang dikelola oleh AusAID. Nilai dana proyek seluruhnya adalah 39,048 juta dolar Australia dimana Australia memberikan kontribusi sebesar 25,587 juta dolar Australia (66% dari total dana).

Tujuan utama proyek tersebut adalah mendukung dan meningkatkan kondisi sosial ekonomi dan kesehatan masyarakat NTB dengan melalui pengembangan fasilitas sanitasi dan penyediaan air bersih. Pengembangan ini melibatkan peran lembaga-lembaga serta masyarakat. Proses pelaksanaan proyek yang diterapkan bagi aktivitas peran masyarakat cukup rumit. Dalam hal ini bantuan staf proyek, terutama Fasilitator Masyarakat dan Tenaga Teknis, berperan besar dalam bekerja erat dengan masyarakat penerima bantuan untuk meningkatkan fasilitas sanitasi dan kondisi penyediaan air bersih di daerah pedesaan di NTB.

Laporan evaluasi proyek ini disiapkan oleh tim independen yang ditunjuk oleh AusAID. Tim evaluasi melakukan penelaahan di Canberra pada bulan Desember 1998 dan melaksanakan kunjungan lapangan ke Indonesia (24 Januari – 26 Februari 1999). Disamping itu, ada sesuatu survei masyarakat dilaksanakan pada akhir tahun 1998 dalam daerah lokasi proyek NTB-ESWS oleh Tim Air Bersih dan Sanitasi Regional untuk Asia Pasifik (RWSG-EAP) dari Program Air Bersih dan Sanitasi, UNDP-Bank Dunia.

Tim evaluasi ini beranggapan bahwa terdapat banyak keberhasilan besar di dalam komponen proyek yang dikelola oleh masyarakat. Diperkirakan adalah 232.000 penerima hasil komponen air bersih (sumur bor dan sistim pipa kecil) dan 463.000 penerima hasil komponen sanitasi (kebanyakan jamban keluarga). Meskipun demikian, ada juga rasa keprihatinan terhadap keberlangsungan fasilitas sanitasi ini yang terletak dalam lokasi-lokasi yang tidak memiliki air yang dialirkan melalui pipa. Oleh sebab itu disarankan agar diadakan tindakan monitoring lebih lanjut. Proyek juga telah berhasil memberi dukungan besar terhadap lembaga-lembaga yang mengelola sektor air bersih di NTB dimana terdapat kurang lebih 94.000 penerima hasil fasilitas ini (sistim pipa yang dikelola oleh Perusahaan Daerah Air Minum - PDAM).

Keberhasilan proyek kurang nampak di bidang lainnya yaitu, pelaksanaan proyek kurang memanfaatkan partisipasi wanita dan lelaki sebagai peserta sederajat. Selain itu, mutu partisipasi masyarakat pada umumnya dalam perencanaan dan pelaksanaan proyek seharusnya ditingkatkan untuk dapat lebih berhasil. Ada juga kekhawatiran terhadap kemampuan pengelolaan teknis PDAM. Aktivitas kredit kecil dinilai terlalu berambisi, kekurangan sumber alat dan tenaga terampil. Akibatnya, sulit sekali mengidentifikasikan perubahan tingkah laku yang diharapkan akan timbul dari masyarakat pada jangka panjang sebagai tanggapan terhadap tindakan kesadaran kesehatan lingkungan.

Mengingat bahwa proyek ini terdiri dari berbagai aktivitas penilaian Tim Evaluasi adalah bahwa hasil kerja proyek secara umumnya dapat dianggap berhasil. Hasil peningkatan kondisi socio-ekonomi dan kesehatan masyarakat NTB dapat dinilai berhasil secara berarti. Tim Evaluasi juga menganggap bahwa proyek ini dilaksanakan secara efisien. Pendeknya, proyek ini telah membekali kita dengan seperangkat pelajaran dan pengalaman yang bernilai dalam sektor air bersih dan sanitasi di Indonesia. Pelajaran dan pengalaman ini dijelaskan secara rinci dalam laporan ini bersama dengan serangkaian tindakan lanjutan yang dianjurkan.

GLOSSARY

AMC	Australian Managing Contractor
ANU	Australian National University
APBN	Anggaran Pendapatan dan Belanja Negara (National Government Budget)
AT	Appropriate Technologist
ATL	Australian Team Leader
AusAID	Australian Agency for International Development
BANGDA	Pembangunan Daerah (Directorate General of Regional Development within Ministry of Home Affairs)
BANGDES	Pembangunan Desa (Directorate General of Village Development within Ministry of Home Affairs)
BAPPEDA	Badan Perencanaan Pembangunan Daerah (Regional Development Planning Board)
BAPPENAS	Badan Perencanaan Pembangunan Nasional (National Development Planning Board)
BMT	Baitul Maal Wat Tamwil (micro-finance organisation operated on Islamic lending principles)
CARE	Co-operative for Assistance and Relief Everywhere (International NGO)
CF	Community Facilitator
CF - TO	Community Facilitator – Technical Officer
Cipta Karya	Human Settlements – Central (Ministry) or Provincial (Dinas) level
CPO	Community Project Officer
DG	Directorate General
DGCK	Direktorat Jenderal Cipta Karya (Directorate General of Human Settlements within the Ministry of Public Works)
DEPKES	Departemen Kesehatan (Ministry of Health)
DIKES	Dinas Kesehatan (Provincial or Kabupaten Health Department)
Dinas	Provincial or kabupaten level technical department

DMU	Data Management Unit
EHE	Environmental health education
EIRR	Economic internal rate of return
ES	Environmental sanitation
ESWS	Environmental sanitation and water supply
FIRR	Financial internal rate of return
GOA	Government of Australia
GOI	Government of Indonesia
HDPE	High density polyethylene
IGA	Income generating activities
IKK	Ibu Kota Kecamatan (capital city of a kecamatan)
Kabupaten	District – second level of regional government
Kecamatan	Subdistrict – third level of regional government
Kotamadya	City – equivalent administrative status to a kabupaten
KRA	Key Result Area (in AusAID's Corporate Plan)
KTL	Kabupaten Team Leader
l/c/d	Litres per capita per day
l/s	Litres per second
LIPI	Lembaga Ilmu Pengetahuan Indonesia (Indonesian Institute of Sciences)
LKMD	Lembaga Ketahanan Masyarakat Desa (Village self reliance organisation, village administrative council)
Lobar	Lombok Barat (West Lombok District)
LP2SD	Lembaga Penelitian dan Pengembangan Sumber Daya (Institute for Human and Physical Resource Development)
Lotim	Lombok Timur (East Lombok District)
MIS	Management Information System
MOHA	Ministry of Home Affairs

MOU	Memorandum of Understanding
MTR	Mid Term Review
NEIS	NTB-ESWS Information System
NGO	Non-government Organisation
NTB	Nusa Tenggara Barat (West Nusa Tenggara)
NTB-ESWS	Nusa Tenggara Barat Environmental Sanitation and Water Supply Project
NTT	Nusa Tenggara Timur (East Nusa Tenggara)
O&M	Operations and maintenance
PABPL	Penyediaan Air Bersih dan Penyehatan Lingkungan (Water Supply and Environmental Sanitation)
PCB	Project Co-ordinating Board
PCR	Project Completion Report
PDAM	Perusahan Daerah Air Minum (Autonomous water enterprise)
PDD	Project Design Document
PHAST	Participatory Hygiene and Sanitation Transformation
PIB	Project Implementation Board
PID	Project Implementation Document
PKK	Pembinaan Kesejahteraan Keluarga (Local Women's Welfare Organisation)
PMDU	Provincial Monitoring and Development Unit
PMS	Project Monitoring System
P3AB	Projek Penyediaan dan Pengelolaan Air Bersih (formerly PPSAB) (Development and Management of Water Supply Project)
P3P	Proyek Peningkatan Prasarana Pemukiman (formerly P3AB) Environmental Infrastructure Improvement Project)
Pokmair	Kelompok pemakai air – water users group
Poktan	Kelompok kegiatan – community water supply activity group
PPSAB	Proyek Peningkatan Sarana Air Bersih (Water Supply Improvement Project)

PRA	Participatory Rural Appraisal
Province	First level of regional government
PUOD	Pemerintahan Umum dan Otonomi Daerah (Directorate General of Public Administration and Regional Autonomy within MOHA)
Relawan	Male volunteer in village
Relawati	Female volunteer in village
Repelita	Rencana Pembangunan Lima Tahun (Five Year Development Plan)
RWSG-EAP	Regional Water Supply and Sanitation Group for East Asia and the Pacific (UNDP–World Bank Water and Sanitation Program)
SSF	Slow sand filter (Saringan pasir lambat)
SISKA	Sistem Informasi dan Sistem Komputer Akuntansi (computerised information and accounting system for PDAMs)
TA	Technical Assessments (by PRA survey team)
TAG	Technical Advisory Group
Tingkat	Specific regional government levels, being Level I for province, Level II for kabupaten or kotamadya, Level III for kecamatan
TO	Technical Officer
Type A	Large piped water supply networks managed by GOI agencies
Type B	Small to medium pipe systems with mix of GOI agency management and community management
Type C	Small water supply systems and point sources (eg. wells) under community management
UFW	Unaccounted-for-water
UNDP	United Nations Development Program
URF	Upflow roughing filter
WS	Water supply
WSS	Water supply and sanitation
Y2K	Year 2000 (computer compliance issue)

EXCHANGE RATES

During the project implementation period (1991-1996), the approximate exchange rate between the Australian Dollar (A$) and Indonesian Rupiah (Rp) was:

A$1.00 = Rp1,480

During the project evaluation fieldwork period (Jan-Feb 1999), the approximate exchange rate was:

A$1.00 = Rp5,000

1. INTRODUCTION AND BACKGROUND TO PROJECT

This section provides an overview of the Nusa Tenggara Barat - Environmental Sanitation and Water Supply Project (NTB-ESWS) undertaken jointly by the Governments of Australia and Indonesia in the period 1991-1996 within the framework of Australia's international development co-operation program managed by AusAID.

1.1 Project Rationale

Nusa Tenggara Barat (NTB) is among the poorer and less developed provinces in Indonesia, with limited fertile land, overcrowding (especially on central Lombok), and comparatively poor health (high infant mortality and morbidity rates, and low nutritional levels).

Less than 10% of the NTB population used piped water supplies in the late 1980s, with wells being the main water source, followed by rivers and springs. Almost 90% of rural households in NTB had limited or no access to safe toilets (Reference 1).

The NTB-ESWS Project addressed the need for improved access to essential infrastructure for water supply and sanitation, with a focus on lower income communities in rural areas. This was in line with both GOI and GOA objectives to promote socio-economic development in Indonesia with a focus on poverty alleviation in the poorer, eastern islands region of the country.

1.2 Formulation

Australia has been associated with environmental sanitation and water supply projects in NTB since the mid 1980s. In early 1990, the GOI and GOA agreed to develop a new ESWS project in NTB, drawing on prior experience in the province. A Project Design Team commenced work in mid-1990, and a Project Design Document (PDD) was completed by January 1991 (Reference 3).

1.3 Objectives and Scope at Design

The primary aims of the NTB-ESWS Project were to provide environmental sanitation and water supply facilities to be used effectively and focused on community and kabupaten-based management and development. The PDD outlined a new classification of water supply schemes in Indonesia:

- **Type A** – Large pipe networks depending on GOI agencies for development, operation and maintenance
- **Type B** – Small to medium pipe systems depending on both GOI agencies and communities for development and management
- **Type C** – Point sources (e.g. wells) and small, reticulated systems depending almost solely on community development and management.

As stated in the PDD, the scope of the project was as follows:

- The project would be phased over the six kabupaten in NTB, with the precise scope to be determined by needs, absorptive capacity, and the activities of other donors. Priority in selecting communities would be principally needs-based, following stated GOI selection criteria as set out in Repelita V
- Up to 800,000 people would receive improved water supply through Type C, with some Type B and ES facilities
- A further 150,000 persons would receive ES and improved effective water supply through rehabilitation of Type A systems.

The principal Australian inputs included personnel, equipment, supplies, training, and hire of locally engaged staff. The principal outputs were improved water supply and environmental sanitation for up to 950,000 persons in total (Type A, B and C systems).

1.4 Financing Arrangements

The PDD envisaged the NTB-ESWS Project would take place over a five year period, with a total project cost estimated at A$28.3 million, of which the Australian component was designed to be A$21.7 million.

1.5 Completion

The NTB-ESWS Project commenced in December 1991 and was essentially completed by December 1996. A Project Completion Report (PCR) was prepared in Bahasa Indonesia (December 1996 - Reference 2) and a PCR in English was issued in January 1997 (Reference 1). There was a minor extension of the project up to May 1997, to complete urban water supply infrastructure works in Dompu.

1.6 Ex-Post Evaluation

AusAID appointed an independent team from Egis Consulting Australia Pty Limited (formerly known as CMPS&F Pty Limited) to undertake this ex-post evaluation in September 1998. A survey (known as Participatory Rural Appraisal [PRA]) of ten sample communities in the NTB-ESWS Project area was carried out in late 1998 by the Regional Water and Sanitation Group for East Asia and the Pacific (RWSG-EAP), of the UNDP-World Bank Water and Sanitation Program (Reference 10). The evaluation team, consisting of an economist / financial analyst (team leader) and water supply / sanitation engineer, undertook a desk review in Canberra with AusAID (7-11 December 1998). Subsequently, the evaluation team undertook a field mission to Indonesia (24 January - 26 February 1999). The final report of the PRA survey was available to the evaluation team in late March 1999. AusAID reviewed the draft findings of the evaluation team in the period March to May 1999, and written comments were provided to the team. This Final Report presents the overall findings and conclusions of the evaluation team, taking into consideration the comments received. The evaluation team expresses their appreciation to the many individuals in Indonesia and Australia who assisted them on this task.

2. IMPLEMENTATION PERFORMANCE

This section outlines the implementation performance of the NTB-ESWS Project, covering activities from project identification through to project completion as relevant to implementation efficiency.

2.1 Project Design

The design structure of the project was based on three components:

- **Project Planning and Co-ordination** – establishes the overall management structures and implementation strategies, focused on the kabupaten level with links to provincial and national levels (see Reference 1, Annex C for details)
- **Community Managed Activities** – sets the framework for specific AusAID and GOI support (Type C systems), in the context of the proposed community participation process integrating health and gender perspectives (see Reference 1, Annex D for details). The implementation process adopted for the community managed activities was relatively complex, involving a range of GOI institutions, community groups and representatives, volunteers, and staff provided by the project. The project staff involved in each kabupaten typically were the Kabupaten Team Leader (KTL); the Community Project Officer (CPO); the Appropriate Technologist (AT); and up to 15 Community Facilitators and Technical Officers (CF-TOs) who played a key role in promoting community participation in the project
- **Institutionally Managed Activities** – outlines the process for providing Type A and B systems, as well as related health and water quality surveillance mechanisms (see Reference 1, Annex E for details).

The PDD was finalised by AusAID in January 1991, and the project commenced in December 1991. The rationale for the project was soundly based, and the overall design structure was quite flexible to allow appropriate amendments to be made with respect to detailed project design issues during implementation. However, the evaluation team notes three significant aspects of the project design which were not appropriate and subsequently led to changes during project implementation:

- The lead agency nominated in the PDD (Ministry of Home Affairs) was not in accordance with established GOI arrangements for managing donor-assisted WSS projects, and an MOU for the project was signed by the GOI Minister of Health in September 1991. As subsequently noted in the PID, the eight person Project Design Team which prepared the PDD in 1990 did not contain members of GOI agencies related to the project

- ❑ The proposed new classification of water supply schemes in Indonesia (Types A, B, C) was not found to be appropriate. In particular, the project found that there were constraints and resistance to the implementation of proposed Type B systems (mix of GOI agencies and direct community responsibility). Also, the project found that within the generic Type C systems there are differing implications for implementation performance between piped and non-piped (ie dug wells) water supply facilities
- ❑ The basis of the estimates of the project beneficiaries in the PDD is not clear, and consequently the project cost estimates were not fully definitive. Detailed analysis during the implementation of the project led to a downgrading of total beneficiary estimates and an increase in project cost estimates.

2.2 Project Implementation Document

A draft Project Implementation Document (PID) was prepared by the Australian Managing Consultant (AMC) and published in July 1992. The major changes from the PDD to the PID were:

- ❑ The project goal was substantially refined and refocused to highlight environmental health concerns:

  "To contribute to improved socio-economic and environmental health conditions in NTB."

  In addition, a clear project purpose was defined:

  "To provide environmental sanitation and water supply facilities which will be effectively used, focusing on community and kabupaten-based management"

- ❑ The Ministry of Health (Directorate General, Communicable Disease Control and Environmental Health) became the lead agency for GOI, in line with national arrangements promulgated by BAPPENAS

- ❑ Significant revisions were made in the PID to the earlier estimates in the PDD of the target beneficiaries of the project. In this respect, the PID is unclear, suggesting in various places beneficiary numbers ranging from around 430,000 persons up to around 950,000 persons. However, the PID tended to downplay the significance of precise beneficiary targets, stating (Page B3-15, Reference 4):

  "The project has a **process orientation** emphasising sustainable improvements **rather than targeting quantitative achievement**"

- ❑ A new element was added to the community managed activities component of the project, namely "income generating activities" (IGA), subsequently renamed "micro-finance" activities. These were included to:

  - Maximise the likely participation of targeted beneficiaries (particularly women), as well as aiding the continuity of water user groups (pokmair) and therefore of project achievements after project completion

- Support the overall goal of improving socio-economic and environmental health conditions in NTB

❑ The total project cost estimate increased by 8% from the PDD (A$28.3 million) to the PID (A$30.5 million). The GOA component rose from A$21.1 million to A$23.4 million, much of this increase being for a higher level of project procurement as well as various increases in project operational costs (branch offices, transport and field travel; data collection). The estimate of GOI costs of A$7.3 million in the PDD remained similar in the PID (A$7.1 million in total), but was split into both government (A$4.8 million) and community (A$2.3 million) contribution estimates.

The draft PID was "approved" by the GOI in December 1992. Exchanges continued until mid 1993 between AusAID and the AMC over issues in the draft PID. Subsequently, it was agreed not to reissue the draft as a final PID. Rather, ongoing amendments to the project were incorporated in the regular annual plans for the project, and handled contractually as specific variations to the project agreement.

These arrangements appear to have been practical and adequate for effective implementation purposes. Nevertheless, particularly given the broad scope of the project with its relatively complex mix of community and institutionally based activities, a fully agreed final PID might have contributed to better implementation through increased comprehension of the project by the many participants, without limiting the flexibility of the project. For example, even for AusAID sponsored reviews covering the NTB-ESWS Project, quoted project details vary significantly. The 1994 WSS sector effectiveness study (Reference 14) stated that the project was designed to benefit approximately 400,000 persons. However, the 1995 WSS TAG study states that the project had almost one million beneficiaries (Reference 15).

2.3 Management and Institutional Issues

A significant issue at project commencement was the need to confirm satisfactory co-ordination arrangements between the AMC (a joint venture of Australian firms Kinhill - ACIL - IDSS) and the GOI. The PDD had identified the Ministry of Home Affairs as the lead agency. However, the preferred lead agency was the Ministry of Health, and an MOU with Australia for the project was signed by this Ministry in September 1991.

The AMC was appointed in December 1991, and fieldwork commenced in Indonesia shortly thereafter. However, the new co-ordination arrangements for the project took some time to be clarified, as the GOI was at the time promulgating new guidelines and procedures for the co-ordination and management of water supply and sanitation projects in Indonesia. With the preparation of the PID in July 1992, the proposed new arrangements were clearly documented.

Consequently, there was a significant delay at project commencement in identifying responsible GOI management personnel for the project. As noted in the PID (Page A1-12. Reference 4):

> "The Consultant (AMC) has experienced difficulties during the initial implementation of the project because of the **lack of a nominated final authority** for initiation of program activities from the GOI side. The authority for day to day program management and direction is lacking."

At the central government level the responsibility for the development and direction of the project was to be vested in a National Water Supply and Sanitation Technical Co-ordinating Committee, chaired by BAPPENAS with members drawn from the Ministries of Health, Public Works and Home Affairs, other related agencies as appropriate, and AusAID. This Technical Co-ordinating Committee had three working groups covering technical issues; community health and water quality; and institutional and community development. In practice, this elaborate management structure proved to be unworkable (see Reference 1), and the ongoing administrative and management co-ordinating function at the national level for the project was provided by the Ministry of Health (Water Supply and Sanitation Secretariat, Directorate General for Communicable Disease Control and Environmental Health).

At the Provincial and Kabupaten levels in NTB, the project was co-ordinated by BAPPEDA (Provincial Planning and Development Board) who chaired both Provincial and Kabupaten Co-ordinating Committees for water supply and sanitation development. As at the national level, administration and management of the project at the Provincial level were provided by the Dinas Kesehatan (Provincial Health Office) through a Water Supply and Sanitation Secretariat.

From the above outline of "on the ground" management arrangements, it appears that the implementation of the project was essentially "driven" by the Australian project management personnel, in particular because of the lack of a neat fit between intended project activities, and the responsibilities of existing GOI agencies. Insofar as the project was focused on achieving specific physical outputs within the timeframe of the project, these management and institutional arrangements appear to have been appropriate and the evaluation team considers that the project was implemented in a suitably efficient manner.

However, with respect to the development of a longer-term, sustainable capacity of an appropriate GOI agency to fulfil a desired role, then the implementation arrangements appear to have been less than satisfactory. For example, the project designed and implemented an information system known as NEIS (NTB-ESWS Information System) which was maintained by a Data Management Unit (DMU). This appears to have worked satisfactorily during the life of the project, reporting on an extensive range of project activities (see References 1, 5). However, once the project was completed, NEIS had no appropriate "home" within the established GOI management structure. Despite extensive enquiries both in Indonesia and Australia by the evaluation team, no evidence of the continued use of NEIS could be found.

A significant institutional issue for the AMC for this project was that its contract with AusAID was an "inputs" style contract (signed in late 1991). In this context, it was a

more appropriate contractual arrangement to successfully manage the delivery of this project, given the PID emphasis on process rather than quantitative targets. For example, with respect to the micro-finance activities, the PID did not identify detailed "outputs" per se, which meant that the AMC had considerable flexibility to deliver this component. The evaluation team considers this was an appropriate approach in this context, albeit that inadequate project resources were ultimately available for this particular activity.

2.4 Performance Monitoring

The performance of the NTB-ESWS Project was actively monitored over the life of the project, from both internal and external perspectives. An internal Project Monitoring System (PMS) was established in 1992, which later became the NEIS system (Reference 1). This covered the following components:

- Job costing details (financial / physical)
- Beneficiary information / community development
- Institutional and community training
- Micro-finance support details.

This internal project monitoring system (which included both quantitative and qualitative elements) operated throughout the life of the project, and was used in the preparation of monthly reports, six-monthly reports, and annual plans. As noted above however, the NEIS system did not survive beyond the life of the project. It is also noted that the PMS / NEIS systems did not attempt to directly monitor the possible impacts of the project on community health, which is widely accepted as being technically difficult to achieve. However, the project assembled proxy data for monitoring the community health impacts of WSS interventions through the baseline and follow-up surveys. These included data such as the extent of water usage before and after project interventions, time taken to collect water, defecation practices, use of health facilities, and delivery of environmental health education. The results as estimated in the NTB-ESWS Project by the PCR and PRA surveys are set out in Section 3.2 below.

A second source of performance monitoring from within the project was the regular Project Director visits (typically each six months on average). These visits (usually around two weeks) would involve meetings in Jakarta and NTB, and would be followed by a formal report to AusAID. This provided another avenue to raise any specific ongoing concerns on the project.

A third source of performance monitoring directly involving the project personnel was the series of Provincial and Kabupaten co-ordinating committee meetings. Originally scheduled to be held on a monthly basis, these tended to be carried out when needed. Similarly, there was a series of meetings involving central government agencies (Project Co-ordinating Board / Project Implementation Board meetings [PCB / PIB]). These were originally scheduled on a six monthly basis, but in practice were held on an approximate annual basis, and provided appropriate opportunities for high level reviews of project implementation progress and consideration of major policy issues.

The Australian Embassy (AusAID staff) in Jakarta undertook field visits on an approximate six-monthly basis and subsequently reported to AusAID Canberra on project performance. This external monitoring program operated throughout the project, keeping Post staff informed of "on the ground" progress and enabling regular performance reporting to Canberra (as perceived by the Post).

The PDD and the PID envisaged that a Mid Term Review (MTR) would be conducted on the project, nominally in mid 1994. However, no MTR was carried out, as the Post was of the view that the positive approach of the AMC to addressing ongoing project issues "probably precludes the need for a mid term review". However, the project was included in two other water sector reviews in Indonesia carried out by AusAID:

- Indonesia: AusAID Water Supply and Sanitation Effectiveness Study: 1994 (Reference 14)
- Indonesia: AusAID Water Supply and Sanitation Technical Advisory Group Field Mission: 1995 (Reference 15).

Both these review missions examined the NTB-ESWS Project, but in the wider context of AusAID's participation in the water supply and sanitation sector in Indonesia. The 1994 review mission recommended against conducting an MTR for the NTB-ESWS Project, stating that it would not "benefit significantly" from any further review. Some specific project concerns and issues addressed in these reviews were:

- The need for thorough planning for the winding down of project activities, and transfer of responsibility to GOI agencies
- Provision of appropriate O&M documentation for community managed facilities, as well as preparation of "as constructed" details for institutionally managed components
- Further attention to involvement of women in project activities was recommended
- The requirement for further monitoring of sustainability indicators to assess continuing utilisation of facilities provided by the project.

There were various efforts by the project to respond to these concerns. A formal "phase-out" plan was prepared in early 1996. Considerable effort was applied to preparing "Final Reports" on different aspects of the project. Increased efforts were made to involve PKK groups in project activities. The PCR notes specific follow up surveys on the sustainability of facilities provided by the project.

2.5 Actual Cost and Financing

The total cost of the project reported in the PCR was A$39.048 million, representing a 28% increase over the project cost estimate in the PID. The main source of this increase was the contributions from the beneficiary communities, as shown on Table 2-1.

Table 2-1: BUDGET VERSUS ACTUAL EXPENDITURE (A$ million)

Budget (PID July 1992)	Actual (PCR Jan 1997)	Percentage Change
Government of Australia $23.385	$25.587	▲ 9.4%
Government of Indonesia $4.836	$3.645	▼ 24.6%
Community $2.301	$9.816	▲ 326.6%
Total $30.518	**$39.048**	▲ **28%**

The GOA contribution increased by 9.4% over the PID estimate, which was in line with price inflation estimates over the period, and had been allowed for as such in the AMC's contract. The GOI contribution was 24.6% lower than estimated at the time of the PID, mainly due to a lower level of GOI contributions to community managed activities than estimated in the PID. In addition, the PID had assumed direct GOI funding of A$640,000 for project planning and co-ordination, whereas the PCR does not attempt to estimate this cost component for the GOI.

The community contribution was A$7.515 million more than estimated at the time of the PID, derived mainly from the provision of Type C (non-piped) water systems and related facilities. This substantial increase is considered by the evaluation team to be a clear indicator of community support for the project.

The evaluation team considers that the emphasis on funding for community managed activities was appropriate given the focus of the project to provide essential water supply infrastructure to lower income groups in NTB. Overall, almost 70% of the project effort was directed to provision of community managed facilities, as shown on Table 2-2.

Table 2-2: NTB-ESWS PROJECT COMPONENTS (A$ million)

Component	Final Cost	Percentage of Total
Project Planning & Co-ordination	$2.628	7%
Community Managed Facilities	$26.959	69%
Institutionally Managed Facilities	$9.461	24%
Total	**$39.048**	**100%**

The estimate for the project planning and co-ordination component of A$2.628 million refers to GOA costs, and is mainly the overhead cost of an Australian Team Leader (ATL) full-time for the five year project period (without attempting to allocate some of this time to the community and institutional components). The time inputs of various other project staff have generally been notionally split between the community managed component and the institutionally managed component (as well as, in the inputs for KTLs and the Field Program Manager, including an estimate for contribution to the project planning and co-ordination component). In these circumstances, it is evident that the estimate for the project planning and co-ordination component is somewhat arbitrary, and precise comparisons of these costs with other WSS projects in Indonesia cannot readily be made.

The financial data in the PCR illustrate the types of expenditure for the GOA contribution to the project, as shown on Table 2-3.

Table 2-3: GOA CONTRIBUTION BY TYPE OF EXPENDITURE ($A million)

Expenditure Category	Total Expenditure	Percentage of Total
Australian Personnel[1]	$7.435	29%
Indonesian Personnel[1]	$6.972	27%
Procurement	$7.602	30%
Training	$0.734	3%
Other Costs[2]	$2.844	11%
Total	**$25.587**	**100%**

[1] For long term and short term professional staff.

[2] Includes non-professional field staff.

In total, around 56% of the GOA contribution was for personnel costs, split almost evenly between Australian and Indonesian long term and short term professional staff which in total was around 1,600 person months. In addition, there were around 7,000 person months of field and support staff inputs (which costs are included in the Other Costs category). This heavy focus on personnel costs reflects the “labour intensive” nature of the community managed component of the project, with 66% of all professional inputs (and all non-professional field staff) being directly related to provision of Type C systems.

The other major project expenditure category was procurement, mainly for water supply equipment and related materials. Procurement expenditure was focused on the institutionally managed component of the project, with more than 50% being directly related to provision of Type A and B systems. This expenditure category was clearly constrained within the total approved budget for the project, and was less a direct result of the specific project design compared to personnel costs.

Training costs as specific and separate items were around 3% of the GOA contribution to the project. However, as discussed in Section 3.3 below, this is understated because there were significant contributions to the overall training effort covered elsewhere under personnel costs, for management, preparation, and "on the job" training. Other Costs included office rental and running expenses, transport costs, and project related travel.

The pattern of project expenditure (GOA contribution) is shown on Table 2-4.

Table 2-4: PROJECT EXPENDITURE BY YEAR (GOA Contribution)

Financial Year	Percentage of Total	Cumulative %
1991 – 1992	7.3%	7.3%
1992 – 1993	22.5%	29.8%
1993 – 1994	19.8%	49.6%
1994 – 1995	24.1%	73.7%
1995 – 1996	22.9%	96.6%
1996 – 1997	3.4%	100%
Total (A$)	**A$25,587,000**	

GOA project expenditure illustrates an even profile, with lower expenditures in the first and final years consistent with the "start-up" and "wind-down" phases of the project (as well as being periods of less than 12 months of project activities).

2.6 Implementation Schedule

The project was implemented broadly "on schedule". In part, this was due to the process orientation of the project (as detailed in Section 2.2 above) rather than being focused on specific implementation milestones. There were three main difficulties experienced by the project with respect to the intended schedule:

- At project commencement, the PDD had identified the Ministry of Home Affairs as the lead agency, whereas the Ministry of Health was the appropriate agency for the GOI. Also, there were significant policy changes under way within GOI at the national level concerning water supply and sanitation development. As discussed in Section 2.3 above, the project experienced delays while these matters were clarified
- There were delays in obtaining the necessary papers (PP19 clearance) to exempt project items purchased in Australia from import duty, which delayed delivery and installation of some facilities
- Towards the end of the project, there was a delay incurred in the construction of water supply headworks at Rora, Dompu due to the limited capacity of the contractors. A minor extension to the project was approved by AusAID to enable these works to be fully completed under project supervision.

3. IMPACT ASSESSMENT

This section provides an assessment of the impacts of the different components of the project, and related contextual issues of concern to AusAID, such as good governance and poverty alleviation, which are Key Result Areas (KRAs) in AusAID's Corporate Plan (see Reference 11).

3.1 INFRASTRUCTURE

3.1.1 General

The overall infrastructure provided by the project was substantial, and is summarised below under the two main components of the project (and detailed in Appendix IV).

- ***Community managed facilities,*** including:
  - 13 piped water supply systems
  - 8,690 dug wells
  - 90,279 household toilets
  - 937 washing / bathing facilities
  - 1,400 other facilities including drainage facilities, school toilets, etc.
- ***Institutionally managed facilities,*** including:
  - 12 new or rehabilitated / augmented Type A and Type B systems
  - Provision of associated equipment including bulk meters, meter testing equipment and water testing equipment.

Estimates of the numbers of beneficiaries of this infrastructure are shown on Table 3-1 below. The basis for these figures is given in Appendix IV. The estimates of the numbers of beneficiaries are based on facilities constructed rather than facilities now in use.

Table 3-1: PROJECT BENEFICIARIES

Infrastructure Category	Facilities	Beneficiaries per facility	Beneficiaries [1]	
			Water supply	Sanitation [3]
Community managed facilities				
• Type C piped systems	13 systems		14,449	
• Dug wells	8,690	25[4]	217,250	
• Household toilets	90,279	5[4]		451,395
• Other facilities	2,337	5[5]		11,685
Subtotal			***231,699***	***463,080***
Institutionally managed systems				
• Type A and B piped systems	12 systems[2]		93,730	
Subtotal			***93,730***	***0***
TOTAL			**325,429**	**463,080**
Total for piped systems			**108,179**	
Total for non piped systems			**217,250**	**463,080**

[1] An overlap occurs between water supply and sanitation beneficiaries. However, given the number of sanitation beneficiaries, there are clearly many who are not water supply beneficiaries. The water supply and sanitation beneficiaries should not be added and expressed as total beneficiaries.

[2] Includes headworks augmentation in Lombok Barat (Gunung Sari), Dompu (Rora) and Bima (Nungga).

[3] These include sanitation facilities constructed in areas which were recipients of Type A and B water supplies.

[4] Project assumption.

[5] Evaluation team assumption. "Other facilities" cover a broad range of facilities with a correspondingly broad range of beneficiary numbers.

3.1.2 Community Managed Facilities

Type C Piped Water Supply Systems

Each of the 13 systems is a gravity piped system utilising spring sources except in the case of Santong which uses water from an irrigation channel. All are designed to supply water to consumers through public taps. The size / capacity of the systems vary, as indicated below:

- The systems were designed to serve populations ranging from 380 to 4,320 persons
- The systems were designed to supply from 46 litres per capita per day (l / c / d) up to 138 l / c / d

- The number of public standpipes ranges from 1 to 41 per scheme (each serving an average of 87 persons)
- The cost per scheme ranged from Rp0.5 million to Rp245 million.

The systems provided to some 14,450 beneficiaries improved water quality through (in 12 of 13 cases) the use of uncontaminated spring sources, improved quantity, and enhanced availability. In most cases there were substantial savings in time taken to collect water, as well as health benefits due to quality and quantity improvements (see Section 3.2 below). The evaluation team confirmed the PRA survey findings that users of piped water systems are satisfied with the quality and quantity of water they get and the fees they pay. The PRA survey also found a strong correlation between the provision of piped water supply and the effective use of latrines (see below and Appendix III).

The PRA survey covered two Type C piped systems (Sumur Pande and Teratak – see Appendix III). The evaluation team inspected Teratak and Santong – see Appendix IV, Table IV-3. It is clear from the findings that there is a wide disparity in the status of Type C systems. Teratak and Sumur Pande (Sesait) were good examples of community implemented and managed water supply systems, with well organised user committees in operation and adequate funding for operation and maintenance. The PRA survey raised concerns about the capacity of the systems, and the ability of the communities to manage the systems with increasing numbers of house connections. In fact, the design criteria for these systems are adequate to enable a substantial increase in the level of house connections. However this issue highlights the lack of technical skills at the village level to make appropriate decisions on issues such as demand management.

The evaluation team inspection of Santong found a very different situation, with little evidence of any community management structure remaining and minimal system maintenance being undertaken. Sections of the system have been abandoned because of poor service levels which are a consequence of a combination of poor management, damaged facilities, and virtually no maintenance.

The situation in the remaining ten Type C piped systems is not known. The sustainability of these systems is considered by the evaluation team to be at risk. The risks are less in well managed systems, but there remains a need for technical support for better system management and maintenance beyond that which can be provided from village resources – even with further training.

Further details of these systems are set out in Appendix IV and are fully detailed in the Final Report of Engineer – Rural Community Managed Piped Systems (Type C).

Dug Wells

The dug wells were constructed to a standard design which included an excavated well of about 1 metre diameter, a lining of precast concrete rings or brick masonry (if required), a surrounding wall about 0.8 metre high at the top of the well together with posts, rail, pulley, and bucket and rope system for withdrawing water. A concrete slab constructed around the well and a drain and soakage pit provided for drainage and disposal of wastewater (sullage). The design maximum well depth was 15 metres but actual construction was occasionally deeper than this (maximum depth 26 metres). The wells were designed to serve about five families (25 persons) each.

The dug wells in most instances provide a reasonable quality and quantity of water to the communities they serve. In most communities there is continued use of alternative sources, with the dug wells being the primary source of water for drinking and cooking. Other sources are used for washing and bathing and non domestic uses for a number of reasons (mainly easier access to increased quantities of water). The PRA survey found similar results and confirmed that following the project the use of water from ponds for drinking and cooking has been discontinued, and the use of water from springs (more remote) and river sources (poorer quality) for drinking and cooking had decreased.

The PRA survey did not rate the condition of dug wells highly. However, the evaluation team found that the condition of wells was generally satisfactory. In most cases they were continuing to provide an acceptable level of service with adequate quality and quantity of water. In many instances routine maintenance is not being carried out. Typical problems include cracking of the well surround and lack of attention to drainage. Some wells have seasonal fluctuations in water availability, but this is to be expected in many areas given the annual rainfall pattern.

Household Toilets

The toilet design used a pour flush squat plate (of polypropylene) in a concrete plinth, with a discharge pipe to a pit or septic tank. The basic design included a concrete "bak" to store water for flushing and cleansing. The toilets were designed to serve a family of five, although on occasions two toilets were constructed with one septic tank.

The siting of wells and toilets were subject to guidelines developed by the project to ensure that the wells were not contaminated by discharge from the septic tanks.

The technology for the Type C non piped water systems was established by the project. The communities were not given a choice of water supply systems, except in limited areas where Type A, B or Type C piped systems were proposed. There was no community choice in relation to the type of toilet facility.

Impacts

The data from the PRA survey in relation to time and energy savings from improved water supply indicate health and economic impacts (refer to Sections 3.2 and 3.8 below). The impact of toilet construction is less clear. The evaluation team inspected many household

toilets and these were generally clean and being used. The standard varied from those fully enclosed with masonry walls, and an attached bathing facility, to those with cloth or bamboo screen enclosure. However the PRA technical assessments (TA) provide a better guide as to the current status of the toilets. These found that:

- In villages where piped water was available toilet usage was 90-100%. This appears to be a consequence of water being readily available for flushing and cleansing
- In villages with dug wells toilet usage was in the range 10-36% (by inference, presumably a consequence of water being less readily available for flushing and cleansing).

While it is difficult to extrapolate these findings to the whole project, there could be important lessons to be drawn from this information. The sustainability of toilets in villages with dug wells for water supply is at risk and health benefits from the project may be compromised (see Section 3.2 below). Based on the PRA survey, the overall utilisation of the toilets across the project could be as low as 50%. This varies from spot surveys at the end of the project reported in the PCR, which found that 98% of toilets were still in use, 94% were clean, and 66% had soap available.

The PRA survey showed that, in all villages, there is continued use of fields and rivers for defecation. These locations meet "preferred site" criteria, as expressed by participants in the PRA survey (water available all the time, close to home or place of work, private, easily accessible, fresh air / no bad odours, and assimilable with traditional practices).

It is not surprising that there has been no replication of project initiatives to construct further toilets after completion of the project interventions. By comparison, some villagers constructed additional wells using the standard designs developed by the project on their own initiative.

Further details of the dug wells, toilets and other facilities are set out in Appendix IV and in the Final Report of Engineer – Rural Non Piped Systems (Type C).

3.1.3 Institutionally Managed Facilities

The primary institutions responsible for the management of urban water supply systems in Indonesia are the kabupaten based water enterprises or PDAMs (Perusahan Daerah Air Minum). These are autonomous water enterprises owned by the Level II governments. There are more that 250 PDAMs in Indonesia including six in NTB, one in each kabupaten.

The original project design envisaged two types of institutionally managed systems:

- **Type A systems** – conventional PDAM systems providing piped water supply to consumers primarily through direct connections and also through public standpipes to serve poorer members of the community

- **Type B systems** – a combination of PDAM and community managed systems whereby the community would contribute to construction of facilities (small branches from a larger urban piped system) and would buy water from the PDAM at a reduced tariff. It was envisaged that communities would maintain the facilities constructed by them.

In effect only Type A systems were constructed. The project considered that the implementation of Type B systems would be too difficult, and the innovations in community participation in these systems did not eventuate. The use of the term Type B in the project documents now usually refers to smaller piped systems.

Facilities Implemented

Appendix IV summarises the Type A and Type B facilities implemented by the project. Additional details are contained in technical reports prepared by the project for each of these systems. The works included new systems as well as assistance with rehabilitation and augmentation of existing systems, particularly in Dompu and Bima. Some Type A and B systems were inspected in each of the five kabupaten in which they were implemented.

In Type A and B systems the project provided technical assistance in planning and design, and provision of equipment. Designs were generally in accordance with standards established by DGCK and were generally appropriate in terms of the key design parameters (unit demands, peaking factors, pressures, storage capacities). The project introduced some innovations. These included:

- The use of HDPE which gives improved performance in small diameter pipelines particularly in relation to UFW
- Modular construction steel reservoirs which are generally superior to reinforced concrete reservoirs in terms of value for money, particularly having regard to the quality of reinforced concrete water retaining structures in remote locations.

The systems varied in type and size from complex systems such as Gamang (design beneficiaries 31,107) in Lombok Timur to small systems such as Hu'u (design beneficiaries 1,890) in Dompu. Sources included springs, surface water and groundwater. Both gravity and pumped systems were provided. Treatment facilities (SSF and URF) were constructed in Lombok Barat and Dompu. Steel reservoirs, transmission and distribution pipelines, and service connections were provided in all systems. Most equipment was procured by the project, with construction being by local contractors.

The Type A and B systems predominantly provided supplies to individual houses through metered connections. No community contribution was required but consumers paid a fee to connect and were required to pay monthly water bills based on the type of connection and the amount of water consumed. Some public standpipes were provided in these systems. Payment for water from public standpipes is also based on consumption but at the lowest (social) tariff. Usually one person is responsible for collection of money from the users of the standpipe and payment of the monthly bill. Systems for collection of money from users varied. They included a flat rate, an estimate based on consumption,

and family size. Hu'u and Adu (see Appendix IV, Table IV-5) were unusual cases where almost all connections were public standpipes.

The Type A and B systems provided an improved water supply to some 94,000 consumers. There were improvements in quality, quantity, and availability. In most cases there were substantial savings in time taken to collect water, as well as health benefits due to quality and quantity improvements. The PRA survey confirmed the evaluation team findings that users of piped water systems are generally satisfied with the quality and quantity of water they get and the fees they pay. However, in two villages with Type B systems covered in the PRA survey, there was found to be some concern about the equity in payment of water from public standpipes, and about the lack of maintenance on these facilities. Consumers interviewed by the evaluation team were generally aware that the monthly water bill was dependent on consumption.

The PRA survey also found a strong correlation between the provision of piped water supply and the effective use of toilets. The PRA survey also confirmed the greater acceptance of piped water supply systems generally, compared to dug wells.

The evaluation team's inspections of facilities indicated that the major visible assets implemented with project support were generally well constructed and able to operate as designed. A number of operation and maintenance issues associated with these systems are detailed in Appendix IV. Below ground pipelines could not be inspected.

The beneficiary numbers for the institutionally managed facilities shown in the previous table are based on the evaluation team field assessments. The numbers of beneficiaries for Type A and Type B systems are less than planned in the design of these facilities. The number of beneficiaries is estimated to be about 64% of those for which the systems were designed.

The reasons for this include:

- The high cost of installation of house connections (approximately Rp400,000)
- Source capacity constraints in the Gamang – Sakra – Keruak – Jerowaru system (Lombok Timur)
- High UFW in all piped systems, especially those in East Lombok, Sumbawa and Dompu
- It is possible that operational problems (including lack of a 24 hour supply and low system pressure) are a contributing factor to the lower number of consumers – creating a reduced level of consumer satisfaction in the system.

3.2 Health

Improvements in environmental health are a major part of the project goal. The PCR consideration of health benefits focuses on the project purpose which is "to provide environmental sanitation and water supply facilities which will be effectively used ...", and provides evidence for health improvements based on improved availability of water (quantity), improved water quality, improved sanitation, and improved hygiene. The PCR provides information based on 144 studies since 1986 supporting the argument that improved water supply contributes to improved health.

Base line and follow up surveys were undertaken to measure changes in these areas, specifically covering improvements in water quantity, quality, toilet use, personal hygiene and environmental sanitation (as detailed in Annex F of the PCR). In summary, these surveys indicated:

- Significant total time savings for collection of drinking water (18 minutes per day on average for NTB Province)
- Significant reductions (more than 50%) in the use of unsafe water sources (river and irrigation canals) as an indicator of improved water quality
- Major increases in toilet use after project interventions, more so for adults than for children, and with higher usage rates on Sumbawa than on Lombok
- Data covering personal hygiene were generally incomplete, and the partial results varied significantly across the project area
- Data on environmental sanitation were limited to the extent of relocation of animal stalls and pens away from houses, where improvements were noted but were quite variable across the project area.

Indonesian health data are generally not available in a form which could be linked to project interventions. As noted above in Section 2.4, the monitoring systems developed by the project (PMS / NEIS) did not include community health statistics. Nevertheless, some health data were collected and reviewed by the evaluation team and discussed with DIKES and DEPKES officials. The PRA survey also provides the views of villagers on the health impacts of the project.

Overall provincial and kabupaten statistics on diarrhoea and malaria do not show improvement in either disease over the period 1993 / 94 to 1996 / 97. Anecdotal evidence is that there has been a reduced number of major diarrhoea outbreaks following project interventions. Wanasaba was one village where major diarrhoea outbreaks regularly occurred pre-project but have not occurred since. This village received more than the normal level of assistance, with reportedly 100% toilet coverage being provided through a combination of project and GOI efforts. High toilet usage was also reportedly achieved through community pressure, including enlisting the support of religious leaders in the promotion of safe sanitation practices.

The PRA survey obtained data on water and toilet use and hygiene. The key findings were:

- Reduced incidence of diarrhoea / cholera, skin infections, malaria, and headache / backache
- Significant time savings (mainly for women) in collecting water
- Less energy used to collect water
- Substantial increases in the quantities of water used (2-5 times)
- Increased use of improved quality (project) water for drinking and cooking
- Decreased use of poor quality water sources for drinking and cooking

- ❑ High utilisation (90-100%) of toilets in villages with piped water supplies
- ❑ Low utilisation (10-36%) of toilets in villages with dug wells
- ❑ Even where toilets are used, this is not to the exclusion of traditional sites in rivers, fields etc
- ❑ Increased bathing (2-3 times) and washing of clothes (daily rather than weekly)
- ❑ Improved neighbourhood and family relationships.

Both the PCR and PRA survey results indicate a positive health impact of the project. Nevertheless, there are specific areas of concern, such as the low utilisation of toilets in villages with dug wells, and the continued use of traditional defecation sites by villagers when they are away from home. EHE messages are understood and remembered, more so by women than men, but are not having the desired impact on behaviour.

3.3 Education and Training

Education and training were a significant part of overall project activities. The PCR indicates in broad terms the categories of training, the number of courses and recipients, and the actual and budgeted expenditure. Summary details of courses and beneficiaries are provided in Table 3-2 below.

Table 3-2: TRAINING COURSES, BENEFICIARIES AND EXPENDITURE

Training Category / Recipient	Number of Training Courses	Number of Beneficiaries	Expenditure (A$)
Community Training			
• Project Staff	116	723	
• Communities	34	10,906	
• NGO / LKMD	3	2,159	
• Other	77	184	
Subtotal	***230***	***13,972***	***615,860***
Institutional Training (PDAM, Health, Public Works)			
• Water engineering	31	468	
• Health and water quality	34	361	
• Management	99	767	
Subtotal	***164***	***1,596***	***231,760***
TOTAL	**394**	**15,568**	**847,620**

Note: Details shown in table are from PCR Appendix 3.

The allocation of expenditure was approximately 72% for community training and 28% on institutional training. The training expenditure figures understate the training effort, particularly in the institutional training area, because the costs of many of the resources used in the planning, management and implementation of training are covered under other categories (for example Australian based personnel).

The community training was undertaken as an essential part of the implementation approach for the community component of the project. Based on the details of the individual training courses contained in Appendix 3 of the PCR, the major areas of focus for community training were:

- Training of CF-TOs (project staff)
- Training of community volunteers (Relawan / Relawati)
- Project orientation workshops (community and LKMD)
- Training of PABPL work groups (local government, LKMD and community)
- Training of village tradesmen
- Construction and O&M training for piped water supply systems (community, LKMD and local government)
- Completion (end of cycle) workshops / training (community and LKMD).

A high proportion of this education and training effort was focused on project implementation requirements. Consequently, much of this is unlikely to have a significant direct impact beyond the project. However, aspects of the training focused on further implementation and longer term use of facilities (for example training for construction, operation and maintenance, and environmental health) are more likely to be of continued value, given their ongoing applicability.

The results of the PRA survey confirm that the community environmental health education (EHE) did not always have the desired impact. Many of the PRA survey participants were aware of key EHE messages, women more so than men. However this knowledge was not uniformly reflected in behavioural changes. For example, defecating in the river or in open / exposed areas was well recognised as "bad for health", and a contamination route for disease transmission. Nevertheless, the practice of defecation in fields and the river continues, albeit at a reduced level. Both the PCR data and the PRA survey findings indicate that the involvement of women in community training needs to be increased, and that the mechanisms for developing and promulgating EHE messages need to be amended (see Appendix III).

The impact of training for community trades people was evidenced by continued construction of wells to project designs in some villages. There was, however, no evidence of similar replication activities for toilets. Some of the CF-TOs remain active in the project area as staff of the micro-finance organisations created or supported under the project. Others are working with NGOs on various community projects. The evaluation team considers that the training these personnel obtained through the project is of benefit to ongoing community development activities.

In the area of institutional training, there were training courses on:

- Results oriented management, primarily for DIKES staff (16 courses)
- UFW related training including meter test bench operation (6 courses)
- PDAM financial management and accounting (17 courses)
- Construction related training (eg. tank erection) (3 courses)
- Basic computer training (13 courses)
- Water sampling and testing (8 courses).

There is evidence from the evaluation team field visits of continued use and further development of skills in computer operation, financial management and accounting for PDAMs. Meter test benches were used effectively in most PDAMs. Water sampling and testing by DIKES is undertaken but is currently constrained by budget limitations and difficulties in purchasing consumables. PDAM operators showed little interest in, and understanding of the need for, regular sampling and testing.

In addition to the formal training activities, there was significant support to PDAMs through on the job training, and institutional strengthening activities. These included:

- Support for longer term planning e.g. preparation of kabupaten plans for piped water supply development
- UFW management programs
- Introduction of SISKA computerised billing and accounting system for PDAMs
- Water tariff management programs
- Operation and maintenance activities particularly associated with new facilities implemented under the project.

While the direct impact of the project activities in these areas is difficult to assess, the following was observed:

- The kabupaten plans were not sighted despite extensive enquiries. This supports the impression conveyed by the PCR that this planning activity was not a priority for GOI
- PDAM management commented favourably on the UFW management programs. While there is no evidence of the application of systematic UFW reduction programs, the UFW performance of some PDAMs has improved, particularly in Lombok Barat and Bima
- SISKA continues to be used, and further development and training are being undertaken by five of the six PDAMs in NTB. (SISKA is being further developed as part of the AusAID supported Flores WSS Reconstruction and Development Project). Lombok Barat has a different system which had been installed and was working satisfactorily prior to SISKA becoming available.

Also, it was advised to the evaluation team that SISKA was more suited to the smaller PDAMs in NTB, and that PDAM Lombok Barat found it to be too slow in handling its larger customer base. Whilst it is difficult to compare the status of PDAM operations pre-project, it is clear that in many respects their operations continue to improve – as indicated by growth in connections, staff numbers, billings, revenue collections, and other indicators. SISKA appears to have been a significant contributor to improved PDAM financial operations

- Water tariff adjustments have been minimal in recent years but most PDAMs have either recently increased tariffs or are planning to do so in 1999, which is considered essential for their financial sustainability
- The utilisation of operation and maintenance processes developed and documented under the project could be improved. For example, consistent recording, review and analysis of pumping records, water quality data, and bulk meter flow records are not regularly undertaken in most PDAMs. UFW data are suspect because of faulty bulk meters which are not being repaired.

3.4 Gender Equity

The PCR provides an overview of the approach and achievements in relation to gender and development. Participation by men and women in the project is summarised in Table 3-3.

Table 3-3: PARTICIPATION BY GENDER

Category of Personnel	Male		Female		Total
	No.	%	No.	%	No.
Project Staff					
• Australian Consultants	12	80%	3	20%	15
• Indonesian Consultants	22	85%	4	15%	26
• Indonesian Admin / Support	47	76%	15	24%	62
• CF-TOs	60	77%	18	23%	78
Water Groups					
• Group Leaders	5,051	97%	162	3%	5,213
• Cadres (Volunteers)	3,217	62%	1,996	38%	5,213
Training recipients					
• Community	8,042	73%	3,026	27%	11,068
• NGOs	46	85%	8	15%	54
• Project Staff	566	76%	175	24%	741
• Government Staff	2,997	81%	708	19%	3,705

Women were under-represented in all aspects of the project, particularly considering that they play a pivotal role in water, sanitation and related environmental health activities at the user level. As was also noted by review reports covering the project (see Section 2.4 above), the evaluation team considers that increased attention is warranted to involving women in such WSS interventions in the future. In particular, for a "demand-responsive" approach to WSS projects to be successful, effective consultation with, and involvement of, women is crucial (given they represent a major source of such "demand"). The project had no discernible impact on traditional decision making structures in the community, and did not change the status of women except as a consequence of time savings, and general improvements in health.

The PRA survey assessed the community decision making processes in the project and reported that women's groups were involved in only 5 out of 139 (less than 4%) decisions, ranging from the selection of villages and facilities to decisions on the level of service and facility management. While women were represented in other groups in the decision making process – eg. In LKMD and DIKES staff, their representation is low and therefore the 4% figure is valid as a measure of female participation in observed formal decision making processes.

Based on these data, additional effort is warranted to increase the role of women in project decision making. One aspect, which should be reviewed for future similar projects, is the decision to appoint university graduates to the CF-TO positions. The PCR states that the gender balance in the selection of CF-TOs (23% female) is similar to the available pool of appropriately qualified applicants for these positions.

The PCR states that the project tried positive discrimination in the selection of CF-TOs: where there were two otherwise equal candidates for a position, the female applicant was favoured. This had mixed results. Some of the best performers were appointed as a consequence of the policy. Equally some of those appointed as a consequence of this policy were not able to achieve the performance levels required and dropped out. Given the range of factors affecting the performance of any individual, it is not possible to draw general conclusions on this issue, except to note that the positive discrimination policy provided greater opportunity for women to participate in the project. Further study aimed at overcoming the barriers to women becoming CF-TOs would be worthwhile.

Men, women and children share in the health benefits. Women are the major beneficiaries of the reduced effort to collect water, with a consequent reduction in back ache and general work load. Their time and energy savings can be put to alternative productive uses. Whilst no data were available in relation to the gender balance of micro-finance recipients, it was clear from discussions that women were beneficiaries, particularly for small trading activities.

The socio-cultural setting is difficult in terms of achieving improved gender equity in development performance. Men dominate traditional village structures and this is reflected in their representation as head of the Poktan (97%). The evaluation team noted that in the meetings held at provincial and kabupaten level by the evaluation team, women

were represented on just three occasions and in a senior capacity only once. The situation was similar at the kecamatan and village level.

Whilst provincial agencies recognise the major role of men in the traditional decision making processes in NTB, they also considered the project to be a success in terms of improving both community and women's involvement – especially in comparison with experience of other projects which made little or no attempt to involve recipient communities in project activities. Nevertheless, the evaluation team considers more can be achieved in the future to raise the level of "involvement" from a focus on sharing of costs and benefits, to more direct participation by recipient communities (and women in particular) in project decision making and implementation.

3.5 Environmental Impact

The project is assessed as having overall positive environmental benefits in terms of improved environmental sanitation, with consequent improvements in environmental health, general environmental amenity, and reduction in pollution in villages and their surrounding areas. While the benefits included reduced pollution of surface water as a consequence of improved excreta disposal, further improvements could be realised with better utilisation of sanitation facilities provided by the project.

There were potential negative environmental impacts of the project. In general these were recognised and addressed in project implementation. Table 3-4 indicates the potential negative impacts, the level of impact as assessed during project implementation by field staff, and the project response in terms of mitigation measures.

Table 3-4: ENVIRONMENTAL IMPACTS

Potential Negative Impact	Level of Impact	Mitigation Measures
Short term construction activity – primarily land clearing and disturbance	Not significant from small scale construction activity	Construction management
Destruction of aquatic biota of springs and streams – from reduced downstream flow	Minor (based on size of springs and level of abstraction)	No specific measures taken
Contamination of groundwater by toilet construction and operation and drainage around wells	Not significant with proper design	Guidelines developed to ensure appropriate separation of wells and latrine pits. PCR reported survey results showing greater than 10 metres between wells and pit latrines averaged more than 96% (Annex F). Designs include appropriate drainage from well.

Potential Negative Impact	Level of Impact	Mitigation Measures
Depletion of groundwater by wells and bores	Not significant	Bores designed and monitored for sustainable yield
Increased sullage (wastewater) from increased water availability and use	Minor	Implementation and maintenance of drainage facilities from wells and public standpipes

An Environmental Specialist undertook a screening visit in 1993 and noted that the project had not been formally assessed as required under GOI regulations and recommended that this be done. Subsequently no formal assessment was undertaken because of the expected overall positive benefits. Given the complex and disparate nature of the project, and its geographically varied mix of activities, the evaluation team considers that this decision not to proceed to a formal environmental impact assessment was reasonable under the circumstances.

During project implementation, researchers from ANU and LIPI raised the issue of nitrate levels in the wells in Lombok. High nitrate levels are prevalent in groundwater in Lombok and this has health implications, primarily for children, as it is a factor in infantile methaemoglobinaemia. The research by ANU implied that the project could be contributing to the problem. The issue was reviewed by the Project Consultant and by the TAG. Whilst the health implications of high nitrate levels are significant for infants and should not be understated, the reviews indicated that the project was not contributing to the problem and in fact the use of piped water supplies (Types A, B and C), and the improved siting of wells and latrines, would improve the public health situation. Additional research is required to fully explain the problem and the appropriate response.

3.6 Micro-Finance Activities

As noted in Section 2.2, project support for micro-finance activities was a new element in the PID. However, no specific targets or objectives were identified for these activities. The PCR reports that around A$115,000 was spent on these activities, mainly for provision of capital grants (seed capital) to five micro-finance organisations as well as for related training activities. These organisations are shown on Table 3-5 below.

Table 3-5: MICRO-FINANCE GRANTS

Kabupaten	Organisation	Funds Provided
Lombok Barat	Ukhuwah	A$16,500
Lombok Tengah	Iqra	A$7,000
Sumbawa	Sabalong Samalewa	A$4,000
Dompu	Adly	A$20,500
Bima	Ash-Shiddieq	A$26,000
	TOTAL	**A$74,000**

The evaluation team contacted the three listed organisations on Sumbawa (Sabalong Samalewa, Adly and Ash-Shiddieq). All confirmed receipt of funds from the project. However, these funds were in general added to the other financial resources of the organisations and simply used as part of their regular lending operations. In one case (Sabalong Samalewa), the funds provided by the project were identified separately in the organisation's accounts for a six month period, after which these funds became part of general funds.

The evaluation team was unable to locate the micro-finance organisations on Lombok which had been involved with the project. It appears that these organisations may have been "absorbed" by other related organisations.

Given the modest scale of the involvement by the project in micro-finance activities, and the disparate range of the organisations involved, it is difficult to draw conclusions on the effectiveness and sustainability of this project component. However, the notion expressed in the PID of linking water supply and sanitation beneficiary groups with provision of finance for income generating activities is considered by the evaluation team to have been too ambitious. In addition, the relatively small amount of project funds applied to this component appears to have been inadequate to achieve a substantial impact.

The PRA survey indicates that the specific type of micro-finance organisations targeted by the project (BMTs, based on Islamic lending principles) was perceived to have some advantages over other sources of finance:

- Comparatively low interest rates and administration fees
- Accessible quickly
- Flexible repayment arrangements
- Familiar management (including former project staff).

The main disadvantage was stated to be the low upper limit of credit available from BMTs.

The PRA survey also suggests that micro-finance provision was a peripheral part of the project. While the evidence is incomplete, it appears that where the micro-finance organisations were set up specifically by the project, these appear not to have been sustainable as standalone entities (such as on Lombok). On the other hand, the micro-finance organisations on Sumbawa appear to have been pre-existing groups, to which the project contributed some useful equity capital, and which continue to operate (albeit with varying degrees of effectiveness) providing financial support for micro-enterprise development in NTB.

3.7 Effective Partnerships and Good Governance

Two specific KRAs in AusAID's Corporate Plan (Reference 11) are:

- Build Effective Partnerships; specifically AusAID will seek to work closely with developing countries, as well as international and community organisations

- Promote Effective Governance; specifically to focus on public sector reform and private sector development, including support for micro-enterprises.

These important guiding priorities are assessed below with respect to the NTB-ESWS Project.

3.7.1 Effective Partnerships

It is apparent to the evaluation team that the project sits squarely within the clearly expressed priorities of both the GOI and the GOA. Enhanced access by the population to adequate water supply and sanitation services in Indonesia is a basic GOI objective, and a key component of Australia's ongoing development co-operation program with Indonesia (see Reference 12). In addition, Australia has a geographical focus to this program in the eastern island provinces, such as NTB.

Furthermore, the NTB-ESWS Project had a focus on community development, and was founded on working with, and promoting the development of, effective and appropriate community organisations. This feature was indeed a "leitmotif" of the project. Also, there has been significant co-operation by AusAID and GOI with relevant international organisations in this context, including in the undertaking of this evaluation (in particular with the UNDP-World Bank Water and Sanitation Program).

3.7.2 Good Governance

The specific notion of "good governance" was not established in the AusAID lexicon in the early 1990s, and is not mentioned in either the PDD (1991) or the PID (1992). Nevertheless, the principles of good governance were recognised in the NTB-ESWS Project, although more as a cross-cutting theme than as a central focus.

The project assisted with the promotion of good governance (as defined above) as follows:

- The institutionally managed component of the project enhanced the efficiency and effectiveness of PDAMs, by management development and technical training programs; support for tariff reforms; and improved financial management systems
- In the community managed component, the project sought to adopt and implement transparent and accountable modes of delivery of various project components.
- With respect to private sector development, there is evidence from the PRA survey that enhanced water supply and time savings generated by the project led to increased private sector activities by villagers (increased market gardening and other production, and more time to sell produce in local markets)
- The project included a micro-finance component through "seed capital" support to local credit agencies (BMTs), and hence contributed directly to the support and development of a range of micro-enterprises in NTB.

3.8 Benefit Cost Analysis

The PCR provides no direct information on the overall economic and financial viability of the project. The PDD did estimate an EIRR of the water supply component of the project of 40% per annum, and an FIRR of 25.2% per annum. These estimates were based on an assumed total number of beneficiaries of 950,000 persons.

The PID (1992) did not provide revised estimates of the project EIRR or FIRR, but did indicate a likely lower number of beneficiaries. Subsequently, AusAID instructed the AMC in 1993 that no further EIRR / FIRR analyses were required (see Reference 5, Page 9).

It is beyond the scope of this evaluation study to attempt to recalculate new estimates of EIRRs / FIRRs for the project. However, there is no doubt that the project delivered real and tangible economic and financial benefits. These include:

- Benefits to consumers from increased quantity and improved quality of water supplied
- Benefits from time savings to collect water
- Benefits from improved health conditions by increased water supply and enhanced environmental sanitation
- Benefits from "demonstration effects" of the project, in particular replication of dug wells to the project design
- Enhanced efficiency and effectiveness of PDAMs, and improved water sector planning and management
- Contributions to income generating activities through project support to micro-finance institutions
- Human resource development benefits, through an extensive training program for both the institutionally managed and community managed components of the project
- Short-term benefits to participants through construction and other activities generated by the project.

The conclusion of the evaluation team is that the project was most worthwhile from an economic and financial perspective, contributing a broad range of real and tangible economic and financial benefits to lower income communities in NTB.

3.9 Poverty Alleviation

At the commencement of the project, NTB was among the poorer and less developed provinces in Indonesia. The project was designed to benefit lower income communities in the province, which were selected on the basis of four criteria:

- Income levels
- Percentage of sub-standard housing in a community
- Percentage of the community with access to clean water and safe sanitation
- Population size.

The first three criteria were used to identify the neediest communities which could benefit most from a WSS project. The population size criterion was included to achieve efficiencies in project implementation and to increase total impact.

Having selected target communities, the project did not specifically direct interventions to the poorer groups within the village. Nevertheless, the project assessed the equity impacts of its interventions. Detailed analysis of the socio-economic baseline studies undertaken by the project suggests that "about one-third of the beneficiaries being reached were relatively poor in comparison with their neighbours" (see Reference 5, Chapter 5).

It is evident that a WSS development project of this nature has potentially complex equity impacts. As shown in Appendix IV, Section 3.3 with respect to the community managed component, the sources of funding for project facilities varied widely across NTB (as between GOA, GOI and community contributions). From an economic perspective the source of funding per se is irrelevant. However, from the financial perspective of specific communities, the precise equity impacts are clearly variable. In this context, project outcomes need to be assessed on a case-by-case basis, taking into account issues such as past provision of WSS infrastructure at the local level; the willingness of specific communities to participate in the project; the costs of technical options available in different locations; and local political considerations. It is beyond the scope of this evaluation study to attempt to calculate these localised financial equity issues of the project. Even with respect to the institutionally managed facilities, a detailed analysis of financial equity issues would be complex.

The PRA survey comments on this issue that:

> "There seems to be a general bias towards the 'better-off' households (as defined by the community itself) in terms of both benefits from the water and sanitation facilities established by the project, and their control."

The PRA survey also notes however that benefits received from improved water supply and sanitation facilities are "linked to the willingness (and capacity) to pay." Another important aspect is that the better-off households are more likely to have available land on which to place wells and toilets.

Notwithstanding the inherent complications with intra-community equity issues, the broad thrust of the project was targeted at lower income communities in NTB. This targeted approach is clearly consistent with AusAID's Corporate Plan covering KRAs guiding priority programs, namely provision of access to poor people, including in rural areas, to essential infrastructure such as water supply and sanitation (Reference 11). Almost 70% of total project expenditure was on community managed facilities for lower income groups in NTB. In addition, almost 25% of total project expenditure was on institutionally managed facilities, for which a sizable beneficiary group is the lower income communities served by the PDAMs.

4. SUSTAINABILITY

This section assesses the sustainability of the water supply and sanitation components of the NTB-ESWS Project. Reference is also made to sustainability issues pertinent to the overall process of WSS development adopted in the project. Sustainability issues related to other project components (such as micro-finance) are covered in the previous section.

4.1 Water Supply Systems

Sustainability for both community and institutionally managed water supply systems implies continued operation and maintenance upon completion, with a focus on the continuation of benefit levels in the longer term (including depreciation of assets and their timely replacement as required). Both the PDD and the PID expected that the sustainability of the Type C systems installed with substantial community contributions and management would be high. Conversely, the sustainability of both Type B and Type A systems was considered to be more "problematic".

The evaluation team found that the sustainability of Type C systems varies significantly between the piped and non piped systems. Similar findings were reported by the PRA survey, though with some differences in emphasis (such as the perceived general condition of dug wells). Type A systems (not covered by the PRA survey) and Type B systems are similar with respect to sustainability concerns.

For **Type C non piped systems** (dug wells provided by the project for an estimated 217,250 beneficiaries), the evaluation team considers that the condition of wells overall was satisfactory, with a high proportion of wells inspected (more than 90%) providing an acceptable quantity and quality of water. With proper maintenance, these facilities may be expected to be long lasting. In a small number of wells inspected, water quality was unsatisfactory and the wells had been abandoned or relegated to non domestic uses.

The primary sustainability concern for dug wells is the lack of routine maintenance (particularly upkeep of well surround, and attention to drainage in the immediate area). Cracking of the well surround can have an adverse effect on the quality of well water, and proper drainage is important to maintain a generally clean and attractive environment around the well. The routine maintenance costs of dug wells are quite minor and without technical difficulty, and within the existing capacity of recipient communities to undertake. The evaluation team noted that in a number of villages inspected there had been construction of new wells, to the project design, on the initiative of villagers. This replication of project provided facilities is considered to be a positive sustainability indicator for this component.

For **Type C piped systems,** of which 13 were constructed under the project for an estimated 14,449 beneficiaries, their sustainability is considered by the evaluation team to be at risk. Basic operational problems with these systems include lack of repairs to obvious leaks; inappropriate fittings used for repairs and pipeline alterations; and inadequate

management of reservoirs. There is a significant risk of failure of the Type C piped systems in the absence of enhanced maintenance procedures and better system management. As detailed in Section 3.1.2 above, the Santong system inspected by the evaluation team had sections which have been abandoned due to poor service levels. For these systems, beneficiaries need various forms of technical support beyond that available from existing community resources.

For **Type A and B systems** provided by the project, for which there were an estimated 93,730 beneficiaries, the evaluation team found that these facilities were generally well constructed and capable of operating as designed. There are, however, specific O&M issues for Type A and B systems which require increased attention by the PDAMs, including better reservoir management, better record keeping, and control of water leakage.

The evaluation team's perception based on the field enquiries is that the operations of the PDAMs in NTB have improved in recent years, in particular their financial management and administration. The computerised billing and accounting system (SISKA) developed by the project is in use in five of the six PDAMs in NTB, enabling the efficient preparation of water bills, monthly accounting and financial reporting. Technical management remains weak, though this varies throughout the province. In a national context, the PDAMs in NTB are rated quite favourably (see Appendix IV for details). Overall, there are reasonable grounds for cautious optimism on the longer term sustainability of Type A and B systems managed by the PDAMs in NTB.

4.2 Sanitation Facilities

The project provided an estimated 90,279 household toilets in NTB, with an estimated 451,395 beneficiaries. The PCR surveys at the end of the project indicated that most of these toilets (98%) remained in use. The field inspections of the evaluation team also found that, in general, toilets provided by the project were operational and were being used.

However, the PRA survey suggests that the use of toilets provided by the project is closely linked to the availability of water to each household. The survey found that, where piped water was available, toilet usage remained high (90% - 100%).

Conversely, in villages with dug wells, reported toilet usage was much lower. In part, this lower usage reflects a reaction to the project technology which was water intensive (pour flush squat plate). However, community behavioural patterns also play a part, as toilet use was found to be conditional and not consistent (for example, where people use household toilets, women are more frequent users than men and children).

The evaluation team considers that the sustainability of toilets provided by the project in villages with Type C non piped water supply (dug wells) is at risk. If the findings of the PRA survey are extrapolated on the basis of water system type, then the overall utilisation of household toilets provided by the project could be as low as 50% or less. Should this scenario be accurate, there are implications for the future design and implementation of

sanitation and water supply improvement projects. The results of the PRA survey, in particular, suggest that a more demand responsive approach to assessing beneficiary needs is required when designing new WSS programs.

4.3 Process Sustainability

A feature of the NTB-ESWS Project was the major involvement of Indonesian personnel (both long term and short term professional staff, and non-professional field staff) in project implementation, funded by the GOA contribution (see Section 2.5 above). The issue of whether the heavy reliance on locally engaged CF-TOs was an appropriate approach for project implementation has been the subject of considerable debate. Some observers have suggested that the development process adopted by the project, with its reliance on external funding for local staff inputs, is (by definition) unsustainable.

At various stages during implementation of the project alternative approaches were suggested, such as using existing village and / or government institutions and their staff instead of CF-TOs. An immediate problem was always the lack of local funding to support dedicated project personnel. A related factor was the "campaign" nature of the project (specifically concerning the community managed facilities component), and the lack of a neat fit between its activities and those of existing GOI agencies.

The evaluation team considers that the approach adopted by the project, with its emphasis on community development using dedicated CF-TOs, was appropriate. Based on the enquiries of the evaluation team, there is evidence that various field personnel involved on the project continue to participate in community development activities in NTB. The broad lessons drawn from past WSS projects in Indonesia strongly support the need for active community involvement to enhance the sustainability of these interventions. Indeed, the PRA survey suggests that even more attention is warranted to working with the recipient communities to make a proper assessment of their demands for preferred levels of service and appropriate types of technology for WSS facilities. This is an important lesson learned from the NTB-ESWS Project, as detailed in the following section.

5. CONCLUSIONS AND LESSONS LEARNED

This final section of the evaluation report for the NTB-ESWS Project provides an overall assessment of the project, reviews lessons learned, and notes follow-up actions.

5.1 Overall Assessment

In undertaking a detailed assessment of project achievements against objectives, particular caution is necessary given the specific design of the NTB-ESWS Project. The main quantitative objective listed in both the PDD and the PID is the numbers of project beneficiaries. However, as detailed in Section 2.2 above, the PID is unclear as to the intended numbers of project beneficiaries, and downplayed precise beneficiary targets, emphasising instead the process orientation of the project.

Nevertheless, there were major achievements in the community managed component of the project. The estimates of the evaluation team are that there were some 231,699 water supply beneficiaries (Type C systems) and some 463,080 sanitation beneficiaries. The PRA survey indicates that the water supply component has had a beneficial impact on the quality of life in the recipient communities. However, the sanitation component has been less successful, in part because these improvements are linked to longer term behavioural change in recipient communities.

The project also provided significant support to the institutionally managed water supply sector in NTB. The evaluation team estimates there were some 93,730 beneficiaries of these facilities (Type A and B piped systems). These piped water supply facilities (specifically Type B) were rated highly by the PRA survey and delivered a range of economic, financial, social and health benefits to recipient communities.

Achievements and performance were less impressive in other aspects of the project. As detailed in Section 3.4 above, there was a lack of gender equity during project implementation, and the extent of community participation in project planning and implementation could have been greater. Concerns exist over the technical management abilities of the PDAMs. The micro-finance activities were too ambitious and under resourced. There are sustainability concerns with respect to sanitation facilities provided by the project. The desired longer term behavioural changes in response to health awareness measures are difficult to identify.

In making an overall assessment of the project, the evaluation team has taken the following criteria into account:

- Appropriateness of project objectives and design
- Professional management
- Achievement of objectives
- Sustainability of outcomes.

A five point ratings scale to assess project performance has been adopted, namely best practice, fully satisfactory, satisfactory overall, marginally satisfactory, and weak. On this basis, the assessment of the evaluation team is that, from a broad perspective taking into account the mix of activities, the project was satisfactory overall. This overall assessment is a qualitative judgement, based on the enquiries and findings of the evaluation team as detailed in this report, and takes into account the relative performance of the project compared to other WSS projects in Indonesia. The project also provided a valuable set of development experiences in the WSS sector in Indonesia. Some specific lessons learned through the NTB-ESWS Project are reviewed below.

5.2 Lessons Learned

The lessons learned from the project have been grouped into five categories by the evaluation team, as detailed below.

5.2.1 Project Design and Implementation

- The project design was too complex in its mix of community and institutionally based activities, and the project had insufficient resources to make a significant impact in the more peripheral areas of interest (such as micro-finance activities). A tighter scope of activities and increased focus of project resources are preferable
- In recognition of the crucial role of women in the WSS sector, particularly for community managed activities, it is considered imperative that an explicit gender strategy (as appropriate to specific project circumstances) be incorporated in project design and implementation
- The PDD suffered by not including appropriate GOI members on the Project Design Team. Subsequently, project implementation suffered because the PID was only prepared in draft form, and not circulated as an agreed, final document. More detailed attention to these process issues can contribute to better project implementation
- Project designs for community managed activities need to be less prescriptive, and recognise the importance of "demand responsive" approaches to WSS development, as distinct from the more conventional "supply side" approach to provision of these facilities. For rural WSS projects in particular, the demand responsive approach implies that consumers are directly engaged in the design, funding and management of new facilities which meet their demands, and which they consider worth sustaining with their own efforts
- Demand responsive approaches to community based WSS projects can require longer to implement in order to properly assess the community needs for these facilities. In addition, more flexibility is warranted in the design to allow for adjustment of project components as circumstances change, and possibly to allow for a project "scaling down" period where appropriate, to support a phased transfer of responsibilities to recipient communities and local

organisations (which might include a "monitoring" period after completion of implementation)

5.2.2 WSS Technology

- The new Type B water supply system as originally proposed by the project (mix of community and institutional inputs) was considered to have too many potential problems to implement[1]. These were effectively implemented as Type A systems (institutionally managed). However, for both Type A and Type B systems, adequate community involvement is important for the effective planning, implementation and maintenance of public standpipes
- The Type C system proposed by the project was found to have different levels of consumer satisfaction and sustainability, depending on whether these were piped water or dug wells. Piped water systems are generally preferred by recipient communities, but are limited by topography, climate and hydrogeological constraints, all of which impact on the cost of provision
- Adoption of a more demand responsive approach to community WSS development requires a broader range of WSS technology options to be available including respective cost implications, and greater community involvement in the selection of preferred options involving an informed choice with respect to the relative costs of options
- Socially acceptable and preferred sanitation options need to be better understood, and may be location specific. Also, preferred sanitation options may depend on the ready availability of water (or otherwise). Consequently, a uniform approach to sanitation provision (as adopted in the project) may be inappropriate, and not consistent with a demand responsive approach.

5.2.3 Community Managed Facilities

- Contributions by the community in support of project implementation were substantially greater than envisaged in the project design. A more demand responsive approach to WSS development is likely to increase community participation in cost-sharing
- An emphasis on community participation in project planning and implementation inherent in the demand responsive approach to WSS development may require long cycle times for adequate consultation at all levels with communities to identify needs; select desired options; and agree on cost sharing arrangements for project interventions. This approach provides a basis for building broad community support (but requires sustained project management)

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1 However, there are many people and institutions currently working in the sector who are confident of finding solutions to the problems and implementing true Type B schemes.

- The implementation of explicit gender strategies (such as the involvement of PKK groups) in WSS development requires to be monitored closely at the community level. In cases where such specific strategies are not successful (for example, due to local circumstances related to individual personalities), alternative approaches need to be identified
- In recognition of the longer-term need for behavioural change linked to environmental health education, community education programs should include a supporting component in local primary schools. Pressure by children on parents and families may contribute more to behavioural change than conventional adult education programs
- Care is required with the "handover" of WSS facilities provided to communities, to ensure that there is perpetual legal ownership by communities, and that responsibilities for O&M are clear. In community managed piped water systems (Type C), a source of technical support for better system management and to assist with more complex maintenance and repair activities must be identified (such as the relevant PDAMs, if appropriate mechanisms can be developed for their involvement).

5.2.4 Institutionally Managed Facilities

- The numbers of beneficiaries from institutionally managed piped water facilities in the project were often less than planned in the design of these systems (despite the preference of communities for this type of water supply). The reasons include a range of technical constraints and the high cost of new house connections. PDAMs could consider wider adoption of loans and / or improved payment terms to encourage more connections, in addition to increased attention to improving the operational efficiency of systems
- There is uncertainty at the interface of community and institutional involvement arising from the attempts by the project to provide Type B systems, in particular public standpipes. In these circumstances, special attention is warranted prior to project handover to fully clarify the maintenance responsibilities of the PDAMs for these facilities. However, PDAMs should be encouraged to maximise community involvement in the selection of locations, numbers provided, and operational management of public standpipes for both Type A and Type B systems
- The performance of the PDAMs has improved in recent years, especially in financial management and administration, but technical management remains weak. Future development assistance should preferably be directed through the PDAMs rather than the central government technical agencies. There are prospects for the further development of the PDAMs, including corporatisation, privatisation, and amalgamation into larger regional agencies (such as a Provincial PDAM). These issues are receiving some attention from multilateral agencies in current loan projects.

5.2.5 Poverty Alleviation and Equity

- Projects designed to assist low income communities need to be aware of intra-community equity issues. Project designs need to consider suitable funding guidelines for the provision of WSS facilities in low income communities, to increase subsidies provided to the poorest groups within the community (that is to target the "poorest of the poor")
- The project concept of linking water supply and sanitation beneficiary groups with the provision of finance for micro-enterprise development is considered to have been too ambitious. Such micro-finance development projects need to be carefully designed and properly resourced, and preferably based on existing organisations to be sustainable.

5.3 Follow-up Actions

Project-specific matters recommended for follow-up action are:

- For Type C piped systems provided by the project, there is a need for technical support for better system management and maintenance. This technical support role might best be provided to the local communities by the relevant PDAMs
- The sustainability of sanitation facilities provided by the project needs further monitoring, in particular to assess the longer term use of pour flush squat plate units in villages with Type C non piped water supply (dug wells). If the low usage of these facilities, as indicated in the PRA survey, is shown to be consistent across the whole project, there are implications for the design and implementation of future WSS development projects.

APPENDIX I – TERMS OF REFERENCE

Indonesia: Evaluation of the Nusa Tenggara Barat Environmental Sanitation and Water Supply Project (NTB-ESWS)

1. BACKGROUND TO THE PROJECT

Nusa Tenggara Barat (NTB) province is one of the poorest, most isolated and least developed provinces in Indonesia, suffering from overcrowding on limited fertile land. At the commencement of preparation of the NTB project (1990) an unacceptably high proportion of the 3.4 million population suffered from health problems related to inadequate water supply and sanitation, and infant and maternal mortality were higher than the national average.

1.1 Project Goal, Objectives, Duration, Cost, Contractor and Location

The goal of the NTB-ESWS Project was to contribute to improved socio-economic and environmental health conditions in NTB. Its purpose was to provide environmental sanitation and water supply facilities, which would be effectively used and focused on community and kabupaten-based management.

The project commenced in December 1991, the Project Implementation Document was approved in December 1992, and implementation was completed in May 1997. The total cost to Australia was A$25.6 million, with Rp5,400 million contributed by the GOI and a further Rp14,500 million contributed by beneficiary communities.

The Australian contractors were Kinhill Engineers Pty Ltd, ACIL Australia Pty Ltd and IDSS Pty Ltd. The Indonesian Executing Authority was the Ministry of Health, Directorate General of Communicable Disease Control and Environmental Health.

The project sites were in the Province of NTB, with activities in the Kabupaten of Lombok Barat, Lombok Tengah, Lombok Timur, Sumbawa, Dompu, and Bima.

1.2 Project Description

The project had three components:

- **project management,** which established project planning and management structures and strategies, within the existing GOI administrative framework for WSS. The project strategies supported both community managed and GOI institutionally managed activities;
- **community managed activities,** which set the framework for specific donor and GOI agency support for the community managed activities; and then described the community process; and

- **institutionally managed activities,** which concentrated on those activities for which GOI agencies were responsible.

The project aimed to benefit some 800,000 persons in rural and small urban communities, with a focus on community based water supply and sanitation improvement. Training and information systems were emphasised. Three water supply models were used:

Type C: Community managed piped, or non-piped, systems.

Type B: Small and medium-sized pipe systems which were intended to have a balance of institutional and community involvement.

Type A: Large, complex networked pipe systems operated and maintained by the institution (water enterprise).

The readily measurable outputs of the project included:

- **Construction**
  - Wells (Community)[1] 8,775
  - Latrines (Community)[2] 93,929
  - Community managed piped water supplies[3] 14
  - Institutionally managed (PDAM) new and rehabilitated piped water supplies[4] 11
  - Miscellaneous environmental sanitation facilities (Community) 2,356
- **Training Courses**
  - Community 230
  - Institutional 164
  - Total persons trained 15,578
- **Community Based Credit Schemes**[5]
  - BMT (Muslim) banks and branches established 31
  - BMT (Muslim) co-operatives established 47

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1 As a rule of thumb, each well served 25 users.

2 It was estimated that 5 people used each latrine.

3 These Type C piped water supplies benefited about 21,400 people.

4 Six rehabilitated Type A systems serving 113,000 beneficiaries and 5 new Type B systems with 39,000 beneficiaries.

5 Total number of borrowers was 3,955.

2. EVALUATION OBJECTIVES

The objectives of the evaluation of the NTB-ESWS Project are to examine and assess:

- ❑ the appropriateness of the goal and purpose of the project in the context of recipient government needs and priorities, AusAID's relevant Country Strategy and AusAID's objectives;
- ❑ the extent to which the activity has achieved its stated goal and objectives;
- ❑ the outcomes and, if appropriate, impact, (both intended and unintended) of the project in AusAID's Key Result Areas[6];
- ❑ the efficiency of project implementation; and
- ❑ the sustainability of benefits.

The evaluation will also identify the major lessons learned from the activity in all stages of its implementation, and note prospects for future assistance in the ESWS sector in Sumbawa.

3. SCOPE OF THE EVALUATION

The Evaluation Team will examine, assess and report on, *inter alia:*

- ❑ the condition, maintenance and community use of physical infrastructure delivered under the project ie. latrines, piped and non-piped water systems, including;
  - water quantity and quality as well as the condition of the infrastructure; and
  - the relative sustainability of Type A, Type B and Type C water supply systems;
- ❑ the status of community management structures and procedures developed under the project, and the retention of knowledge provided through project training;
- ❑ gender disaggregated data on the involvement of women and men in project activities including training, and current involvement in community management structures, maintenance of facilities, and decision-making;
- ❑ the status of institutional structures and procedures set up under the project to manage more complex water systems, and the retention of knowledge provided through project training;
- ❑ developments in the provision of water and sanitation facilities in the region since the completion of the project, and the influence of the project on these;

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6 Health, education, infrastructure, agriculture and rural development, governance, gender equity, environmental sustainability, effective partnerships with developing countries, and humanitarian and emergency assistance

- changes in the incidence of waterborne diseases in the province and the possible role of the project;
- the environmental impact of the schemes;
- community perceptions of the benefits to men, women and children of project-derived outputs;
- the status of the credit schemes established under the project and their benefits to men and women;
- strengths and weaknesses of project implementation;
- the institutional / counterpart arrangements for the implementation of the project, and their impact on the project's performance;
- the criteria for determining the priorities for implementation of facilities within the project;
- the interaction among AusAID water supply projects in the region; and
- the need for additional donor inputs in the ESWS sector, particularly on Sumbawa Island.
- If feasible, the Evaluation Team will undertake a cost benefit analysis of the project.

4. METHOD

The evaluation will follow the method generally used in AusAID's project evaluations and reviews. That is, the evaluation will commence with a desk study where the Team is briefed, collects information, prepares a method to achieve the objectives of the evaluation, and finalises its itinerary. The information will then be verified and expanded in a field visit.

The evaluation will use a combination of qualitative, quantitative, participatory and technical assessment methods.

The evaluation of the institutionally managed components of the project will include consultation with relevant GOI officials and former project personnel at national, provincial and kabupaten level, examination of records and inspection of larger piped water systems, associated structures and equipment provided under the project.

The evaluation of the community-based components of the project will include community surveys using the basic information collection method and survey questionnaires developed by the UNDP / World Bank Water and Sanitation Program, Regional Water and Sanitation Group for East Asia and the Pacific (RWSG-EAP). In this way the results of the study should be comparable to a series of similar studies being carried out in Indonesia by RWSG-EAP.

A draft report will be written by the Team and agreed with the AusAID Post, GOI and the RWSG-EAP. This report will be circulated more widely for comment and finalised in

Canberra. It is expected that the evaluation will take up to eight weeks to complete, allowing three weeks for comments to be provided on the draft report. Additional time may be required for the collection and analysis of survey data.

An AusAID Advisory Group will guide the evaluation process and co-ordinate comments on the evaluation report. Membership of the Advisory Group will be from:

Indonesia Section;

Performance Information and Assessment Section;

Infrastructure and Environment Group;

Gender and Education Group; and

Health Group.

The RWSG-EAP will also be invited to provide a member of the Advisory Group.

Dr Philip Fradd, the Task Manager, Performance Information & Assessment Section will manage the evaluation.

5. EVALUATION TEAM COMPOSITION

The core of the Evaluation Team will be a Team Leader (Economist / Financial Analyst), a Water Supply and Sanitation Engineer and a Community Development Specialist (provided by the RWSG-EAP). Community survey teams will be contracted in Indonesia as required and a 'guide' will be hired to direct survey teams and Evaluation Team members to project sights in Nusa Tenggara Barat. The GOI will be invited to provide an additional member of the Evaluation Team. The Team will work under the direction of the Team Leader who will report to the AusAID Task Manager.

Among them, Team Members will have the following expertise:

General

- ❑ experience with development projects in Indonesia, particularly in design and / or evaluation; and an understanding of GOI's development objectives;
- ❑ familiarity with AusAID requirements for reviews and evaluations;
- ❑ excellent communication and writing skills;
- ❑ understanding of Bahasa Indonesian and / or local dialects in NTB:

Sectoral

- ❑ experience in analysis of community-based development activities, including social and cultural aspects and assessment of gender impact;
- ❑ experience in health work in similar climatic and social conditions to that of the project, especially experience with environmental sanitation and water-related health issues, including experience in health education activities for community-based programs;

- ❑ experience in the design, construction, operation and assessment of piped and non-piped water supply systems, preferably in a similar climatic and social environment; to that of the project;
- ❑ experience in design, construction, operation and assessment of environmental sanitation systems (human waste disposal, drainage etc) in a similar climatic and social environment to that in the project;
- ❑ experience in analysis of institutional development activities; and
- ❑ experience in economic and financial assessment in developing countries, including cost-benefit analysis of development activities.

6. EVALUATION TEAM OUTPUTS

Desk Review

At the conclusion of the desk review the Team will have:

- ❑ become familiar with issues to be examined during the field work;
- ❑ developed a detailed work plan to implement the task, including allocation of Team responsibilities, agreed with AusAID;
- ❑ a field work itinerary, as agreed with AusAID;
- ❑ an annotated format for the draft Report; and
- ❑ developed assessment instruments, interview schedules and questions agreed with AusAID (see Method above).

Field Study

The primary output of the Team at the conclusion of the Field Study will be the Draft Evaluation Report, which has been agreed with the Task Manager, the AusAID Post and the recipient government.

The field study will be conducted according to the itinerary, and using the questionnaires and interview schedules agreed during the desk review.

7. REPORTING

The Team will produce a draft report as noted above, for discussion at the wrap-up meeting in Indonesia. The Final Report will be approximately 30 - 40 pages, together with any essential appendices and will be finalised after the Evaluation Team's return to Australia.

APPENDIX II – FIELD VISIT PROGRAM

LIST OF MEETINGS AND FIELD VISITS

This appendix includes an abbreviated list of agencies and organisations, representatives of which met with members of the evaluation team in Indonesia, and sites of facilities which were inspected by the team in NTB. The evaluation team wishes to thank project villagers, Government of Indonesia staff in Jakarata and Nusa Tenggara Barat, staff of RWSG-EAP and AusAID, Jakarta, for their willing cooperation and assistance in this evaluation.

Date	Location	Meetings	Facility inspections
25 Jan 99	Jakarta	AusAID, Australian Embassy RWSG EAP	
26 Jan 99	Jakarta	BAPPENAS DEPKES DG P2M & PLP Consultant, World Bank	
27 Jan 99	Jakarta	DG Cipta Karya	
28 Jan 99	Mataram	BAPPEDA Tk I DIKES Tk I	
29 Jan 99	Mataram	Provincial Co-ordination Team	
30 Jan 99	Praya	Kabupaten Co-ordination Team	Teratak (Type C piped system)
31 Jan 99	Lobar		Gunung Sari and Lembar
1 Feb 99	Lobar	Kabupaten Co-ordination Team	Desa Santong
2 Feb 99	Lotim	Kabupaten Co-ordination Team	Gemang (Sakra) system and village inspections at Lenek and Rempung
3 Feb 99	Mataram	PDAM Lobar P3P (formerly P3AB)	
4 Feb 99	Mataram	Dinas Kesehatan GTZ Project Manager	

Date	Location	Meetings	Facility inspections
6 Feb 99	Sumbawa Besar	Kabupaten Coordination Team	Lape and Lopok
8 Feb 99	Sumbawa Besar	BMT Sabalong Samalewa	Plampang and Empang
9 Feb 99	Dompu	Kabupaten Coordination Team BMT	Rora & Dompu urban system
10 Feb 99	Dompu		Hu'u and Adu
11 Feb 99	Bima	Kabupaten Coordination Team	DKSTBS PDAM Workshop inspection
12 Feb 99	Bima	PDAM BMT Ash Shiddieq	
17 Feb 99	Mataram	Dinas PU Cipta Karya / PMDU	
18 Feb 99	Mataram	Provincial Wrap-Up Meeting (with AusAID and RWSG-EAP representatives)	
19 Feb 99	Selong	PDAM Lotim	
23 Feb	Jakarta	Wrap-Up Meeting with Central Government (with AusAID and RWSG-EAP representatives)	

APPENDIX III – SUMMARY OF PARTICIPATORY RURAL APPRAISAL FINDINGS

This Executive Summary has been reprinted from the report by the Regional Water and Sanitation Program for East Asia and the Pacific, UNDP – World Bank Water and Sanitation Program, Jakarta, March 1999, titled

Evaluation of the Community Managed Activities Component of the AusAID supported NTB-ESWS Project.

The full report is available from the PIA Section, AusAID.

EXECUTIVE SUMMARY

Over the last few years of the current millennium a global consensus has emerged on the principles to guide the provision of community water supply and sanitation services. International policies now call for treating water as an economic as well as a social good, managed at the lowest appropriate level. For Rural Water Supply and Sanitation this implies that the majority of consumers are engaged in selecting, financing, constructing, and managing systems that meet their demands[1] and are therefore considered worth sustaining with their own investments. However, putting demand-responsive principles into practice presents significant challenges for WSS sector institutions, most of which still function through systems and policies designed for the supply-oriented modes of the past.

The AusAID-funded Environmental Sanitation and Water Supply (ESWS) project in Nusa Tenggara Barat (NTB) province of Indonesia field-tested a range of approaches and water supply systems; the purely community managed (C-type), purely institutionally managed (A-type) and a combination of the two (B-type). At the time of design and inception of the project (1990-91) there was insufficient information and learning available about the value of demand-responsive approaches for the sustainability of rural water supply and sanitation investments. The concepts of "consumer demand" and "sustainability of service" were not stated explicitly in the project objectives – although they were implied. The ESWS project goal was *"to contribute to improved socio-economic and environmental health conditions in Nusa Tenggara Barat." The purpose of the project was "to provide environmental sanitation and water supply facilities which would be effectively used and focussed on community and kabupaten-based development".* (Project Completion Report, January 1997)

The project introduced several innovations. It was completed in January 1997. At the initiative of AusAID, an evaluation of the project was carried out during December 1998 – February 1999. As a part of this evaluation, Component 2, *i.e.*, Community-Managed Activities, was assessed using a participatory assessment approach. The results bear valuable lessons about what works, what doesn't and why.

The assessment was designed and carried out by the Regional Water and Sanitation Group for East Asia and Pacific (WSP-EAP) of the global UNDP – World Bank Water and Sanitation Program. Two non-governmental organizations partnered WSP-EAP in the process of field work and synthesis of results. These were: the NTB branch of *LP3ES (Lembaga Penelitian, Pendidikan dan Penerangan Ekonomi dan Sosial)*, and the *P3WK – ITB* (Center for Urban and Regional Development Studies, of the Institute of Technology, Bandung).

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1 Global research evidence has now established that consumer demand i.e., willingness to pay for services, based on informed choice, is critical to the sustainability of services. Worldwide, this realization has focussed attention on demand-responsive approaches (DRA), which constitute a radical departure from the earlier need-based approaches whereby "needs" were assessed without reference to the willingness of potential users to pay.

In consultation with AusAID a sample of 10 villages was selected, 5 in each of the two islands making up the province *i.e. Lombok and Sumbawa.* Five of these villages had piped water systems, of which two were gravity-fed and community managed (C-type piped systems). Three others were pumped piped systems which were expected to represent the B-type combined-management systems, but in reality were found to be more like institutionally managed A-type systems. Five other villages had non-piped community managed (C-type, non-piped) water systems, *i.e.,* dug wells. All had a sanitation component which largely consisted of household latrines. Groups of men and women who used the water and sanitation facilities in the 10 villages constituted the co-evaluators with whom participatory researchers assessed the project process and impact, using a specially designed set of PRA and PHAST activities. A technical assessment of water and sanitation systems in the 10 communities was also carried out simultaneously. Field work was undertaken during December 1998, prior to the visit of the Project Evaluation team from Australia.

For the component "Community Managed Activities" which constituted nearly 70 per cent of the total project budget, the summary conclusions are:

1. The Water Supply component has made a major impact on community quality of life. Clean water is now significantly closer to home, takes little time and energy to collect, and is used in quantities 2-5 times more per day per household than was the case before the project. Users also reported reductions in diarrhoea and skin diseases and some indirect economic benefits.

2. Users of piped water systems are highly satisfied with the quality and quantity of water they get and the user tariffs they pay. Piped water is used mainly for domestic purposes *i.e.,* drinking and cooking, and to a lesser extent, for washing and bathing.

3. Dug well users are frequently unsatisfied with quality of the water and in half of the villages surveyed, also with the quantity. They continue to use rivers and springs as supplementary sources, mainly for washing and bathing. Spring and river water are also still used for drinking by a part of the population in these villages. Dug well water is used almost equally for domestic as well as non-domestic purposes *e.g.,* watering animals and irrigating kitchen gardens.

4. The sanitation component has not been as successful as water supply. Although latrine usage by a section of the population has increased, it has not led to a significant reduction in open defecation practices by the majority. Even those who do use latrines, do so conditionally, *i.e.,* only when at home and if water is available in the latrine throughout the year, without having to carry it in from elsewhere. Women are the most frequent users, children the least. Overall, 73 per cent of the latrines constructed in the 10 villages are still in use.

5. In villages with piped water, latrine owners think it was a useful investment and 90 – 100 per cent of the constructed latrines are currently in use. Most houses with latrines have house connections of piped water and many have built bathing facilities along with latrines.

6. By contrast, in villages with dug wells most people feel that the latrine is not a useful investment, are not satisfied with the design and only 10 – 36 per cent of the latrines constructed are in use in different villages.

7. Project facilities have benefited the better-off proportionately more than the poorer villagers. This may be due, in part, to the criteria used for:

   a) eligibility for household piped water connections (ability to pay Rp.200,000 – Rp.400,000 to PDAM);

   b) siting of public dug wells (ability to contribute land, willingness and ability to pay workers and provide food during construction); and

   c) deciding the recipients of latrine stimulant packages (availability of private land for latrine construction, willingness to contribute rest of the construction cost).

   Future project designs should incorporate strategies for better targeting of the poorest groups, e.g., priority for facilities in poor neighbourhoods, use of public land rather than private land for public facilities, developing a range of options and costs for water supply and sanitation facilities that allow consumers to choose what they can afford – instead of offering them a single option as at present.

8. Community management comes closest to the scenario envisaged by the ESWS Project design in the case of the C-type piped systems observed *(Sesait and Teratak)*. These communities were fully involved in establishing the services, although the technology (GPS for water supply, pour-flush toilets for sanitation) and level of service (public taps, household latrines) had been pre-determined by the project. Both communities have well established user committees that raise and manage user fees with transparency, take care of repairs, O&M and have even expanded the system in one case. They have built up a sizeable capital for future replacement or expansion of the system, although the technical capacity to do so may be uncertain.

9. Community management is negligible in the designated "B-type" piped systems observed *(Sakuru, Samili, Empang Atas)* in which communities were not involved in planning and construction. The only feature of community management is a fee-collector for each public hydrant who gathers user fees based on an average calculated every month and pays PDAM for the actual consumption. Savings are kept by him, used for minor repairs at public hydrants and not reported to users. Users are reluctant to contribute for repairs of public hydrants as they are unsure of their ownership of the facilities and their authority to repair PDAM-constructed structures. Household connection holders pay for their consumption directly to PDAM and manage their O&M individually. It is more appropriate to classify these B-types as fully institutionally managed A-type systems.

10. Dug wells (C-type non-piped systems) are being managed not by user groups but by an "owner / manager" who owns the land a well is built on. Users contribute when asked by him for annual repairs or maintenance work. This pattern of management evolved as a natural process in all villages observed, after project-constituted user groups ceased to function following construction.

11. Lack of formal water-use rights and legal ownership of water facilities by dug well users has led to the access of the poorer groups declining with time. Villagers reported a tendency of the "owner / manager" household to gradually convert public dug wells into private property. Having voluntarily provided land and a higher than average contribution (cash and wages / food for workers) for construction, these households have been known to establish private ownership by putting fences around the well and discouraging other users. In several cases, land contributed for the well by a man has been reclaimed by his son following his death.

12. The overall evaluation of project implementation (by Egis Consulting, Australia) reports that community contributions exceeded expected projections in the project design by more than 200 per cent, disproving the myth that rural communities cannot pay for Water Supply and Sanitation services. This was despite the fact that they had little choice of types and levels of services. It is likely that projects using a demand-responsive approach that offers a range of options at varying costs will allow this potential for community cost-sharing to be fully utilized. Greater cost-sharing by communities will allow wider population coverage with limited public sector funds presently available for community water and sanitation.

13. It is important, however, to establish poverty targeting strategies that counteract biases against the poor, and incorporate equitable cost-sharing principles in the project rules that progressively reduce subsidies for higher levels of technology and service. ESWS did not seem to have clear rules regarding subsidies. Communities which received lower levels of technology and services (dug wells) paid higher proportions of construction costs than those that received a higher level of technology and service (piped systems).

14. The manner in which key decisions were made in the project was not conducive to building confidence, capacity and a sense of collective ownership among the majority of the users. Reasons were related to aspects of project design and institutional factors in project implementation. *(See box at the end of this section)*

15. Community management is usually the end product of a consistently carried out empowering process throughout the life of a project. Without adequate information sharing, some choice and adequate voice in decisions, empowerment does not happen. It is unrealistic to expect the communities to sustain and manage the facilities in the long run without external assistance. Already the public facilities which are part of more complex piped systems are showing considerable damage (Empang Atas and Samili) and community-

managed gravity pipe systems are being exploited for unplanned household connections beyond the designed capacity *(Sesait and Teratak)*. There has been no technical training for O&M of the relatively complex piped systems. At the end of the project user communities still do not have legal ownership of the facilities and are not aware of the implications regarding time-money-technical capacity requirements of sustaining the systems they have received. It is uncertain whether the users would be willing and / or able to sustain the services, if the implications turn out to be "unaffordable" or "not worth it" at a future date.

Whither Community Empowerment ?

The average beneficiary of the project was a passive recipient of services and arrangements made by outside agencies or the *Kepala Desa*. He or she could exercise no choice and voice in the process. Since the villagers were habituated to the top-down mode of development programs that they had experienced, this project process was accepted as normal. They had also made the prescribed contributions for facilities, regardless of whether it was their choice, due to prevalent social norms of conforming and for lack of alternative services. No attempt was made to provide information to and consult women or involve them in project processes, except for the token inclusion of *PKK* in some village meetings. The overall consequence was that the real managers of water - sanitation - hygiene in the community were not included in project processes, dialogue and decisions. That this might happen was predicted by the 1995 Technical Advisory Group, in view of the lack of a gender strategy in the project and paucity of female Community Facilitators.

Another reason for this state of affairs could be the rather inflexible field work process used in the project, which required Community Facilitators to complete work up to the completion of construction in each community within a limited period of time (one year) before moving on to another village. This allowed no flexibility in planning community level work, afforded little time to develop viable community organizations and build their capacity. Inevitably the facilitators concentrated on fulfilling construction targets, as that was the only criterion they were judged by in the project. This happened at the cost of exclusion of the less powerful, less articulate, less vocal majority, *i.e.*, the poor and also the women. Community Facilitators chose to work with the elite minority that constitutes village leadership, which had the necessary authority to get things implemented quickly.

Improving Sustainability: Lessons Learned and Recommendations

Predicting or measuring the sustainability of community water and sanitation services requires taking into account the entire range of diverse factors that influence it. From research evidence and field experience available to date, the following sets of key indicators have been selected by WSP-EAP, to assess the sustainability of water supply and sanitation systems.

For Water Supply:

A. System Performance – in accordance with design

B. Effective Use

C. Extent of User Demands being met by Water Systems

D. Effective Financing

E. Effective Management

F. Extent of Community Ownership

These are sub-divided into 20 sub-indicators as in Table ES-1.

For Sanitation (household latrines only in this case):

A. System Performance – in accordance with design

B. Effective Use

C. Extent of User Demands being met by Sanitation Facility

D. Effective Financing

E. Effective Management

These are sub-divided into 12 sub-indicators as in Table ES-2.

(Methods to quantify Sustainability sub-indicators have been developed and are being applied in larger sample studies for statistical consolidation and hypotheses testing. In view of the small sample and the qualitative focus of the present study it was not considered relevant to proceed beyond the nominal classifications in Tables ES-1 and ES-2. The analysis following the tables examines the differences among the categories and tries to identify the cause/s of those differences, rather than measuring extent).

TABLE ES-1

SUSTAINABILITY MONITORING INDICATORS	TYPES OF WATER SUPPLY SYSTEMS STUDIED		
	C-TYPE PIPED (GFS)	**B-TYPE PIPED (PUMPED)**	**C-TYPE NON-PIPED (DUGWELLS)**
A. SYSTEM PERFORMANCE AS DESIGNED			
Functioning / delivering water as per Design	**NO** – Original public taps based design modified by up to half the users for unofficial house connections	**YES** – For house connections **PARTLY** – For public hydrants which are in poor physical condition	**PARTLY** – Seasonal fluctuations in quality and quantity
Design appropriate in technical Terms	**NOT** – for the present pattern of usage **YES** – for the original design	**YES** – Mostly	**YES** – Mostly
Quality of construction and materials adequate for design	**NOT** – for the present patterns of usage **YES** – for the original design	**YES** – For house connections **NO** – For public hydrants mostly	**YES**
B. EFFECTIVE USE			
Change in water use for better health	**YES**	**YES**	**NO** – appreciable qualitative change
A sufficient majority of all classes have access (Rich / Poor / middle economic classes)	**YES**	**NO** – Bias against poor	**PARTLY** – Biased towards Rich. Access of poor reduces with time (see conclusion 11 in Summary)
Environmentally sound usage of Facility	**YES**	**PARTLY** – Waste water not well managed at public hydrants	**NO** – Mostly. Waste water around wells. Locations have high pollution risk in many places
C. SERVICE MEETING USERS' DEMANDS			
Demands for level of service being met	**YES** – Partly. More applications for house connections pending	**YES**	**YES** – Partly
Demands for quality, quantity, regularity of Water Supply being met	**YES** – Quantity + quality **YES** – Partly for regularity Long ques at public taps	**YES** – Quality & quantity **YES** – Partly for regularity Water sometimes available only at night in dry season	**NO** – Problems with quality + quantity of water reported frequently

SUSTAINABILITY MONITORING INDICATORS	TYPES OF WATER SUPPLY SYSTEMS STUDIED		
	C-TYPE PIPED (GFS)	**B-TYPE PIPED (PUMPED)**	**C-TYPE NON-PIPED (DUGWELLS)**
D. EFFECTIVE FINANCING			
User fees cover full cost of O&M	**YES**	**YES**	**YES** – (annual contribution for cleaning, repair, etc.)
Users co-financed construction	**YES**	**Minimall –** In 1 out of 3 cases, not at all.	**YES**
Users building up capital for repairs, expansion, replacement	**YES**	**NO**	**NO**
Universality and timelines of user payments	**YES**	**YES** – Mostly	**YES** – Mostly
E. EFFECTIVE MANAGEMENT			
Organized community structures for management at Water facility levels and village level	**YES**	**Minimal** – Only for public facility	**NO** – An individual assumes "managership"
Organized community structures have adequate representation of Rich and Poor, Men and Women	**NO** - Male only. Members mostly non-poor	**NO** – Male only	**NO** – Individual; male landowner, rich
Technical capacity to operate and maintain at designed level of system performance	Partly and inadequately. Moreover O&M is not happening as per design	**Minimal** – No training of operators	**YES** – Know how traditionally exists at village level
Ability to make repairs (technical + financial + spare parts availability)	**YES** – Evidence of repairs made available	**NO** – (could be due to lack of authority)	**YES** – Same as above
Transparent rules, regulations, sanctions for operation + usage	**YES**	**NO**	**NO** – Has led to misuse by "owner / manager" in many cases
F. COMMUNITY OWNERSHIP			
Formal proof of collective community ownership of facilities	**NO** – But informal understanding to the effect	NO	**NO** – Has led to public dug well becoming private property at times
Formal authority of community bodies for O&M, repairs, expansions	**NO** – But informal authority exists and has been used	**NO** – Communities hesitant to act, consider the facility to belong to Government	**NO** – But informal community understanding to the effect exists

Sustainability Implications by Water Supply System Type

Table ES-1 compares the relative sustainability of the three types of water supply systems, as explained below.

C-type Piped Systems: (Sesait, Teratak) These systems scored higher than dug wells and "B-type" piped systems on most aspects of sustainability, *i.e., Effective Use, Meeting Users' Demands, Effective Financing* and *Effective Management* (one exception being the sub-indicator Technical Capacity for O&M). *Community Ownership* too is fairly high, although there is no formal, legal proof of ownership. The principal threat to the sustainability of these systems lies in the area *"System Performance as Designed"*. These systems were planned as branched networks of public taps. However, users are inserting private hoses and pipes into public tap lines for household connections because that is their desired level of service. 37 % and 49 % of users have done this in the two villages observed. More applications for house connections are pending with the Water Users' Association. House connections only require the users to pay nominally higher user fees per month. No investment cost is necessary except for rubber hoses. Such uncontrolled modification of the system is a serious threat to sustainability. The original water source is a mountain spring. Because supply was dwindling in the original system, villagers in *Sesait* have tapped another available spring by themselves and connected it to their distribution system. The surveyors further discovered that a second village *(Danyang)* that received a similar ESWS piped system source from the same spring, has run dry only 3 months after construction, thus wasting the investment. Researchers were told that this was the result of *Sesait* residents cutting off the supply to Danyang from the spring located within *Sesait*, when supplies could not keep up with demands in Sesait. Technical observers also found O&M practices inadequate, probably due to a lack of O&M training of community level operators.

The findings suggest the following lessons for improving the sustainability of C-type piped systems :

a) Engineering designs need to be based on proper assessment of community demand for the preferred level of service and type of technology.

b) The assessed demand should be used to project future demand and assess feasibility / capacity of the primary source of water accordingly. Designs should assume that 90 – 100 per cent of users will eventually want house connections.

c) Costs to users for different levels of service should be worked out by implementing agency personnel (e.g., Public Works, PDAM, Technical officers of Projects) in consultation with communities, at levels that make it difficult to exploit the primary source in an unsustainable manners, e.g. making house connections proportionately much more expensive than public taps, deciding user tariffs with communities in proportion to the ratio of user households to each public tap etc. This is integral to helping communities make "informed choices" regarding their water resources.

d) To assess demand accurately, it is essential to communicate directly with the larger community of potential users, both poor and non-poor. Community leaders / representatives often do not represent the interests and the voice of the poor, who are the majority.

e) It is also imperative to assess demand directly with both women and men. ESWS project facilitators were unable to involve women in the process for various reasons, which should be addressed in future projects, as women are the real managers of water and hygiene in almost every household.

f) It is necessary to ensure that, i) technical requirements of O&M are discussed with communities before systems are designed and constructed, ii) communities receive relevant training in O&M, and iii) have access to technical support to operate and maintain the systems for aspects that cannot be covered through training. This is yet another aspect of helping communities make "informed choices" with respect to technologies and scales of systems that are feasible for them to operate and maintain.

"B-type" Piped Systems: (Sakuru, Samili, Empang Atas) These systems scored well in terms of *"System performance as designed"*(although the public hydrants in the systems were in poor physical condition) and *"Services meeting users' demands"*. They also scored moderately well in terms of *"Effective use"*. The threat to their sustainability comes from the poor management of the public facilities by the community, low feelings of community ownership and lack of training of community members operating and managing the systems. The exclusion of the community from the process of planning and construction of the systems by PDAM has created a public impression that the systems are PDAM's property and the villagers are not authorized to make repairs / modifications, and so forth. Thus maintenance of public facilities is poor and no funds are gathered for repairs. House connections were chosen by the richer villagers who could afford the individual investments of Rp.200,000 – Rp.400,000 each. They feel they own their part of the system and take care of repairs needed individually. Public facility users were required to pay little or nothing for construction.

For improving the sustainability of "B-type" systems the emerging lessons are:

a) Community management is the end product of a process of community involvement in planning and construction of the system, which includes, firstly, a degree of choice-making by people for the kind of services they want and choose to pay for. In addition, before construction happens, operation and maintenance requirements must be discussed and agreed between water supply agencies (PDAM in this case) and user communities, and relevant training provided for community operators. Finally, communities need formal, legal proof of ownership of the system and need to understand clearly how responsibility is to be shared between them and the agency, for repairs, replacements, expansion, etc.

b) The manner in which the designated "B-type" systems were designed and built by PDAMs suggests that the PDAMs concerned did not really understand the pre-requisites of community management. They made all the key decisions about design and construction of services unilaterally, offered no training for O&M and did not formally hand-over the facilities to the community. In future projects, time and resources need to be allocated for improving institutional understanding of how and what they need to do in order to foster community involvement, capacity and ownership.

c) The process needs to ensure that it targets and fully involves the poor and the rich, men and women in planning, choice-making, implementation and management. Systems that serve only the rich minority and take no account of women's preferences are not responding to the majority of users' demands, and therefore are less likely to be sustained by them.

C-type Non-Piped Systems (Dug wells in Banggo, Lape, Kayangan, Lenek Lauq, Tebaban):
These systems scored moderately on most sustainability indicators, poorly in terms of *"Effective use"* and well in terms of *"Effective financing"* since cost-sharing for construction as well as O&M were high. Risks to sustainability of service from dug wells seem to be social as well as physical. Because the criteria for siting dug wells favoured the economically better-off, the poorest households gained less-than-equitable access to begin with. Thereafter, due to the lack of legal proof of collective ownership, poor users were sometimes deprived of access by the owner of the land on which the well is sited.

Wide variations were observed in the design of wells, which influenced patterns of usage and user satisfaction. Some wells were constructed by contractors and others by communities – without specified designs.

Quality of well water was often unsatisfactory due to:

a) Poor wastewater management around wells.

b) Sites being too close to polluted rivers / canals / latrines.

c) Lack of water quality monitoring and treatment.

Quantity of water was also frequently open to seasonal fluctuations.

All of these factors lower the scores for *"Effective use"* and *"Service meeting user demands"*

Lessons for improving the sustainability of water supply from dug wells for the majority of the users are:

a) Public ownership of each dug well needs to be formally established. Every household contributing to construction should receive legal proof of shared ownership and rights to operate / maintain the well for the agreed period of time. This can be done even with existing dug wells.

b) Before construction, user groups should be helped to understand the causes of pollution of wells and preventive measures needed to preserve water quality, e.g., safe distance from sources of pollution, waste water management, periodic water treatment.

c) The criteria for siting dugwells should be re-examined to reduce biases towards the land-owning, richer households. Public land or land collectively contributed by groups of poor households should be given priority in siting, to improve access of the poor.

d) User preferences about design should be catered to by developing a range of optional designs and costs, e.g., diameter, type of lining, types of protective structures and ancillary facilities. Potential user groups should be helped to choose the design (and cost) that best meets their demands. They should then be able to supervise construction in keeping with the chosen design and pay any contractors they employ. There is evidence that communities have / can easily acquire technical capacity to accomplish this in Indonesia.

Sustainability of Household Latrines

The sustainability of household latrines in the ESWS Project is closely linked to the ready availability of water at household level, since the technology used is water intensive, i.e., pour-flush type with single / twin pits, with or without pit lining. Table ES-2 below illustrates the major differences between sustainability indicators for latrines in villages with piped water systems and dug wells.

TABLE ES-2

SUSTAINABILITY MONITORING INDICATORS	HOUSEHOLD LATRINES OBSERVED	
	IN VILLAGES WITH PIPED WATER	**IN VILLAGES WITH DUGWELLS**
A. SYSTEM PERFORMANCE AS DESIGNED		
Functioning as per design	YES	Partly
Design appropriate in technical terms	YES	Partly - NOT appropriate for water scarce village
Quality of construction and materials adequate for design	YES	Partly – pits collapsed in 1 village due to mismatch between soil type and pit lining
B. EFFECTIVE USE		
Change in defecation practices for better health (consistent, hygienic use of safe excreta disposal systems)	YES - Those who have house connection of piped water	NO – Majority still use rivers and crop fields
A sufficient majority have access (Rich / Poor; Men / Women)	NO - Poor have low access	NO – Poor have low access
Environmentally sound usage of facilities (not polluting water sources, not causing health hazards)	YES	NO – Latrines too close to dug wells in 3 of 5 villages
C. SERVICE MEETING USERS' DEMANDS		
Demands for level of service being met (location, convenience, degree of sharing)	YES	NO - Supply seems to exceed demand
Demands for quality of construction & design met	YES	NO – Water intensive latrine technology is not appropriate where water is scarce / source far away
D. EFFECTIVE FINANCING		
Users fees cover full cost of O & M	YES	YES
Users meet more than half cost of construction	YES	YES

SUSTAINABILITY MONITORING INDICATORS	HOUSEHOLD LATRINES OBSERVED	
	IN VILLAGES WITH PIPED WATER	IN VILLAGES WITH DUGWELLS
E. EFFECTIVE MANAGEMENT		
Technical capacity to operate and maintain at designed level of system performance	YES	YES
Capacity to make repairs (technical + financial + spare parts availability) exists or developed in the community	YES – Partly. Artisan (Tukang) training in 4 of 5 villages	YES – Partly. Artisan (Tukang) training in 3 of 5 villages

Although both types of villages have the capacity to operate, maintain and get repairs made locally and both shared similarly high proportions of construction costs, latrines are performing better, being used more effectively and meeting user demands to a greater extent in villages with piped water. The study revealed that wherever people have switched to using latrines rather than rivers and crop fields, women are more frequent users than men and children. It also revealed that latrine use is conditional and not consistent, indicating that a significant community behaviour change has not yet been achieved.

Strategies to improve the sustainability of household latrines have to be considered together with strategies to effect sustainable changes in community behaviour towards consistent use of sanitation facilities.

Lessons from this study for sustainable sanitation are that the sanitation component of projects should:

a) Avoid an approach that measures success of the sanitation component by the number of latrines constructed.

b) Offer a range of sanitation options that cater to the preferences and habits of communities having varying degrees of access to water. Limiting the option to only the pour-flush type of sanitation facility in the ESWS project met with little success in villages with dug wells, because users are not willing to carry water from an external source to the latrine – which in their opinion is not an essential facility when there are rivers, canals and fields available for defecation.

c) Design and implement the sanitation component in a way that targets behaviour change rather than construction. This means that the project staff begin by investigating current sanitation practices and the community's rationale / preferences associated with them. Then they work with community groups of women, men and children to improve community awareness about how diseases spread from open defecation. Finally, they help community groups to choose the key behaviours they wish to change and the services that they want to acquire – to improve their health, convenience, and quality of life.

d) Use the Hygiene Awareness component of projects as a dialogue opener with communities as described above. A learning approach should be adopted that allows participatory assessment of community hygiene behaviour and joint planning for change, rather than a top-down, standardized, educational-messages-based "Hygiene Education" approach. This will require appropriate training of community facilitators, realistic time schedules for community level work prior to construction (1-2 years on an average in each community) and project performance indicators related to behaviour change rather than construction targets.

e) Allow demand for sanitation to emerge before services are provided. If demand for sanitation is not forthcoming, even after awareness building and hygiene promoting interventions, the provision of sanitation facilities should be postponed until underlying reasons can be understood and addressed.

f) Avoid making latrine construction an obligatory requirement linked to other benefits, unless there are reasonable means to ensure consistent usage (e.g., public and peer pressure in a highly motivated and aware community).

g) Ensure a gender-sensitive approach overall, that directly approaches and involves both women and men in situation analysis, planning and implementation of sanitation interventions.

APPENDIX IV – INFRASTRUCTURE ASSESSMENT

1. GENERAL

This appendix summarises the findings of investigations and field assessments of water supply and environmental sanitation infrastructure provided under the project. There were two major categories of water supply and sanitation facilities namely:

- Community managed infrastructure
- Institutionally managed infrastructure.

This infrastructure comprised the major physical outputs of the project. For an appreciation of the relative impact of the various facilities, the overall beneficiary numbers are relevant. Details of beneficiary numbers are provided later in this appendix.

A Summary is provided below.

Community Managed Facilities

❑ Type C piped water supply systems	14,449 beneficiaries	4% of water supply beneficiaries
❑ Type C non piped water supply systems	217,250 beneficiaries	67% of water supply beneficiaries
❑ Household toilets beneficiaries	451,395 beneficiaries	97% of sanitation
❑ Other facilities	11,685 beneficiaries	3% of sanitation beneficiaries

Institutionally Managed Facilities

❑ Type A and B water supply systems	93,730 beneficiaries	29% of water supply beneficiaries

2. ASSESSMENT APPROACH

The assessment is based on the findings of the evaluation team from desktop studies, field discussions, and facility inspections. The evaluation team also used detailed technical assessments (TA) which were undertaken of a limited range of facilities in the PRA survey locations.

Brief details of the sample of systems and facilities covered by the PRA TA are set out below. Additional information is provided in the separate PRA report (see Reference 10 and Appendix III).

General Scope

- The TA covered facilities in 10 hamlets within 10 villages – these include five hamlets with piped water supply systems (Type B and C) and five with non-piped water supply systems.

Water Supply Facilities Assessed

- Two Type C piped systems out of 13 provided by the project with 39 water tanks and public taps
- Three Type B systems out of nine provided by the project with 10 public hydrants and 430 house connections
- Type C non-piped systems in five of the some 208 villages in which facilities were provided by the project. These facilities included 187 wells out of 8,690 provided by the project.

Sanitation Facilities Assessed

- 112 household toilets out of 90,279 provided by the project.

Piped systems are thus over represented in the TA. Further, for non-piped systems, the sample represents only about 2% of the wells and 0.1% of the toilets. Care is therefore required in any extrapolation from the TA results because of both the bias in the sample and the small sample size, especially in relation to the household toilets.

3. COMMUNITY MANAGED FACILITIES

3.1 Facilities Implemented

Community managed facilities included:

- Type C non-piped water systems (dug wells) and Type C piped water systems
- Household toilets (jamban keluarga or jaga)
- Additional related infrastructure including drainage and washing / bathing facilities as well as toilets for schools etc.

Community managed facilities were implemented in all six kabupaten in NTB. A summary of the Type C non-piped facilities is shown in Table IV-1

TABLE IV-1

SUMMARY OF COMMUNITY MANAGED FACILITIES

Kabupaten	No. of Desa	Dug Wells	Toilets	Wash / Bath	Other
Lombok Barat	27	1,508	17,390	335	151
Lombok Tengah	23	1,353	9,371	22	51
Lombok Timur	50	1,921	13,473	440	247
Sumbawa	48	2,056	24,635	49	283
Dompu	34	1,002	11,873	32	400
Bima	36	850	13,537	59	268
Total	**218**	**8,690**	**90,279**	**937**	**1,400**
Difference from PCR		**85**	**3,650**	**19**	

The toilets, washing and bathing, and other facilities listed in Table IV-1 include those implemented in association with Type A, B and C piped systems.

The above figures were extracted from GOI records and aggregated from village level data. Details are set out in the following tables (Table IV-2.1 to Table IV-2.7). There are slight differences between these figures and the figures in the PCR. The primary differences are the number of dug wells in Lombok Timur and Bima, and toilets in Lombok Barat and Lombok Timur. The total difference is shown in the table. The PCR figures are believed to have come from the Project MIS which the evaluation team was unable to locate in the field despite extensive enquiries.

There is some conflicting information about the number of Type C piped water supply systems. The *Final Report of the Engineer – Rural Community Managed Pipe Systems (Type C)* provides details of 13 systems constructed. These include seven located in Lombok Barat, three in Lombok Tengah, two in Lombok Timur and one in Bima. The PCR includes an additional system for Mursemalang which appears to have been built without GOA funding, and possibly this is the reason for its exclusion from the technical report.

3.2 Technology Assessment and Approach to Construction

The non-piped systems involved simple but well developed technologies including primarily:

- Dug wells with associated wastewater (sullage) drainage and disposal facilities
- Household toilets including pour flush squat plate and pit latrine
- Additional sanitation facilities including school toilets, washing / bathing facilities, and drainage improvements.

TABLE IV-2.1

SUMMARY OF TYPE C FACILITIES BY KABUPATEN AND DESA

Kabupaten / Desa	Cycle	Year	Dug Wells	Toilets	Wash / Bath Facilities	Other	
LOMBOK BARAT							
Akar-Akar	1	1993 / 4	15	8	4	3	
Akar-Akar	2	1994 / 5		7	5	15	
Bayan	1	1993 / 4		2	12	4	
Beleke	3	1995 / 6	27	875	6		#
Bentek	1	1993 / 4	23		1		
Bentek	2	1994 / 5	20				
Dasan Geras	3	1995 / 6	24	1,234	13		#
Dasan Geria	4	1996 / 7	39	648	23	7	
Duman	4	1996 / 7	28	443	13	1	
Gapuk	3	1995 / 6	30	1,044	18	2	#
Gerung	3	1995 / 6	27	1,400	20	4	#
Gondan	1	1993 / 4	28		14		
Jembatan Kembar	2	1994 / 5	86	250	10	1	#
Jembatan Kembar	3	1995 / 6	43	1,025	19	4	#
Kayangan	1	1993 / 4	33		8	3	
Kebon Ayu	2	1994 / 5	155	308	49	73	#
Kebon Ayu	3	1995 / 6	31	825	20	7	#
Kekait	2	1994 / 5	71				
Keke	2	1994 / 5	63	500	2		#
Lembar	3	1995 / 6		995			#
Loloan	1	1993 / 4			1		
Mambalan	2	1994 / 5	76		1		
Penimb	2	1994 / 5	29	1,201	9	1	#
Peresak	4	1996 / 7	77	399	22	1	
Rempek	1	1993 / 4	27	6	12		
Rempek	2	1994 / 5	37		6	3	
Selengen	1	1993 / 4	10			4	
Selengen	2	1994 / 5	41	165	16	1	#
Sembung	4	1996 / 7	49	317	2	2	
Sesait	1	1993 / 4	15	11	5		
Sesela	2	1994 / 5	101				
Sigerongan	4	1996 / 7	54	429	12	8	
Sukadana	1	1993 / 4	8	54	6	2	
Other (DPU Tk I)	2	1994 / 5	249	5,247			#,@
Total Kabupaten Lombok Barat			**1,508**	**17,390**	**335**	**151**	

Includes significant Non-Poktan facilities
@ No GOA funding

TABLE IV-2.2

SUMMARY OF TYPE C FACILITIES BY KABUPATEN AND DESA

Kabupaten / Desa	Cycle	Year	Dug Wells	Toilets	Wash / Bath Facilities	Other
LOMBOK TENGAH						
Bagu	4	1996 / 7	53	180	3	2
Bagu	3	1994 / 5	58	340		2
Barejulat	4	1996 / 7	31	282		4
Beber	2	1993 / 4	38	344		5
Beieke	2	1993 / 4	38	293		
Bonjeruk	4	1996 / 7	43	258		4
Bonjeruk	3	1994 / 5	61	381		
Bujak	2	1993 / 4	43	250	2	
Ganti	2	1993 / 4	62	318		
Jelantik	4	1996 / 7	35	310	1	4
Labulia	3	1994 / 5	55	420	1	
Lapulia	4	1996 / 7	44	285	2	2
Marong	2	1993 / 4	47	342		
Pangutar	2	1993 / 4	52	394	2	1
Pemempek	4	1996 / 7	50	337		7
Pemempek	3	1994 / 5	65	324		
Pengenjek	3	1994 / 5	57	385		
Perina	4	1996 / 7	45	343		5
Pringgarata	4	1996 / 7	32	252	1	3
Pringgarata	3	1994 / 5	62	355	1	6
Puyung	4	1996 / 7	56	535		4
Semoyang	2	1993 / 4	35	383	4	
Sengkerang	2	1993 / 4	38	206		
Situng	3	1994 / 5	50	206	2	
Sukarara	3	1994 / 5	49	442		
Tanah Beak	2	1993 / 4	24	290	1	
Teratak	2	1993 / 4	36	303		
Ubung	4	1996 / 7	41	237		2
Ubung	3	1994 / 5	53	376	2	
Total Kabupaten Lombok Tengah			**1,353**	**9,371**	**22**	**51**

TABLE IV-2.3

SUMMARY OF TYPE C FACILITIES BY KABUPATEN AND DESA

Kabupaten / Desa	Cycle	Year	Dug Wells	Toilets	Wash / Bath Facilities	Other
LOMBOK TIMUR						
Aikmel Utara	2	1994 / 5		428	13	28
Anjani	1	1993 / 4	40	53	24	2
Apitaik	3	1995 / 6	59	390		1
Bagik Papan	3	1995 / 6	42	516	1	
Batuyang	3	1995 / 6	40	436		
Danger	2	1994 / 5	75	262	22	3
Dasan Lekong	3	1995 / 6	2	12		
Dasan Lekong	1	1993 / 4	54	48	32	12
Gunung Rajak	4	1996 / 7				1
Gunung Rajak	3	1995 / 6	2	112		
Jantuk	1	1993 / 4	10		2	1
Jenggik	4	1996 / 7	39	267		4
Jerowaru	3	1995 / 6	2	125		
Jurit	3	1995 / 6	2	6		
Jurit	2	1994 / 5	79	305	25	2
Kabar	3	1995 / 6	2	12		
Kerongkong	3	1995 / 6	2	12		
Kerongkong	1	1993 / 4	37	44	8	5
Kerumut	3	1995 / 6	68	299		
Kesik	3	1995 / 6	37	326	4	5
Labuan Lombok	3	1995 / 6	45	260		
Lendang Nangka	2	1994 / 5	50	250	30	8
Lenek Daya	2	1994 / 5	65	250	19	7
Lenek Daya	2	1994 / 5	69	306	9	11
Lenek Lauq	2	1994 / 5	98	183	17	3
Loyok	4	1996 / 7	56	294	7	7
Mamben Lauk	4	1996 / 7		1,000		
Mamben Lauk	2	1994 / 5	81	548	10	7
Masbagik Timor	1	1993 / 4	28	53	26	6
Masbagik Timur	3	1995 / 6	2	12		
Montong Baan	4	1996 / 7	30	186	6	4
Montong Betok	4	1996 / 7	50	382	3	9
Padamara	1	1993 / 4	47	68	37	23
Paok Motong	3	1995 / 6	38	323	1	4
Pengadangan	3	1995 / 6	48	321	1	8
Pohgading	3	1995 / 6	67	202		1
Pringga Jurang	4	1996 / 7	17	190	5	1
Pringgabaya	3	1995 / 6	33	349		
Pringgasela	2	1994 / 5	94	216	12	13
Rarang	4	1996 / 7	25	152	3	1
Rempang	1	1993 / 4	19	170	8	1

TABLE IV-2.3

Kabupaten / Desa	Cycle	Year	Dug Wells	Toilets	Wash / Bath Facilities	Other	
Rempung	3	1995 / 6	2	12			
Renang	4	1996 / 7				1	
Rensing	3	1995 / 6	2	12			
Rumbuk	3	1995 / 6	2	212			
Sakra	3	1995 / 6	2	12			
Selebung Kattangga	3	1995 / 6	2	12			
Semaya	4	1996 / 7	41	312	9		
Sepit	4	1996 / 7	1			1	
Sepit	3	1995 / 6	2	292			
Setanggor	1	1993 / 4	46	61	27	7	
Sikur	4	1996 / 7	27	226	11	2	
Stangga	3	1995 / 6	2	12			
Sukamulia	3	1995 / 6	2	12			
Sukamulia	1	1993 / 4	54	80	22	12	
Suradadi	4	1996 / 7	36	227	4	4	
Suralaga	3	1995 / 6	2	12			
Suralagi	1	1993 / 4	47	46	20	3	
Tebaban	1	1993 / 4	55	60	6	5	
Terara	4	1996 / 7	42	231	6	2	
Wanasaba	3	1995 / 6		1,300		1	#
Wanasaba	2	1994 / 5		974	10	31	
Total Kabupaten Lombok Timur			**1,921**	**13,473**	**440**	**247**	

Includes significant Non-Poktan facilities

TABLE IV-2.4

SUMMARY OF TYPE C FACILITIES BY KABUPATEN AND DESA

Kabupaten / Desa	Cycle	Year	Dug Wells	Toilets	Wash / Bath Facilities	Other
SUMBAWA						
Bangkat Monte	3	1995 / 6	76	301	4	
Bantulanteh	2	1994 / 5	70	391		1
Batu Bulan	2	1994 / 5	90	277		2
Berora	1	1993 / 4	28	178	10	18
Boal	2	1994 / 5	92	499		
Brang Bara	4	1996 / 7	18	235		33
Bugis	4	1996 / 7	10	254		30
Dete	1	1993 / 4	21	190	3	3
Empang Atas	3	1995 / 6		307		2
Empang Bawa	3	1995 / 6		393		2
Jereweh	4	1996 / 7		10		
Jorok	3	1995 / 6	135	601		9
Jorok	4	1996 / 7				6
Jotang	3	1995 / 6	4	365		2
Kakiang	1	1993 / 4	70	104	7	11
Kerato	4	1996 / 7		10		
Labuhan Aji	2	1994 / 5	37	147		5
Labuhan Badas	4	1996 / 7				1
Labuhan Bontong	2	1994 / 5	39	75	1	2
Labuhan Jambu	2	1994 / 5	37	95		
Labuhan Kuris	1	1993 / 4		118		
Labuhan Lalar	3	1995 / 6	61	379		19
Lape	1	1993 / 4	23	183	6	6
Lopok	1	1993 / 4	70	252	5	
Luk	4	1996 / 7	54	185		2
Lunyuk Ode	4	1996 / 7	96	459		4
Lunyuk Rea	4	1996 / 7	62	284		2
Motong	4	1996 / 7	72	460		6
Ngeru	2	1994 / 5	70	620		
Ongko	2	1994 / 5	56	47		2
Orong bawah	4	1996 / 7				2
Pada Suka	4	1996 / 7	110	421		6
Pekat	4	1996 / 7	23	169		11
Penyaring	1	1993 / 4	24	328	2	10
Plampang	2	1994 / 5	68	563		2
Poto	1	1993 / 4	28	204	11	5
Pungkit	1	1993 / 4	30	169	2	4
Rhee	3	1995 / 6	53	488		18
Sabedo	3	1995 / 6	62	278		5
Samapuin	4	1996 / 7	42	249		21
Sampe	3	1995 / 6	9	39		

TABLE IV-2.4

Kabupaten / Desa	Cycle	Year	Dug Wells	Toilets	Wash / Bath Facilities	Other	
Sebewe	1	1993 / 4	26	276	2	14	
Semamung	2	1994 / 5	43	420			
Sepakat	2	1994 / 5	65	407			
Serading	2	1994 / 5	72	545			
Seteluk	4	1996 / 7		8		2	
Stowe Brang	4	1996 / 7				2	
Tengah	4	1996 / 7	30	227		5	
Tepas	3	1995 / 6	80	392		4	
Outside ESWS areas	3	1995 / 6		6,630			**
Outside ESWS areas	4	1996 / 7		5,403			**
Total Kabupaten Sumbawa			**2,056**	**24,635**	**49**	**283**	

** Includes some GOA funding

TABLE IV-2.5

SUMMARY OF TYPE C FACILITIES BY KABUPATEN AND DESA

Kabupaten / Desa	Cycle	Year	Dug Wells	Toilets	Wash / Bath Facilities	Other
DOMPU						
Adu	2	1994 / 5	31	459	2	
Banggo	2	1994 / 5	39	317	1	8
Bara	4	1996 / 7	19	347		17
Beringin Jaya	3	1995 / 6	18	479		25
Daha	3	1995 / 6	36	349		
Hu'u	2	1994 / 5	23	220		
Jambu	2	1994 / 5	35	241	1	1
Kadindi	3	1995 / 6		481	1	
Kandai Satu	4	1996 / 7	19	260	1	3
Katua	4	1996 / 7	24	281	2	4
Kempo	4	1996 / 7	8	259		27
Konte	2	1994 / 5	60	254	2	
Kwangko	2	1994 / 5	35	262	4	7
Lanci Jaya	4	1996 / 7	46	268	1	3
Lasi	2	1994 / 5	30	211		10
Lepadi	3	1995 / 6	27	305		3
Malaju	2	1994 / 5	18	419		34
Matua	4	1996 / 7	21	311		4
Mbawi	3	1995 / 6	121	782	2	15
Mbuju	2	1994 / 5	30	267		9
Montabaru	4	1996 / 7	5	364		19
Nangamiro	3	1995 / 6	21	283	2	5
Nowa	4	1996 / 7	8	376		2
Nusa Jaya	2	1994 / 5	47	473	6	36
O'o	3	1995 / 6		442		
Pekat	3	1995 / 6	10	483		7
Ranggo	2	1994 / 5	50	419	1	66
Rasabou	2	1994 / 5	29	388		10
Riwo	4	1996 / 7	36	294		7
Sorinomo	3	1995 / 6		217	2	25
Soriutu	2	1994 / 5	60	391	2	5
Soro	2	1994 / 5	4	22		
Soro	3	1995 / 6	22	240		
Ta'a	3	1995 / 6	64	378	2	39
Wawunduru	4	1996 / 7	6	331		9
Total Kabupaten Dompu			**1,002**	**11,873**	**32**	**400**

TABLE IV-2.6

SUMMARY OF TYPE C FACILITIES BY KABUPATEN AND DESA

Kabupaten / Desa	Cycle	Year	Dug Wells	Toilets	Wash / Bath Facilities	Other
BIMA						
Bajo	2	1994 / 5	70	292	10	3
Baralau	3	1995 / 6	5	252		
Bontokape	4	1996 / 7	19	144	1	5
Campa	3	1995 / 6	36	636	4	2
Cenggu	4	1996 / 7	12	292		
Dadibou	2	1994 / 5	9	103		1
Doggobolo	2	1994 / 5	2	128	1	1
Kalampa	2	1994 / 5		242		
Kananta	2	1994 / 5	9	97		1
Karumbu	2	1994 / 5	39	485		5
Keli	2	1994 / 5		380		1
Kuta	3	1995 / 6	26	252		1
Leu	4	1996 / 7	24	241		2
Monggo	3	1995 / 6	48	499	6	2
Nata	4	1996 / 7	15	252		
Ntonggu	3	1995 / 6	40	695	1	11
Pandai	2	1994 / 5		126		
Paradorato	3	1995 / 6	18	492		
Paradowane	3	1995 / 6	20	422		1
Punti	2	1994 / 5	3	183		1
Risa	2	1994 / 5	21	338		5
Roi	4	1996 / 7	13	422		
Runggu	4	1996 / 7	34	372		
Rupe	2	1994 / 5	102	1,021	1	5
Sakuru	3	1995 / 6	15	415	3	1
Samili	2	1994 / 5	4	366		
Sie	4	1996 / 7	5	561	12	87
Simpasai	3	1995 / 6	19	506	3	
Sondosia	4	1996 / 7	25	374		6
Tangga	4	1996 / 7	11	592	3	111
Teke	3	1995 / 6	76	578	4	8
Tenga	2	1994 / 5	11	186		
Timu	4	1996 / 7	22	226	3	
Tonggorisa	3	1995 / 6	34	395	1	5
Waworada	2	1994 / 5	5	219		2
Woro	3	1995 / 6	58	753	6	1
Total Kabupaten Bima			**850**	**13,537**	**59**	**268**

TABLE IV-2.7

SUMMARY OF TYPE C FACILITIES BY KABUPATEN AND DESA

TOTALS FROM DESA FIGURES

Kabupaten	Dug Wells	Toilets	Wash / Bath Facilities	Other
Lombok Barat	1,508	17,390	335	151
Lombok Tengah	1,353	9,371	22	51
Lombok Timur	1,921	13,473	440	247
Sumbawa Besar	2,056	24,635	49	283
Dompu	1,002	11,873	32	400
Bima	850	13,537	59	268
TOTAL	**8,690**	**90,279**	**937**	**1,400**
			2,337	

TOTAL FROM PROVINCIAL SUMMARY DATA

Kabupaten	Dug Wells	Toilets	Wash / Bath Facilities	Other
Lombok Barat	1,508	19,155	335	182
Lombok Tengah	1,353	9,371	22	51
Lombok Timur	1,986	15,623	440	247
Sumbawa Besar	2,056	24,635	49	290
Dompu	1,002	11,873	32	401
Bima	870	13,537	59	268
TOTAL	**8,775**	**94,194**	**937**	**1,439**
			2,376	

PROJECT COMPLETION REPORT DATA

Kabupaten	Dug Wells	Toilets	Other
Lombok Barat	1,508	18,890	497
Lombok Tengah	1,353	9,371	73
Lombok Timur	1,986	15,623	687
Sumbawa Besar	2,056	24,635	339
Dompu	1,002	11,873	433
Bima	870	13,537	327
TOTAL	**8,775**	**93,929**	**2,356**

These facilities, properly constructed and maintained, provide an appropriate level of water supply and sanitation in village environments. They represent the key project infrastructure achievements in terms of numbers of beneficiaries (67% of water supply, and 100% of sanitation). A key finding from the PRA is that technical options for WSS facilities were limited and determined by the project and not by the communities. The implications of this for the project and for future activities in the sector are considered elsewhere in this report.

The project approach was for the community to participate in planning and implementation of the facilities. In brief, the community provided labour and supplied general building materials while the project provided training, technical assistance for planning, design, and construction, cement and specialist construction materials. The ongoing operation and maintenance of these facilities is the responsibility of the communities.

Type C piped water systems are all gravity systems sourced from springs or other surface water sources. The transmission and distribution systems include simple reservoirs and distribution primarily through community taps, although in some instances individual taps are installed. The community played a major role in implementation of the facility, and is responsible for on going operation and maintenance as for the non-piped systems.

Summary details of the Type C piped systems are set out in Table IV-3.

Details of the standard designs used are contained in the project documents and are detailed in the following project reports:

- *Final Report of Engineer – Rural Type C Non Piped Systems*
- *Final Report of Engineer – Rural Community Managed Pipe Systems (Type C).*

More detailed information pertaining to the community approach to implementation is covered elsewhere in this report.

3.3 Cost of Facilities and sources of funds

Table IV-4 details the cost of water supply facilities (including Type A and B) and indicates the per capita cost of water supply facilities for the various technology options provided by the project.

For community managed facilities the capital cost of the systems and the relative contribution of the GOA, GOI and the community is as follows:

TABLE IV-3

TYPE C PIPED WATER SUPPLY FACILITIES [1]

	Name of System	Location			Beneficiaries	Source Capacity (l/s)	Utilised Capacity (l/s)	Comment
		Kabupaten	Kecamatan	Desa				
1	Santong	Lombok Barat	Gangga	Sesait	1,495	10.5	1.4	Inspected. Poorly maintained. Some parts of system no longer in use.
2	Sumur Pande (Sesait)	Lombok Barat	Gangga	Sesait	1,105	2.5	2.0	
3	Batu Gerantung	Lombok Barat	Bayan	Loloan	585	0.5	0.4	
4	Sambiq Elen	Lombok Barat	Bayan	Loloan	1,150	1.0	1.0	
5	Lokok Mandala	Lombok Barat	Bayan	Bayan	490	17.5	1.1	
6	Lokok Suren	Lombok Barat	Bayan	Bayan	522	6.6	6.6	
7	Torean	Lombok Barat	Bayan	Loloan	2,170	4.8	2.4	
	Subtotal Lombok Barat				***7,517***			
8	Persil	Lombok Tengah	Batu Kliang	Tanak Beak	665	60.5	0.9	
9	Ketangga	Lombok Tengah	Batu Kliang	Teratak	785	43.3	3.9	
10	Teratak	Lombok Tengah	Batu Kliang	Teratak	4,032	43.3	7.8	Inspected. Appeared well managed and generally well maintained
	Subtotal Lombok Tengah				***5,482***			
11	Keroak	Lombok Timur	Aik Mel	Lenek Daya	470	5.4	0.3	
12	Lendang Belo	Lombok Timur	Masbagik	Lend. Nanka	380	0.2	0.2	
	Subtotal Lombok Timur				***850***			
13	Niu	Bima	Rasanae	Sambinae	600	2.3	0.8	
	Subtotal Bima				***600***			
	Totals				**14,449**	**198.4**	**28.8**	

[1] Based on Final Report of Engineer - Rural Community Managed Pipe Systems (Type C)

TABLE IV-4

UNIT COST OF WATER SUPPLY AND SANITATION SYSTEMS

TYPE A AND B WS SYSTEMS [1]

System	Type	Beneficiaries	Cost (Rupiah)				Cost / Capita
			GOA	GOI	Community	Total	
Gerung	A, B	13,828	405,091,237	422,213,000	0	827,304,237	59,828
Gamang	A, B	31,107	1,063,843,000	1,143,440,000	0	2,207,314,107	70,959
Lape	B	6,000	179,880,000	98,723,000	0	278,609,000	46,435
Empang	B	10,800	640,028,742	268,000,000	0	908,039,542	84,078
Plampang	B	6,000	192,257,000	191,752,000	0	384,015,000	64,003
Adu	A	1,200	45,281,000	27,000,000	0	72,282,200	60,235
Hu'u	A	1,200	69,863,000	33,000,000	0	102,864,200	85,720
DKSTBS	A, B	14,822	449,297,000	503,694,000	0	953,005,822	64,297
Total/Average		**84,957**	**3,045,540,979**	**2,687,822,000**	**0**	**5,733,434,108**	**67,486**
			53%	**47%**	**0%**	**100%**	

[1] Only systems inspected by evaluation team included herein. Systems for which the project influenced a part only are not included (eg. Dompu, Bima - Nungga)

TYPE C NON PIPED SYSTEMS AVERAGE COST OF DUG WELL [2]

Item	Quantity	Unit	Unit Price	Cost (Rupiah)		
				Project	Community	Total
Cement	13.0	bag	10,250	133,250		133,250
Wheel	1.0	set	2,500	2,500		2,500
Rubber rope	15.0	m	400	6,000		6,000
GI pipe	1.5	m	3,900	5,850		5,850
PVC drain pipe	8.0	m	3,000	24,000		24,000
Sand	1.7	m^3	14,000		23,800	23,800
Gravel	2.0	m^3	15,500		31,000	31,000
Rock	1.8	m^3	10,000		18,000	18,000
Bricks	120.0	No.	40		4,800	4,800
Unskilled labour	29.0	m.d.	4,500		130,500	130,500
Skilled labour	17.0	m.d.	6,500		110,500	110,500
Total				**171,600**	**318,600**	**490,200**
				35%	**65%**	**100%**
Average cost per person						**19,608**

[2] Based on Final Report of Engineer - Rural Type C Non-Piped Systems

TABLE IV-4

TYPE C NON PIPED SYSTEMS
AVERAGE COST OF FAMILY TOILET [3]

Item	Quantity	Unit	Unit Price	Cost (Rupiah)		
				Project	Community	Total
Cement	2.0	bag	10,250	20,500		20,500
Closet (pan)	1.0	set	12,000	12,000		12,000
PVC 3" drain pipe	1.3	m	3,000	3,900		3,900
Reinforcing steel	11.0	m	400	4,400		4,400
Sand	0.4	m^3	14,000		5,600	5,600
Gravel	0.5	m^3	15,500		7,750	7,750
Rock	0.2	m^3	10,000		2,000	2,000
Bricks	1,200	No.	40		48,000	48,000
Wood	0.04	m^3	100,000		4,000	4,000
Bamboo matting	8	m^2	1,000		8,000	8,000
Alang alang (grass)	1	Bundle	2,000		2,000	2,000
Unskilled labour	6.0	m.d.	4,500		27,000	27,000
Skilled labour	1.0	m.d.	6,500		6,500	6,500
Total				**40,800**	**110,850**	**151,650**
				27%	**73%**	**100%**
Average cost per person						**30,330**

[3] Based on Final Report of Engineer - Rural Type C Non-Piped Systems

TYPE C PIPED WS SYSTEMS[4]

Name of System	Beneficiaries	Cost (Rupiah)				Cost / Capita
		GOA	GOI	Community	Total	
Santong	1,495	10,781,000		5,038,000	15,819,000	10,581
Sumur Pande	1,105	10,519,000		4,696,000	15,215,000	13,769
Batu Gerantung	585	4,255,000		1,642,000	5,897,000	10,080
Sambiq Elen	1,150	7,685,000		1,822,000	9,507,000	8,267
Lokok Mandala	490	6,250,000		986,000	7,236,000	14,767
Lokok Suren	522	5,293,000		2,514,000	7,807,000	14,956
Torean	2,170	80,134,000	44,300,000	14,575,000	139,009,000	64,059
Persil	665	8,697,000	2,051,000	1,455,000	12,203,000	18,350
Ketangga	785	14,299,000	1,728,000	1,472,000	17,499,000	22,292
Teratak	4,032	214,505,000	14,250,000	18,212,000	246,967,000	61,252
Keroak	470	7,101,000		1,357,000	8,458,000	17,996
Lendang Belo	380	316,000		154,000	470,000	1,237
Niu	600	10,721,000	22,050,000		32,771,000	54,618
Totals	14,449	380,556,000	84,379,000	53,923,000	518,858,000	35,910
		73%	16%	10%	100%	

[4] Based on Final Report of Engineer - Rural Community Managed Pipe Systems (Type C)

- Dug wells (Type C non piped systems)
  - Average cost / capita[1] Rp 19,600
  - Contribution Project 35%; Community 65%
- Household toilets (Type C non piped systems)
  - Average cost / capita[2] Rp 30,300
  - Contribution Project 27%; Community 73%
- Type C piped systems
  - Average cost / capita[3] Rp 35,900
  - Contribution Project 90%; Community 10%.

These per capita costs compare favourably with per capita costs from other similar projects based on data provided by RWSG-EAP (see Reference 16).

3.4 Condition of Water Supply Facilities

The condition assessment was undertaken using:

- Results from the PRA TA where appropriate. (The results of the PRA and the associated detailed TA are contained in a separate report. Summary findings are contained in Appendix III)
- Evaluation team field assessments from visits to a number of villages including those covered by the PRA and others. Random inspections of facilities and interviews with project beneficiaries were undertaken. An audit of all dug wells was undertaken in one village, Rempung, Lombok Timur.

The PRA TA methodology includes parameters related to the physical condition, operation and sustainability of the facilities, and produces an overall score for the facilities assessed. For the community managed facilities, the scores are in the range 70-80% with the exception of Sidutan which scored just under 50%. It should be noted that Sidutan represents only seven wells, many of which suffered from being constructed during the wet season. As a consequence they were not constructed to sufficient depth to provide a reliable source during the dry season.

Sample inspections in villages by the evaluation team yielded qualitative information which generally supports the overall PRA TA results.

More general observations are provided below in relation to Type C water supply systems and particularly their longer term sustainability.

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1 Based on 25 users per well

2 Based on 5 users per toilet

3 Based on number of beneficiaries

Piped Systems

The condition of Type C piped systems varied but in general there was a poor understanding in the villages of the operation of piped systems. Evidence included the lack of repairs to obvious leaks, inappropriate fittings used for repairs or pipeline alterations, the frequent lack of inlet float valves and thus inappropriate management of the reservoirs. In the worst cases (eg. Santong) the combined consequences of such problems are that the systems supply fewer consumers than should be the case and many consumers, particularly those at the ends of the pipe branches, are likely to abandon the system because the service is inadequate. In Santong some parts of the system had been abandoned already. There is a substantial risk of failure of the Type C piped systems without improvements to system management and maintenance.

Non-Piped Systems

Dug wells are a simple technology and whilst not providing the same level of convenience as piped systems, they are more robust and should be more sustainable. Problems were noted with wells but in most cases they were continuing to provide an appropriate level of service with reasonable quantities and quality of water. Specific issues were:

- In some wells (e.g. Sidutan) the depth was inadequate and this led to a lack of supply in the dry season. Anecdotal evidence suggests that in many instances the wells simply needed to be deepened during the dry season to provide an adequate supply
- Maintenance of the paved area surrounding the wells and of the associated drainage was generally poor. Whilst cracking of the well surround may appear inconsequential it is important in maintaining the quality of the well water and a generally clean and attractive environment in the area of the well
- Replacement of essential high "wear & tear" items such as buckets, pulleys and "ropes" was generally undertaken as required. The cost of the routine maintenance required for most wells is minor when compared to the major capital cost of constructing the well.

3.5 Condition of Sanitation Systems

The condition and use of sanitation facilities is best assessed from the results of the PRA. Utilisation was more related to convenience than to the condition of facilities and a greater utilisation of toilets was found in locations with piped water supply systems. Overall utilisation in the PRA villages was about 95% in villages with piped water compared to 20% in those with non piped water systems.

However in all villages including those with piped water, whilst the latrines were used, traditional defecation practices also continued with significant use of rivers, fields and the yard. These locations met "preferred site" criteria as expressed by participants in the PRA (water available all the time, close to home or place of work, private, easily accessible, fresh air / no bad odours, assimilable with traditional practices). Clearly there is more to be done to achieve optimum utilisation of sanitation facilities.

It is difficult to apply the PRA findings across the project but if the PRA results were applied on the basis of water system type then the overall utilisation of household toilets could be less than 50%.

A significant number of "other" sanitation facilities were constructed under the project including washing / bathing facilities, school toilets, drainage systems and other sanitation related improvements. Very few of these facilities were located during inspections by the evaluation team and they were not included in the PRA. The PCR did not differentiate between the types of facilities but the data obtained from Dikes Tk.I (Table IV-2.1 to Table IV-2.7) did distinguish between "washing and bathing" (MC) and "other" facilities. Of the small number of project provided washing / bathing facilities inspected during the evaluation team visit, most were not being used regularly.

4. INSTITUTIONALLY MANAGED FACILITIES

4.1 Institutional background

The primary institutions responsible for the management of urban water supply systems in Indonesia are the kabupaten based water enterprises or PDAM (Perusahan Daerah Air Minum). These are autonomous water enterprises owned by the Level II governments. There are more than 250 PDAM in Indonesia including six in NTB, one in each kabupaten. The PDAM for Lombok Barat is also responsible for Kotamadya Mataram. This arrangement is not normal - usually there would be a separate PDAM for the kotamadya water supply. However, it is a sensible approach in that the systems are interconnected and the larger size of a combined system and institution provides a number of advantages.

The PDAMs are supported by various central and provincial government agencies in the implementation, and operation and management, of the urban water supply systems. Primary among these are:

- Direktorat Jenderal Cipta Karya (DGCK) which is represented at the provincial level through P3P (previously PPSAB and P3AB)
- Provincial Monitoring and Development Unit (PMDU) formed within the Provincial Dinas PU Cipta Karya.

P3P is involved mainly in capital works programs involving central government development budget expenditure (APBN), as well as in overviewing the application of national policies and standards applicable to urban water supply.

The PMDU provides technical advice, training and support to the PDAMs from the provincial level with a focus on operation and maintenance.

4.2 Type A and Type B Facilities

The original project design envisaged two types of institutionally managed systems:

- **Type A systems** – construction, rehabilitation and augmentation of conventional PDAM systems providing piped water supply to consumers primarily through direct connections and through public standpipes serving poorer members of the community
- **Type B systems** –these were envisaged as a collaboration between a PDAM and the community in which the community would contribute to construction of facilities (small branches from a larger PDAM urban piped system) and would buy water from the PDAM at a reduced tariff. It was envisaged that communities would maintain the facilities constructed by them.

In effect only Type A systems were constructed. As noted in the PCR, the project recognised that the Type B systems were not, at the time, acceptable to the relevant institutions and the innovations related to community participation in these systems did not eventuate. The use of the term Type B in the project documents now generally refers to smaller PDAM systems although this is not universally the case.

4.3 Facilities Implemented

Table IV-5 lists the Type A and Type B facilities implemented by the project. These covered activities in five of the six project kabupaten (excluding Lombok Tengah). The works included new systems and assistance with rehabilitation and augmentation of existing systems particularly in Dompu and Bima. The evaluation team inspected some Type A and B systems in each of the five kabupaten.

TABLE IV-5

TYPE A AND B FACILITIES

Location	Details	Assessment	Beneficiaries			Comment
			PCR	Evaln.	Basis	
Lombok Barat						
PDAM Lobar	Bulk meters	Inspection & discussion				All reported as not operating.
Gerung, Lembar, Kebun Ayu, Jembatan Kembar systems	Type A augmentation & Type B new	Inspection & discussion	13,829	4,355	PDAM connection numbers	Operating under different regime using spring source and new transmission main funded by ADB.
Gunung Sari SSF	Pilot WTP modification	Inspection & discussion		NA		Operating. Problems with raw water quality. Lack of water quality monitoring information.
Lombok Tengah						
PDAM Praya	Meter test bench	Not assessed				
Lombok Timor						
PDAM Selong	Bulk meters	Discussions				Reportedly all operating.
	Meter test bench	Discussions				Not used because of certification problem.
Gamang, Sakra, Keruak, Jerowaru System	Type A rehabilitation & Type B new	Inspection & discussion	31,107	11,885	PDAM connection numbers	Under capacity source resulting in under utilisation of system. Augmentation of source planned to restore capacity.
Sumbawa						
PDAM Sumbawa	Meter test bench	Not assessed				Not discussed.
Besar	Bulk meters	Some inspected				Those inspected were operating but reservoir outlet pipe (Lape) running part full causes erroneous readings
Lape	Type B new	Inspection & discussion	6,000	2,015	PDAM connection numbers	System under utilised. Reservoir not operating effectively.
Plampang	Type B new	Inspection & discussion	6,000	2,395	"	Operating but system under utilised.
Empang	Type B new	Inspection & discussion	10,800	5,550	"	Transmission main damaged by flood. System inoperative on day of inspection.
Dompu						
PDAM Dompu	Meter test bench	Inspection & discussion				Utilised.
Dompu Urban System	Type A rehabilitation & augmentation	Inspection & discussion	44,000	44,000	PCR. Actual beneficiaries of Project works difficult to determine	Remaining high UFW. Lack of water quality monitoring information for treatment plant.
Hu'u	Type A rehabilitation	Inspection & discussion	1,890	1,890	PCR. Obvious errors in beneficiary/connection numbers in reports	Very small system - rehabilitated ex CARE. Consumers generally happy with system performance. Slow response to repair of notified leaks. Transmission line frequently damaged by flood.
Adu	Type A rehabilitation	Inspection & discussion	2,440	2,440	"	Very small system - rehabilitated ex CARE. Consumers generally happy with system performance. Slow response to repair of notified leaks.
Kwangku	Type B new	Not assessed	1,500	1,500	PCR	
Bima						
PDAM Bima	Meter test bench	Inspection & discussion				Utilised. Lack of standardisation in meter purchase causes increased difficulties with repairs.
	Bulk meters	Inspection & discussion				Some observed, operating and recorded regularly.
Nungga	Type A augmentation	Not assessed	13,000	13,000	PCR	
DKSTBS	Type B new	Inspection & discussion	14,822	4,700	PDAM connection numbers	System currently under utilised. Plans being developed for changes to system associated with new surface water source (dam).
Total			**145,388**	**93,730**		

4.4 Planning Design and Implementation

For Type A and B systems the project provided technical assistance in planning and design, and provision of equipment including pipe materials, prefabricated steel reservoirs, meters, pumps and associated equipment. Designs were generally in accordance with standards established by Cipta Karya and were generally appropriate. Construction was undertaken by contract usually with supervision from GOI – generally through P3AB (now P3P). The PCR and other project documentation acknowledge difficulties in achieving appropriate quality of works particularly during the early stages of implementation. This was a consequence of the limited capacity of both contractors and GOI supervisory staff, but the situation reportedly improved with changes in GOI staffing within P3AB and the appointment of additional project resources to support construction supervision activities.

The evaluation team facility inspections indicated that the major visible assets implemented with project support were generally well constructed and capable of being operated as designed. A number of operation and maintenance issues associated with these systems is addressed below. Below ground pipelines could not be inspected.

4.5 Institutional Strengthening/Water Supply System Management Initiatives

In addition to assistance with physical works, the project included activities to strengthen the institutions responsible for planning, design, implementation, and operation and maintenance of these systems. These activities included training on the job and specific training courses. A brief assessment of these activities is provided below.

Kabupaten Plans

The Project Design included the provision of technical assistance for the preparation of kabupaten plans for the development of institutionally managed systems. The PCR refers to the kabupaten plans and indicates that preliminary plans were completed in 3 kabupaten – Lombok Barat, Lombok Timur and Sumbawa. Enquiries at both the provincial and kabupaten level failed to locate any evidence of these documents. A Corporate Plan for PDAM Dompu was located. The lack of positive responses to the enquiries indicates a lack of ownership of the plans at kabupaten level, particularly by the PDAMs, and at the provincial level is probably symptomatic of staff and organisational changes particularly in P3P.

Metering and Unaccounted-for-Water Programs

Assistance was provided to support the PDAMs in unaccounted-for-water (UFW) reduction. Bulk meters were provided to improve measurement of water production and distribution. Meter test benches were provided to facilitate the checking, repair and replacement of consumer meters. Assistance was provided with the planning and implementation of UFW management programs. The success of these activities was

mixed. In some kabupaten the bulk meters are no longer operable and in others they are not used optimally. In most kabupaten the consumer meters are regularly tested and replaced or repaired. There is recognition of the importance of UFW reduction and its commercial impact on the PDAMs. UFW varies from approximately 30% in Lombok Barat and Bima to 45% in Dompu and Sumbawa Besar. These figures are difficult to verify as in some instances bulk meters are no longer working and often the readings are not taken and recorded on a systematic basis.

SISKA

Computerised Billing and Accounting System – The project assisted with the development and implementation of a computerised billing and accounting system for the project PDAMs. This system is in use in five of the six PDAMs. PDAM Lombok Barat uses a different program for reasons which are not fully understood. The SISKA system enables efficient preparation of water bills, monthly accounting and reporting for the PDAMs. It is probably capable of providing much more useful management information and analysis but the package appears to have been designed primarily around the standard data requirements and reporting needs rather than as a general management tool. Some difficulties are faced by the PDAMs in using SISKA but these seem to be primarily related to the inadequacies of the computer hardware systems on which it is operated. For example, in Bima, in order to produce the monthly billings on time it is necessary to operate SISKA on two separate computers which are not networked. This loses the benefits of maintaining one integrated database for the PDAM. The issue of Y2K appears to have been recognised and addressed but this requires confirmation from the program originators. (Much of the PDAM computer hardware is unlikely to be Y2K compliant, given its age. However this was not supplied by the project.)

Water Tariff Management

Considerable assistance was provided during the early stages of the project with analysis and preparation of recommendations for tariff structures and tariff levels. The PCR concedes that although tariffs were previously set at levels which barely covered operation and maintenance, and certainly did not provide adequately for depreciation and capital replacement, there was a political reluctance to increase tariffs. The field observations of the evaluation team confirm that tariffs have historically remained fixed for many years and still do not provide adequately for depreciation and capital replacement. However, PDAM accounts do now include depreciation and most PDAMs either have instituted recent tariff increases or are planning to do so in 1999 (Refer to Table IV-6). There appears to be a strong recognition of the need for regular tariff adjustments in future and in at least one PDAM (Lombok Barat) there is a plan for regular tariff adjustments based on a consumer price index.

Water Treatment

Assistance was provided with slow sand filter (SSF) water treatment facilities in Lombok Barat and Dompu. In Lombok Barat, the project augmented an existing SSF treatment plant at Gunung Sari. In Dompu a new SSF plant was constructed together with an upflow roughing filter (URF) pre-treatment facility. Both facilities were inspected and some operational problems noted.

At Gunung Sari, discarded filter sand should be removed from adjacent to the filters. At present this sand and other surface debris is being washed into the filters during periods of heavy rainfall. Overhanging vegetation should also be removed. Although the SSF produces an improved quality of water compared to the situation prior to the augmentation, there is high raw water turbidity, and consequent poor filter performance during the wet season. Monitoring of both raw and treated water quality is inadequate to enable the longer term role of the SSF plant to be assessed. There is anecdotal evidence of long term deterioration of raw water quality and therefore improved data are required for future planning.

At Dompu, the URF and SSF appeared to be working well. However, there is similarly a lack of data on raw and treated water quality to assess the plant's performance and to plan for future requirements. The operators reported problems with algal growth in the URF during the dry season and planned the construction of a roof over the URF to ameliorate this problem. PDAM staff indicated that the quality of the treated water was much improved and acceptable to consumers most of the time.

4.6 Operation and Maintenance

General comments are made below based on observations of the evaluation team during its visits to the various systems.

Reservoirs

The project provided prefabricated steel reservoirs for use in the Type A and B systems. These were generally well constructed and maintained. Only in one instance was there evidence of leakage at reservoirs. In this instance the apparent cause was vandalism by local residents to secure a supply of water. However, in the majority of installations, the reservoirs were not fulfilling their design role, which is to provide a buffer for periods of peak demand during the day (while filling during the low demand periods at night). In many instances the outflow equalled the inflow and the storage therefore failed to fill. The reasons were unclear but are likely to be a consequence of higher unit demands, high UFW, inadequate capacity or operation of the transmission system supplying the storage, or a combination of these factors. In most instances the actual numbers of consumers were less than designed.

In pumped systems this problem was sometimes exacerbated as the hours of operation of the inlet pumps were limited which meant that the system was unable to function as designed – ie. as a 24 hour supply. Float operated valves on the inlet to the reservoirs

were usually missing – it was often not clear whether they were included in the original designs or not. Of the reservoirs inspected, only those in Bima were operating as designed.

Operating Records

In addition to the lack of water quality monitoring data for the SSF water treatment plants mentioned above, there was a lack of regular recording of key information on system operations such as bulk meter readings, reservoir levels, pump operating records etc. This data should be regularly recorded by operators and reviewed by management. Most PDAMs were unaware that the project had produced operation and maintenance manuals.

Repairing of Leaks

While there was limited visual evidence of major system leaks in the institutionally managed systems the high reported levels of UFW indicated that significant leakage was likely. Whilst the overall UFW levels bear little relationship to the project funded components in the project kabupaten, there was evidence in some areas visited of lack of attention to leaks reported by consumers – some were not repaired after several months. Even on untreated gravity systems, repair of leaks should be a priority to ensure that system performance (pressure, flow at consumer taps) and customer satisfaction is maintained.

4.7 PDAMs

Table IV-6 summarises information on several of the PDAMs. The project impact on PDAMs was significant if not major with institutionally managed pipe system beneficiaries being about 20% of the current customer base of the PDAMs.

While it was not possible to access historical data on PDAM operations it appeared to the evaluation team that the financial management and administration of the PDAMs had generally improved. This was particularly evidenced by the level of consumer satisfaction, high billing and collection efficiency, improved customer focus, and regular comprehensive reporting. Nevertheless the PDAMs remain financially weak. With the exception of Lombok Barat, they have substantial accumulated (and increasing) financial losses of a magnitude comparable to their net asset value. Technical management also remains weak.

The economic crisis has had an impact on PDAMs throughout Indonesia. The impacts are a consequence of the following:

- Higher prices particularly for operation and maintenance equipment including pipes, fittings, mechanical and electrical equipment, laboratory equipment and the like which have substantial foreign currency components in their pricing. The increase in prices for many of these items has been up to 400% – significantly greater than inflation

- ❑ Higher prices for consumables including power, fuel and chemicals (particularly chlorine)
- ❑ Reduced consumer ability to pay due to general price rises exceeding their increases in income.

The Central Government has undertaken a review of PDAMs across the country to determine:

- ❑ Whether major problems exist for the ongoing operation of PDAMs; and
- ❑ What actions should be undertaken to provide assistance to PDAMs during this crisis period.

Through this review process, undertaken by DGCK together with MOHA (PUOD), all PDAMs have been classified in one of three categories; "dynamic", "static" or "critical", based on criteria which include size, efficiency, asset condition, financial condition, and tariff level. PDAM Lombok Barat was categorised as "dynamic" whilst the other five PDAMs in NTB were categorised as "static". [It is interesting to compare with NTT where six out of 12 PDAMs were categorised as "critical".] GOI propose to provide assistance to PDAMs in the "static" and "critical" categories including financial support for purchase of chemicals and fuel in the case of "critical" PDAMs. For the five "static" PDAM in NTB technical assistance in the form of advisory support is proposed – probably utilising local consultants or seconded government staff.

5. BENEFICIARIES

Infrastructure beneficiaries have been assessed on the following basis:

- ❑ Only direct water supply and sanitation beneficiaries are included. Beneficiaries from training and other activities are not included
- ❑ Water supply and sanitation beneficiaries are classified separately as there is substantial overlap in these two categories
- ❑ For non piped systems the facility numbers are based on the village level data provided by DIKES and the following unit beneficiaries:
  - Dug wells 25 beneficiaries / well
  - Household toilets 5 beneficiaries / facility
  - Other sanitation facilities 5 beneficiaries / facility
- ❑ For Type C piped systems – the number of consumers based on the Final Report of Engineer – Rural Community Managed Pipe Systems (Type C)
- ❑ For Type A and B piped systems, the actual connection numbers or where these were not available, the beneficiary numbers from the PCR.

Table IV-7 indicates the total infrastructure beneficiaries on this basis. The results are disaggregated by kabupaten as well as by type of facility.

TABLE IV-6

NTB PDAMs - SUMMARY INFORMATION

Item	Units	PDAM				
		Lombok Barat (11/98)	Lombok Timur	Sumbawa (11/98)	Dompu (11/97 & 98)	Bima (12/97 & 98)
Number of Active Connections						
- Public standpipe/ social	No.	630	655	422	295	489
- House connections	No.	20,852	6,365	8,793	3,582	7,429
- Other	No.	1,807	1	248	138	381
- Total	No.	23,289	7,021	9,463	4,015	8,299
Number of Branch Offices	No.	11	10	11	3	NA
Number of staff	No.	150	81	186	47	102
Staff/ 1000 connections	No.	6.44	11.54	19.66	11.71	12.29
Water sources	Refer footnote	S, R, GW	S, R	S, R, GW	S, R, GW	S, R, GW
Water production	m^3/month	1,039,388	259,295	236,758	156,359	208,580
Water sales	m^3/month	730,809	194,952	130,425	86,356	147,228
Unaccounted for Water	m^3/month	308,579	59,187	106,333	70,003	61,352
	% of production	30%	30%	45%	45%	29%
Average tariff	Rp/m^3	594	619	546	431	485
Latest tariff increase	Date	1998	1993 [1]	Not known - possibly '98	Not known	January '99
Monthly operating revenue	Million Rupiah	703	59	105	38	67
Monthly operating cost	Million Rupiah	720	58	106	32	66
Monthly operating surplus (deficit)	Million Rupiah	-17	1	-1	5	1
Accumulated surplus (loss)	Million Rupiah	3,935	-5,466	NA	-3,030	-4,224
Net assets	Million Rupiah	33,936	4,435	NA	3,885	4,358
Borrowings	Million Rupiah	11,977	Nil	NA	NA	NA

[1} Planned for 1999
S= Spring R= River GW= Groundwater

TABLE IV-7

WSS SYSTEMS BENEFICIARY DETAILS

WATER SUPPLY BENEFICIARIES

WS Facility Category and Type	Lombok Barat		Lombok Tengah		Lombok Timur		Sumbawa		Dompu		Bima		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	% Total
Institutionally Managed Systems														
Type A and Type B [1]	4,355		0		11,885		9,960		49,830		17,700		93,730	
Total Institutionally Managed	**4,355**	**9%**	**0**	**0%**	**11,885**	**20%**	**9,960**	**16%**	**49,830**	**67%**	**17,700**	**45%**	**93,730**	**29%**
Community Managed Systems														
Type C Piped [2]	7,517	15%	5,482	14%	850	1%		0%		0%	600	2%	14,449	4%
Type C Non Piped [3]	37,700	76%	33,825	86%	48,025	79%	51,400	84%	25,050	33%	21,250	54%	217,250	67%
Total Community Managed	**45,217**	**91%**	**39,307**	**100%**	**48,875**	**80%**	**51,400**	**84%**	**25,050**	**33%**	**21,850**	**55%**	**231,699**	**71%**
GRAND TOTAL	**49,572**	**100%**	**39,307**	**100%**	**60,760**	**100%**	**61,360**	**100%**	**74,880**	**100%**	**39,550**	**100%**	**325,429**	**100%**
Total Piped	11,872	24%	5,482	14%	12,735	21%	9,960	16%	49,830	67%	18,300	46%	108,179	33%
Total Non Piped	37,700	76%	33,825	86%	48,025	79%	51,400	84%	25,050	33%	21,250	54%	217,250	67%

[1] Based on field evaluation or PCR in absence of better data. Refer Table IV-5.

[2] Based on Final Report of Engineer - Community Managed Piped Systems (Type C). Refer Table IV-3.

[3] Based on facility numbers from DIKES Provincial records aggregated from village and kabupaten figures. PCR assumption of 25 beneficiaries/well.

TABLE IV-7

WSS SYSTEMS BENEFICIARY DETAILS

SANITATION AND OTHER BENEFICIARIES [2]

Sanitation/Other Facility	Lombok Barat		Lombok Tengah		Lombok Timur		Sumbawa		Dompu		Bima		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	% Total
Community Managed Systems														
Toilets [1]	86,950	97%	46,855	99%	67,365	95%	123,175	99%	59,365	96%	67,685	98%	451,395	97%
Others [1] [2] [3]	2,430	3%	365	1%	3,435	5%	1,660	1%	2,160	4%	1,635	2%	11,685	3%
Total Community Managed	**89,380**	**100%**	**47,220**	**100%**	**70,800**	**100%**	**124,835**	**100%**	**61,525**	**100%**	**69,320**	**100%**	**463,080**	**100%**

[1] Based on facility numbers from DIKES Provincial records aggregated from village and kabupaten figures. PCR assumption of five beneficiaries/jaga and evaluation team assumption of five beneficiaries/"other" sanitation facility.

[2] Includes washing/laundry facilities, drainage, school toilets and others

[3] Possibly understated because some facilities serve more than the five beneficiaries. However also overlaps with toilet beneficiaries.

DISTRIBUTION OF BENEFICIARIES BY KABUPATEN

Facility Type	Lombok Barat		Lombok Tengah		Lombok Timur		Sumbawa		Dompu		Bima		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	% Total
Water Supply	49,572	15%	39,307	12%	60,760	19%	61,360	19%	74,880	23%	39,550	12%	325,429	100%
Sanitation and related	89,380	19%	47,220	10%	70,800	15%	124,835	28%	61,525	13%	69,320	15%	463,080	100%

NOTE: An overlap occurs between water supply and sanitation beneficiaries, and these should not be added and expressed as total beneficiarie

APPENDIX V – LIST OF REFERENCES

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Quality Assurance Series No. 17

Wells, Taps and Toilets

The Nusa Tenggara Barat (NTB) Environmental Sanitation and Water Supply project began in late 1991 and was completed in 1996. Its goal was to contribute to improved socio-economic and environmental health conditions in NTB and its purpose was to provide environmental sanitation and water supply facilities which would be effectively used, focussing on community and kabupaten based management.

An evaluation of the project in early 1999 concluded that the extent of infrastructure implemented by the project was impressive, and included over 90,000 household toilets, almost 9,000 dug wells, 13 community managed piped water systems, and 12 new or rehabilitated institutionally managed piped water systems. Over 325,000 people benefited from improved water supply while over 463,000 people had improved sanitation and related facilities.

The dug wells and piped water systems contributed to time savings in water collection and increased the availability of clean water for drinking and cooking.

There were concerns about some aspects of the project. These included the low usage rates of sanitation facilities in sites without piped water, and doubts about the sustainability of community-managed piped water systems. The extent of community participation in project planning and implementation had been lower than expected, particularly the participation of women, and it appeared that the project was supply- rather than demand-driven. Concerns also existed over the technical management abilities of the PDAMs (water supply enterprises), although these improved over the course of the project.