

PD-ABS-008  
89275

## **NATURAL RESOURCES MANAGEMENT PROJECT**

**BAPPENAS – Ministry of Forestry  
Assisted by  
USAID**

### **WATER SUPPLY AND SANITATION PROGRAM IN BUKIT BAKA – BUKIT RAYA, KALIMANTAN**

**STATUS REPORT NO. 2**

**Associates in Rural Development  
for  
Office of Agro-Enterprise and Environment  
USAID – Jakarta**

**AID Contract No. 497 – 0362**

**September 1993**

**REPORT NO. 24**

# **NATURAL RESOURCES MANAGEMENT PROJECT**

BAPPENAS – Ministry of Forestry  
Assisted by  
USAID

## **WATER SUPPLY AND SANITATION PROGRAM IN BUKIT BAKA – BUKIT RAYA, KALIMANTAN**

STATUS REPORT NO. 2

Associates in Rural Development  
for  
Office of Agro–Enterprise and Environment  
USAID – Jakarta

AID Contract No. 497 – 0362

September 1993

REPORT NO. 24

## TABLE OF CONTENTS

Preface	i
Executive Summary	ii
1.0 Introduction	1
1.1 Water Supply Project Background	1
1.2 Terms of Reference	3
1.3 Schedule and Approach	3
2.0 Technical Assistance Activities	5
2.1 Approach	5
2.2 Design	5
2.3 Community Participation	6
2.4 Materials and Equipment Procurement	7
2.5 Construction	7
2.6 Health Education	8
2.7 Operation and Maintenance	9
3.0 Current Status	11
3.1 Sungkup	11
3.2 Belaban Ella	13
3.3 Nanga Siyai	15
3.4 Tanjung Paku	16
3.5 Tumbang Kaburai	17
3.6 Riam Batang/Tumbang Taberau	19
4.0 Program Completion Requirements	21
4.1 Construction	21
4.2 Operation and Maintenance	22
4.3 Health & Hygiene Education	24

5.0	Conclusions, Recommendations, and Lessons Learned	25
5.1	Conclusions	25
5.2	Recommendations	26
5.3	Lessons Learned	29

**Annexes**

Annex 1:	Consultant's TOR
Annex 2:	Persons Interviewed
Annex 3:	Bibliography

## PREFACE

This report is one of a number of reports produced under the Government of Indonesia's Natural Resources Management Project (NRM) that is assisted by the United States Agency for International Development (USAID).

The NRM Project, working with the Indonesian National Planning Board (Bappenas) and the Department of Forestry (Departemen Kehutanan), provides through a specially established project Policy Secretariat advice to Bappenas on natural resource issues relating to long term and short-term national planning. In addition, working with the Department of Forestry the NRM project carries out field activities in two pilot project areas one in West/Central Kalimantan and one in North Sulawesi including the preparation of management plans for the Bukit Baka - Bukit Raya National Park in Kalimantan and the Bunaken National Park in North Sulawesi. Each report addresses an aspect of the planned NRM project activities that are agreed on and laid out in an annual NRM Implementation Plan and each report aims at providing specific recommendations for future work in the area addressed.

This second status report looks at the progress made in the building of potable water systems by local communities assisted by NRM/ARD advisors in the villages around the Bukit Baka - Bukit Raya National Park. This activity is being carried out with the full support of the local communities and the SBK concessionaires.

## EXECUTIVE SUMMARY

### Background

As a result of interest expressed by rural communities in Bukit Baka-Bukit Raya (BB/BR), in and around the National Park and the logging concessions, the NRMP conducted a feasibility study to determine if a collaborative effort to help address these needs was possible. This study was complete following field work in November and January 1992. Activities were to focus on the communities of Nanga Siyai, Belaban Ella, and Sungkup in Kalimantan Barat and on the communities of Tanjung Paku, Tumbang Kaburai, Riam Batang and Tumbang Taberau in Kalimantan Tengah. The first three communities lie along the logging access road between 19 and 25 km from the Popai log pond. They lie outside the BB/BR National Park and outside the concession areas. They are, however impacted by logging operations. Among other impacts is the deterioration of river water quality due to increased erosion. The other four communities lie within the SBK concession area. Their traditional water supplies have also been effected. Six water systems were proposed to serve these seven communities (Riam Batang and Tumbang Taberau were to be served by one system). All of these communities are very poor and remote from most of the benefits of development activities.

As a result of the recommendations of this study, the rural communities themselves agreed to provide all labor and locally available materials at no cost, the logging concessionaire, P.T. Sari Bumi Kusuma (SBK) agreed to provide cement, pipes and other material which required procurement outside the BB/BR area, and the NRMP, which is assisting BAPPENAS and the Ministry of Forestry (MoFr) on the project arranged the required technical assistance. Groundwork for the activity was completed in February and March 1993 and the technical assistance team arrived to begin the process of helping villagers build their own water systems in April.

### Activities

The process of establishing water supply systems for the seven communities was predicated on the findings of a number of studies which suggest that sustainable operation of rural water systems depends on community willingness and ability to provide for ongoing management and maintenance themselves, without dependence on outside sources of support. Involvement of community members in planning and construction of their water system and insistence that they provide those inputs they can (labor and local materials) help insure their

commitment to the water supply systems and the benefits it provides. After agreement was reached that the technical assistance and capital materials could be provided, agreements were reached and documented with each of the communities.

Materials were procured and delivered by SBK in April. Unfortunately, misunderstandings resulted in purchase of pipe that did not meet specifications and in failure to purchase some of the fittings required. SBK, when made aware of these problems, readily agreed to reorder pipe and obtain all necessary fittings. Although this delayed the activity somewhat, nearly all materials and equipment has now been purchased and delivered to the BB/BR area.

Construction activities were originally scheduled to take place between the end of harvest for the communities and the beginning of the following planting season. Preparation and training to help the communities organize themselves to participate in the planning and construction process as well as the ongoing operation and maintenance is an important component of the overall activity. This aspect as well as construction aspects have been constrained by the priority need for community members to plant their crops so they have enough food for the following year. However, where construction activities have taken place, many community members have been enthusiastically contributing labor and learning new skills.

Improved health are among the benefits to be derived from new water systems. However, community members seemed largely unaware of the link between clean water, good sanitation practice and many water borne and water washed diseases. As a result, one of the proposed activities was to provide a local consultant trained in rural health education to help community members learn good health and hygiene behavior specifically as it is related to the water system. This includes proper collection and storage of water, the reasons why cleanliness and system maintenance is important, and to reinforce the need to use the water supply system for getting drinking water and to repair the system when necessary.

In recognition that communities had little experience in operation and maintenance management for community based infrastructure which provides benefit to all, specialized training sessions on O&M management was planned. The primary focus of the training was monitoring system use and preventing abuses, overseeing routine maintenance tasks, and mobilization of community resources for repairs when they become necessary.

## Current Status

The construction phase for the communities of Sungkup and Belaban Ella are largely complete. Community members in Sungkup are particularly proud of their water system and new skills and have offered to help other communities without pay. In both cases some modification to the original designs were made at the request of the communities who wanted additional taps or washing facilities. In Belaban Ella, the community decided it did not need a 12 m<sup>3</sup> and chose to build one half that size. This decision may cause problems in the community sometime in the future.

The construction activities for the communities of Tanjung Paku and Tumbang Kaburai are more than half complete. In both cases, the spring catchment has been completed, the main pipeline to the village installed and the water storage tank near the village now being constructed. Decisions have been made where public taps and washing/bathing facilities are to be located, but these have not been built yet. The distribution pipelines within these two villages also have to be built.

Formal construction activities have not yet started for the two systems to cover the three communities of Nanga Siyai, Riam Batang, and Tumbang Taberau. However, all of the cement and pipe has been delivered and the communities have begun to fulfill their commitment to haul sand and aggregate to the spring location (to be used for the spring catchment).

Arrangements have been made to begin construction before the beginning of October, 1993. Current plans project completion of all construction activities in all communities by the end of November. If this schedule cannot be met, it will not require much additional effort by that time.

The health education component has not yet begun. It has been difficult to identify suitable candidates to conduct the training from the area who are sensitive to Dayak culture and tradition. However, two Dayak public health nurses with experience in preventative health outreach have now been located and are anxious to join the activity and conduct the training.

During the construction of these water systems, the technical advisors have been training technicians in the skills necessary for operation and maintenance. Informally, they have also begun the process of sensitizing community members to the need for responsible system management. However, the formal training sessions in O&M management have not yet been conducted. The primary focus has been on construction

activities. This training is planned and will be scheduled when systems are fully completed.

### **Conclusions, Recommendations and Preliminary Lessons Learned**

Among the conclusions are that communities are clearly willing to commit time and energy to community based activities which bring obvious benefit to them. However, planning and scheduling implementation was ambitious considering the relative inexperience of SBK and the communities with projects of this type. Unexpected delays has caused the activity implementation schedule to be extended. However, in spite of delays, an excellent effort to assist communities meet their needs has been made. The water supply program is an excellent example of the collaboration which is possible between rural communities on the one hand and the Government represented by MoFr (assisted by NRMP) and the logging concessionaire on the other.

Recommended activities are based first on the need to conclude this program activity in a responsible manner and the obvious opportunity to expand on the approach to include other communities and perhaps other activities. Therefore, an extension to the contracts of Chief Construction Supervisor and the Water Systems Construction Specialist should be approved if necessary. In addition, a separate one month contract to allow the Chief Construction Supervisor to return for follow-up training should be authorized. Also a contract to complete the health education component of the project should be concluded as soon as possible. At the completion of the activity, formal water system dedications should be held to recognize the contributions of all collaborating parties and to solidify the communities sense of ownership. The NRMP should resist the urge to provide all assistance that might be requested for the maintenance and repair of water systems so that unwanted dependencies do not develop. However it is appropriate to provide advice and guidance in the interest of continuing to develop community capability. The Water Supply Engineer/O&M specialist should also return to make final system inspections, confirm lessons learned, and suggest approaches for broader support for provision of clean water in communities impacted by production forestry activity.

Although the water supply activity is not yet complete, a series of preliminary lessons learned have emerged. A more focused effort to explore these lessons and provide guidance for activities that may benefit from these lessons should be a major component to the final activity completion report. It appears that community based programs which involve collaboration with communities rather than prescribe activities to meet real community needs appear to have a good

chance of success. However, community based development activities take time because communities have competing priorities and they must learn how to organize and contribute meaningfully to the planning and implementation process and must understand the longer term implications of these activities. Logging concessionaires are likely to lack knowledge related to rural water supply provision such as system specifications and design. But, with expertise that is available within Indonesia, logging concessionaires could expand their *bina desa* programs to include meeting the water supply needs of rural communities effected by their operations.

## 1.0 INTRODUCTION

The USAID-funded Natural Resources Management Project (NRMP) is assisting BAPPENAS and the Ministry of Forestry (MoFr) to plan for sustainable economic growth through improved policies and practices for managing natural resources. The project has two closely related components: analysis of important natural resource policies complimented by pilot programs to manage forests, protected areas, and industrial pollution. The projects five main components are: sustainable economic development planning, environmental planning in urban and industrial development, sustainable production forest management, conservation areas management, and special studies. The project maintains offices and staff in Jakarta, Pontianak (Kalimantan Barat), and Manado (Sulawesi Utara).

### 1.1 Water Supply Project Background

In Kalimantan Barat (West Kalimantan), the NRMP project is working with the Ministry of Forestry's Kanwil (area) office, the local office of Perlindungan Hutan dan Pelestarian Alam (PHPA, The Forest Protection and Nature Conservation Agency of the Ministry of Forestry), the local office of the Penelitian dan Pengembangan (Litbang, The Ministry of Forestry's Forest Research and Development Agency), and the logging concessionaire P.T. Sari Bumi Kusuma (SBK) in the area in and around the Bukit Baka/Bukit Raya (BB/BR) National Park. The park sits astride the divide between Kalimantan Barat and Kalimantan Tengah (Central Kalimantan) roughly 100 km southeast Sintang, Kalimantan Barat. The BB/BR National Park was established in early 1992 after being first designated as a nature reserve in 1985. The Kanwil office of the MoFr has overall responsibility for management of forestry resources including administrative management of the logging concessionaires including SBK. PHPA is responsible for management of the national park, Litbang is responsible for all forestry research activities. The NRMP project is focusing on a variety of activities to encourage and support sustainable forestry. SBK has been logging in the area near the park since 1980.

In 1982, SBK began a community development program (*bina desa*) to assist communities effected by their logging operations. SBK's *bina desa* program was in part responsible for the Government of Indonesia's decision to require *bina desa* programs for all logging concessionaires beginning in 1987. SBK's *bina desa* program activities have included:

- o providing agricultural extension support to villagers,
- o providing employment opportunities in direct support of logging operations,
- o road building for local communities, and
- o providing markets for community products including food crops and non-timber forest products,

The NRMP project, as part of the sustainable production forest management component, has been working with local communities in and around the BB/BR National Park to enhance the roles of local communities in the development of forest resources. This work has included social surveys to define community structure, economic activities, agricultural practices, traditional perceptions of land and forest ownership and community needs in the changing social and economic environment in and around the part and the concession area. Among the most often expressed interest of villagers was for improved water supply. The traditional water sources have been the river areas, many of which have been adversely impacted by logging operations and other development activities including swidden agricultural practices. Logging operations have resulted in increased soil erosion and subsequent sediment loading of the local streams and rivers which are the community's primary water sources. As a result of this community interest, a feasibility study for the improvement of community water supplies was authorized. A feasibility study was completed in December 1992.

The feasibility study recommended that six gravity flow water supply systems be constructed to meet the needs of seven villages<sup>1</sup> in and around BB/BR national park and the SBK logging concession. The study further recommended that NRMP provide technical assistance, SBK provide materials and equipment, and the communities provide local materials and labor. It was also recommended that, to maximize health benefits, a sanitation, health and hygiene education program be implemented in the seven effected communities. These recommendations were accepted by all parties in February and March 1993. SBK initiated procurement of materials as specified in the feasibility study. Mr. Rieuwpassa, who participated in the feasibility study, returned to act as Chief Construction in April. He was joined in May by an assistant, Mr. Adolph Sumual. During April and May,

---

<sup>1</sup> Wanga Siyai, Sungkup, Belaban Ella, Tanjung Paku, Riam Batang/Tumbang Taberau, and Tumbang Kaburai

agreements were reached with the seven villages involved to provide local materials and labor *tanpa upah* (without wages). Initial plans called for completion of the six water supply systems by mid-August.

## 1.2 Terms of Reference

As the construction phase of rural water supply activities draws nearer to completion, a consultant was requested to finalize construction activities, training, and operation and maintenance for the six community water supply systems. The specific task assignments included:

- o receiving briefings on program status including procurement, construction and training from NRMP staff and other officials,
- o visiting the six construction sites to assess the status of construction, review system/site layout, quality of system design and construction, and appropriateness in meeting community needs,
- o assessing the quality and appropriateness of training activities provided in organizing construction, operation and maintenance, and hygiene and sanitation education, and
- o preparing a report to include an assessment of the sustainability of the project approach and a preliminary set of lessons learned.

This report fulfills the last of these tasks and addresses the other items outlined in the scope of work.

## 1.3 Schedule and Approach

The consultant completed the scope as outlined above during a two week period in early September 1993. After initial briefings in Jakarta and Pontianak with NRMP project staff and meetings with SBK and MoFr officials in Pontianak, arrangements were made to visit the BB/BR project area and the seven villages currently involved in the improved water supply program. The consultant, accompanied by the NRMP project coordinator in Pontianak, the Chief Construction Supervisor, and several consultants working on other project activities, traveled to SBK's Camp 54 to spend six days in the field. During this period meetings were held, spring sites visited and construction activities observed in all seven villages. Particular attention was paid to construction status and

community preparation for assuming operation and maintenance responsibilities. Upon return to Pontianak, the proposed health and hygiene education consultants were interviewed and debriefings held with NRMP staff as well as with Kanwil (MoFr), PHPA and SBK personnel. Final debriefings were conducted with MoFr officials, USAID staff, and NRMP project personnel in Jakarta at the conclusion of the assignment.

## 2.0 TECHNICAL ASSISTANCE ACTIVITIES

The technical activities of the project can be summarized under seven main headings including approach, design, community participation, procurement, construction, health education, and operation and maintenance.

### 2.1 Approach

Evaluations in Indonesia and worldwide have shown that the sustainability of rural water supply and sanitation systems is largely dependent on the value the community places on the benefit of improved systems, the quality of the original design and construction, the technical and management skill of community members, and sense of responsibility and ownership felt by the community. Outside organizations, such as government agencies, are not directly effected and hence do not have the same motivation to maintain and repair water and sanitation systems. The approach suggested in the feasibility study and subsequently adopted during implementation recognized these findings and proposed robust, well designed systems using high quality materials and focused on community participation without payment, first as an indicator of community interest in the project and second as a way to train technicians and instill a sense of community ownership of the completed system. Outside technical assistance was provided by the project to ensure the quality of construction and training. Direct financial assistance was limited to provision of material and equipment which the communities could not readily afford or easily procure.

### 2.2 Design

Once the decision was made to seek spring sources to feed gravity water supply systems for six water systems to supply seven communities, system technical design depended on the location and yield of suitable springs. During the field work for the feasibility study, suitable springs were identified for six systems (one community, Nanga Apat, was not included in the proposed program because a suitable spring could not be located at the time). Unfortunately, the feasibility study took place in December, during the rainy season. The average monthly rainfall during the dry season is 40-50% of December's rainfall. Hence spring yields measured in December were likely to be considerably higher than during the dry season (June-August). Typical drinking water consumption in the targeted villages is about 12-15 LCD based on interviews during the feasibility study. Initial system design sought

springs which would provide more than the WHO minimum design standard of 30 liters per person per day (LCD) in order to allow for expected seasonal spring yield fluctuations. Suitable springs whose yields exceeded WHO standards were sought (and found for six water systems). In May, at the beginning of the dry season, spring yields were checked again. Several (Sungkup, Nanga Siyai, Tumbang Kaburai, and Riam Batang/Tumbang Taberau) yielded similar volumes measured in December. Several others showed significantly reduced yield. New springs were sought and located for Belaban Ella and Tanjung Paku. In Tumbang Kaburai, no other suitable spring could be found. However, the diffuse nature of the source provided hope that a well designed catchment would still yield sufficient water. This, in the end, proved true.

Main pipelines from the spring to a water storage tank in or near the village were measured and found to be from 600 to 1320 meters with head differences of 5 to 55 meters. Main pipelines were designed to be built with 1" medium class galvanized iron pipe. Water captured at the spring was designed to be delivered through the main pipeline to a nominally sized 12 cubic meter storage tank (actual volume 10.8 m<sup>3</sup>).

At least three water points were designed into each system, one located at the tank and two elsewhere in the village. The other distribution points were to be public standpipes or MC (*mandi/cuci*, washing and bathing facilities). The actual design for each village depended on the spring yield and an evaluation of the adequacy of the spring.

Although materials and equipment were purchased based on these initial designs, the designs changes somewhat as communities thought more seriously about how many and where they wanted water points and, as mentioned above, new and better springs were located.

### 2.3 Community Participation

A critical feature of the water supply program approach was the participation of community members in various aspects of system design and construction and the community's eventual acceptance of operation and maintenance responsibility. The feasibility study team sought to engage community leaders (both traditional and government<sup>2</sup>) in discussions regarding community involvement and commitments. The study highlighted the fact that most of the communities did not have experience

---

2 pemuka adat and kepala desa respectively

in undertaking self-help programs in the magnitude of water supply construction. As such, time and training would be required to help communities organize themselves to provide the agreed upon local labor and materials and to assume the functions and roles of water resource and operation and maintenance managers.

#### 2.4 Materials and Equipment Procurement and Delivery

According to agreements made in February and March, the logging concessionaire, SBK, was to provide all equipment and materials for construction of the six water supply systems. This included all medium class galvanized iron (GI) pipe, Pralon VP class PVC pipe, all fittings, cement, reenforcing bar, wood for forms, nails and all other materials. Several problems related to procurement surfaced during the initial stages of the program. SBK procured lesser grade Lucky and Banlon PVC pipe rather than the VP grade of Pralon pipe. When this mistake was pointed out, SBK agreed to replace the pipe with that specified in the feasibility study<sup>3</sup>. In addition, the galvanized iron pipes were purchased without the connectors/sockets (as they do for their own operations). This required reordering all connectors<sup>4</sup>. After discussions with SBK, it appeared that there was also confusion about the description of some other items. In May, examples of all items but the air release valves were provided to SBK's procurement section to clarify what was needed.

As of early September, all items except the air release valves have been procured and tans-shipped to the Popai log pond (some 400 miles up the Kapuas and Melawi rivers). The NRMP water supply construction team has moved all these supplies, first to SBK camps 35 and 54 and then to the communities in which they have been or are to be installed.

#### 2.5 Construction

Construction activities were initiated subsequent to the signing of written agreements with communities which outlined the responsibilities of communities in the construction process. All of the communities agreed to provide sand and aggregate for concrete and provide all unskilled labor for construction at no cost. Construction scheduling has been upset by number of factors. First, the misunderstandings and delays in procurement of the required quality and type of

---

3 The replacement Pralon pipe was received in mid-June

4 The connectors/sockets were received at the Popai log pond on July 17.

materials and equipment has meant that construction has not taken place in the order planned. This caused delays in connecting pipelines, completing water storage reservoirs, and installing distribution systems. Second, an accident involving one of the three project vehicles assigned to NRMP in the BB/BR area, the logistical demands of other NRMP team members and the inability to get the repaired vehicle back to the area due to low water<sup>5</sup> complicated movement between sites and constrained proper training and oversight of activities. Third, the communities themselves have other activities of importance during this period of the year, namely the planting of rice and other crops in their *ladang* agricultural lands. Although the potential for delays related to community commitments was to some degree foreseen, the other delays have caused the construction time schedule to slip from a planned completion in mid-August to an expected completion in November.

As of early September 1993, two of the six water systems are largely complete (Sungkup and Belaban Ella), two are more than half complete (Tumbang Kaburai and Tanjung Paku), and two have not yet initiated actual construction (Nanga Siyai and Riam Batang/Tumbang Taberau). As the end of the planting season approaches at the end of September, the pace of work should increase. In addition the planned return of the third project vehicle to the BB/BR project area will facilitate all NRMP activities including the village water supply program.

## 2.6 Health Education

It is clear that health and hygiene education are necessary if communities are to receive maximum benefits from their improved water supply systems. Overall awareness of the links between clean water and sanitation and health are relatively low in the seven project communities. Suitable health education trainers who understand the local Dayak language and understand the culture and traditions within the communities have been hard to identify. However, several suitable candidates have now been found and were interviewed during the present consultancy. They are Dayaks from rural Kalimantan Barat who have worked for more than five years in the health sector in health education in rural communities. They are willing and able to begin the health and hygiene education component of the project within the next month.

---

5 The vehicle has to be barged up the river to the Popai log pond and the river was too low during the June-August dry season.

## 2.7 Operation and Maintenance

As operation and maintenance responsibilities for completed water supply systems will fall to the communities themselves, villagers were to be trained in all necessary operation, maintenance and repair procedures. The feasibility study also recommended that village water committees (VWC) be formed to organize system construction and ultimately to manage the operation and maintenance. It was also recommended that a water user fee system be established to cover operation and maintenance costs (for pipe replacement, replacement taps, etc.).

During the construction phases of the project in each village, several energetic, willing and bright village members are identified for more focused attention in training for operations maintenance and repair. This training takes place on the job, as a part of the construction process. In those communities with systems that have largely completed construction, these individuals have been identified and trained. Village water committees have not yet been formed. Although the formal creation of VWCs is recommended and is desirable, the small size and general homogeneity of the communities makes it unlikely that a VWC is absolutely necessary or will continue to function if established. Recent studies have shown that the sustainability of rural water supply systems in Indonesia does not seem to depend on the existence of an active VWC, but rather on a open and democratic management style. Fee collection, although desirable, will not be easy to establish in communities as poor as these.

In discussions with village leaders and community members, it is clear that they understand that the completed water supply system is theirs to use and maintain. In fact, in several communities there is considerable pride in the fact that they built the system and know how to operate and maintain it<sup>6</sup>. When villagers were asked if they felt confident of making repairs, all replied in the affirmative (although the Chief Construction Supervisor indicated that additional training was still necessary). A galvanized pipe replacement (costing roughly Rp.50,000 including transportation) would require the collection of funds. Most indicated that this would take about a month. Although community leaders and technicians trained by the NRMP construction team have emphasized the need for using medium class galvanized iron and Pralon VP class PVC pipe, it is unlikely that communities will purchase these when

---

6 The villagers in Sungkup are delighted with their new skills and are willing to help other communities complete their systems with no compensation.

repairs become necessary. Standard grade galvanized iron and lower grades of PVC are all that are available in Nanga Pinoh, the nearest commercial center. However, the initial use of high quality components should provide years of service before major repairs and replacement are necessary. A recent study of CARE/Indonesia's older water supply projects suggests that high quality initial construction is a major factor in water supply system sustainability.

### 3.0 CURRENT STATUS

Although construction and training activities are not yet complete, significant progress towards project goals has been achieved. Delays related to procurement misunderstandings are all but over. Return of the third project vehicle to the BB/BR project area is imminent with the onset of the rainy season and the rise of water levels in the rivers. Planting season in the *ladang* is largely complete. In addition communities, initially unsure that the efforts expected of them would yield tangible benefit, have seen results in their communities or others nearby and are gaining enthusiasm. The following paragraphs detail progress, reviews remaining work, and examines continuing concerns on a site by site basis. Sungkup, Belaban Ella, and Nanga Siyai are all in Kalimantan Barat along the main logging road to the SBK concession in Kalimantan Tengah. These three communities are neither in the concessionaire area nor in the national park. They are however, effected by logging operations. Tanjung Paku, Tumbang Kaburai, Riam Batang, and Tumbang Taberau are all within the SBK concession area in Kalimantan Tengah.

#### 3.1 Sungkup

Sungkup is an RT (*Rukun Tetangga* or neighborhood) of Belaban Ella which is a *dusun* of Nanga Siyai. It is a small community of about 190 people located at Km 24 (24 Km from the SBK log pond at Popai). One of SBK's first agricultural demonstration plots (*demplot*) is nearby. This community is one of two which continues to have a long house (the other being Nanga Siyai).

The Village Agreement was completed in late April and construction commenced in early May. Construction activities were somewhat disjointed due to the delays in getting the proper PVC pipe and galvanized iron pipe couplings/sockets. However, the spring catchment and the storage tank (with one tap) were completed by the end of June. Two public stand pipes and two MC (the planned design called for two MC and no public taps) along with the distribution network from the tank were completed in July. The main pipeline was completed when the couplings/sockets were received in mid-July. Final connection of the spring and main pipeline on one side of the logging road to the storage tank and the community on the other was made on the evening of the 16th of August, just in time for Independence Day celebrations<sup>7</sup>. A third standpipe

---

7 The connection had to be made during a time when the logging road is not in use by SBK. Coordination with SBK determined the time for digging across the road, placing the pipes, and back-filling the trench.

has been constructed on the other side of the road, just in case the pipeline under the road is somehow damaged.

Community enthusiasm for the new water supply system was clearly evident from the welcome we received when we visited the community. We visited the spring (.26 liters per second) and the village technician cleaned the siltbox. Although the community should have sufficient water (over 100 LCD), we were asked to look at several other springs that the community wishes to tap so they have additional water. Several community members expressed their willingness to help construct other water systems without compensation. Some concern was raised during our meeting that someone had burned the area near the spring and the community was worried that this would effect the spring yield. Upon inspection, the burn area is below the spring and should not cause any reduction in yield.

Many of the decisions regarding the construction and placement of water system components were made by community members. These decisions were made within the Technical constraints of water availability and spring location as well as the logistical constraints imposed by the list of materials originally procured for the water system at this site. The community decided that they wanted several additional taps and suggested where in the village they should be located. Upon completion of the system, some cement was still remaining and the community agreed that new steps for the church, a flagpole (for Independence Day celebrations) and posts for a volleyball net were high priorities. Two pit latrine slab were also built (one mainly for community use and one intended for village visitors). NRMP and SBK staff agreed that use of the remaining material for these items was appropriate in the interests of community development and community members constructed these items with direction from NRMP water supply program staff. The pit latrines were built adjacent to the two MC. Since they are clearly separated from the MC and water comes from the spring and cannot be contaminated by the latrine, the latrine location poses no problem.

The only physical tasks remaining to be completed at Sungkup are the procurement and installation of lockbars on the spring siltbox, the water storage tank and the valve boxes and the procurement and installation of an air release valve in the main pipeline. Decisions regarding the signboard (how credit for establishing the system will be apportioned) remain to be made before the signboard can be completed and installed. Although discussions have been initiated with the community regarding operation and maintenance management during the construction phase, more formal awareness and training regarding the specific O&M functions and responsibilities needs to be completed. As with all sites, the health

education training remains to be completed. The water supply system also needs to be formally opened and turned over to the community.

The initiative shown by the community of Sungkup and the obvious pride they take in the work they have done to complete the water system suggests that this water system will be sustainable. Although, like other communities it seems clear that establishing a formal VWC and fee collection system will be difficult, this small community should be able to manage without undue problems. System abuses should be kept in check by community leaders and social pressures. However, when problems arise that require purchase of spare parts, it may be difficult to mobilize the necessary financial resources. The community is just off the main SBK logging road and has received assistance from SBK's *bina desa* program in the past. It would be logical for the community to appeal to SBK for help in procurement and we expect them to do so.

### 3.2 Belaban Ella

Belaban Ella is a *dusun* of Nanga Siyai located just off the main logging road at Km 25. The total community population comprising three locations is just over 500. Sungkup is one of these locations now being served by its own water system. The part of Belaban Ella which is served by the water system consists of about 330 people. There is a small shop along the logging road and the PHPA park guards live in the village. The NRMP has been active in the village with agro-forestry, gardening and other activities.

The Village Agreement was approved and signed in late April. Construction activities commenced with construction of the spring catchment<sup>8</sup> in mid-June. As at Sungkup, construction activities were somewhat disrupted due to the delays in getting the proper PVC pipe and the GI pipe couplings/sockets. Additional delays were encountered in Belaban Ella due to difficulties in organizing some community members to work on the system as agreed upon. Due to the reluctance of community members to work, the water supply project staff accepted the communities request to make the water storage tank near the village half the planned volume so that community members would not have to haul so much sand and aggregate. The spring catchment and the storage tank (with an MC) were completed by the end of August (an additional tap at the tank has yet to be installed). Two public stand pipes (the planned design called

---

8 The spring used for the system was not the original one tested in December 1992, but a new spring identified in May 1993

for three MC and one public tap) along with the distribution network from the tank were completed in mid-August. The MC located within the village has been connected to the system but the MC walls are not quite finished. Several leaks at pipe joints have been noted and are being repaired. These leaks may be due to slight variations in the pipe and coupling/socket connectors which were purchased at different times and from different suppliers. As with Sungkup, the main pipeline was completed when the couplings/sockets were received in mid-July. Final connection of the spring and main pipeline on one side of the logging road to the storage tank and the community on the other was made during the religious holiday at the end of August. Also as at Sungkup, an additional standpipe has been constructed on the other side of the road.

With a store, a school, and several community members working for the logging companies, one would think that this community would be well organized and enthusiastic about the water system. Some community members clearly are. However, it appears that community leadership is fragmented and efforts to coordinate work crews was difficult. These problems were evident in the difficulty the water supply project team had in scheduling work on this system and in the decision by the community to build a smaller water storage tank than designed. Already a plastic hose (*slang plastik*) has been connected to the MC at the water storage tank suggesting that control of abuses may be difficult. As a result of these initial hints of possible future problems, the Chief Construction Supervisor decided to use galvanized iron pipe for the distribution system in the village to make it more difficult for community members to make private connections.

There are several physical tasks remaining to be completed at Belaban Ella. These include the placement of concrete supports for the main pipeline as it descends from the spring to the water storage tank. The procurement and installation of lockbars on spring siltbox, water storage tank and the valve boxes must also be completed. The signboard will be completed when a decision is reached regarding the wording to be used on it. As with Sungkup, discussions were initiated with the community regarding operation and maintenance management during the construction phase. More formal awareness and training regarding the specific O&M functions and responsibilities needs to be completed. As with all sites, the health education training remains to be completed. The water supply system must also be opened and formally turned over to the community.

The concerns raised by the lack of broad community initiative and participation in Belaban Ella are in direct contrast to the community support provided by Sungkup just one kilometer

away. From a technical standpoint, the failure of the community to mobilize to build the recommended 12 cubic meter storage tank is likely to result in water wastage from tank overflow at night and reduced water availability at the standpipes during the day. This may lead to conflict among villagers concerning equitable use and water availability. If so, it is not clear that these can easily be resolved. The use of a plastic hose only weeks after system completion is not a good sign and the placement of a tap adjacent to the garden area may be an invitation to abuse the system. Particular attention should be paid to help the community understand the need for a more concerted and collaborative effort to manage this water system. The O&M training should lay the groundwork, but additional ongoing reinforcement of these messages will likely be necessary. Fortunately Belaban Ella is convenient to the logging road; NRMP has continuing programs in the village; the school teachers may be able to assist; and the PHPA park guards provide an official presence in the community. These influences together maybe able to allay concerns regarding the long term sustainability of this system.

### 3.3 Nanga Siyai

The community of Nanga Siyai which will be served is an RT of the larger *desa*, also called Nanga Siyai. It is a small community with a present population of about 190 people. Nanga Siyai is located about 15 minutes walk off the SBK logging road at Km 17. NRMP is quite active in this community with fire control awareness, national park support activities, environmental education programs and adat council support activities.

Although the Village Agreement was signed in April, formal construction activities have yet to be started in Nanga Siyai. All of the cement and pipes have been delivered to the community. The community has begun the laborious process of taking sand and aggregate to the spring area for use in building the spring catchment. Formal construction activities are expected to begin before the end of September. Agreement has been reached with community leaders that even if the planting season is not over, a group of five people will be available every day to work on the water system under the direction of the NRMP water supply program staff. Construction activities including building the spring catchment and water storage tank, laying the main pipeline, and completing the distribution system within the community including public taps and MC, should take 30 full days. Although scheduling for completion before the end of November may be tight, the end of the planting season and the subsequent availability of more labor could make it possible to meet this deadline.

Although the feasibility study report suggests that Nanga Siyai was initially rather cool to the idea of improved water supplies (with several other potential projects having higher priority), this appears to have changed. This is at least in part due to observing the system at Sungkup, the delivery of cement and pipes and the realization that the water project could become a near term reality. Nanga Siyai has been involved in several SBK and NRMP project initiatives and has experience in managing and responding to the demands of outside interventions. Even though it will not be completely clear until the water project is complete, it appears that the community, through its strong leadership, will be able to manage system use and abuses. The need for democratic decision making regarding system use and maintenance and repair requirements should be stressed during the O&M training that will be conducted at Nanga Siyai.

### 3.4 Tanjung Paku

Tanjung Paku is a *desa* village on a tributary of the Seruyan River in Kalimantan Tengah. It is a community of about 270 people located just off the main logging road at Km 73. SBK has designated this village as the headquarters for its *bina desa* program and has built a number of buildings nearby. There is also a relatively large area of demonstration irrigation plots and a fishpond supported by the program. A training center for craftsmen is also located here. The community has two generators. The community generator is not in use since the *bina desa* program generator provides sufficient power to meet community needs as well as their own.

The Village Agreement was signed in early May, and construction commenced in early June. The two spring catchments<sup>9</sup> were completed by the end of the month. During July the community installed the main pipeline, using what they had learned to change the route of the pipeline to minimize the amount of digging required. The base for the water storage tank was begun during the last days of July, but progress has been slowed by the need for the community to prepare and plant their crops and project transportation limitations, which has restricted the amount of time the Water Supply Team spends in the village to teach and motivate. The water storage tank is now partially constructed with the tank base complete and walls formed up. The original design called for two MCs (one at the storage tank) and no public taps. The community decided to forgo one of the MC in order to have sufficient cement to complete the second spring catchment and will now have on MC and two public taps.

---

9 The springs identified in May, not those identified in December.

The remaining physical tasks at Tanjung Paku are completion of the water storage tank, building the MC and two public standpipes, placing the distribution pipeline in the village. Procurement and installation of lockbars on the spring siltboxes, the water storage tank and valve boxes and construction of the signboard must also be completed. An air release valve in the main pipeline must also be purchased, delivered and installed. As at other sites, discussions regarding operation and maintenance management have been ongoing during the construction phase, but more formal awareness and training regarding the specific O&M functions and responsibilities still needs to be planned and completed. Also, the health education training remains to be completed. As with other sites, the water supply system also needs to be formally dedicated and turned over to the community.

The community of Tanjung Paku has supported the establishment of the water supply system with good participation at all stages so far. The SBK *bina desa* program has been active in the community for nearly ten years so the community has adapted to the presence of outsiders and seems able to organize themselves to take advantage of opportunities provided to them. A number of community members have seen the water system at Sungkup and understand the benefits that the system can bring to their community. Community members clearly understand that ongoing maintenance and repair will be their responsibility. The community also understands the need to choose someone to be responsible for maintenance and repair, but will wait to set up these management systems until the facilities are complete. Several people from the community work for SBK and so receive regular salaries. The water system in this community should be operational without major problems for a long time.

### 3.5 Tumbang Kaburai

Tumbang Kaburai is a *desa* village on tributary of the Ketingan River in Kalimantan Tengah. It is a small, poor community of about 190 people located about 7 kilometers from the SBK camp at Km 54. The community has only very recently been connected to the outside world by a passable road<sup>10</sup>. SBK's *bina desa* program has also initiated project activities in the community with the establishment of a pilot irrigation project very recently.

The Village Agreement was agreed to and signed in late April but construction did not get started until mid-July. To date

---

10 The road has been completed since the feasibility study was done in December 1992.

the spring catchment has been completed<sup>11</sup> and the main pipeline has been installed. Water is flowing from the spring to the vicinity of the storage tank (.31 liters/sec.) which has been relocated to an elevated location on the spring side of the small creek separating the community from the spring. The water storage tank is partially constructed with the tank base and walls complete but the top not yet formed up. The original design called for two MCs (one at the storage tank) and a single public tap. As a result of further discussions with villagers, the design has been changed to include one MC and three public taps (one at the storage tank). Several technical changes were also recommended during the visit to the village. First, it was noted that the siltbox clean-out pipe was not properly located<sup>12</sup>. Plans to correct this situation were made immediately. Second, it was noted that the main pipeline passes directly through the irrigation fields (which were build after the pipeline was placed). The community understands that it should move the line to the edge of these fields. The water supply program team agreed to provide the necessary fittings.

Work at the Tumbang Kaburai site is ongoing with tank completion high on the agenda. Completion of the distribution system and distribution points is planned before the end of September. Activities have been organized in such a way that a team of five people are available each day to work on the system. The *kepala desa* has a list of the assigned village members for each days work posted on a wall in his house. In fact the same group of four to five people appear for work on most days. Unfortunately two of the better workers have been chosen for an extended agricultural training course near Pontianak and are no longer available to work<sup>13</sup>.

The community is clearly interested in completion of the water system. They take their responsibilities seriously and are hopeful of a positive benefit<sup>14</sup>. Unfortunately, they seem overwhelmed by a series of changes happening to the community all at once. In December the community could be reached only by canoe or by walking through the jungle for 45 minutes. Now, with completion of the road, trucks and 4-wheel drive vehicles can (and do) drive right into the village. The SBK

- 
- 11 As predicted, the careful construction of the capturing appeared to increase the water flow to a clearly acceptable level.
- 12 The siltbox clean-out should be placed so that half of the clean-out pipe is below the siltbox floor.
- 13 These two people were visited following the site visit and both asked about progress on the system.
- 14 At Tumbang Kaburai, as well as at other sites, small baskets containing various items were suspended above the spring area as offerings to assure good fortune in the project.

*bina desa* program activities in irrigated agriculture have just been initiated as well with workers arriving on a daily basis from other communities. This has all happened during the period when most of the village is away during the day in the *ladang* preparing fields and planting crops.

The physical tasks remaining to be completed at Tumbang Kaburai are completion of the water storage tank, building MC and public standpipes, placing the distribution pipeline in the village (including the pipeline across the river), the procurement and installation of lockbars on the spring siltbox, the water storage tank and the valve boxes, the procurement and installation of an air release valve in the main pipeline and construction of the signboard. Discussions regarding operation and maintenance management have been ongoing during the construction phase, but more formal awareness and training regarding the specific O&M functions and responsibilities still needs to be planned and completed. As with all sites, the health education training remains to be completed. The water supply system also needs to be formally dedicated and turned over to the community.

Although much of the work is being completed by a small number of relatively dedicated workers there seems to be excitement at the possibility that the water supply system will be completed soon. Several community members have seen the system at Sungkup and can now more clearly envision the reality of the improved water system. Community members clearly understand that the system will be theirs once it is complete. Community participation in construction activities clearly contributes to this understanding. However, the particularly poor conditions in Tumbang Kaburai along with the rapid changes the community is currently experiencing causes some concern for the sustainability of the water system. Particular attention will have to be paid to outlining operation and maintenance requirements, the need to monitor and control system use, and the need for a source of funds for maintenance and repair when required. The proximity of the village to SBK's camp 54 and the new NRMP staff quarters will make it easier to monitor activities at the site and render advice as required (at least for several years).

### **3.6 Riam Batang/Tumbang Taberau**

The *desas* of Riam Batang and Tumbang Taberau (RB/TT) are immediately adjacent to each other on a tributary of the Seruyan River several kilometers downstream from the SBK logging road at Km 83. The communities are located about an hours boat ride downstream on the river (about an hour and a half back upstream). Although the community is within the SBK concession area, SBK's *bina desa* program has not been very active in these communities. One recent development has been

the construction of a road to the community. At this stage the road has been graded but work remains to be completed, particularly at the low spots, before vehicle access will be possible.

As with other sites, the Village Agreement has been signed (May 1993). But formal construction activities have yet to be started. All of the cement and galvanized pipes have been transported to the communities. The communities transported all items to the project site from Km 83 (where they were deposited) by canoe. Although the community has a motorized boat, it was not possible to use it due to the low water levels in the river. One hundred sixty bags of cement were transported at four bags per trip. Three lengths of galvanized iron pipe were lost in the river during the process of moving these to the village. The difficult process of taking sand and aggregate to the spring area for use in building the spring catchment has also begun. Formal construction at the site is expected to begin before the end of September. The communities expect that they will be through with planting by the third week in September when all hands will be available to help with construction.

Construction activities including building the spring catchment and water storage tank, laying the main pipeline, and completing the distribution system within the community including public taps and MC, should take just over 30 full days. As with Nanga Siyai, scheduling for completion before the end of November may be tight, but the end of the planting season and the subsequent availability of more labor could make it possible to meet this deadline.

Based on experiences in other Provinces in Indonesia, the construction of a water system for use by two *desa* may lead to community conflict over fair division of construction and maintenance tasks, and equitable allocation of the water resource. However, the fact that these communities are immediately adjacent to each other and in fact form one larger extended community suggests that these potential problems may not surface. In addition community leadership appears strong and should be able to resolve disputes if they arise. However, there are some indications that the villagers themselves continue to think of themselves as two villages. If these feelings are strong, particular attention must be placed on working to establish a representative group to oversee system operation, maintenance and repair. The fact that little collective development activity has occurred in RB/TT indicates that organizing work for mutual community benefit is not common. This may mean that the water supply program staff may require extra time in helping the community organize, explain benefits and training the community to act in a more collective manner.

## 4.0 PROGRAM COMPLETION REQUIREMENTS

As of early September 1993, all of the site preparation work has been done in each community, 50-60% of construction activities have been completed, O&M training has been initiated in communities where construction is completed or on-going, and the health and hygiene education component has not yet been initiated. The program began with the arrival of the Chief Construction Supervisor in early April. Discussions with community members, obtaining agreement from villagers to provide local inputs took the first month to six weeks. Delays in receiving materials and equipment interrupted the construction schedule. This pushed construction into the field preparation and planting season (May through September). Although arrangements were made with communities to continue work on water supply systems, progress was slower than expected. Now as the planting season draws to a close, the pace of construction activities should pick up. Current plans call for all construction and O&M management training to be completed by the end of November. The health and hygiene education component has not yet been initiated due to difficulties identifying suitable consultants. Specific program completion requirements are identified under the headings of construction, operation and maintenance, and health and hygiene education.

### 4.1 Construction

Construction activities can be broadly grouped under the headings of spring catchment, main pipeline, water storage tank, village distribution system, and final punchlist items.

#### Spring Catchment

Spring catchments remain to be built at Nanga Siyai and Riam Batang/Tumbang Taberau. The communities have begun to deliver sand and aggregate to the spring sites in both locations. All materials are available for completion of these two spring catchments. Lockbars for the siltboxes at all sites have yet to be fabricated and installed.

#### Main Pipeline

The main pipelines remain to be constructed at Nanga Siyai and Riam Batang/Tumbang Taberau. All pipes and connectors/sockets are available in the BB/BR project area (pipes stored in the villages and connectors/sockets stored at SBK camp 54). Air release valves have not yet been received for these two communities or for Sungkup, Tanjung Paku and Tumbang Kaburai where the pipelines have already been installed. The main

pipeline must still be anchored down at strategic locations in all communities except Sungkup.

#### **Water Storage Tank**

Water storage tanks have yet to be built at Nanga Siyai and Riam Batang/Tumbang Taberau. Tanks are not yet completed in Tanjung Paku (forms for the side walls in place and some concrete mixed and placed) and Tumbang Kaburai (walls complete but without the roof). Water is being delivered through the main pipeline to the vicinity of the tank in these two cases. Lockbars remain to be fabricated for the storage tank covers at all sites.

#### **Village Distribution System**

The village distribution system includes the pipelines within the village from the taps to the distribution points and the distribution points, be they public taps or MC facilities. All of the village distribution system remains to be completed in Nanga Siyai, Riam Batang/Tumbang Taberau, Tanjung Paku, and Tumbang Kaburai. This work should go quite quickly in the later two communities once the storage tanks are complete and the communities sense the imminent availability of water at locations near their houses. One of the MCs is not quite complete in Belaban Ella (although water is available at the distribution point).

#### **Final Punchlist Items**

These items include a number of smaller, easily completed tasks related to final completion of the water systems. This includes ensuring proper drainage near water distribution points, obtaining and installing taps at several locations, painting selected components for protection or aesthetics, erecting signboards, and completing a final inspection for leaks prior to formal system dedication.

#### **4.2 Operation and Maintenance**

The water supply project team has spent considerable time with village members, both in meetings and as part of on-the-job training, explaining and increasing awareness of operation and maintenance requirements. Community participation in the construction process helps ensure that the skills required for maintenance and repair activities have been transferred to community members. As construction progresses, the team has identified individuals with the interest and intelligence to master system troubleshooting and repair activities and have paid particular attention to explaining system operation including maintenance and repair procedures to them. The team

also takes every opportunity to explain the importance of water conservation and appropriate water use to the community as well as the need to control abuses such as using water to irrigate gardens. These lessons were brought home early at Sungkup when the initial enthusiasm of having water for the first time led to overuse and the tank was empty when water was needed in the late afternoon. This education and awareness effort is an ongoing process.

Formal operation and maintenance management training is also planned in each community. This training, which has not yet been conducted in any community, is intended to help communities set up Village Water Committees with the organizational and financial management capability to sustain their water systems. Given the current community leadership systems, the education and skill levels of community members, the economic conditions, and the small populations in these seven communities, the formal establishment of VWCs (with regular meeting, the taking of minutes, etc.) is unrealistic and unnecessary. However, community training should be conducted with the specific goal of impressing upon community members the need for system management, how to establish an O&M management system, and the functional responsibilities of management. These functional responsibilities include:

- o Monitoring system use and controlling abuses such as leaving taps open, irrigating, or using plastic hoses (*slang plastik*) to create private connections,
- o Performing or overseeing routine maintenance (such as cleaning the siltbox, the storage tank, and the areas in and around the water distribution points),
- o Delegating responsibility for tools and the limited spares provided through the project,
- o Performing or overseeing repairs including repair of leaking or broken pipes and replacement of taps,
- o Mobilizing funds, either through a fee collection system or on an as needed basis, for purchase of spare and replacement system components,

The need for an open management style will be stressed to ensure that all users continue to trust those designated to manage the system. This more focused O&M management training should be completed over a several day period at each site before the end of November.

### 4.3 Health and Hygiene Education

All of the health and hygiene education and training remains to be completed. The water supply project team has been providing informal information during the course of their work to help communities establish good practices such as cleaning the storage tank and providing adequate drainage around MC and public taps. However more formal training linking improved health to changes in behavior related to water availability and use has been planned and needs to be completed. Suitable health educators with rural health extension and education backgrounds have now been identified. Contracts remain to be concluded though. Both the water supply project team and the health educators hope to initiate the health and hygiene education program during early October. It is important that there is overlap between the water supply program team and the health education team for several reasons. Overlap will allow the water supply program team to introduce the health educators to the communities and help community members link water supply with health education component. It will also allow the health educators to get a clearer understanding of the efforts that communities are making to complete their water systems. The health and hygiene educators should also try to establish the current prevalence of diarrhea and other water related diseases in order to track health improvement in the communities. The health educators should focus their efforts on community leaders (such as the *kepala desa* or *dusun*, the *pemuka adat*, and teachers) and women. The messages that need reinforcing include:

- o Water transport and hygienic storage in the home,
- o The importance of regular cleaning of tanks, MCs and standpipes,
- o The importance of regular maintenance of drainage to prevent standing water and wastewater,
- o Community clean-up campaigns,
- o Defecation and urination practices and their potential health impacts, and
- o Responsible water use and conservation of resources.

The successful completion of the health education component of this program will help improve the health of community members and help them derive maximum benefit from their new water supply system.

## 5.0 CONCLUSIONS, RECOMMENDATIONS, AND LESSONS LEARNED

A number of general conclusions and recommendations arise out of the NRMP water supply program. In addition, a series of lessons have been learned. These are outlined in this chapter.

### 5.1 Conclusions

Communities are clearly willing to commit time and energy to community based activities which bring obvious benefit to them. The establishment of water supply systems in seven communities in the BB/BR area is being achieved with communities providing their contribution *tanpa upah* (without wages). The effort of moving sand and aggregate to the construction sites, carrying cement, pipes and fittings, digging trenches and other labor is a significant contribution for these communities. It suggests that they value the benefits that will accrue to them. With this contribution, they acquire a greater sense of ownership of the complete facilities and are more likely to continue to work to keep the system operational.

Planning and scheduling implementation was ambitious considering the relative inexperience of SBK and the communities with projects of this type. The water supply program has not maintained the original scheduling. This has been due in part to unforeseen transportation difficulties as one of the three project vehicles has not been available due to accident. However the major reasons for slow implementation have been first, that communities, although they are willing, are not prepared for the impact the construction process has on their lives and second, that the logging concessionaire has little experience in management and procurement for projects of this type. Even though communities are willing, they need time to absorb and process information so they feel a real part of the decision making and implementation process and not just a source of free labor. This is important if communities are to assume responsibility for the water system. Additional time is particularly needed in these communities which have little experience in working collectively for a common and public benefit. Project timing, which due to other delays, overlapped with field preparation and harvesting, is also a factor. Although SBK has been implementing their *bina desa* program for many years, this is the first time that they have been involved in community water programs. The design, procurement and implementation is unfamiliar and the need for specific material quality not well understood. SBK has been

willing and accommodating to the best of their ability<sup>15</sup> and is certainly more capable now as a result of these project experiences.

In spite of delays an excellent effort to assist communities meet their needs has been made. Two communities now have essentially completed improved water supply systems and two more will do so in the coming weeks. The remaining two systems are planned for completion within the next several months. Community enthusiasm has been overwhelming in most cases. Even in communities where it has been more difficult to arouse broad community support, there exist a core of eager and excited individuals. The cost for these water system has been modest at roughly Rp.30 million with communities supplying a significant component. The program has helped cement links to communities in the NRMP project area by helping provide tangible benefits as expressed by the communities themselves.

The water supply program is an excellent example of the collaboration which is possible between rural communities on the one hand and the Government represented by MoFr (assisted by NRMP) and the logging concessionaire on the other. The rural communities have been willing to provide all local materials and all labor at no cost. This is a significant contribution in time and energy which, for the most part, has taken place during the field preparation and planting season. The logging concessionaire, SBK, has provided materials and equipment and has transported them from the suppliers to the BB/BR area. The NRMP project has provided guidance in approach and the technical assistance necessary to guide and train villagers. The successes that are now being achieved is a testament to the collaborative process.

## 5.2 Recommendations

An extension to the contracts of Chief Construction Supervisor and the Water Systems Construction Specialist should approved if necessary. The construction phase of the water supply program is more than half completed. The field preparation and planting season is nearly over which will make more community labor available. The project is planning to return the third project vehicle to the BB/BR area. These factors suggest that the current schedule, that has all program activities completed before the end of November, can be met. However, the scheduling will be tight. Rather than force completion by

---

<sup>15</sup> SBK has demonstrated their willingness by making additional contributions beyond the original agreement for items such as community signboards.

a program specified deadline, the contracts of the water supply project team should be extended if the schedule cannot be met. It is important that the technical aspects of the program be completed under the direction of the project team and that final details not be left entirely to community members to complete on their own.

A separate one month contract to allow the Chief Construction Supervisor to return for follow-up training should be authorized. The communities in the BB/BR area have never before had the responsibility for operating and managing infrastructure investments for public benefit. As such, it will take some time and experience before the full impact of this responsibility and its requirements are clear to them. They would benefit greatly and the sustainability of the water systems will be enhanced if they receive additional training and the opportunity to ask questions once they have had some experience with O&M management and the problems that may develop. A one month contract for a follow-up visit by the Chief Construction Supervisor should be planned for this purpose at some point during the latter part of the 1994 dry season.

A contract to complete the health education component of the project should be concluded as soon as possible. Assuring the health benefits of improved water supplies is not normally a priority for rural communities. Unfortunately this is also true for NRMP. The feasibility study recommended that consultants be identified to conduct 10 weeks of appropriate health and hygiene education. The dearth of suitable candidates, other project priorities, and misunderstandings about the scope of work led to delays in locating consultants to complete the health and hygiene education component. It now appears that suitable candidates for this training have been identified. It is important that they begin their training and education consultancy before all water system construction is complete. A contract should be negotiated before the end of September to allow this work to begin as soon as possible.

The Chief Construction Supervisor should visit Nanga Apat to see if a suitable spring has been found to supply water to this community. Nanga Apat was originally target as a potential location for a water system. At the time of the feasibility study no suitable spring could be located. Now the kepala desa of Nanga Apat has come forward with the information that a spring has been located. Having seen the completed systems as Sungkup and Belaban Ella, this may be wishful thinking on his part. However, a follow-up visit to evaluate the spring should be made. If it is judged suitable, serious consideration should be given to helping the community establish a water system for themselves on the same basis as the other villages.

Conduct formal water system dedications and formally handover the facilities to the communities. One of the main reasons for fully involving communities in the process of building their water systems and requiring their contribution without compensation was to help develop a clear sense of ownership of the system and pride in their accomplishments. Sense of ownership helps ensure that the community willingly takes on the responsibility for monitoring responsible system use and O&M. A formal system dedication clearly recognizing the accomplishments of the villagers as well as the contributions of others will help cement these efforts.

Resist the urge to provide all assistance that might be requested for the maintenance and repair of water systems. All of the communities where water systems have been constructed are poor. If problems arise, they may approach NRMP staff for help. It may be tempting to provide time, technical help, and financial assistance to ease the maintenance and repair burden on communities. However, these urges should be resisted. The NRMP project will be completed in several years and dependencies should be avoided. Considerable effort has been made to develop skills and capacity and a sense of responsibility within these communities and this should not be subverted. Be willing to offer advice on maintenance and repair in the spirit of training and developing community capacity, but do not take responsibility or make repairs to a water system for villagers.

The Water Supply Engineer/O&M specialist should return to make final system inspections, confirm lessons learned, and suggest approaches for broader support for provision of clean water in communities impacted by production forestry activity. The findings of the feasibility study and this mission suggest that logging activities do have an adverse impact on water quality and clean water is a high priority in communities in and around national parks and concessionaire areas. Preliminary lessons (see below) suggest that there is considerable scope for collaboration among government agencies, the concessionaires and the communities themselves for meeting the clean water needs of these rural communities. A final activity evaluation would focus on examining opportunities to expand and develop the approach in a cost effective manner that would not require further NRMP project input.

### 5.3 Lessons Learned

Although the water supply activity is not yet complete, a series of preliminary lessons learned have emerged. A more focused effort to explore these lessons and provide guidance for activities that may benefit from these lessons should be a major component to the final activity completion report. A preliminary set of lessons are provided in the following paragraphs.

Community based programs which involve collaboration with communities rather than prescribe activities to meet real community needs appear to have a good chance of success. The clear excitement that many people have regarding their water supply systems and the physical and psychological investment these individuals make in time and energy suggests that they will continue to make efforts to sustain the water systems. The collegial relationship that has developed between the water supply program staff and community members helps to convince community members that they have the capacity (with a little technical assistance and training) to contribute significantly to fulfilling their development ambitions. This increases the likelihood that the water supply systems will be sustained since the community perceives the water system has not been provided for them, but that they have a significant share in ownership of the water system.

Community based development activities take time. Local communities have their own time frame and agendas which do not always coincide with government agencies, donors or private sector company's schedules. It takes time to explain what the requirements of development activities are and to develop community confidence that their efforts can bring positive results. Communities also have other priorities such as preparing fields and planing crops and harvesting these crops. The importance of these subsistence activities must be accounted for in planning development activities.

Logging concessionaires are likely to lack knowledge related to rural water supply provision such as system specifications and design. The experiences that the water supply team has had in obtaining the materials required for quality system construction suggests that the concessionaire is not fully aware of water system design and construction. This should not be a surprise as the concessionaires skills lie in forestry and not in water supply development. Water system design and construction is a specialized technical activity that requires skills that concessionaires are not likely to have on permanent staff. In most cases, when such skills are required, for establishing water systems for logging camps for example, the most cost effective approach for the concessionaires is to contract for these services.

With expertise that is available within Indonesia, logging concessionaires could expand their bina desa programs to include meeting the water supply needs of rural communities effected by their operations. The success of the water supply development project suggests that communities do, in general, value the benefits of improved water supplies. Concessionaires can meet the financial requirements for developing rural water supplies. Although concessionaires may not have the technical skills for implementing community based water supply programs, these skills do exist within Indonesia. The NRMP program has been implemented by Indonesian nationals who clearly have the necessary skills.

**ANNEX 1: TERMS OF REFERENCE  
VILLAGE WATER SUPPLY III -  
SENIOR WATER ENGINEER**

**I. Background**

Under the USAID- assisted Natural Resources Management (NRM) project, a team of advisors has been assigned to do work in the Bukit Baka/Bukit Raya National Park carrying out activities under the NRM Implementation Plan. This includes a NRM/ARD Team Leader/ Forestry Research Advisor, Agroforestry Advisor, a Conservation Advisor, and a Social Forestry Extension Advisor. As the project moves forward with the implementation of field activities, an urgent need has been identified for technical assistance in the area of community water supply system development in the villages surrounding the Bukit Baka-Bukit Raya National Park.

This assistance would be undertaken in two Phases. Phase One has already been completed. During this phase consultants surveyed the potable water supplies for the individual villages, and conducted a feasibility study (including preliminary designs and cost estimates) for the required systems. Phase Two focused on detailed system planning, resource mobilization, construction, and operation and maintenance training. These Terms of Reference deal specifically with tasks that are required of the Senior Water Engineer who is overseeing the the completion of the work.

**II. Major Tasks**

During this supervision mission the Senior Water Engineer will work with the Chief of Construction Supervisor and his assistant, to supervise work to date in the construction of the six planned community water systems. He will:

- a. work with a local government in Pontianak, SBK concessionaire and NRM/ARD advisors to brief them on the location and progress to date on the potable water system;
- b. inspect the construction done to date in the villages making any modifications that are required and discuss fully with the field team the construction of the balance of the water systems.

### III. Outputs

A written interim report of Phase Two will be presented to the GOI (PHPA), SBK, and the NRMP Chief of Party at the end of the consultancy. This report will provide details of the water supply system in each of the villages, any large deviations from the construction planning undertaken in the feasibility study (Phase One), and the schedule of training to be undertaken in the six villages. The interim report will also note any areas where problems have arisen, or where there is a potential for a problem, and the contingencies being established to resolve those problems.

In addition to the written report, the consultant will also provide, before he leaves Indonesia, GOI counterparts, SBK, NRM/ARD staff, and USAID/Indonesia, with a debriefing of his findings.

### IV. Level of effort

Twelve (12) working days.

### V. Roles and Responsibilities

The consultant will report to the NRMP Chief of Party and will work closely his efforts with the NRMP Bukit Baka-Bukit Raya Team Leader while in West Kalimantan. The consultant is also expected to work closely with GOI counterparts and Indonesian staff assigned to this activity.

### VI. Qualifications

The consultant should have the following qualifications:

- a. A degree in engineering or a related field;
- b. Experience in community based water supply system including the engineering, financial and institutional aspects of community water supply; and
- c. Working experience in Southeast Asia preferably Indonesia.

**ANNEX 2:  
PERSONS CONTACTED**

**NRMP Project**

Dr. Colin MacAndrews	Chief of Party
Chris Bennett	Forestry Advisor
Ismail MAZ	Administrative Specialist
Setiabudhi	Administrative Specialist
Roy Voss	Team Coordinator, BB/BR
T.H.G. Mering Ngo	Social Forestry Extension Advisor
Ali Hayat	Nature Conservation Research Assistant
Alfonso Rieuwpassa	Chief Construction Supervisor
Adolph Sumual	Water Supply Construction Specialist

**Ministry of Forestry**

Ir. Yaya Mulyana	Dir. Subdirectorate for National Parks, PHPA
Ir Hendriks	Staff Officer, National Parks, PHPA
Tony Suhartono	District Chief of PHPA, Pontianak
Erwin	Technical Staff, PHPA
Sinaga	Forest Guard, Belaban Ella
Sihombing	Forest Guard, Belaban Ella
Darwis	District Chief, Litbang

**P.T. Sari Bumi Kusuma (Logging Concessionaire)**

Mamat Mulyana	Forest Utilization Manager
Edwin	Asst. Camp Manager, Km. 35
Budi Supardiat	Bina Desa Program Manager, Km 54
Rusianto	Lead Hand, SBK Bina Desa Program

USAID

Jerry Bisson NRMP Project Officer

Proposed Health Education Team

Dr. Wendell Geary Dr. at Serukum Hospital  
Mrs. Wendell Geary Proposed Health Education Team Leader  
Mardin Public Health Nurse  
Secong Public Health Nurse

Community Members

Manan Pemuka Adat, Sungkup  
Hinong Ex-KaDus, Belaban Ella, Sungkup  
Tian Water Supply System Worker, Sungkup  
Bainuddin Teacher, Belaban Ella  
Aman Water Supply System Worker, Sungkup  
Setamin Water Supply System Worker, Sungkup  
Hendrik Pemuka Adat, Tanjung Paku  
Ranan SecDes, Tanjung Paku  
Iyup Osman Teacher, Tanjung Paku  
Isardi Teacher, Tanjung Paku  
Pilang KadDes, Tumbang Kaburai  
Sutrisno Teacher, Tumbang Kaburai  
Usran SecDes, Tumbang Taberau  
Ranggan Nanggung KaDes, Riam Batang

and many other community members, including children, who assisted in water supply system planning and construction activities.

### ANNEX 3: BIBLIOGRAPHY

- HODGKIN, Jonathan and Methodius Kusumahadi. August 1993. "A Study of the Feasibility of CARE-Assisted Water Supply and Sanitation Projects 1979-1991)." (Draft Report) Jakarta: CARE International.
- NGO, Mering. July 1992. "Structure of the Local Communities Within and Around the Bukit Baka-Bukit Raya National Park, West/Central Kalimantan." (Draft Special Report No. 1) Jakarta: NRMP
- NRMP. 1993a. *Community Water Supply and Sanitation (WS&S) Program in Bukit Baka/Bukit Raya, Kalimantan: Program Status Report* (Richard McGowan and Alfonso Rieuwpassa). NRMP Report No. 18. Jakarta: NRMP
- NRMP. 1993b. *Community Water Supply Feasibility Study for Bukit Baka/Bukit Raya, Kalimantan* (Richard McGowan and Alfonso Rieuwpassa). NRMP Report No.12. Jakarta: NRMP
- NRMP. 1993c. *Quarterly Report, April 1 - June 30, 1993*. Jakarta: NRMP.
- NRMP 1992a. *Annual Report, August 1991-August 1992*. Jakarta: 1992.
- NRMP. 1992b. *Applied Research Recommendations for Production Forest Management* (Lisa M. Curran and Monica Kusneti). NRMP Report No. 4. Jakarta: NRMP.
- NRMP. 1992c. *Balancing Forest and Marine Conservation with Local Livelihoods in Kalimantan and North Sulawesi* (Jill M. Belsky). NRMP Report No. 5. Jakarta: NRMP.
- RIEUWPASSA, Alfonso. 1993. "Monthly Implementation and Status Reports of the Bukit Baka/Bukit Raya Water Supply Program." NRMP Internal Reports, June, July, August 1993. Pontianak: NRMP
- SEYMOUR, Francis J. January 1993. "Summary of Findings and Recommendations of the Environmental Assessment of the Natural Resources Management Project (NRMP)." Final Draft, Biodiversity Support Program. Washington DC: USAID

## NRM/ARD CONSULTANCY REPORTS

NO.	TITLE	AUTHOR
1.	Procurement Plan For Research Equipment at Bukit Baka and Equipment Installation at Samarinda Forestry Research Station	Roy Voss
2.	Agroforestry in Bukit Baka/ Bukit Raya	W.G. Granert
3.	Pengukuran dan Pemetaan Topografi Sebagian Daerah Taman Nasional Bukit Baka/Bukit Raya	Sahri Denny, cs
4.	Applied Research Recommendations for Production Forest Management An Economic and Ecological Review of the Indonesian Selective Cutting and Replanting System (TPTI)	Lisa Curran & Monica Kusneti
5.	Balancing Forest and Marine Conservation with Local Livelihoods in Kalimantan and North Sulawesi	Jill M. Belsky
6.	Proposal to the GOI and USAID for the Development of Comprehensive Environmental and Natural Resources Accounts (CENRA) for Economic Planning and Management	Henry Peskin & Joy Hecht
7.	Bukit Baka Mini--Hydraulic System Implementation Plan	Michael Johnson
8.	Final Report: Bukit Baka – Bukit Raya 1992	Roy Voss
	Station Protocol: Bukit Baka – Bukit Raya 1992	Roy Voss
	Research Protocol: Bukit Baka – Bukit Raya 1992	Roy Voss

NO.	TITLE	AUTHOR
9.	Environmental Education and Awareness in Bukit Baka (vol.1)	Nancy Bergau
	Environmental Education and Awareness in Bukit Baka Guide to Environment and Fire Campaign (vol.2)	Nancy Bergau
10.	Recommendations for Controlled Timber Harvesting in the SBK Forest Concession	John Hendrison
11.	Cruiser Identifications at SBK and Local Uses of Trees by Local People	Jim Jarvie
12.	Community Water Supply Feasibility Study for Bukit Baka–Bukit Raya, Kalimantan	Rick McGowan & Alfonso Rieuwpassa
13.	Report on NRM Library Consultancy September – December 1992	Dachlan Cartwright
14.	Livelihoods Strategies and Marine Resource Among Residents of Bunaken National Park, North Sulawesi: Recommendations for Local Involvement in Park Management	Jill M. Belsky
15.	A Competitive Awards Scheme for Applied Forest Management and Nature Conservation	Peter R. Burbridge
16.	Design of a Management Information System for the Natural Resources Management Project	Joy Hecht
17.	Environmental Education and Awareness Strategy for Bukit Baka – Bukit Raya National Park (volume 1)	Nancy Bergau
	NGO Training for a Local Environmental Education and Awareness Strategy (volume 2)	Nancy Bergau
18.	Water Supply and Sanitation (WS&S) Program in Bukit Baka – Bukit Raya, Kalimantan Program Status Report	Rick McGowan

NO.	TITLE	AUTHOR
19.	The Role of NGOs in Supporting the NRM Project in Bukit Baka – Bukit Raya National Park	Marcel de Brune
20.	Integration of Provincial Regional Development Planning into the Bukit Baka – Bukit Raya National National Park Management Plan	E. Edwards McKinnon
21.	Communications, Information, and Education Strategy for Bunaken National Park	Nancy Bergau
22.	Report on the Preparation of a Design for a Study of the Natural Resource Impacts of Marine Sector Policy During the Second Long–Term Development Plan Period	Andrea S. Katz
23.	Management Information System for the Natural Resources Management Project Report on the Second Mission to Jakarta July – August 1993 (Volume 1)	Joy Hecht
	Management Information System for the Natural resources Management Project User Manual and Technical Documentation (Volume 2)	Joy Hecht

47