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## **NATURAL RESOURCES MANAGEMENT PROJECT**

BAPPENAS – Ministry of Forestry  
Assisted by  
USAID

### **WATER SUPPLY AND SANITATION (WS&S) PROGRAM IN BUKIT BAKA – BUKIT RAYA, KALIMANTAN**

#### **PROGRAM STATUS REPORT**

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

AID Contract No. 497 – 0362

May 1993

**REPORT NO. 18**

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## 1.0 Introduction and Project Background

In November and December 1992, ARD's Senior Engineer Rick McGowan and Indonesian water supply and sanitation consultant Mr. Alphonso C. B. Rieuwpassa travelled to West and Central Kalimantan and did a feasibility study to develop community water supplies and provide health and hygiene education to eight communities in the Bukit Baka/Bukit Raya (BB/BR) area, one of two areas where USAID's Natural Resources Management (NRM) Project is focused. In the subsequent report, *Community Water Supply Feasibility Study for Bukit Baka/Bukit Raya, Kalimantan*, a recommended action plan for the development of water supply systems for seven<sup>1</sup> of the eight communities in the area was given. Implementation of the proposed plan required inputs from four groups:

- USAID, which was providing the technical assistance for the program as part of the NRM Project;
- the Government of Indonesia (through Bappenas and MoFr), which was providing overall direction of the NRM Project;
- Sari Bumi Kusuma (SBK), the main concessionaire in the BB/BR area;
- the beneficiary communities themselves, as represented by their formal (Kepala Desa/Dusun) and traditional (Kepala Adat) representatives.

For the proposed construction and training, USAID was to provide ongoing technical assistance, SBK was to provide all purchased materials and equipment (M&E), and the communities were to provide all labor and local materials (including sand, rock, gravel, and lumber required for construction). All interested parties agreed to the proposal in February and March of 1993. SBK initiated procurement procedures, and Mr. Rieuwpassa returned to Kalimantan as Chief Construction Supervisor (CCS) in early April. ARD Senior Engineer and Water Supply and Sanitation Specialist Rick McGowan returned in early May to review the status of procurement, meet with beneficiary communities, assist with logistics, and oversee initiation of construction.

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<sup>1</sup>. No suitable spring source was available in the eighth community, Nanga Apat.

## 2.0 Procurement of Materials and Equipment (M&E)

After acceptance of the recommendations of the feasibility study, SBK began procurement based on the site by site M&E lists given in the feasibility report. Much of the procurement and shipping had already been completed by the beginning of May. Shipments of M&E from Pontianak to Popai (the SBK log pond) were then either:

- transhipped to the recipient communities (Sungkup, Belaban Ella, Nanga Siyai, and Tanjung Paku) using SBK trucks and community labor, supervised by the CCS, and included mainly GI pipes and cement;
- stored temporarily at Popai (all PVC pipe and the remainder of the GI pipe not delivered to the first four community sites);
- transhipped to Camp 35 (fittings, paint, tools and other small items); or
- stored in the CCS's room at Camp 54 for use as construction proceeds.

Transshipment of materials to the final two sites (Tumbang Kaburai and Tumbang Taburau/Riam Batang) will be completed by the end of May. Vehicle arrangements have already been made with SBK. The four communities in which construction materials are being stored have all signed agreements (see Appendix Three of this report) assuming responsibility for the storage and safekeeping of the M&E<sup>2</sup>, as well as agreeing to provide all necessary labor to build their water systems. While the bulk of procurement has been completed, there are several problems which are in the process of being resolved. These largely involve the procurement of some incorrect items, and are discussed in the section on Problems Encountered given below.

## 3.0 Technical Assistance Activities

The CCS Mr. Rieuwpassa returned to Kalimantan in early April. His activities through the end of April are given in Appendix A of this report. In summary, the CCS spent one week in Pontianak meeting with Kanwil, SBK and NRM project staff discussing WS&S program inputs to review the status of procurement, and to clarify any outstanding issues. After his arrival in the BB/BR area, the CCS began by visiting most of the beneficiary communities to discuss project scheduling, and to make certain the communities clearly understood their required inputs and related responsibilities. He

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<sup>2</sup>. Pipes and other M&E are stored in a variety of places, such as under the long house in Nanga Siyai and in the Catholic Chapel in Sungkup.

also measured several springs to re-test their yield (debit), began to transport M&E from the log pond to the communities, and began spring catchment construction at the initial site (Sungkup).

I arrived in Jakarta May 3 and left the next morning for Pontianak. The CCS and I met with NRMP/Pontianak staff and SBK/Pontianak to discuss procurement, scheduling, and get my travel documents. We then travelled to BB/BR. Our first task to inventory the M&E which had by then been delivered to Camp 35, including fittings, tools, materials, and other small items. The next ten days were spent:

- visiting all of the beneficiary communities, and discussing construction preparation and scheduling, M&E requirements, operation and maintenance (O&M), and required training;
- re-testing the springs previously identified and surveyed to determine whether previously measured yields were sustained during the drier season;
- in three communities, identifying, testing yields, and surveying new spring sources which appeared to offer better possibilities (higher yield, greater head, closer proximity to the community centers) than the previously measured springs<sup>3</sup>; and
- checking availability of all required M&E (including delivery of local materials to the construction sites), appropriateness and security of local storage facilities.

In some cases (especially Belaban Ella), some of the new springs tested and surveyed proved decidedly superior in yield and/or location (higher up to provide greater pressure head, or closer in, requiring less pipe and associated installation labor). Using the new springs will in some cases require re-distribution of some pipe, fittings, and cement at some sites to develop the new springs. Depending upon how closely actual M&E requirements fit our design estimates (we overestimated procurement needs by about 5% to insure sufficiency), it may also be necessary to procurement some more pipes<sup>4</sup> and fittings to reach the new springs. Additional required M&E should be purchased directly by the NRM project both the insure the correct M&E is purchased, as well as to avoid delays of going

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<sup>3</sup>. These measurements were made during a somewhat drier season (monthly rainfall during May is about 65% of the average maximum which occurs in January, and 72% of the average rainfall in November/December, when the last yield measurements were made) than the previous consultancy.

<sup>4</sup>. Initial estimates include buying an additional 120 meters of PVC pipe (cost: about \$80).

through SBK's procurement system. These additional purchases are unlikely to add appreciably to program cost or duration (see Section 4.1 below).

The CCS has been quite successful in organizing communities to participate in the project thus far. In addition to working on transshipping M&E from the log pond at Popai, villagers at four of the six sites have already completed the bulk of the collection and delivery of local materials (sand and gravel for mixing concrete, large rocks and stone for spring catchment construction, and cut lumber for concrete forms) to construction sites. Community interest in the program is quite evident in their prompt response to and energetic enthusiasm for initial construction activities. Seeing men, women, and even children, carrying up to 40 kilogram sacks of cement, sand and stone half a kilometer or more up a rocky, slippery, muddy trails to the spring sources cannot help but generate admiration.

Communities thus far have been equally enthusiastic in providing labor during construction. At Sungkup, the community has organized itself into three groups which provide daily labor on a rotating basis. Some of the more motivated community members (including the Kepala Adat) have shown up for work nearly every day of the five days it took to finish the layout and construction of the spring catchment there. Construction of the water storage tank alongside the main road on a hill overlooking the village is already well underway. The anticipated order of construction will be Sungkup, Belaban Ella, Nanga Siyai (all in the lower elevations in Kalimantan Barat), followed by Tanjung Paku, Tumbang Taberau/Riam Batang, and Tumbang Kaburai (all in Kalimantan Tengah).

Tumbang Kaburai will probably be the most difficult site to develop because of the vertical elevation, the distance from the village to the spring catchment site, and the topography of the catchment itself (a wide, sandy, diffuse source). Sungkup, Belaban Ella, and Tanjung Paku will be relatively easy sites to develop because of the proximity of their springs to the community centers, the topographical conditions around the springs, and easy access to the communities from the main logging road. Tumbang Taberau/Riam Batang will be easy to build once the M&E is delivered, but the community itself is well away from the main logging road (about an hour and a half down river by canoe).

Program technical staff have been taking many pictures during meetings with communities as well as during construction. Not only can these be used for various project reports, but we also intend to put together story boards in each community which will have photos documenting each stage of project design, construction, and training there. Such photographic records are usually a source of considerable pride for villagers to showcase their community development efforts to visitors.

## 4.0 Problems Encountered

### 4.1 Procurement

As mentioned above, most procurement has been completed, and most M&E has already been delivered to four of the six sites. The one major problem thus far has been substitution of inferior materials for those specified in the feasibility report. This is due in part to a misconception that "Pralon" (brand name of one kind of high quality PVC pipe in Indonesia) is commonly assumed to mean any PVC pipe. There are many manufacturers and quality grades. Pralon VP Class was specified because its characteristics (pressure ratings) were known to the system designers, and are crucial to system durability. Instead, Lucky and Banlon pipe was purchased (even their lower grade) which does not meet the standards for constructing these systems. For these reasons, SBK has been requested to replace all PVC pipe (and fittings) already purchased with Pralon VP Class, and has agreed to do so.

For the galvanized iron (GI) pipe, Medium Class GI was specified in the feasibility report, and this was indeed purchased. However, rather than buying standard pipe with one male and one female end (so that they can be screwed together without buying additional fittings) all the GI pipes have two male ends<sup>5</sup>. Thus, connectors (double female) must be purchased to assemble the GI pipes. SBK has been advised of this and is proceeding accordingly.

A similar problem occurred with certain pipe fittings and valves. Many kinds of fittings and valves are available here. A particular high-quality valve (Kitz) was specified in the M&E lists which, though initially more expensive, would help minimize long term maintenance and repair costs. Instead, low quality (and cost) brands were purchased, which are now being replaced by SBK. The same problem arose with nearly all the GI fittings (elbows, plugs, tees, etc.) which were not Medium Class and were clearly inferior quality. They are also being replaced. Finally, there appeared to have been a descriptive problem with certain other fittings (e.g., pipe unions, and valve sockets which connect GI and PVC pipe), which resulted in the wrong parts being procured. In Pontianak, we purchased and gave to SBK staff one complete set of the precise fittings<sup>6</sup> we required, so they knew what we wanted.

<sup>5</sup>. This was apparently done because other SBK installations using GI pipes weld the pipes together, rather than using connectors or standard pipes with male/female ends. While this does save capital costs, it is much more labor intensive and does not allow for easy repair or replacement of pipes later on.

<sup>6</sup>. With the exception of air release valves, which were not available in the pasar in Pontianak, but for which drawings were provided.

Lastly, the feasibility study recommended that a modest amount of equipment be procured which was necessary both for construction and community training. Some of this equipment has already been procured for the WS&S program<sup>7</sup>, some of it was procured directly for the NRMP activities (e.g., altimeters), some still remains. This equipment, which should be procured immediately since it is needed in ongoing field activities, includes:

- one more 50 meter measuring tape;
- one pipe threader kit (with 1" and 1/2" cutters);
- one pipe vise and stand for pipeline assembly;
- four pairs of linesman's pliers for rebar wire; and
- two hammers and two handsaws for concrete form work.

These can all be easily purchased in Pontianak by the NRMP Team Coordinator. Minor materials such as plastic buckets for measuring spring flow, and film to document construction and training activities have also been purchased directly in BB/BR. Certain office supplies (e.g., white boards, magic markers, and the like) will also need to be purchased in support of the hygiene and sanitation training.

At this stage, all further M&E needed for the WS&S program should be purchased directly with project funds rather than going through SBK, which might otherwise cause inordinate delays in construction. It is estimated that the total cost of any additional M&E (including additional pipe to reach the newly measured and surveyed springs we intend to use at two sites) is unlikely to exceed \$1,000, and will more likely be about \$750.

#### 4.2 Transportation and Logistics

Lack of adequate transportation may cause delays in the WS&S program. During my visit, usually only two of the three project cars were functioning, the third having been sent to Pontianak for major repairs. Over a ten day period, the remaining two cars were out of commission repeatedly for short periods due to problems such as flat tires (three in four days), and problems with transmissions, exhaust manifolds, and two shock replacements. The vehicles (all Daihatsu) are not of the caliber required for such difficult driving conditions (among the worst of which is the road from the main logging road to Camp 54, which clearly requires additional SBK maintenance). Besides those repairs, the vehicles are aging quickly, and problems will likely increase over the next three

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<sup>7</sup>. Including the two Mears water flow calculators, one Abney level for surveying, a stopwatch, a hacksaw, and pipe wrenches for all sites.

months of the WS&S program. For the implementation schedule given in Section Five to be followed, it will be necessary for the two water technicians to have daily and full time access to a vehicle for transporting personnel and M&E.

Since there are also three full-time NRM project staff based in Camp 54 (plus the Pontianak-based BB/BR Team Coordinator, who spends about 25% of the time in BB/BR)<sup>8</sup>, this may be difficult unless another project vehicle is procured immediately. **It is recommended that another vehicle be procured immediately.** By the time the water program is completed, it is quite likely that one (or more) of the existing vehicles will have completely gone out of commission, so that the proposed new vehicle will then complement the diminishing vehicle fleet available to long term project staff.

Besides vehicle availability, basing WS&S program staff in Camp 54 greatly adds to daily transportation time. All WS&S sites (except Tumbang Kaburai) can be reached much more quickly from Camp 35. Except when the CCS or his assistant are working at Tumbang Kaburai, basing them at Camp 54 would save 1:20-1:40 per day, or about 17% of their average nine hour workday, *everyday*. They should therefore relocate there, with their support vehicle. Where feasible, the CCS and/or his assistant should also make arrangements to stay in the more remote communities (especially Tumbang Taberau/Riam Batang, and possibly also Tanjung Paku) during the majority of construction there. This would save time and fuel, and might occasionally free up a vehicle for other NRM project activities.

There is one further logistics problem whose solution would make the WS&S program more efficient. Under current project rules, the local consultants can only be advanced one month's anticipated expenses at a time. SBK also requires payment of room and board every month. The consultants must then return to Pontianak once a month to report on their activities and receive further advances. These trips take minimum of three days, more likely four. In order to make the best use of the local consultants' time, and to maximize their utility to the project, it is recommended that they not be required to make these monthly trips to Pontianak. The trips are not necessary for R&R on such a relatively brief mission, and take them away from their work duties unnecessarily. It is recommended that some other procedure be used to cover their advances, salary payments, and expense reporting which would not require their taking time off to go to Pontianak every month.

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<sup>8</sup>. Not to mention the occasional official visitors, who typically require the accompaniment of both NRM project staff plus at least one of the two existing vehicles during their visits.

#### 4.3 Technical Assistance/Management Issues

The initial schedule in the feasibility study assumed that the CCS's assistant would join him two weeks after his arrival. This would have been about April 20. In fact, the consultant selected (Mr. Adolpho Sumual) was delayed by a month due to processing, and did not arrive in Kalimantan until May 17. This one month delay will therefore have to be added on to the initial estimate of the duration of construction. This is not a significant problem, but it does slow things down a bit.

I have just been notified that I will be working for the next six months or more as Project Management Advisor for the World Bank-funded Water Supply and Sanitation Project for Low Income Communities (WSSPLIC) in Indonesia, implemented by Bappenas, Departmen Kesehatan, and PU/Cipta Karya. In the NRMP WS&S program feasibility report, it was recommended that one more expatriate technical assistance mission (about two weeks in length) be funded to do final inspection of the systems, to review arrangements for O&M training, and to review the hygiene and sanitation training which should be well underway by the time most of the construction is completed. Since I will not likely be available for this mission (likely to be in late July or early August), I recommend that ARD Staff Engineer and Water resources Specialist Jonathan Hodgkin be used for this mission. The draft TOR for this mission is included as Appendix Four of this report.

Mr. Hodgkin is well qualified (MSc in Civil Engineering in Water Resources) and quite experienced in design, construction, and particularly O&M of community water systems (ten years of international development work in this field, mostly with USAID). In addition, it is almost certain that Mr. Hodgkin will be working on two related water supply and sanitation activities in Indonesia in July/August<sup>9</sup>, and could take two weeks off to complete the mission in BB/BR during that period. These concurrent activities would allow for considerable cost sharing of Mr. Hodgkin's indirect costs for international transportation, making him available to the NRMP WS&S program at a quite reasonable cost.

The two Hygiene and Sanitation Trainers need to be identified as soon as possible so that they can be fielded and begin their training activities. Contacts have begun to be made, especially through the consultant's contacts in CARE, the largest potential source of experienced community-based hygiene and sanitation training specialists. These contacts will continue until suitable

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<sup>9</sup>. An evaluation of operation and maintenance of community water systems build with the assistance of CARE/Indonesia, and a related activity for the WASH project on the field testing in Indonesia of a manual for assessing the sustainability of community water and sanitation systems, a manual for which Mr. Hodgkin was the principal author.

candidates have been identified, and two consultants have been successfully recruited.

#### 4.4 System Construction

In several communities, output from spring sources we measured during the previous mission in November/December was considerably reduced. In other cases, the villagers had identified what they believed to be superior spring water sources which they asked us to evaluate. During the current consultancy, the CCS and I worked with community members to make sure we had the highest yield, easily accessible source by:

- re-measuring the yields of most spring sources measured previously (since spring output often varies during the year, especially in areas where there are significant seasonal difference in rainfall patterns); and
- assessing new springs at three sites (Belaban Ella, Nanga Siyai, and Tanjung Paku), measuring yields and surveying pipeline routes to the communities.

The results of the spring yield measurements are given in the table below:

Site Name	Spring Yield (liters/sec)	Previous (11/92)	Current (5/93)	New Spring (5/93)
Sungkup		0.36	0.57	n.a.
Belaban Ella		0.22	n.a.	0.50
Nanga Siyai		0.71	0.67	0.08
Tanjung Paku (#1)		0.35	0.04	0.09
Tumbang Kaburai		0.23	0.06	n.a.
Tumbang Taberau/RM (#1)		0.39	0.38	n.a.

The previously measured springs in Sungkup, Nanga Siyai, and Tumbang Taberau/Riam Batang all maintained good yields since the previous measurements. The old spring in Belaban Ella was not re-measured because a much better source was found not much further away with considerably more head. The new spring in Nanga Siyai was measured and surveyed because even though its yield was obviously less than the original spring, it would nonetheless be able to supply the necessary amount of water, and was much closer to the community center. However, it was discarded after surveying because of insufficient head.

The spring yields in Tanjung Paku and Tumbang Kaburai remain a source of some concern. In Tanjung Paku, there is one strong spring we measured during the first consultancy which was quite far away (over 2 kilometers) and would have involved considerably greater difficulty in construction<sup>10</sup>, so we decided not to use it. The currently identified source will provide about 7.8 m<sup>3</sup>/day, which is about 28 liters per day per capita for the current village population, compared to the system design criteria of 30 liters per capita. There are in fact several other small springs near the primary source, and it may be necessary to tap another of them in the future, depending upon demand growth. Given their proximity to the main source, this will not involve significantly greater overall system cost (the additional cost of a relatively small catchment tank, plus about 50 meters of pipeline) if it is indeed required at all. Given that there is a relatively clean, year-around creek nearby, the community can use the new system for drinking water and cooking, and use the creek for bathing and washing.

Tumbang Kaburai presents a similar situation. There do not appear to be other suitable candidate springs to develop in the nearby area. Given the relatively low population of the community, the identified spring source will still provide more than the design per capita consumption, if its measured yield is sustained during the driest part of the year. However, given the sandy soil and physically disburbed topography of the source, there was probably a significant percentage of its actual yield that was not impounded by the surface dam we used for measuring yield. A well-designed spring catchment will help to capture a greater amount of the actual available water for community use.

## **5.0 Activity Status Report and Revised Implementation Schedule**

The Activity Status Report and Revised Implementation Schedule given on the following pages reflect the somewhat delayed fielding of local consultants, delivery of M&E thus far, transportation and other logistics difficulties discussed above, and better estimates of construction time for individual system components based on actual construction experience we now have with the program's beneficiary communities.

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<sup>10</sup>. It was up a very steep and difficult to reach hillside, would have required crossing the main logging road, and would have been much more expensive, requiring GI pipe for its entire length because of the difficult topography.

## Activity Status Report for NRMP Water Supply & Sanitation Program (As of May 18, 1993)

Site Name	Site Preparation					Construction				Post Construction		Total Work Days (est.)
	Agreement Signed	Local Mate. Deliv'd	SBK M&E On-Site	Yield Re-done	New Test & Survey	Spr.Catchment Days Complete	Storage Tank Days Complete	Main Pipeline Days Complete	MC/Distribution Days Complete	Train. VWSC Days Complete	Hyg.Sanit.Train Days Complete	
Sungkup	yes	yes	yes	yes		5 yes	8 partial	7	8	2	8	38
Belahan Ella	yes	yes	yes		yes	5	8	7	9	2	8	39
Nanga Siyai	yes	yes	yes	yes	yes	4	8	13	5	2	8	40
Tanjung Paku	yes	yes	yes	yes	yes	4	8	3	4	2	8	29
Riam Batang/TT	yes			yes		4	8	10	9	2	8	41
Tumbang Kaburai				yes		7	8	13	5	2	8	43
Total Days for All of the Sites =											230	
Plus 25% for Logistics Delays =											288	

Note: While the total number of days appears excessive, in fact construction activities will run concurrently, reducing the overall length of the program.

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# Revised Implementation Schedule for the NRMP WS&S Program

22-May-93

Activity/Site	Week	May				June				July					August			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Prep/Logistics		XX	X	X	X					X								
Sungkup		XX	XXX	XXXX	XXXXXX	XXXXXX	XXXXX	XXX	TT	SSSSSS	S	S						
Belahan Ella		X		XX	XXXX	XXXXXX	XXXXXX	XXXXXX	XXXTT		SSSSSS	S	S					
Nanga Siyal		X	X	X	X		X	XXX	XXXXX	XXXXXX	XXXXXX	XXXXXX	XXXTT					
Tanjung Paku		X								XXXXX	XXXXXX	XXXXXX	XXTT	SSSSSS	SS			
T. Taberau/RB			X									SSSSSS	XXXS	XXXXXX	XXXXXS	XXXXXX	XXXXXX	XXXTT
Tumbang Kaburai			X									SSSSSS	XXXXXX	SXXXXXS	XXXXXX	XXXXXX	XXXXXX	XXXTT

"X" indicates construction and related logistics support activity. Beginning in the 3rd-4th week of May, there will be two technical advisors, so 12 "X"s per week, each "X" indicating one day of construction activity in a community. "T" denotes one day in a community spent training the community in VWSC organization, O&M, and bookkeeping. "S" denotes one day spent in a community doing sanitation and hygiene training.

This revised implementation schedule is an ideal approximation of what will really happen in the field work. It will, of course, be subject to the level of community participation, ease or difficulty of building the physical structures, and how often the vehicles break down. It is quite possible that the work will be accomplished in less time than indicated here. This chart is primarily intended to show the flow of work efforts, rather than give precise deadlines.

It is assumed that the hygiene and sanitation trainers will be fielded about July 1. Since the two H&S trainers will work together, they can only work in one community at a time. Their work is integrated with the technicians to make the most efficient use of everyone's time.

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**APPENDIX ONE**  
**REPORT ON APRIL ACTIVITIES OF THE CONSTRUCTION SUPERVISOR**

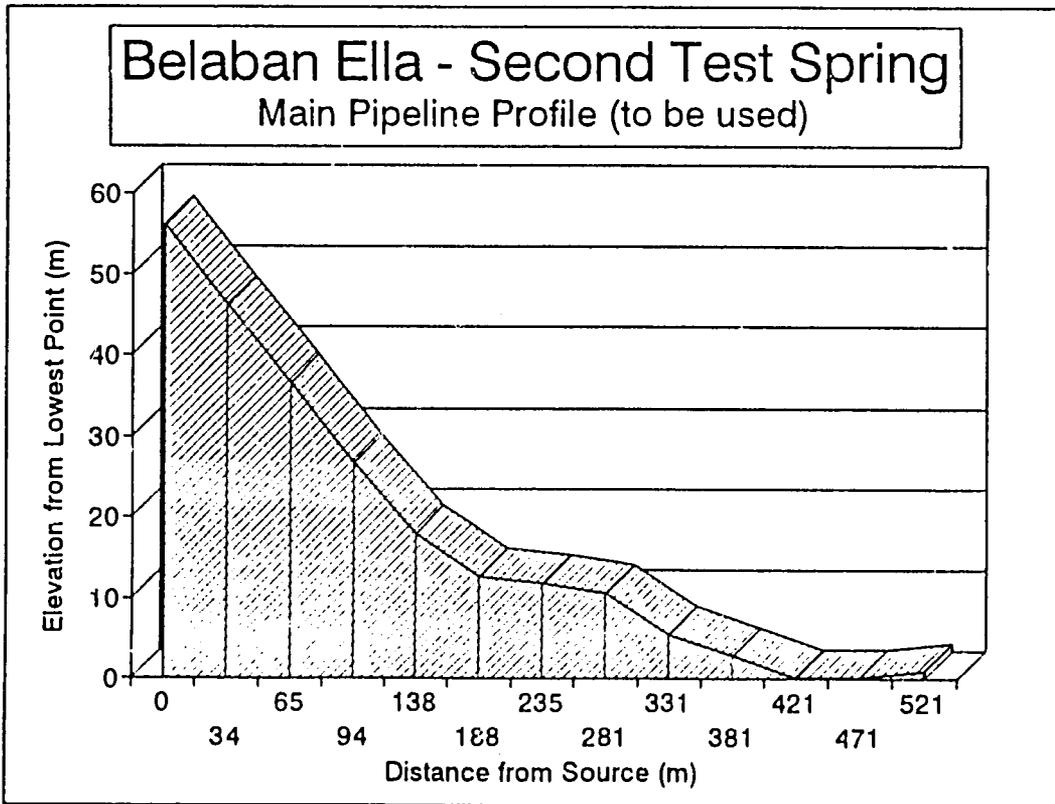
REPORT OF ACTIVITIES DONE DURING  
IMPLEMENTATION OF BB/BR WATER-SUPPLY  
PROJECT IN 7 VILLAGES.

( Starting April 5th. 1993 )

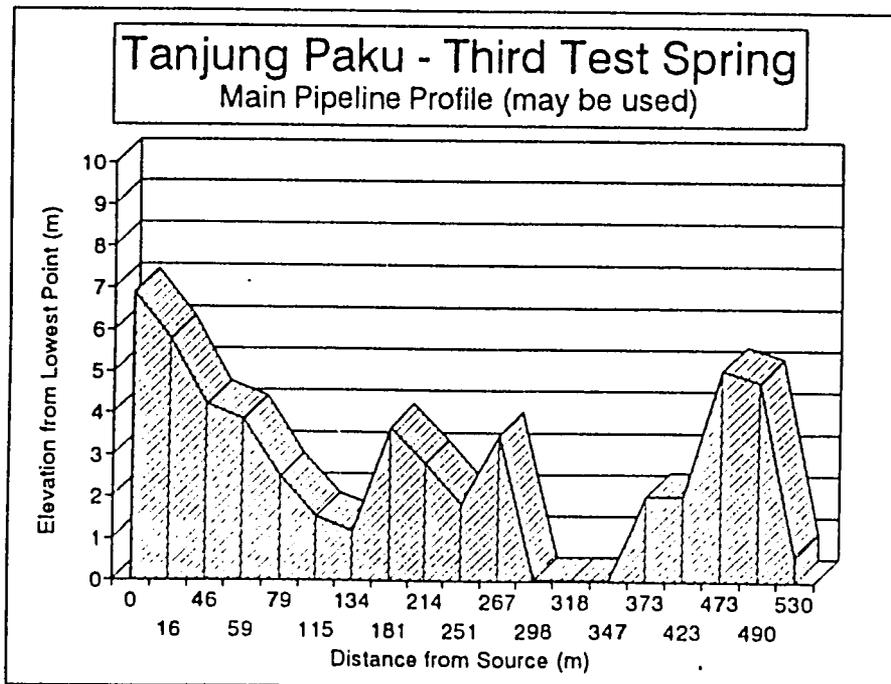
- =====  
April 5 - Chief Construction Supervisor (CCS) arrived in Jakarta from Ujung Pandang.
- " 6 - After a short talk with Pak Colin Andrews (APD-GOP), the CCS flew to Pontianak, and dropped in the Mahkota-Hotel.
- " 7 - Together with Roy Voss and Sukarman, the CCS visited SBK Pontianak, and had a brief talk with Pak Fachri Mashuri, who arranged the purchase and sending of all ordered materials for the Water-Supply project.  
Accordingly Pak Fachri, not all of the materials have been shipped to Popai (Log-pond).
- " 8 - Visited Kehutanan Staff (Pak Tony) and also KeKanwil Kehutanan Pontianak (Pak Suhendra), but he was out of town.
- " 9 - Holiday. Doing paper-work.
- " 10 - Again, we visited SBK-Pontianak for the concerned recommendation-letter to SBK Camp Km.35 and 54, in order to support the CCS in his duties.
- " 11 - Doing paper-work and preparing to leave the next day to BB/BR site.
- " 12 - The CCS flew to Nanga Pinoh, and continued per speed-boat (charter) to Popai (Log-pond).  
After 2 hours waiting at Popai, USAID pick-up met the CCS.  
Arrived 17.30 hour at Camp Km.54.
- " 13 - The CCS informed SBK BB/BR about his arrival, and went straight to Nanga Dayai to see the village Chief, who is also the Chief of Dusun Sungkup and Balaban Ella.  
Had a meeting with the Chief, the Kepala Adat and some of the village people.  
At the meeting, it was decided that a written statement will be issued by the Chief-village on behalf of the community for full participation in this project.
- " 14 - The CCS visited Dusun Sungkup for the same steps.
- " 15 - Meeting with the community of Sungkup.
- " 16 - The CCS visited Dusun Balaban Ella and arranged a meeting with the community, the next evening. Also a better spring has been found.
- " 17 - Meeting at Balaban Ella, and the community are ready to participate in this project.
- " 18 - Doing Paper-work.
- " 19 - The CCS drove up to Tr. Paku and met the Chief of village.  
A meeting with the community will be held on 21/4.
- " 20 - Went back to Tr. Dayai, Sungkup and Balaban Ella to collect the written statements of these sites.
- " 21 - Meeting at Tr. Paku and obtained the same results.
- " 22 - Received the concerned written-statement, re full participation of the community in this project. In the meantime, we had found out that the spring has a decrease in its water-debit. Together with the community, the CCS had found another spring, close to spring no.1. The community now, agree to have 2 spring-catchments and cancel the NO unit. We will see ?
- " 23 - The first day and opportunity to transport the materials (Cement, planks/lumbers, rebar-steel, and GI-pipes). However, all GI pipes have not their sockets. It is common, that SBK is ordering GI pipes in the past without sockets. SBK always looking-on their GI pipes by welding them. SBK will order the needed GI sockets as soon as possible. Today, it's Sungkup's turn, hauling materials from Log-pond to site.

**APPENDIX TWO**  
**YIELD MEASUREMENTS, SURVEYS, AND SYSTEM PROFILES OF NEW SPRINGS**  
**AT BELABAN ELLA, NANGA SIYAI, AND TANJUNG PAKU**

Belaban Ella (Second Spring) - Pipeline Survey							22-May-93
Station Number	Angle in Degrees	Distance (meters)	Elevation Diff.(m)	Accum. Elevation	Accum. Distance	Top Down	Remarks
0	0.0	0	0.00	0.0	0	56.1	Spring
1	17.0	34	9.94	9.9	34	46.2	
2	18.0	31	9.58	19.5	65	36.6	
3	20.0	29	9.92	29.4	94	26.7	
4	11.5	44	8.77	38.2	138	17.9	
5	6.0	50	5.23	43.4	188	12.7	
6	1.0	47	0.82	44.3	235	11.8	Ladang
7	1.5	46	1.20	45.5	281	10.6	
8	6.0	50	5.23	50.7	331	5.4	
9	3.0	50	2.62	53.3	381	2.8	
10	4.0	40	2.79	56.1	421	0.0	Storage
11	0.0	50	0.00	56.1	471	0.0	
12	-1.0	50	-0.87	55.2	521	0.9	



Tanjung Paku (Third Spring) - Pipeline Survey							22-May-93
Station Number	Angle In Degrees	Distance (meters)	Elevation Diff.(m)	Accum. Elevation	Accum. Distance	Top Down	Remarks
0	0.0	0	0.00	0.0	0	6.9	Spring
1	4.0	16	1.12	1.1	16	5.8	
2	3.0	30	1.57	2.7	46	4.2	Joint
3	1.5	13	0.34	3.0	59	3.9	
4	4.0	20	1.40	4.4	79	2.5	Past #1
5	1.5	36	0.94	5.4	115	1.5	
6	1.0	19	0.33	5.7	134	1.2	
7	-3.0	47	-2.46	3.2	181	3.7	
8	1.5	33	0.86	4.1	214	2.8	
9	1.5	37	0.97	5.1	251	1.8	
10	-6.0	16	-1.67	3.4	267	3.5	
11	6.5	31	3.51	6.9	298	0.0	
12	0.0	20	0.00	6.9	318	0.0	
13	0.0	29	0.00	6.9	347	0.0	
14	-4.5	26	-2.04	4.9	373	2.0	
15	0.0	50	0.00	4.9	423	2.0	
16	-3.5	50	-3.05	1.8	473	5.1	Road
17	1.0	17	0.30	2.1	490	4.8	
18	6.0	40	4.18	6.3	530	0.6	Storage Site



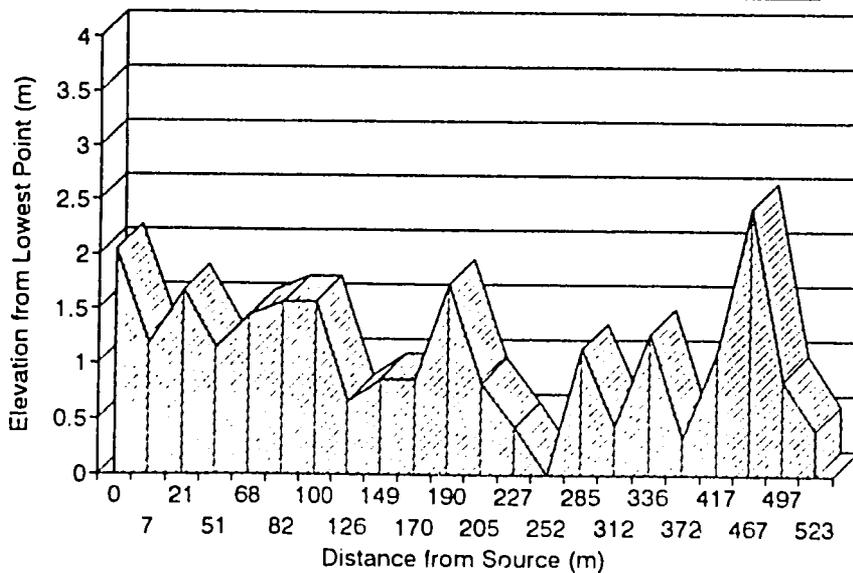
# Nanga Siyai (Third Spring) - Pipeline Surve

22-May-93

Station Number	Angle in Degrees	Distanc (meters)	Elevation Diff.(m)	Accum. Elevation	Accum. Distance	Top Down	Remarks
0	0.0	0	0.00	0.0	0	2.0	Spring
1	7.0	7	0.85	0.9	7	1.2	
2	-2.0	14	-0.49	0.4	21	1.7	Creek
3	1.0	30	0.52	0.9	51	1.2	
4	-1.0	17	-0.30	0.6	68	1.4	
5	-0.5	14	-0.12	0.5	82	1.6	
6	0.0	18	0.00	0.5	100	1.6	
7	2.0	26	0.91	1.4	126	0.7	
8	-0.5	23	-0.20	1.2	149	0.9	
9	0.0	21	0.00	1.2	170	0.9	
10	-2.5	20	-0.87	0.3	190	1.7	
11	3.5	15	0.92	1.2	205	0.8	
12	1.0	22	0.38	1.6	227	0.4	
13	1.0	25	0.44	2.0	252	0.0	
14	-2.0	33	-1.15	0.9	285	1.2	
15	1.5	27	0.71	1.6	312	0.4	
16	-2.0	24	-0.84	0.8	336	1.3	
17	1.5	36	0.94	1.7	372	0.3	
18	-1.0	45	-0.79	0.9	417	1.1	
19	-1.5	50	-1.31	-0.4	467	2.4	High spot
20	3.0	30	1.57	1.2	497	0.9	
21	1.0	26	0.45	1.6	523	0.4	Storage

## Nanga Siyai - Third Test Spring

Main Pipeline Profile (not to be used)



**APPENDIX THREE**  
**SIGNED COMMUNITY PARTICIPATION AGREEMENTS**

SURAT PERNYATAAN.

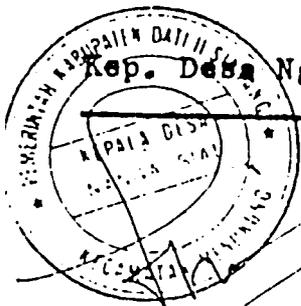
\*\*\*\*\*

Kami yang bertanda-tangan dibawah ini, menerangkan dengan sebenarnya, bahwa setelah diadakan rapat bersama masyarakat Desa Nanga Siyai, tentang pembuatan proyek air-bersih di Desa Ng. Siyai, maka dengan suara-bulat telah diputuskan bahwa :

1. Masyarakat Desa Ng. Siyai berpartisipasi penuh dalam pembuatan proyek air-bersih tersebut diatas hingga selesai, antara lain dengan menyediakan tenaga-kerja secara gotong-royong tanpa upah dan bahan-bahan seperti batu-gunung, pasir dan kerikil.
2. Masyarakat Desa Ng.Siyai bertanggung-jawab atas keamanan bahan2 (material) yang diserahkan untuk proyek tsb. diatas, serta mengadakan administrasi ("record") tentang pemakaiannya, yang juga harus di legalisasi oleh Pak Alfonso CBR. ( Staf USAID ).

Demikianlah, Surat Pernyataan ini dibuat dengan sebenarnya.

NANGA SIYAI, 20 April 1993.



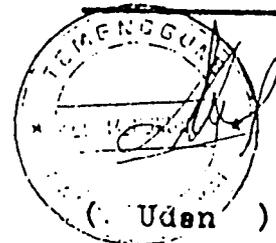
( Dehlen )

Kep. Desa Ng.Siyai :

Kep.Dusun Ng.Siyai :

( Sebran )

Pemuka Adat  
Desa Ng. Siyai :



( Uden )

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SURAT PERNYATAAN.

=====

Kami yang bertanda-tangan dibawah ini, menerangkan dengan sebenarnya, bahwa setelah di adakan rapat bersama masyarakat Dusun SINGKUP ( Desa Ng.Siyai ), tentang pembuatan proyek Air-bersih di Dusun SINGKUP, maka dengan suara-bulat telah diputuskan, bahwa :

1. Masyarakat Dusun SINGKUP berpartisipasi penuh dalam pembuatan proyek Air-bersih tsb. diatas sampai selesai, antara lain dengan menyediakan tenaga-kerja secara gotong-royong tanpa upah, dan bahan-bahan bangunan-lokal, seperti batu-gunung, kerikil dan pasir.
2. Masyarakat Dusun SINGKUP bertanggung-jawab penuh atas kesamanan bahan-bahan ( material ) yang diserahkan untuk proyek tersebut diatas, dan mengadakan administresi ("record") seperlunya tentang pemakaiannya, yang juga harus di legalisasi oleh Pak Alfonso CBR. ( Staf USAID ).

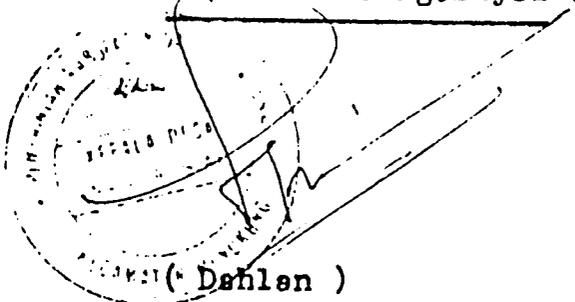
Demikianlah, Surat Pernyataan ini dibuat dengan sebenarnya.

SINGKUP, 20 April 1993.

Kepala Desa Ng.Siyai :

Kep. Dusun Singkup :

Pemuka Adat  
Dusun Singkup :

  
( Dahlan )

  
( Hinong )

  
( Manen )

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SURAT PERNYATAAN

=====

Kami yang bertanda-tangan di bawah ini, menerangkan dengan sebenarnya, bahwa setelah diadakan rapat bersama masyarakat Dusun BALABAN ELLA ( Desa Ng.Siyai ), tentang pembuatan proyek air-bersih di Dusun BALABAN ELLA, maka dengan suara bulat telah diputuskan, bahwa :

1. Masyarakat Dusun BALABAN ELLA akan berpartisipasi penuh dalam pembuatan proyek air-bersih tsb.ditatas hingga selesai, antara lain dengan menyediakan tenaga-kerja tanpa upah , dan bahan2 seperti batu-gunung, pasir dan kerikil.
2. Masyarakat Dusun BALABAN ELLA turut bertanggung-jawab atas keselamatan bahan-bahan (materiail) yang diserahkan untuk pembuatan proyek tsb.ditatas, dan mengadakan administrasi ("record") seperlunya mengenai pemakaiannya, yang juga harus di legalisasi oleh Staf USAID, Pak Alfonso CBR.

Demikianlah, Surat Pernyataan ini dibuat dengan sebenarnya.

BALABAN ELLA, 20 April 1993.

Kep. Desa Ng.Siyai :

Kep. Dusun Balaban Elle :



( Hinong )

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SURAT PERNYATAAN.

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Kami yang bertanda-tangan di bawah ini, menerangkan dengan sebenarnya, bahwa setelah mengadakan rapat bersama masyarakat Desa Tg. Paku, tentang pembuatan proyek air-bersih di Desa Tg. Paku, maka dengan suara-bulat telah diputuskan, untuk :

1. masyarakat Desa Tg. Paku siap berpartisipasi-penuh dalam pembuatan proyek air-bersih tersebut diatas hingga selesai, antara lain dengan menyediakan tenaga-kerja secara gotong-royong tanpa upah, dan bahan2 seperti batu-gunung, pasir dan kerikil.
2. masyarakat Desa Tg. Paku turut bertanggung-jawab atas keamanan bahan2 (material) yang diserahkan untuk proyek tersebut diatas, dan sekaligus mengadakan administrasi ("record") mengenai jumlah pemakaiannya, yang disertai pula persetujuan dari Pak Alfonso CBR. (Staf USAID).

Demikianlah, Surat Pernyataan ini dibuat untuk dipergunakan<sup>?</sup> seperlunya.

Tg. Paku, 22 April 1993.

Kepala Desa Tg. Paku



(Timbas Kariya)

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SURAT PERNYATAAN.

=====

Dengan adanya bantuan Proyek Air-Bersih untuk Desa-desa Tumbang Taberau dan Riam Batang, maka kami yang bertanda-tangan di bawah ini, menyatakan dengan sebenarnya, bahwa :

1. Masyarakat Desa Tumbang Taberau dan Desa Riam Batang siap berpartisipasi penuh dalam pembuatan proyek air-bersih hingga selesai. Adapun tenaga-kerja secara gotong-royong, tanpa upah dan bahan-bahan seperti Batu-gunung, pasir dan kerikil akan disiapkan oleh masyarakat.
2. Masyarakat Desa Tumbang Taberau dan Desa Riam Batang akan turut bertanggung-jawab atas keselamatan dan pemakaian dari seluruh bahan-bahan (material) yang disediakan untuk pembuatan proyek air-bersih tersebut. Adanya administrasi tentang pemakaian bahan2 ("record") yang turut disetujui oleh Staf USAID, Pak Alfonso CBR.

Demikianlah, surat pernyataan ini dibuat untuk dipergunakan seperlunya.

Tumbang Taberau/  
Riam Batang ,

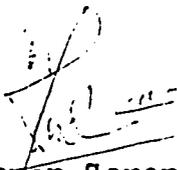
13 Mei 1993.-

Kepala Desa Tumbang Taberau :

Kepala Desa Riam Batang :

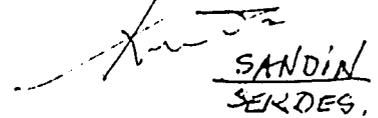
*aps*

*w/m*



YUSRAN  
SEKDES.

( Bidoran Senen )



SANDIN  
SEKDES.

( Ranggalam Nanggung )

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**APPENDIX FOUR**

**TERMS OF REFERENCE FOR THE WATER SUPPLY ENGINEER/O&M SPECIALIST**

## **TERMS OF REFERENCE COMMUNITY WATER SUPPLY - SENIOR WATER SUPPLY ENGINEER**

### **1. 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 Forestry Management Advisor, a Conservation Advisor, and a Social Forestry 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 development in the villages surrounding the Bukit Baka/Bukit Raya National Park.

This assistance is being undertaken in two phases. Phase One has already been completed. During this phase, consultants surveyed potential water supply systems for the individual villages, and conducted a feasibility study (including preliminary system designs and cost estimates) for the required systems. Phase two, currently well underway, focuses on detailed system planning, resource mobilization, construction, and operation and maintenance training. These Terms of reference deal specifically with tasks required of the Senior Water Engineer who will oversee elements of the WS&S program called for in the feasibility study.

### **2. Major Tasks**

During Phase Two of this Technical Assistance Activity a Senior Water Engineer will work with the Chief Construction Supervisor and his assistant, the Water System Construction Specialist in finalizing construction, training, and operation and maintenance for the six community water systems currently under construction. The Senior Water Engineer's tasks are predominantly supervisory. In brief, he/she will:

- a) Travel to Jakarta and Pontianak to be briefed by NRMP staff on the status of the water supply and sanitation (WS&S) program, including procurement (which should be completed by that time), construction (nearly completed), and associated training (ongoing).
- b) Travel to Nanga Pinoh (where he will be met by the Chief Construction Supervisor) and subsequently to Camp 54. There, he will meet with senior SBK staff and the NRMP Water System Construction Specialist to assess the status of construction, and the various inputs (labor, materials, technical assistance) which were agreed to be provided by USAID, SBK, and the communities themselves.
- c) Travel to each of the seven communities where construction took place to do a final inspection of each of the six water systems, which by that time should be largely if not completely finished. Review site/system layouts, the quality of system design and construction, and appropriateness of the systems for meeting the needs of the beneficiary communities, based on direct discussions with community water users and their official and traditional representatives (Kepala Desa, Kepala Adat).
- d) Assess the quality and appropriateness of the training activities provided under the project, including training for community organization, construction, operation and maintenance, and hygiene and sanitation.

- e) Prepare a final WS&S program report which should include the following:
- i) Assessment of the sustainability of the approach (including physical system design, construction, and training, used in this program, and its replicability in other logging areas in Indonesia.
  - ii) A set of lessons learned which can be used in future WS&S support activities in similar situations, where water systems are developed and training in O&M and hygiene/sanitation are provided as a component of concessionaire-sponsored bina desa programs.

### 3. Outputs

A written final program report will be presented to the NRM Chief of Party at the end of this consultancy. Besides the two points given in Task E above, this report should outline progress of the program to date, summarizing the status of all major program activities (including procurement, community organization, construction, operation and maintenance, and hygiene and sanitation training) at each of the six sites. It should note any problems have arisen, approaches taken to address those problems, and the schedule for any further program activities remaining at that point.

The Consultant will also orally brief NRMP staff, USAID/Indonesia, and SBK/Pontianak and Jakarta staff after the completion of his filed mission.

### 4. Level of Effort

The Senior Water Engineer, assisted by the Chief Construction Supervisor and the Water System Construction Specialist (the latter two already on site) will require an estimated two six-day weeks in the field to complete these Terms of Reference.

### 5. Roles and Responsibilities

The Consultant will report directly to the NRMP Chief of Party. He/she will work closely and coordinate all his/her activities with the NRMP Bukit Baka/Bukit Raya Team Leader while in Kalimantan. The consultant is also expected to work closely with GOI counterparts and Indonesian staff assigned to this activity.

### 6. Duration

These Terms of Reference are expected to be completed in 2-3 weeks, including travel time to Pontianak, Nanga Pinoh and Camp 54, as well as layovers and briefings in Jakarta.

## 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